2017-2018 SPECIALIZED HIGH SCHOOLS STUDENT HANDBOOK

Fiorello H. LaGuardia High School of Music & Art and Performing Arts

The Bronx High School of Science

The Brooklyn Latin School

Brooklyn Technical High School

High School for Mathematics, Science and Engineering at the City College of New York

High School of American Studies at Lehman College

Queens High School for the Sciences at York College

Staten Island Technical High School

Stuyvesant High School

NYC Department of Education

Office of the Mayor

Carmen Fariña
Chancellor

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ABOUT THE COVER
Student: Kiara Rosa | **Teacher:** Carl Landegger | **Principal:** Matthew Tossman
Each year, the NYC Department of Education and Cooper Hewitt, Smithsonian Design Museum partner on a cover design competition for public high school students. This directory's cover was designed by Kiara Rosa, a student at Manhattan Early College School for Advertising. For more information, including how to enter next year's competition, ask your art teacher or visit **schools.nyc.gov/CoverDesign**.

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MESSAGE TO STUDENTS AND PARENTS/GUARDIANS ABOUT
SPECIALIZED HIGH SCHOOLS ADMISSIONS

This 2017-2018 Specialized High Schools Student Handbook contains useful information, including:

- Specialized High School admission procedures

- Registration for the Specialized High Schools Admissions Test (SHSAT) and Fiorello H. LaGuardia High School of Music & Art and Performing Arts (LaGuardia High School) auditions

- Confirming testing accommodations for SHSAT and LaGuardia High School auditions

- Calendar of important dates

- Sample SHSAT tests with test-taking tips

There are nine Specialized High Schools in New York City. They are:

ADMISSIONS DETERMINED BY AUDITION(S)	**FIORELLO H. LAGUARDIA HIGH SCHOOL OF MUSIC & ART AND PERFORMING ARTS**	
	Dance	Drama
	Instrumental Music	Technical Theater
	Fine Arts	Vocal Music
ADMISSIONS DETERMINED BY SHSAT	**THE BRONX HIGH SCHOOL OF SCIENCE**	
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These schools were established under New York State Law 2590 – Section G. Entrance into these schools is determined by the SHSAT, except for LaGuardia High School, which is based on a competitive audition and review of academic records. Students must be residents of New York City and current eighth grade or first-time ninth grade students in order to apply, register, sit for, and receive results for the Specialized High Schools Admissions Test (SHSAT) and LaGuardia High School audition(s).

For updates concerning Specialized High School admissions, please visit:
schools.nyc.gov/shs

The Specialized High Schools Student Handbook is a project of the New York City Department of Education.

THE BRONX HIGH SCHOOL OF SCIENCE

75 West 205th Street, Bronx, New York 10468
Phone: (718) 817-7700 ■ **Website:** www.bxscience.edu
Email: golanc@bxscience.edu

Overview: The Bronx High School of Science educates an academically gifted community of learners through a rigorous Science, Technology, Engineering, and Mathematics (STEM) curriculum. All academic disciplines are taught through the lens of inquiry to emphasize critical thinking and problem solving. The school cultivates a diverse community of lifelong learners who discover their passions through a collaborative and supportive network of students, educators, and alumni. Utilizing a balance of theoretical and applied learning, students explore complex problems and have access to a rich offering of resources to develop solutions. Drawing upon a long tradition of academic success, the Bronx High School of Science prepares students to flourish in the best colleges and universities. The school creates the leaders and visionaries of the future. Included among the school's alumni are eight Nobel Prize winners and six Pulitzer Prize winners.

Academic program: The Bronx High School of Science offers 30 Advanced Placement (AP) courses and many post-AP courses (second-year college courses). The school offers seven foreign languages, numerous electives in biology, chemistry, physics, mathematics, technology, the humanities, music and a three-year independent research course in STEM or social science. Students may also select sequences in computer science and engineering that emphasize hands-on applications of scientific principles. The school's website provides full course descriptions.

Extracurricular activities: Extracurricular activities include over 70 after-school clubs, 43 athletic teams, an internationally acclaimed speech and debate team, mock trial team, two robotics teams, two theatrical productions, S!NG, a newspaper and yearbook, and scholarly journals.

2017 Admissions: 19,198 students listed Bronx Science as a choice on the SHSAT, and 941 offers were made.

THE BROOKLYN LATIN SCHOOL

223 Graham Avenue, Brooklyn, New York 11206
Phone: (718) 366-0154 ■ **Website:** www.brooklynlatin.org
Email: parents@brooklynlatin.org

Overview: Modeled after the prestigious Boston Latin school and founded in 2006, The Brooklyn Latin School (TBLS) provides a liberal arts curriculum, with an emphasis on the Classics and Latin language instruction. Early instruction emphasizes the acquisition of core knowledge of the key academic disciplines that students use as a foundation for deeper exploration in the upper grades. Widely regarded around the world as the most rigorous and comprehensive course of study at the high school level, the International Baccalaureate (IB) Programme is integral to the TBLS curriculum. In all classes, students experience a strong and consistent emphasis on structured writing and public speaking, as well as numerous opportunities for analytical thinking, which prepares them for the challenges of college work.

Academic program: All students are required to complete four years of study in Latin, history, mathematics, English, and science, at least two years of a world language, and one year of art history. Many of our classes feature public speaking exercises such as Declamation and Socratic Seminars, as well as oral presentations of scientific labs and mathematical problem sets. In addition, many of our classes feature writing exercises such as science lab reports, Spanish portfolios and essays, math modeling papers and Latin sight translations. The IB Programme's emphasis on student-led inquiry, global perspectives, international mindedness, and personal integrity conform perfectly with the ideals on which the school was founded. In addition to rigorous class work, IB emphasizes independent thinking and community engagement. In order to earn the IB Diploma, students are expected to complete an independent research project that culminates in a 4,000-word essay paper on a subject of choice, a task which correlates closely to college-level research writing. They are required to take a two year epistemology course called Theory of Knowledge (TOK) that challenges students to consider the ways knowledge is constructed, and which culminates in a final research paper and presentation. In addition, students are required to engage in activities involving creativity, service, and reflection over an 18-month period. Creativity, action, and service (CAS) may include volunteering or engaging meaningfully with the TBLS community and the larger community. These requirements of the IB Diploma help our students become well-rounded citizens of the world.

Extracurricular activities: To provide enrichment for students outside of the classroom, and to facilitate the completion of their CAS requirements, TBLS currently supports over 40 extracurricular activities, including athletic teams such as coed cross country, badminton and soccer, boys and girls basketball, boys wrestling, and girls volleyball clubs; fine and performing arts offerings like studio art, photography, literary magazine, dance, and a cappella; and various other groups such as the school newspaper, STOKED, Math Club, Science Olympiad, Model United Nations, Law Club, and many more.

2017 Admissions: 16,621 students listed The Brooklyn Latin School as a choice on the SHSAT, and 425 offers were made.

BROOKLYN TECHNICAL HIGH SCHOOL

29 Fort Greene Place, Brooklyn, New York 11217
Phone: (718) 804-6400 ■ **Website:** www.bths.edu
Email: info@bths.edu

Overview: With over 5,500 students, Brooklyn Technical High School (Brooklyn Tech) is the largest public high school devoted to science, technology, engineering, and mathematics (STEM). Housed in a state-of-the-art physical plant reborn for the 21st century, the school is a national model for excellence and a stimulating environment that fosters transformational education and personal growth. With modern technology at its core and labs and classrooms on par with university and industry standards, Brooklyn Tech serves as a vibrant intellectual arena for faculty and students to explore and embrace the ideas, technology, and instructional methods that will truly shape the future. Graduates go on to the finest colleges and universities. They are found in every facet of society. Graduates invented the digital camera, contributed to the development of the internet, and helped put man on the moon. They are innovators and entrepreneurs. Brooklyn Tech graduates have won Nobel prizes and occupy prominent positions in industries, engineering firms, corporations, government, academia, and research institutions.

Academic program: In the ninth grade, all students take the Design and Drawing for Production class which is a foundation course through Project Lead the Way. This class immerses students in the design process, from brainstorming to prototyping through 3D printing. Students use industry standard 3D modeling software (Autodesk Inventor) to complete both individual and team-oriented projects. During the 10th grade, all students take AP Principles of Computer Science. In the 11th and 12th grades, Brooklyn Tech students choose one of the following major areas of concentration: Aerospace, Architecture, Biological Sciences, Chemistry, Civil Engineering, College Prep, Finance, Electrical Engineering, Environmental Science, Gateway to Medicine, Industrial Design, Law & Society, Mathematics, Mechatronics & Robotics, Media & Digital Animation, Physics, Social Science Research, or Software Engineering. In addition, the school offers unique electives in performance-based music, competitive mathematics, and research opportunities.

Extracurricular activities: Brooklyn Tech's unparalleled learning environment is enriched with 43 PSAL teams and more than 120 activities and clubs. Partners in industry and higher education, as well as an active alumni community help sustain the level of excellence through classroom enrichment, mentoring, internships, and more.

2017 Admissions: 23,329 students listed Brooklyn Tech as a choice on the SHSAT, and 1,923 offers were made.

HIGH SCHOOL FOR MATHEMATICS, SCIENCE AND ENGINEERING AT THE CITY COLLEGE OF NEW YORK

240 Convent Avenue, New York, New York 10031
Phone: (212) 281-6490 ■ **Website:** www.hsmse.org
Email: info@hsmse.org

Overview: Founded in September 2002, The High School for Mathematics, Science and Engineering (HSMSE) at The City College of New York (CCNY) provides a unique and unparalleled collaborative educational experience. The school's mission is to encourage students to develop the habits of inquiry, written and verbal expression, and critical thinking. HSMSE enrolls approximately 450 students, drawn from all five boroughs, making it one of the most ethnically diverse schools in New York City. The academically rigorous learning environment focuses on mathematics, science, and engineering, while emphasizing civic responsibility and the value of acquiring knowledge for its own intrinsic reward. HSMSE faculty work together regularly to plan lessons, develop curricula, and share best practices. Their deep professional and personal experiences enrich the learning community; many faculty members have earned doctorates, and all have advanced degrees. Many have distinguished themselves in business, engineering, and other fields prior to becoming teachers.

HSMSE has staff who conduct individual and group counseling sessions regularly, and coordinate the Big Sib / Little Sib Program that connect upperclassmen to serve as peer mentors to underclassmen. Through a partnership with The New York Foundling, HSMSE has a Health and Wellness Center with a full-time mental health clinician. HSMSE sponsors workshops that have an overall theme and industry partners, who provide different speakers from different departments to offer a comprehensive perspective of a particular job or company. Students who participate can apply for summer research, apprenticeship, and/or employment opportunities in the partnering company.

Academic program: HSMSE faculty plan lessons that include student discussion and cooperative learning to develop and improve problem-solving skills. All students take four years of math and science courses. Core classes meet every other day for 90 minutes, allowing time to engage in hands-on activities and in-depth discussions. Students attend a 45-minute elective enrichment course daily; course options include: Gastronomy, Astronomy, Microsoft Office User Certification, Art, Poetry Writing, Jazz Band, and Classical Guitar. There are three major concentrations that students select from in the spring of their sophomore year: Mathematics, Mount Sinai Medical Biomedical Research Program, or Engineering. HSMSE has the largest German Language program in New York State. College credit courses are offered in multiple ways: Advanced Placement

courses are offered to all, and City University of New York (CUNY) courses are offered to eligible students through the CCNY partnership and the CUNY College Now program. At HSMSE, we strive to educate the whole child; therefore, in addition to stellar academic support services, HSMSE offers a Health and Wellness Center with a full-time mental health clinician to meet the socio-emotional needs of our students, too.

Extracurricular activities: CCNY's Baskerville Hall faces the college quad, giving students green space in which to eat lunch, socialize, and relax on sunny days. Students may participate in a wide variety of extracurricular activities and PSAL sports after school, including Junior Statesmen of America, EatNYC, Euro-Challenge, Fed-Challenge, Science Olympiad, Robotics Club, and the Key Club International. Additionally, HSMSE offers ping-pong, volleyball, dance, cheerleading, and Strategy Games clubs. HSMSE students compete in national competitions, sponsored by the Goethe Institute and American Association of Teachers of German, for study abroad opportunities to Germany. Every year, at least one HSMSE student competes successfully enough to earn two weeks free travel to Germany. During the school year, HSMSE sponsors trips to colleges such as Boston College, Massachusetts Institute of Technology, Princeton, Brown, and University of Michigan.

2017 Admissions: 18,863 students listed HSMSE at CCNY as a choice on the SHSAT, and 199 offers were made.

HIGH SCHOOL OF AMERICAN STUDIES AT LEHMAN COLLEGE

2925 Goulden Avenue, Bronx, New York 10468
Phone: (718) 329-2144 ■ **Website:** www.hsas-lehman.org
Email: atrebofiore@schools.nyc.gov

Overview: The High School of American Studies at Lehman College (HSAS) emphasizes the study of American History and offers students a well-rounded academic program that aims to prepare students for admission to highly competitive colleges and for a range of careers in politics, law, journalism, business, science, mathematics, and the arts. In all endeavors, HSAS seeks to encourage in students a love for learning and an inquisitive spirit.

Academic program: All students engage in a three-year chronological study of American History. Our aim is to make history come alive through the use of primary source documents, films, biographies, literature, and creative teaching techniques. Supported by the Gilder-Lehrman Institute, students gain first-hand knowledge of the key events in American history through trips to sites and cities of historic importance and through participation in special seminars with guest speakers. We also offer honors-level, Advanced Placement, and elective courses in mathematics, science, constitutional and criminal law, literature,

film, foreign languages, history, and the arts. A special component of our program focuses on the development of college-level research skills and methodologies, and students are therefore supported by school and college faculty in the process of pursuing individualized research projects. Through our collaboration with Lehman College, students have access to its campus library and athletic facilities and take credit-bearing college classes and seminars in their junior and senior years.

Extracurricular activities: After school, students may participate in a wide variety of clubs, join one of the school's many athletic teams, and take part in competitive activities, such as moot court, mock trial, debate, and Model UN.

2017 Admissions: 16,737 students listed HSAS at Lehman College as a choice on the SHSAT, and 146 offers were made.

QUEENS HIGH SCHOOL FOR THE SCIENCES AT YORK COLLEGE

94-50 159th Street, Jamaica, New York 11433
Phone: (718) 657-3181 ■ **Website:** www.qhss.org
Email: lgibson4@qhss.org

Overview: Queens High School for the Sciences at York College is dedicated to providing a rigorous curriculum in collaboration with York College that emphasizes the sciences and mathematics. The school philosophy is students are more successful when nurtured in a small learning community. The school mission is to develop a community of diligent learners and independent thinkers who are inspired to attain academic excellence and prepare them for the competitive environment and challenges of higher education.

Academic program: In line with offering small-sized classes for standard high school courses (such as English, Social Studies, Science, and Mathematics), the school offers a wide range of elective courses in all academic subjects, as well as art, music, and language. Advanced Placement courses, including Biology, Calculus AB, Calculus BC, Chemistry, Chinese, English Language and Composition, Environmental Science, Physics 1, Spanish, U.S. History, and World History, are available to those who qualify. Students also have the opportunity to enroll in City University of New York (CUNY) College Now courses, such as Biology, Sociology, Health Services, Nutrition and Health, Pre-Calculus, and Psychology. Course offerings vary from year to year. Besides offering nurturing, small classes, students are further supported with tutoring by teachers and honors students. School counselors support and assist students in all areas of concern, especially the selection of and application to colleges.

Extracurricular activities: Since the school is located on the campus of York College, students enjoy state-of-the-art facilities

such as the College's library, gymnasium, pool, theater, and cafeteria/food court throughout their high school career. A variety of clubs (determined by student suggestion and staff capacity) are available to all students, including Model UN, Amnesty International, chess, Sigma sorority, philosophy, basketball, Key Club, and many others. Boys and Girls Swimming, Girls Bowling, and Coed Tennis and Handball comprise the school's athletic teams.

2017 Admissions: 16,402 students listed Queens High School for the Sciences at York College as a choice on the SHSAT, and 179 offers were made.

STATEN ISLAND TECHNICAL HIGH SCHOOL

485 Clawson Street, Staten Island, New York 10306
Phone: (718) 667-3222 ■ **Website:** www.siths.org
Email: BMalenfant@schools.nyc.gov

Overview: Staten Island Technical High School's college preparatory curriculum provides a robust liberal arts curriculum that includes courses in Science, Technology, Engineering, Arts, and Mathematics (STEAM), and a cutting edge Career and Technical Education (CTE) program. All 9th grade students participate in the highly innovative 1:1 Digital Education Initiative. Over 60% of the faculty members teach Advanced Placement (AP) and other college level courses.

Academic program: Students advance beyond the core curriculum by taking four years of mathematics and a wide array of STEAM, AP, and Dual-Enrollment courses in all subject areas, along with the option of participating in the Science & Engineering Research Program, in which students compete in the NYC Science and Engineering Fair, Intel Science Talent Search, Google, and Quality of Life competitions. All ninth grade students take an Intensive Writing course and College Board's Common Core-aligned SpringBoard English Language Arts curriculum, which prepares all students for AP Language and AP Literature and Composition curricula. All students graduate with at least two or three AP Social Studies courses and take three years of Russian language. There is an optional fourth-year of a second language offered in Mandarin, Latin, German, French, Italian or Spanish via a blended learning program.

The Pre-Engineering STEAM program features Robotics, AutoCAD, Digital-Analog Electronics, TV Studio Engineering, IT Mouse Squad, and Computer Science courses as well as an extensive Work Based Learning (WBL) College and Career Exploration sequence featuring career talks, job shadowing, career and college fairs, as well as internships. All students participate in the Pre-Engineering STEAM program.

Partnerships with CUNY College Now, SUNY University in the High School, St. John's University College Advantage and the College of St. Rose provide students with the opportunity to earn and graduate with 15 to 60 college credits.

Extracurricular activities: The extracurricular program features over 100 afterschool clubs and activities (e.g., robotics, debate, Science/ Russian Olympiad) and 46 PSAL teams. The Student Organization, National Honor Society and Junior Statesmen of America serve as the pipeline for our student leaders, while students interested in the arts can participate in nine different bands, including jazz, marching band and ensembles, as well as theatrical productions.

2017 Admissions: 15,278 students listed Staten Island Technical High School as a choice on the SHSAT, and 339 offers were made.

STUYVESANT HIGH SCHOOL

345 Chambers Street, New York, New York 10282-1099
Phone: (212) 312-4800 ■ **Website:** www.stuy.edu
Email: 02M475@schools.nyc.gov

Overview: Stuyvesant High School's mission is to provide students with a rigorous curriculum that nurtures and rewards their intellectual curiosity. Although Stuyvesant is historically recognized for its strengths in math, science, and technology instruction, the school also has a dynamic and diverse Humanities program, as well as unique educational opportunities outside the classroom.

Academic program: The school's enriched curriculum includes required courses for graduation and also affords its students the opportunity to take many advanced courses and electives in various subjects. These course selections include Research, Multivariate Calculus, Organic Chemistry, Existentialism, and Wall Street, in addition to a wide array of Advanced Placement courses.

Extracurricular activities: The school is proud of its 45 PSAL sports teams and extensive extracurricular activities such as Robotics, Math Team, Speech and Debate, Science Olympiad, chess, Model UN, and Junior State of America. There are a number of major publications, over 190 student-run clubs, and an active student government. Students interested in music may participate in symphonic band, symphony orchestra, jazz band, and a number of choral groups, as well as join the Stuyvesant Theater Community, which presents three major productions yearly, including a musical, drama, and comedy.

2017 Admissions: 22,393 students listed Stuyvesant High School as a choice on the SHSAT, and 926 offers were made.

FIORELLO H. LAGUARDIA HIGH SCHOOL OF MUSIC & ART AND PERFORMING ARTS

100 Amsterdam Avenue, New York, New York 10023
Phone: (212) 496-0700 ■ **Website:** www.laguardiahs.org
Email: admissions@laguardiahs.org

The Fiorello H. LaGuardia High School of Music & Art and Performing Arts enjoys an international reputation as the first and foremost high school committed to nurturing students dedicated to the arts. LaGuardia High School's dual mission provides a uniquely balanced educational experience that includes both demanding conservatory-style training and a rigorous, comprehensive academic program.

Studio Programs: Students in the **Dance** program study ballet and modern dance; supplementary courses include professional skills, dance history, choreography, theater dance (tap and jazz), career management, and repertory. Students in the **Drama** program focus on theater preparation through courses in acting, voice and diction, physical techniques, theater history, musical theater, acting on film, and script analysis. Students in the **Fine Arts** program receive the first two years of training in traditional and foundational skills and media. These include, but are not limited to, drawing, painting in water-based media, graphic design, and painting in oils and acrylics. After taking the core art courses, students round out their arts education with advanced courses in the subjects listed above and with other elective offerings, such as architecture, art history, ceramics, computer graphics, mural painting, photography, print making, and sculpture. Students in the **Technical Theater** program receive practical training in scenic carpentry, lighting technology, costume construction, sound properties, stage management, technical drawing, and design. Upon successful completion of this program, students may receive a Career and Technical Education (CTE) endorsed diploma. Technical Theater students participate in both the production and the performance aspects for various LaGuardia High School events. Students in the **Instrumental Music** program study sight singing, music theory, and music history. The Instrumental Music Studio performing groups include Senior Orchestra, Junior Orchestra, Intermediate Orchestra, Elementary Orchestra, Senior Band, Junior Band, Intermediate Band, Senior Jazz Band, Junior Jazz Band, and two Pit Orchestras. Students in the **Vocal Music** Studio program study sight-singing, music theory, and music history. Studio performing groups include Elementary, Mixed, Girls, Women's, and Senior Choruses. In voice classes, students receive training in Italian, German, and French vocal literature. Both Vocal and Instrumental Music elective courses include Chamber Music, Guitar, Soundlab Recording Studio, Music Technology, New Music Ensemble, Show Choir, Solo Voice, Audition Preparation, Gospel Choir, Piano, Songwriting, and an

Opera production. Students also have the opportunity to compose, conduct, and perform original repertoire.

Each studio requires a substantial time commitment after school, in addition to multiple periods of study during the school day. Requirements include, but are not limited to, rehearsals and performances, as well as the practical application of technical theater and gallery management techniques. Longer school days are expected during performance times, and students are required to be present and participate in program-related, after-school performances and activities. Upon successful completion of graduation requirements, studio coursework, and examinations, students may receive the Chancellor's Arts Endorsement.

Auditions will be held at the LaGuardia High School campus in Manhattan. Students must register for auditions with their school counselors. See pages 12-14 for LaGuardia High School audition information.

Academic Program: LaGuardia High School students exceed the NYC Department of Education's College and Career Readiness Benchmarks. These benchmarks, as outlined by the DOE, define the qualities and achievements that students need to complete in order to be ready to enroll, persist, and succeed in college, postsecondary training opportunities, and gain entry into meaningful careers. The school's rigorous academic program includes required courses for graduation, CUNY College Credit Bearing Courses, as well as over 23 Advanced Placement (AP) courses in the following subjects: Art History; Biology; Calculus AB and BC; Chemistry; Computer Science Principles; English Language; English Literature; Environmental Science; Government & Politics; Human Geography; Language and Culture in Italian, French, and Spanish; Music Theory; Physics; Psychology; Statistics; Studio Art Drawing and 2-D; US History; and World History.

Students complete this course load in addition to their studio majors.

Extracurricular activities: Students actively engage in 23 PSAL sports teams and an extensive array of extracurricular activities such as Math Team, Speech and Debate, Science Olympiad, Chess, and ARCHON and ARISTA Honor Societies. Students participate in over 50 student-run clubs and student government.

2017 Admissions: 1,285 students received one or more offers to the programs at LaGuardia High School from a pool of 10,849 students who registered for an audition.

A ll eligible current 8th and first-time 9th grade students in public, private, and parochial schools applying to one or more of New York City's Specialized High Schools (with the exception of LaGuardia High School) must take the SHSAT. Approximately 28,000 students took the SHSAT for September 2017 admission.

Students interested in taking the SHSAT should speak with their school counselor during the registration period.

Students will be issued a Test Ticket, which will indicate the date, time, and location assigned to the student for testing.

Students must test on the date and at the location assigned. Testing locations are specified on page 11, and students are assigned to a test site based on the geographic district in which the student's school is located. Conflicts should be reported to the student's school counselor prior to the test date.

September 7 – October 12, 2017

Registration Period

Students register for the SHSAT and LaGuardia High School audition(s) with school counselors.

October 18, 2017

Test Tickets available for distribution

TEST DATES (For locations, see page 11)	
■ All current 8th grade students	**Saturday, October 21, 2017** **Sunday, October 22, 2017**
■ All current 9th grade students ■ 8th and 9th grade students who are English Language Learners or students with disabilities who have Individualized Education Programs (IEPs) or 504 Plans that include testing accommodations.* ■ Make-up test requests	**Sunday, October 29, 2017** **Saturday, November 4, 2017**
■ Students new to New York City (Records must show that student arrived in NYC after the November test.)	**End of summer 2018**

ALTERNATE TEST DATE

■ Students must notify their school counselors within the registration period if they require a test date that does not conflict with a Saturday or Sunday religious observance. If a student's Test Ticket does not indicate an appropriate date, the student should speak to his/her school counselor so that the ticket can be modified.

■ If a student is ill and unable to take the test on a scheduled date, the student must immediately notify their school counselor upon return to school, present medical documentation, and request that the school counselor provide a make-up testing date.

■ Documentation is required to confirm a valid make-up request. School counselors must submit requests with required documentation by October 25 for the October 29 test and by November 1 for the November 4 test.

*More information about eligible English Language Learners and former English Language Learners is on page 16.

TEST LOCATIONS		
Grade 8 and 9 students attending schools in:	**TESTING SITE**	**ADDRESS**
Manhattan	Stuyvesant High School	**345 Chambers Street, New York, NY 10282 Tel:** (212) 312-4800 **Subways:** 1, 2, 3, A, C, E to Chambers Street; R to City Hall **Buses:** M20, M22, M5, M9, X1, X10
Bronx	The Bronx High School of Science	**75 West 205 Street, Bronx, NY 10468 Tel:** (718) 817-7700 **Subways:** 4, to Bedford Park Boulevard-Lehman College; B, D to Bedford Park Boulevard **Buses:** Bx1, Bx10, Bx2, Bx22, Bx26, Bx28, Bx3
Brooklyn Districts 13, 14, 15, 16, 19, 20, 32	Brooklyn Technical High School	**29 Fort Greene Place, Brooklyn, NY 11217 Tel:** (718) 804-6400 **Subways:** 2, 3, 4, 5 to Nevins Street, A to Hoyt & Schermerhorn; B, Q, R to DeKalb Avenue; C to Lafayette Avenue; D, N to Atlantic Avenue-Barclays Center; G to Fulton Street **Buses:** B103, B25, B37, B38, B41, B45, B52, B54, B62, B63, B65, B69
Brooklyn Districts 17, 18, 21, 22, 23	James Madison High School	**3787 Bedford Avenue, Brooklyn, NY 11229 Tel:** (718) 758-7200 **Subways:** B, Q to Kings Highway **Buses:** B100, B2, B31, B44, B49, B7, B82, BM3, BM4
Queens Districts 26, 27, 28, 29	Hillcrest High School	**160-05 Highland Avenue, Jamaica, NY 11432 Tel:** (718) 658-5407 **Subway:** E, J, Z to Jamaica Center-Parsons/Archer; F to Parsons Boulevard **Buses:** Q1, Q110, Q111, Q112, Q114, Q17, Q2, Q20A, Q20B, Q24, Q3, Q31, Q34, Q36, Q40, Q41, Q43, Q56, Q6, Q65, Q76, Q77, Q8, Q83, Q9, X68
Queens Districts 24, 25, 30	Long Island City High School	**14-30 Broadway, Long Island City, NY 11106 Tel:** (718) 545-7095 **Subways:** N, Q to Broadway **Buses:** Q100, Q102, Q103, Q104, Q18, Q66, Q69
Staten Island	Staten Island Technical High School	**485 Clawson Street, Staten Island, NY 10306 Tel:** (718) 667-3222 **Subways:** Staten Island Railway (SIR) to New Dorp **Buses:** S57, S74, S76, S78, S79-SBS

Note: Not every site will be available on November 4. Please check your Test Ticket for precise testing location.

TEST RESULTS

Please note that the SHSAT is not a requirement for admission to LaGuardia High School. For all other Specialized High Schools, offers are made to students based upon their SHSAT scores, how they ranked the Specialized High Schools on the SHSAT answer sheet, and seat availability. SHSAT scores are available in March 2018 with High School Admissions Round One results. To determine offers to a Specialized High School:

- All scores of the students who took the test are ranked from highest score to lowest score.

- The student with the highest score is placed in their first choice (highest prioritized school).

- Starting from the highest score on down, each student, in turn, is placed in that student's highest prioritized school in which seats are still available. Therefore, if all the seats in a student's first-choice school have been offered to students who scored higher, the student is placed in their second-choice school if seats are available. If all the seats in the student's second-choice school have been offered to students who scored higher, the student is offered a seat in their third-choice school if there are still seats available, and so on. This process continues until there are no seats available in any of the eight Specialized High Schools where admission is based on the SHSAT.

From year to year, the number of offers and projected seats for each Specialized High School may be subject to an increase or decrease based on school enrollment.

FIORELLO H. LAGUARDIA HIGH SCHOOL OF
MUSIC & ART AND PERFORMING ARTS AUDITIONS

September 7 – October 12, 2017

Register for LaGuardia High School audition(s) with your school counselor.

October 18, 2017

Audition Tickets available for distribution

UDITION ATES

All auditions are held at LaGuardia High School. Dates are scheduled according to the borough in which your school is located, not your current home address, and by the first letter of your last name.

BOROUGH	LAST NAME	AUDITION GROUP	DATE	START TIME
Bronx	A–L	Students auditioning for Dance	Saturday, November 04, 2017	8:00 AM
Bronx	M–Z	Students auditioning for Dance	Sunday, November 05, 2017	8:00 AM
Bronx	A–Z	Students auditioning for a single or multiple studios except Dance	Saturday, December 02, 2017	8:00 AM
Brooklyn	A–Z	Students auditioning for two or more studios or Technical Theater	Saturday, October 28, 2017	8:00 AM
Brooklyn	A–L	Students auditioning for a single studio except Technical Theater	Sunday, October 29, 2017	8:00 AM
Brooklyn	M–Z	Students auditioning for a single studio except Technical Theater	Sunday, October 29, 2017	11:30 AM
Manhattan	A–Z	Students auditioning for two or more studios or Technical Theater	Saturday, November 04, 2017	8:00 AM
Manhattan	A–L	Students auditioning for a single studio except Technical Theater	Sunday, November 05, 2017	8:00 AM
Manhattan	M–Z	Students auditioning for a single studio except Technical Theater	Sunday, November 05, 2017	11:30 AM
Queens/ Staten Island	A–Z	Students auditioning for two or more studios or Technical Theater	Saturday, November 18, 2017	8:00 AM
Queens/ Staten Island	A–K	Students auditioning for a single studio or Technical Theater	Sunday, November 19, 2017	8:00 AM
Queens/ Staten Island	L–Z	Students auditioning for a single studio or Technical Theater	Sunday, November 19, 2017	11:30 AM

AUDITION EXCEPTIONS

If a student's audition date conflicts with a religious observance, the student may audition on either the Saturday or Sunday of the student's school's scheduled weekend.

If a student's scheduled SHSAT date/time conflicts with their scheduled LaGuardia High School audition, the student must audition on either the Saturday or Sunday of the student's school's scheduled weekend.

LaGuardia High School requires a doctor's note for students who miss their audition and need to reschedule due to illness/injury.

AUDITIONS FOR STUDENTS NEW TO NEW YORK CITY

A student whose official records indicate that they became a New York City resident after November 1, 2017 may be eligible to audition at the end of summer 2018. Please visit a New York City Department of Education Family Welcome Center once a student becomes a New York City resident.

ADMISSIONS PROCESS

■ Admission to LaGuardia High School is based on a competitive audition and review of a student's academic record to ensure success in the school's demanding studio work and challenging academic program.

■ To audition for one or more of the studios at LaGuardia High School, a student must inform their school counselor of their intention to audition and indicate for which studio(s) they wish to audition. The school counselor must provide the student with a receipt to reflect the request during the registration period, and an Audition Ticket prior to the audition date.

■ Successful candidates are expected to exhibit an intermediate to advanced level of proficiency in their art forms. Students are evaluated based on their preparation for the audition, technical proficiency, and artistic expression. Most students receiving an offer for one or more of the studios typically score between 80-100 points on the studio rubric in addition to having a satisfactory academic and attendance record.

■ All applicants must bring their Audition Ticket to each audition for entrance. Printed receipts from the registration process are not acceptable. For students who attend a non-public school (private or parochial), one copy of the previous academic year's report card and/or transcript is required for each studio audition for which the student is registered. For example, if the student is auditioning for two studios, then the student must provide two copies of the Audition Ticket and report card. Students are evaluated solely on the official marks awarded during the previous academic school year. No reevaluation will be done based on any subsequent improved academic performance.

REGISTERING FOR LAGUARDIA HIGH SCHOOL AUDITIONS

■ Students interested in applying to one or more of the six studios at LaGuardia High School should review the audition requirements listed in this handbook and also in the *2018 New York City High School Directory* to prepare to audition.

■ Students registered to audition for more than two studios may be asked by LaGuardia High School to audition over more than one day. Students should ask their school counselors to follow up with LaGuardia High School directly if they are in this situation.

■ English Language Learners (ELLs) eligible for testing accommodations and students with Individualized Education Plans (IEPs) or 504 Plans including testing accommodations will receive those accommodations for the LaGuardia High School audition(s) as long as the accommodations do not interfere with the content or the skill being measured.

■ Students with disabilities or eligible former English Language Learners who will be using their accommodations for LaGuardia High School auditions must send relevant documents related to the accommodations to LaGuardia High School prior to the registration deadline (e.g., student's IEP, 504 Plan, or signed letter on school letterhead describing ELL supports received by student in school setting). Documentation

for LaGuardia High School can be faxed to 212-724-5748 or emailed to **admissions@laguardiahs.org.**

■ Students must arrive on time for audition(s), although the arrival time indicated on the Audition Ticket may not be the actual start time of the audition. Students are strongly encouraged to bring a light snack and/or water.

■ At the auditions, there is a designated waiting area for families, as audition areas are for student applicants only. Family members or guardians also may choose to leave and re-enter the school building at any time. It is important that the student has food and that any other communication with families is made prior to the beginning of the audition process.

AUDITION INFORMATION FOR EACH STUDIO

A total of 10,849 students registered to audition for one or more of the six studios at LaGuardia High School for the 2017-2018 school year. Students may audition for the studios listed below. Only students who are residents of New York City are eligible to apply and audition.

DANCE Applicants participate in both a ballet class and a modern dance class. Applicants should wear ballet shoes and fitted black dance attire.

DRAMA Applicants should be prepared to perform two (age and content appropriate) contrasting one-minute monologues. Applicants may be asked to do an impromptu reading. Attire should allow free movement since applicants may be asked to demonstrate how well they move physically.

FINE ART Applicants must bring a portfolio of 8-15 pieces of original artwork done in a variety of media. The type of artwork should be from observation, imagination, and memory. All artwork must be labeled appropriately to include student name, type of artwork, and medium. Students must also label artwork as being created from observation, imagination, or memory. Photographs—not originals—of three-dimensional (3D) works may be included. For the audition, applicants will be given three drawing assignments. Students are asked to draw the human figure from observation, draw a still life from memory, and create a drawing in color based on imagination. All drawing materials for auditions will be supplied by the school at the time of the audition.

INSTRUMENTAL MUSIC Applicants should prepare a solo selection to perform without accompaniment and bring one copy of the music they plan to perform. Applicants should bring their instruments to the audition, except those auditioning on piano, percussion, tuba, double bass, and harp. These instruments will be provided by the school at the audition. Amplifiers also will be provided at the audition for electric guitarists. Applicants will be tested for rhythm and tonal memory and will be asked to perform a sight-reading excerpt.

TECHNICAL THEATER Applicants are expected to bring a prepared 3D design model/diorama with attached photograph of the diorama from one of the following plays: *The Crucible*, *A Raisin in the Sun*, or *Dracula*. Students must be able to discuss the play and their choices in designing the diorama. Students must also be able to carry the diorama themselves throughout the audition day. Applicants participate in one-on-one, hands-on practical in more than one aspect of technical theater.

VOCAL MUSIC Applicants should prepare a song to sing without accompaniment for the audition. LaGuardia High School has a suggested online song list (**www.laguardiahs.org**); applicants are not required to select from the song list. In addition to performing the selected song, applicants will be asked to sing back melodic patterns and tap back rhythmic patterns.

1 CONTACT SCHOOL COUNSELOR

Students should contact their school counselor to indicate intention to take the SHSAT and/or audition for LaGuardia High School within the registration period, starting in early September.

2 OBTAIN A TEST OR AUDITION TICKET

Prior to the testing/audition date(s), school counselors will provide students with a SHSAT Test Ticket and/or a LaGuardia High School Audition Ticket. This ticket will indicate the location of the test/audition site, the date and time of the SHSAT/audition, the student's ID number, and the school code number of the student's current school. If a student has a conflict with the test or audition date assigned, the student should inform the school counselor immediately to arrange an alternate test or audition date. Once Test and Audition Tickets have been issued, students are expected to arrive on the date and time indicated on their tickets. SHSAT test sites are based on the location of students' current schools, not current home addresses. LaGuardia High School audition dates and times are based on the borough where students currently attend school.

3 REVIEW TEST OR AUDITION TICKET

Students and parents/guardians should review all information on the Test or Audition Ticket for accuracy. ELLs and students with disabilities should check their tickets and make sure they are scheduled for the appropriate testing date (see pages 10 and 12) with the appropriate accommodations. They should inform their school counselors immediately if there are any errors on the Test or Audition Ticket.

4 COMPLETE AND OBTAIN PARENT/ GUARDIAN SIGNATURE ON TEST OR AUDITION TICKET

Students and parents/guardians must sign the Test or Audition Ticket prior to the exam or audition. Those taking the SHSAT should rank, in priority order, up to eight Specialized High Schools to which they want to apply. Students will copy these choices onto the SHSAT answer sheet on test day. Students may choose to apply to only one school, or may apply to as many as all eight schools to increase their chances of being offered a seat in one of those Specialized High Schools. Students should only list schools that they wish to attend if they are offered a seat. Families and students should work together to ensure that the student is prepared to complete their selections on the answer sheet as desired. Once choices have been submitted on the day of the test, they may not be changed. The LaGuardia High School Audition Ticket

will display the studio(s) for which the student requested to audition when the registration was submitted. Students should make a copy of the Audition Ticket for each audition they attend.

5 ATTEND SHSAT OR AUDITION

Students taking the SHSAT must bring their Test Tickets to their assigned test sites on the day of the test. Students auditioning for one or more studios at LaGuardia High School must bring their Audition Tickets to their audition(s) as well.

Students arriving without an Audition or Test Ticket may not be guaranteed admittance. Although sites will make every effort to confirm a student's registration and accommodate those with missing tickets, another test or audition date may need to be scheduled. Students should arrive at the time indicated on the Test or Audition Ticket; but it is important to note that the test or audition may start after the arrival time listed on the Test or Audition Ticket.

Students are allowed to bring cell phones to the SHSAT test site and/or LaGuardia High School, but cell phones must be turned off and not in use while in school buildings. No other electronic devices are allowed. Prior to the start of the audition or SHSAT, students must be prepared to turn in their cell phones when it is requested.

For both the SHSAT and LaGuardia High School auditions, students may bring a snack and water; however, test and audition site staff, including proctors and adjudicators, will determine when consuming these items is allowed.

6 RECEIVE RESULTS

Students must be residents of New York City in order to receive results of the SHSAT and/or offers to LaGuardia High School studio(s). In March 2018, students will be notified through the High School Admissions Round One result letters as to whether or not they received offer(s) to the Specialized High Schools. It is possible for students who audition for one or more of the studios at LaGuardia High School to receive offer(s) to one or more of the studios at LaGuardia High School. Students who receive offers to a Specialized High School may, at the same time, receive an offer to one of the other high school choices that were submitted on their New York City High School Admissions Application. At this time, the student will have to choose between the Specialized High School offer(s) and the High School Admissions Application offer.

TESTING AND AUDITION ACCOMMODATIONS

Students with disabilities who have IEPs or 504 Plans that include testing accommodations and English Language Learners, including current and former English Language Learners who achieved proficiency on the New York State English as a Second Language Achievement Test (NYSESLAT) within the past two years, are eligible to receive testing and/or audition accommodations on the SHSAT and LaGuardia High School auditions.

Testing accommodations are changes made in the administration of the test in order to remove obstacles to the test-taking process that are presented by the disability or language proficiency without changing the skills or content being tested. Families are encouraged to review the New York City Department of Education's (NYCDOE) resources on testing accommodations for additional information: http://schools.nyc.gov/Academics/SpecialEducation/FamilyResources/GuidesDocuments/default.htm.

IMPORTANT NOTES:

■ Testing accommodations for the SHSAT or LaGuardia auditions are provided based on a student's existing testing accommodations. These are documented on students' IEPs or 504 Plans or based on their ELL status.

■ Accommodations that are requested only for the SHSAT and/or LaGuardia High School auditions are not allowed. Students must demonstrate a documented history of needing and using testing accommodations.

■ Students with 504 Plans must have their accommodations approved every year. Schools and families must review (and approve, if appropriate) the student's 2017-18 504 Plan no later than the last day of school in June 2017. Please see this FAQ on 504 Plans: http://schools.nyc.gov/Offices/Health/SchoolHealthForms

■ Students who demonstrate disabilities or temporary impairments within 30 days of the SHSAT may receive certain emergency testing accommodations, if approved by the principal. Please see the section on "Emergency Testing and/or Audition Accommodations" on page 18 for more information.

TESTING ACCOMMODATIONS ON THE SHSAT

Students with disabilities will be provided with the accommodations listed in their IEPs or 504 Plans, unless the accommodation is not permitted on the SHSAT, or if the accommodation is not needed on the SHSAT (see the next section). Students and families should contact school counselors at their current schools directly with questions about testing accommodations on the SHSAT and to make sure their testing accommodations are correct on their test tickets.

Due to the time needed to transition students from the building entrance to the testing rooms, extended time on the examination is calculated from the start time of the exam, not the arrival time indicated on the ticket.

ELLs and eligible former ELLs taking the SHSAT are granted extended testing time of 360 minutes (2.0x standard testing time). Bilingual mathematics glossaries will also be provided by the NYCDOE on the day of the SHSAT at each test administration site in the NYCDOE's nine major languages: Arabic, Bengali, Chinese (Traditional and Simplified), French, Haitian-Creole, Korean, Russian, Spanish, and Urdu. Students are not permitted to bring their own bilingual mathematics glossaries. Sample glossaries can be found on the NYCDOE Specialized High Schools Admissions Test (SHSAT) website: http://schools.nyc.gov/accountability/resources/testing/shsat.htm.

