

2016–2017

The SAT[®]

Student Guide



Information about the SAT[®]



Test-taking advice and tips



An official practice test

Learn all about the SAT at sat.org.

Connect your College Board results and
get personalized practice at satpractice.org.

 **CollegeBoard**

About the College Board

The College Board is a mission-driven not-for-profit organization that connects students to college success and opportunity. Founded in 1900, the College Board was created to expand access to higher education. Today, the membership association is made up of over 6,000 of the world's leading educational institutions and is dedicated to promoting excellence and equity in education. Each year, the College Board helps more than seven million students prepare for a successful transition to college through programs and services in college readiness and college success — including the SAT® and the Advanced Placement Program®. The organization also serves the education community through research and advocacy on behalf of students, educators, and schools. For further information, visit collegeboard.org.

SAT Customer Service

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Introduction to the SAT®

The SAT® measures reading, writing and language, and math skills and knowledge developed over many years, both in and out of school. You won't be asked to recall facts from literature, history, or science, or to complete math formulas, because this test focuses instead on measuring your reasoning and critical thinking skills.

If you plan to register for the SAT, you can use this booklet to get familiar with the test. Remember, if you have access to the internet, you can find everything in this booklet and more at sat.org/practice.

Our Commitment to Students

Each year more than 1.67 million students take the SAT, and thousands of high school counselors and postsecondary admission officers worldwide use their scores to guide decisions in the college application process. The test that students like you will take on test day is a challenging yet appropriate and fair assessment of what you know and can do. The questions you'll tackle focus on the knowledge and skills that the best available evidence indicates are essential for college and career readiness and success.

Opportunity

We're committed to providing opportunities that propel you toward your goals for college, career, and beyond. The SAT Suite of Assessments — including the SAT and PSAT/NMSQT®, which

are scored in the same way so you can track your progress — is highly relevant to your future success, and the Access to Opportunity™ program is designed to help you recognize and make the most of the opportunities you've earned.

By focusing on the skills you learn in school and those linked to college performance, the SAT shows you (and your parents, teachers and counselors, and college admission officers) how ready you are for college and career. The SAT also provides detailed information about your strengths and areas in need of improvement and insights into what you can do to boost or build on your knowledge and skills. This helps college admission staff determine if you're a good match for their institution and its programs of study and helps you do the same.

Are you the first person in your family to think about going to college? Maybe the cost seems out of reach. Maybe you have other reasons for thinking college is for someone else, not for you. Our Access to Opportunity program identifies and breaks down barriers that prevent many students from applying to and enrolling in colleges that are the best academic, social, and financial fit for them. Visit collegeboard.org/opportunity to learn more.

Students who take the SAT with a fee waiver will also receive four college application fee waivers in their senior year. This reflects our goal to get all students — including those who are college ready and from lower-income families — to apply to at least four colleges: one sure thing, two

that are a good fit, and one that might initially seem out of reach. See page 4 for eligibility information, and visit sat.org/fee-waivers to learn more about what the fee-waiver program offers eligible students.

Don't forget: The Free Application for Federal Student Aid (FAFSA) — the form you'll need to qualify for most financial aid opportunities — opens on October 1. You should complete your FAFSA as early as possible.

Transparency

The College Board has ensured that students, teachers, and counselors can know exactly what to expect on test day. What the test assesses should be absolutely clear; there is no mystery. You can access test specifications and sample questions at sat.org.

Some Key Features of the SAT

- 1. Words in Context:** The test asks you both to use and determine the meaning of relevant words and phrases in the contexts in which they appear. These tasks engage you in close reading and call attention to the nuances of how vocabulary is used in particular situations.
- 2. Command of Evidence:** You must demonstrate your ability to interpret and use evidence found in a wide range of texts. You will, for example, have to determine the best evidence for the answer to another question and to analyze informational graphics, such as tables, graphs, and charts.
- 3. Essay Analyzing a Source:** In the SAT Essay, you're asked to read a passage and explain how the author builds an argument to persuade an audience. This task closely mirrors college writing assignments, and it requires close reading, careful analysis, and clear writing. The Essay is an optional component of the SAT, although some school districts and colleges require it.
- 4. Math that Matters Most:** The test focuses in depth on three essential areas of math: Heart of Algebra, Problem Solving and Data Analysis, and Passport to Advanced Math.
 - Heart of Algebra focuses on linear expressions, equations, and systems, mastery of which is important for developing abstract reasoning skills.
 - Problem Solving and Data Analysis is about being quantitatively literate. It includes using ratios, percentages, and proportional reasoning to solve problems in science, social science, and career contexts; describing relationships shown graphically; and analyzing data.

- Passport to Advanced Math focuses on your familiarity with complex equations and the manipulation they require.

There are also questions that fall under the heading of **Additional Topics in Math**, including geometry, trigonometry, radian measure, and the arithmetic of complex numbers.

- 5. Problems Grounded in Real-World Contexts:** The Reading Test includes questions on literature and literary nonfiction passages, but also questions on passages and informational graphics like the ones you're likely to encounter in science, social science, and other majors and careers. Writing and Language questions ask you to edit and revise texts in history/social studies, humanities, science, and career contexts. The Math Test features multistep applications in science, social science, career, and other authentic contexts. This allows you to dig into a situation and think about it, then model it mathematically.
- 6. Analysis in Science and in History/Social Studies:** You are asked to apply your reading, writing, language, and math knowledge and skills to answer questions in science, history, and social studies contexts. You'll draw on these same sorts of skills and knowledge throughout your life to make sense of recent discoveries, political developments, global events, and health and environmental issues. Questions require you to read and comprehend texts, revise texts to be consistent with data presented in graphics, synthesize information presented in texts and graphics, and solve problems based in science and social science contexts.
- 7. U.S. Founding Documents and the Great Global Conversation:** On the Reading Test, you will encounter a passage from one of the U.S. founding documents (texts such as the Declaration of Independence, the Bill of Rights, and the *Federalist Papers*) or a text from the wider global conversation about civic life. We hope that the SAT will inspire a close study of these rich, meaningful, often profound texts.
- 8. No Penalty for Guessing:** You will be scored only on the questions you answer correctly. This encourages you to give the best answer you have to every question.

What the SAT Measures

The test is composed of three sections. You have three hours of testing time, plus an additional 50 minutes for the optional essay.

- **Evidence-Based Reading and Writing:** Includes a Reading Test and a Writing and Language Test. Each test is composed of multiparagraph passages

and multiple-choice questions. The Reading Test measures your comprehension and reasoning skills with a focus on close reading of appropriately challenging passages in a wide array of subject areas. The Writing and Language Test assesses your skills in revising and editing a range of texts in a variety of subject areas to improve expression of ideas and to correct errors in grammar, usage, and punctuation.

Time allotted for Reading: 65 minutes.
Time allotted for Writing and Language: 35 minutes.

- **Math:** Includes multiple-choice and student-produced response questions based on the math that college-bound students typically learn during their first three years of high school.
Time allotted for Math – No Calculator: 25 minutes.
Time allotted for Math – Calculator: 55 minutes.
- **Essay (optional):** Asks you to read and analyze an argument and write an effective response.
Time allotted for essay: 50 minutes.

NOTE: We occasionally pretest new questions to determine if they should be included in a future SAT test form. These questions may appear in any of the test sections, and testing time will be extended by 20 minutes so test-takers have time to answer them. These questions will not be included in computing test-takers' scores.

How the SAT Is Scored

All multiple-choice questions are scored the same way: one point for each correct answer and zero points for incorrect answers. No points are subtracted for incorrect answers or answers left blank.

- **Total Score:** You will receive one total score, on a scale ranging from 400 to 1600, that is the sum of two section scores:
 - ♦ Evidence-Based Reading and Writing
 - ♦ MathThe three scores for the optional SAT Essay will be reported separately on 2-to-8 scales and will not be factored into the total score.
- **Section Scores:** You will receive two section (domain) scores, reported on a scale ranging from 200 to 800, in 10-point intervals:
 - ♦ Evidence-Based Reading and Writing, which will combine the Reading Test score and the Writing and Language Test score
 - ♦ Math

- **Test Scores:** You will receive three test scores reported on a scale ranging from 10 to 40:

- ♦ Reading
- ♦ Writing and Language
- ♦ Math

- **Cross-Test Scores:** You will receive two cross-test scores that are based on questions from across the Reading, Writing and Language, and Math Tests. These are reported on a scale ranging from 10 to 40:

- ♦ Analysis in Science
- ♦ Analysis in History/Social Studies

- **Subscores:** You will receive multiple subscores for Reading, Writing and Language, and Math. In total the SAT will report seven subscores, each on a scale ranging from 1 to 15:

- ♦ The Reading and the Writing and Language Tests contribute questions to two subscores:
 1. Command of Evidence
 2. Words in Context
- ♦ The Writing and Language Test reports out two additional subscores:
 3. Expression of Ideas
 4. Standard English Conventions
- ♦ The Math Test reports out three subscores:
 5. Heart of Algebra
 6. Problem Solving and Data Analysis
 7. Passport to Advanced Math

Resources to Help You Prepare

The College Board has partnered with Khan Academy® to give you free, personalized practice you can access anytime, anywhere. When you upload your test results — from the PSAT/NMSQT, PSAT™ 10, PSAT™ 8/9, a previous SAT, or the practice test in this booklet — you can get individualized instruction in the areas where you need it most.

If you've already taken the PSAT/NMSQT in 2015 or the PSAT 10 in 2016, you have a good idea of what you'll see on the SAT. Be sure to start using the resources available to you through your online score report at studentscores.collegeboard.org and find out how to use your PSAT/NMSQT results to power your study at satpractice.org.

As noted previously, the contents of the SAT are not a mystery. You can prepare by reading more about the test at sat.org.

Using This Booklet

Use this booklet to:

- Become familiar with the test. Study the descriptions of the SAT so that you're not surprised or confused on test day.
- Learn the test directions. The directions for answering the questions in this booklet are the same as those on the actual test. If you become familiar with the directions now, you'll leave yourself more time to answer the questions when you take the test.
- Review the sample questions. The more familiar you are with the question formats, the more comfortable you'll feel when you see similar questions on the actual test. In particular, be sure to practice writing answers to the student-produced response math questions (see page 24).
- Understand how the tests are scored. You get one point for each right answer. Hard questions count the same amount as easier questions. You won't lose any points if you have to guess, so try to answer every question.

When you're ready, take the practice test, then go to sat.org/scoring to learn how you can get scores just by taking a picture of your answers with your phone. For personalized practice based on your results, go to satpractice.org, where you can:

- Create your own study plan.
- Get personalized instruction that targets the skills and knowledge you need to work on.

College Board Programs for You

- The score-reporting portal gives you access to an online score report with personalized, practical information about your SAT results, including how your scores compare to those of other test-takers and how you performed on each area of the test. It also allows you to access and print your (optional) essay to share with your teachers. Link to your report at studentscores.collegeboard.org.
- Score Choice™ lets you choose which scores to send to the colleges you select, based on what each college requires as part of the application process. You can choose which SAT Subject Test scores to send by test date or choose SAT scores from one, several, or all SAT test dates in your record. Score Choice is optional, so if you don't actively choose to use it, all of your scores will be sent automatically with your score report. Since most colleges only consider your best scores, you should feel comfortable reporting scores from all of your tests.
- Fee waivers are available to qualified, lower-income students who want to take the SAT and

SAT Subject Tests™. They cover 100 percent of the registration fees for a single test date. Each qualifying student can use up to two waivers for the SAT and up to two waivers for the SAT Subject Tests. To be eligible, you must meet **at least one** of the requirements below:

- ◆ Enrolled in or eligible to participate in the National School Lunch Program (NSLP).
- ◆ Annual family income falls within the Income Eligibility Guidelines set by the USDA Food and Nutrition Service.
- ◆ Enrolled in a federal, state, or local program that aids students from lower-income families (e.g., Federal TRIO programs such as Upward Bound).
- ◆ Family receives public assistance.
- ◆ Live in federally subsidized public housing or a foster home, or are homeless.
- ◆ A ward of the state or an orphan.

College Connections

Student Search Service® Program

Our Student Search Service® is a free and voluntary program that connects students with information about educational and financial aid opportunities from more than 1,500 colleges, universities, scholarship programs, and educational organizations. Here's how it works:

1. During SAT or SAT Subject Test registration, indicate that you want to be a part of Student Search Service.
2. As part of the registration, you will also be asked to provide information on your education, aspirations, and background.
3. Participating, eligible organizations use Student Search Service to find groups of students like you to contact, because these students may be a good fit for their communities and programs. Only students who opt to participate in Student Search Service will be included.
4. To find groups of students, these organizations can use any attribute you provided, except the following: disability, self-reported parental income, Social Security number, phone numbers, and actual test scores.
5. The most searched items are expected high school graduation date, cumulative grade point average (GPA), and intended college major. A full list of questions is available in the *Student Registration Booklet*.
If you have questions or concerns about Student Search Service or want more information about the program, please visit collegeboard.org/student-search-service or call 866-825-8051.

Here are some points to keep in mind about Student Search Service:

- Most students who take the PSAT/NMSQT, AP Exams, SAT, or SAT Subject Tests participate in this free service; however, you may take the test even if you don't take part in Student Search Service.
- Organizations participating in Student Search Service never receive actual student scores, but they can ask for names of students within certain score ranges.
- Being contacted by a college doesn't mean you have been admitted. You must submit an application in order to be considered for admission. The colleges and organizations that participate want to find students who fit in with their environment, classes, programs, scholarships, and special activities. Student Search Service is simply a way for colleges to reach prospective students to let them know about the opportunities they offer.
- Student Search Service will share your contact information only with eligible colleges, universities, and qualified nonprofit educational organizations or scholarship programs that are recruiting students like you. Your name and other information will never be sold to a commercial marketing firm or retailer of merchandise or services (such as test prep).
- Student Search Service allows these eligible organizations to send communications directly to the students whose names were received through Student Search Service. All colleges and other institutions that receive this student information must comply with our strict confidentiality guidelines. These colleges and institutions determine how they will communicate with the students, including the frequency and type of communication (print or electronic). Colleges and institutions must not only adhere to our guidelines but also comply with applicable federal and state laws governing your privacy.
- To unsubscribe from Student Search Service, go to collegeboard.org/student-search-service, call 800-626-9795, or write to:

The College Board
11955 Democracy Drive
Reston, VA 20190-5662
Attention: Student Search Service

More College Planning Resources

The College Board offers free, comprehensive resources at BigFuture™ to help you with your college planning. Visit bigfuture.org to put together a step-by-step plan for the entire process, from finding the right college, exploring majors and careers, and calculating costs, to applying for scholarships and financial aid.

Protecting Your Privacy

Telemarketing and Internet Scams

From time to time, we receive reports of phone scams when callers posing as employees of the College Board contact students and families attempting to sell test-preparation products or otherwise requesting sensitive, personally identifying information, such as credit card and Social Security numbers. Some of these callers use illegal spoofing to make it seem as if the call is coming from the actual company. These calls do not come from the College Board. The College Board does not make unsolicited phone calls to students or families requesting this type of information.