ELLs with IEPs or 504 Plans will receive the accommodations to which they are entitled, as long as the accommodations are permitted for the SHSAT (see the next section).

Students whose IEPs or 504 Plans include the use of assistive technology, such as a Frequency Modulation (FM) Unit, or other aids, such as masks, markers, highlighters, pencil grip, or a magnifying glass must bring these with them on the day of the SHSAT and/or audition if needed. Assistive technology and other aids will not be provided by test or audition sites on testing and/or audition days.

Testing Accommodations Not Allowed for SHSAT

Students are entitled to the testing accommodations stated on their IEPs or 504s, however certain testing accommodations are not permitted for any student on the SHSAT because providing these accommodations would interfere with how the test measures certain skills. For example, students are not permitted to use calculators and/or mathematics tables on the Mathematics section because this section of the SHSAT measures students' mathematical computation skills. Additionally, oral translations of test directions, questions, and answers are not permitted because this changes the standardization of the test. (ELLs who need translations are permitted to use bilingual mathematics glossaries on the Mathematics section of the SHSAT only.)

Students and families should work with their school counselors to inquire about testing accommodations or specific situations which may not be addressed here.

TESTING AND AUDITION ACCOMMODATIONS

Testing Accommodations Not Needed for the SHSAT

In addition, some accommodations that students may use on other tests may not be needed on the SHSAT. For example, students who use a computer or word processor for tests with essays will not need to use this accommodation on the SHSAT because there are no essays on the test.

A Note About Scribes: If a student has a scribe listed on their IEP or 504 Plan, it is important to note if the student needs help answering in the test booklet or help filling in the answer sheet. **A scribe is not needed** if the student is able to circle answers in the test booklet. **A scribe is only needed** if a student is unable to write their answers in the test booklet. Students requiring transcription of answers onto the answer sheet are provided with the accommodation of answers in the test booklet, but do not require a scribe. Students using a scribe on testing day will have a 1:1 testing administration. Therefore, it is critical for families to work with their IEP or 504 Team to make sure this accommodation is correctly listed on the IEP or 504 Plan as well as on the student's Test Ticket.

TESTING ACCOMMODATIONS FOR LAGUARDIA HIGH SCHOOL AUDITIONS

If there is any question as to whether an accommodation is permitted for an audition, please have your school counselor contact LaGuardia High School directly by phone at 212-496-0700 or email at **admissions@laguardiahs.org.** For information about arranging for accommodations for LaGuardia High School auditions, please see the next section.

CONFIRMING TESTING ACCOMMODATIONS FOR THE SHSAT AND LAGUARDIA HIGH SCHOOL AUDITIONS

■ During the SHSAT registration period, a student's current school, including non-public schools (private and parochial schools), is responsible for entering the appropriate testing accommodations in the NYCDOE's Student Enrollment Management System (SEMS). For students with 504 Plans or similar school-based accommodation plans (only for students not in NYCDOE schools), all documentation must be submitted to the NYCDOE for review via email to **SHSATaccommodations@schools.nyc.gov** at least three (3) weeks prior to the registration deadline. Documentation received after this deadline may not be reviewed in time for the student's scheduled test date. Students and families should directly contact their school counselors at their current schools with questions about testing accommodations on the SHSAT.

■ Students arranging accommodations for LaGuardia High School auditions must have their school counselor send

supporting documentation **directly to LaGuardia High School** prior to the registration deadline (e.g., student's IEP, 504 Plan, or signed letter on school letterhead describing English Language Learner supports received by student in school setting). Documentation for LaGuardia High School can be faxed to 212-724-5748 or emailed to **admissions@laguardiahs.org.** School counselors should contact LaGuardia High School directly with any questions about audition accommodations.

■ Non-public school students with disabilities who do not have an IEP or 504 Plan indicating their need for testing accommodations **must work with their school counselor to complete a NYCDOE Request for Accommodations form** and submit the form and supporting documentation to the NYCDOE for review and approval at least three (3) weeks prior to the registration deadline. Students' current schools can provide the form and are responsible for ensuring that an appropriate review process takes place, and that students' accommodations and relevant documentation are submitted at least three (3) weeks prior to the registration deadline. The NYCDOE reserves the right to request additional information about schools' processes for granting accommodations and verify that the requested accommodation addresses a documented need. Non-public school students auditioning at LaGuardia High School must have accommodations plans approved by school-based support or IEP teams and the documentation should be sent directly to LaGuardia High School so that accommodations can be arranged for the audition(s).

OPTING OUT OF TESTING ACCOMMODATIONS

Before the registration deadline, parents/guardians of English Language Learners and students with IEPs or 504 Plans may opt out of certain testing accommodations for their children on the SHSAT or LaGuardia High School auditions. Before the registration deadline, parents/guardians must contact their child's school counselor to indicate in writing their desire to opt out of testing accommodations for their child. Neither school counselors nor students may opt out of testing accommodations; written consent by a parent/guardian is required.

If it is not possible to provide written consent to opt out of testing accommodations before the registration deadline, parents/guardians must provide their written consent on testing day to opt out of the testing accommodations listed on their child's Test or Audition Ticket.

On testing day, students cannot modify or opt out of the testing accommodations listed on their Test or Audition Ticket unless parent/guardian consent has been provided in writing on the Test or Audition Ticket.

TESTING AND AUDITION ACCOMMODATIONS

STUDENTS WITH EXTENDED TIME WHO FINISH THE TEST BEFORE THE END OF THE EXTENDED TIME PERIOD

■ All students must stay in testing rooms until at least the end of the standard test administration time (180 minutes), with the exception of bathroom breaks.

■ Once the standard test administration time (180 minutes) is over, students with an accommodation of extended time may leave if they have finished working on the exam.

■ Students who leave before the end of their extended time will be required to acknowledge in writing that they had the opportunity to use the full amount of the extended time period but chose to leave early.

■ If a parent/guardian does not want their child to leave the testing room before the full amount of the extended time period has ended, the parent/guardian is responsible for communicating this to their child before the test begins.

■ Re-tests will not be provided to students who choose to leave before the end of their extended time.

EMERGENCY TESTING AND/OR AUDITION ACCOMMODATIONS

Emergency testing accommodations are intended for use by students whose disabilities or injuries occur after the registration deadline but before their scheduled testing/audition day, and without enough time to develop an IEP or 504 Plan. For the SHSAT, students and families should work with their school counselor to complete the Emergency Testing Request form and ask their school counselor to email **SHSATaccommodations@schools.nyc.gov** as soon as possible prior to the testing day that emergency accommodations may be needed.

If a family requests an accommodation without giving the NYCDOE sufficient time to review the request before the regular SHSAT administration date, the student's SHSAT may be rescheduled to ensure that the request for accommodations may be properly reviewed.

If a student requires emergency accommodations for a LaGuardia High School audition, the family or school counselor must contact LaGuardia High School directly to request the accommodation.

Students and families should contact their current school counselor for additional information about testing accommodations.

BUILDING ACCESSIBILITY

The NYCDOE is committed to ensuring that its programs, services, and activities are accessible to staff, members of the school community, students, and family members with disabilities. The NYCDOE assesses all of its buildings on a continuing basis to determine which schools are accessible to individuals with disabilities. For the most up-to-date information on the accessibility of each school, please contact the school directly. Families are encouraged to visit schools to learn about the level of accessibility. For more information, please visit http://schools.nyc.gov/Offices/OSP/Accessibility.

The SHSAT assesses knowledge and skills. These skills consist of the ability to comprehend English prose, to demonstrate understanding of revising and editing skills central to writing in English, and to use problem-solving skills in mathematics. The test measures knowledge and skills students have gained over the course of their education. Keeping up with schoolwork throughout the year is the best possible preparation.

CHANGES TO SHSAT TEST DESIGN

Starting with the fall 2017 SHSAT test administration (for admissions to schools for the 2018-19 school year), the Specialized High Schools Admissions Test (SHSAT) will have an updated test design.

The following processes and policies have **not** changed:

- Process for registering for the SHSAT
- How eligibility for Specialized High Schools is determined — rank ordering of students based on performance on SHSAT, in combination with students' school preferences and available seats
- Availability of allowed accommodations for eligible students

The following changes have been made to the SHSAT for 2017:

English Language Arts. The SHSAT will continue to have two sections; however, the Verbal section is now called English Language Arts (ELA) and consists of two parts: Revising/Editing and Reading Comprehension.

Grid-In Mathematics items. In addition to multiple-choice items, the Mathematics section now includes 5 grid-in items. See page 34 for more information on the grid-in item type.

Multiple Choice items. All multiple choice items will have 4 answer choices instead of 5 answer choices.

Embedded field test items. Each section of the 2017 SHSAT includes items that are not counted in the student's score but that are being tried out, or field tested, for possible use in future SHSAT tests.

Increased testing time. Overall testing time has been increased to 180 minutes.

SHSAT TEST DESIGN FOR 2017

The SHSAT has two sections, English Language Arts (ELA) and Mathematics. Standard administration time is 180 minutes to complete the test.

There are 57 items total in each section; of these, 47 are scored items and 10 are embedded field test items. **You will NOT know which items are scored and which are field test items. It is to your advantage to answer all items in each section.**

ENGLISH LANGUAGE ARTS SECTION (57 QUESTIONS)

The English Language Arts (ELA) section consists of two parts: Revising/Editing and Reading Comprehension. The Revising/Editing section may have up to 20 total questions and is divided into Parts A and B. Part A includes up to eight questions, each of which is based on its own sentence or paragraph. Part B includes questions that are based on one or two passages. Each Revising/Editing passage may have up to eight questions. Revising/Editing items assess students' ability to recognize and correct language errors and to improve the overall quality of a piece of writing. There are up to 50 items in Reading Comprehension. The Reading Comprehension section requires students to read five or six passages, each of which is followed by up to ten questions assessing students' ability to understand, analyze, and interpret what they have read.

MATHEMATICS SECTION (57 QUESTIONS)

The Mathematics section consists of word problems and computational questions in either a multiple-choice or grid-in format. There are 5 grid-in Math items and 52 multiple-choice items. The Mathematics section asks students to solve word and computational problems involving addition, subtraction, multiplication, and division. Some word and computational problems will also include working with fractions, decimals, and statistics.

Students may choose to complete either the English Language Arts or Mathematics section first. Students who finish early may go back to questions in either section to review their work.

Students will not be given extra time at the conclusion of testing to transfer responses from the test booklet to the answer sheet. All responses must be recorded on the answer sheet before the conclusion of the test.

TEST MATERIALS

Students must bring to the testing session:

- a SHSAT Test Ticket signed by parent/guardian with student's Specialized High School choices
- sharpened Number 2 pencils (a ballpoint pen or other ink cannot be used for machine scoring)
- an eraser
- Assistive Technology (if indicated on the IEP and Test Ticket)
- a silent non-calculator watch to keep track of your working time

The test site will provide:

- a test booklet with an answer sheet and scrap paper attached

Scrap paper may be used to solve mathematics problems, and will be collected at the end of the test.

SHSAT TESTING PROCEDURES

Students, it is important to review the instructions below with your parent/guardian to ensure understanding prior to testing.

ARRIVING AT THE TEST SITE

■ It is important to arrive at the test site at the time indicated on your SHSAT Test Ticket. Please note the test may not begin immediately after the stated arrival time. The test site can provide information about anticipated test completion times. You may bring snacks and water, but the test site will determine the appropriate time to consume them. All cell phones and electronic devices will be collected by the proctor and stored in the testing room prior to the test and will be returned at the conclusion of the test. You may not use a cell phone until after the test is completed and you have been dismissed from the building.

■ Prior to the test, you will be asked to read and sign a statement on your answer sheet indicating that you are a resident of New York City, are well enough to take the test, and are taking it at the appropriate grade level. Students who sign this statement but do not meet the requirements specified will be disqualified from acceptance to any of the Specialized High Schools.

■ If you do not feel well and do not have an approved medical 504, you should inform the test proctor immediately; you should not begin the test, or sign the statement. Once you have begun the test, you may not be able to request a make-up test due to illness. Any requests for a make-up test made after you have started the test may not be honored.

■ Prior to the start of the test, NYCDOE staff will take a photograph or video of the students in each testing room. These images will be used for test security purposes only.

Do not bring cameras or personal electronic devices such as a calculator watch, smart watch, calculator, MP3 Player/iPod, tablet/iPad or ebook reader to the test. Non-calculator watches are allowed.

As per NYCDOE testing policy, cell phones and other electronic devices will be collected from all students entering the room in which the test is being administered and returned to the student after the student finishes the test and leaves the testing room. Students may not access any devices during testing, including break periods.

During testing, schools will establish a collection point upon students entering the classroom prior to the test administration. Students will be instructed to store cell phones/cameras/electronic devices in their backpack/bag, or a school provided container, and place it in the front of the classroom until the conclusion of the test administration. Admission to the test shall be denied to any student who refuses to relinquish a prohibited device. Possession of a prohibited device at any time during the test administration, even if powered off, shall result in the test being invalidated. Students will not be provided with an opportunity to make up the exam on a subsequent day.

FILLING IN THE ANSWER SHEET

Answer sheets will be attached to test booklets. When the proctor instructs you to do so, you must detach the answer sheet and a sheet of scrap paper from the test booklet along the perforations, being careful not to tear the answer sheet or break the seal on the test booklet.

Before taking the test, you will need to provide information such as name, student ID number, school number, and school choices on the answer sheet.

It is important to fill in the circles completely so that scoring is not delayed. The following grids from the answer sheet collect important identifying information as well as information that affects admission to a Specialized High School.

In Grid 4 you will fill in in your name as it appears in your school record and on your high school application. You should not use a nickname. For example, if your name on your school record is Robert, you should fill in in that name, even if most people call you "Robbie." Or if your name on your school record is Mei-Ling, you should fill in in that name, even if most people call you "Melanie."

Grid 5 is for your choice of Specialized High Schools only. If you mark Grid 5 incorrectly, your admission to a Specialized High School may be affected. Admission is based on your score and the order in which you rank your school preferences in Grid 5, as well as the number of seats available at each school. Therefore, it is very

important that you make your decisions about ranking schools before the day of the test. Discuss with your family the schools you are interested in, and determine the order in which you will list them on the answer sheet. Enter these rankings on the Test Ticket so that you will be able to carefully copy them onto Grid 5 on your answer sheet at the test site. Only choices made in Grid 5 will be counted.

EXAMPLES OF CORRECT GRID 5

5. CHOICES OF SPECIALIZED HIGH SCHOOLS
Indicate your school choice in order of preference.
• Fill in only one school for each choice.
• You **must** fill in a first choice school.
• Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	●	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	●
Brooklyn Tech	○	●	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	●	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	●	○
Queens Sci./York	○	○	○	○	○	●	○	○
Staten Island Tech	●	○	○	○	○	○	○	○
Stuyvesant	○	○	●	○	○	○	○	○

5. CHOICES OF SPECIALIZED HIGH SCHOOLS
Indicate your school choice in order of preference.
• Fill in only one school for each choice.
• You **must** fill in a first choice school.
• Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	●	○	○	○	○	○	○
Staten Island Tech	○	○	○	○	○	○	○	○
Stuyvesant	●	○	○	○	○	○	○	○

You MUST fill in a first choice school.

EXAMPLES OF INCORRECT GRID 5

5. CHOICES OF SPECIALIZED HIGH SCHOOLS
Indicate your school choice in order of preference.
• Fill in only one school for each choice.
• You **must** fill in a first choice school.
• Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	●	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	●	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	●	○	○	○	○	○	○
Staten Island Tech	○	○	●	○	○	○	○	○
Stuyvesant	○	○	○	○	○	○	○	○

DO NOT fill in more than one circle in a column.

5. CHOICES OF SPECIALIZED HIGH SCHOOLS
Indicate your school choice in order of preference.
• Fill in only one school for each choice.
• You **must** fill in a first choice school.
• Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	●	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	●	○	○	○	○
Brooklyn Tech	○	●	○	○	○	●	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	○	○	○	○	○	○	○
Staten Island Tech	○	○	○	○	○	○	○	○
Stuyvesant	○	○	○	○	○	○	○	○

DO NOT fill in more than one circle in a row.

5. CHOICES OF SPECIALIZED HIGH SCHOOLS
Indicate your school choice in order of preference.
• Fill in only one school for each choice.
• You **must** fill in a first choice school.
• Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	○	○	○	○	○	○	○
Staten Island Tech	●	●	●	●	●	●	●	●
Stuyvesant	○	○	○	○	○	○	○	○

DO NOT fill in the same school for each choice.

You must fill in one and only one circle for each school for which you wish to be considered. You may make as few as one or as many as eight choices. To increase your chances of receiving an offer to one of the Specialized High Schools, you are encouraged to make more than one choice. You must fill in a first choice school, and you may fill in only one school for each choice. You must fill in only one circle in a row and only one circle in a column. You must not fill in a school more than once. You must not fill in the same school for each choice.

In Grid 7, you must print the name of the school where you are now enrolled. You will then print your school code exactly as it appears on your Test Ticket or in the Feeder School List available from the test proctor. After that, you will fill in the circle under the corresponding number or letter for each digit of your school code. Fill in the circle marked with the letter "P" if you attend a private or parochial school. For example, a student who attends Abraham Lincoln IS 171 in Brooklyn should complete Grid 7 as shown in the example on the right. Fill in Grid 7 carefully: an error in Grid 7 may delay the reporting of your score.

Grid 8 is labeled "STUDENT ID NUMBER." Write your nine-digit student ID number in Grid 8. You will find this number on your SHSAT Test Ticket. Below each box, fill in the circle containing the same numeral as the box. (See the example on the right.)

When you are told to begin the test, mark your answers on the answer sheet by completely filling in the appropriate circle (see example). Make sure your marks are heavy and dark. Be careful not to make any stray marks on the answer sheet. If you change an answer, completely erase your first answer. Do not fold or tear the answer sheet. There is only one correct answer to each question. If your answer sheet shows more than one mark in response to a question, that question will be scored as incorrect.

SAMPLE ANSWER MARKS

1	Ⓐ	Ⓑ	Ⓒ	●	**RIGHT**
2	Ⓧ	Ⓑ	Ⓒ	Ⓓ	WRONG
3	Ⓐ	Ⓧ	Ⓒ	Ⓓ	WRONG
4	Ⓐ	Ⓑ	Ⓒ	Ⓓ	WRONG
5	Ⓐ	Ⓑ	●	●	WRONG

You may write in your test booklet or on the scrap paper provided to work through ELA or mathematics problems, but your answers must be recorded on the answer sheet in order to be counted. It will not be possible to go back and mark your answers on the answer sheet after time is up. Information in the test booklet or on scrap paper will not be counted.

GRID 7

7. SCHOOL WHERE YOU ARE NOW ENROLLED

Abraham Lincoln IS 171

NAME OF SCHOOL

School Code

1	9	K	1	7	1

Ⓟ Fill in for private or parochial schools only

GRID 8

8. STUDENT ID NUMBER

3 2 1 – 4 5 6 – 7 7 8

STUDENT MISCONDUCT

It is important to note that test security is CRITICAL for the SHSAT. Items and answers may not be shared with any individuals outside of the testing site. During the test, you may not attempt to communicate with other students in any way. This includes, but is not limited to: speaking, writing and passing notes, sharing test booklets or answer sheets, looking at other students' answers, recording test items, and/or possession of a camera or personal electronic device. Students found to be engaging in any of these activities will have their tests invalidated and will not be allowed to take the test again until the following school year (for current 8th grade students; 9th grade students will not have any additional opportunities to take the test after 9th grade).

CLAIMS OF TESTING IRREGULARITIES

If you believe there is interference or testing irregularity during any part of the SHSAT test, you should bring the matter to the immediate attention of the proctor. This may include a misprinted test booklet, undue distraction, or improper student behavior. The proctor will attempt to remedy the situation and may take a written statement from you at the end of the test.

Students and parents/guardians may also report any suspected proctoring or testing irregularities, in the form of a letter, to the address below:

Office of Student Enrollment
52 Chambers Street, Room 415
New York, NY 10007

Mailed letters must be sent by certified mail with proof of delivery and postmarked no later than one week after the test administration. For all claims, please include parent/guardian and student names, as well as telephone and/or email contact information. Any claims of testing irregularity postmarked later than one week after the test date may not be considered. Claims will be responded to on an individual basis.

SHSAT SCORING

SHSAT scores are based on the number of correct answers marked on scored items.[1] There is no penalty for wrong answers. If you are not sure of an answer, you should mark your best guess. You should not spend too much time on any one question. Answer each question as best you can or skip it and keep going. If you have time at the end of the test, you may go back.

Each answer sheet is scanned and scored electronically, and the number of correct answers on scored items, called a raw score, is determined for each test taker. Because there are

several forms of the SHSAT, raw scores from different test forms cannot be compared directly. The test forms were developed to be as similar as possible, but they are not identical.

To make valid score comparisons, a raw score must be converted into another type of score that takes into account the differences between test forms. In a process called calibration, ELA and mathematics raw scores are converted into scaled scores. The raw scores and scaled scores are not proportional. In the middle of the range of scores, an increase of one raw score point may correspond to an increase of three or four scaled score points. At the top or bottom of the range of scores, an increase of one raw score point may correspond to 10-20 scaled score points. The reason for this difference is that the scaled scores have been adjusted to fit the normal curve. Scaled scores are on a scale that is common to all test forms, making it possible to compare these scores directly. The composite score is the sum of the ELA and mathematics scaled scores. The composite score is used to determine admission to a Specialized High School.

REVIEW PROCEDURES

After receiving results, students and their parents/guardians may review a copy of their answer sheet by requesting an appointment with a representative from the Office of Assessment. Copies of answer sheets are not available for distribution but will be reviewed at the scheduled appointment. Appointments may be arranged in one of the following ways:

1) By submitting an electronic request via the SHSAT website, www.nyc.gov/schools/Accountability/resources/testing/SHSAT, or

2) By sending a written request via certified mail with proof of delivery to:

Office of Assessment, SHSAT Review
131 Livingston Street, Room 401A
Brooklyn, New York 11201

Electronic requests must be submitted and letters must be postmarked no later than March 30, 2018. Requests must include:

■ Student's name, date of birth, and OSIS number
■ Parent/guardian's name, phone number, and email address

Within four weeks of receipt of the request, the Office of Assessment will provide information to schedule an appointment. The student and at least one parent/guardian must be present at the appointment. Along with the student, only a parent/guardian will be admitted to the appointment. Translators are available upon request.

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[1] A small number of items will be pre-designated for field testing and will not count towards a student's score.

DISCOVERY PROGRAM

As stated in New York State law, the Specialized High Schools may sponsor a Discovery Program to give disadvantaged students of demonstrated high potential an opportunity to attend a Specialized High School program. Students will be notified which schools will be sponsoring a Discovery Program and whether they are eligible to participate in Spring 2018.

To be eligible, the student must:

1. have scored within a certain range below the qualifying score on the SHSAT. Eligible scores will vary from year to year and will be based on seat availability; and

2. have ranked one of the Specialized High Schools that plans to host a 2018 Discovery Program as among the choices on their 2017 SHSAT answer sheet; and

3. be certified as disadvantaged by their current school; and

4. be recommended by their current school as having high potential for the Specialized High School program.

Once notified of eligibility, families should meet with the school counselor to discuss the Discovery Program application. Not all eligible students will be accepted into the Discovery Program. Those students who are successful in meeting the demands of the summer program will be granted an offer to the school sponsoring the Discovery Program. Those students who are not successful will attend the school to which they had previously been assigned. Students should speak to their school counselors if they have any questions. For more information on eligibility requirements, please visit http://schools.nyc.gov/ChoicesEnrollment/High/specialized.

PARENTS/GUARDIANS ARE ENCOURAGED TO REVIEW THE FOLLOWING TIPS WITH THEIR CHILDREN SO THAT THEY ARE WELL PREPARED FOR THE TEST.

BEFORE TEST DAY

Knowing what to expect on the test and having some practice in test taking is beneficial. This handbook describes each part of the test and contains two sample tests to use as practice. Each sample test has been updated to match the 2017 tests as closely as possible. A list of correct answers is provided for each test, along with explanations.

Simulating the actual testing situation helps. You will have three hours (180 minutes) to complete the test. During the test, how you allot the time between the ELA and mathematics sections is up to you. You may start with either section. Use the practice tests to decide how much time you will spend on each section to keep yourself on pace and manage your time on test day. For example, will you spend 90 minutes on each section, or will you spend more time on one section than another? Will you leave certain questions for the end? You may return to one section if you have time remaining after finishing the other section. Mark your answers on the answer sheet provided in this handbook. Remember, on the actual test, you will not be given extra time to mark your answers on the answer sheet after time is up.

After you complete the practice test, check your answers against the list of correct answers. Read the explanations of the correct answers to see the kinds of mistakes you may have made. Did you read too quickly and misunderstand the question? Did you make careless errors in computation? Did you choose answers that were partially correct, but were not the best answers? Were many of your wrong answers guesses? You also should check to see whether there is a pattern to your errors. For example, did you get all of the inequality questions wrong? Did you leave any answers blank? Seek out opportunities to do more practice in areas that challenged you.

Put this handbook away for a few days, and then take the second sample test, following the same procedure. Be aware that how well you do on these sample tests is not a predictor of your score on the actual test. However, these tests will give you an idea of what to expect when taking the SHSAT.

DAY OF THE TEST

Prepare yourself. The night before the test, remember to get a good night's sleep. Bring your signed Test Ticket with you to your assigned test site and make sure it includes a parent/guardian signature and your ranked choices of Specialized High Schools. Arrive at your assigned test site on time. Wear comfortable clothes and bring a non-calculator watch to keep track of the time. Make sure that you have several sharpened Number 2 pencils and an eraser that erases cleanly. You may also bring a highlighter, pencil grip, or a magnifying glass, if needed. Do not bring personal electronic devices to the test. Such devices include, but are not limited to: an iPod, calculator, tablet/iPad, or ebook reader. You may bring a cell phone but it will be turned off and collected by your proctor for the duration of the test.

Plan your time. Be aware of the total number of questions and the amount of time you have to complete the test. Work carefully, but keep moving at a comfortable pace and keep track of the time. Listen carefully to your test proctor and all instructions regarding time. Be sure to place all answers on the answer sheet. You will not be given additional time to transfer your answers from the test booklet or any scrap paper to the answer sheet after time is up.

Read the instructions carefully. Be sure you understand the task before marking your answer sheet. For each question, read all the choices before choosing one. Many questions ask for the best answer; it is important to compare all the choices to determine the choice that best answers the question.

Mark your answers carefully. This is a machine-scored test, and you will not receive credit if you mark the wrong answer bubble or mark the answers to two questions on the same line. Make sure the number on the answer sheet matches the number of the question in your test booklet. To change an answer, erase the original mark completely. If two bubbles are filled in for a question, that question will be scored as incorrect. Avoid making stray pencil marks on your answer sheet. You may write in your test booklet to work through ELA or mathematics problems, but remember that only answers recorded on the answer sheet will be counted.

There is no penalty for a wrong answer. Your score is based on the number of correct answers marked on the answer sheet. Therefore, omitting a question will not give you an advantage, and wrong answers will not be deducted from your right answers. Fill in any blanks when the time limit is almost up.

Make an educated guess when you do not know the answer to a question. Do this by eliminating the answer choice(s) that are definitely wrong, and then choose one of the remaining answers.

Be considerate of other students during the test. Do not chew gum or make noises or movements that would be distracting to others.

If you finish before time is up, go back over your work to make sure that you followed instructions, did not skip any questions, and did not make careless mistakes. Students must remain in the testing room for the entire duration of the test (180 minutes).

REVISING/EDITING Part A

The first part of the Revising/Editing section contains up to eight items and measures your ability to identify specific errors in language conventions, to select the correction for an error in language conventions, or to improve the quality of the writing presented in sentences or short paragraphs. The language skills assessed in this section are based on the Language section of the Common Core Learning Standards for Grade 7, as well as skills that are introduced at lower grade levels.

Each question directs you to read a sentence, a list of sentences, or a paragraph with numbered sentences. Then you are asked to address issues related to conventions of language or punctuation. Be sure to read the question carefully so that you know which of the following you are being asked to do:

- identify a sentence with an error
- select the best correction for an error
- improve the writing by combining sentences or revising part of a sentence

TIPS FOR REVISING/EDITING PART A

Read the text in the box and take note of any issues. For example, consider the following:

- Are there words, phrases, or sentences that are difficult to read due to an error in language usage or punctuation?
- Is there any part of the text that could be written more clearly, concisely, or precisely?

After reading and thinking about the text in the box, read the question.

Think about possible ways to correct or improve the text before reading the answer options.

It is highly recommended that you re-read the text in the box and the question at least once after you read the answer options.

The following sample questions show different types of items you may encounter in the first part of the Revising/Editing section.

Example 1—Identify a sentence with an error

Read this paragraph.

> (1) Established in 1946, the National Air and Space Museum (NASM) contains the most prominent collection of historical aircraft in the world. (2) As one of the many museums and landmarks of the Smithsonian Institution, millions of people from around the world visit NASM each year. (3) Over the years, NASM has undergone several renovations and major reconstruction to accommodate more visitors and exhibits. (4) In addition to being a popular Washington, D.C., tourist destination, NASM is home to a research center for terrestrial and planetary science.

Which sentence should be revised to correct a misplaced modifier?

A. sentence 1

B. sentence 2

C. sentence 3

D. sentence 4

Correct Answer for Example 1: B

Sentence 2 begins with the modifying phrase "As one of the many museums and landmarks of the Smithsonian Institution," which refers to NASM but instead modifies "millions of people." It is nonsensical to describe "millions of people" as "one of the many museums and landmarks of the Smithsonian Institution." A revised version of this sentence could be, "As one of the many museums and landmarks of the Smithsonian Institution, NASM sees millions of visitors from around the world each year."

Example 2—Select the best correction for an error

Read this sentence.

> Since college admissions are highly competitive, many students began planning for the admissions process while they attend middle school rather than waiting until they enter high school.

Which edit should be made to correct this sentence?

A. change *are* to **will be**

B. change *began* to **begin**

C. change *attend* to **had attended**

D. change *enter* to **entered**

Correct Answer for Example 2: B

The verbs in this sentence are in present tense, and the error relates to an inappropriate shift in tense. Option B suggests changing the past tense *began* to the present tense **begin**. This edit would correct the inappropriate shift in tense.

Example 3—Improve the writing by combining sentences or revising part of a sentence

Read these sentences.

> (1) Monarch butterflies are common in the United States.
> (2) Monarch butterflies are recognizable by their orange-and-black wings.
> (3) Monarch butterflies travel thousands of miles when they migrate to warmer climates in the fall.

What is the best way to combine these sentences?

A. Because they are common in the United States, monarch butterflies are recognizable by their orange-and-black wings and travel thousands of miles when they migrate to warmer climates in the fall.

B. By traveling thousands of miles when they migrate to warmer climates in the fall and being common in the United States, monarch butterflies are recognizable by their orange-and-black wings.

C. Although they are common in the United States, monarch butterflies, which are recognizable by their orange-and-black wings, travel thousands of miles when they migrate to warmer climates in the fall.

D. Monarch butterflies, common in the United States and recognizable by their orange-and-black wings, travel thousands of miles when they migrate to warmer climates in the fall.

Correct Answer for Example 3: D

The key details of the three sentences are the following: monarch butterflies are common in the United States, they have recognizable orange-and-black wings, and they migrate a long distance. Option D is the best way to combine these sentences because it clearly and concisely combines the ideas in the three sentences into one complex sentence. The sentence begins with the topic, monarch butterflies, and then describes the details. The ideas that monarch butterflies are common in the United States and are recognizable by their orange-and-black wings are combined into one phrase to describe "monarch butterflies." After providing a description of monarch butterflies, the sentence continues on to explain what they do: travel thousands of miles when migrating to warmer climates.

REVISING/EDITING Part B

The second part in the Revising/Editing section measures your ability to read a passage and then make decisions that improve the overall quality of the writing. There are one or two passages in Part B, and each passage is approximately 350 words long. The passages are either argumentative or informative. An argumentative passage presents an argument for a claim by offering supporting evidence. An informative passage introduces a topic and explains the topic by offering supporting details. Subjects include historical and current events, people, places, technology, and phenomena in the biological sciences, physical sciences, and social sciences.

Passages may contain errors in language usage, missing or extraneous supporting details, missing or inappropriate transitions, a missing or an unclear introductory statement or concluding statement, and other errors that are typical in student writing. Each sentence is numbered so that you can quickly locate and refer to specific parts of the passage.

TIPS FOR REVISING/EDITING PART B

In order to ensure a thorough understanding of the text, read the passage carefully rather than skimming it. Make sure that you understand the content of the text so that you can answer questions about how the text is developed and organized.

As you read, be aware of specific sentences and paragraphs that seem illogical, extraneous, redundant, imprecise, informal, or difficult to read. There are most likely questions that ask you to correct or improve those sentences or the organization of ideas in those paragraphs.

After reading the passage in its entirety, read the question carefully. Refer back to the passage and re-read the sentences or paragraphs that are relevant to the question. Keep in mind that it is important to read the sentences that appear both before and after the sentence or paragraph stated in the question.

Take note of any issues in the relevant sentences or paragraphs. Then read each answer option and choose the best one.

The following sample passage and questions show the types of items you may encounter in the second part of the Revising/Editing section.

Example 4

Studying Religions

(1) According to the National Council for the Social Studies, "knowledge about religions is not only a characteristic of an educated person but is necessary for effective and engaged citizenship in a diverse nation and world." (2) In support of this idea, the world history standards in most states in this country include a basic overview of the five major world religions. (3) While public schools are not allowed to promote one religion over another, school officials should understand that the study of world religions through an academic lens is an essential component of history and social studies instruction and needs to be part of every student's education.

(4) It is impossible to deny the role that religion plays in history, literature, and current events. (5) Some schools and teachers are hesitant to educate students about world religions. (6) The First Amendment to the United States Constitution guarantees the separation of church and state, which makes the discussion of religion in public schools seem problematic to some school districts and teachers. (7) The First Amendment also states that the government cannot obstruct religious freedom in the United States. (8) A 2010 survey by Pew Research Center found that more than half of those polled thought teachers were prohibited from teaching classes about religions.

(9) An understanding of different world religions enriches a student's education in several ways. (10) The politics, economics, and laws of countries are often a by-product of religious ideas, and literary and cultural references are better understood through the context of religion. (11) The benefits of this knowledge extend beyond the classroom. (12) Students who get world religions do better when they start working with people who come from different backgrounds. (13) They can appreciate the traditions and values of their neighbors and co-workers and can form educated opinions regarding current events and world issues. (14) A comprehensive study of world religions will help students become informed adults.

Example 4 *continued...*

1. Which sentence would best follow sentence 6 to support the argument presented in the passage?

    A. Some educators avoid the topic altogether, and as a result, many students are not studying the founding ideas of culture and society.
    B. Many teachers are worried about the risk of introducing ideas or concepts that may lead to controversy.
    C. Schools tend to spend more resources teaching mathematics and the physical sciences than teaching the humanities.
    D. In order to protect students' personal beliefs, many teachers think that they should teach only limited ideas about world religions.

2. Which transition should be added to the beginning of sentence 11?

    E. For that reason
    F. In contrast
    G. Of course
    H. Moreover

3. Which revision of sentence 12 uses the most precise language?

    A. Students who are clued into world religions are likely to get along better with the people they work with who are from different places.
    B. Students who know about world religions are likely to understand more about doing business with new people.
    C. Students who understand world religions are better equipped to work with diverse colleagues and customers from around the world.
    D. Students who are familiar with world religions may be more aware of how to do business with acquaintances from other countries.

4. Which sentence is irrelevant to the argument presented in the passage and should be deleted?

    E. sentence 2
    F. sentence 7
    G. sentence 10
    H. sentence 13

QUESTION 1

(A) Sentence 6 states that there is a constitutional foundation for the separation of church and state in the United States and suggests that because of this separation, some educators are unsure of how to treat religion in classrooms. The question asks for a sentence that would follow and further expand on the ideas in sentence 6 and relate to the main claim in the passage. Option A is the only option that explains and makes a connection between educators avoiding the topic of religion and the subsequent impact on a student's education.

QUESTION 2

(H) Sentence 11 is leading into the idea that having an understanding of world religions is also important outside of the classroom. By explaining the benefits of understanding world religion outside of an educational context in sentences 12 and 13, the author is providing further support for the argument that learning about world religions is important. The word "Moreover" (Option H) best conveys that sentence 11 is transitioning to new supporting evidence for the argument on top of what is stated in sentence 10.

QUESTION 3

(C) Sentence 12 uses vague and imprecise language and needs to be corrected. Of all the available options, Option C uses the most precise language ("understand," "better equipped," "diverse colleagues and customers").

QUESTION 4

(F) The question asks for a sentence that is irrelevant to the development of the argument in the passage. Sentence 7 (Option F), while related to the general topic of religion, introduces the idea of a person's freedom to practice a religion but does not relate to the discussion about the study of religion in schools. This sentence should be removed from the passage.

READING COMPREHENSION

This section measures your ability to read and comprehend five to six passages. Each passage is up to 900 words long. The subjects include short biographies, discussions of historical events, descriptions of scientific phenomena, brief essays on art or music, discussions with a point of view, and human interest stories.

TIPS FOR READING COMPREHENSION

In order to ensure a thorough understanding of the text, read the passage carefully rather than skimming it. This will help prevent you from making inaccurate assumptions based on only a few details.

After reading the passage in its entirety, read the question carefully. Re-read the relevant part or parts of the passage.

Try to determine the answer before reading the answer choices. Then read each answer option and choose the best one.

Base your answers only on the information presented in the passage. Do not depend on your prior knowledge of the topic.

The following sample passage and questions show the types of items you may encounter in the Reading Comprehension section.

Example 5

Several animal species, although they remain wild, are comfortable living in close proximity to people. Some of these animals, such as squirrels and pigeons, are plentiful
5 even in big cities. Many make their home in buildings and have developed a taste for human food. Among these species, few have a larger appetite for the products of human civilization than seagulls do.

10 Despite the name, not all gulls live near the sea. Of the forty-four gull species, several are found in deserts or mountain regions, although most inhabit shorelines. On the California coast, western gulls far
15 outnumber other gull species. Glaucous-winged gulls dominate the Pacific Northwest; herring gulls, the North Atlantic coast; ring-billed gulls, the Great Lakes and other inland freshwater; and California
20 gulls, despite their name, the Great Salt Lake in Utah. Because of special glands above their eyes, all gulls can drink saltwater as well as freshwater.

Gulls have a varied natural diet, ranging
25 from fish and shellfish to rodents and insects. They typically break shellfish open by carrying them while they fly and then dropping them onto a hard surface. Some gulls have been seen trying to dine on some
30 rather unusual substances. For example, gulls have attempted to eat golf balls, perhaps mistaking them for the eggs of another species of bird. Others have dropped metal objects, such as nuts and
35 bolts, from the sky onto the ground.

Gulls have learned that human habitation usually means a plentiful, easy food supply. They accept handouts eagerly and will drive off more mild-mannered birds, such as
40 ducks, rather than share food with them. Gulls follow fishing boats and garbage scows, knowing that these are reliable sources of easy pickings. They find landfills, with their plentiful food scraps, especially
45 inviting. Unfortunately, this causes a serious problem when the landfills are located near airports. Gulls have been sucked into the air intakes of jet engines, resulting in fatal plane crashes.

50 Many gulls have adapted to living among city skyscrapers. The buildings' high roofs and straight sides resemble the cliffs where gulls nest in the wild and provide the same kind of updrafts that allow seagulls to glide
55 and soar with little effort. Apart from an occasional hawk, seagulls have few natural predators in urban settings. City living also provides easy access to plenty of garbage.

It seems, though, that gulls are not the best
60 of neighbors. They are noisy and have been known to damage buildings and farm crops and to pester humans carrying food. A whole "gull control" industry has sprung up to discourage seagulls from congregating
65 near human communities. For example, electronic devices produce flashing lights or the sounds of predators, and spikes and sprinklers on buildings and fences deter the birds from roosting. As long as people
70 continue to provide them with food, however, gulls will probably remain the birds next door.

Example 5 *continued...*

1. Which of the following best tells what this passage is about?

    A. how gulls pester both people and animals
    B. how gulls have adapted to living near human communities
    C. how gulls have become tame
    D. how gulls' intelligence helps them survive

2. Which of the following statements about the eating habits of gulls is suggested by the passage?

    E. Gulls have developed a taste for metal objects.
    F. Gulls eat only food that people have thrown away.
    G. Gulls sometimes steal and eat the eggs of other birds.
    H. Gulls are fussy eaters compared with other birds.

3. What species of gull would have the **least** use for the special glands mentioned in line 21?

    A. ring-billed
    B. herring
    C. western
    D. glaucous-winged

QUESTION 1

(B) The correct answer for this question must encompass the main points without being overly broad. The passage explains how gulls have adapted to living in areas near humans, particularly in relation to the gulls' diet (third paragraph and fourth paragraph) and where gulls prefer to fly or build nests (fifth paragraph). This main idea is best stated in Option B.

QUESTION 2

(G) The eating habits of gulls are mentioned in several places throughout the passage. You must keep all of these in mind in order to answer correctly. The third paragraph provides an example of how gulls have attempted to eat golf balls because the balls look like small round eggs. Based on this information, you can infer that gulls eat the eggs of other types of birds. This is best described in Option G.

QUESTION 3

(A) The special glands mentioned in line 21 allow gulls to drink saltwater as well as freshwater. All the gull species in the second paragraph, except the ring-billed gulls, live near saltwater oceans or the Great Salt Lake. Thus, they need the special glands in order drink to saltwater. Ring-billed gulls live near the Great Lakes and other inland freshwater. Freshwater is easily accessible to them, so they have little use for the special glands (Option A).

The Mathematics section consists of word problems and computational questions in either a multiple-choice or grid-in format. There are 5 grid-in items and 52 multiple-choice items. The Mathematics section includes arithmetic, algebra, probability, statistics, and geometry problems. The mathematical terms and general concepts in these test questions can be found in **Common Core Learning Standards for Mathematics**. The math problems involve application of topics covered in the Common Core. However, as one of the purposes of this test is to identify students who will benefit from an education at a Specialized High School, the SHSAT contains many questions that require using mathematical skills to respond to novel situations.

Math problems on the Grade 8 test forms are based on material included in the New York City curriculum through Grade 7. Math problems on the Grade 9 test forms are based on material through Grade 8.