This type of activity, known as telemarketing fraud, is a crime. If you receive an unsolicited phone call from someone claiming to work for the College Board, including when your caller ID indicates that the telephone number originates from a College Board location, do not provide the caller with any personal information. Representatives of the College Board only make calls or send text messages to students and their families in response to students' inquiries and/or to provide or gather information about a test or program a student registered for or about preparation for college and the application process. If you have a question about the origin of a phone call from a caller who claims to be from the College Board, contact Customer Service.

Safety and Security Tips

1. Be wary of unsolicited contacts, whether via telephone or email.
2. Remember that the College Board will never contact you to ask you to send your credit card, bank account, or password information over the telephone or through email.
3. Never supply credit card information to someone who calls or emails you.
4. If you suspect you have received a fraudulent call or email, contact the Federal Trade Commission (FTC) and your local authorities and provide them with all the details.
5. Keep in mind that if an offer appears too good to be true, it probably is.
6. To make a complaint and to obtain more information about protecting yourself from telephone and internet scams, visit the FTC's Consumer Information site at consumer.ftc.gov.

Evidence-Based Reading and Writing

The Evidence-Based Reading and Writing section is composed of two tests that assess different but related skills and knowledge. The Reading Test gives you a chance to show how well you understand what you read. The Writing and Language Test asks you to revise and edit text.

This section has four distinctive features:

- **Emphasis on words in context:** Both tests measure your understanding of the meaning and use of words and phrases in the context of extended passages.
- **Emphasis on command of evidence:** Both tests require you to demonstrate your understanding of how writers make use of evidence to support and develop their claims and points.
- **Inclusion of informational graphics:** Both tests contain data presented in tables, graphs, charts, and the like, which you must interpret and integrate with information in a passage.
- **Variations in text complexity:** The passages on both tests range in difficulty from those found in grades 9–10 to those found in college-entry, credit-bearing postsecondary courses.

Reading Test Overview

The Reading Test gives you a chance to show how well you understand what you read.

- Total questions: 52 passage-based reading questions with multiple-choice responses
- Time allotted: 65 minutes
- Calculators may not be used or on your desk

About the Passages

Reading passages range in length from about 500 to 750 words, and they are taken from a variety of fields, including U.S. and world literature, history/social studies, and science. Some passages are accompanied by tables, graphs, charts, and the like that you must interpret and sometimes synthesize with information and ideas presented in the associated passage. (Mathematical computation, however, is not required to answer these questions.) Some passages on similar subjects are paired, and these pairs are accompanied by questions that require you to make important connections between the passages as well as others that ask about each passage on its own.

Tips for the Reading Test

- To answer each question, consider what is said directly in the passage(s) and use careful reasoning to draw supportable inferences and conclusions from the passage(s). The best answer to each question is derived from what is stated or implied in the passage(s) rather than from prior knowledge of the topics covered.
- Reading carefully is the key to finding the best answer. The information you need to answer each question is always in the passage(s). Don't be misled by an answer that looks correct but isn't supported by the actual text of the passage(s).
- The questions don't increase in difficulty from easy to hard. Instead, they are presented as logically as possible, with general questions about central ideas and themes, point of view, overall text structure, and the like coming early in the sequence. After that come more specific questions about details, words in context, evidence, and so on.
- Stay with a passage (or pair of passages) until you have answered as many questions as you can before you proceed to the next passage. Do not jump from passage to passage.
- The questions often include line numbers to help direct you to relevant part(s) of the passage(s). If one word or more is quoted exactly from the passage(s), generally the number(s) of the line(s) where that quotation can be found will appear in the question. You may have to look elsewhere in the passage(s), however, in order to find the best answer to the question.
- In your test booklet, mark any question you skip so that you can easily go back to it later if you have time.
- Remember that all questions are worth one point regardless of the type or difficulty. You are not penalized for guessing wrong, so it's to your advantage to answer each question as best you can.

Sample Reading Materials

Following are samples of the kinds of Reading passages and questions that may appear on your test. For each set of sample materials:

- Read the passage(s) carefully.
- Decide on the best answer to each question.
- Read the explanation for the best answer to each question and for the answer you chose (if the two are different).

On the actual test, each passage will be followed by 10 or 11 questions. The directions provided on the next page match what you will see on the actual test.

Reading Test Questions

Directions

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

Questions 1-3 are based on the following passages.

Passage 1 is adapted from Susan Millus, "A Different Kind of Smart." ©2013 by Science News. Passage 2 is adapted from Bernd Heinrich, *Mind of the Raven: Investigations and Adventures with Wolf-Birds*. ©2007 by Bernd Heinrich.

Passage 1

In 1894, British psychologist C. Lloyd Morgan published what's called Morgan's canon, the principle that suggestions of humanlike mental processes behind an animal's behavior should be rejected if a simpler explanation will do.

Still, people seem to maintain certain expectations, especially when it comes to birds and mammals. "We somehow want to prove they are as 'smart' as people," zoologist Sara Shettleworth says. We want a bird that masters a vexing problem to be employing human-style insight.

New Caledonian crows face the high end of these expectations, as possibly the second-best toolmakers on the planet. Their tools are hooked sticks or strips made from spike-edged leaves, and they use them in the wild to wrinkle grubs out of crevices. Researcher Russell Gray first saw the process on a cold morning in a mountain forest in New Caledonia, an island chain east of Australia. Over the course of days, he and crow researcher Gavin Hunt had gotten wild crows used to finding meat tidbits in holes in a log. Once the birds were checking the log reliably, the researchers placed a spiky tropical pandanus plant beside the log and hid behind a blind.

A crow arrived. It hopped onto the pandanus plant, grabbed the spiked edge of one of the long straplike leaves and began a series of ripping motions. Instead of just tearing away one long strip, the bird ripped and nipped in a sequence to create a slanting stair-step edge on a leaf segment with a narrow point and a wide base. The process took only seconds. Then the bird dipped the narrow end of its leaf strip into a hole in the log, fished up the meat with the leaf-edge spikes, swallowed its prize and flew off.

"That was my 'oh wow' moment," Gray says. After the crow had vanished, he picked up the tool the bird had left behind. "I had a go, and I couldn't do it," he recalls. Fishing the meat out was tricky. It turned out

that Gray was moving the leaf shard too forcefully instead of gently stroking the spines against the treat.

The crow's deft physical manipulation was what inspired Gray and Auckland colleague Alex Taylor to test other wild crows to see if they employed the seemingly insightful string-pulling solutions that some ravens, kea parrots and other brainiac birds are known to employ. Three of four crows passed that test on the first try.

Passage 2

For one month after they left the nest, I led my four young ravens at least once and sometimes several times a day on thirty-minute walks. During these walks, I wrote down everything in their environment they pecked at. In the first sessions, I tried to be teacher. I touched specific objects—sticks, moss, rocks—and nothing that I touched remained untouched by them. They came to investigate what I had investigated, leading me to assume that young birds are aided in learning to identify food from the parents' example. They also, however, contacted almost everything else that lay directly in their own paths. They soon became more independent by taking their own routes near mine. Even while walking along on their own, they pulled at leaves, grass stems, flowers, bark, pine needles, seeds, cones, clods of earth, and other objects they encountered. I wrote all this down, converting it to numbers. After they were thoroughly familiar with the background objects in these woods and started to ignore them, I seeded the path we would later walk together with objects they had never before encountered. Some of these were conspicuous food items: raspberries, dead meal worm beetles, and cooked corn kernels. Others were conspicuous and inedible: pebbles, glass chips, red winterberries. Still others were such highly cryptic foods as encased caddisfly larvae and moth cocoons. The results were dramatic.

The four young birds on our daily walks contacted all new objects preferentially. They picked them out at a rate of up to tens of thousands of times greater than background or previously contacted objects. The main initial criterion for pecking or picking anything up was its novelty. In subsequent trials, when the previously novel items were edible, they became preferred and the inedible objects became "background" items, just like the leaves, grass, and pebbles, even if they were highly conspicuous. These experiments showed that ravens' curiosity ensures exposure to all or almost all items in the environment.

1

Within Passage 1, the main purpose of the first two paragraphs (lines 1-11) is to

- A) offer historical background in order to question the uniqueness of two researchers' findings.
- B) offer interpretive context in order to frame the discussion of an experiment and its results.
- C) introduce a scientific principle in order to show how an experiment's outcomes validated that principle.
- D) present seemingly contradictory stances in order to show how they can be reconciled empirically.

Estimated Difficulty: Hard	Key: B
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Choice B is the best answer. Passage 1 opens with an explanation of Morgan's canon and continues with a discussion of people's expectations regarding animal intelligence. Taken together, the first two paragraphs indicate that despite cautions to the contrary, people still tend to look for humanlike levels of intelligence in many animals, including birds. These two paragraphs provide a framework in which to assess the work of Gray and Hunt, presented in the rest of the passage. The passage's characterization of the experiment Gray and Hunt conduct, in which they observe a crow's tool-making ability and to which Gray responds by trying and failing to mimic the bird's behavior ("I had a go, and I couldn't do it," line 37), suggests that Shettleworth, quoted in the second paragraph, is at least partially correct in her assessment that "we somehow want to prove [birds] are as 'smart' as people" (lines 8-9).

Choice A is incorrect because while the reference to Morgan's canon in the first paragraph offers a sort of historical background (given that the canon was published in 1894), the second paragraph describes people's continuing expectations regarding animal intelligence. Furthermore, the fact that Gray and Hunt may share with other people the tendency to look for humanlike intelligence in many animals does not by itself establish that the main purpose of the first two paragraphs is to question the uniqueness of Gray and Hunt's findings.

Choice C is incorrect because while the reference to Morgan's canon in the first paragraph does introduce a scientific principle, the discussion in the second paragraph of people's expectations regarding animal intelligence, as well as the passage's characterization of Gray and Hunt's experiment and how the researchers interpret the results, primarily suggest that people tend to violate the canon by attributing humanlike levels of intelligence to many animals.

Choice D is incorrect because although the first two paragraphs do present different perspectives, they are not seemingly or genuinely contradictory. The second paragraph, particularly the quotation from Shettleworth, serves mainly to qualify (not contradict) the position staked out in the first paragraph by suggesting that while Morgan's canon is probably a sound principle, people still tend to project humanlike levels of intelligence onto many animals. Moreover, the experiment depicted in the rest of the passage primarily bears out Shettleworth's claim that "we somehow want to prove [birds] are as 'smart' as people" (lines 8-9) and thus does not reconcile the perspectives found in the opening paragraphs.

2

According to the experiment described in Passage 2, whether the author's ravens continued to show interest in a formerly new object was dictated primarily by whether that object was

- A) edible.
- B) plentiful.
- C) conspicuous.
- D) natural.

Estimated Difficulty: Easy	Key: A
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Choice A is the best answer. The last paragraph of Passage 2 presents the results of an experiment in which the author scattered unfamiliar objects in the path of some ravens. According to the passage, the birds initially "contacted all new objects preferentially" but in "subsequent trials" only preferred those "previously novel items" that "were edible" (lines 75-81).

Choice B is incorrect because the ravens studied by the author only preferred those "previously novel items" that "were edible," whereas "the inedible objects became 'background' items, just like the leaves, grass, and pebbles" (lines 80-83). In other words, plentiful items did not continue to interest the ravens unless the items were edible.

Choice C is incorrect because the ravens studied by the author only preferred those "previously novel items" that "were edible," whereas "the inedible objects became 'background' items, just like the leaves, grass, and pebbles, even if they were highly conspicuous" (lines 80-84). In other words, conspicuous items did not continue to interest the ravens unless the items were edible.

Choice D is incorrect because the ravens studied by the author only preferred those "previously novel items" that "were edible," whereas "the

inedible objects became 'background' items, just like the leaves, grass, and pebbles" (lines 80-83). In other words, natural items did not continue to interest the ravens unless the items were edible.

3

The crows in Passage 1 and the ravens in Passage 2 shared which trait?

- A) They modified their behavior in response to changes in their environment.
- B) They formed a strong bond with the humans who were observing them.
- C) They manufactured useful tools for finding and accessing food.
- D) They mimicked the actions they saw performed around them.

Estimated Difficulty: Medium	Key: A
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Choice A is the best answer. Both bird species studied modified their behavior in response to changes in their environment. The researchers described in Passage 1 "had gotten wild crows used to finding meat tidbits in holes in a log" (lines 20-21). In other words, the researchers had repeatedly placed meat in the log — that is, changed the crows' environment — and the birds had responded by modifying their behavior, a point reinforced in line 22, which noted that the birds began "checking the log reliably." The ravens in Passage 2 act in analogous fashion, responding to the introduction of new objects in their environment by "pick[ing] them out at a rate of up to tens of thousands of times greater than background or previously contacted objects" (lines 76-78).

Choice B is incorrect because while there is some evidence that the ravens described in Passage 2 formed a bond with the author, going on walks with him and possibly viewing him as their "teacher," there is no evidence that a similar bond formed between the researchers described in Passage 1 and the crows they studied. Indeed, these researchers "hid behind a blind" (lines 23-24) in an effort to avoid contact with their subjects.

Choice C is incorrect because while crows' tool-making ability is the central focus of the experiment described in Passage 1, there is no evidence that the ravens in Passage 2 did anything similar. Passage 1 does mention that "some ravens" use "seemingly insightful string-pulling solutions" (lines 44-45), but nothing in Passage 2 suggests that the ravens in that particular study had or displayed tool-making abilities.

Choice D is incorrect because while there is some evidence that the ravens described in Passage 2 mimicked human behavior, going on walks with the author and possibly viewing him as their "teacher," there is no evidence that the crows in Passage 1 did any mimicking. Passage 1, in fact, suggests that the ability of the crow to produce the meat-fishing tool was innate rather than a skill it had acquired from either humans or other birds.

Questions 4-6 are based on the following passage and supplementary material.

This passage is adapted from Richard Florida, *The Great Reset*. ©2010 by Richard Florida.

In today's idea-driven economy, the cost of time is what really matters. With the constant pressure to innovate, it makes little sense to waste countless collective hours commuting. So, the most efficient and productive regions are those in which people are thinking and working—not sitting in traffic.

The auto-dependent transportation system has reached its limit in most major cities and megaregions. Commuting by car is among the least efficient of all our activities—not to mention among the least enjoyable, according to detailed research by the Nobel Prize-winning economist Daniel Kahneman and his colleagues. Though one might think that the economic crisis beginning in 2007 would have reduced traffic (high unemployment means fewer workers traveling to and from work), the opposite has been true. Average commutes have lengthened, and congestion has gotten worse, if anything. The average commute rose in 2008 to 25.5 minutes, "erasing years of decreases to stand at the level of 2000, as people had to leave home earlier in the morning to pick up friends for their ride to work or to catch a bus or subway train," according to the U.S. Census Bureau, which collects the figures. And those are average figures. Commutes are far longer in the big West Coast cities of Los Angeles and San Francisco and the East Coast cities of New York, Philadelphia, Baltimore, and Washington, D.C. In many of these cities, gridlock has become the norm, not just at rush hour but all day, every day.