TIPS FOR TAKING THE MATHEMATICS SECTION OF THE SHSAT

To improve your mathematics skills, choose a mathematics textbook or ask your teacher for recommendations for websites for your grade level. Practice solving five to ten problems every day. Do both routine and challenging problems. Routine problems reinforce basic mathematical skills. More challenging problems help you understand mathematics concepts better. Do not limit yourself only to types of problems that test what you have learned in your mathematics class. Do not give up if you cannot complete some of the problems. Skip them and move on. You may be able to solve them after you have practiced different types of problems.

You must know the meanings of **mathematical terms** that are appropriate to your grade level, such as "parallel" and "perpendicular," as well as the customary symbols that represent those terms. You also need to know **various formulas** learned in your mathematics class, such as those for the perimeter and area of different figures. You can find these mathematical terms, symbols, and formulas in your mathematics course materials. These terms, symbols, and formulas will **NOT** be given in the test booklet. Practice using them to solve problems until you are comfortable with them. Do not use a calculator when solving problems. **Calculators are not allowed on the test.**

READ EACH PROBLEM CAREFULLY and work out the answer on scrap paper or in your test booklet. **Do not calculate on your answer sheet.**

YOU MAY DRAW FIGURES OR DIAGRAMS for questions that do not have them. This will help you visualize the context of the problem.

SOME QUESTIONS ASK YOU to combine a series of simple steps. Take one step at a time, using what you know about mathematics and what the question tells you to do.

TIPS FOR MULTIPLE-CHOICE QUESTIONS

MOST MULTIPLE-CHOICE PROBLEMS SHOULD BE DONE by working out the answer. This is more efficient than trying out the options to see which one fits the question. The only exception is when you are explicitly asked to look at the options, as in, "Which of the following is an odd number?"

IF THE QUESTION IS A WORD PROBLEM, it is often helpful to express it as an equation. When you obtain an answer, look at the choices listed. If your answer is included among the choices, mark it. If it is not, reread the question and solve it again.

If your answer is not among the answer choices, write your answer in a different form. For example, $10(x + 2)$ is equivalent to $10x + 20$. Or simplify the fraction, if your answer is in fraction form.

THE INCORRECT CHOICES are answers that people often get if they misread the question or make common computational errors. For this reason, it is unwise to solve a problem in your head while looking at the possible choices. It is too easy to be attracted to a wrong choice.

TIPS **FOR GRID-IN QUESTIONS**

The Mathematics section includes five grid-in questions in which students must solve computational questions and provide the correct numerical answer rather than selecting the answer from multiple-choice options. For each grid-in question, you will write your answer in the boxes at the top of the grid **and** fill in the circles within the grid that match the numbers or symbols that you wrote.

The grid for each question is made up of five columns. When you record your answer in the grid, begin on the left.

Print only **one** number or decimal symbol in each box. Use the "." symbol if your response includes a decimal point.

Fill in the circle under the box that matches the number or symbol that you wrote.

Example A shows the acceptable way to grid an answer of 5. **Example B** shows the acceptable way to grid an answer of 3.2.
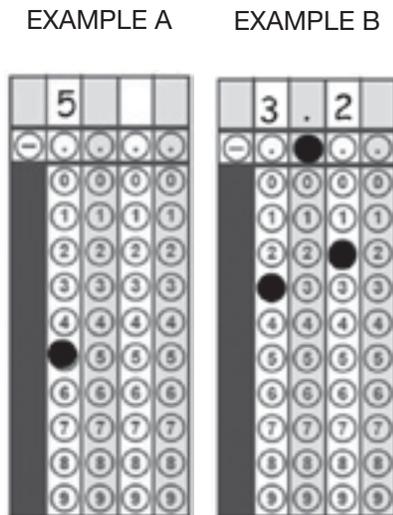
EXAMPLE A   EXAMPLE B

The first column on the left of the grid is **ONLY** for recording a negative sign, as in **Example C**. If your answer is positive, leave the first column blank and begin recording your answer in the second column.

EXAMPLE C
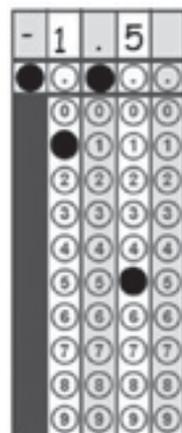
When your answer includes a decimal, make sure to fill in the circles that match all parts of your answer. For example, if your answer is 0.78, fill in the circles under the 0, ".," 7, and 8, like in **Example D**. Note that an answer displaying .78 will also be accepted as correct, like in **Example E**.
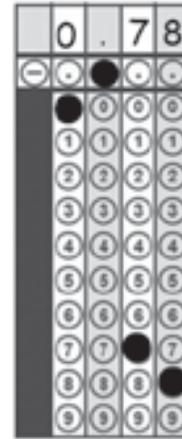
EXAMPLE D   EXAMPLE E
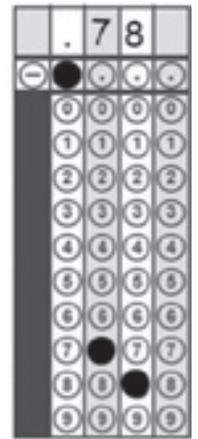
Do not leave a box blank in the **middle** of an answer. If there is a blank in the middle of your answer, it will be scored as incorrect. For example, if your answer is 308, **Example F** is the acceptable way to grid in your response. In **Example G**, there is a space between the 3 and the 8 rather than a 0—this is an unacceptable way to grid in your response and will be scored as incorrect.
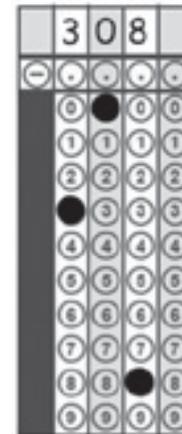
EXAMPLE F   EXAMPLE G
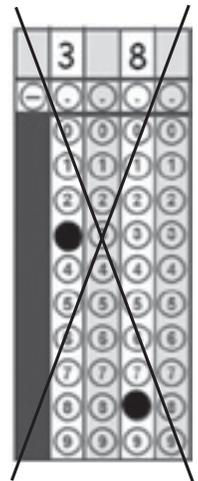
Do not fill in a circle under an unused box, as in **Example H**. The answer recorded in Example H will be scored as 3,080 because the circle in the last column for 0 is filled in.

EXAMPLE H
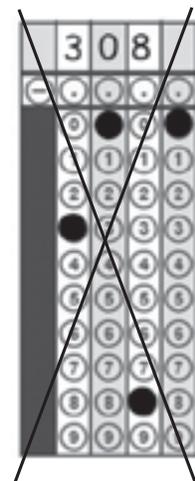
IMPORTANT NOTES

For your answer to be scored, the circles in the grid that match your answer must be filled in. If you write an answer in the boxes but do not fill in the circles in the grid, your answer will not be scored.

A complete numerical response that is correct will be scored as correct, even if you accidentally begin recording in the wrong column.

If you accidentally add a decimal point (with no additional values or zeros) after a whole number, your answer will be scored as that whole number. For example, if your answer is 5, as in Example A, an answer that is filled in as "5." or "5.0" will be considered an answer of "5" in scoring.

Double-check how you have filled in the circles for each grid. If there is more than one circle filled in for a column, your answer will be scored as incorrect. If your answer written in the boxes does not match how you have filled in the circles, your score will be based on how you have filled in the circles, like in Example H.

SAMPLE TESTS AND PRACTICE GRID-IN QUESTIONS

The sample tests in this handbook are Grade 8 forms.

If you are taking the Grade 9 test, work the math problems on pages 143–146 as well. These problems cover topics that are introduced in the Common Core for Grade 8.

Additional grid-in questions are found on pages 149–151.

Now you are ready to try sample test Form A. Begin by carefully reading the Directions on pages 36 and 37 and filling out side 1 of the Answer Sheet on page 38. For Form A, use side 2 of the Answer Sheet (page 39). When you are ready for Form B, use the Answer Sheet on page 91. You may tear out pages 39 and 91 to make it easier to mark your answers.

NEW YORK CITY PUBLIC SCHOOLS
2017 Specialized High Schools
ADMISSIONS TEST

GENERAL DIRECTIONS

Identifying Information

Turn to Side 1 of the answer sheet. **Line 1** says, "I am well enough to take this test and complete it. I understand that once I break the seal of the test booklet, I may not be eligible for a make-up test. I am a New York City resident and a Grade 8 student taking a Grade 8 test. I understand that a student who is not a New York City resident, who takes the test more than once in a given school year, or who takes the test at the wrong grade level will be disqualified from acceptance to any of the specialized high schools." Sign your name in the space following the word "signature." Do not print your name. **Notify the proctor immediately if you are ill or should not be taking this test. Do not sign the statement or begin the test. Return your answer sheet to the proctor.**

On **Line 2**, print today's date, using the numbers of the month, the day, and the year. On **Line 3**, print your birth date with the number of the month first, then the number of the day, then the last two digits of the year. For example, a birth date of March 1, 2003, would be 3-1-03.

In **Grid 4**, print the letters of your first name, or as many as will fit, in the boxes. Write your name exactly as you did on the application. If you have a middle initial, print it in the box labeled "MI." Then print your last name, or as much as will fit, in the boxes provided. Below each box, fill in the circle that contains the same letter as the box. If there is a space in your name, or a hyphen, fill in the circle under the appropriate blank or hyphen.

Make **dark marks** that **completely fill the circles.** If you change a mark, be sure to erase the first mark completely.

Grid 5 is for your choice of specialized high schools. If Grid 5 is not marked correctly, your admission to a specialized high school will be affected because your admission is based on the score you attain and the order in which you rank your school preferences. The school choices indicated on your answer sheet are final. Therefore, carefully copy the order in which you ranked the schools on your Test Ticket onto Grid 5.

Fill in one and only one circle for each school for which you wish to be considered. You may make as few as one or as many as eight choices. To increase your chances of being assigned to one of the specialized high schools, you are encouraged to make more than one choice. You **must** fill in a first choice school. Do not fill in a school more than once. Do not fill in the same school for each choice. Fill in only one circle in a row and only one circle in a column.

Grid 6 asks for your date of birth. Print the first three letters of the month in the first box, the number of the day in the next box, and the year in the last box. Then fill in the corresponding circles.

For **Grid 7:**
1. Print the name of the school where you are now enrolled in the space at the top of the grid.

2. In the boxes marked "SCHOOL CODE," print the six-digit code that identifies your school and fill in the circle under the corresponding number or letter for each digit of the school code. (You can find your school code on your Test Ticket. If it is not there, you or the proctor should look in the Feeder School List under the borough in which your school is located to find the code for your school.)

3. If you attend a private or parochial school, fill in the circle marked "P."

Grid 8 is labeled "STUDENT ID NUMBER." All SHSAT test-takers should write their student ID number in Grid 8. The student ID number is found on your Test Ticket. In the boxes, print your nine-digit student ID number. Below each box, fill in the circle containing the same number as in the box.

> **DO NOT OPEN THIS BOOKLET**
> **UNTIL YOU ARE TOLD TO DO SO**
>
> **TURN YOUR BOOKLET OVER TO THE BACK COVER**

GENERAL DIRECTIONS, continued

Grid 9 is labeled "BOOKLET LETTER AND NUMBER." In most cases, Grid 9 is already filled in for you. If it is not, copy the letter and numbers shown in the upper-right corner of your test booklet into the boxes. Below each box, fill in the circle containing the same letter or number as the box.

Now review Side 1 to make sure you have completed all lines and grids correctly. Review each column to see that the filled-in circles correspond to the letters or numbers in the boxes above them.

Turn your answer sheet to Side 2. Print your test booklet letter and numbers, and your name, first name **first**, in the spaces provided.

Marking Your Answers

Be sure to mark all your answers in the row of answer circles corresponding to the question number printed in the test booklet. Use a Number 2 pencil. If you change an answer, be sure to erase it completely. **You may write in your test booklet to solve problems, but your answers must be recorded on the answer sheet in order to be counted.** Be careful to avoid making any stray pencil marks on your answer sheet.

Each question has only one correct answer. If you mark more than one circle in any answer row, that question will be scored as incorrect. Select the **best** answer for each question. Your score is determined by the number of questions you answered correctly. **It is to your advantage to answer every question, even though you may not be certain which choice is correct.** See the example of correct and incorrect answer marks below.

SAMPLE ANSWER MARKS

1 Ⓐ Ⓑ Ⓒ ● **RIGHT**
2 Ⓐ Ⓑ Ⓒ Ⓓ WRONG
3 Ⓐ Ⓑ Ⓒ Ⓓ WRONG
4 Ⓐ Ⓑ Ⓒ Ⓓ WRONG
5 Ⓐ Ⓑ ● ● WRONG

Planning Your Time

You have 180 minutes to complete the entire test. How you allot the time between the English Language Arts and Mathematics sections is up to you. **If you begin with the English Language Arts section, you may go on to the Mathematics section as soon as you are ready. Likewise, if you begin with the Mathematics section, you may go on to the English Language Arts section as soon as you are ready.** It is recommended that you do not spend more than 90 minutes on either section. If you complete the test before the allotted time (180 minutes) is over, you may go back to review questions in either section.

Work as rapidly as you can without making mistakes. Don't spend too much time on a difficult question. Return to it later if you have time.

Students must remain for the entire test session.

Example 1

DIRECTIONS: Solve the problem. Find the **best** answer among the answer choices given.

E1. If four ice cream cones cost $2.00, how much will three ice cream cones cost?

    A. $0.50
    B. $1.00
    C. $1.25
    D. $1.50

EXAMPLE ANSWER
E1. Ⓐ Ⓑ Ⓒ ●

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

Pearson

A

NY00001234

1109213   1 2 3 4 5 A B C D E   Printed in the USA   ISD16301

2017

NEW YORK CITY PUBLIC SCHOOLS
SPECIALIZED HIGH SCHOOLS ADMISSIONS TEST
GRADE 8

USE A PENCIL ONLY

SIDE 1

8

1. **STUDENT STATEMENT:** I am well enough to take this test and complete it. I understand that once I break the seal of the test booklet, I may not be eligible for a make-up test. I am a New York City resident and a Grade 8 student taking a Grade 8 test. I understand that a student who is not a New York City resident, who takes the test more than once in a given school year, or who takes the test at the wrong grade level will be disqualified from acceptance to any of the specialized high schools.

Signature (full name, first name first): _____

2. **TODAY'S DATE:** _____

   Month Day Year

3. **DATE OF BIRTH:** _____

   Month Day Year

CAREFULLY RECORD YOUR NAME, SCHOOL CHOICES, INFORMATION ABOUT THE SCHOOL WHERE YOU ARE NOW ENROLLED, DATE OF BIRTH, AND STUDENT ID NUMBER.

USE A PENCIL ONLY. INCORRECT MARKS MAY DELAY THE SCORING OF YOUR ANSWER SHEET.

4. **FIRST NAME (please print)** MI **LAST NAME (surname) (please print)**

(Grid of bubbles A–Z for each letter column)

5. **CHOICES OF SPECIALIZED HIGH SCHOOLS**

Indicate your school choice in order of preference.
- Fill in only one school for each choice.
- You **must** fill in a first choice school.
- Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	○	○	○	○	○	○	○
Staten Island Tech	○	○	○	○	○	○	○	○
Stuyvesant	○	○	○	○	○	○	○	○

6. **DATE OF BIRTH**

Month	Day			Year		
JAN	1	11	21	19	0	0
FEB	2	12	22	20	1	1
MAR	3	13	23		2	2
APR	4	14	24		3	3
MAY	5	15	25		4	4
JUN	6	16	26		5	5
JUL	7	17	27		6	6
AUG	8	18	28		7	7
SEP	9	19	29		8	8
OCT	10	20	30		9	9
NOV			31			
DEC						

7. **SCHOOL WHERE YOU ARE NOW ENROLLED**

NAME OF SCHOOL _____

School Code

(Bubble grid columns with letters K, M, Q, X, R, W and digits 0–9)

P Fill in for private or parochial schools only

8. **STUDENT ID NUMBER**

(Bubble grid of digits 0–9)

9. **BOOKLET LETTER AND NUMBER**

(Column of letters A, B, C, D, E, F, G, H, J, K, L, P, Q, W and digit columns 0–9)

198824-001:321

38

NEW YORK CITY PUBLIC SCHOOLS

2017 SPECIALIZED HIGH SCHOOLS ADMISSIONS TEST

GRADE 8

USE A PENCIL ONLY

SIDE 2

Test Booklet Letter   Test Booklet Number

Student's First Name (please print)   Student's Last Name (please print)

PART 1   ENGLISH LANGUAGE ARTS

Answer bubbles for questions 1–57.

PART 2   MATHEMATICS

Gridded-response grids for questions 58–62.

Answer bubbles for questions 63–114.

SAMPLE TEST, FORM A
PART 1 — ENGLISH LANGUAGE ARTS

Suggested Time — 90 Minutes

57 QUESTIONS

REVISING/EDITING

QUESTIONS 1–20

IMPORTANT NOTE

The Revising/Editing section (Questions 1-20) is in two parts: Part A and Part B.

REVISING/EDITING Part A

DIRECTIONS: Read and answer each of the following questions. You will be asked to recognize and correct errors in sentences or short paragraphs. Mark the **best** answer for each question.

1. Read this sentence.

> During a nightly-news segment about a cooking contest, a reporter talked to some people who did the best in the contest.

Which of these is the most precise revision for the words ***talked to some people who did the best in the contest***?

A. conversed with some of the people who won the contest

B. spoke to the three contestants who did well

C. discussed the contest with some of the winners

D. interviewed the top three contestants

2. Read this paragraph.

(1) When coal was used to heat homes, it frequently left a soot stain on the walls. (2) Brothers Cleo and Noah McVicker, who owned a cleaning product company, created a doughy substance to help people remove this soot. (3) Over time, as natural gas becomes more common, people had little need for soot cleansers, and the McVickers' family company struggled to stay in business. (4) Then one day, Joe McVicker, Cleo's son, learned that his sister-in-law had been using the substance for art projects in her classroom, so he remarketed the product as the toy known today as Play-Doh.

Which sentence should be revised to correct an inappropriate shift in verb tense?

E. sentence 1

F. sentence 2

G. sentence 3

H. sentence 4

3. Read this sentence.

The animal shelter, which is located on Midway Street, is looking for volunteers to help with a variety of tasks, such as walking dogs cleaning kennels, hand-feeding newborn kittens, and supporting the pet adoption process.

Which edit should be made in this sentence?

A. delete the comma after ***shelter***

B. insert a comma after ***volunteers***

C. insert a comma after ***dogs***

D. delete the comma after ***kennels***

4. Read these sentences.

> (1) Flyby missions near Jupiter have been happening since 1973.
>
> (2) Flyby missions allow scientists to collect data about Jupiter and its moons.

What is the best way to combine these sentences to clarify the relationship between the ideas?

E. Flyby missions near Jupiter, which allow scientists to collect data about the planet and its moons, have been happening since 1973.

F. Although there have been flyby missions near Jupiter since 1973, they have allowed scientists to collect data about the planet and its moons.

G. Flyby missions near Jupiter allow scientists to collect data about the planet and its moons, which have been happening since 1973.

H. Since 1973 flyby missions have been happening near Jupiter, but they allow scientists to collect data about the planet and its moons.

5. Read this paragraph.

> (1) Eliza and Brianna have been singing in their school chorus since they were in fourth grade. (2) The girls always sing a duet at the school talent show, and they take turns singing the national anthem before school sporting events. (3) Outside of school, she also sings in a choir made up of young and old members of her community. (4) Both girls hope that they will be able to continue singing for many more years.

Which sentence should be revised to correct a vague pronoun?

A. sentence 1

B. sentence 2

C. sentence 3

D. sentence 4

6. Read this sentence.

> In 1962 the agile athletic Wilt Chamberlain became the first and only professional basketball player in the United States to score 100 points in a single game.

Which edit should be made to correct this sentence?

E. insert a comma after *agile*

F. insert a comma after *Chamberlain*

G. insert a comma after *only*

H. insert a comma after *States*

DIRECTIONS: Read the passage below and answer the questions following it. You will be asked to improve the writing quality of the passage and to correct errors so that the passage follows the conventions of standard written English. You may reread the passage if you need to. Mark the **best** answer for each question.

Unlock, Ride, Return

(1) In metropolitan areas around the world, millions of cars, trucks, and taxis pack the streets every day, causing headaches for commuters and polluting the environment. (2) Public transportation eases some of this congestion, but crowding and potential delays are still an issue for many travelers. (3) In recent years, another transportation option has been gaining momentum in some cities. (4) This option is all about sharing bicycles, which is a creative and new idea for some.

(5) The bike share concept is fairly simple. (6) Bike stations are set up at multiple locations in a city. (7) Frequent users can purchase a membership pass, while less-frequent users or tourists can buy a daily permit. (8) Many city bikers prefer bike sharing over ownership. (9) They are not responsible for the bike's storage or its maintenance. (10) Tourists also benefit from having an affordable way to experience the sites of a city.

(11) The largest bike sharing program in the United States today is in New York City. (12) Known as Citi Bike, the program was launched in 2013 and now boasts 10,000 bikes spread across 600 stations in Manhattan, Brooklyn, and Queens. (13) Similarly, in Hangzhou, China, a city of 7 million residents, there are approximately 75,000 bikes offered across 2,700 stations. (14) In 2016, people used Citi Bike for a lot of trips, which turned out to be a huge increase in the number of people taking rides from the previous year. (15) These numbers are likely to increase further, since the program is set to expand into additional neighborhoods soon. (16) According to Citi Bike, the bike sharing concept has gained rapid popularity because it is "faster than walking, cheaper than a taxi, and more fun than the subway."

(17) New York City officials estimated that in 2016 the bike share program had kept nearly 5,000 tons of carbon dioxide out of the city's air. (18) Officials in Montreal, Canada, and Lyon, France, have noted similar impacts on air quality.

(19) As populations grow, fuel costs increase, and environmental concerns escalate, people will continue to search for more economical and environmentally friendly ways to travel. (20) Bike sharing is a new mode of transportation.

7. Which sentence should replace sentence 4 to more clearly introduce the topic of this passage?

    A. Bike share programs have become an accessible and environmentally friendly solution for many urban travelers.

    B. Bike share programs are successful because both residents and tourists can use the bicycles to travel within a city.

    C. Bike share programs offer an alternative form of transportation in urban areas that is faster than using a car or taxi.

    D. Bike share programs have created an affordable mode of transportation for people in large cities throughout the world.

8. Which sentence can best follow sentence 6 to help develop the ideas in the second paragraph (sentences 5–10)?

   E. Bike sharing stations that are located near tourist destinations or major transportation hubs are the most popular.

   F. A person obtains a bike from one station, rides it for a period of time, and then returns the bike to the original station or to another station within the system.

   G. A mechanism called a dock keeps each bicycle securely locked to the station until a user comes along, releases the lock, and starts a ride.

   H. Bike sharing stations have been built in many of the largest cities in the United States, including Boston, San Francisco, Chicago, Minneapolis, and Denver.

9. What is the best way to combine sentences 8 and 9 to clarify the relationship between the ideas?

   A. Although they prefer bike sharing over ownership, many city bikers are not responsible for the bike's storage or its maintenance.

   B. Many city bikers prefer bike sharing over ownership, and they are not responsible for the bike's storage or its maintenance.

   C. Since many city bikers prefer bike sharing over ownership, they are not responsible for the bike's storage or its maintenance.

   D. Many city bikers prefer bike sharing over ownership because they are not responsible for the bike's storage or its maintenance.

10. Which revision of sentence 14 uses the most precise language?

    E. In 2016, data revealed that Citi Bike was used for millions of trips, which shows that the program had a 40 percent increase in ridership from the previous year.

    F. In 2016, nearly 14 million trips were recorded by Citi Bike, which adds up to a huge increase in ridership compared with the previous year.

    G. In 2016, Citi Bike documented nearly 14 million trips, which amounted to an astonishing 40 percent increase in ridership from the previous year.

    H. In 2016, Citi Bike saw several million trips, which turned out to be a big increase in ridership from the previous year.

11. Which sentence should be added before sentence 17 to improve the organization of the fourth paragraph (sentences 17–18)?

    A. Experts increasingly want to discuss the positive effects of bike sharing programs, such as Citi Bike, in big cities.

    B. While bike sharing programs offer clear benefits to riders, some people cite another reason for their support of the bike share model.

    C. If bike sharing programs are going to continue to increase in popularity, it is important for communities to discuss all the benefits these programs offer.

    D. Citi Bike is an innovative program that can cite positive statistics about ridership from one year to another.

12. Which sentence could best follow sentence 18 and support the main point of the fourth paragraph (sentences 17–18)?

    E. Bike share programs are developed in cities mainly to improve air quality.

    F. Participating in a bike share program is the main way travelers can improve air quality in cities.

    G. Cities may begin to experience improved air quality as more travelers use bike share programs.

    H. Bike share programs may be more effective at improving air quality in some cities than they are in other cities.

13. Which sentence is irrelevant to the ideas in the third paragraph (sentences 11–16) and should be deleted?

    A. sentence 12

    B. sentence 13

    C. sentence 15

    D. sentence 16

14. Which concluding sentence should replace sentence 20 to better support the information presented in the passage?

    E. Over time, bike sharing may become a routine part of modern urban life.

    F. Even small- or medium-sized cities can benefit from implementing a bike share program.

    G. Compared with other solutions, bike sharing seems to have the most potential.

    H. Ultimately, bike sharing is an interesting and unique way for tourists to explore a city.

Pursuing a Hobby

(1) A hobby is an activity or interest that a person pursues for pleasure or relaxation. (2) For some it is a sport or a game, while for others it is an art, a craft, or a volunteer opportunity. (3) Becoming involved in a hobby can seem difficult and time consuming, but that should not stop people from pursuing one.

(4) Hobbies can be an outlet for the stress of everyday life. (5) School, work, family responsibilities, and relationships can all compete for a person's time and attention. (6) Many people exhibit psychological symptoms of stress, such as boredom, tension, and anxiety. (7) Others report physical symptoms, including low energy, headaches, and insomnia. (8) Reading books, creating works of art, or playing games can give the human mind a reprieve from stress. (9) But stress relief is not the only benefit of pursuing a hobby.

(10) People who regularly pursue a hobby spend time in what is called active leisure. (11) Active leisure involves doing an activity that is relaxing but that also expends some mental or physical energy, such as following a pattern to knit a scarf, analyzing statistics about a favorite sports team, or doing light noncompetitive exercise. (12) During active leisure, people may experience what experts call flow, or a state of effortless concentration. (13) Pursuing a stimulating hobby can help a person find flow, which psychologists believe is more relaxing and restorative than passive leisure activities, such as watching television. (14) Many successful businesspeople and celebrities have said that they pursue hobbies in their free time.

(15) Another benefit of hobbies is that they can encourage positive social interaction among people with similar interests. (16) A hobbyist might decide to do something to get better at a hobby or go to places with other people interested in the hobby. (17) Making connections and having discussions with fellow hobbyists can enhance a person's knowledge about a hobby while fostering new friendships.

(18) Free time is a precious commodity, and spending it engaged in a hobby has many advantages. (19) Finding an enjoyable hobby may take effort, but the physical, mental, and social effects of engaging in a hobby are overwhelmingly positive.

15. Which sentence should follow sentence 3 to state the main claim of the passage?

   A. Hobbies offer a variety of benefits, and people should set aside time to pursue them.

   B. People should select a hobby carefully before investing the time and resources.

   C. Hobbies are a productive way to spend free time, so people should pursue them.

   D. People should find hobbies that bring them pleasure and enjoyment.

16. Which transition word or phrase should be added to the beginning of sentence 6?

   E. For example

   F. Indeed

   G. As a result

   H. Also

17. Read this sentence.

> Active hobbies, such as jogging or yoga, can also provide relief from some of the effects of stress, because they prompt the body to release chemicals called endorphins, which can promote positive feelings.

Where should this sentence be added to best support the ideas in the second paragraph (sentences 4–9)?

A. between sentences 6 and 7
B. between sentences 7 and 8
C. between sentences 8 and 9
D. at the end of the paragraph (after sentence 9)

18. Which revision of sentence 16 uses the most precise language?

E. A hobbyist might try to learn more about a hobby or go to events with other people who also like the same hobby.
F. A hobbyist might enroll in a course related to the hobby or attend a convention with other people who enjoy the hobby.
G. A hobbyist might try to find new information about a hobby or go to places where other people are involved with the hobby.
H. A hobbyist might want to expand his or her knowledge of a hobby or do an activity with other people who pursue the same hobby.

19. Which sentence would best follow sentence 17 to support the ideas in the fourth paragraph (sentences 15–17)?

A. Meaningful friendships are associated with an increased sense of self-confidence and happiness.
B. Participating in a hobby with friends is usually more enjoyable than pursuing a hobby alone.
C. Friends who enjoy pursing a hobby together will likely enjoy pursuing other hobbies together.
D. Forming deep and rich friendships can become more challenging as people get older.

20. Which sentence is irrelevant to the ideas presented in the third paragraph (sentences 10–14) and should be deleted?

E. sentence 10
F. sentence 11
G. sentence 13
H. sentence 14

DIRECTIONS: Read the passage below and answer the questions following it. Base your answers **on information contained only in the passage.** You may reread a passage if you need to. Mark the **best** answer for each question.

The eruption of the Philippine volcano Mount Pinatubo in June 1991 sent a huge cloud of gas and dust encircling the globe. The dust and ash from Mount Pinatubo was blamed
5 for a two-year decrease in global temperature, changes in weather patterns, and damage to the ozone layer. The situation brings to mind a meteorological event that occurred 175 years earlier. At that time,
10 harsh weather conditions plagued much of eastern North America and, to a lesser extent, northern Europe.

April 1816 brought typical spring weather to upstate New York and New England; trees
15 budded, and farmers prepared to plow and plant. In May, however, the expected warm temperatures failed to arrive. Most people remained optimistic, waiting for the summer that was "just around the corner." They
20 waited in vain. June ushered in what modern meteorologists call "The Year Without a Summer." During the first week of June, ten inches of snow fell on New England. Throughout the month, temperatures rarely
25 rose above the 30s. Many farmers replanted crops several times, only to see them stunted or destroyed by sleet, hail, and icy winds. July and August brought little improvement. During most days the temperature stayed in
30 the 40s. Farmers' diaries document the farmers' daily struggles with near-freezing temperatures, failing crops, and dying farm animals. The few crops that managed to survive were killed by frost in mid-
35 September. Winter came early in New England and was unusually severe. Even the South was affected; on July 4, the high temperature for Savannah, Georgia, was only 46 degrees!

40 Some religious leaders warned their congregations that the unusual weather meant that the end of the world was drawing near. Other leaders attributed the cool weather to unusual sunspot activity. The
45 proliferation of the newly invented lightning rod was also blamed. Some people believed that lightning rods had interrupted the natural temperature balance of Earth, causing the cooler temperatures.

50 It was not until October that the first plausible explanation for "The Year Without a Summer" was suggested. A German astronomer, Friedrich Bessel, reported seeing thick clouds of dust in the upper atmosphere.
55 He theorized that these dust particles screened portions of Earth from the warming rays of the sun. It was discovered that in April 1815, Mount Tambora, an Indonesian volcano, had erupted with such force that it
60 had sent an estimated 100 cubic miles of fine dust into the atmosphere. Witnesses to the eruption reported that the sky remained dark for two days. The dust then rose high into the stratosphere, where it encircled the world for
65 several years to come.

Skeptics in 1816 doubted that a faraway volcano could steal their summer. However, most present-day researchers believe Bessel's explanation to be generally correct,
70 demonstrating the global nature of weather. The dust in the atmosphere eventually settled, and the spring of 1817 was back to normal.

21. Which of the following best tells what this passage is about?

    A. the belief of some religious leaders that the end of the world was coming in 1816
    B. a summer of strange weather and its probable cause
    C. the importance of summer weather to agriculture in New England
    D. a comparison of the weather of 1816 and 1991

22. What is the most likely reason farmers persisted in replanting their crops?

    E. They believed that the cold weather could not continue all summer long.
    F. They thought that crops would be able to survive even though the weather remained cold.
    G. The weather had warmed up by July.
    H. They thought the June snowfalls would provide needed moisture.

23. In the winter that followed the summer of 1816, New Englanders most likely experienced

    A. new weather events that they had not encountered before.
    B. temperatures that were warmer than usual for that time of year.
    C. shortages of fruits, vegetables, and other essential crops.
    D. difficulty adjusting to a different time line for planting crops.

24. Which of the following is implied by the phrase "the global nature of weather" (line 70)?

    E. Understanding weather events around the world is important for making weather predictions.
    F. Extreme weather conditions in some parts of the world can have a lasting impact on a geographical area.
    G. Natural disasters tend to occur in different parts of the world at the same time.
    H. Conditions in one part of the world can affect weather in another part of the world.

25. The author includes the details about the eruption of Mount Tambora in lines 57–65 in order to

    A. emphasize that the aftermath of the eruption still affects the environment today.
    B. highlight the severe impact that the eruption had on the atmosphere.
    C. provide details about what happens during a volcanic eruption.
    D. suggest that weather events around the world caused the eruption.

26. The cold summer of 1816 was most likely caused by

    E. unusual sunspot activity.
    F. the excessive use of lightning rods.
    G. damage to the ozone layer.
    H. an increase in dust in the atmosphere.

27. How does the third paragraph contribute to the passage?

    A. It presents the most probable cause of the 1816 weather.
    B. It shows how nineteenth-century people explained the 1816 weather.
    C. It presents a theory about the 1816 weather that some skeptics doubted.
    D. It includes eyewitness reports to describe the source of the 1816 weather.

The British novelist Charles Dickens is well known for the colorful and eccentric characters he created in his many novels. But one of his books, *David Copperfield*, seems to
5 have a great deal to do with fact as well as fiction. After attempting to write his autobiography, Dickens abandoned the project and began to work on a novel, the plot of which was loosely based on his own
10 boyhood experiences. Apparently, it was easier for him to weave the events of his own life into the fiction of *David Copperfield* than to write about them in nonfiction.

Some of Dickens's most troubling memories
15 involved a job he held in 1824 as a 12-year-old child. Because his family was deeply in debt, he was forced to quit school and go to work in a London factory, pasting labels on pots of shoe polish. Dickens lived in a
20 boardinghouse, using his meager wages to support himself and to help pay his family's debts. He worked in the dreary, run-down factory six days a week from 8:00 a.m. to 8:00 p.m. Such long hours were not unusual
25 at the time, for children or adults, but Dickens was miserable during the entire four months he spent working at the factory.

Even when the family finances improved, Dickens continued to work at the factory
30 until his father quarreled with Dickens's boss, who promptly dismissed the son. Dickens was upset at being fired but relieved to be out of the factory. Thus he felt betrayed when his mother, anxious for the boy's weekly
35 wage, succeeded in making peace and getting Dickens's job back for him. The father, however, now sided with his son, and the boy was sent back to school. "I know how these things have worked together to make me
40 what I am," Dickens later wrote, but he never forgot that his mother was eager for him to return to work.

As an adult, Dickens always remembered the shame and humiliation he felt during those
45 months at the factory. For years afterward, whenever in London, he could not go near the sites of the factory and boardinghouse, going out of his way to avoid those painful reminders of his past. In fact, Dickens never
50 told his wife and children about his childhood work experience. It was only after his death that they heard of it from a family friend whom Dickens had confided in.

Instead, Dickens expressed his feelings by
55 giving his fictional "other self," David Copperfield, a job similar to the one he had so hated. In the novel, ten-year-old David is forced by his harsh stepfather to work as a bottle washer in a factory. Young David, who
60 "suffered exquisitely" as a child manual laborer, was apparently Dickens's way of dealing with his own past. *David Copperfield* was to become Dickens's most popular novel, and Dickens himself called it his "favorite
65 child."

28. Which of the following best tells what this passage is about?

    E. Dickens's motivations for becoming a writer

    F. Dickens's childhood relationship with his parents

    G. the autobiographical basis for Dickens's *David Copperfield*

    H. the characters created by Dickens for *David Copperfield*

29. In the fourth paragraph, the author includes details about Dickens's experiences as an adult in order to

    A. highlight that the time Dickens spent working in the factory affected him throughout his life.

    B. emphasize that Dickens made sure he would never have to work in a factory again.

    C. highlight that Dickens did not readily share details about his childhood with others.

    D. emphasize that Dickens did not want his own children to experience hardships.

30. The details in the second and third paragraphs suggest that young Dickens

    E. struggled to perform his job in the factory.

    F. worried about the financial situation of his family.

    G. wished he had a better relationship with his parents.

    H. preferred attending school to working in a factory.

31. Which of the following is the most likely reason that Dickens wrote *David Copperfield*?

    A. He needed money from the novel to help pay his family's debts.

    B. He needed a way to cope with the difficulties of his childhood.

    C. He wanted to avoid telling his children about his experiences in the factory.

    D. He wanted to explain how his childhood had influenced his adult life.

32. Based on the details in the third paragraph, what can be concluded about the relationship between Dickens and his mother?

    E. He avoided her after he was allowed to return to school.

    F. He resented her for putting the need for his wages above his happiness.

    G. He hoped she would understand why attending school was important to him.

    H. He recognized that she had the authority to negotiate on his behalf.

33. What most directly enabled Charles Dickens to return to school?

    A. the discussion between his mother and his boss

    B. the argument between his father and his boss

    C. getting fired from the factory

    D. getting support from his father

When you eat an orange, your experience of its flavor comes from the combination of its aroma and its taste. Taste buds, the sensory receptors on the tongue, convey information to the brain about chemicals in food while the food dissolves in saliva. The sense of smell comes into play when the olfactory nerve in the nasal passages senses even very low concentrations of food chemicals in gaseous form. The sense of smell has a larger role in tasting flavors than most people realize— that is, until they have a stuffy nose and nothing tastes good.

If taste and smell depend on our detection of food chemicals, one might expect that chemists would be able to duplicate the flavors of foods. In fact, a surprising number of popular food flavors can now be reproduced in the laboratory, and even more are on the way. Orange, perhaps the most popular flavor worldwide, has been reproduced successfully. So have some national favorites, including cashew (Latin America), paprika (Hungary), and fruit-flavored Jamaica (Mexico). Synthetic flavors are not limited to flavoring food; they are also added to mouthwashes, toothpastes, beverages, and other consumer products.

Only a small proportion of the chemical components occurring naturally in foods actually contributes to their flavor. To identify these critical components, scientists use a gas chromatograph to separate a food into its basic chemical constituents. Flavor experts, called flavorists, then attempt to isolate those chemicals that are essential to the distinctive flavor of a food. Mechanical techniques have been developed to capture the aromas of food as it is being prepared— such as the smell of baking bread—and distill the essential chemicals from these essences. Flavorists use their highly developed senses of taste and smell to attempt to produce acceptable flavorings that are chemically identical to, but purer than, flavors that are naturally present in unprocessed food.

Although American consumers claim to want "natural" flavors in their food, taste tests demonstrate that they often prefer their synthetically produced counterparts. Artificial flavors tend to be stronger and less subtle than natural flavors. For example, many Americans prefer a soft drink created with artificial flavors, such as orange soda, over an "all-natural" soda flavored with real oranges, which may taste weak in comparison. In fact, some flavorists worry that consumers will develop such a strong taste for artificial flavors that natural flavorings, usually more expensive than their artificial counterparts, will become scarce.

Researchers have not always been successful in their efforts to duplicate natural flavors. Some popular flavors, such as coffee, strawberry, and chocolate, have proven virtually impossible to reproduce. The difficulty in creating a flavor like chocolate, experts say, is its complexity—a mysterious combination of sweet and bitter that excites the taste buds in an unusual and satisfying way.

34. Which of the following best tells what this passage is about?

    E. the relationship between smell and taste
    F. the science of how taste buds work
    G. the analysis and creation of flavors
    H. the difficulty of producing artificial flavors

35. What is the principal goal of the scientific research described in the third paragraph?

    A. to predict consumer taste preferences in food
    B. to develop food with strong flavors
    C. to produce synthetic equivalents of natural food flavors
    D. to improve the natural flavors in unprocessed food

36. Which of the following can be concluded from the collection of aromas during food preparation?

    E. Creating artificial flavors from captured aromas is a difficult process.
    F. Certain chemical components of a food's flavor are present in its aroma.
    G. Most people cannot tell the difference between natural flavors and artificial flavors.
    H. The natural flavor of a food is usually enhanced during the cooking process.

37. Why does the author mention orange soda in the fourth paragraph?

    A. to suggest that consumer preferences for natural or artificial flavors vary
    B. to explain why natural flavors are more expensive than artificial substitutes
    C. to demonstrate that consumers sometimes prefer artificial flavors to natural flavors
    D. to give an example of a natural flavor that may become difficult to find in the future

38. The author describes the role that the sense of smell plays when experiencing a flavor (lines 6–13) in order to

    E. emphasize that it is easier for a person to sense the aroma of a flavor than its taste.
    F. highlight that the aroma of a flavor influences how a person perceives its taste.
    G. emphasize that synthetic flavors need to have both an aroma and a taste.
    H. highlight that synthetic flavors tend to have a stronger aroma than taste.

39. The author includes details about the uses for synthetic flavors in lines 25–28 in order to

    A. show that synthetic flavors are easy to create.
    B. demonstrate that many items are made with the same synthetic flavor.
    C. suggest that synthetic flavors are healthier than natural flavors.
    D. highlight that synthetic flavors are found in a variety of everyday items.

The African country of Zimbabwe took its name from the Shona word meaning "stone enclosures" or "venerated houses." In fact, today dozens of stone ruins are scattered
5 throughout Zimbabwe and other areas in southeastern Africa. One of these ruins, known as Great Zimbabwe, was once a fabled city that inspired tales that circulated throughout Europe. Where was this
10 remarkable city, and who had built it? For centuries the mystery occupied the minds of explorers and treasure seekers.

The first reports to Europeans of Great Zimbabwe were spread a thousand years ago
15 by Arab traders sailing between the Middle East and the east coast of Africa. They told of the fabulous wealth of a mysterious stone city in the African interior. In their tales, that city became associated with their
20 understanding of Middle Eastern history— the Queen of Sheba, King Solomon, and his legendary gold mines, long since lost to the world. By the sixteenth century, Portuguese explorers regularly visited East Africa,
25 searching for "King Solomon's gold," but they never found Great Zimbabwe. In 1552, a Portuguese historian, João de Barros, recorded a story told by the Arabs about a city with a "square fortress of masonry
30 within and without, built of stones of marvelous size, and there appears to be no mortar joining them."

In fact, Great Zimbabwe *was* a marvel. In one area, a massive wall, over thirty feet high
35 and twenty feet thick, created a great enclosure. Another area contained a fortress-like series of walls, corridors, and steps built into the bluff above. Throughout the city, each stone was precisely fitted to the others
40 without the use of mortar.