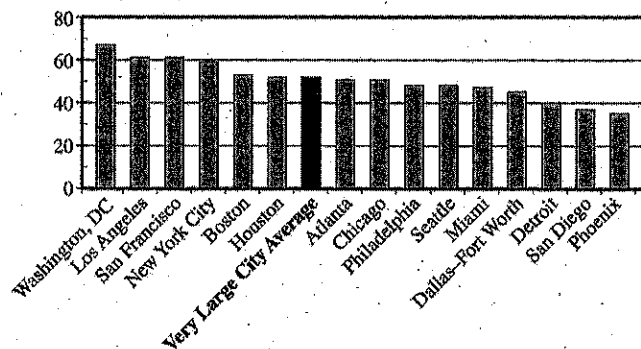
The costs are astounding. In Los Angeles, congestion eats up more than 485 million working hours a year; that's seventy hours, or nearly two weeks, of full-time work per commuter. In D.C., the time cost of congestion is sixty-two hours per worker per year. In New York it's forty-four hours. Average it out, and the time cost across America's thirteen biggest city-regions is fifty-one hours per worker per year. Across the country, commuting wastes 4.2 billion hours of work time annually—nearly a full workweek for every commuter. The overall cost to the U.S. economy is nearly \$90 billion when lost productivity and wasted fuel are taken into account.

At the Martin Prosperity Institute, we calculate that every minute shaved off America's commuting time is worth \$19.5 billion in value added to the economy. The numbers add up fast: five minutes is worth \$97.7 billion; ten minutes, \$195 billion; fifteen minutes, \$292 billion.

It's ironic that so many people still believe the main remedy for traffic congestion is to build more roads and highways, which of course only makes the problem worse. New roads generate higher levels of "induced traffic," that is, new roads just invite drivers to drive more and lure people who take mass transit back to their cars. Eventually, we end up with more clogged roads rather than a long-term improvement in traffic flow.

The coming decades will likely see more intense clustering of jobs, innovation, and productivity in a smaller number of bigger cities and city-regions. Some regions could end up bloated beyond the capacity of their infrastructure, while others struggle, their promise stymied by inadequate human or other resources.

The Most Congested Cities in 2011
Yearly Hours of Delay per Automobile Commuter



Adapted from Adam Werbach, "The American Commuter Spends 38 Hours a Year Stuck in Traffic." ©2013 by The Atlantic.

4

The passage most strongly suggests that researchers at the Martin Prosperity Institute share which assumption?

- A) Employees who work from home are more valuable to their employers than employees who commute.
- B) Employees whose commutes are shortened will use the time saved to do additional productive work for their employers.
- C) Employees can conduct business activities, such as composing memos or joining conference calls, while commuting.
- D) Employees who have lengthy commutes tend to make more money than employees who have shorter commutes.

Estimated Difficulty: Medium Key: B

Choice B is the best answer because details in the third paragraph (lines 30-46) strongly suggest that researchers ("we") at the Martin Prosperity Institute assume that shorter commutes will lead to more productive time for workers. The author notes that "across the country, commuting wastes 4.2 billion hours of work time annually" and that "the overall cost to the U.S. economy is nearly \$90 billion when lost productivity and wasted fuel are taken into account" (lines 37-41). Given also that those at the institute "calculate that every minute shaved off America's commuting time is worth \$19.5 billion in value added to the economy" (lines 42-44), it can reasonably be concluded that some of that added value is from heightened worker productivity.

Choice A is incorrect because there is no evidence in the passage that researchers at the Martin Prosperity Institute assume that employees who work from home are more valuable to their employers than employees who commute. Although the passage does criticize long commutes, it does not propose working from home as a solution.

Choice C is incorrect because there is no evidence in the passage that researchers at the Martin Prosperity Institute assume that employees can conduct business activities, such as composing memos or joining conference calls, while commuting. The passage does discuss commuting in some detail, but it does not mention activities that commuters can or should be undertaking while commuting, and it generally portrays commuting time as lost or wasted time.

Choice D is incorrect because there is no evidence in the passage that researchers at the Martin Prosperity Institute assume that employees who have lengthy commutes tend to make more money than employees who have shorter commutes. The passage does not draw any clear links between the amount of money employees make and the commutes they have.

5

As used in line 55, "intense" most nearly means

- A) emotional.
- B) concentrated.
- C) brilliant.
- D) determined.

Estimated Difficulty: Easy Key: B

Choice B is the best answer because the context makes clear that the clustering of jobs, innovation, and productivity will be more concentrated in, or more densely packed into, "a smaller number of bigger cities and city-regions" (lines 56-57).

Choice A is incorrect because although "intense" sometimes means "emotional," it would make no sense in context to say that the clustering of jobs, innovation, and productivity will be more emotional in "a smaller number of bigger cities and city-regions" (lines 56-57).

Choice C is incorrect because although "intense" sometimes means "brilliant," it would make no sense in context to say that the clustering of jobs, innovation, and productivity will be more brilliant in "a smaller number of bigger cities and city-regions" (lines 56-57).

Choice D is incorrect because although "intense" sometimes means "determined," it would make no sense in context to say that the clustering of jobs, innovation, and productivity will be more determined in "a smaller number of bigger cities and city-regions" (lines 56-57).

6

Which claim about traffic congestion is supported by the graph?

- A) New York City commuters spend less time annually delayed by traffic congestion than the average for very large cities.
- B) Los Angeles commuters are delayed more hours annually by traffic congestion than are commuters in Washington, D.C.
- C) Commuters in Washington, D.C., face greater delays annually due to traffic congestion than do commuters in New York City.
- D) Commuters in Detroit spend more time delayed annually by traffic congestion than do commuters in Houston, Atlanta, and Chicago.

Estimated Difficulty: Easy Key: C

Choice C is the best answer. Higher bars on the graph represent longer annual commute delays than do lower bars; moreover, the number of hours of annual commute delay generally decreases as one moves from left to right on the graph. The bar for Washington, D.C., is higher than and to the left of that for New York City, meaning that D.C. automobile commuters experience greater amounts of delay each year.

Choice A is incorrect because the graph's bar for New York City is higher than and to the left of that for the average for very large cities, meaning that New York City automobile commuters experience greater, not lesser, amounts of delay each year.

Choice B is incorrect because the graph's bar for Los Angeles is lower than and to the right of that

for Washington, D.C., meaning that Los Angeles automobile commuters experience lesser, not greater, amounts of delay each year.

Choice D is incorrect because the graph's bar for Detroit is lower than and to the right of those for Houston, Atlanta, and Chicago, meaning that Detroit automobile commuters experience lesser, not greater, amounts of delay each year.

Questions 7-9 are based on the following passage.

This passage is adapted from a speech delivered by Congresswoman Barbara Jordan of Texas on July 25, 1974, as a member of the Judiciary Committee of the United States House of Representatives. In the passage, Jordan discusses how and when a United States president may be impeached, or charged with serious offenses, while in office. Jordan's speech was delivered in the context of impeachment hearings against then president Richard M. Nixon.

Today, I am an inquisitor. An hyperbole would not be fictional and would not overstate the solemnness that I feel right now. My faith in the Constitution is whole; it is complete; it is total. And I am not going to sit here and be an idle spectator to the diminution, the subversion, the destruction, of the Constitution.

"Who can so properly be the inquisitors for the nation as the representatives of the nation themselves?" "The subjects of its jurisdiction are those offenses which proceed from the misconduct of public men."* And that's what we're talking about. In other words, [the jurisdiction comes] from the abuse or violation of some public trust.

It is wrong, I suggest, it is a misreading of the Constitution for any member here to assert that for a member to vote for an article of impeachment means that that member must be convinced that the President should be removed from office. The Constitution doesn't say that. The powers relating to impeachment are an essential check in the hands of the body of the legislature against and upon the encroachments of the executive. The division between the two branches of the legislature, the House and the Senate, assigning to the one the right to accuse and to the other the right to judge—the framers of this Constitution were very astute. They did not make the accusers and the judges . . . the same person.

We know the nature of impeachment. We've been talking about it a while now. It is chiefly designed for the President and his high ministers to somehow be called into account. It is designed to "bridle" the executive if he engages in excesses. "It is designed as a method of national inquest into the conduct of public men."* The framers confided in the Congress the power, if need be, to remove the President in order to strike a delicate balance between a President swollen with power and grown tyrannical, and preservation of the independence of the executive.

The nature of impeachment: a narrowly channeled exception to the separation of powers maxim. The Federal

Convention of 1787 said that. It limited impeachment to high crimes and misdemeanors, and discounted and opposed the term “maladministration.” “It is to be used only for great misdemeanors,” so it was said in the North Carolina ratification convention. And in the Virginia ratification convention: “We do not trust our liberty to a particular branch. We need one branch to check the other.”

... The North Carolina ratification convention: “No one need be afraid that officers who commit oppression will pass with immunity.” “Prosecutions of impeachments will seldom fail to agitate the passions of the whole community,” said Hamilton in the *Federalist Papers*, number 65. “We divide into parties more or less friendly or inimical to the accused.”* I do not mean political parties in that sense.

The drawing of political lines goes to the motivation behind impeachment; but impeachment must proceed within the confines of the constitutional term “high crime[s] and misdemeanors.” Of the impeachment process, it was Woodrow Wilson who said that “Nothing short of the grossest offenses against the plain law of the land will suffice to give them speed and effectiveness. Indignation so great as to overgrow party interest may secure a conviction; but nothing else can.”

Common sense would be revolted if we engaged upon this process for petty reasons. Congress has a lot to do: appropriations, tax reform, health insurance, campaign finance reform, housing, environmental protection, energy sufficiency, mass transportation. Pettiness cannot be allowed to stand in the face of such overwhelming problems. So today we’re not being petty. We’re trying to be big, because the task we have before us is a big one.

*Jordan quotes from *Federalist* No. 65, an essay by Alexander Hamilton, published in 1788, on the powers of the United States Senate, including the power to decide cases of impeachment against a president of the United States.

7

The stance Jordan takes in the passage is best described as that of

- A) an idealist setting forth principles.
- B) an advocate seeking a compromise position.
- C) an observer striving for neutrality.
- D) a scholar researching a historical controversy.

Estimated Difficulty: Hard **Key:** A

Choice A is the best answer. Jordan helps establish her idealism by declaring that she is an “inquisitor” (line 1) and that her “faith in the Constitution is whole; it is complete; it is total” (lines 3-4). At numerous points in the passage, Jordan sets forth principles (e.g., “The powers

relating to impeachment are an essential check in the hands of the body of the legislature against and upon the encroachments of the executive,” in lines 18-20) and makes reference to important documents that do the same, including the U.S. Constitution and *Federalist* No. 65.

Choice B is incorrect because although Jordan is advocating a position, there is no evidence in the passage that she is seeking a compromise position. Indeed, she notes that she is “not going to sit here and be an idle spectator to the diminution, the subversion, the destruction, of the Constitution” (lines 4-6), indicating that she is not seeking compromise.

Choice C is incorrect because Jordan is a participant (“an inquisitor,” line 1) in the proceedings, not a mere observer. Indeed, she notes that she is “not going to sit here and be an idle spectator to the diminution, the subversion, the destruction, of the Constitution” (lines 4-6).

Choice D is incorrect because Jordan is identified as a congresswoman and an “inquisitor” (line 1), not a scholar, and because she is primarily discussing events happening at the moment, not researching an unidentified historical controversy. Although she refers to historical documents and individuals, her main emphasis is on the (then) present impeachment hearings.

8

In lines 49-54 (“Prosecutions . . . sense”), what is the most likely reason Jordan draws a distinction between two types of “parties”?

- A) To counter the suggestion that impeachment is or should be about partisan politics
- B) To disagree with Hamilton’s claim that impeachment proceedings excite passions
- C) To contend that Hamilton was too timid in his support for the concept of impeachment
- D) To argue that impeachment cases are decided more on the basis of politics than on justice

Estimated Difficulty: Medium **Key:** A

Choice A is the best answer. Jordan is making a distinction between two types of “parties”: the informal associations to which Alexander Hamilton refers and formal, organized political parties such as the modern-day Republican and Democratic parties. Jordan anticipates that listeners to her speech might misinterpret her use of Hamilton’s quotation as suggesting that she thinks impeachment is essentially a tool of organized political parties to achieve partisan ends, with one party attacking and another defending the president. Throughout

the passage, and notably in the seventh paragraph (lines 55-63), Jordan makes clear that she thinks impeachment should be reserved only for the most serious of offenses — ones that should rankle people of any political affiliation.

Choice B is incorrect because Jordan offers no objection to Hamilton’s notion that impeachment proceedings excite passions. Indeed, she quotes Hamilton extensively in a way that indicates that she fundamentally agrees with his view on impeachment. Moreover, she acknowledges that her own speech is impassioned — that she feels a “solemnness” (line 2) and a willingness to indulge in “hyperbole” (line 1).

Choice C is incorrect because Jordan offers no objection to Hamilton’s level of support for the concept of impeachment. Indeed, she quotes Hamilton extensively in a way that indicates that she fundamentally agrees with his view on impeachment.

Choice D is incorrect because Jordan suggests that she and her fellow members of Congress are “trying to be big” (line 71), or high-minded, rather than decide the present case on the basis of politics. Indeed, throughout the last four paragraphs of the passage (lines 37-72), she elaborates on the principled, just basis on which impeachment should proceed. Moreover, throughout the passage, Jordan is focused on the present impeachment hearings, not on the justice or injustice of impeachments generally.

9

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 13-17 (“It . . . office”)
- B) Lines 20-24 (“The division . . . astute”)
- C) Lines 55-58 (“The drawing . . . misdemeanors”)
- D) Lines 65-68 (“Congress . . . transportation”)

Estimated Difficulty: Hard **Key:** C

Choice C is the best answer because in lines 55-58, Jordan draws a contrast between political motivations and “high crime[s] and misdemeanors” as the basis for impeachment and argues that impeachment “must proceed within the confines” of the latter concept. These lines thus serve as the best evidence for the answer to the previous question.

Choice A is incorrect because lines 13-17 only address a misconception that Jordan contends some people have about what a vote for impeachment means. Therefore, these lines do not

serve as the best evidence for the answer to the previous question.

Choice B is incorrect because lines 20-24 only speak to a division of responsibility between the two houses of the U.S. Congress. Therefore, these lines do not serve as the best evidence for the answer to the previous question.

Choice D is incorrect because lines 65-68 serve mainly to indicate that the U.S. Congress has an extensive and important agenda. Therefore, these lines do not serve as the best evidence for the answer to the previous question.

Writing and Language Test Overview

In the Writing and Language Test, you will be asked to make revision and editing decisions to improve multiparagraph passages.

- Total questions: 44 passage-based questions with multiple-choice responses
- Time allotted: 35 minutes
- Calculators may not be used or on your desk.

About the Passages

Writing and Language passages range in length from about 400 to 450 words; they’re well-written pieces covering career-related topics as well as topics in history/social studies, the humanities, and science. As in the Reading Test, some passages in the Writing and Language Test are accompanied by tables, graphs, charts, and the like, which are intended to inform your decisions about how to revise and edit the passages. (Mathematical computation, again, is not required to answer these questions.)