In the 1870s, a German geologist, Karl Mauch, was the first European to see Great Zimbabwe, by then in ruins. Mauch realized that he had "rediscovered" the fabled city
45 from de Barros's story. He jumped to the conclusion that Great Zimbabwe had been

built by the Queen of Sheba. British authorities sent a British journalist, Richard Hall, to Great Zimbabwe to investigate
50 Mauch's report. Archaeology was still in its infancy, and Hall, convinced that the structures had been built by ancient people from the Middle East, dug up and discarded archaeological deposits that would have
55 revealed much about the true history of Great Zimbabwe. Later European excavations destroyed even more valuable evidence.

In the twentieth century, after excavating
60 areas that had not been disturbed, David Randall-MacIver, a Scottish Egyptologist, and Gertrude Caton-Thompson, an English archaeologist, concluded that the ruins were unmistakably African in origin. Great
65 Zimbabwe was most likely built during the fourteenth or fifteenth century by the ancestors of the present-day Shona people. Recent carbon-14 dating supports their conclusion. Great Zimbabwe was once home
70 to an estimated 20,000 people, the center of a great Shona kingdom. Wealthy Shona kings traded their ivory and gold in coastal towns for other goods, thus accounting for the discovery of beads and other foreign wares in
75 the ruins.

One mystery of Great Zimbabwe had been solved. Another mystery remains: why was the settlement at Great Zimbabwe abandoned, leaving the magnificent stone
80 architecture to fall into ruins?

40. Which statement best describes the central idea of the passage?

   E. Great Zimbabwe was an enormous stone city thought to be home to some of the greatest treasure of ancient history.

   F. Mysteries related to Great Zimbabwe continue to interest historians and explorers even though archaeologists have confirmed its origins.

   G. The history of Great Zimbabwe was subject to much speculation until modern archaeologists definitively determined its origins.

   H. Early missteps in the study and excavation of the Great Zimbabwe ruins led to the loss of valuable evidence about the city.

41. What was the main way that Karl Mauch's conclusions about Great Zimbabwe (lines 45–47) affected later archaeological investigations?

   A. Archaeologists from all over Europe became interested in excavating the area.

   B. Archaeologists made assumptions about the history of the ruins before excavating.

   C. Archaeologists started to believe that many of the past accounts recorded about the ruins were true.

   D. Archaeologists realized it was unlikely that an ancient culture could build such a grand structure.

42. What was "one mystery of Great Zimbabwe" (line 76) that had been solved?

   E. when the settlement was abandoned and why

   F. why there was no ivory or gold found in the ruins

   G. why the ruins remained undiscovered until the 1870s

   H. who had built the settlement and when

43. Which of the following statements about the Shona people is best supported by the passage?

   A. They live along the east coast of Africa.

   B. They are descendants of the people who built Great Zimbabwe.

   C. They lived in the Middle East before settling in Africa.

   D. They were once ruled by King Solomon and the Queen of Sheba.

44. The conclusions of David Randall-MacIver and Gertrude Caton-Thompson were significant mostly because they

   E. proved that Great Zimbabwe was much older than previously thought.

   F. questioned why the Shona people left Great Zimbabwe.

   G. supported the idea that ancient Shona society was robust.

   H. revealed that Great Zimbabwe was created by the ancient Shona people.

45. Which of the following best describes the relationship of Portuguese explorers to Great Zimbabwe?

   A. They searched for it but were never able to find it.

   B. They hoped it was as grand as they had been told by traders.

   C. They knew it was unlikely they would find the stone city.

   D. They had to rely on information from others in order to search for it.

In many cultures, the ugly physical appearance of the bat has given it an unearned reputation as an evil and vicious bearer of diseases. Many people, for example,

5 believe that little brown bats carry rabies. In fact, they are no more likely to transmit the disease than other animals, such as dogs. Brown bats actually help prevent disease, not spread it. The basis of their diet is the

10 mosquito, an insect that transmits more diseases than all the bats in the world combined.

A group of bat species known as flying foxes or fruit bats serves another important

15 purpose as a critical link in the reproduction of many tropical trees and shrubs. In the tropical rain forests of Africa, Asia, and Australia, plants such as avocados, date trees, cashews, and mangoes rely in part on

20 flying foxes for pollination. One of Africa's most valuable hardwood trees, the iroko, is entirely dependent on this type of bat for pollination. Flying foxes feed on flowers, fruit, and nectar, flying from one plant to another

25 and pollinating the plants as they go, much as bees do in other parts of the world. Because they are sloppy eaters, flying foxes drop fruit as they go, dispersing the seeds. They can travel great distances and convey

30 pollen and seeds far from their origins, thereby maintaining the genetic biodiversity within a plant species.

Because of the importance of bats' role in pollination and seed distribution, scientists

35 consider them a keystone in the ecosystems of tropical rain forests. Without bats, many bat-pollinated plants—and the animals that depend on them for food and shelter—would be threatened to the point of extinction.

40 Areas outside the rain forests would be affected as well, since the rain forests' lush vegetation replenishes the oxygen in the global atmosphere.

Unfortunately, many people are determined

45 to get rid of bats. Flying foxes are at particular risk. In the wild, they feed on wild fruit, but when their rain forest habitat is reduced by conversion into farmland or residential areas, they occasionally raid

50 cultivated fruit trees, spoiling the crops. Several flying fox species have been hunted to extinction, while others are seriously endangered.

Conservation groups and government

55 agencies in many countries are attempting to change people's attitudes toward bats. When people learn that bats pollinate the trees and crops that provide their livelihood, they are more likely to appreciate and protect the bats

60 in their area. There are also effective, nonharmful ways to deal with troublesome bats. Orchard owners can cover their trees with netting to discourage the bats, and there are humane methods for moving bats from

65 places where they are not wanted. For the sake of the rain forests and for life-forms everywhere that depend on them, it is urgent that people apply a new twist to an old adage and realize that ugliness is only skin deep.

46. Which statement best reflects the central idea of this passage?

   E. Bats provide numerous benefits to the environment and should be protected.
   F. Bats are still considered pests even though people understand that bats are helpful.
   G. Bats help limit the spread of disease by eating insects that carry diseases.
   H. Bats are responsible for pollinating a variety of rain forest plants across great distances.

47. Which of the following best describes animal species that function as a "keystone" (line 35)?

   A. They can be threatened with extinction.
   B. They are a food source for other animals.
   C. They pollinate many different types of plants.
   D. They help maintain the balance of their environment.

48. Which statement best describes the author's opinion about bat conservation?

   E. Allowing bats to occasionally eat crops and fruit from cultivated trees is a good way to prevent bats from becoming endangered.
   F. Because bats can support the growth of many different species, they should be relocated to areas with struggling ecosystems.
   G. Although bats may seem to be a nuisance, it is vitally important that they are protected and managed in humane ways.
   H. Protecting the bat population takes priority over concerns about bats ruining cultivated trees and crops.

49. Which evidence best supports the claim that the bat is important to the survival of certain species?

   A. the details about how bats pollinate the iroko tree
   B. the information about how bats help maintain genetic diversity
   C. the details about how bats sometimes eat cultivated fruit trees
   D. the information about how bats consume mainly mosquitoes

50. In the third paragraph, the author includes the details about the bat's role as a keystone species in order to

   E. convey that bats help distribute seeds throughout the rain forest.
   F. show that bats provide food and shelter for other animals.
   G. emphasize that threats to bats would affect the rain forest ecosystem.
   H. highlight that bats help maintain the levels of oxygen in the atmosphere.

51. What does the author intend to convey by the statement "ugliness is only skin deep" (line 69)?

   A. Certain species of bats have a less appealing physical appearance than other species of bats.
   B. People should avoid making assumptions about bats based on the animals' physical appearance.
   C. People should avoid removing bats from certain areas because of the physical appearance of bats.
   D. Efforts to conserve bats are worthwhile even though people dislike the animals' physical appearance.

Imagine living in a society where ordinary people could be punished for what they choose to read and write. For much of the twentieth century, such a closed society existed in Russia and the rest of the Soviet Union. The Soviet government tried to dominate its citizens' activities and ideas by controlling the information that they received. Government censors examined books, films, and newscasts and banned anything they considered objectionable. They censored criticism of the Soviet government, news from the outside world, and anything that complimented Soviet enemies.

The Soviet government's strict censorship made life tremendously difficult for writers. Most worried that they were being watched by the government's secret police. Despite the harsh laws, small groups of writers dodged state censorship through an underground, or secret, publishing network that produced works called *samizdat*. The name samizdat came from the Russian words for "self" and "publish." For many writers, samizdat offered the only outlet for their intellectual and creative expression. To produce samizdat, an author passed a typed or handwritten text to a second person, who made a handwritten or typed copy. The original was returned to the author, while the copy was passed to other members of the network. The works were unsigned or signed with false names.

At first, samizdat focused mainly on literature, such as poetry and novels. By the late 1950s, samizdat circles were distributing political material, such as letters to the government, political essays, and trial transcripts. By the mid-1960s, the samizdat network produced sophisticated political news, debate, and analysis.

The great Russian novelist Boris Pasternak had his work published as samizdat. Like other writers, he feared that an appearance of disloyalty to the Soviet state would bring a knock at his door in the middle of the night. His classic novel *Doctor Zhivago* was smuggled out of the Soviet Union for publication in Western countries in 1956; in Russia, it appeared only as samizdat. Pasternak won the Nobel Prize in Literature in 1958, but the government forced him to refuse the prize. Soviet authorities also blocked publication of the work of Anna Akhmatova, one of Russia's greatest poets. Her work was banned until 1952 because censors thought she did not sufficiently praise the Soviet government. Akhmatova was kept out of public life and the official Writers' Union. She composed her poetry in private, and her works were available only as samizdat.

Through the 1960s and '70s, Russian writers used samizdat networks to circulate banned or politically risky material. By the late 1980s, computers became available in scientific research facilities, and underground writers began using the computers to store and circulate texts. Censorship was officially abolished in 1989, shortly before the breakup of the Soviet Union, leading to a publishing boom. Works by previously banned authors were published, and the samizdat networks quickly faded into history.

52. Which of the following best tells what this passage is about?

    E. the Russian writers Boris Pasternak and Anna Akhmatova

    F. the poetry published in the Soviet Union during the twentieth century

    G. censorship in the Soviet Union and the underground system that arose in response

    H. the reasons for banning writers who criticized the Soviet government

53. Which of the following is most likely an example of material circulated in the earliest phase of samizdat?

    A. a letter protesting a writer's imprisonment

    B. a short story

    C. a list of political prisoners

    D. an article from a foreign newspaper

54. The phrase "a knock at his door in the middle of the night" (lines 44–45) most likely refers to a visit by

    E. the secret police.

    F. a representative from a major publisher.

    G. a participant in the samizdat network.

    H. people from other countries.

55. Which event led to a change in how samizdat was created and shared?

    A. government authorities censoring Akhmatova's work

    B. the increase in the distribution of political essays

    C. Pasternak winning the Nobel Prize

    D. the rise in the use of computers and computer networks

56. What is the most likely reason that samizdat materials were unsigned or signed with false names?

    E. to allow the materials to be smuggled out of the country

    F. to protect the writer from punishment

    G. to avoid breaking censorship laws

    H. to differentiate between original and copied works

57. Why did samizdat networks quickly disappear in 1989?

    A. Samizdat networks were unnecessary after censorship was abolished.

    B. Samizdat networks became regular publishing companies.

    C. Samizdat networks were replaced by the use of computers.

    D. Samizdat networks went deeper underground than ever before.

PART 2 — MATHEMATICS

Suggested Time — 90 Minutes

57 QUESTIONS

IMPORTANT NOTES

(1) Formulas and definitions of mathematical terms and symbols are **not** provided.

(2) Diagrams other than graphs are **not** necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be figured out from the information given.

(3) Assume that a diagram is in one plane unless the problem specifically states that it is not.

(4) Graphs are drawn to scale. Unless stated otherwise, you can assume relationships according to appearance. For example, (on a graph) lines that appear to be parallel can be assumed to be parallel; likewise for concurrent lines, straight lines, collinear points, right angles, etc.

(5) Reduce all fractions to lowest terms.

GRID-IN PROBLEMS

QUESTIONS 58–62

DIRECTIONS: Solve each problem. On the answer sheet, write your answer in the boxes at the top of the grid. Start on the left side of each grid. Print only one number or symbol in each box. **DO NOT LEAVE A BOX BLANK IN THE MIDDLE OF AN ANSWER.** Under each box, fill in the circle that matches the number or symbol you wrote above. **DO NOT FILL IN A CIRCLE UNDER AN UNUSED BOX.**

58.

In the figure above, PQRS is a parallelogram. What is the value of x?

59. The owner of a tree farm plants pine trees and oak trees in a ratio of 8:3. How many oak trees are planted if 264 pine trees are planted?

60. For what value of w is $4w = 2w - 8$?

---

61. A survey asked students what pets they have. Based on the results, the following statements are all true.

- 20 students have cats.
- 23 students have dogs.
- 3 students have both dogs and cats.
- 5 students have no dogs or cats.

How many students were surveyed?

62. The sum of two consecutive integers is -15. If 1 is added to the smaller integer and 2 is subtracted from the larger integer, what is the **product** of the two resulting integers?

Multiple Choice Problems

Questions 63–114

DIRECTIONS: Solve each problem. Select the **best** answer from the choices given. Mark the letter of your answer on the answer sheet. You can do your figuring in the test booklet or on paper provided by the proctor. **DO NOT MAKE ANY MARKS ON YOUR ANSWER SHEET OTHER THAN FILLING IN YOUR ANSWER CHOICES.**

63. The set of possible values of m is $\{5, 7, 9\}$. What is the set of possible values of k if $2k = m + 3$?

A. $\{3, 4, 5\}$
B. $\{4, 5, 6\}$
C. $\{8, 10, 12\}$
D. $\{10, 14, 18\}$

64. One bottle contains 500 milliliters of juice. How many **liters** of juice are there in 24 of these bottles?

E. 12 L
F. 120 L
G. 1,200 L
H. 12,000 L

65. In a certain school, course grades range from 0 to 100. Adrianna took 4 courses and her average course grade was 90. Roberto took 5 courses. If both students have the same sum of course grades, what was Roberto's average?

A. 72
B. 80
C. 90
D. 92

66. Jenny starts a game with twice as many marbles as Keiko. Jenny gives Keiko 5 marbles, but she still has 10 more than Keiko. How many marbles did Jenny have to start with?

E. 25
F. 30
G. 35
H. 40

67. In a scale diagram, 0.125 inch represents 125 feet. How many inches represent 1 foot?

A. 0.001 in.
B. 0.01 in.
C. 0.1 in.
D. 0.12 in.

68.

PEOPLE PER VEHICLE AT CHECKPOINT

Number of People in Vehicle	Percent of Vehicles
1	40%
2	35%
3	15%
4	7%
5 or more	3%

A researcher recorded the number of people in each vehicle that passed through a checkpoint. The table above shows the percent distribution for the 420 vehicles that passed through the checkpoint yesterday morning. How many of the 420 vehicles contained **at least** 3 people?

  E. 42
  F. 63
  G. 105
  H. 315

69.
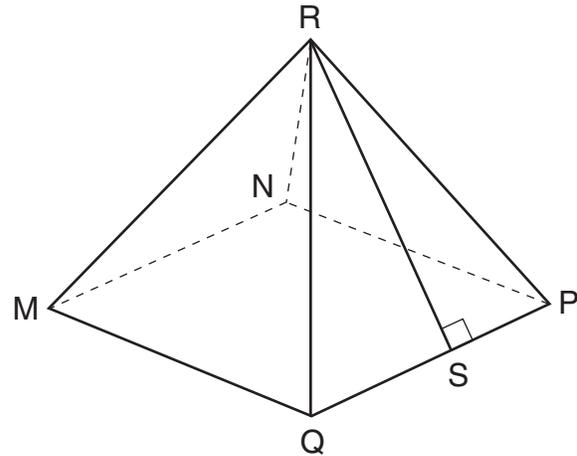
In the pyramid above, each triangular face has the same area, and the base $MNPQ$ is a square that measures 8 centimeters on each side. If the length of $\overline{RS}$ = 6 centimeters, what is the surface area of the pyramid **excluding** the base?

  A. 48 sq cm
  B. 96 sq cm
  C. 128 sq cm
  D. 160 sq cm

70. The perimeter of a rectangle is 510 centimeters. The ratio of the length to the width is 3:2. What are the dimensions of this rectangle?

  E. 150 cm by 105 cm
  F. 153 cm by 102 cm
  G. 158 cm by 97 cm
  H. 165 cm by 90 cm

71. Which number line below shows the solution to the inequality $-4 < \frac{x}{2} < 2$?

A.

B.

C.

D.
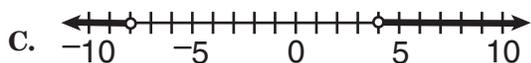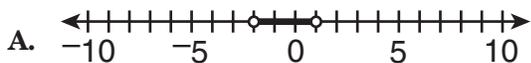
72.
$$1 \text{ dollar} = 7 \text{ lorgs}$$
$$1 \text{ dollar} = 0.5 \text{ dalt}$$

Kevin has 140 lorgs and 16 dalts. If he exchanges the lorgs and dalts for dollars according to the rates above, how many dollars will he receive?

E. $28
F. $52
G. $182
H. $282

73. A box of colored pencils contains exactly 6 red pencils. The probability of choosing a red pencil from the box is $\frac{2}{7}$. How many of the pencils in the box are **not** red?

A. 5
B. 15
C. 21
D. 30

74. The sum of the numbers x, y, and z is 50. The ratio of x to y is 1:4, and the ratio of y to z is 4:5. What is the value of y?

E. 4
F. 8
G. 10
H. 20

75.
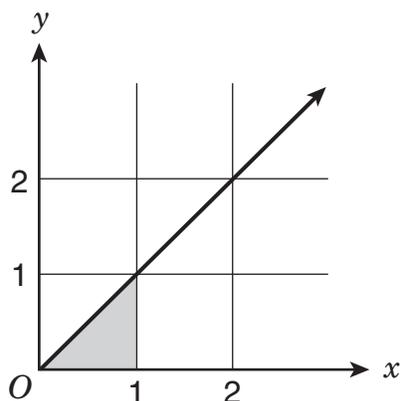
What is the area of the shaded region in the graph above?

A. 0.25 square unit
B. 0.5 square unit
C. 1 square unit
D. 1.5 square units

76. In Centerville, 45% of the population is female, and 60% of the population commutes to work daily. Of the total Centerville population, 21% are females who commute to work daily. What percentage of the total Centerville population are males who do **not** commute to work daily?

E. 15%
F. 16%
G. 24%
H. 39%

77. Mrs. Cranston bought five bottles of water for $0.90 each and 8 pounds of meat. She paid a total of $26.90 for these items, not including tax. What was the price per pound of the meat?

  A. $2.80
  B. $3.25
  C. $14.40
  D. $22.40

78. In a sample of 10 cards, 4 are red and 6 are blue. If 2 cards are selected at random from the sample, one at a time without replacement, what is the probability that both cards are **not** blue?

  E. $\dfrac{2}{15}$

  F. $\dfrac{4}{25}$

  G. $\dfrac{3}{10}$

  H. $\dfrac{1}{3}$

79.
$$1 \text{ sind} = 4 \text{ lorgs}$$
$$2 \text{ plunks} = 5 \text{ dalts}$$
$$5 \text{ sinds} = 2 \text{ harps}$$
$$1 \text{ plunk} = 3 \text{ harps}$$

A nation has five types of coins: sinds, dalts, lorgs, harps, and plunks. The relationship between the coins is shown above. Which coin is most valuable?

  A. sind
  B. dalt
  C. harp
  D. plunk

80.

SCORES ON MATH QUIZ

Score	Number of Students
85	4
75	4
65	2

What is the mean score of the 10 students in the table above?

  E. 22.5
  F. 75
  G. 77
  H. 85

81.

HOW PEOPLE GET TO WORK
IN CENTER CITY

Bicycle 4%

Car Pool 15%

Walk 22%

Bus 10%

Drive Alone 49%
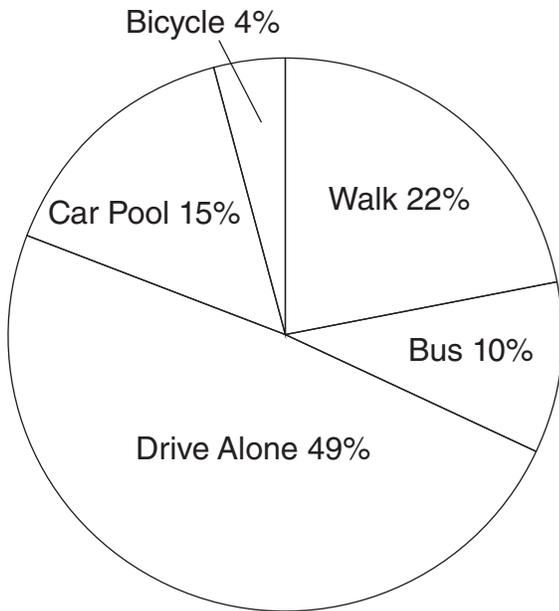
Total number of people
working in Center City = 15,000

How many more people in Center City walk to work than ride their bicycle to work?

A. 2,500
B. 2,700
C. 2,800
D. 3,000

82. Which of the following numbers has factors that include the smallest factor (other than 1) of 91?

E. 30
F. 35
G. 39
H. 44

83. In a scale drawing of a triangular banner, one side measures 16 centimeters and the other two sides each measure 12 centimeters. On the actual banner, these two sides each measure 36 feet. What is the length of the remaining side of the actual banner?

A. 16 ft
B. 32 ft
C. 40 ft
D. 48 ft

84. The faculty of a certain four-year college consists of 179 teachers. There are 663 first-year students. The student-to-faculty ratio for the entire college is 15 to 1. What is the total number of second-, third-, and fourth-year students?

E. 1,989
F. 2,022
G. 2,652
H. 2,685

85. $$2\frac{1}{5} + 3\frac{3}{10} + 4\frac{2}{5} + 5\frac{1}{2}$$

What is the value of the expression shown above?

A. $14\frac{7}{20}$

B. $14\frac{2}{5}$

C. $15\frac{7}{20}$

D. $15\frac{2}{5}$

86. A car is traveling 55 miles per hour, and 1 mile = 5,280 feet. Which of the following calculations would give the car's speed in **feet per second**?

E. $\dfrac{55 \cdot 5{,}280}{1}$

F. $\dfrac{55 \cdot 5{,}280}{3{,}600}$

G. $\dfrac{55 \cdot 3{,}600}{5{,}280}$

H. $\dfrac{55 \cdot 5{,}280}{60}$

87. Today, Tien's age is $\dfrac{1}{4}$ of Jordan's age. In 2 years, Tien's age will be $\dfrac{1}{3}$ of Jordan's age. How old is Jordan today?

A. 4 years old
B. 6 years old
C. 12 years old
D. 16 years old

88. How many positive even factors of 48 are greater than 24 and less than 48?

E. 0
F. 1
G. 2
H. 12

89. The least of 5 consecutive integers is l, and the greatest is g. What is the value of $\dfrac{l+g}{2}$ in terms of l?

A. $2l$

B. $3l$

C. $l + 2$

D. $l + 5$

90. Johan leased a car for three years. He paid a one-time fee of $1,000, and an additional $300 per month for the full three years. At the end of the three years, what is the total amount Johan paid for leasing this car?

E. $1,900
F. $4,600
G. $10,800
H. $11,800

91. There are 6 different cookies on a plate. Aiden will choose 2 of these cookies to pack in his lunch. How many different pairs of 2 cookies can he choose from the 6?

A. 12
B. 15
C. 30
D. 36

92. For a presentation, Deion can create 5 slides in 20 minutes, working at a constant rate. Kyra can create 3 slides in 10 minutes, working at her own constant rate. What is the total number of slides the two of them can create in one hour?

E. 16
F. 30
G. 33
H. 55

93.

On the number line above, $LN = \dfrac{1}{8}$. Point M (not shown) is located between point L and point N. Which value below is a possible value for M?

A. 4.26
B. 4.31
C. 4.35
D. 4.58

---

94. An unmarked straight stick will be laid end over end to measure a distance of exactly 72 feet. The same stick will be used in the same way to measure a distance of exactly 30 feet. What is the length of the longest possible stick that can be used for both measurements?

E. 3 ft
F. 4 ft
G. 6 ft
H. 8 ft

---

95. Ryan must read 150 pages for school this weekend. It took him 30 minutes to read the first 20 pages. At this rate, how much **additional** time will it take him to finish the reading?

A. $2\dfrac{1}{6}$ hr

B. $3\dfrac{1}{4}$ hr

C. $3\dfrac{3}{4}$ hr

D. $7\dfrac{1}{2}$ hr

---

96. Suppose $M = \dfrac{w}{x}$, $N = \dfrac{y}{z}$, and $w, x, y,$ and z do not equal 0. What is $\dfrac{M}{N}$ in terms of $w, x, y,$ and z ?

E. $\dfrac{wx}{yz}$

F. $\dfrac{wy}{xz}$

G. $\dfrac{wz}{xy}$

H. $\dfrac{xy}{wz}$

---

97. In the set of consecutive integers from 12 to 30, inclusive, there are four integers that are multiples of both 2 and 3. How many integers in this set are multiples of **neither** 2 nor 3?

A. 5
B. 6
C. 13
D. 15

98.

NUMBER OF SCHOOLS IN FIVE CITIES
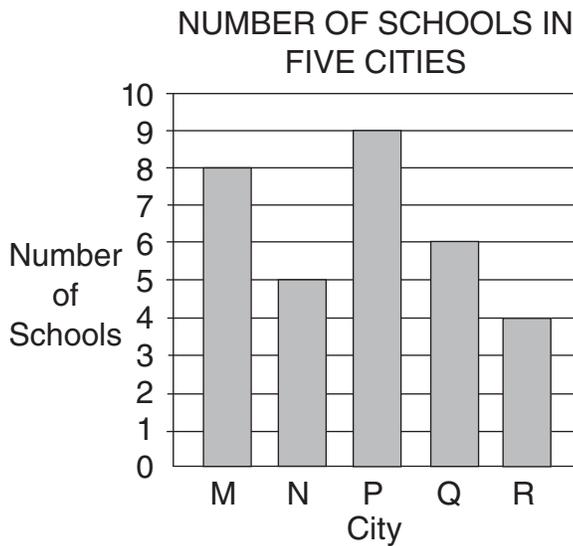
The graph above shows the number of schools per city for five small cities. Cities M and N each have 500 students per school. City P has 400 students per school. Cities Q and R each have 700 students per school. Which of the five cities has the **greatest** number of students?

E. City M
F. City P
G. City Q
H. City R

99. A box contains 5 strawberry candies, 3 banana candies, and 2 orange candies. If Braden selects 2 candies at random from this box, without replacement, what is the probability that both candies are **not** banana?

A. $\dfrac{1}{15}$

B. $\dfrac{9}{100}$

C. $\dfrac{7}{15}$

D. $\dfrac{49}{100}$

100.
$$\frac{w}{x} = \frac{y}{z}$$

In the equation above, w, x, y, and z are positive numbers. Which of these is equal to z?

E. x

F. xy

G. $\dfrac{w}{xy}$

H. $\dfrac{xy}{w}$

101.
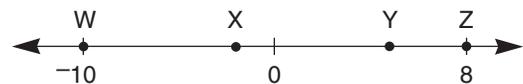
On the number line above, points W, X, Y, and Z are integers, and WX:XY:YZ = 4:2:3. What is the value of $\overline{WY}$?

A. 8
B. 11
C. 12
D. 18

102. A metal plate used in an electronic device must have a thickness of 0.02 inch, with an allowable error of 1 percent. What is the **greatest** allowable thickness of the metal plate?

E. 0.0002 in.
F. 0.02 in.
G. 0.0202 in.
H. 0.03 in.

103.

SCORES ON BIOLOGY TEST

Section	Lowest Score	Range
I	65	28
II	62	25
III	67	22

Mr. Blake's biology class is divided into three sections. The same test was given to each section. The table above shows both the lowest score and the range of scores on this test for each section. What is the **overall** range of all scores in all three sections?

A. 25
B. 27
C. 28
D. 31

104. If $3n$ is a positive even number, how many **odd** numbers are in the range from $3n$ up to and including $3n + 5$?

E. 2
F. 3
G. 4
H. 5

105. $$\frac{10}{13} = 0.\overline{769230}$$

In the infinitely repeating decimal above, 7 is the first digit in the repeating pattern. What is the 391st digit?

A. 0
B. 3
C. 6
D. 7

106. A car travels at 4,400 feet per minute. The radius of each tire on the car is 1 foot. How many revolutions does one of these tires make in 1 minute? (Use the approximation $\frac{22}{7}$ for π .)

E. 700
F. 1,925
G. 13,828
H. 15,400

107. $100(2 + 0.1)^2 - 100 =$

A. 101
B. 200
C. 301
D. 341

108. A sports store has a container of handballs: 4 blue, 5 red, 8 yellow, 9 white, and 11 green. If one ball is picked from the container at random, what is the probability that it will be yellow?

E. $\dfrac{1}{37}$

F. $\dfrac{1}{8}$

G. $\dfrac{8}{37}$

H. $\dfrac{8}{29}$

109. Each week, Leon has fixed expenses of $1,250 at his furniture shop. It costs him $150 to make a chair in his shop, and he sells each chair for $275. What is Leon's **profit** if he makes and sells 25 chairs in 1 week?

   A. $1,875
   B. $2,500
   C. $3,125
   D. $4,375

---

110. Using the approximation 2.54 centimeters = 1 inch, how many centimeters are in 4 feet 7 inches?

   E. 21.65 cm
   F. 119.38 cm
   G. 121.92 cm
   H. 139.70 cm

111.
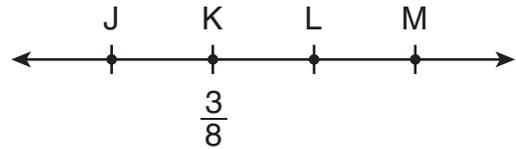
On the number line above, $JK = 3\frac{1}{2}$, $JM = 9\frac{3}{4}$, and $LM = 1\frac{1}{8}$. What is the position of point L ?

   A. $5\frac{1}{8}$

   B. $5\frac{1}{4}$

   C. $5\frac{1}{2}$

   D. $6\frac{1}{4}$

---

112. If $4x - 3y = 12$, what is x in terms of y ?

   E. $x = \frac{3}{4}y + 12$

   F. $x = -\frac{3}{4}y + 12$

   G. $x = \frac{3}{4}y + 3$

   H. $x = -\frac{3}{4}y + 3$

113.

SERVINGS OF FRUITS AND VEGETABLES

Number of Servings of Fruits and Vegetables	Number of Students
0	5
1	7
2	3
3	4
4	0
5	1

There are 20 students in a class. The frequency table above shows the number of students in this class who ate 0, 1, 2, 3, 4, or 5 servings of fruits and vegetables yesterday. What is the mean number of servings of fruits and vegetables eaten yesterday per student in this class?

A. $1\frac{1}{2}$

B. 3

C. $3\frac{1}{3}$

D. 4

114. A paste is made by mixing the following ingredients by weight: 4 parts powder, 3 parts water, 2 parts resin, and 1 part hardener. One billboard requires 30 pounds of this paste. How many total pounds of resin are required for 4 billboards?

E. 6 lb
F. 8 lb
G. 24 lb
H. 48 lb

THIS IS THE END OF THE TEST.
IF TIME REMAINS, YOU MAY CHECK YOUR ANSWERS. BE SURE THAT THERE ARE NO STRAY MARKS, PARTIALLY FILLED ANSWER CIRCLES, OR INCOMPLETE ERASURES ON YOUR ANSWER SHEET. ■

REVISING/EDITING PART A

1. (**D**) The question asks for the most precise revision for the words ***talked to some people who did the best in the contest***. Option A and Option C do not precisely state how many people the reporter interviewed. Option B specifies the number of people interviewed but uses the imprecise phrase "who did well." Option D is the only option that precisely states the reporter's action ("interviewed") as well as who exactly the reporter interviewed ("the top three contestants").

2. (**G**) The question asks for the identification of a sentence with an inappropriate shift in verb tense. Option E, Option F, and Option H identify sentences that use past tense. Sentence 3 (Option C) demonstrates an incorrect shift into the present tense with the clause "as natural gas becomes more common," which should be "as natural gas became more common."

3. (**C**) The sentence in the box needs a comma to separate items in a series. Option A would remove the necessary comma before the nonrestrictive clause "which is located on Midway Street." Option B is incorrect because while the phrase that ends with the word "volunteer" can stand on its own as an independent clause, a comma is not needed before the explanation of what the volunteers would help do. Option D would delete a necessary comma between two items in a series. Option C is the only option that would place a necessary comma to separate items "walking dogs" and "cleaning kennels" in the series.

4. (**E**) The question asks for the best way to combine the sentences to clarify the relationship between the ideas. Option F is incorrect because the conjunction "although" suggests that scientists were allowed to collect data even though there were flyby missions, which is inaccurate. In Option G, the phrase "which have been happening since 1973" is incorrectly modifying "the planet and its moons." In Option H, the conjunction "but" suggests an adverse relationship between ideas, which is also incorrect. Option E is the only option that accurately reflects the relationship between the ideas by using the nonrestrictive phrase "which allow scientists to collect data about the planet and its moons" to describe the purpose of the flyby missions.

5. (**C**) The question asks the student to identify a vague pronoun in a sentence in the box. Sentence 1 (Option A) correctly uses the plural pronouns "their"/"they" to refer to both Eliza and Brianna. Sentence 2 (Option B)

uses the pronoun "they" to correctly refer to both girls again. Sentence 4 (Option D) uses the pronoun "they" to correctly refer to "both girls." Sentence 3 (Option C) is the only sentence where the pronoun is vague. The sentence uses the pronoun "she" near the beginning, but whether "she" refers to Eliza or Brianna is unclear.

6. (**E**) The sentence in the box needs a comma to separate coordinate adjectives. Option F incorrectly adds a comma between the subject and the verb. Option G incorrectly adds a comma between two adjectives, but they are not coordinate adjectives. Option H is incorrect because a comma is not needed to set off the phrase "to score 100 points in a single game." Option E is the only option that places a comma where it is needed, between the coordinate adjectives "agile" and "athletic."

REVISING/EDITING PART B

Unlock, Ride, Return

7. (**A**) The correct answer must state the topic of the passage and hint at some of the supporting ideas. Option B mentions the idea that bike sharing programs are successful because both residents and tourist can use them, but that detail is mentioned in only the second paragraph. Option C mentions that bike sharing provides a faster mode of transportation, but it is referring to a detail suggested in sentence 16. Option D might seem attractive because it states a specific benefit of bike sharing, but it does not encompass other key points of the passage. Option A is the only option that clearly states the topic of the passage and refers to multiple key points.

8. (**F**) Because it will be placed after sentence 6, the correct answer needs to provide appropriate details that help the reader understand sentences 5 and 6. Sentences 5 and 6 begin to explain how bike sharing programs work, so the correct answer should provide additional general details that help the reader picture how people use the program. The detail stated in Option E may be true, but the detail relates to where bike sharing stations are located, not to how a bike sharing program works. Similarly, Option H includes details about major United States cities that have bike sharing programs and does not provide more information about how a bike sharing program works. Option G might seem attractive because it provides very specific details about how the bike stations keep bicycles secure. However, this level of detail is too specific to help the reader understand the program as a whole. Only Option F includes details that give the reader a clear idea of how people use bike sharing programs.

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9. (**D**) The correct answer needs to have the same relationship between ideas as the one implied in sentences 8 and 9. Context tells the reader that there is a causal relationship between city bikers' lack of responsibility and their preference for bike sharing. The subordinate clause in Option A, "Although they prefer bike sharing over ownership," presents an opposing idea, giving the impression that city bikers prefer bike sharing even though they are not responsible for storage and maintenance, which is an inaccurate way to connect these ideas. In Option B, the linking word "and" connects the two ideas but does not clarify that one idea is the cause of the other. Option C presents a causal relationship, but it reverses the relationship between the ideas. The use of "since" in Option C suggests that city bikers' preference for bike sharing is the reason they are not responsible for bike storage and maintenance. Only Option D accurately expresses the relationship that the original two sentences implied. The transition word "because" clarifies that avoiding the responsibility for storage and maintenance is the reason city bikers prefer bike sharing.

10. (**G**) The correct answer should use the most precise and specific details and language. Option E uses an imprecise word, "millions," which does not provide a specific number. Option F specifies "14 million," but it uses the imprecise "huge increase" rather than a specific number. Option H uses the imprecise phrase "several million" rather than the precise number of trips, and it uses the imprecise phrase "big increase" rather than the specific number for the increase. Option G is the only option that includes precise numbers and language.

11. (**B**) The correct answer must transition from the third paragraph and provide a topic sentence for the fourth paragraph. Option A presents information ("experts increasingly want to discuss") that was not addressed in the passage. Option C might seem attractive because it mentions information from earlier paragraphs about the popularity of bike sharing programs, but it does not accurately preview the fourth paragraph. Option D restates information from the third paragraph but does not relate to the information in the fourth paragraph. Only Option B includes a transition from the previous paragraph and an accurate topic sentence for the fourth paragraph.

12. (**G**) The correct answer must relate to the topic of the fourth paragraph: the relationship between bike sharing programs and improved air quality in a city. Option E states that improving air quality is the main reason cities establish bike sharing programs, but

this option is incorrect because the paragraph focuses on how improved air quality is an effect of people using bike sharing programs. Option F indicates that participating in a bike sharing program is the principal way travelers can improve air quality, but that does not accurately connect the ideas in the paragraph. Option H suggests that bike sharing programs in some cities are more effective at improving air quality than bike sharing programs in other cities, but this option is incorrect because it does not relate to the main topic of the paragraph: there is a relationship between a city's implementation of a bike sharing program and improved air quality in the city. Option G is correct because it makes a connection between the increasing use of bike sharing programs and the potential impact on air quality.

13. (**B**) The correct answer must be a sentence that does not relate to the topic of the third paragraph. Option A (sentence 12), Option C (sentence 15), and Option D (sentence 16) are relevant to the paragraph because they provide information about the bike sharing program in New York City. Option B (sentence 13) relates to a program in a city in China, which is not the focus of the third paragraph.

14. (**E**) The correct answer should provide a logical conclusion based on the details about the transportation and environmental benefits of bike sharing programs. Option F makes a prediction about small- and medium-sized cities that is not supported by the passage, which mentions only large cities. Option G compares bike sharing with other transportation methods, but this option is an incorrect conclusion because the passage focuses on the benefits of bike sharing programs, not comparing bike sharing to other modes of transportation. Option H states that bike sharing is useful for tourists, which does not provide a conclusion for the details about transportation and the environmental impact of bike sharing programs. Only Option E could follow sentence 19 by presenting the conclusion that bike sharing programs will become more routine because of the benefits outlined in the passage.

Pursuing a Hobby

15. (**A**) The question asks for a sentence that should follow sentence 3 and state the main claim of the passage. Option B suggests that people should think carefully about selecting a hobby to pursue, which may be true, but it is only a minor detail implied in the last paragraph. Option C claims that people should pursue hobbies because hobbies are a productive way to spend

free time. This idea is implied in sentence 18, but it is not the main claim of the passage. Option D addresses the idea that having a hobby should be enjoyable, which is addressed in sentence 1, but this is a general description of hobbies, not the main claim of the passage. Option A is the only option that logically follows the statement in sentence 3 and presents the main claim that people should make time to pursue a hobby because hobbies have a variety of benefits. This claim is developed in sentences 4, 9, 13, and 17.

16. (**G**) Sentence 5 states the aspects of everyday life that can cause stress. Sentence 6 lists several physical symptoms that can result from stress. Option E incorrectly suggests that sentence 6 is an example of sentence 5. Option F suggests that sentence 6 provides confirmation of the point made in sentence 5, which is incorrect. Option H suggests that sentence 6 is the addition of examples similar to those presented in sentence 5, which is also incorrect. Option G is the only option that provides a transition to show that the symptoms in sentence 6 can happen as a result of the stressors listed in sentence 5.

17. (**C**) The sentence in the box names some active hobbies and states that these hobbies release endorphins to promote positive feelings and override some effects of stress. Option A places this sentence between sentences 6 and 7, which are both sentences that deal with symptoms of stress and not the hobbies themselves. Option B places the sentence in the box between sentences 7 and 8. Sentence 8 begins a list of some hobbies and how they can give the mind a break from stress. Since the sentence in the box uses the phrase "can also provide," this sentence needs to go after sentence 8. The sentence in the box would not follow sentence 9 (Option D) because sentence 9 is used to end the discussion of how hobbies relieve stress. Option C states the only place where the ideas in the sentence fit into the paragraph.

18. (**F**) Sentence 16 uses vague and imprecise language that needs to be more specific ("do something," "get better," "go to places"). Only Option F provides specific details about the social activities a hobbyist might do ("enroll in a course," "attend a convention"). The language used in Option E ("learn more about," "go to events"), Option G ("try to find new information," "go to places"), and Option H ("want to expand his or her knowledge," "do an activity") does not offer more precision than the original sentence.

19. (**A**) The question asks for a sentence that follows sentence 17 and supports the ideas in the paragraph: hobbies can encourage positive social interaction. Pursuing a hobby with friends (Option B) may be enjoyable, but this does not explain the benefits of engaging in positive social interaction. Option C states that friends who enjoy one hobby may enjoy other hobbies, but this is not the idea that needs to be supported in sentence 17. Option D addresses the idea that forming relationships becomes more difficult as people grow up, which does not support the ideas in the paragraph. Option A is the only option that provides support for sentence 17 by making the point that having meaningful friendships stemming from interest in a hobby may be associated with a variety of positive outcomes.

20. (**H**) The question asks for a sentence that is irrelevant to the development of ideas in the third paragraph of the passage. Sentences 10 (Option E), 11 (Option F), and 13 (Option G) are essential to the paragraph in order to explain active leisure and flow. The idea in sentence 14 (Option H) relates to the hobbies of celebrities and businesspeople, which is not relevant to the description and benefits of engaging in active leisure.

READING COMPREHENSION

No Summer

21. (**B**) The passage is mostly about the strange, cold summer of 1816 and speculation around its cause, which is best stated in Option B. Option A is a detail in the passage about one theory regarding the cause of the weather. Option C is incorrect because the passage is about more than agriculture in New England. Option D is a detail in the passage mentioned only in the first paragraph.

22. (**E**) The second paragraph states that "farmers prepared to plow and plant" (lines 15–16), they "expected warm temperatures" (lines 16–17), and they were "optimistic" (line 18). This suggests that the farmers kept replanting their crops because they expected the weather to return to normal, which is reflected in Option E. Option F and Option H are incorrect because the cold weather and the snow actually worsened growing conditions. Option G is incorrect because the weather did not improve until the following year.

23. (**C**) The winter of 1816–1817 followed the meager harvest of the summer of 1816. With many crops "stunted or destroyed" (lines 26–27), one would expect food shortages the following winter, which is Option C. There is no evidence in the passage that people experienced new weather events (Option A) or warmer temperatures (Option B). Although some famers did replant their crops, there is no evidence in the passage that they struggled to adjust to a different time line for farming (Option D).

24. (**H**) The phrase "the global nature of weather" refers to how conditions in one part of the world can affect weather in another part of the world, which is Option H. Option E is incorrect because line 70 is about the effects of weather conditions around the world, not about making weather predictions. Option F is incorrect because it discusses the lasting impact on specific geographical areas, while the phrase "the global nature of weather" refers to events that affect the entire world. While weather events, like the unusually cold summer in New England in 1816, can be related to natural disasters such as a volcano eruption, there is no support for the idea that natural disasters tend to occur at the same time, which rules out Option G.

25. (**B**) The details about the eruption are included in the fourth paragraph. They highlight the severity of the eruption and how it clouded the atmosphere and eventually encircled the world (Option B). The passage does not support the idea that the effects are still present today (Option A) or that other weather events caused the volcano to erupt (Option D). While the details may include information about what happens during an eruption (Option C), that is not why the author includes those details.

26. (**H**) Researchers today believe that Bessel's theory is the most logical and probable (lines 67–70). His ideas are summarized in lines 55–57, and Option H restates his theory. Option E and Option F were thought to be other possible causes at the time. Option G was an effect of Mount Pinatubo erupting in 1991.

27. (**B**) The third paragraph describes how nineteenth-century religious and other leaders tried to account for the cooler weather in 1816. Some leaders thought it was "the end of the world" (line 42), "sunspot activity" (line 44), or a new invention (lines 44–46). This is best stated in Option B. The causes described in the third paragraph were not the most probable cause (Option A), as "the first

plausible explanation"—Bessel's—is described later in the passage. The ideas described in Option C and Option D are not included in the third paragraph.

Dickens

28. (**G**) The issues presented in Option E and Option H are only briefly mentioned or hinted at in the passage. Option F states an important detail about Dickens's childhood, but it is not a main topic. Option G correctly combines the information in the passage about Dickens's childhood and the novel *David Copperfield*.

29. (**A**) The author includes the details about Dickens's experiences as an adult in the fourth paragraph in order to highlight that his time spent in the factory continued to influence him as an adult, as evidenced in lines 43–44 ("As an adult, Dickens always remembered the shame and humiliation"), lines 46–47 ("he could not go near the sites of the factory and boardinghouse"), and lines 49–53 ("Dickens never told his wife and children about his childhood work experience"). This purpose is best stated in Option A. While Dickens was "miserable during the entire four months he spent working at the factory" (lines 26-27) and likely did not want to work in a factory ever again, the author does not include the details in the fourth paragraph to emphasize this idea, ruling out Option B. Option C is incorrect because the detail that Dickens did not share information about his childhood with others is used as a supporting sentence for the idea that childhood experiences affected his adult life. It is also reasonable to infer that Dickens did not want his children to suffer the way that he did, but the details in the fourth paragraph do not emphasize or support this inference, ruling out Option D.

30. (**H**) Although Dickens disliked his job, there is no reason to think he could not perform his duties (Option E). Option F and Option G might be true, but the details presented in the second and third paragraphs primarily support Option H, the idea that Dickens disliked working in the factory and preferred attending school ("forced to quit school," "relieved to be out of the factory," "The father, however, now sided with his son, and the boy was sent back to school").

31. (**B**) The correct answer is found in lines 10–13 and in the fifth paragraph. Dickens wrote *David Copperfield* because he was unable to complete his autobiography and writing the novel helped him deal with difficult childhood memories (Option B). Dickens's writings as an adult would not have helped pay his family's

debts (Option A). While it may be true that Dickens avoided telling his children about his job at the factory (Option C), that is not the reason Dickens wrote *David Copperfield*. Option D is incorrect because Dickens did not intend to share information about his own experiences.

32. (**F**) The passage says little about the relationship between Dickens and his mother, only that Dickens felt betrayed when his mother, anxious for the boy's wages, got his job back for him (lines 33–36). Option F best expresses this information. Option E suggests that they did not have a positive relationship, but there is no evidence in the passage to support this inference. Dickens may have hoped his mother would understand why he wanted to go to school (Option G), but this idea is not clearly expressed in the passage. Dickens's mother did negotiate with the factory boss on his behalf (Option H), but this action does not describe their relationship.

33. (**D**) The passage states, "The father, however, now sided with his son, and the boy was sent back to school" (lines 36–38). In other words, Dickens was able to return to school because his father supported the idea (Option D). The discussion between his mother and his boss (Option A) led to Dickens getting his factory job back. The argument between his father and his boss (Option B) led to Dickens's dismissal from his job, not his return to school. Getting fired from the factory (Option C) occurred before Dickens returned to school but was not the direct reason for it.

Flavors

34. (**G**) Option E and Option F are too specific: the passage mentions some scientific aspects of taste and smell, but it concentrates on the development of flavors. Option H is mentioned in only the last paragraph. Option G is a good summary of the passage. It incorporates the main topics—the scientific analysis of flavors and how flavors are created.

35. (**C**) The third paragraph describes a technique for separating a food into its basic chemical constituents. Option C best summarizes the goal of this research. Option A and Option D are not supported by the passage as goals of the research. Option B is incorrect because the goal of the research is to capture and reproduce the flavor, not to develop food.

36. (**F**) The process of collecting aromas during food preparation is described in the third paragraph. Option E is not supported because the process of capturing aromas has been successful and only certain flavors present difficulties. The idea that most people cannot tell the difference between natural and synthetic flavors (Option G) is not a conclusion that can be made from the collection of aromas during food preparation. Option H is incorrect because aromas are collected during the cooking process to isolate essential chemicals that make up flavor (lines 35–37), not to enhance the natural flavor. Option F is the best answer: the aroma of food as it is being prepared can be captured and distilled to synthesize the food's flavor (lines 35–41).

37. (**C**) Orange soda is mentioned in lines 52–57 to provide an example of a product that uses a synthetic flavor that some consumers prefer to its natural counterpart (Option C). The idea that consumer preferences for artificial or natural flavors vary could be true, but this is not suggested by the author's discussion of one flavor (orange soda), ruling out Option A. Option B is incorrect because even though the passage states that natural flavors may be more expensive than artificial flavors, the author does not use the details about orange soda to make this point. The author states that some natural flavors may become scarce in the future (lines 59–61), but this is not exemplified by the discussion of orange soda in lines 52–57, ruling out Option D.

38. (**F**) The author describes the role of the sense of smell to highlight that the aroma of a flavor, in addition to its taste, influences how a person experiences a flavor, as evidenced in lines 10–11 ("The sense of smell has a larger role in tasting flavors than most people realize"). This is best stated in Option F. Option E reflects the idea in lines 8–10, but the idea that it is easier for people to smell an aroma than to taste its flavor is not why the author includes the description about how smell impacts taste. Option G and Option H present inaccurate ideas regarding synthetic flavors and fail to explain why the author describes the role of the sense of smell at the beginning of the passage.

39. (**D**) The author describes the uses of synthetic flavors in items such as "mouthwashes, toothpastes, beverages" (lines 26–27) to demonstrate that synthetic flavors are found in many everyday household products. This is best stated in Option D. Option A may seem like an attractive option because the list of everyday items with synthetic flavors could give the impression that creating synthetic flavors is easy; however, while some synthetic flavors have

been successfully created (lines 17–20), efforts to duplicate other flavors have been unsuccessful (lines 62–71), ruling out Option A. The idea that the same synthetic flavor is used in many items (Option B) and the idea that synthetic flavors are healthier than natural flavors (Option C) cannot be concluded from the list of common products that use synthetic flavors in lines 26–28.

Great Zimbabwe

40. (**G**) Only Option C represents the central idea that is developed, supported, and explained throughout the passage. The idea that there was much speculation about Great Zimbabwe is explained in lines 9 and 10 as well as in the second paragraph, and the details about how modern archaeologists determined its origins are explained in the fifth paragraph. Option E is incorrect because it does not encompass the facts revealed about Great Zimbabwe in the fifth paragraph. Option F is incorrect because it mainly focuses on the idea that archaeologists are still interested in the mysteries of Great Zimbabwe, which is mentioned only in the sixth paragraph. Option H is incorrect because the fact that early excavations of Great Zimbabwe caused the destruction of valuable evidence is a detail from lines 50–58, and the option does not fully explain the central idea developed in the passage.

41. (**B**) Lines 45–47 explain that Mauch "jumped to the conclusion that Great Zimbabwe had been built by the Queen of Sheba." This affected later investigations of the ruins because archaeologists worked under the assumption that Mauch's conclusions were accurate, and the archaeologists discarded evidence that may have suggested otherwise, as detailed in lines 50–56. This is best stated in Option B. Archaeologists were interested in the area (Option A), but this was not the main effect of Mauch's conclusions, as described in the passage. People searched for Great Zimbabwe because they already believed the stories told by Arab traders and historians like de Barro were true (lines 23–26), not because of Mauch's conclusions, which rules out Option C. Although the city was considered impressive (lines 29–40; lines 69–75), Mauch's conclusions did not influence whether people believed an ancient culture could have built it, ruling out Option D.

42. (**H**) The fifth paragraph states that carbon-14 dating proved Randall-MacIver and Caton-Thompson's conclusions that Great Zimbabwe was built by ancestors of the Shona people during the fourteenth or fifteenth century (lines 64–69). Option E, "when the settlement

was abandoned and why," has not been solved (lines 77–80). The presence of ivory and gold (Option F) and the reason that Europeans did not discover Great Zimbabwe until the 1870s (Option G) are not presented as mysteries.

43. (**B**) The Shona people are discussed in the fifth paragraph. Ancient Shona people lived in the African interior, not on the coast, and the passage does not explain where Shona people live in the present, which eliminates Option A. Option C and Option D confuse the histories of the Shona people and ancient Middle Eastern people. Option B is the best answer; lines 64–67 state that Great Zimbabwe was most likely built by ancestors of the present-day Shona people.

44. (**H**) David Randall-MacIver and Gertrude Caton-Thompson's conclusions were significant because their excavation of the ruins revealed that Great Zimbabwe was most likely built by the Shona people (lines 64–67) and discredited the long-standing idea that the structure was Middle Eastern in origin. This is stated in Option H. Option E is incorrect because Randall-MacIver and Caton-Thompson's determined that the city was most likely built in the fourteenth or fifteenth century (line 66), which was later than earlier explorers had assumed. Lines 69–75 indicate that the Shona society was robust (Option G), and lines 77–80 pose the question of why the great city was abandoned (Option F), but these ideas are not the main reasons Randall-MacIver and Caton-Thompson's conclusions were significant.

45. (**A**) Option A is correct; the Portuguese searched for "King Solomon's gold," which they associated with Great Zimbabwe but they never found the city (lines 23–26). Option B and Option D may be true based on the details in the second paragraph, but they are not the best descriptions of the Portuguese explorers' overall relationship with Great Zimbabwe. Even though Portuguese explorers had little information about the precise location of Great Zimbabwe (lines 13–16), the passage does not support the idea that the explorers knew they would not find the stone city (Option C).

Bats

46. (**E**) Option E is correct because it states the main idea of the passage: bats provide benefits for the environment and need to be protected. These benefits are explained and supported in the second and third paragraphs, and the idea that they need to be protected is supported in the fourth and fifth paragraphs. Option

F is incorrect because it focuses on the idea that people consider bats pests and does not explain how bats are helpful. The idea that bats help prevent the spread of disease (Option G) and pollinate rain forest plants (Option H) are details about some of the benefits bats provide, not the central idea of the passage.

47. (**D**) The far-reaching impact of a keystone species is described in the third paragraph. The flying fox, a keystone species in the rain forest, pollinates plants and distributes seeds and thus helps provide food and shelter for many other plants and animals in its ecosystem. Rain forests in turn help maintain a balanced global atmosphere for living creatures everywhere. Option D best states that bats are important in maintaining a stable ecosystem because of the effects listed in lines 36–43. A keystone species can be threatened with extinction (Option A), but that does not explain the function of a keystone species. Option B and Option C are too limited in scope to represent the function of a keystone species.

48. (**G**) The author discusses bat conservation at the end of the passage. The author acknowledges that many people think bats are a problem but then stresses that bats should be carefully managed and protected, which is best stated in Option G. Option E is incorrect because the author does not advocate for bats eating crops and cultivated trees. Option F is incorrect because, while bats do support the growth and survival of many species, the author never suggests relocating them to areas with struggling ecosystems as a conservation method. Option H is incorrect because the author understands that farmers and orchard owners need their crops and trees to survive in order to earn a livelihood (lines 62–65).

49. (**A**) The iroko tree is mentioned in lines 20–23 as a valuable tree that depends entirely on flying foxes for pollination (Option A), and so without bats this plant would not exist. While genetic diversity can improve a plant's ability to survive, it is not necessary for survival, ruling out Option B. Lines 46–50 explain why bats sometimes eat cultivated fruit, but the result of this is that crops are ruined, ruling out Option C. While bats do eat mosquitoes (lines 9 and 10), this detail best supports the idea that bats help limit the spread of disease, which rules out Option D.

50. (**G**) The author describes the bat's role as a keystone species in order to emphasize the drastic effects that a sudden change in the bat population would have on the pollination of plants and trees (lines 36–37), the ability of certain animals to find shelter (lines 37–38), and the levels of oxygen in the atmosphere (lines 40–43). This is best stated in Option G, which encompasses the idea that if bats could not perform these natural activities, the rain forest would be threatened. The ideas in Option E, Option F, and Option H are explained in the third paragraph as natural activities that bats support, but these are individual details about what bats do. The statements do not explain the significance of the role of bats in the survival of an entire rain forest ecosystem.

51. (**B**) The phrase "ugliness is only skin deep" (line 69) is intended to mean that an unattractive outward appearance does not necessarily indicate inward ugliness. The intended meaning—that the ugly outward appearance of bats does not mean that they are bad—is best stated in Option B. While the passage describes different species of bats ("brown bat" in lines 5 and 8 and "flying foxes" in the second paragraph), the text focuses on their roles in the environment, not on a comparison of their appearance, which rules out Option A. Option C is incorrect; the passage states people try to remove bats because they ruin fruit trees and crops (lines 49–50), not because of their appearance. As mentioned in the fifth paragraph, conservation groups and government agencies are trying to overcome people's negative perception of bats by educating people about the benefits bats provide; however, Option D is incorrect because the passage does not state or imply that the physical appearance of bats influences efforts to conserve them.

Samizdat

52. (**G**) Option E mentions two important samizdat writers from the fourth paragraph but does not explain samizdat or the authors' relationship to it. Option F refers to all poetry published in the Soviet Union, not just samizdat poetry, so it is too broad. Option H is mentioned only in the first paragraph. Option G is a good description of the topic of the passage, describing Soviet censorship and the samizdat response.

53. (**B**) The earliest phase of samizdat is described in lines 33 and 34: "At first, samizdat focused mainly on literature, such as poetry and novels." Only Option B, "a short story," fits in this category. Option A, Option C, and Option D are not representative of the earliest phase of samizdat.

54. (**E**) The phrase "a knock at his door in the middle of the night" refers to the secret police. Pasternak, like other samizdat writers, feared being caught by authorities and accused of writing and distributing samizdat (lines 15–18). Option E is correct. The passage does not indicate that Pasternak would be concerned about "a representative from a major publisher" (Option F), "a participant in the samizdat network" (Option G), or "people from other countries" (Option H) knocking on his door at night.

55. (**D**) Option D is the best answer because storing and circulating texts via computers marked a significant change from hand-copying or typing paper copies of samizdat texts (lines 64–68). Option A, Option B, and Option C represent events that occurred during the peak of samizdat circulation, but those events did not directly lead to significant changes in the samizdat distribution process.

56. (**F**) Lines 1–3 indicate that people could be punished for writing about certain topics. Lines 26–32 explain the steps samizdat authors and distributors used to ensure that the network of authors was protected, including having authors leave their work unsigned or using fake names. This is stated in Option F. Samizdat works, like Pasternak's Doctor Zhivago, were smuggled out of the country (lines 46–48), so using no names or fake names would not relate to this practice, ruling out Option E. Samizdat writers would be breaking censorship law regardless of whether they included their real names, which rules out Option G. While making copies of a work was part of the samizdat distribution process, the act of leaving work unsigned or writing under a false name would not differentiate between original and copied works, which rules out Option H.

57. (**A**) The answer is found in lines 68–73. The correct answer, Option A, makes the connection between the abolishment of censorship and subsequent freedom of the press, which eliminated the need for samizdat. The fifth paragraph explains that there was "a publishing boom" (lines 70–71) after censorship laws were abolished but does not suggest that samizdat networks ended because they became regular publishing companies, which rules out Option B. Option C is incorrect because the use of computers helped samizdat networks spread material (lines 65–68) while censorship laws were still in place. Option D is incorrect because going deeper underground would not be necessary after censorship was abolished.

58. (**162**) First, find the measure of angle PQR. The measure of angle PQR is equal to the measure of angle PSR.

$m\angle\text{PSR} = 180 - 72 = 108.$

So, the measure of angle PQR is also 108.

$108 + 90 + x = 360$

$198 + x = 360$

$x = 162$

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59. (**99**) Let x be the number of oak trees when 264 pine trees are planted. Set up a proportion and solve for x:

$\dfrac{x}{264} = \dfrac{3}{8}$

$8x = 762$

$x = 99$

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60. (**−4**) $4w = 2w - 8$

$2w = -8$

$w = -4$

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61. (**45**) Let $x =$ number of students with only cats as pets.

Let $y =$ number of students with only dogs as pets.

Calculate x and y using the given information: There are 20 students who have cats, and of those 20 students, 3 have both cats and dogs. Thus, $x = 20 - 3 = 17$. There are 23 students who have dogs, and of those 23 students, 3 have both cats and dogs. Thus $y = 23 - 3 = 20$.

To find the total number of students surveyed, add the number of students who only have cats (x), the number of students who only have dogs (y), the number of students who have both (3), and the number of students who have neither (5): $3 + 5 + x + y = 8 + 17 + 20 = 45$

62. (**63**) If x is the smaller consecutive integer, then $x + 1$ is the larger consecutive integer. Use their sum (-15) to find x:

$x + (x + 1) = -15$

$2x + 1 = -15$

$2x = -16$

$x = -8$

The two consecutive integers are -8 and -7.

One is added to the smaller integer: $-8 + 1 = -7$, and 2 is subtracted from the larger integer: $-7 - 2 = -9$.

Find the product: $-7 \times -9 = 63$.

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63. (**B**) $2k = m + 3$ so $k = \dfrac{m+3}{2}$.

Substitute each value of m to find the values of k:

$k = \dfrac{5+3}{2} = \dfrac{8}{2} = 4$

$k = \dfrac{7+3}{2} = \dfrac{10}{2} = 5$

$k = \dfrac{9+3}{2} = \dfrac{12}{2} = 6$

The set k is $\{4, 5, 6\}$.

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64. (**E**) First, convert 500 milliliters to liters by dividing by 1,000: $500 \div 1{,}000 = 0.500$

Now, multiply by 24 to find the solution: $0.500 \times 24 = 12\,\text{L}$

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65. (**A**) The sum of Adrianna's course grades equals 4 times the average (mean) of her grades: $90 \times 4 = 360$. Roberto has the same sum (360) as Adrianna. Find the mean of his course grades:

$360 \div 5 = 72$

66. (H) Set up some equations.

Jenny (J) has twice as many marbles as Keiko (K): $J = 2K$

Jenny gives Keiko 5 marbles, so now they each have: $J - 5$ and $K + 5$ marbles.

Jenny still has 10 more than Keiko:
$J - 5 = (K + 5) + 10$

To find how many marbles Jenny had to start with, solve $J = 2K$ for K and substitute that into the second equation:

In equation $J = 2K$, solve for K: $K = \dfrac{J}{2}$.

Substitute $\dfrac{J}{2}$ in for K.

$J - 5 = (K + 5) + 10$

$J - 5 = \left(\dfrac{J}{2} + 5\right) + 10$

$J - 5 = \dfrac{J}{2} + 15$

$J = \dfrac{J}{2} + 20$

$\dfrac{J}{2} = 20$

$J = 40$ marbles

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67. (A) Let x be the number of inches representing 1 foot. Set up a proportion and solve for x:

$\dfrac{x}{1} = \dfrac{0.125}{125}$

$x = 0.001$ in.

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68. (G) First, add the percentage of cars containing 3 people, 4 people, and 5 or more people:

$15\% + 7\% + 3\% = 25\%$

Thus, 25% of the cars contained **at least** 3 people, so use that to calculate the number of cars:

$420 \times 0.25 = 105$ cars.

---

69. (B) Line segment $\overline{RS}$ is the altitude, or height, of triangle QRP. The length of QP is 8 cm. Use that information to find the area of triangle QRP: $A = \dfrac{1}{2}bh = \dfrac{1}{2}(8)(6) = 24$ sq cm.

There are 4 congruent triangles in the pyramid, so the surface area is $4 \times 24 = 96$ sq cm.

---

70. (F) Let $2x = $ the width and $3x = $ the length. Draw the rectangle to help visualize.
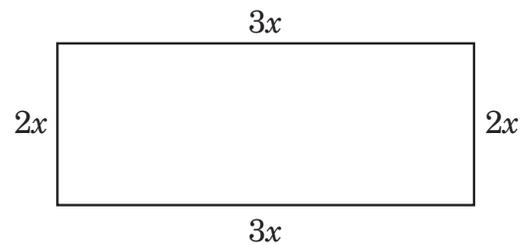
Since 2 times width $+ 2$ times length $=$ perimeter, we get

$2(2x) + 2(3x) = 510$

$4x + 6x = 510$

$10x = 510$

$x = 51$

$2x = 102\,\text{cm}$ and $3x = 153\,\text{cm}$

---

71. (D) Multiply each term by 2 to eliminate the fraction, and isolate x:

$-4(2) < \left(\dfrac{x}{2}\right)(2) < 2(2)$

$-8 < x < 4$

Therefore, x must be between -8 and 4.

72. (F) Use proportions to make the conversions:

Lorgs to dollars:

$$\frac{140}{x} = \frac{7}{1}$$

$$7x = 140$$

$$x = \$20$$

Dalts to dollars:

$$\frac{16}{x} = \frac{0.5}{1}$$

$$0.5x = 16$$

$$x = \$32$$

Total dollars $= 20 + 32 = \$52$

---

73. (B) Let x be the total number of colored pencils in the box. Set up a proportion to find x:

$$\frac{2}{7} = \frac{6}{x}$$

$$2x = 42$$

$$x = 21$$

If there are 6 red pencils, then the number of pencils that are not read is $21 - 6 = 15$.

---

74. (H) Since both ratios have y in common, solve for x and z in terms of y in both equations.

Using $x{:}y = 1{:}4$, solve for x in terms of y.

$$\frac{x}{y} = \frac{1}{4}$$

$$x = \frac{1}{4}y$$

Using the ratio $y{:}z = 4{:}5$, solve for z in terms of y:

$$\frac{y}{z} = \frac{4}{5}$$

$$z = \frac{5}{4}y$$

The question states $x + y + z = 50$. Substitute from the two equations above and solve for y.

$$\frac{1}{4}y + y + \frac{5}{4}y = 50$$

$$\frac{10}{4}y = 50$$

$$10y = 200$$

$$y = 20$$

---

75. (B) The shaded region is a right triangle. Each leg is 1 unit in length. So the area is

$$A = \frac{1}{2}bh = \frac{1}{2}(1)(1) = \frac{1}{2} \text{ or } 0.5 \text{ sq unit}$$

---

76. (F) Create a table with the information provided in the problem and use subtraction to fill in the rest of the table:

	Female	Male	TOTAL
Commutes to work	21%	**39%** (60 – 21)	60%
Does not commute to work	**24%** (45 – 21)	**16%** (40 – 24)	**40%** (100 – 60)
TOTAL	45%		100%

16% of the population is male and does not commute to work.

---

77. (A) Let x be the price per pound for the meat. Set up an equation to show what Mrs. Cranston spent:

$5(0.90) + 8x = 26.90$

$4.50 + 8x = 26.90$

$8x = 22.40$

$x = 2.80$

The price per pound for the meat is $2.80.

78. (E) The probability that both cards are not blue is the same as the probability that both cards **are** red. There are 4 red cards out of the 10, so the probability of the first card being red is $\frac{4}{10}$. Now there are 9 cards left, and 3 of those are red, so the probability of the second card being red is $\frac{3}{9}$. Multiply the two probabilities to find the probability that both cards are red (not blue):

$\frac{4}{10} \times \frac{3}{9} = \frac{12}{90} = \frac{2}{15}$

79. (D) 1 sind = 4 lorgs, so 1 sind > 1 lorg.

2 harps = 5 sinds, so 1 harp > 1 sind.

1 plunk = 3 harps, so 1 plunk > 1 harp, meaning that 1 plunk > 1 sind and 1 lorg.

2 plunks = 5 dalts, so 1 plunk > 1 dalt.

Therefore, the plunk is the most valuable.

80. (G) For each row, multiply the number of students by the score. Then add those together and divide by the total number of students to find the mean (average) of the 10 students.

$\frac{85(4) + 75(4) + 65(2)}{10} = \frac{340 + 300 + 130}{10}$

$= \frac{770}{10} = 77$

81. (B) According to the chart, 22% of people walk to work and 4% ride a bicycle. Subtract to find the percentage of how many more people walk than bicycle:

$22\% - 4\% = 18\%$

To find the exact number of people, multiply 18% (0.18) by the number of people working in Center City (15,000):

$15,000 \times 0.18 = 2,700$

82. (F) To find the smallest factor of 91, list the factors: 1, 7, 13, and 91.

The smallest factor (other than 1) is 7.

Of the options listed (30, 35, 39, and 44), only 35 is a multiple of 7.

83. (D) Let x be the remaining side of the actual banner. Set up a proportion:

$\frac{x}{16} = \frac{36}{12}$

$x = 48 \text{ ft}$

84. (F) Let x be the number of second-, third-, and fourth-year students. Then the total number of students in the college is $663 + x$. Set up a proportion and solve for x:

$\frac{15}{1} = \frac{663 + x}{179}$

$663 + x = 179(15)$

$663 + x = 2,685$

$x = 2,022$

85. (D) $2\frac{1}{5} + 3\frac{3}{10} + 4\frac{2}{5} + 5\frac{1}{2}$

Convert all the fractions to a common denominator (10):

$2\frac{2}{10} + 3\frac{3}{10} + 4\frac{4}{10} + 5\frac{5}{10}$

$= (2 + 3 + 4 + 5) + \left(\frac{2 + 3 + 4 + 5}{10}\right)$

$= 14 + 1\frac{4}{10} = 15\frac{2}{5}$

86. (F) Divide the rate by the number of seconds in an hour. (Since there are 60 minutes in an hour and 60 seconds in a minute, multiply $60 \times 60 = 3,600$ seconds in an hour):

$\dfrac{55}{3,600}$ miles per second

Multiply by the number of feet in a mile (5,280):

$\dfrac{55 \cdot 5,280}{3,600}$ feet per second

87. (D) First, set up an equation to express Tien's age (T) and Jordan's age (J) today:

$T = \dfrac{1}{4}J$

Two years from now, Tien's age will be $T + 2$, and Jordan's age will be $J + 2$. Set up an equation about the relationship between Tien's age and Jordan's age in two years:

$T + 2 = \dfrac{1}{3}(J + 2)$

Solve the above equation for T:

$T = \dfrac{1}{3}(J + 2) - 2$

Now set the two equations equal to each other and solve for J:

$\dfrac{1}{4}J = \dfrac{1}{3}(J + 2) - 2$

$\dfrac{1}{4}J = \dfrac{1}{3}J - \dfrac{4}{3}$

$-\dfrac{1}{12}J = -\dfrac{4}{3}$

$J = -\dfrac{4}{3}\left(-\dfrac{12}{1}\right)$

$J = 16$

88. (E) List the factors of 48:

1 and 48, 2 and 24, 3 and 16, 4 and 12, 6 and 8

There are no factors greater than 24 and less than 48.

89. (C) The first integer is l, so the second is $l + 1$, the third is $l + 2$, then $l + 3$, and finally $l + 4$. Since g is the fifth and greatest of the integers, $g = l + 4$.

Substitute $l + 4$ for g and simplify:

$\dfrac{l+g}{2} = \dfrac{l+l+4}{2} = \dfrac{2l+4}{2} = l + 2$

90. (H) Three years is 36 months (12×3). Set up an expression to find the total amount Johan paid:

$1,000 + 300(36) = \$11,800$

91. (B) Create a list of the possible pairs. Let the cookies be named A, B, C, D, E, and F.

AB, AC, AD, AE, AF
BC, BD, BE, BF
CD, CE, CF
DE, DF
EF

There are a total of 15 possible pairs of cookies that Aiden can choose.

92. (G) Set up proportions to figure out how many slides Deion and Kyra can create in 1 hour:

Deion

$\dfrac{5}{20} = \dfrac{x}{60}$

$20x = 300$

$x = 15$

Deion can create 15 slides in 1 hour.

Kyra

$\dfrac{3}{10} = \dfrac{x}{60}$

$10x = 180$

$x = 18$

Kyra can create 18 slides in 1 hour.

Add Deion and Kyra to figure out how many slides they can create together in 1 hour:
$15 + 18 = 33$.

93. (C) Since $LN = \dfrac{1}{8}$, point N is located at $4\dfrac{5}{16} + \dfrac{1}{8} = 4\dfrac{7}{16}$. So M must be between point L, $4\dfrac{5}{16}$, and point N, $4\dfrac{7}{16}$. Point L can also be written as 4.3125, and point N can be written as 4.4375. The only option given that lies between those two points is 4.35.

94. (G) The length of the stick must be the greatest common factor of 72 and 30. The factors of 30 are 1, 2, 3, 5, 6, 10, 15, and 30. Of those, only 1, 2, 3, and 6 are also factors of 72. The greatest of these is 6.

95. (B) Ryan has 130 pages left to read $(150 - 20)$. He read 20 pages in 30 minutes, which means he read at a rate of 40 pages per 1 hour. To find out how much longer it will take him to finish the assignment, divide the total number of pages remaining (130) by the number of pages he is able to read per hour (40):

$$\frac{130}{40} = 3\frac{1}{4}$$

96. (G) It is easier to rewrite $\dfrac{M}{N}$ as $M \div N$ since they are both fractions.

$$M \div N = \frac{w}{x} \div \frac{y}{z} = \frac{w}{x} \cdot \frac{z}{y} = \frac{wz}{xy}$$

97. (B) The question asks for integers from 12 to 30 that are not divisible by 2 or 3.

The set of consecutive integers is {12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30}.

Since all even numbers are divisible by 2, eliminate all even numbers, leaving the odd numbers in the set: {13, 15, 17, 19, 21, 23, 25, 27, 29}.

Eliminate those integers that are multiples of 3 (15, 21, and 27). The remaining integers are: {13, 17, 19, 23, 25, 29}. Therefore, there are 6 numbers in the set that are multiples of **neither** 2 nor 3.

98. (G) Take each city's number of schools and multiply by the number of students. It is not necessary to calculate all 5 of these. Cities M and N have the same number of students, so just calculate the number of students in City M because it has more schools than City N. The same goes for Q and R — only Q needs to be calculated because it has more schools than R.

M = $8 \times 500 = 4,000$

P = $9 \times 400 = 3,600$

Q = $6 \times 700 = 4,200$

City Q has the greatest number of students.

99. (C) The total number of candies in the box is $5 + 3 + 2 = 10$. The number of candies that are not banana is $5 + 2 = 7$.

The probability of the first candy not being banana is $\dfrac{7}{10}$. Now, out of 9 candies, there are 6 candies left that are not banana.

The probability of the second candy not being banana is. $\dfrac{6}{9}$. Multiply these two probabilities to get the solution:

$$\frac{7}{10} \times \frac{6}{9} = \frac{42}{90} = \frac{7}{15}$$

100. (H) Solve the equation for z:

$$\frac{w}{x} = \frac{y}{z}$$

$$wz = xy$$

$$z = \frac{xy}{w}$$

101. (C) Convert the ratios into fractions of WZ. Use the sum of the ratios for the denominator.

WX:XY:YZ = 4:2:3

$$WX = \frac{4}{4+2+3} = \frac{4}{9}$$

$$XY = \frac{2}{4+2+3} = \frac{2}{9}$$

The part of WZ that is WY is the sum of those fractions:

$$WY = \frac{4}{9} + \frac{2}{9} = \frac{6}{9} = \frac{2}{3}$$

Find the length of WZ: WZ = $8 - (-10) = 18$

The value of WY is $\frac{2}{3}(18) = 12$.

102. (G) Find 1% of 0.02: $0.02 \times \frac{1}{100} = 0.0002$

The greatest allowable thickness would be $0.02 + 0.0002 = 0.0202$ inch.

103. (D) First, calculate the highest score for each section by adding the lowest score to the range:

Section I: $65 + 28 = 93$

Section II: $62 + 25 = 87$

Section III: $67 + 22 = 89$

The overall highest score is 93, and the overall lowest score is 62. Thus the overall range is $93 - 62 = 31$.

104. (F) Since $3n$ is even, then $3n + 1$ must be odd. Thus $3n + 3$ and $3n + 5$ are also odd. So there are a total of 3 numbers in this range that are odd.

105. (D) There are 6 digits in the repeating decimal (769230), so 7 would be the first, seventh, thirteenth digit and so on. To find the 391st digit, divide 391 by 6.

$391 \div 6 = 65 \, R1$

Since the remainder is 1, that means the 391st digit is the same as the 1st digit, which is 7.

106. (E) One revolution is equal to the circumference of the tire:

$$C = 2\pi r = 2(1)\left(\frac{22}{7}\right) = \frac{44}{7} \text{ ft}$$

The car travels at 4,400 ft per minute. To calculate the number of revolutions, divide the speed by the circumference:

$$4,400 \div \frac{44}{7} = 4,400 \times \frac{7}{44} = 700 \text{ revolutions.}$$

107. (D) $100(2 + 0.1)^2 - 100 = 100(2.1^2) - 100$
$= 100(4.41) - 100 = 441 - 100 = 341$

108. (G) The total number of handballs in the container is $4 + 5 + 8 + 9 + 11 = 37$.

Since there are 8 yellow handballs, the probability of selecting a yellow handball is $\frac{8}{37}$.

109. (A) Each chair costs Leon $150 to make, and he sells the chair for $275. His profit is found by subtracting the cost from the price:

$275 - 150 = 125$ per chair

If Leon makes and sells 25 chairs in a week, his initial profit is $25 \times \$125 = \$3,125$. However, Leon has additional fixed expenses of $1,250 per week, so this cost must also be subtracted to arrive at the profit. His final profit is $\$3,125 - \$1,250 = \$1,875$.

110. (**H**) Convert 4 ft 7 in. to inches.

Since $12 \text{ in.} = 1 \text{ ft}$:

$4(12) + 7 = 55$ inches

Multiply that by the conversion

$254 \text{ cm} = 1 \text{ in.}$

$55 \times 2.54 = 139.70 \text{ cm}$

111. (**C**) First, use $JK = 3\frac{1}{2}$ to find the location of J:

$$\frac{3}{8} - J = 3\frac{1}{2}$$

$$J = \frac{3}{8} - 3\frac{1}{2} = -3\frac{1}{8}$$

Now, use $JM = 9\frac{3}{4}$ to find the location of M:

$$M - \left(-3\frac{1}{8}\right) = 9\frac{3}{4}$$

$$M + 3\frac{1}{8} = 9\frac{3}{4}$$

$$M = 9\frac{3}{4} - 3\frac{1}{8} = 6\frac{5}{8}$$

Finally, use $LM = 1\frac{1}{8}$ to find the location of L:

$$6\frac{5}{8} - L = 1\frac{1}{8}$$

$$L = 6\frac{5}{8} - 1\frac{1}{8} = 5\frac{4}{8} = 5\frac{1}{2}$$

112. (**G**) $4x - 3y = 12$

$$4x = 3y + 12$$

$$x = \frac{3}{4}y + \frac{12}{4}$$

$$x = \frac{3}{4}y + 3$$

113. (**A**) First, determine the total number of servings of fruits and vegetables that the students ate by multiplying the number of servings by the number of students in each row of the table. Then add that column to get the total number of servings:

Number of Servings of Fruits and Vegetables	Number of Students	Number of Servings × Number of Students
0	5	0
1	7	7
2	3	6
3	4	12
4	0	0
5	1	5

Total: 30

Calculate the mean by dividing the total number of servings of fruits and vegetables by the total number of students:

$$\frac{30}{20} = 1\frac{1}{2}$$

114. (**G**) The ratio is 4:3:2:1, so the total parts is 10.

Since there are two parts resin, the fraction of resin is $\frac{2}{10} = \frac{1}{5}$.

So the amount of resin in 30 lb of paste (for 1 billboard) is $\frac{1}{5} \times 30 = 6$ lb. For 4 billboards, that would be $6 \times 4 = 24$ lb.

Answer Key for Sample Form A

1. D	14. E	27. B	40. G	53. B	66. H	79. D	92. G	105. D
2. G	15. A	28. G	41. B	54. E	67. A	80. G	93. C	106. E
3. C	16. G	29. A	42. H	55. D	68. G	81. B	94. G	107. D
4. E	17. C	30. H	43. B	56. F	69. B	82. F	95. B	108. G
5. C	18. F	31. B	44. H	57. A	70. F	83. D	96. G	109. A
6. E	19. A	32. F	45. A	58. 162	71. D	84. F	97. B	110. H
7. A	20. H	33. D	46. E	59. 99	72. F	85. D	98. G	111. C
8. F	21. B	34. G	47. D	60. –4	73. B	86. F	99. C	112. G
9. D	22. E	35. C	48. G	61. 45	74. H	87. D	100. H	113. A
10. G	23. C	36. F	49. A	62. 63	75. B	88. E	101. C	114. G
11. B	24. H	37. C	50. G	63. B	76. F	89. C	102. G	
12. G	25. B	38. F	51. B	64. E	77. A	90. H	103. D	
13. B	26. H	39. D	52. G	65. A	78. E	91. B	104. F	

NEW YORK CITY PUBLIC SCHOOLS
2017 SPECIALIZED HIGH SCHOOLS ADMISSIONS TEST
GRADE 8

USE A PENCIL ONLY

SIDE 2

Test Booklet Letter   Test Booklet Number

Student's First Name (please print)   Student's Last Name (please print)

PART 1   ENGLISH LANGUAGE ARTS

1 Ⓐ Ⓑ Ⓒ Ⓓ   16 Ⓔ Ⓕ Ⓖ Ⓗ   31 Ⓐ Ⓑ Ⓒ Ⓓ   46 Ⓔ Ⓕ Ⓖ Ⓗ
2 Ⓔ Ⓕ Ⓖ Ⓗ   17 Ⓐ Ⓑ Ⓒ Ⓓ   32 Ⓔ Ⓕ Ⓖ Ⓗ   47 Ⓐ Ⓑ Ⓒ Ⓓ
3 Ⓐ Ⓑ Ⓒ Ⓓ   18 Ⓔ Ⓕ Ⓖ Ⓗ   33 Ⓐ Ⓑ Ⓒ Ⓓ   48 Ⓔ Ⓕ Ⓖ Ⓗ
4 Ⓔ Ⓕ Ⓖ Ⓗ   19 Ⓐ Ⓑ Ⓒ Ⓓ   34 Ⓔ Ⓕ Ⓖ Ⓗ   49 Ⓐ Ⓑ Ⓒ Ⓓ
5 Ⓐ Ⓑ Ⓒ Ⓓ   20 Ⓔ Ⓕ Ⓖ Ⓗ   35 Ⓐ Ⓑ Ⓒ Ⓓ   50 Ⓔ Ⓕ Ⓖ Ⓗ
6 Ⓔ Ⓕ Ⓖ Ⓗ   21 Ⓐ Ⓑ Ⓒ Ⓓ   36 Ⓔ Ⓕ Ⓖ Ⓗ   51 Ⓐ Ⓑ Ⓒ Ⓓ
7 Ⓐ Ⓑ Ⓒ Ⓓ   22 Ⓔ Ⓕ Ⓖ Ⓗ   37 Ⓐ Ⓑ Ⓒ Ⓓ   52 Ⓔ Ⓕ Ⓖ Ⓗ
8 Ⓔ Ⓕ Ⓖ Ⓗ   23 Ⓐ Ⓑ Ⓒ Ⓓ   38 Ⓔ Ⓕ Ⓖ Ⓗ   53 Ⓐ Ⓑ Ⓒ Ⓓ
9 Ⓐ Ⓑ Ⓒ Ⓓ   24 Ⓔ Ⓕ Ⓖ Ⓗ   39 Ⓐ Ⓑ Ⓒ Ⓓ   54 Ⓔ Ⓕ Ⓖ Ⓗ
10 Ⓔ Ⓕ Ⓖ Ⓗ   25 Ⓐ Ⓑ Ⓒ Ⓓ   40 Ⓔ Ⓕ Ⓖ Ⓗ   55 Ⓐ Ⓑ Ⓒ Ⓓ
11 Ⓐ Ⓑ Ⓒ Ⓓ   26 Ⓔ Ⓕ Ⓖ Ⓗ   41 Ⓐ Ⓑ Ⓒ Ⓓ   56 Ⓔ Ⓕ Ⓖ Ⓗ
12 Ⓔ Ⓕ Ⓖ Ⓗ   27 Ⓐ Ⓑ Ⓒ Ⓓ   42 Ⓔ Ⓕ Ⓖ Ⓗ   57 Ⓐ Ⓑ Ⓒ Ⓓ
13 Ⓐ Ⓑ Ⓒ Ⓓ   28 Ⓔ Ⓕ Ⓖ Ⓗ   43 Ⓐ Ⓑ Ⓒ Ⓓ
14 Ⓔ Ⓕ Ⓖ Ⓗ   29 Ⓐ Ⓑ Ⓒ Ⓓ   44 Ⓔ Ⓕ Ⓖ Ⓗ
15 Ⓐ Ⓑ Ⓒ Ⓓ   30 Ⓔ Ⓕ Ⓖ Ⓗ   45 Ⓐ Ⓑ Ⓒ Ⓓ

PART 2   MATHEMATICS

58, 59, 60, 61, 62 — grid-in answer boxes with digits 0–9 and negative/decimal bubbles

63 Ⓐ Ⓑ Ⓒ Ⓓ   76 Ⓔ Ⓕ Ⓖ Ⓗ   89 Ⓐ Ⓑ Ⓒ Ⓓ   102 Ⓔ Ⓕ Ⓖ Ⓗ
64 Ⓔ Ⓕ Ⓖ Ⓗ   77 Ⓐ Ⓑ Ⓒ Ⓓ   90 Ⓔ Ⓕ Ⓖ Ⓗ   103 Ⓐ Ⓑ Ⓒ Ⓓ
65 Ⓐ Ⓑ Ⓒ Ⓓ   78 Ⓔ Ⓕ Ⓖ Ⓗ   91 Ⓐ Ⓑ Ⓒ Ⓓ   104 Ⓔ Ⓕ Ⓖ Ⓗ
66 Ⓔ Ⓕ Ⓖ Ⓗ   79 Ⓐ Ⓑ Ⓒ Ⓓ   92 Ⓔ Ⓕ Ⓖ Ⓗ   105 Ⓐ Ⓑ Ⓒ Ⓓ
67 Ⓐ Ⓑ Ⓒ Ⓓ   80 Ⓔ Ⓕ Ⓖ Ⓗ   93 Ⓐ Ⓑ Ⓒ Ⓓ   106 Ⓔ Ⓕ Ⓖ Ⓗ
68 Ⓔ Ⓕ Ⓖ Ⓗ   81 Ⓐ Ⓑ Ⓒ Ⓓ   94 Ⓔ Ⓕ Ⓖ Ⓗ   107 Ⓐ Ⓑ Ⓒ Ⓓ
69 Ⓐ Ⓑ Ⓒ Ⓓ   82 Ⓔ Ⓕ Ⓖ Ⓗ   95 Ⓐ Ⓑ Ⓒ Ⓓ   108 Ⓔ Ⓕ Ⓖ Ⓗ
70 Ⓔ Ⓕ Ⓖ Ⓗ   83 Ⓐ Ⓑ Ⓒ Ⓓ   96 Ⓔ Ⓕ Ⓖ Ⓗ   109 Ⓐ Ⓑ Ⓒ Ⓓ
71 Ⓐ Ⓑ Ⓒ Ⓓ   84 Ⓔ Ⓕ Ⓖ Ⓗ   97 Ⓐ Ⓑ Ⓒ Ⓓ   110 Ⓔ Ⓕ Ⓖ Ⓗ
72 Ⓔ Ⓕ Ⓖ Ⓗ   85 Ⓐ Ⓑ Ⓒ Ⓓ   98 Ⓔ Ⓕ Ⓖ Ⓗ   111 Ⓐ Ⓑ Ⓒ Ⓓ
73 Ⓐ Ⓑ Ⓒ Ⓓ   86 Ⓔ Ⓕ Ⓖ Ⓗ   99 Ⓐ Ⓑ Ⓒ Ⓓ   112 Ⓔ Ⓕ Ⓖ Ⓗ
74 Ⓔ Ⓕ Ⓖ Ⓗ   87 Ⓐ Ⓑ Ⓒ Ⓓ   100 Ⓔ Ⓕ Ⓖ Ⓗ   113 Ⓐ Ⓑ Ⓒ Ⓓ
75 Ⓐ Ⓑ Ⓒ Ⓓ   88 Ⓔ Ⓕ Ⓖ Ⓗ   101 Ⓐ Ⓑ Ⓒ Ⓓ   114 Ⓔ Ⓕ Ⓖ Ⓗ

Sample Test, Form B
Part 1 — English Language Arts

Suggested Time — 90 Minutes

57 Questions

Revising/Editing

Questions 1–20

IMPORTANT NOTE

The Revising/Editing section (Questions 1-20) is in two parts: Part A and Part B.