Tips for the Writing and Language Test

The Writing and Language Test comprises a series of passages — sometimes accompanied by one or more informational graphics (e.g., tables and graphs) — and associated multiple-choice questions. The questions ask you to revise and edit text to improve the development, organization, and expression of information and ideas and to correct errors in sentence structure, usage, and punctuation. All of the questions are passage based. Rote recall of language conventions is not tested.

- Each page of the Writing and Language Test is divided into two columns. Passages appear across multiple pages in the left-hand column, while associated questions appear in the right-hand column of each page. Questions direct your attention to particular parts of the passage, such

as a bit of underlined text or a paragraph, or ask you to consider the passage as a whole.

- Read each passage carefully. As you answer each question, decide on the best choice in light of the passage as a whole. Some questions can be answered just by looking at a particular sentence, but others require an understanding of the writer's overall purpose and approach. Remember that while most questions call attention to certain parts of the passage, finding the best answer may require looking back or further ahead in the passage. The information you need to answer each question is always in the passage.
- The most common format for the questions offers you three alternatives to an underlined portion of the passage along with the option of not changing the original language. For each of these questions, select the alternative that most effectively improves the development, organization, or use of language in the passage or that corrects an error in grammar, usage, or punctuation; or select "NO CHANGE" if you think the original version presented in the passage is the best option.
- Stay with a passage until you have answered as many questions as you can before you proceed to the next passage. Do not jump from passage to passage.

Writing and Language Test Questions

Directions

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a "NO CHANGE" option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

- In your test booklet, mark each question you skip so that you can easily go back to it later if you have time.
- Remember that all questions are worth one point regardless of the type or difficulty. You are not penalized for guessing wrong, so it's to your advantage to answer each question as best you can.

Sample Writing and Language Materials

Following are samples of the kinds of Writing and Language passages and questions that may appear on your test. For each set of sample materials:

- Read the passage carefully.
- Decide on the best answer to each question.
- Read the explanation for the best answer to each question and for the answer you chose (if the two are different).

On the actual test, the passages and questions will be in side-by-side columns, with each passage (spread over multiple pages) in the left-hand column and associated questions in the right-hand column.

The directions provided here match what you will see on the actual test.

Questions 1-5 are based on the following passage.

Dong Kingman: Painter of Cities

A 1954 documentary about renowned watercolor painter Dong Kingman shows the artist sitting on a stool on Mott Street in New York City's Chinatown. A crowd of admiring spectators **1** watched as Kingman squeezes dollops of paint from several tubes into a tin watercolor **2** box, from just a few primary colors, Kingman creates dozens of beautiful hues as he layers the translucent paint onto the paper on his easel. Each stroke of the brush and dab of the sponge transforms thinly sketched outlines into buildings, shop signs, and streetlamps. The street scene Kingman begins composing in this short film is very much in keeping with the urban landscapes for which he is best known.

Kingman was keenly interested in landscape painting from an early age. His interest was so keen, in fact,

that he was named after it. In Hong Kong, where Kingman completed his schooling, teachers at that time customarily assigned students a formal "school name." The young boy who had been Dong Moy Shu became Dong Kingman. The name Kingman was selected for its two **3** parts, "king" and "man"; Cantonese for "scenery" and "composition." As Kingman developed as a painter, his works were often compared to paintings by Chinese landscape artists dating back to CE 960, a time when a strong tradition of landscape painting emerged in Chinese art. Kingman, however, departed from that tradition in a number of ways, most notably in that he chose to focus not on natural landscapes, such as mountains and rivers, but on cities.

His fine brushwork conveys detailed street-level activity: a peanut vendor pushing his cart on the sidewalk, a pigeon pecking for crumbs around a fire hydrant, an old man tending to a baby outside a doorway. His broader brush strokes and sponge-painted shapes create majestic city skylines, with skyscrapers towering in the background, bridges connecting neighborhoods on either side of a river, and **4** delicately painted creatures, such as a tiny, barely visible cat prowling in the bushes of a park. To art critics and fans alike, these city scenes represent the innovative spirit of twentieth-century urban Modernism.

During his career, Kingman exhibited his work internationally, garnering much acclaim. In 1936, a critic described one of Kingman's solo exhibits as "twenty of the freshest, most satisfying watercolors that have been seen hereabouts in many a day." **5**

- 1**
- A) NO CHANGE
 - B) had watched
 - C) would watch
 - D) watches

Estimated Difficulty: Easy Key: D

Choice D is the best answer because the simple present tense verb "watches" is consistent with the tense of the verbs in the rest of the sentence and paragraph.

Choice A is incorrect because "watched" creates an inappropriate shift to the past tense.

Choice B is incorrect because "had watched" creates an inappropriate shift to the past perfect tense.

Choice C is incorrect because "would watch" creates an inappropriate shift that suggests a habitual or hypothetical aspect when other verbs in the sentence and paragraph indicate that a specific, actual instance is being narrated.

- 2**
- A) NO CHANGE
 - B) box. From just a few primary colors,
 - C) box from just a few primary colors,
 - D) box, from just a few primary colors

Estimated Difficulty: Medium Key: B

Choice B is the best answer because it provides punctuation that creates two grammatically complete and standard sentences.

Choice A is incorrect because it results in a comma splice as well as some confusion about what the prepositional phrase "from just a few primary colors" modifies.

Choice C is incorrect because it results in a run-on sentence as well as some confusion about what the prepositional phrase "from just a few primary colors" modifies.

Choice D is incorrect because it results in a comma splice.

- 3**
- A) NO CHANGE
 - B) parts: "king" and "man,"
 - C) parts "king" and "man";
 - D) parts; "king" and "man"

Estimated Difficulty: Hard Key: B

Choice B is the best answer because the colon after "parts" effectively signals that what follows in the sentence further defines what the "two parts" of Kingman's name are and because the comma after "man" properly indicates that "'king' and 'man'" and "Cantonese for 'scenery' and 'composition'" are nonrestrictive appositives.

Choice A is incorrect because the semicolon after "man" incorrectly joins an independent clause and a phrase. Moreover, the comma after "parts" is arguably a weak form of punctuation to be signaling the strong break in the sentence indicated here.

Choice C is incorrect because the semicolon after "man" incorrectly joins an independent clause and a phrase and because the absence of appropriate punctuation after "parts" fails to indicate that "two parts" and "'king' and 'man'" are nonrestrictive appositives.

Choice D is incorrect because the semicolon after "parts" incorrectly joins an independent clause and two phrases and because the absence of appropriate punctuation after "man" fails to indicate that "'king' and 'man'" and "Cantonese for 'scenery' and 'composition'" are nonrestrictive appositives.

4

The writer wants to complete the sentence with a third example of a detail Kingman uses to create his majestic city skylines. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) exquisitely lettered street and storefront signs.
- C) other details that help define Kingman's urban landscapes.
- D) enormous ships docking at busy urban ports.

Estimated Difficulty: Hard	Key: D
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Choice D is the best answer because the phrase "enormous ships docking at busy urban ports" effectively continues the sentence's series of details ("skyscrapers towering in the background" and "bridges connecting neighborhoods") conveying the majesty of city skylines as depicted by Kingman.

Choice A is incorrect because the phrase "delicately painted creatures, such as a tiny, barely visible cat prowling in the bushes of a park" does not convey a sense of the majesty of city skylines as depicted by Kingman and thus does not effectively continue the sentence's series of details ("skyscrapers towering in the background" and "bridges connecting neighborhoods").

Choice B is incorrect because the phrase "exquisitely lettered street and storefront signs" does not convey a sense of the majesty of city skylines as depicted by Kingman and thus does not effectively continue the sentence's series of details ("skyscrapers towering in the background" and "bridges connecting neighborhoods").

Choice C is incorrect because the phrase "other details that help define Kingman's urban landscapes" is too vague and general to constitute a third example that conveys a sense of the majesty of city skylines as depicted by Kingman and thus does not effectively continue the sentence's series of details ("skyscrapers towering in the background" and "bridges connecting neighborhoods").