REVISING/EDITING Part A

DIRECTIONS: Read and answer each of the following questions. You will be asked to recognize and correct errors in sentences or short paragraphs. Mark the **best** answer for each question.

1. Read this paragraph.

> (1) In September 2016, the National Museum of African American History and Culture opened, as part of the Smithsonian Institution, the museum is already the Smithsonian's third most popular site. (2) Experts say that they expect this newest Smithsonian facility to welcome nearly 4 million visitors a year. (3) The museum features more than 30,000 objects, including Muhammad Ali's boxing gloves and a dress sewn by Rosa Parks. (4) A commemorative copy of the Emancipation Proclamation, which was written in 1863 during the presidency of Abraham Lincoln, is also available for viewing at the museum.

Which sentence should be revised to correct a run-on?

A. sentence 1
B. sentence 2
C. sentence 3
D. sentence 4

2. Read this sentence.

> To promote their club, a bake sale will be sponsored by members of the debate team on Wednesday.

How should this sentence be revised?

E. To promote their club, on Wednesday a bake sale will be sponsored by members of the debate team.

F. On Wednesday to promote their club, a bake sale will be sponsored by members of the debate team.

G. To promote their club, members of the debate team will sponsor a bake sale on Wednesday.

H. Members of the debate team, on Wednesday to promote their club, will sponsor a bake sale.

3. Read this paragraph.

> (1) Devon spent several hours preparing for an upcoming audition. (2) First, he did vocal exercises to practice his diction and projection. (3) Then, he studies the text of the monologue to better understand the emotions and motivations of the character he plans to portray. (4) Finally, he recited his monologue in front of a mirror many times, making slight adjustments and improvements to his performance each time.

Which sentence should be revised to correct an inappropriate shift in verb tense?

A. sentence 1
B. sentence 2
C. sentence 3
D. sentence 4

4. Read this sentence.

> The Colosseum in Rome, Italy which is considered one of the New Seven Wonders of the World, is the largest amphitheater ever built and could hold more than 50,000 spectators.

Which edit should be made to correct this sentence?

E. delete the comma after *Rome*
F. insert a comma after *Italy*
G. delete the comma after *World*
H. insert a comma after *built*

5. Read this sentence.

> The engineers tried some other things in the hope of finding a more effective insulation for the compartment.

What is the most precise revision for the words *The engineers tried some other things*?

A. The engineers did experiments with several new materials

B. The engineers tested foam and fiberglass

C. The engineers did tests with two new materials

D. The engineers worked with foam and fiberglass

DIRECTIONS: Read the passage below and answer the questions following it. You will be asked to improve the writing quality of the passage and to correct errors so that the passage follows the conventions of standard written English. You may reread the passage if you need to. Mark the **best** answer for each question.

The Local Library

(1) According to a 2015 survey, more than two-thirds of Americans own a smartphone, which means that obtaining information or communicating with people is easier than ever before. (2) With the swipe of a finger or the tap of an icon, people have instant access to articles, blogs, news, and social networking websites. (3) Even with all these immediate sources, one of the best resources also happens to be one of the oldest. (4) The public library is a great place for people to get information.

(5) The public library serves a truly critical role in promoting community. (6) There has been an explosion of digital media in recent years. (7) This now allows people in different places to communicate almost instantaneously. (8) And yet many people complain of feeling more isolated and alone than ever before. (9) The library stands in a unique position to help community members meet this universal need for human connection and companionship.

(10) Furthermore, libraries offer free assistance, training programs, and Internet access to all people. (11) A student who does not have a computer at home can research and type a paper for school. (12) An unemployed adult without access to the Internet can make use of library resources to find job opportunities. (13) A library's selection of materials, known as its collection, can include classic novels, reference books, magazines, periodicals, CDs, and DVDs. (14) The stuff that is found at the library can help people get a lot done.

(15) Public libraries also offer a variety of resources to community members. (16) One important resource is the local librarian, who does far more than check out books and collect fines. (17) Other library resources include free or low-cost tutoring and training programs. (18) Additionally, lectures, book groups, and town meetings promote critical thinking and community engagement. (19) A typical librarian holds a master's degree and can help library patrons navigate through the flood of information available in print or on the Internet.

(20) The hallmark of a public library is that its materials and services are accessible to all. (21) The library connects people to a network of information and resources and is an important part of a community.

6. Which sentence should replace sentence 4 to best introduce the main claim of the passage?

   E. The public library is a valuable resource that all members of a community should use.

   F. Going to the public library to gather information can be a valuable learning experience.

   G. The resources available at a public library are most useful for students.

   H. A public library offers many services to those who are interested in improving their communities.

7. What is the best way to combine sentences 6 and 7 to clarify the relationship between ideas?

   A. There has been an explosion of digital media in recent years, since people in different places can now communicate almost instantaneously.

   B. There has been an explosion of digital media in recent years, although it now allows people in different places to communicate almost instantaneously.

   C. In addition to the explosion of digital media in recent years, people in different places can communicate almost instantaneously.

   D. With the explosion of digital media in recent years, people in different places can now communicate almost instantaneously.

8. Which sentence can best follow and support sentence 9?

   E. Libraries, which have been around for centuries and are found throughout the world today, help preserve the history of a community.

   F. The public library is often used as a place for community leaders and organizers to host community events, such as hearings or town halls.

   G. Libraries rely on a combination of local, state, and federal dollars to provide the kinds of services and programs that community members have come to expect.

   H. At a public library, people can interact with others through a variety of programs, including teen book clubs, toddler story times, and senior-citizen exercise classes.

9. Which transition word or phrase should be added to the beginning of sentence 12?

   A. For example
   B. Similarly
   C. Indeed
   D. As a result

10. Which revision of sentence 14 best maintains the formal style established in the passage?

   E. The resources available at the library can help people accomplish many tasks.

   F. All the materials you can get at the library can help you do many different tasks.

   G. Everything in the library can help people work on a lot of different things.

   H. The resources you can find at the library can help you do whatever you need to do.

11. Where should sentence 19 be moved to improve the organization of the fourth paragraph (sentences 15–19)?

   A. to the beginning of the paragraph (before sentence 15)
   B. between sentences 15 and 16
   C. between sentences 16 and 17
   D. between sentences 17 and 18

12. Which sentence is irrelevant to the argument presented in the passage and should be deleted?

    E. sentence 3

    F. sentence 11

    G. sentence 13

    H. sentence 20

13. Which concluding sentence should be added after sentence 21 to support the argument presented in the passage?

    A. Finally, patrons of the public library can grow in both their interpersonal life and their level of community engagement.

    B. Clearly, it is in the best interest of community members to maintain, support, and use their public library.

    C. After all, the public library has been a part of American communities since the first one was founded in 1833.

    D. In the end, community leaders must work together to find ways to generate more involvement in public library events.

Moving Through Mountains

(1) An age-old proverb says that necessity is the mother of invention. (2) Centuries of human ingenuity in the face of obstacles prove this to be true. (3) For many years the Swiss Alps, a mountain range spanning southern Switzerland and northern Italy, were such an obstacle. (4) Roads and railways had to navigate around the mountains or through winding tunnels inside the mountains. (5) Transportation of people and goods was difficult and time consuming. (6) In 2016 these burdens were eased with the completion of the Gotthard Base Tunnel.

(7) Construction of the high-speed railway tunnel began in 1996. (8) The tunnel was created through the use of tunnel-boring machines, which are giant drills with a rotating head. (9) Each of the tunnel-boring machines used during the construction of the tunnel was about the length of four football fields arranged end-to-end. (10) During the seventeen-year construction period, 28 million tons of rock were removed, enough to rebuild the Great Pyramid at Giza five times. (11) This massive construction project is reported to have cost $12 billion. (12) After that, 4 million cubic meters of concrete, or enough concrete to build eighty-four Empire State Buildings, were used to construct and support the tunnel.

(13) By 2020 the high-speed railway will carry more than 250 freight trains and fifty-five passenger trains a day, with most traveling at speeds of around 100 to 125 miles an hour. (14) It will be faster for people to travel between northern and southern Europe. (15) The travel time between the European cities of Zurich, Switzerland, and Milan, Italy, will be reduced by an hour. (16) Many European leaders compare the Gotthard Base Tunnel to the Channel Tunnel, a 33-mile underwater tunnel that connects the United Kingdom and France. (17) While there is no roadway in the Channel Tunnel, people can drive their cars onto special trains that will carry vehicles through to the other side.

(18) The Gotthard Base Tunnel project was successful, so now there is renewed interest in solving other problems associated with traveling to and from certain places. (19) Just as traffic congestion in major cities led to the construction of underground local transportation, natural formations, such as mountain ranges, have also sent people underground for faster, easier, and cheaper methods of transportation across larger areas.

14. What is the best way to combine sentences 4 and 5 to clarify the relationship between ideas?

- **E.** Roads and railways had to navigate around the mountains or through winding tunnels inside the mountains, making the transportation of people and goods difficult and time consuming.
- **F.** Even though roads and railways had to navigate around the mountains or through winding tunnels inside the mountains, the transportation of people and goods was difficult and time consuming.
- **G.** Roads and railways had to navigate around the mountains or through winding tunnels inside the mountains, emphasizing that the transportation of people and goods was difficult and time consuming.
- **H.** Roads and railways had to navigate around the mountains or through winding tunnels inside the mountains, since the transportation of people and goods was difficult and time consuming.

15. Which sentence should follow sentence 6 to most clearly introduce the topic of the passage?

    A. The Gotthard Base Tunnel was approved by Swiss voters in 1992 and was funded by tolls, fuel taxes, and government loans.

    B. Leaders from several European countries attended the opening ceremonies for the Gotthard Base Tunnel.

    C. The Gotthard Base Tunnel is the world's longest and deepest railway tunnel, stretching 35.5 miles straight through the base of the Swiss Alps.

    D. The construction of the Gotthard Base Tunnel continues to help reduce the number of freight trucks on the roadways.

16. Which sentence could be added to follow and support sentence 8?

    E. The tunnel-boring machine is helpful to tunnel builders in the modern era and has been an improvement over dynamite.

    F. These enormous tunnel-boring machines function somewhat like a cheese grater, grinding slowly through rock and stone.

    G. Engineers had considered making a tunnel under the mountains for many years, but it was impossible to do without modern tunnel-boring machines.

    H. Different types of tunnel-boring machines are used depending on the geology of the area where the tunnel is being created.

17. Where should sentence 12 be moved to improve the organization of the second paragraph (sentences 7–12)?

    A. to the beginning of the paragraph (before sentence 7)

    B. between sentences 7 and 8

    C. between sentences 9 and 10

    D. between sentences 10 and 11

18. Which transition word or phrase should be added to the beginning of sentence 15?

    E. Even so

    F. Additionally

    G. For example

    H. Therefore

19. Which sentence is irrelevant to the topic presented in the passage and should be removed?

    A. sentence 3

    B. sentence 11

    C. sentence 13

    D. sentence 17

20. Which concluding sentence should be added after sentence 19 to support the topic presented in the passage?

    E. There is proof that underground tunnels like the Gotthard Base Tunnel are beneficial to the economy of the surrounding areas.

    F. The Gotthard Base Tunnel is an extraordinary example of how human ingenuity and persistence can overcome great obstacles.

    G. The completion of the Gotthard Base Tunnel shows that people can work together to achieve important goals.

    H. The Swiss government is confident that the economic impact of the Gotthard Base Tunnel will be worth its construction cost.

DIRECTIONS: Read the passage below and answer the questions following it. Base your answers **on information contained only in the passage.** You may reread a passage if you need to. Mark the **best** answer for each question.

On Monday evening, September 26, 1960, seventy million Americans turned on their TV sets to view the first televised political debate in a campaign for the presidency of
5   the United States. As of that date, it was by far the largest number ever to witness a political discussion. The novelty of the event drew even those with little or no interest in politics.

10 The candidates, Republican Vice President Richard M. Nixon and Democratic Senator John F. Kennedy, had agreed to face each other and the nation in four one-hour sessions that the press dubbed the "Great
15 Debates." Many expected Vice President Nixon to win the debates easily. He was ahead in the newspaper polls, he was an experienced public speaker, and he had served as vice president for nearly
20 eight years. Senator Kennedy was less well-known and, at forty-three, was the youngest man ever to run for president. Throughout the presidential race, his opponents criticized him for his relative youth and inexperience.

25 By mutual agreement, the first session was limited to domestic issues within the United States. Each candidate was given eight minutes to make his opening remarks. During the remainder of the hour, the
30 candidates took turns responding to questions posed by selected reporters. Both Kennedy and Nixon dealt with the issues calmly and carefully. Viewers who expected to see a free-for-all were disappointed. The way
35 the two men appeared on the television screen, however, may have been as important as what they said. Kennedy looked at the camera while answering questions, appearing to speak directly to his viewers and give
40 them straight answers. Nixon was recovering from a severe bout of influenza, and he appeared tense and tired. He looked at the reporters who asked the questions instead of at the camera, giving some viewers the
45 impression that he avoided eye contact with his audience and thus suggesting that he was not trustworthy. Most commentators agreed that Kennedy gained from the encounter: many viewers who had previously thought he
50 lacked the maturity necessary to be president were won over by his charm, poise, and confident manner.

While far fewer people watched the three later sessions, much discussion ensued
55 regarding the influence of the Great Debates on the outcome of the 1960 presidential election. Some feared that the better TV performer was bound to come across as being the better candidate. "Is this a good way to
60 judge a person's ability to serve as president of the United States?" they asked.

Kennedy ultimately won the election, but it was by the narrowest popular vote margin in more than eighty years. Some observers
65 concluded that, had the Great Debates been broadcast on radio and not on television, Nixon would have won.

21. Which of the following best tells what this passage is about?

    A. the reasons Nixon was expected to defeat Kennedy in the 1960 election
    B. the discussion of domestic issues in the 1960 presidential debates
    C. the events related to the first televised presidential debate
    D. the qualifications of Nixon and Kennedy for the role of president

22. Which of the following would have been the most likely result if the candidates had **not** debated on television in 1960?

    E. Kennedy would have won the election anyway.
    F. Nixon would have had a better chance of winning the election.
    G. The election results would have been much closer.
    H. The debates would not have become a tradition.

23. Which of the following did critics in 1960 think could be an undesirable consequence of televised presidential debates?

    A. Candidates who are less well-known would have to debate experienced politicians.
    B. Candidates might have difficulty overcoming the pressure of being on live television.
    C. Candidates would be evaluated based on their performance rather than their positions.
    D. Candidates would need to participate in multiple televised debates to fully cover important issues.

24. How did Kennedy benefit from the debates?

    E. He was able to prove that he knew more about domestic issues than Nixon did.
    F. He was able to display favorable personal characteristics despite his inexperience.
    G. He was able to show that he had a more positive relationship with reporters than Nixon did.
    H. He was able to persuade viewers to agree with his positions on domestic issues.

25. What evidence does the author provide to support the last sentence of the passage?

    A. Kennedy and Nixon drew much smaller audiences for their later debates.
    B. Kennedy and Nixon responded to questions calmly and carefully.
    C. Nixon participated in the debate despite having been recently ill.
    D. Nixon was more experienced and well-known than Kennedy.

26. Why did people who were not normally interested in politics tune in to the first of the Great Debates?

    E. Vice President Nixon was a popular politician.
    F. Television had never before been used in this way.
    G. They had heard that Kennedy was young and charismatic.
    H. They wanted to see whether the newspaper polls were correct.

If you have ever watched someone fall on the ice, you've seen slipperiness at work. But have you wondered what makes ice slippery, or why skates or skis glide across ice so easily? The answer might seem obvious: ice is smooth. Yet smoothness in itself does not explain slipperiness. Imagine, for example, skating on a smooth surface of glass or sheet metal.

Surprisingly, scientists do not fully understand why ice is slippery. Past explanations of slipperiness have focused on friction and pressure. According to the friction theory, a skate blade rubs across the ice, causing friction. The friction produces heat, melting the ice and creating a slippery, microscopically thin layer of water for the skate to glide on. The friction theory, however, cannot explain why ice is slippery even when someone stands completely motionless, creating no friction.

The pressure theory claims that pressure from a skate blade melts the ice surface, creating a slippery layer of water. The water refreezes when the pressure is lifted. Science textbooks typically cite this explanation, but many scientists disagree, claiming that the pressure effect is not great enough to melt the ice. Nor can the pressure theory explain why someone wearing flat-bottomed shoes— which have a greater surface area than skate blades and thus exert less pressure per square inch—can glide across the ice or even go sprawling.

During the 1990s, another theory found acceptance: the thin top layer of ice is liquid, or liquid-like, regardless of friction or pressure. This notion was first proposed more than 150 years ago by physicist Michael Faraday. Faraday's simple experiment illustrates this property: two ice cubes held against each other will fuse together. This happens, Faraday explained, because liquid on the cubes' surfaces freezes solid when the surfaces make contact.

Faraday's hypothesis was overlooked, in part because scientists did not have the means to detect molecular structures. However, technological advances during recent decades have allowed scientists to measure the thin layer on the surface of ice. For example, in 1996, a chemist at Lawrence Berkeley Laboratory shot electrons at an ice surface and recorded how they rebounded. The data suggested that the ice surface remained liquid-like, even at temperatures far below freezing. Scientists speculate that water molecules on the ice surface are always in motion because there is nothing above them to hold them in place. The vibration creates a slippery layer of molecules. According to this interpretation of the Lawrence Berkeley Laboratory experiments, the molecules move only up and down; if they also moved side to side, they would constitute a true liquid. Thus it could be said that people are skating on wildly vibrating molecules!

The phenomenon of a slippery, liquid-like surface is not limited to ice, although ice is the most common example. Lead crystals and even diamond crystals, which are made of carbon, also show this property under certain temperature and pressure conditions.

27. Which of the following best tells what this passage is about?

    A. the circumstances that allow ice to melt
    B. the theories behind what makes ice slippery
    C. the discoveries of Michael Faraday
    D. the processes of freezing and melting

28. What is the most likely reason that the author mentions lead and diamond crystals in the last paragraph?

    E. to point out that solids other than ice have slippery surfaces
    F. to suggest that ice, lead, and diamonds are composed of the same materials
    G. to cast doubt on Faraday's theory of slipperiness
    H. to illustrate the effects of temperature and pressure on slipperiness

29. According to Faraday, why do two ice cubes fuse when held together?

    A. Friction causes the surfaces of the ice to melt and refreeze.
    B. The applied pressure forces the surfaces of the cubes to stick to each other.
    C. Liquid layers on the surfaces freeze together when the surfaces make contact.
    D. The liquid layers on the surfaces of the ice are perfectly smooth.

30. What is the most likely reason that the author mentions the 1996 experiment at Lawrence Berkeley Laboratory?

    E. to provide evidence about the surface of ice
    F. to illustrate that studying ice molecules is difficult
    G. to show how experiments on ice are inconclusive
    H. to explain why ice cubes freeze together

31. According to researchers at the Lawrence Berkeley Laboratory, why is the surface of ice liquid-like rather than a true liquid?

    A. because electrons rebound from the ice surface
    B. because the ice surface molecules vibrate only up and down
    C. because the ice surface is a different temperature
    D. because the ice surface is under pressure

32. According to the passage, which of the following undermines the friction theory of slipperiness?

    E. a person wearing flat-bottomed shoes gliding across an icy surface
    F. two ice cubes fusing together
    G. electrons bouncing off the surface of ice
    H. a person sliding while standing immobile on an icy surface

33. The author includes details about the pressure theory in the third paragraph in order to

    A. highlight that there are different ideas regarding this theory about the slipperiness of ice.
    B. describe the most recently accepted theory for the slipperiness of ice.
    C. emphasize that this theory has been tested by scientists who study the slipperiness of ice.
    D. show that there is scientific support for a plausible theory about the slipperiness of ice.

One of the books that has done the most to alert the world to the dangers of environmental degradation was George Perkins Marsh's *Man and Nature*. Its
5 message—that Western society was in the process of causing irreparable harm to the environment—greatly influenced ecologists during the beginning of the modern environmentalist movement in the 1960s.
10 Marsh was not, however, part of this movement. Surprisingly, *Man and Nature* was first published in 1864.

Marsh first observed the environmentally destructive effects of human activities while
15 growing up in Vermont in the early nineteenth century. The heavy demand for firewood had depleted the forests, and extensive sheep grazing had stripped the land. The result was flooding and soil erosion.
20 Furthermore, streams were fouled by wastes dumped from numerous mills and dye houses.

Much later in his life, after careers in law, business, farming, and politics, Marsh served
25 as ambassador to Italy. There he noticed land abuse similar to what he had seen in Vermont. Overgrazing and forest mismanagement had rendered desolate areas that had been productive farmland since the
30 days of the Roman Empire. Marsh attributed this to what he called "man's ignorant disregard for the laws of nature."

In Italy, Marsh began to organize his observations and theories. He wrote in a way
35 intended to educate readers about the impact of industrial and agricultural practices on the environment. In *Man and Nature*, he evaluated the important relationships between animals and plants, discussed
40 forestry practices in great detail, and analyzed the ways natural water supplies are affected by human use.

Man and Nature challenged the popular belief that nature could heal any damage
45 that people inflict upon it. Marsh argued that

people may use and enjoy, but not destroy, the riches of the earth.

Furthermore, he asserted that everything in nature is significant and that even the tiniest
50 organism affects the fragile environmental balance. His belief that drastic alteration of this balance would be dangerous is now accepted as a fundamental principle of modern environmental science.

55 Although he pointed out environmental damage caused by irresponsible human activities, Marsh did not oppose every human alteration to the environment. To him, the goal was proper management, not a return to
60 wilderness conditions. People should consider the consequences of their actions, he wrote, and become "co-worker[s] with nature." Marsh praised the Suez Canal, the human-made waterway between the Mediterranean
65 Sea and the Gulf of Aden, as "the greatest and most truly cosmopolite physical improvement ever undertaken by man." He believed that the advantages of the canal— improved transportation and commerce—
70 would outweigh any environmental damage. Yet he also warned of possible unintended consequences, such as destructive plants and animals spreading from one body of water to the other.

75 Marsh was considered a radical thinker during his lifetime. By the late nineteenth century, however, his writings, along with those of John Muir, Henry David Thoreau, and others, had inspired what became known
80 as the conservation movement. The conservationists of that time sought to educate the public that wilderness areas were worth preserving, and they were responsible for creating the National Park
85 Service and the National Forest Service.

34. Which statement best describes the central idea of the passage?

 E. Marsh's experience growing up on a farm allowed him to witness firsthand how human demands on nature can lead to problems, and as an adult he wrote one of the first books about conservation.

 F. Marsh challenged the notion that nature could repair the damage people cause to it, but he also supported human-made modifications to nature that improve transportation and commerce.

 G. Marsh's ideas about the environment were considered radical in his lifetime, but they later gained popularity during the environmental movement in the twentieth century.

 H. Marsh was a radical thinker who believed that people's actions could dramatically affect nature, and his writings are considered foundational to the conservation movement.

35. Marsh believed that the people of his time caused harm to the environment mostly because

 A. they assumed future generations would solve any environmental problems.

 B. they thought industrial progress was more important than protecting nature.

 C. they were unwilling to change farming and waste-disposal practices.

 D. they lacked knowledge of nature and natural processes.

36. What is the most likely reason the author uses the word "surprisingly" in line 11?

 E. to argue that Marsh's ideas are more applicable in the present than they were during his lifetime

 F. to show that Marsh introduced ideas a century before they became widely accepted

 G. to emphasize that Marsh was unaware that his ideas would help begin a conservation movement

 H. to prove that there would be fewer issues with the environment today if people had accepted Marsh's ideas earlier

37. Which evidence supports the idea that Marsh's theories about nature were accurate?

 A. the details about Marsh's observations of environmental degradation

 B. the details about how Marsh's writing inspired a conservation movement

 C. the details about how Marsh's ideas are essential to modern environmental science

 D. the details about Marsh's opinion on human alterations to the environment

38. Which detail about Marsh provides support for the author's statement in lines 55–58?

    E. his reputation as a radical thinker
    F. his contribution to the conservation movement
    G. his experience working as an ambassador
    H. his approval of beneficial human-made projects in nature

39. Which of Marsh's ideas most influenced the environmental movement of the 1960s?

    A. Some human alterations to the environment are necessary.
    B. People lack an understanding of the environment.
    C. Human activities could damage the environment.
    D. Environmental degradation has been occurring for many years.

Anyone who has watched TV news coverage of a hurricane has seen how destructive wind energy can be. But the power of the wind can also be put to constructive use. From sailboats to old-fashioned windmills to high-tech wind turbines, people have devised ways to harness wind energy for thousands of years.

The first known attempt to use wind power was the sailboat. Ancient shipbuilders understood how to use forces like lift and momentum, even if they could not explain those forces scientifically. The principles behind sailing led to the development of the windmill. The first known windmills originated in Persia, an area that is now Iran, as early as A.D. 500. They were created to help with the demanding chores of grinding grain and pumping water. By the tenth century, windmills were used throughout central Asia; they were used in China as early as the thirteenth century.

In Europe, windmills came into widespread use during the twelfth century. As in other parts of the world, they were used for milling grain and pumping water. Windmills replaced the water wheel, which was turned by the movement of running water over paddles mounted around a wheel. The windmill was more adaptable and efficient than the water wheel and quickly became popular. For example, Holland, famous for its windmills, used the machines to pump seawater away from low-lying coastal bogs. This allowed the Dutch to reclaim large areas of land from the sea. Windmills eventually became sophisticated enough for use in a broad range of work, from sawmills and drainage pumping to processing goods, such as dyes, tobacco, cocoa, and spices.

In the 1700s, as steam engines gained in popularity, the use of wind machines for many types of work declined. However, windmills still played an essential role in pumping water on farms throughout the American West and Midwest. Between 1850 and 1970, over six million small windmills were installed on American farms for watering livestock and meeting other water needs. In many remote areas even today, livestock production would be impossible without the use of windmills to provide water.

Beginning in the late nineteenth century, windmills were adapted to generate electricity. During the 1930s and '40s, thin-bladed windmills provided electricity for hundreds of thousands of farms across the United States. By the 1950s, however, power lines connected almost every household in America to a central power source, such as a utility company. After that, there was little need for wind turbines until the energy crisis of the 1970s. At that time, interest in wind turbines was renewed due to rising energy costs and concern about the future availability of fossil fuels, such as oil, coal, and natural gas. The last several decades have seen the development of "wind farms," clusters of wind turbines that generate electricity. Efficient, clean, and fairly inexpensive to operate, wind farms may prove to be as important in the future as earlier windmills were in the past.

40. Which of the following best tells what this passage is about?

    E. the ways people have harnessed wind power throughout history
    F. reasons for developing wind farms to generate electricity
    G. how windmills are used in the United States
    H. why windmills were modified to generate electricity

41. What evidence best supports the idea that windmills were important resources in the western United States?

    A. the details about the development and use of wind farms
    B. the details about how windmills provided water for farms and livestock
    C. the details about the role of wind energy during the energy crisis of the 1970s
    D. the details about how steam engines influenced the use of windmills

42. The author describes the tasks windmills were used for in lines 36–40 in order to

    E. emphasize that windmills served a variety of purposes.
    F. highlight that windmills are more efficient than water wheels.
    G. emphasize that windmills were used for many years.
    H. convey that some countries used windmills more than other countries.

43. Why were fewer American farms dependent on wind machines for electrical power after the 1950s?

    A. The energy crisis had prompted interest in other fuel sources.
    B. Coal and natural gas could generate more power than wind turbines.
    C. Centralized power systems connected most places.
    D. Wind farms had reduced the need for individual windmills.

44. Which of the following best expresses the author's opinion regarding the future use of wind energy?

    E. Wind farming methods are unlikely to increase electrical output.
    F. Wind farms will most likely be used to provide energy in rural areas.
    G. Wind farming output will likely supplement other sources of energy.
    H. Wind farms may become an important source of electricity.

45. According to the passage, the people of Holland most notably used windmills to

    A. pump water to remote locations.
    B. turn bogs into usable land.
    C. make the country famous.
    D. process a variety of goods.

Archaeologists first succeeded in using tree-ring dating while excavating ancient Pueblo Native American villages in the southwestern United States during the

5 1920s. At that time, no one knew when the villages had been occupied, or for how long, but the logs used in the buildings provided a clue. Scientists had long known that trees add a new growth ring to their

10 circumferences during each growing season. Drought or early frost results in little growth and narrow rings. Good growing years result in wide rings. Archaeologists knew that by matching identical patterns of wide and

15 narrow rings in sections of two different logs, they could determine which log was older. For example, a log with a certain pattern of rings near its outside edge would indicate a specific series of good and bad growing seasons. This

20 log would have been cut down before a log of comparable size that shows the identical pattern near its center.

But how could these ring patterns help determine the actual dates for the abandoned

25 Pueblo villages? Archaeologists had already used the ring patterns of trees with overlapping lifetimes to establish a tree-ring chronology for the southwestern United States that went back to A.D. 1260. That work

30 had been done in a Hopi village called Oraibi. Oraibi had been continuously inhabited since before the arrival of the first Spanish explorers in 1540.

That same team of archaeologists also

35 developed a relative, or floating, chronology for the abandoned Pueblo villages by matching up the ring patterns of the various

logs used in the buildings. With this floating chronology, the archaeologists could tell

40 which logs were older and which were more recent. None could be precisely dated, since no log had a pattern of tree rings that matched any part of the established chronology. It was clear from this evidence,

45 however, that the buildings must have been constructed before 1260.

Finally, continued excavations turned up a "key" beam. The outer ring pattern of the key beam overlapped the earliest rings in the

50 established chronology. Furthermore, its inner ring pattern matched the pattern formed by the most recent rings of the floating chronology. Thus, the chronology for the abandoned Pueblo villages could be

55 known with certainty. Counting backward from the present, the archaeologists estimated that the villages had been occupied between 900 and 1300.

The tree rings also suggested why the

60 villages had been abandoned. The rings for the years 1276 to 1299 were very thin, indicating a severe drought that lasted for twenty-three years. Most likely the villagers had left their homes to search for a more

65 hospitable climate.

46. Which of the following best tells what this passage is about?

    E. how variations in weather conditions affect tree growth

    F. recent breakthroughs in understanding Native American cultures

    G. why the Pueblo villages were abandoned

    H. how tree-ring dating can establish the age of archaeological findings

47. What was the importance of the key beam described in the fourth paragraph?

    A. It proved that trees of the same age would have identical tree-ring patterns.

    B. It helped archaeologists determine why the villages had been built at that time.

    C. It revealed a new floating chronology for archaeologists to investigate.

    D. It connected the floating chronology to the established chronology.

48. The author explains the causes of wide and narrow tree rings in lines 8–13 in order to

    E. emphasize that tree-ring dating is highly accurate.

    F. highlight how tree rings help determine past weather patterns.

    G. emphasize that a tree's ring patterns grow in a unique way.

    H. highlight the importance of studying tree rings.

49. Which evidence best supports the idea that tree-ring dating helped archaeologists understand why the Pueblo villages were abandoned?

    A. the details about the Hopi village Oraibi

    B. the details about the twenty-three-year drought

    C. the details about the discovery of the Pueblo villages

    D. the details about the floating chronology

50. Why did the archaeologists conclude that the buildings in the abandoned Pueblo villages were constructed before A.D. 1260?

    E. The logs in the Pueblo buildings did not share any ring patterns with the established chronology from the Hopi village.

    F. The logs in the Pueblo buildings had fewer rings than the logs from the buildings in the Hopi village.

    G. The Pueblo villages were abandoned before the Hopi village was established.

    H. The Pueblo villages and the Hopi village were constructed from logs of similar size.

51. Why did archaeologists compare the logs from buildings in the abandoned Pueblo villages with logs from the Hopi village?

    A. to find the oldest and most recent logs used in the Pueblo villages

    B. to find evidence that would help explain what caused people to leave the Pueblo villages

    C. to find a log from the Pueblo villages that had tree rings that matched logs from the Hopi village

    D. to find evidence that the Pueblo villages were constructed before the Hopi village

The decade that began with the stock market crash in 1929 and ended with the declaration of war in Europe in 1939 was a turning point for art in the United States. Rejecting European trends, such as abstract art, American painters searched for a style that was distinctly American. It was a time of great social change—a society based on rural and small-town life was rapidly being replaced by a society focused on city life and values. Although members of various groups are all referred to as "American Scene" painters, different groups painted their images of the United States in very different ways.

One group, sometimes called the Regionalists, included Thomas Hart Benton, Grant Wood, and John Steuart Curry, all from the Midwest. Their art was intensely patriotic and frequently glorified an older, simpler United States. Their subject matter included church steeples, New England fishing villages, and Midwestern cornfields. Grant Wood's most famous canvas is probably *American Gothic*, which shows a stiff and proper farm couple, the husband holding a pitchfork. The Regionalists were often muralists as well, painting local scenes on walls of state capitols and other public buildings. Enormously popular during the 1930s, Regionalist art is still treasured by many as a fond memory of times gone by.

While the Regionalists remembered the past, other American Scene artists painted the drab realities of the contemporary urban environment, testifying to its loneliness and anonymity. The Urban Realists, including Reginald Marsh, Isabel Bishop, and the Soyer brothers, were associated with the Art Students League in New York. These painters showed the high price paid by individual men and women struggling to survive the Depression. The names of some of their works illustrate the style: *Office Girls*, *Waiting*, *The Bowery*. For various reasons, their work has been largely forgotten today.

Edward Hopper was an artist who was associated with the American Scene but otherwise escaped further classification. Like the Urban Realists, he painted the tired dinginess of the urban streets during the Depression. Yet Hopper often found beauty in the midst of the city's monotony. For example, one of Hopper's best-known paintings, *Nighthawks*, shows several people sitting like robots in a brightly lit coffee shop at night, each apparently unaware of the others. Hopper was not interested in a return to the past. He presented what he saw without apology or sentimentality.

The American Scene art movement of the 1930s was characterized by realistic paintings that expressed the traditions and interests of people in the United States at that time. Because the paintings presented common images and mirrored the lives of many people, the general public readily identified with the subjects of the paintings. With the onset of World War II, a new spirit of internationalism swept through the art of the United States, and the American Scene painters became out of date. Although the movement did not last, it had reflected its own time with profound understanding.

52. Why did ordinary people in the 1930s identify with the art of the American Scene painters?

E. The artists were primarily concerned with painting farm life.
F. People appreciated the beauty reflected in the paintings.
G. People wanted paintings to show social and cultural change.
H. The paintings reflected the times in ways that were familiar to most viewers.

53. Which of the following subjects would an Urban Realist painter be most likely to represent?

A. a scene with factory workers going home from work
B. a scene with children playing games in a street
C. a scene of a bustling European city
D. a scene showing the stores along the main street in a city

54. Hopper's paintings contrast with the work of the Urban Realist painters by

E. showing the ugliness of a city environment.
F. illustrating the move toward an international style.
G. revealing the ways that dull urban life can include beauty.
H. focusing on the portrayal of people rather than on the setting.

55. How does the fourth paragraph contribute to the passage?

A. It describes the end of the American Scene movement.
B. It highlights Edward Hopper as a unique American Scene painter.
C. It explains why Edward Hopper's work has been forgotten.
D. It contrasts the American Scene and Urban Realist styles.

56. The author uses the phrase "without apology" (lines 59–60) to explain that Hopper did not think he needed to justify

E. how he portrayed his subjects.
F. painting scenes of real places.
G. why his paintings became popular.
H. the classification of his art style.

57. What is the most likely reason that Regionalist art has retained some of its popularity while Urban Realist art has not?

A. Regionalist art depicts modern life as well as life in the past, while Urban Realist art depicts only the past.
B. Regionalist art more accurately portrays the time in which it was painted than Urban Realist art does.
C. Regionalist art shows American life as people wish to remember it, while Urban Realist art does not.
D. Regionalist art depicts Americans overcoming the Depression, while Urban Realist art depicts life during World War II.

PART 2 — MATHEMATICS

Suggested Time — 90 Minutes

57 QUESTIONS

IMPORTANT NOTES

(1) Formulas and definitions of mathematical terms and symbols are **not** provided.

(2) Diagrams other than graphs are **not** necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be figured out from the information given.

(3) Assume that a diagram is in one plane unless the problem specifically states that it is not.

(4) Graphs are drawn to scale. Unless stated otherwise, you can assume relationships according to appearance. For example, (on a graph) lines that appear to be parallel can be assumed to be parallel; likewise for concurrent lines, straight lines, collinear points, right angles, etc.

(5) Reduce all fractions to lowest terms.

GRID-IN PROBLEMS

QUESTIONS 58–62

DIRECTIONS: Solve each problem. On the answer sheet, write your answer in the boxes at the top of the grid. Start on the left side of each grid. Print only one number or symbol in each box. **DO NOT LEAVE A BOX BLANK IN THE MIDDLE OF AN ANSWER.** Under each box, fill in the circle that matches the number or symbol you wrote above. **DO NOT FILL IN A CIRCLE UNDER AN UNUSED BOX.**

---

58. How many 5-digit numbers can be created using the digits 2, 3, 5, 7, and 8 without repeating any digits within that 5-digit number?

59. $$\frac{147-x}{12} = 12$$

What is the value of x in the equation shown above?

60. $|(-6) - (-5) + 4.2| - |3 - 9.6| =$

---

61. Tyler has completed 60 pages in his French workbook. This is 20% of the total number of pages in the workbook. How many pages are in the workbook?

62.
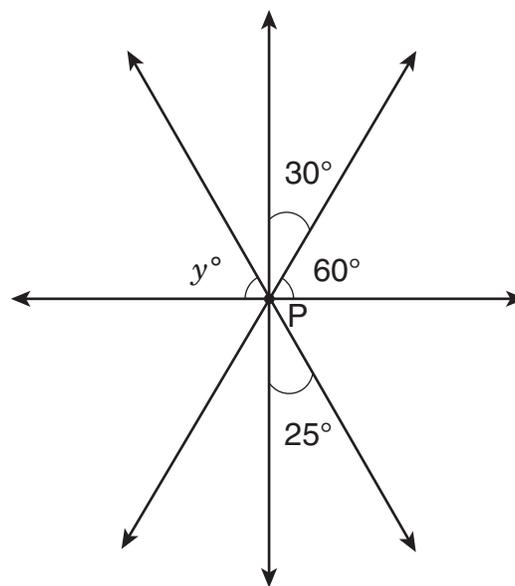
Four straight lines intersect at point P as shown above. What is the value of y?

MULTIPLE CHOICE PROBLEMS

QUESTIONS 63–114

DIRECTIONS: Solve each problem. Select the **best** answer from the choices given. Mark the letter of your answer on the answer sheet. You can do your figuring in the test booklet or on paper provided by the proctor. **DO NOT MAKE ANY MARKS ON YOUR ANSWER SHEET OTHER THAN FILLING IN YOUR ANSWER CHOICES.**

---

63. If $x = 9$ and $y = -7$, what is the value of $x(x - 2y)$?

    A. 18
    B. 45
    C. 144
    D. 207

64.
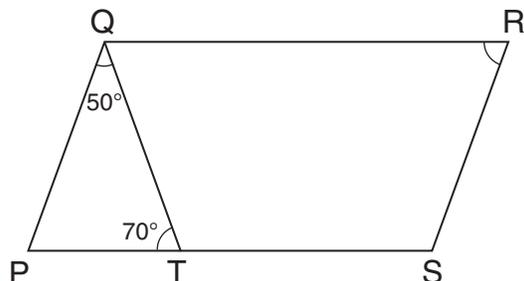
In the figure above, PQRS is a parallelogram. The measure of $\angle PQT$ is $50°$, and the measure of $\angle PTQ$ is $70°$. What is the measure of $\angle QRS$?

    E. 60°

    F. 70°

    G. 80°

    H. 120°

65.
$$M = 3N = \frac{P}{4} = Q + 5 = \frac{R}{7} > 0$$

Based on the statement above, which variable has the **greatest** value?

    A. M

    B. N

    C. P

    D. R

---

66. A roofing contractor uses shingles at a rate of 3 bundles for every 96 square feet of roof covered. At this rate, how many bundles of shingles will he need in order to cover a roof that is 416 square feet?

    E. 5
    F. 12
    G. 13
    H. 14

---

67. To make party invitations, Macie could buy a package of paper for $10.50, or she could buy x individual sheets of the same paper for $0.15 each. What is the largest value of x that would make buying the individual sheets **less** expensive than buying the package?

    A. 60
    B. 65
    C. 69
    D. 70

68. At 1:00 p.m. one day, the temperature was 8 degrees above zero. During the rest of the day, the temperature fell 3 degrees per hour. What was the temperature at 7:00 p.m. that day?

   E. $-13°$

   F. $-10°$

   G. $-7°$

   H. $5°$

69. A bag contains 75 marbles that are red, blue, or green. The ratio of red to blue marbles is 15:7, and the ratio of blue to green marbles is 7:3. If 2 blue marbles are removed and replaced with 2 green marbles, what will be the new ratio of red to green marbles?

   A. 3:1
   B. 5:1
   C. 7:5
   D. 45:11

70.

DESSERT CHOICES

Dessert	Number of Times Ordered
Cookies	42
Pie	23
Cake	47
Ice Cream	48

The table above shows the number of times that different desserts were ordered at a restaurant. Based on this information, what is the probability of a customer ordering ice cream as a dessert?

   E. 25%
   F. 30%
   G. 40%
   H. 48%

71. What is the least common multiple of 24, 6, and 18?

   A. 36
   B. 48
   C. 72
   D. 144

72. One day, the Early Bird Restaurant used 15 dozen eggs for 200 breakfast customers. At this rate, approximately how many dozen eggs are needed for 300 breakfast customers?

   E. 20
   F. 23
   G. 25
   H. 30

73. A cooler contains three types of beverages: 5 bottles of apple juice, 3 bottles of grape juice, and 6 bottles of fruit punch. What is the probability that a bottle chosen at random from this cooler is **not** apple juice?

A. $\dfrac{1}{9}$

B. $\dfrac{5}{14}$

C. $\dfrac{9}{14}$

D. $\dfrac{2}{3}$

74. A large circular dinner plate has a radius of 20 centimeters. A smaller circular plate with a circumference of 20π centimeters is placed in the center of the larger dinner plate. What is the area of the part of the larger dinner plate that is not covered by the smaller plate?

E. 20π sq cm

F. 100π sq cm

G. 200π sq cm

H. 300π sq cm

75.

PRICES FOR AD SPACE

Space	Price
$\dfrac{1}{4}$	200
$\dfrac{1}{2}$	350
full page	600

The table above shows prices for newspaper advertising. A store purchased $\dfrac{1}{4}$ pages, $\dfrac{1}{2}$ pages, and full pages of space in equal numbers for a total of $11,500. What is the total amount of page space the store purchased?

A. $1\dfrac{3}{4}$ pages

B. 10 pages

C. $16\dfrac{1}{2}$ pages

D. $17\dfrac{1}{2}$ pages

76.
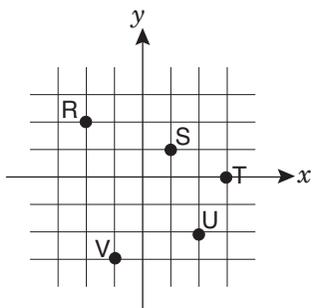
For which point on the graph above is the value of the y-coordinate greater than the value of the x-coordinate?

E. R
F. T
G. U
H. V

---

77. If $\dfrac{36}{y} = 4x$, what is the value of x when $y = 3$?

A. 3
B. 4
C. 9
D. 12

---

78. Points X, Y, and Z are on a straight line, and Y is between X and Z. Length $\overline{YZ} = \dfrac{3}{5}\,\overline{XY}$, and length $\overline{XY} = 20$ centimeters. What is the length of $\overline{XZ}$?

E. 12 cm
F. 24 cm
G. 30 cm
H. 32 cm

---

79. Bryana bought $1\dfrac{3}{4}$ yards of cloth at $8.00 per yard. If there was an 8% sales tax, what was the total cost of the cloth?

A. $12.96
B. $14.08
C. $15.12
D. $16.08

80.

On the number line above, $MN = 5\dfrac{5}{6}$. What is the position of point M ?

E. $-7\dfrac{1}{6}$

F. $-4\dfrac{1}{2}$

G. $4\dfrac{1}{2}$

H. $7\dfrac{1}{6}$

---

81. A United States presidential coin is made from an alloy of four metals—copper, zinc, manganese, and nickel—with weights in the ratio of 177:12:7:4, respectively. The coin weighs a total of 8 grams. What is the weight of the zinc in this coin?

A. 0.28 g
B. 0.48 g
C. 0.96 g
D. 48 g

82. Jack scored an average of 15 points per game in his first 3 basketball games. In his 4th game, he scored 27 points. What is his average score for the first 4 games?

   E. 15
   F. 17
   G. 18
   H. 21

83. A cylindrical oil drum can hold 4,320 liters when it is completely full. Currently, the drum is $\frac{1}{3}$ full of oil. How many **kiloliters** of oil need to be added in order to fill the drum completely?

   A. 1.44 kL
   B. 2.88 kL
   C. 4.32 kL
   D. 14.10 kL

84. Nicole's age now is three times Carmen's age. If Carmen will be 17 in two years, how old was Nicole 5 years ago?

   E. 38 yr
   F. 40 yr
   G. 45 yr
   H. 50 yr

85. A chemical decays in such a way that the amount left at the end of each week is 20% less than the amount at the beginning of that same week. What percent of the original amount is left after two weeks?

   A. 40%
   B. 60%
   C. 64%
   D. 80%

86. If $w - 1$ is an odd integer, which one of the following **must** be an even integer?

   E. $w + 1$
   F. $2w - 1$
   G. $2w - 2$
   H. $2w + 1$

87. Three students stand at the starting line of a running track and begin running laps at the same time. Ann completes 1 lap every 2 minutes, Jack completes 1 lap every 3 minutes, and Lee completes 1 lap every 4 minutes. How many laps does Ann complete before all three runners are once again at the starting line at the same time?

   A. 4
   B. 6
   C. 12
   D. 20

88. Simplify this expression:

$$4(7 - 3x) - (5 - x)$$

   E. $23 - 4x$
   F. $23 - 11x$
   G. $28 - 4x$
   H. $28 - 12x$

89.

PET SURVEY

Number of Pets	Number of Students
0	12
1	16
2	7
3 or more	5

Amy surveyed students at her school about the number of pets they have. What is the probability that a student who participated in the survey has at least 2 pets?

A. $\dfrac{7}{40}$

B. $\dfrac{1}{12}$

C. $\dfrac{1}{8}$

D. $\dfrac{3}{10}$

90. A large container is partially filled with n liters of water. Ito adds 10 liters of water to the container, making it 60% full. If Ito adds 6 more liters of water, the container will be 75% full. What is the value of n?

E. 14
F. 15
G. 26
H. 30

91.
$$5x^3 + 3x + 9 + \frac{1}{x^2}$$

If $x = 10$, what is the value of the expression above?

A. 2,539.01
B. 5,039.01
C. 5,039.1
D. 5,139

92.
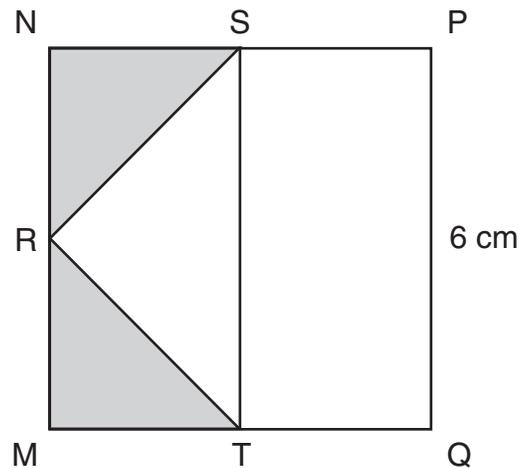
R, S, and T are midpoints of the sides of square MNPQ, as shown above. What is the sum of the areas of the shaded triangles?

E. 9 sq cm
F. 12 sq cm
G. 18 sq cm
H. 36 sq cm

93. The Chens spend $5 of every $8 they earn on planned expenses. If the family earns $29,600 in one year, how much will they spend on planned expenses that year?

A. $1,850
B. $3,700
C. $5,920
D. $18,500

94. A pizza shop offers a choice of 3 sizes (small, medium, and large) and 7 different toppings. Different pizzas can be created by changing the size and/or the choice of toppings. If Cody wants to order a pizza with exactly 2 different toppings, how many different pizzas can he create?

E. 6
F. 21
G 63
H. 126

95.

SURVEY OF CATS PER FAMILY

Number of Cats	Number of Families
0	15
1	42
2	35
3 or more	8

The table above shows the number of cats per family in 100 households in the Blaine neighborhood. By what **percentage** is the number of families with 1 cat greater than the number of families with 2 cats?

A. 7%
B. 10%
C. 17%
D. 20%

96. A wooden box has a square base. The height of this box is 3 times the length of one side of the base. If one side of the base is 3 feet long, what is the volume of this box?

E. 9 cu ft
F. 27 cu ft
G. 36 cu ft
H. 81 cu ft

97. On a bike trip, Rajiv traveled 65 kilometers in 5 hours, while Shaina traveled 72 kilometers in 4 hours. How much less was Rajiv's mean speed, in kilometers per hour (kph), than Shaina's?

A. 1 kph
B. 5 kph
C. 7 kph
D. 9 kph

98. Points P, Q, R, and S represent -3, -1, 0, and 2, respectively, on a number line. How many units is the midpoint of $\overline{PQ}$ from the midpoint of $\overline{RS}$?

E. 1
F. 2
G. 3
H. 4

99. There are 1,000 cubic centimeters in 1 liter, and 1,000 cubic millimeters in 1 milliliter. How many cubic millimeters are there in 1,000 cubic centimeters?

A. 1,000
B. 10,000
C. 100,000
D. 1,000,000

100.
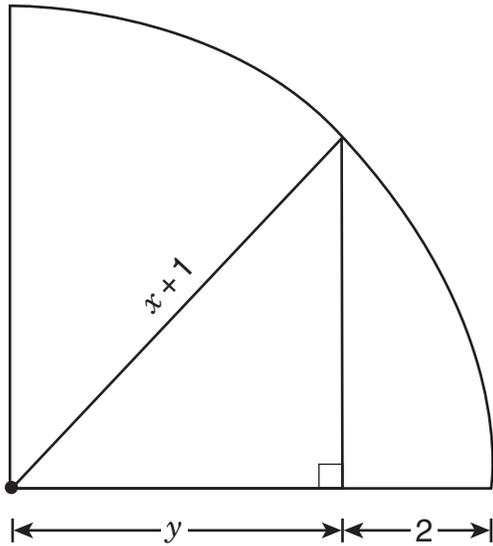
In the quarter circle above, what is y in terms of x?

E. $x - 1$

F. $x + 1$

G. $\dfrac{x+1}{2}$

H. $\sqrt{\dfrac{(x+1)^2}{2}}$

101.
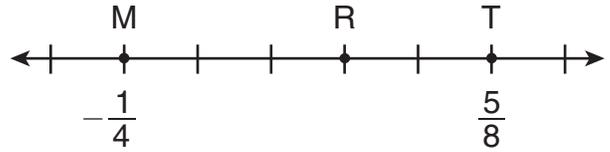
The hash marks on the number line above are evenly spaced. What is the coordinate of point R?

A. $\dfrac{7}{40}$

B. $\dfrac{9}{40}$

C. $\dfrac{11}{40}$

D. $\dfrac{21}{40}$

102. Phan chose an Internet service that charges $18.00 per month plus $0.024 per minute. Deion chose an Internet service that charges $30.00 per month for unlimited usage. At the end of the month, Phan's and Deion's charges were identical. For how many minutes did Phan use the Internet service that month?

E. 50 min
F. 60 min
G. 100 min
H. 500 min

103. In a sample of 50 cars at a local dealership, there are 12 red cars and 10 cars with backup cameras. Of the 12 red cars, 4 have backup cameras. If a car is selected at random from the given sample, what is the probability that **both** of the following are true: the car is **not** red and does **not** have a backup camera?

A. $\dfrac{3}{5}$

B. $\dfrac{16}{25}$

C. $\dfrac{19}{25}$

D. $\dfrac{4}{5}$

104. The decimal 0.06 can be written as the fraction $\dfrac{x}{50}$. What is the value of x?

E. 3
F. 6
G. 12
H. 30

105.
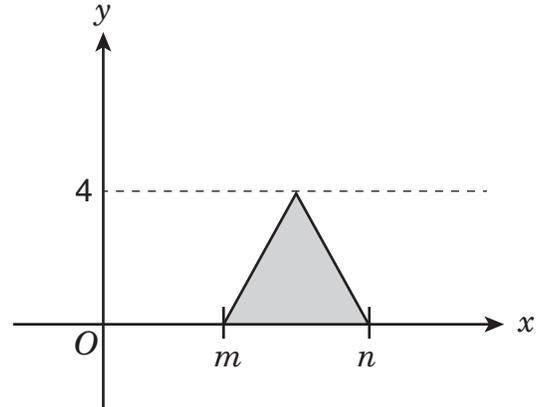
What is the area of the shaded triangle shown above?

A. $m + n$

B. $n - m$

C. $2(n - m)$

D. $4(n - m)$

106.

ANIMAL CARDS

Number of Cards	Picture on Card
8	cat
6	dog
5	bird
4	fish
1	horse

The cards in the table above are mixed in a box. Which animal pictured on a card has exactly a 1 in 4 chance of being picked at random from the box?

E. cat
F. dog
G. fish
H. horse

107. Which number line below shows the solution set for $2x - 2 \leq y \leq 4x + 10$ when $y = 1$?

A.
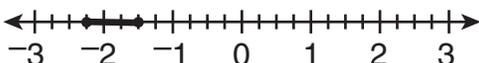
B.
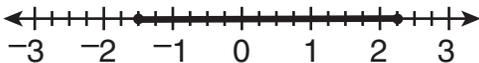
C.
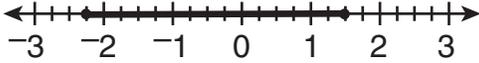
D.
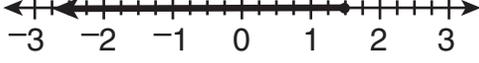
108. $$\frac{14}{21} = \frac{p}{7}$$

In the equation above, what is the value of p?

E. $\dfrac{2}{3}$

F. 3

G. $\dfrac{14}{3}$

H. 14

109. A ball is selected at random from a box that contains 7 black balls, 14 green balls, and 21 red balls. What is the probability that the ball selected is black?

A. $\dfrac{1}{6}$

B. $\dfrac{1}{5}$

C. $\dfrac{1}{3}$

D. $\dfrac{5}{6}$

110. At North High School, a survey asked two questions, Question A and Question B. For each question, students could answer either "yes" or "no." Of the 800 students who responded to the survey, 720 answered "yes" to Question A, and 640 answered "yes" to Question B. What is the **least** possible number of these students who could have answered "yes" to **both** questions?

E. 80
F. 160
G. 560
H. 640

111. Raoul is at least 3 years older than Vahn. Which of the following inequalities gives the relationship between Raoul's age (r) and Vahn's age (v)?

A. $r - v \geq 3$

B. $r - v \leq 3$

C. $3 - v \leq r$

D. $3 - r \leq v$

112.

$$1 \text{ sind} = 5.6 \text{ ricks}$$
$$1 \text{ sind} = 12.88 \text{ dalts}$$

Using the conversion above, how many dalts are equal to 1 rick?

E. 0.43 dalt
F. 2.30 dalts
G. 7.28 dalts
H. 18.48 dalts

113. There are now x cans stacked on a shelf that holds 36 cans when full. If 4 of these cans were removed, the shelf would be half full. What is the value of x?

A. 14
B. 16
C. 18
D. 22

114. Carlos tossed a paper cup in the air 50 times and found that the probability of it landing on its side was 72%. If he tosses the cup in the air 150 **more** times, what is the total number of times he can expect the cup to land on its side?

E. 72
F. 108
G. 144
H. 158

THIS IS THE END OF THE TEST.
IF TIME REMAINS, YOU MAY CHECK
YOUR ANSWERS. BE SURE THAT THERE
ARE NO STRAY MARKS, PARTIALLY
FILLED ANSWER CIRCLES, OR
INCOMPLETE ERASURES ON YOUR
ANSWER SHEET. ■

REVISING/EDITING PART A

1. (**A**) The question asks for the identification of a run-on sentence that needs to be corrected. Option B, Option C, and Option D identify complete sentences that are not run-ons. Option A identifies a sentence made up of two independent clauses that need to be more definitively separated between "opened" and "as," using either a semicolon or a period.

2. (**G**) The sentence in the box demonstrates the use of a misplaced modifier. In Option E and Option F, the phrase "to promote their club" incorrectly modifies "a bake sale." While Option H makes it clearer that "to promote their club" refers to the "members of the debate team," the rest of the sentence is poorly written. Option G is the only option in which the phrase "to promote their club" clearly modifies "members of the debate team" and that clarifies that the bake sale is on Wednesday.

3. (**C**) All the sentences should have a main verb in the past tense. For Option A (sentence 1), Option B (sentence 2), and Option D (sentence 4), the main verbs in the sentences are in the past tense ("spent," "did," "recited"). For Option C (sentence 3), the main verb in the sentence inappropriately shifts to the present tense ("studies") and should be revised to the past tense ("studied").

4. (**F**) The sentence in the box needs a comma to set off the nonrestrictive clause "which is considered one of the New Seven Wonders of the World." Option E would remove the comma between a city and country, which would be incorrect. Option G would incorrectly remove the comma at the end of a nonrestrictive clause, which is set off by commas at the beginning and the end. Option H is incorrect because a comma is not necessary before the conjunction "and" to connect a dependent clause. Option F is the only option that places a comma where it is needed, after "Italy," to set off the nonrestrictive clause that follows.

5. (**B**) The question asks for the most precise revision for the words *The engineers tried some other things.* Option A and Option C use the word "materials" rather than precisely identifying what the engineers used. Option D identifies the materials, but the imprecise verb "worked with" does not specify what the engineers were doing. Option B is the only option that revises the words to be precise by using the specific words "tested" for the verb and "foam and fiberglass" for the materials.

REVISING/EDITING PART B

The Local Library

6. (**E**) The question asks for a sentence that should replace sentence 4 to introduce the main claim in the passage. Option F states that going to the library can be a learning experience. This idea is implied in sentences 17 and 18, but it is not the main claim of the passage. Option G states that the resources at a public library are most useful for students, which is discussed in the third and fourth paragraphs. The idea that the library is useful for students is offered as evidence for the main claim. Option H states the fact that local libraries provide services to help improve communities, which is explained in sentences 15–18, but this statement does not present an argument. Option E best presents the argument that the public library is a valuable resource and should be used by community members.

7. (**D**) This question asks for the best way to combine sentences 6 and 7 to clarify the relationship between ideas. Option A makes an incorrect connection that the explosion of digital media happened "since" people can communicate instantaneously. Option B makes an incorrect connection because the use of the conjunction "although" suggests that the explosion of digital media in recent years led to something different before allowing people to communicate instantaneously, which does not make sense. Option C suggests that instantaneous communication is in addition to the explosion of digital media, rather than an effect. Option D is the only option that accurately connects the ideas in sentences 6 and 7 to show that the explosion of digital media has contributed to the ability of people to instantaneously communicate.

8. (**H**) Sentence 9 expresses the idea that the library helps community members meet the need for human connection and companionship. Option E references the history of the library, which does not support the ideas in sentence 9 or the main argument in the passage. Option F introduces the idea of community meetings, but it does not support the idea in sentence 9. Option G mentions an expectation of the community, but it does not support the ideas in sentence 9, and it brings up a new idea unrelated to the main claim in the passage. Option H is the only option that provides support for sentence 9 and strengthens the connection between the information in sentence 9 and the main argument in the passage by listing examples of how people can connect at the library.

9. (**B**) Sentence 11 provides an example of a way that a person can use the library, and sentence 12 offers another way. Option A suggests that sentence 12 is an example of the idea in sentence 11. Option C suggests that sentence 12 confirms the point made in sentence 11. Option D suggests that sentence 12 is a result of sentence 11. Option B is the only option that demonstrates that sentence 12 provides a similar example of a person who can use the library.

10. (**E**) The question asks for a revision of sentence 14 that best maintains the formal style established in the passage. Both Option F and Option H use the second person and directly address the reader, which is more informal. Also, Option H uses the informal phrase "whatever you need to do." Option G does not use second person, but it uses informal language like "work on" and "things." Option E is the only option that maintains the formal style by using "people" instead of "you" and the more formal language "resources available" and "accomplish many tasks."

11. (**C**) The question asks for where sentence 19 should be moved in order to improve the organization of the fourth paragraph. Sentence 19 describes a typical librarian and the direction he or she provides in the library. Option A places this sentence before the main idea of the paragraph, which states that public libraries offer a variety of resources. Sentence 19 is an example of one of the resources, so it would not be placed at the beginning of the paragraph before the main idea. Option B places the sentence before the librarian is introduced in the paragraph. Both sentences 17 and 18 (Option D) have moved on from the topic of the librarian, so sentence 19 would not logically fit between them. Option C correctly places sentence 19 after the librarian is introduced in sentence 16, with an example of what else the librarian does.

12. (**G**) The question asks for a sentence that is irrelevant to the argument presented in the passage. Option E is relevant because sentence 3 makes reference to the library being one of the oldest yet best resources. Option F is relevant because sentence 11 provides an example of how a person can get assistance at the library, the main idea of the third paragraph. Option H is relevant because sentence 20 emphasizes the important idea that libraries are accessible. Option G, while related to the topic of the library because it states the selection of materials available, does not contribute

to the argument of the passage, which is that the library promotes a sense of community and offers assistance. This sentence should be deleted.

13. (**B**) The question asks for a concluding sentence that would follow sentence 21 to support the argument presented in the passage. Option A does not provide a logical conclusion to support the argument that the public library is a valuable resource because the sentence addresses the patrons of the library more than the function of the library. Option C presents the idea that the library has been in existence since 1833, but it does not logically support the main claim of the passage as a concluding sentence because it focuses only on this one idea. Option D states a new claim, that community leaders must work together to support library events, instead of a claim supporting the argument of the passage. Option B is correct because it logically follows sentence 21 and supports the argument that the public library is a valuable part of a community by urging community members to use, maintain, and support their local public library.

Moving Through Mountains

14. (**E**) Sentence 4 is the reason for the situation described in sentence 5. In Option F, the phrase "even though" changes the relationship between ideas so that the sentence illogically implies that needing to navigate around and through the mountains should have made transportation easy. Option G is incorrect because it states that traveling around the mountains or through winding tunnels emphasized that transporting people and goods was difficult rather than clarifying that this difficulty was an effect of having to travel around the mountains or through winding tunnels. Option H reverses the relationship between the ideas. Only Option E makes it clear that the transportation of people and goods was difficult because roads and railways had to navigate around and through the mountains.

15. (**C**) The correct answer should state the main topic of the passage. Option A offers overly detailed information about the funding to build the Gotthard Base Tunnel, but it does not explain what or where it is. Option B gives details about the opening of the tunnel but does not provide a description of the tunnel. Option D offers a result of the Gotthard Base Tunnel, rather than a description of what and where it is. Only Option C specifically states and clarifies the Gotthard Base Tunnel as the main topic.

16. (**F**) The correct answer needs to provide details about the tunnel-boring machines used to build the Gotthard Base Tunnel to supplement the general description of the machines in sentence 8. Option E offers information about how tunnel-boring machines were an improvement, which does not explain how the machines work. Option G is incorrect because it describes how the tunnel could not be completed until advances were made in tunnel-boring machine technology and does not describe the machines used for this tunnel. Option H explains that there are different types of machines for different geologies, but the geology of the tunnel area is not discussed in sentence 8 or the rest of the paragraph and the sentence does not explain how the machines work. Only Option F gives specific details about the tunnel-boring machines used to create the Gotthard Base Tunnel.

17. (**D**) The correct answer must be a location in which the sentence completes the detailed steps of how the tunnel was built. Option A, placing the sentence at the beginning of the paragraph (before sentence 7), would not make sense because the topic has not been introduced. Similarly, Option B, placing the sentence after sentence 7, would not make sense because adding concrete would have to happen after the rock was broken down and removed from the tunnel. Similarly, Option C, placing the sentence between sentences 9 and 10, would not make sense because the use of concrete did not take place before the removal of "28 million tons of rock." Option D, placing the sentence between sentences 10 and 11, is correct because placing the sentence there helps the reader understand the full sequence of steps in constructing the tunnel before the cost of the project is introduced.

18. (**G**) The correct answer must be a transition that clarifies the relationship between the ideas in sentences 14 and 15. Option E, "even so," suggests that travel between Zurich and Milan would not be affected by the tunnel. Option F may seem attractive because "additionally" is used to show that sentence 15 gives a new idea related to the earlier one in sentence 14. However, sentence 15 doesn't add an idea related to faster travel time. Option H, "therefore," is used to show that one idea or event is the result of another. However, the one-hour reduction in travel time from Zurich to Milan mentioned in sentence 15 is not a result of travel being faster from northern to southern Europe but a detail to show one trip that will be faster. Only Option G, "for example," correctly shows that the reduced travel time from Zurich to Milan is an example of faster travel between northern and southern Europe.

19. (**D**) The correct answer must be a sentence that is irrelevant to the topic. Sentence 3 (Option A) introduces the obstacle that the Gotthard Base Tunnel was built to overcome, so sentence 3 should not be removed. Sentence 11 (Option B) should not be removed because the sentence helps the reader understand that building the tunnel was a massive job. Sentence 13 (Option C) helps the reader understand how the tunnel will improve transportation through the Alps, so it should not be removed. However, the information about the Channel Tunnel in sentence 17 (Option D) does not help the reader understand the Gotthard Base Tunnel, so sentence 17 should be removed.

20. (**F**) The correct answer needs to support key points from earlier in the passage. Option E would not be an effective concluding sentence because the economies of surrounding areas were never mentioned in the passage. Option G might seem attractive because building the Gotthard Base Tunnel appears to have required many people to work together. However, the passage does not explicitly mention people or groups working together. Option H would not be an effective concluding sentence because it focuses on the cost of the Gotthard Base Tunnel, which is referred to in only sentence 11 of the passage. Only Option F, which supports key elements from the introductory paragraph, would make an effective concluding sentence.

READING COMPREHENSION

Debates

21. (**C**) The passage is primarily about the participants in the first televised presidential debate (lines 10–24), details about how both Nixon and Kennedy acted during the debate (lines 25–47), and the impact of the debate (lines 47–61). All of these details are best stated by Option C. The reasons Nixon was expected to win (Option A), the discussion of domestic issues (Option B), and the qualifications of each candidate (Option D) are important details related to the debates but are not the overall topic.

22. (**F**) Some observers suggested that had the debate not been on television, it is more likely that Nixon, not Kennedy, would have won the election (lines 64–67), which is Option F. The passage states that Nixon was well known, ahead in the polls, and more experienced than Kennedy (lines 16–20), so it is unlikely that Kennedy would have won anyway (Option E) or that the

election results would have been closer (Option G). The idea that the debates would not have become a tradition (Option H) is not supported by the passage.

23. (**C**) The answer to this question can be found in the fourth paragraph. Lines 57–59 state that "Some feared that the better TV performer was bound to come across as being the better candidate." This concern is best reflected in Option C. The less well-known candidates have to encounter more experienced candidates whether the political debates are televised or not, which rules out Option A. While certain candidates may be uncomfortable on live television, this was not the main concern described in the fourth paragraph, ruling out Option B. Multiple debates were planned before the first debate took place, so the idea in Option D would not be considered an undesirable consequence of televised debates.

24. (**F**) Details in lines 49–52 show that the televised debates benefitted Kennedy by allowing him to display his "charm, poise, and confident manner," which were favorable characteristics that convinced viewers he had the maturity to be president. This benefit is summarized by Option F. Option E is incorrect because it can be inferred that both candidates appeared to have an equal understanding of domestic issues since they are described as having "dealt with the issues calmly and carefully" (lines 31–33). Both Nixon and Kennedy took questions from reporters (lines 29–31), but there is no indication that Kennedy had a better relationship with reporters than Nixon did, which rules out Option G. The debate may have persuaded some viewers to agree with Kennedy's positons on domestic issues (Option H), but the passage does not support that this was an advantage for Kennedy because of the debates being televised.

25. (**D**) The detail in Option D supports the last sentence of the passage: Nixon's greater experience (lines 16–20) may have been more apparent to radio listeners who would not have been distracted by his poor television appearance. While lines 53–54 state that fewer people watched the later debates (Option A), this does not support the idea that Nixon would have won had the debates not been televised. The idea that both Nixon and Kennedy responded to questions calmly and carefully (lines 31–33) also does not indicate that Nixon would have won, ruling out Option B. While Nixon was ill just before the debate (lines 40–41), this does not support the idea that Nixon was the favorite to win before the debate, ruling out Option C.

26. (**F**) The answer is given in lines 3–9, which explains that the debates of 1960 were the first time presidential debates were broadcast on television and reached a greater audience than ever before, including people who were not interested in politics. This is summarized in Option F. Option E is a true statement, but it does not explain why people not interested in politics would have watched the debates. The text does not indicate that Kennedy's youth and charisma were the main reasons people watched the debates, ruling out Option G. The idea that people wanted to verify the newspaper polls (Option H) is not supported by the passage.

Ice

27. (**B**) The passage begins by asking why ice is slippery (lines 2–5) and then reviews several theories of slipperiness: smoothness, friction, pressure, and Faraday's theory. Option B best states the topic of the passage. The circumstances that allow ice to melt (Option A), the discoveries of Michael Faraday (Option C), and the processes of freezing and melting (Option D) are details related to the theories of ice slipperiness, but they do not express the main idea of the passage.

28. (**E**) The most likely reason that the author mentions lead and diamond crystals (lines 70–71) is to illustrate that solids other than ice have slippery surfaces and indicate that other substances can contain this property under the right circumstances (lines 72–73). This is best stated in Option E. Option F cannot be correct, because these crystals are not made of frozen water. The properties of lead and diamond crystals are not related to Faraday's theory, ruling out Option G. While lead and diamond crystals may demonstrate the slipperiness property under certain temperature and pressure conditions (Option H), the author does not list these substances in order to show the effects of temperature and pressure on their slipperiness.

29. (**C**) According to Faraday, the liquid on the ice cubes' surfaces freezes solid when the surfaces make contact (lines 42–45). This information is restated in Option C. Option A is incorrect because Faraday's explanation does not include the concept of friction. Neither the pressure theory, described in the third paragraph, nor Faraday's theory, described in lines 35–42, support the idea that applied pressure forces ice cubes to stick together, ruling out Option B. Smoothness (Option D) was a discredited explanation for slipperiness, not for why two ice cubes fuse when held together.

30. (**E**) The experiment at Lawrence Berkeley Laboratory is mentioned in lines 51–57. The author most likely mentions the experiment because the data provide evidence that the ice surface remains liquid-like, creating a slippery layer of molecules on the ice surface (Option E). In the past, studying ice molecules was impossible (lines 46–48), but the experiment at Lawrence Berkeley Laboratory does not indicate the difficulty of studying ice molecules presently, ruling out Option F. Option G is incorrect because the experiment described in the fifth paragraph did lead to the conclusion that the molecules vibrated only up and down (lines 63–64). Ice cubes freezing together refers to Faraday's observations in lines 41–42 (Option H), but the experiment at the lab in 1996 is included to present observations about ice on a molecular level.

31. (**B**) The distinction between the two terms is made in lines 63–65. The surface of ice is liquid-like because the surface molecules move only up and down, which is Option B. Option A describes the results of the experiment, not the ice surface itself. The passage does not state that the liquid-like state is related to temperature (Option C) or pressure (Option D).

32. (**H**) The friction theory of slipperiness is explained in the second paragraph, which concludes that the theory cannot explain why ice is slippery for someone who stands motionless, essentially creating no friction. Something that a theory cannot explain can be said to weaken, or undermine, the theory. Option H, "a person slipping while standing immobile on an icy surface," is the best answer. Option E undermines the pressure theory, not the friction theory. Option F and Option G neither support nor undermine the friction theory.

33. (**A**) The author includes the information about the pressure theory to highlight that there are different perspectives on the validity of the pressure theory between what is presented in textbooks and what researchers believe to be true (lines 25–29). This is best stated in Option A. Option B is incorrect because the liquid-like theory, not the pressure theory, has gained more acceptance recently. Even if scientists have tested the pressure theory (Option C), the pressure theory still raises questions about why ice is still slippery when less pressure is applied (lines 29–34). There is scientific support for a plausible theory (Option D), but that support is for Faraday's theory, not the pressure theory.

Marsh

34. (**H**) The second through fifth paragraphs of the passage primarily describe Marsh's personal experiences and his ideas about nature, and the final paragraph explains how his ideas are the basis for the conservation movement. This is best stated in Option H. Option E focuses mainly on Marsh's early life and does not address his influence. Option F describes specific details about Marsh's beliefs but does not explain who he was or how he affected the conservation movement. Option G emphasizes that Marsh's ideas were radical and influential but does not provide any information about what Marsh's beliefs were.

35. (**D**) Marsh attributed people's practices to "the popular belief that nature could heal any damage that people inflict upon it" (lines 43–45), which suggests a lack of understanding, or ignorance, of nature (lines 31–32). This is best stated in Option D. Although future generations are working to solve environmental problems, there is no indication in the passage that Marsh believed that people in his time expected future generations to solve environmental problems, ruling out Option A. While the people of Marsh's time made advances in industry, Marsh did not indicate that he believed that people thought industrial progress outweighed efforts to protect the environment (Option B). Option C is incorrect because there is also no evidence in the passage to suggest that Marsh believed that people were unwilling to change their practices.

36. (**F**) Lines 1–9 lead the reader to expect that Marsh was part of the modern environmental movement that began in the 1960s. Therefore, the fact that Marsh's influential book was published 100 years earlier is surprising (Option F). While Marsh's ideas have had a resurgence in popularity since the 1960s (lines 7–9), Marsh's observations about deforestation in Vermont (lines 16–19) and land mismanagement in Italy (lines 25–30) indicate that his ideas were just as applicable in his time as they are today, ruling out Option E. While Marsh could not have been aware that his ideas would lead to the start of a conservation movement (Option G), line 12 indicates that the surprising part is that Marsh had these ideas 100 years before the conservation movement became popular. While it's possible a greater awareness of human impact on the environment during Marsh's time could have prevented certain environmental issues today (Option H), this is conjecture and does not explain the author's purpose for using the word "surprisingly."

37. (**C**) The concept that Marsh's theories about nature were accurate is best supported by the statement that ideas from his book are now considered basic knowledge in the field of environmental science (lines 51–54), which is Option C. While Marsh made observations of environmental degradation (lines 13–22, lines 25–27), this does not provide evidence that his theories were accurate, ruling out Option A. While Marsh's writing did inspire a conservation movement (lines 77–80), these details do not call attention to the accuracy of his ideas, which rules out Option B. Option D is incorrect because it refers to personal opinions (lines 58–59, lines 67–70), not his theories, which are considered true today.

38. (**H**) Details about Marsh's approval of the Suez Canal (lines 63–67) show that Marsh did not oppose certain human activates because the advantages—improved transportation and commerce—improved human life and outweighed negative environmental damage (lines 67–70). Option H best summarizes that idea. Option E is not relevant to the statement in question. Option F acknowledges Marsh's contributions to the environmental movement but does not relate to his attitudes about certain alterations to the environment. Option G is incorrect because it relates to a time when Marsh observed environmental degradation in a foreign country.

39. (**C**) Marsh's main contribution to the modern environmental movement is given in lines 5–7—the idea that Western society was causing irreparable harm to the environment. Option C restates that idea. While Marsh did believe that some human alterations to the environment are necessary (lines 67–70; Option A), that people lacked an understanding of nature (lines 30–32; Option B), and that environmental degradation had been occurring for many years (lines 27–30; Option D), it is clear from the information in the first paragraph that the impact of human activity was his most influential idea.

Wind Energy

40. (**E**) Option E best describes what the passage is about, which is how wind energy has been used in a variety of ways from ancient sailboats to medieval windmills to modern turbines. Wind farms are a more modern development, and they are mentioned only in lines 68–74, which rules out Option F as the main topic of the passage. Option G is incorrect because the second and third paragraphs explain in detail about windmills that were used in other areas of the world, not just the United States. Developing windmills to generate

electricity is mentioned in lines 54–56, but this detail is explained only at the end of the passage, ruling out Option H.

41. (**B**) The idea that windmills were an important resource in the western United States is best supported by the information about the use of windmills to pump water for farms and livestock in lines 44–45 ("essential role in pumping water") and lines 47–50 ("over six million small windmills were installed . . . for watering livestock and meeting other water needs"). This is best stated in Option B. The details about the development and use of wind farms in lines 68–71 (Option A) support the idea of wind being an alternative energy source but are not limited to a specific region. The energy crisis of 1970 (Option C) was not limited to the western United States, and steam power (Option D) led to a decline in the use of windmills.

42. (**E**) The author describes the different tasks windmills were used for mainly to emphasize that windmills and wind energy can be used to serve a variety of purposes and were important in the production of goods before steam power was harnessed. This purpose is best stated in Option E. While windmills did replace water wheels (lines 26–31), this is not the idea the author is emphasizing by including a list of the tasks windmills were adapted to perform, ruling out Option F. The passage does explain that windmills had been used for many years (lines 15–23), but this idea is not highlighted by the list of tasks, which rules out Option G. Option H is incorrect because it relates to the idea that Holland was famous for its windmills (line 32), which is not proved or emphasized by the tasks listed in lines 36–40.

43. (**C**) The need for wind machines to produce electricity on American farms before the 1950s is discussed in lines 54–59. The next two sentences explain that the need for windmills decreased in the 1950s because most homes were connected to an electric utility and no longer depended on windmills for electrical power (Option C). The energy crisis happened in the 1970s and prompted a renewed interest in wind energy, which rules out Option A. The idea that coal and natural gas generate more power than wind turbines (Option B) is not supported in the passage as the main reason for the decline in the use of wind machines in the 1950s. Electrical connectivity, not wind farms, reduced the need for individual windmills (Option D).

44. (**H**) The author's opinion regarding the future use of wind energy is discussed in the last paragraph: "wind farms may prove to be as important in the future as earlier windmills were in the past" (lines 72–74). Option H best conveys the author's optimism that wind farms will be a major source of electricity in the future. Option E is incorrect, given the author's optimism. Option F and Option G relate to the present state of wind farming more than the author's vision of the future.

45. (**B**) The country of Holland most notably used windmills to pump seawater away from bogs and reclaim large areas of land (lines 32–36), as stated in Option B. The pumping of water to remote locations (Option A) was more important in the United States than in Holland. While Holland is famous for its windmills (line 32), the passage clearly states that windmills were most notably used for practical purposes, such as clearing bogs (lines 33–34) or processing goods (line 39), which rules out Option C. The use of windmills to process goods was not limited to or most notably done by the Dutch, which rules out Option D.

Pueblo

46. (**H**) Option E cannot be the topic of the passage because only the first paragraph discusses how weather conditions affect tree growth. Option F is too broad to be a good statement of the topic. The reason for the abandonment of the Pueblo villages (Option G) is mentioned only in the last paragraph, so it is not the main topic. Option H offers the best statement of the topic of the passage.

47. (**D**) Option A is true but can be proved without a key beam. Option B is not related to the key beam. Option C misrepresents the importance of the key beam. Option D is correct. The key beam, with its overlapping ring patterns from the established and floating chronologies, allowed archaeologists to connect the two chronologies.

48. (**F**) The size of the tree rings provides information about the health of the tree and insight about environmental factors and weather patterns (Option F). The fact that archaeologists rely on tree-ring dating suggests that it is accurate (Option E), but this does not explain why the author describes ring widths. Option G is incorrect because the passage explains that trees that live in a specific place at the same time will have the same tree-ring pattern. Option H is incorrect because it does not offer an explanation about the conclusions that can be made from the size of tree rings.

49. (**B**) Tree-ring dating helped reveal that the Pueblo villages were likely abandoned during a long drought (Option B). Option C first led archaeologists to realize that the villages had been abandoned. Option A and Option D contributed to establishing the chronology but do not explain why the villages were abandoned.

50. (**E**) The third paragraph describes the development of a floating chronology that did not overlap the established chronology that went back to 1260. This implies that the years of the floating chronology preceded the years of the established chronology, which is stated in Option E. Option F is incorrect because the pattern of tree-rings in the logs reveals more about the chronology than the number of tree-rings does. Archaeologists knew that the Pueblo villages were abandoned before the Hopi villages were established because the Hopi villages had been continuously inhabited (lines 31–33), ruling out Option G. Option H is incorrect because the size of the logs does not provide information about their connection to the established chronology.

51. (**C**) Lines 41–44 suggest that archaeologists compared samples from both villages in hopes of finding a beam where the patterns matched (Option C). The discovery of the key beam is described later in the passage. Option A, Option B, and Option D are related to information that can be gathered from examining the logs, but the options do not accurately explain the archaeologists' purpose of finding a key beam.

American Scene

52. (**H**) The correct answer is found in lines 65–68; the general public identified with American Scene art because the paintings presented common images and mirrored the lives of many people, which is best stated in Option H. While farm life was depicted in a subset of American Scene art (Regionalist art; lines 16–32), this is not an explanation of why people identified with the art, which rules out Option E. Option G is incorrect because American Scene art primarily focused on painting the changing United States as the artists saw it (lines 11–15). Option F may seem true, but the emphasis of the passage is on the relatability of the scenes depicted in American Scene art, not the beauty.

53. (**A**) According to the third paragraph, Urban Realists "painted the drab realities of the contemporary urban environment" (lines 34–36) and depicted "the high price paid by individual men and women struggling to survive the Depression" (lines 41–43). The subject that

best matches that description is Option A. Option B and Option D may be set in an urban environment, but they do not fit the description of Urban Realist art given in the passage. Option C is incorrect because it does not describe an American city scene.

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54. (**G**) Lines 49–53 provide the correct answer. Edward Hopper, the painter of *Nighthawks*, portrayed dingy urban streets; however, he often found beauty in the midst of a city's drab surroundings, which is expressed in Option G. Option E and Option H do not state clear contrasts to the Urban Realist style. The international style had not yet developed, ruling out Option F.

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55. (**B**) The fourth paragraph is about Edward Hopper and his association with American Scene art. The paragraph highlights that Hopper's work was unique and hard to classify because of the way he found beauty in otherwise drab urban settings (lines 49–53). This is best stated in Option B. The end of the American Scene movement is described in the fifth paragraph, not the fourth, ruling out Option A. Option C is incorrect because Hopper's work has been remembered. Option D is incorrect because the fourth paragraph focuses on Hopper's contribution to the art style of the time. Additionally, Urban Realist style is a subcategory of American Scene style, and most typically contrasted with Regionalist art (lines 33–37).

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56. (**E**) The phrase "without apology" (lines 59–60) refers to how Hopper saw and portrayed his subjects. In his art, he presented people and places as he saw them, as in his painting *Nighthawks* (lines 55–57). This is described in Option E. While Hopper did paint scenes of real places (Option F), the phrase is about how he chose to portray those scenes in his work. Hopper's works became well known (Option G), but the phrase does not relate to the popularity of his work. The passage says that Hopper "escaped further classification" (line 49), but the phrase does not relate to the classification of his art style, which rules out Option H.

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57. (**C**) Regionalist art, with its pleasant and familiar subjects, retained some of its popularity because it showed American life as people wished to remember it (lines 8–11, lines 19–23). This is best stated in Option C. It did not retain some of its popularity because it portrayed modern life (Option A) or the time in which it was painted (Option B). Regionalist art did not depict Americans overcoming the Depression or life during World War II, ruling out Option D.

58. (**120**) There are 5 choices for the first digit, 4 choices for the second digit, 3 choices for the third digit, 2 choices for the fourth digit, and 1 choice for the final digit. The total number of possibilities is $5 \times 4 \times 3 \times 2 \times 1 = 120$.

59. (**3**) $\frac{147-x}{12} = 12$

$147 - x = 144$

$x = 3$

60. (**–3.4**) $|(-6) - (-5) + 4.2| - |3 - 9.6| = |3.2| - |{}^{-}6.6|$
$= 3.2 - 6.6 = {}^{-}3.4$

61. (**300**) Let x be the total number of pages in the workbook. Then, 20% of x is 60. Set up a proportion and solve for x:

$\frac{20}{100} = \frac{60}{x}$

$20x = 6,000$

$x = \frac{6,000}{20} = 300$ pages

62. (**65**) Call the missing angle in the top half of the figure x. The sum of the four angles on the top of the figure is equal to 180°.
$x + y + 30 + 60 = 180$

Since x is a vertical angle with the 25° angle, then x is also 25°. Use that to solve for y.

$25 + y + 30 + 60 = 180$

$y + 115 = 180$

$y = 65$

63. (**D**) $x(x - 2y) = 9[9 - 2(-7)] = 9(9 + 14)$
$= 9(23) = 207$

64. (**E**) Find the missing angle, angle QPT, of triangle PQT: $180° - 70° - 50° = 60°$

In parallelogram PQRS, angle QPT is congruent to angle QRS, so the measure of angle QRS is also 60°.

65. (**D**) Break the equations apart to each equal M:

$M = 3N$

$M = \frac{P}{4}$

$M = Q + 5$

$M = \frac{R}{7}$

Pick a number to substitute into the equations, and solve the equations to find the values of M, N, P, Q, and R.

Let $M = 2$. Since all the equations are equal to 2, substitute 2 to find each variable.

$M = 3N$

$2 = 3N$

$\frac{2}{3} = N$

$M = \frac{P}{4}$

$2 = \frac{P}{4}$

$8 = P$

$M = Q + 5$

$2 = Q + 5$

$-3 = Q$

$M = \frac{R}{7}$

$2 = \frac{R}{7}$

$14 = R$

Variable R has the greatest value.

66. (**G**) Set up a proportion:

$$\frac{x}{416} = \frac{3}{96}$$

$$96x = 1,248$$

$$x = 13 \text{ bundles}$$

67. (**C**) Set up an inequality to compare the costs:

$$0.15x \le 10.50$$

$$x \le 70$$

Therefore, 70 individual sheets of paper would cost $10.50, so 69 is the greatest number of individual sheets of paper that Macie can buy that would be less expensive than the package.

68. (**F**) 7:00 p.m. is 6 hours after 1:00 p.m. Calculate the number of degrees the temperature dropped in 6 hours: $3 \times 6 = 18$ degrees.

Subtract that from the starting point (8 degrees) to find the solution: $8 - 18 = {}^-10$ degrees.

69. (**D**) The ratio of red to blue to green is $15{:}7{:}3$.

Find the proportion of blue marbles. Add the numbers of the ratio and use the total sum as the denominator: $\frac{7}{15+7+3} = \frac{7}{25}$. Find the proportion of green marbles: $\frac{3}{25}$. Since there are a total of 75 marbles, the number of blue marbles is $\frac{7}{25} \times 75 = 21$. The number of green marbles is $\frac{3}{25} \times 75 = 9$. The number of red marbles is $75 - 21 - 9 = 45$.

If 2 blue marbles are removed and replaced with 2 green marbles, the number of blue marbles is now 19 and the number of green marbles is now 11. The ratio of red marbles to green marbles is $45{:}11$.

70. (**F**) The total number of desserts ordered is $42 + 23 + 47 + 48 = 160$.

The probability that ice cream was chosen is

$$\frac{48}{160} = \frac{3}{10} = 30\%.$$

71. (**C**) Since 18 and 24 are both multiples of 6, find the least common multiple of only 18 and 24.

Multiples of 18: 18, 36, 54, 72…

Multiples of 24: 24, 48, 72…

The least common multiple of 6, 18, and 24 is 72.

72. (**F**) Let x be the number of dozens of eggs for 300 customers. Set up a proportion:

$$\frac{x}{300} = \frac{15}{200}$$

$$200x = 4500$$

$$x = 22.5 \text{ dozen eggs.}$$

Round up to 23 because you can't have half an egg.

73. (**C**) The total number of bottles of juice in the cooler is $5 + 3 + 6 = 14$.

The number of bottles of juice that are not apple juice (grape juice and fruit punch) is $3 + 6 = 9$.

So the probability is $\frac{9}{14}$.

74. (**H**) The radius of the large plate is 20 cm. Use that to find the area of the large plate:

$$A = \pi r^2 = \pi(20^2) = 400\pi \text{ sq cm}$$

The circumference of the smaller plate is 20π cm. Use that to find the radius, and then the area, of the smaller plate:

$$C = 2\pi r$$

$$20\pi = 2\pi r$$

$$r = 10$$

$$A = \pi r^2 = \pi(10^2) = 100\pi \text{ sq cm}$$

Subtract the area of the small plate from the area of the large plate:

$$400\pi - 100\pi = 300\pi \text{ sq cm}$$

75. (**D**) The question says that an equal number (x) of each type of space was purchased. To find the number of each type of space that was purchased, multiply the price per type by x and set it equal to the total amount spent, then solve for x:

$$200x + 350x + 600x = 11{,}500$$

$$1{,}500x = 11{,}500$$

$$x = 10$$

Thus, the store purchased 10 units of each type of space. To find the total **amount** of page space purchased, multiply each type of space by 10, and add:

$$\left(10 \times \frac{1}{4} \text{ page}\right) + \left(10 \times \frac{1}{2} \text{ page}\right) + (10 \times 1 \text{ page})$$
$$= 17\frac{1}{2} \text{ pages}$$

76. (**E**) In the second quadrant, where point R is located, the x-values are negative and the y-values are positive. Any point in the second quadrant will have a y-value greater than the x-value. So, the answer is point R.

77. (**A**) Substitute 3 for y and solve for x:

$$\frac{36}{y} = 4x$$

$$\frac{36}{3} = 4x$$

$$12 = 4x$$

$$3 = x$$

78. (**H**) Since $\overline{XY} = 20$ cm, use that to find $\overline{YZ}$:

$$\overline{YZ} = \frac{3}{5}\overline{XY} = \frac{3}{5}(20) = 12 \text{ cm}$$
$$\overline{XZ} = \overline{XY} + \overline{YZ} = 20 + 12 = 32 \text{ cm}$$

79. (**C**) Calculate the cost of the cloth before tax:

$$1\frac{3}{4} \times 8 = \frac{7}{4} \times 8 = \$14$$

Now find the tax for \$14 worth of cloth:

$$14 \times 8\% = 14 \times \frac{8}{100} = \$1.12$$

Finally, add the cost of the fabric and the tax:

$$\$14 + \$1.12 = \$15.12$$

80. (**F**) To find M, subtract $N - M$ and set it equal to the length:

$$1\frac{1}{3} - M = 5\frac{5}{6}$$
$$-M = 5\frac{5}{6} - 1\frac{1}{3}$$
$$-M = 5\frac{5}{6} - 1\frac{2}{6}$$
$$-M = 4\frac{3}{6}$$
$$M = -4\frac{1}{2}$$

81. (B) Add the four values in the ratio $(177 + 12 + 7 + 4 = 200)$ and use the sum as the denominator. Use that to find the fraction of zinc in one of the coins. Then reduce the fraction:

$$\frac{12}{200} = \frac{3}{50}$$

Multiply this fraction by 8 to find the number of grams of zinc in decimal form:

$$\frac{3}{50} \times 8 = \frac{24}{50} = 0.48\,\text{g}$$

82. (G) Jack scored a mean of 15 points per game in each of the first 3 games, so he earned a total of 45 points for the first 3 games. Use that information to calculate the mean over the four games:

$$\frac{45 + 27}{4} = \frac{72}{4} = 18$$

83. (B) Find the number of liters that need to be added. Since $\frac{1}{3}$ of the oil drum is full, $\frac{2}{3}$ of the drum remains empty:

$$\frac{2}{3} \times 4{,}320 = 2{,}880 \text{ liters}$$

Use the conversion $1\,\text{kL} = 1{,}000\,\text{L}$ to find the number of kL:

$$\frac{2{,}880}{1{,}000} = 2.88\,\text{kL}$$

84. (F) First, find out how old Nicole and Carmen are now.

Let $N =$ Nicole's age now.

Let $C =$ Carmen's age now.

$C + 2 = 17$

$C = 15$ (Carmen's age now)

$N = 3C$

$N = 3(15) = 45$ (Nicole's age now)

$N - 5 = 45 - 5 = 40$ (Nicole's age 5 years ago)

85. (C) Let x be the original amount of the chemical. It loses 20% after each week, which means 80% of the chemical remains at the end of each week.

End of first week: $0.80x$

At the end of the second week, 80% of the amount left at the end of the first week remains.

End of second week:
$0.80(0.80x) = 0.64x$ or 64%

86. (G) One more than an odd integer must be even.

One more than $w - 1$ is w, therefore w must be even. Two times an even integer must be even, therefore $2w$ is even. An even integer decreased by 2 must be even.

Therefore, $2w - 2$ must be even.

87. (B) Find the least common multiple of 2, 3, and 4 — which is 12. So, it takes 12 minutes before all three are back at the starting line. Ann completes 1 lap every 2 minutes, so in 12 minutes she has completed 6 laps.

88. (F) $4(7 - 3x) - (5 - x) = 28 - 12x - 5 + x$
$= 23 - 11x$

89. (D) First, add the number of students for each category to find out how many total students were in the survey: $12 + 16 + 7 + 5 = 40$

The number of students who had at least 2 pets are the ones who have 2 pets (7) plus the ones who have 3 or more (5). The total number of students with at least 2 pets is $7 + 5 = 12$.

The probability of a student in the survey having at least two pets is:

$$\frac{12}{40} = \frac{3}{10}$$

90. (E) Let x be the total number of liters the container can hold.

$$\frac{n+10}{x} = 60\% \text{ and } \frac{n+16}{x} = 75\%$$

First, solve each equation for x:

Equation 1:

$$\frac{n+10}{x} = \frac{60}{100}$$

$$\frac{n+10}{x} = \frac{3}{5}$$

$$3x = 5(n+10)$$

$$x = \frac{5n+50}{3}$$

Equation 2:

$$\frac{n+16}{x} = \frac{75}{100}$$

$$\frac{n+16}{x} = \frac{3}{4}$$

$$3x = 4(n+16)$$

$$x = \frac{4n+64}{3}$$

Now, set the two equations equal to each other and solve for n.

$$\frac{5n+50}{3} = \frac{4n+64}{3}$$

$$5n + 50 = 4n + 64$$

$$n + 50 = 64$$

$$n = 14 \text{ liters}$$

91. (B) $5x^3 + 3x + 9 + \dfrac{1}{x^2}$

$$= 5(10^3) + 3(10) + 9 + \frac{1}{10^2}$$

$$= 5,000 + 30 + 9 + \frac{1}{100} = 5,039.01$$

92. (E) The length of one side of the square is 6 cm. Since R, S, and T are midpoints, then $\overline{\text{TM}}$, $\overline{\text{MR}}$, $\overline{\text{RN}}$, and $\overline{\text{NS}}$ are all equal to 3 cm. Triangles TMR and RNS are both right triangles, so the area of one of the triangles is $\dfrac{1}{2} \times 3 \times 3 = \dfrac{9}{2}$. The triangles are congruent, so the sum of the areas is $\dfrac{9}{2} + \dfrac{9}{2} = 9$ sq cm.

93. (D) Let x be the amount spent on planned expense in one year:

$$\frac{x}{29,600} = \frac{5}{8}$$

$$x = \frac{5}{8}(29,600) = 18,500$$

94. (G) First, figure out how many different topping pairs are possible. Use 1, 2, 3, 4, 5, 6, 7 to represent the toppings and create a list of possible pairs:

1,2; 1,3; 1,4; 1,5; 1,6; 1,7
2,3; 2,4; 2,5; 2,6; 2,7
3,4; 3,5; 3,6; 3,7
4,5; 4,6; 4,7
5,6; 5,7
6,7

So there are 21 different topping combinations for one pizza.

Since there are 3 pizza sizes, multiply the total number of combinations by 3 to get the total number of different pizzas Cody can create: $3 \times 21 = 63$.

95. (D) To find by what percent the number of families with 1 cat is greater than the number of families with 2 cats, calculate the difference between the two numbers and divide by the number of families with 2 cats:

$$\frac{42-35}{35} = \frac{7}{35} = \frac{1}{5} = 0.20 \text{ or } 20\%.$$

96. (H) One side of the square base is 3 ft long. Since the height of the box is 3 times the length, then the height is $3 \times 3 = 9$ ft. The volume of a rectangular prism is length $\times$ height $\times$ width. The volume of the wooden box is

$V = 3 \times 3 \times 9 = 81$ cu ft.

97. (B) Calculate each mean speed:

$R = \dfrac{65}{5} = 13\,\text{kph}$

$S = \dfrac{72}{4} = 18\,\text{kph}$

Then calculate the difference of both mean speeds:

$S - R = 18 - 13 = 5\,\text{kph}$

98. (G)
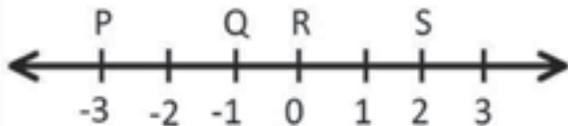
Find the midpoint of PQ and RS:

Midpoint of PQ $= \dfrac{-1-(-3)}{2} = \dfrac{2}{2} = 1$ unit.

The midpoint of PQ is located 1 unit from each endpoint, so the midpoint is at -2.

Midpoint of RS $= \dfrac{2-0}{2} = \dfrac{2}{2} = 1$ unit.

The midpoint of RS is located 1 unit from each endpoint, so the midpoint is at 1.

The distance between the two midpoints is $1 - (-2) = 3$ units.

99. (D) If $1\,\text{L} = 1,000\,\text{cu cm}$, then $1\,\text{L} = 1,000\,\text{mL}$. Set up a proportion, letting $x =$ the amount of cubic millimeters in 1,000 cubic centimeters.

$$\frac{1,000\,\text{cu mm}}{1\,\text{L}} = \frac{x\,\text{cu mm}}{1,000\,\text{cu mm}}$$

Solve for x: 1,000,000 cubic millimeters are in 1,000 cubic centimeters.

100. (E) Both $x + 1$ and $y + 2$ are radii. So, set them equal to each other and solve for y.

$y + 2 = x + 1$

$y = x - 1$

101. (C) There are 5 sections between M and T. To find the length of one of these sections, find the distance between M and T and divide by 5:

$$\left(\frac{5}{8} - \left(-\frac{1}{4}\right)\right) \div \frac{5}{1} =$$
$$\left(\frac{5}{8} + \frac{2}{8}\right) \div \frac{5}{1} =$$
$$\frac{7}{8} \div \frac{5}{1} = \frac{7}{8} \times \frac{1}{5} = \frac{7}{40}$$

R is 3 sections away from M, so add:

$$-\frac{1}{4} + 3\left(\frac{7}{40}\right) = -\frac{10}{40} + \frac{21}{40} = \frac{11}{40}$$

R is located at $\dfrac{11}{40}$.

102. (H) Let x be the number of minutes Phan used his internet service in the month. Phan's monthly charges were $18 + 0.024x$. Since Deion's charges were the same as Phan's, set the expression equal to 30 and solve for x:

$18 + 0.024x = 30$

$0.024x = 12$

$x = 500$

Phan used his service for 500 minutes.

103. (B) Create a chart using the given information and use subtraction to figure out how many cars are not red **and** do not have a back-up camera:

	Red	Not Red	TOTAL
Back-up Camera	4	**6** (10-4)	10
No back-up Camera		**32** (38-6)	
TOTAL	12	**38** (50-12)	50

The probability of selecting a car that meet both conditions from the total of 50 cars at the dealership is $\frac{32}{50} = \frac{16}{25}$.

---

104. (E) $0.06 = \frac{6}{100}$. Simplify the fraction to find the answer:

$$\frac{6}{100} = \frac{3}{50} \text{ so, } x = 3.$$

---

105. (C) The height of the triangle is 4 units. The length of the base is $n - m$. So the area is

$$A = \frac{1}{2}(n - m)(4) = 2(n - m).$$

---

106. (F) The total number of cards in the box is $8 + 6 + 5 + 4 + 1 = 24$. Set up a proportion to figure out which card has exactly a 1 in 4 chance of being picked at random. $\frac{x}{24} = \frac{1}{4}$ or $x = 6$. The dog card has a 1 in 4 chance of being randomly selected.

---

107. (C) Separate the compound inequality into two pieces:

$$2x - 2 \leq y \text{ and } y \leq 4x + 10$$

Substitute $y = 1$ into each inequality and solve for x:

$$2x - 2 \leq 1$$
$$2x \leq 3$$
$$x \leq \frac{3}{2}$$

$$1 \leq 4x + 10$$
$$-9 \leq 4x$$
$$-\frac{9}{4} \leq x$$

The solution is the number line that shows that x is greater than or equal to $-2\frac{1}{4}$ and less than or equal to $1\frac{1}{2}$.

---

108. (G) $\frac{14}{21} = \frac{p}{7}$

$$21p = 7(14)$$
$$21p = 98$$
$$p = \frac{98}{21} = \frac{14}{3}$$

---

109. (A) The total number of balls in the box is $7 + 14 + 21 = 42$.

The probability that the ball is black is

$$\frac{7}{42} = \frac{1}{6}.$$

110. (G) None of the 80 students $(800 - 720)$ who answered "no" to Question A $(800 - 720)$ could have answered "yes" to both questions. Therefore, the least possible number of students who could have answered "yes" to both questions, can be found by subtracting the 80 who answered "no" to Question A from the 640 who answered "yes" to Question B or $640 - 80 = 560$.

111. (A) Raoul is at least 3 years older than Vahn, which can be written as

$$r \geq v + 3$$

Rewrite this inequality to match the answer options:

$$r - v \geq 3$$

112. (F) Since 5.6 ricks and 12.88 dalts are both equal to 1 sind, then 5.6 ricks $= 12.88$ dalts. To calculate the number of dalts (d) in 1 rick, set up a proportion:

$$\frac{5.6}{12.88} = \frac{1}{d}$$

$$5.6d = 12.88$$

$$d = 2.3$$

113. (D) The shelf, when full, holds 36 cans. When the shelf is half full, it holds 18 cans.

$$x - 4 = 18$$

$$x = 22$$

114. (G) The probability of the cup landing on its side is 72%. Carlos tossed the cup a total of 200 times $(50 + 150)$. The number of times the cup lands on its side is 72% of 200:

$$0.72 \times 200 = 144.$$

Answer Key for Sample Form B

1. A	13. B	25. D	37. C	49. B	61. 300	73. C	85. C	97. B	109. A
2. G	14. E	26. F	38. H	50. E	62. 65	74. H	86. G	98. G	110. G
3. C	15. C	27. B	39. C	51. C	63. D	75. D	87. B	99. D	111. A
4. F	16. F	28. E	40. E	52. H	64. E	76. E	88. F	100. E	112. F
5. B	17. D	29. C	41. B	53. A	65. D	77. A	89. D	101. C	113. D
6. E	18. G	30. E	42. E	54. G	66. G	78. H	90. E	102. H	114. G
7. D	19. D	31. B	43. C	55. B	67. C	79. C	91. B	103. B	
8. H	20. F	32. H	44. H	56. E	68. F	80. F	92. E	104. E	
9. B	21. C	33. A	45. B	57. C	69. D	81. B	93. D	105. C	
10. E	22. F	34. H	46. H	58. 120	70. F	82. G	94. G	106. F	
11. C	23. C	35. D	47. D	59. 3	71. C	83. B	95. D	107. C	
12. G	24. F	36. F	48. F	60. –3.4	72. F	84. F	96. H	108. G	

DIRECTIONS: This section provides sample mathematics problems for the Grade 9 test forms. General directions for how to answer math questions are located on pages 61 and 114. There is no sample answer sheet for this section; mark your answers directly on this page or on a separate piece of paper.

1. Assume $S(x)$ equals the sum of all positive even integers less than or equal to x. What is the value of $S(7)$?

2. $\sqrt{16} \cdot \sqrt{196} =$

3.
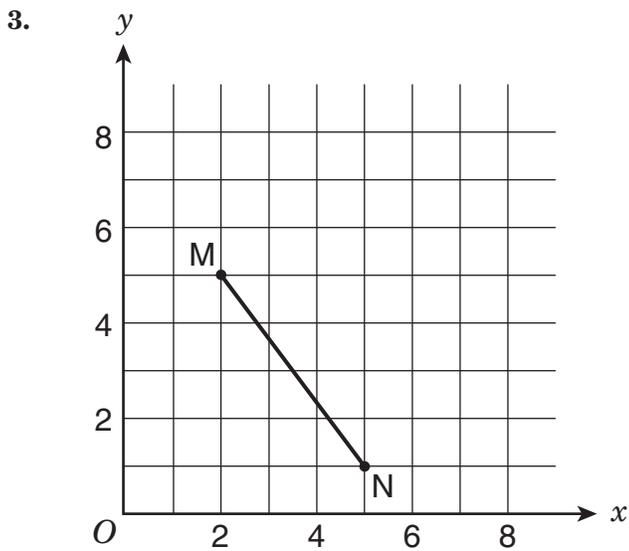
If $\overline{MN}$ is translated 1 unit to the left to produce $M'N'$, what is the area of parallelogram $NMM'N'$?

A. 3 square units
B. 4 square units
C. 5 square units
D. 6 square units

4. Simplify:

$$\frac{p^{12} \cdot p^{0}}{p^{-4}}$$

E. 0
F. p^{-3}
G. p^{8}
H. p^{16}

5.
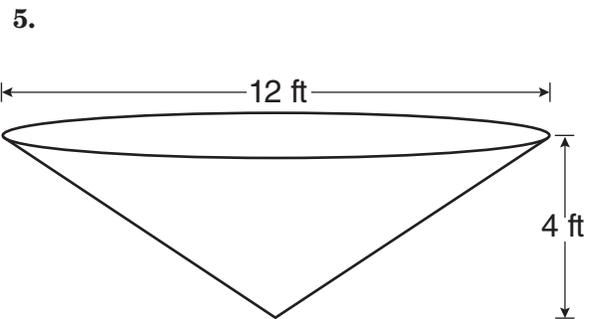
Water is pumped into a tank that is shaped like the right inverted cone shown above. The cone has a base diameter of 12 feet and a height of 4 feet. What is the volume, in cubic feet, of the water in the tank when the height of the water is 2 feet?

A. 6π cu ft
B. 18π cu ft
C. 24π cu ft
D. 48π cu ft

6.
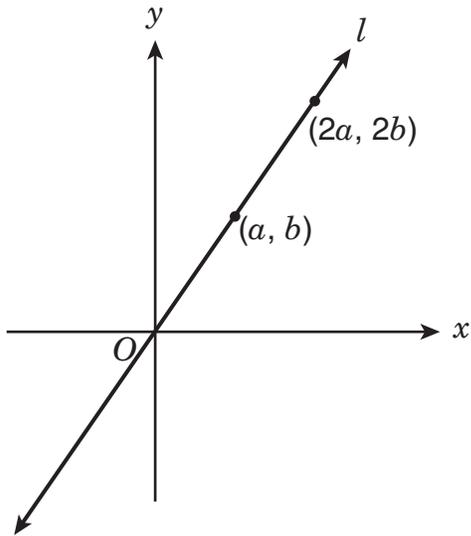
Straight line l passes through the origin, as shown in the figure above. What is the slope of line l in terms of a and b?

E. $\dfrac{a}{b}$

F. $\dfrac{2b}{a}$

G. $\dfrac{2a}{b}$

H. $\dfrac{b}{a}$

7. The graph shows the wolf population in Yellowstone National Park since 2000. A student drew a line of best fit to model the data.
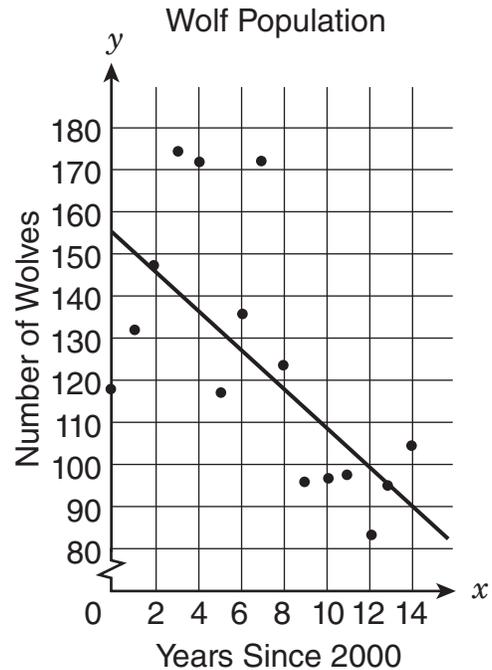
Which statement best describes the line of best fit that the student drew?

A. The line of best fit is not a strong model for the data, because the points are not close to the line.

B. The line of best fit is not a strong model for the data, because it does not pass through any of the data points.

C. The line of best fit is a strong model for the data, because both the line and the data show a negative trend.

D. The line of best fit is a strong model for the data, because about half the data points are on each side of the line.

8. To determine the price of servicing a car, a mechanic charges a fixed fee plus an hourly rate for each hour he works. If his price for 4 hours of service is $270, and his price for 7 hours of work is $420, what is the fixed fee that the mechanic charges?

E. $50
F. $60
G. $70
H. $120

9.
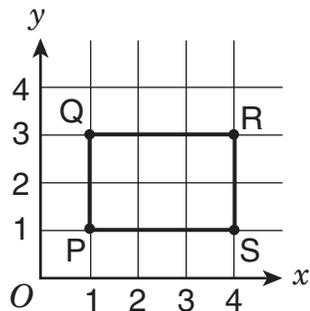
Rectangle PQRS above is rotated 180° about the origin to form rectangle P′Q′R′S′. What are the coordinates of R′?

A. $(4, -3)$

B. $(-4, 3)$

C. $(-4, 1)$

D. $(-4, -3)$

10.

$$\frac{15.3 \times 10^{-8}}{1.5 \times 10^{4}}$$

What is the quotient of the expression above, expressed in scientific notation?

E. 1.02×10^{-13}

F. 1.02×10^{-11}

G. 1.02×10^{-4}

H. 1.02×10^{12}

11. Which of the following expressions is **negative** in value?

A. $4 - \pi$

B. $3\pi - 9$

C. $12 - 4\pi$

D. $36 - 9\pi$

12.
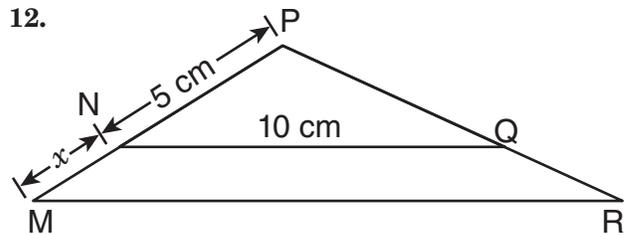
In the figure above, $\triangle$MPR is similar to $\triangle$NPQ. If the length of $\overline{NQ}$ is 10 centimeters, what is the length of $\overline{MR}$ in terms of x?

E. $2x$

F. $2x + 10$

G. $x + 5$

H. $\frac{1}{2}x + 5$

145

13.
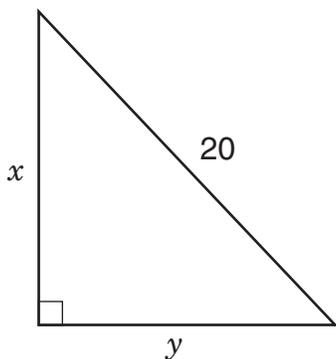
In the right triangle above, $x = 2y$. What is the value of y?

A. 2

B. $\sqrt{10}$

C. $\sqrt{80}$

D. $\sqrt{200}$

1. (12) $S(x)$ is the sum of all positive even integers less than or equal to x. 1, 2, 3, 4, 5, and 6 are all integers less than 7. Take the positive integers from the list and find the sum:

$S(7) = 2 + 4 + 6 = 12$

---

2. (56) $\sqrt{16} \cdot \sqrt{196} = 4 \cdot 14 = 56$

---

3. (B) When $\overline{MN}$ is translated 1 unit left, the distance between M' and M is 1 unit, which is the base of the parallelogram. The height of the parallelogram is the vertical distance from M to N. Since M is at $y = 5$ and N is at $y = 1$, the height is $5 - 1 = 4$ units. The area of a parallelogram is base $\times$ height, so the area is $1 \times 4 = 4$ square units.

---

4. (H) $\dfrac{p^{12} \cdot p^0}{p^{-4}} = \left(p^{12} \cdot p^0\right)\dfrac{p^4}{1} = p^{(12+0+4)} =$

$p^{(12+4)} = p^{16}$

---

5. (A) First, find the radius when the depth of the water is 2 ft. Set up two similar right triangles as shown below:
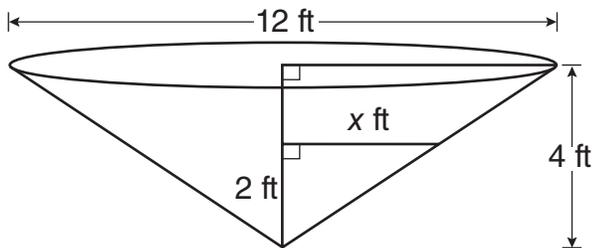
Use a proportion to find x. Since the diameter of the right inverted cone is 12 ft, the radius is 6 ft:

$\dfrac{x}{6} = \dfrac{2}{4}$

$x = 3\,\text{ft}$

Now, find the volume of the cone with a radius of 3 ft and a height of 2 ft:

$V = \dfrac{1}{3}r^2\pi h = \dfrac{1}{3}(3^2)\pi(2) = 3\pi(2) = 6\pi$

---

6. (H) Use the slope formula to figure out the slope of line l.

Slope of line $l = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{2b-b}{2a-a} = \dfrac{b}{a}$

---

7. (A) The line of best fit should be close to as many points as possible. In this case, very few of the points are on or next to the line. So, this is not a strong model for the data, because most of the points are not close to the line.

---

8. (G) Set up the two equations and subtract them from one another to find the price per hour:

$y + 7x = 420$

$-\ y + 4x = 270$

$3x = 150$

$x = 50$

To find the fixed fee, use one of the equations $(y + 7x = 420$ or $y + 4x = 270)$ and solve for y, using $x = 50$.

$y + 4x = 270$
$y + 4(50) = 270$
$y + 200 = 270$
$y = 70$

---

9. (D) Point R is at $(4, 3)$. If (x, y) is rotated $180°$ about the origin: $R(x, y) \rightarrow (-x, -y)$. Therefore, $R(4, 3) \rightarrow (-4, -3)$.

---

10. (F)

$\dfrac{15.3 \times 10^{-8}}{1.5 \times 10^4} = \left(\dfrac{15.3}{1.5}\right) \times \dfrac{10^{-8}}{10^4} = 10.2 \times \dfrac{10^{-8}}{10^4}$

Then use the rule of exponents to simplify.

$10.2 \times 10^{(-8-4)} = 10.2 \times 10^{-12}$

Rewrite the answer so that it is standard scientific notation form.

1.02×10^{-11}

11. (C) Substitute the approximation $\pi = 3.14$ into each expression and solve to find which expression results in a negative value:

$4 - \pi = 0.86$

$3\pi - 9 = 0.42$

$12 - 4\pi = {}^{-}0.56$

$36 - 9\pi = 7.74$

So, the answer is $12 - 4\pi$.

12. (F) Triangles NPQ and MPR are similar, so corresponding sides of the triangles are proportional. Set up a proportion to find $\overline{MR}$.

$$\frac{\overline{MR}}{\overline{MP}} = \frac{\overline{NQ}}{\overline{NP}}$$

$$\frac{\overline{MR}}{x + 5} = \frac{10}{5}$$

$$5(\overline{MR}) = 10(x + 5)$$

$$5(\overline{MR}) = 10x + 50$$

$$\overline{MR} = 2x + 10$$

13. (C) Use the Pythagorean Theorem:

$$x^2 + y^2 = 20^2$$

Substitute $x = 2y$ into the equation and solve for y.

$$(2y)^2 + y^2 = 20^2$$

$$4y^2 + y^2 = 400$$

$$5y^2 = 400$$

$$y^2 = 80$$

$$y = \sqrt{80}$$

Answer Key for Grade 9 Mathematics

1. 12	6. H	11. C
2. 56	7. A	12. F
3. B	8. G	13. C
4. H	9. D	
5. A	10. F	

DIRECTIONS: Solve each problem. On the answer sheet, write your answer in the boxes at the top of the grid. Start on the left side of each grid. Print only one number or symbol in each box. **DO NOT LEAVE A BOX BLANK IN THE MIDDLE OF AN ANSWER.** Under each box, fill in the circle that matches the number or symbol you wrote above. **DO NOT FILL IN A CIRCLE UNDER AN UNUSED BOX.**

1. On a practice test, there are 3 essay questions for every 7 multiple-choice questions. If there are a total of 420 questions on this test, how many of those are essay questions?

2. $$|19 - 21| + |1.9 - 2.1| - x = 10$$

In the equation above, what is the value of x?

3. $$\frac{0.21}{0.33} = \frac{x}{1.10}$$

What is the solution to the equation above?

4.
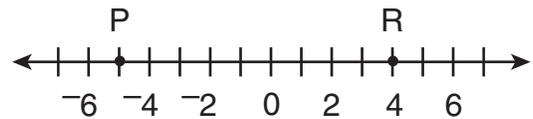
Point Q is to be placed on the number line one-third of the way from Point P to Point R. What number will be at the midpoint of segment PQ?

5. How many ways can the letters in the word RAIN be arranged horizontally so that the vowels (A and I) are always immediately next to each other (either AI or IA)?

6.

On the number line above, D (not shown) is the midpoint of $\overline{AB}$, and E (not shown) is the midpoint of $\overline{BC}$. What is the midpoint of $\overline{DE}$?

7. A box contains 11 marbles: 7 red and 4 green. Five of these marbles are removed at random. If the probability of drawing a green marble is now 0.5, how many red marbles were removed from the box?

8. If $\dfrac{a}{b} = 20$ and $a = 8$, what is the value of $3b + a^2$?

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9. Maria is now 16 years old. In 6 years, she will be twice as old as her brother will be at that time. How old is her brother now?

10. $\dfrac{4.5}{0.1} \times 0.22 =$

DIRECTIONS: When filling out the answer grid, remember that each column should contain **ONLY** one symbol/one digit. When filling out the circles, only fill in one circle to **MATCH** the symbol or digit at the top of the column.

1. (126) There are 3 essay questions for every 7 multiple-choice questions, for a total of 10 questions. The proportion of essay questions is $\dfrac{3}{10}$. Multiply the fraction of essay questions by 420 to find the total number of essay questions: $420 \times \dfrac{3}{10} = \dfrac{1260}{10} = 126$

Since the answer is a positive whole number, skip the first column and begin inputting the digits to the answer in the second column on the left-hand side.
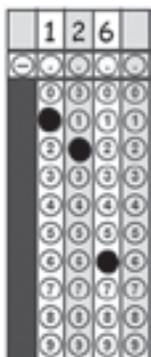
2. ($-$7.8) $|19 - 21| + |1.9 - 2.1| - x = 10$

$|-2| + |-0.2| - x = 10$

$2 + 0.2 - x = 10$

$x = -7.8$

Since the answer is a negative, begin filling out the grid with the negative sign. The answer contains a negative sign, a whole number, a decimal point, and a digit in the tenths place. Each part of the answer, including the decimal point, should be placed in a separate column, with no blank spaces between them.

3. (**0.7**) $\dfrac{0.21}{0.33} = \dfrac{x}{1.10}$

Multiply the numerators and denominators of all the fractions by 100 to eliminate the decimals:

$\dfrac{21}{33} = \dfrac{100x}{110}$

Simplify the fractions:

$\dfrac{7}{11} = \dfrac{10x}{11}$

$7(11) = 10x(11)$

$7 = 10x$

$x = \dfrac{7}{10} = 0.7$

Since the answer is a positive decimal, skip the first column and place the zero in the second column on the left-hand side.
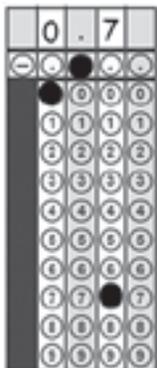
4. (**−2**) First, find the length of $\overline{PR}$: $4 - (-5) = 9$ units

Point Q is located $\dfrac{1}{3}$ of the way from P to R, so calculate where that point would be:

$9 \times \dfrac{1}{3} = 3$ units

So, point Q is located at $4 - 3 = 1$. Finally, calculate the midpoint of $\overline{PQ}$:

Midpoint $\overline{PQ} = \dfrac{-5+1}{2} = -2$

Since the answer is a negative single-digit, fill in the negative sign and the second column contains the digit, 2.
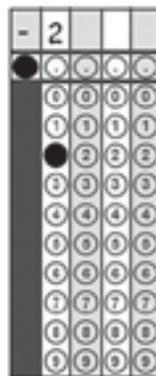
5. (**12**) There are three positions for the letters AI in the four letter combinations:

AI _ _, _ AI _ _, and _ _ AI

For each of those positions of A and I, there are two combinations of the letters R and N: AIRN, AINR, RAIN, NAIR, RNAI, NRAI. Thus, for the letters AI (in that order), there is a total of 6 combinations. The question indicates that IA is also possible, so there are also + combinations with the letters in the order IA. The total number of combinations is $6 + 6 = 12$.

Since the answer is a positive whole number, skip the first column and begin inputting your answer in the second column.

6. (**1.25**) Calculate the midpoints of $\overline{AB}$ and $\overline{BC}$ to find the locations of D and E, respectively:

Find the midpoint for $\overline{AB}$ (Point D):

$D = \dfrac{-8+3}{2} = \dfrac{-5}{2} = -2.5$

Find the midpoint for $\overline{BC}$ (Point E):

$E = \dfrac{3+7}{2} = 5$

Now, find the midpoint of $\overline{DE}$:

$\dfrac{-2.5+5}{2} = \dfrac{2.5}{2} = \dfrac{5}{4} = 1.25$

Since the answer is a positive decimal, skip the first column. The response begins inon the second column on the left-hand side.

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7. (4) There were 11 marbles in the box. After 5 marbles were removed, the total number of marbles in the box is now 6. The probability of drawing a green marble is now $\frac{1}{2}$, which is equivalent to $\frac{3}{6}$, thus, 3 green marbles remain in the box.

Originally, there were 7 red marbles in the box. Since there are now 6 total marbles, there are now 3 red marbles. Meaning 4 red marbles were removed from the box.

Since the answer is a positive single-digit whole number, skip the first column and the response begins on the second left-hand column.
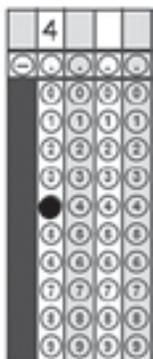
8. (65.2) Use the given equation and value of a to find the value of b:

$\frac{a}{b} = 20$ and $a = 8$, so $\frac{8}{b} = 20$ or $b = \frac{8}{20}$.

Now, calculate the expression:

$3b + a^2 = 3\left(\frac{8}{20}\right) + 8^2 = 1.2 + 64 = 65.2$

Since the answer is a positive whole number with a decimal, skip the first column and begin inputting the answer starting at the second column at the left-hand side.
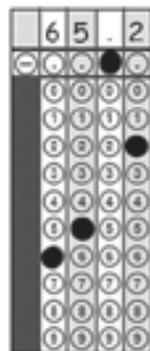
9. (5) When Maria is 22, she will be twice as old as her brother.

Let $x =$ the age of Maria's brother when Maria is 22.

$2x = 22$

$x = 11$

To find Maria's brother's current age, subtract $11 - 6 = 5$.

Maria's brother is currently 5 years old.

Since the answer is a positive single-digit whole number, skip the first column and the response begins in the second left-hand column.
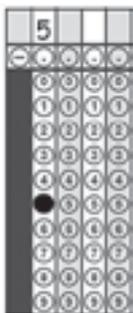
10. (9.9) In order to solve this problem, first convert $\frac{4.5}{0.1}$ to a whole number by multiplying the numerator and denominator by 10 to get $\frac{45}{1}$ which is 45.

Multiply:

$45 \times 0.22 = 9.9$

Since the answer is a positive whole number with a decimal, skip the first column and begin inputting the answer starting in the second column on the left-hand side.
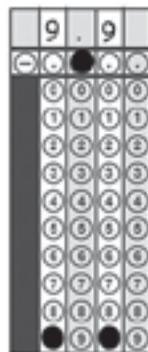
Answer Key for Grid-In Mathematics

1. 126	6. 1.25
2. –7.8	7. 4
3. 0.7	8. 65.2
4. –2	9. 5
5. 12	10. 9.9

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Department of Education

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