5

The writer wants to conclude the passage with a sentence that emphasizes an enduring legacy of Kingman's work. Which choice would best accomplish this goal?

- A) Although Kingman's work might not be as famous as that of some other watercolor painters, such as Georgia O'Keeffe and Edward Hopper, it is well regarded by many people.
- B) Since Kingman's death in 2000, museums across the United States and in China have continued to ensure that his now-iconic landscapes remain available for the public to enjoy.
- C) The urban landscapes depicted in Kingman's body of work are a testament to the aptness of the name chosen for Kingman when he was just a boy.
- D) Kingman's work was but one example of a long-lasting tradition refreshed by an innovative artist with a new perspective.

Estimated Difficulty: Hard	Key: B
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Choice B is the best answer because it concludes the passage with a sentence that emphasizes the enduring legacy of Kingman's work by indicating that museums continue to make Kingman's iconic paintings accessible to the public.

Choice A is incorrect because it concludes the passage with a sentence that acknowledges that the works of other painters are more famous than Kingman's (which downplays, rather than emphasizes, the enduring legacy of Kingman's work) and offers only a general assertion that Kingman's work is "well regarded by many people."

Choice C is incorrect because instead of referring to the enduring legacy of Kingman's work, it concludes the passage with a sentence that recalls a detail the passage provides about Kingman's early life.

Choice D is incorrect because it concludes the passage with a sentence that is too vague and general to emphasize effectively an enduring legacy of Kingman's work. It is not clear what the idea of refreshing a long-lasting tradition is intended to mean or how (or even whether)

this represents an enduring legacy. Moreover, referring to Kingman's work as "but one example" downplays the significance of any potential legacy that might be suggested.

Questions 6-10 are based on the following passage and supplementary material.

A Life in Traffic

A subway system is expanded to provide service to a growing suburb. A bike-sharing program is adopted to encourage nonmotorized transportation. Stoplight timing is coordinated to alleviate rush hour traffic jams in a congested downtown area. When any one of these changes 6 occur, it is likely the result of careful analysis conducted by transportation planners.

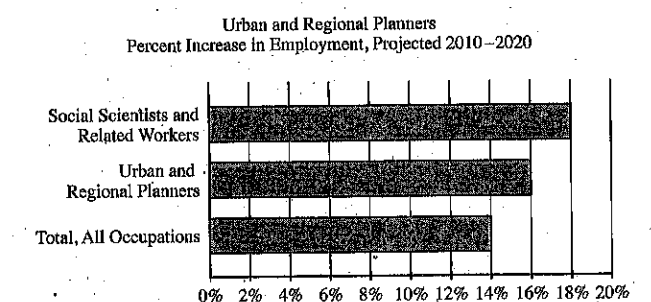
The work of transportation planners generally includes evaluating current transportation needs, assessing the effectiveness of existing facilities, and improving those facilities or designing new ones. Most transportation planners work in or near cities, 7 but some are employed in rural areas. Say, for example, a large factory is built on the outskirts of a small town. Traffic to and from that location would increase at the beginning and end of work shifts. The transportation planner's job might involve conducting a traffic count to determine the daily number of vehicles traveling on the road to the new factory. If analysis of the traffic count indicates that there is more traffic than the 8 current road as it is designed at this time can efficiently accommodate, the transportation planner might recommend widening the road to add another lane.

Transportation planners work closely with a number of community stakeholders, such as government officials and other interested organizations and individuals. For instance, representatives from the local public health department might provide input in designing a network of trails and sidewalks to encourage people to walk more. 9 According to the American Heart Association, walking provides numerous benefits related to health and well-being. Members of

the Chamber of Commerce might share suggestions about designing transportation and parking facilities to support local businesses.

People who pursue careers in transportation planning have a wide variety of educational backgrounds. A two-year degree in transportation technology may be sufficient for some entry-level jobs in the field. Most jobs, however, require at least a bachelor's degree; majors of transportation planners are 10 varied, including fields such as urban studies, civil engineering, geography, or transportation and logistics management. For many positions in the field, a master's degree is required.

Transportation planners perform critical work within the broader field of urban and regional planning. As of 2010, there were approximately 40,300 urban and regional planners employed in the United States. The United States Bureau of Labor Statistics forecasts steady job growth in this field, predicting that employment of urban and regional planners will increase 16 percent between 2010 and 2020. Population growth and concerns about environmental sustainability are expected to spur the need for transportation planning professionals.



Adapted from United States Bureau of Labor Statistics, Employment Projections program. "All occupations" includes all occupations in the United States economy.

6

- A) NO CHANGE
- B) occur, they are
- C) occurs, they are
- D) occurs, it is

Estimated Difficulty: Hard	Key: D
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Choice D is the best answer because it maintains agreement between the pronoun ("it") and the antecedent ("any one") and between the subject ("any one") and the verb ("occurs").

Choice A is incorrect because the plural verb "occur" does not agree with the singular subject "any one."

Choice B is incorrect because the plural verb "occur" does not agree with the singular subject "any one" and because the plural pronoun "they" does not agree with the singular antecedent "any one."

Choice C is incorrect because the plural pronoun "they" does not agree with the singular antecedent "any one."

7

Which choice results in the most effective transition to the information that follows in the paragraph?

- A) NO CHANGE
- B) where job opportunities are more plentiful.
- C) and the majority are employed by government agencies.
- D) DELETE the underlined portion and end the sentence with a period.

Estimated Difficulty: Medium	Key: A
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Choice A is the best answer because it effectively signals the shift in the paragraph to the example of the work a transportation planner might perform if he or she were employed in a rural area and asked to consider the effects of a new factory built "on the outskirts of a small town."

Choice B is incorrect because noting that job opportunities are more plentiful in cities does not effectively signal the shift in the paragraph to the example of the work a transportation planner might perform if he or she were employed in a rural area.

Choice C is incorrect because noting that most transportation planners work for government agencies does not effectively signal the shift in the paragraph to the example of the work a transportation planner might perform if he or she were employed in a rural area.

Choice D is incorrect because the proposed deletion would create a jarring shift from the statement "Most transportation planners work in or near cities" to the example of the work a transportation planner might perform if he or she were employed in a rural area.

8

- A) NO CHANGE
- B) current design of the road right now
- C) road as it is now currently designed
- D) current design of the road

Estimated Difficulty: Medium	Key: D
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Choice D is the best answer because it offers a clear and concise wording without redundancy or wordiness.

Choice A is incorrect because "current" is redundant with "at this time" and because "as it is designed" is unnecessarily wordy.

Choice B is incorrect because "current" is redundant with "right now."

Choice C is incorrect because "now" is redundant with "currently."

9

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it provides supporting evidence about the benefits of walking.
- B) Kept, because it provides an additional example of a community stakeholder with whom transportation planners work.
- C) Deleted, because it blurs the paragraph's focus on the community stakeholders with whom transportation planners work.
- D) Deleted, because it doesn't provide specific examples of what the numerous benefits of walking are.

Estimated Difficulty: Medium	Key: C
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Choice C is the best answer because it identifies the best reason the underlined sentence should not be kept. At this point in the passage and paragraph, a general statement about the benefits of walking only serves to interrupt the discussion of the community stakeholders with whom transportation planners work.

Choice A is incorrect because the underlined sentence should not be kept. Although the sentence theoretically provides supporting evidence about the benefits of walking, the passage has not made

a claim that needs to be supported in this way, and including such a statement only serves to interrupt the discussion of the community stakeholders with whom transportation planners work.

Choice B is incorrect because the underlined sentence should not be kept. Although the American Heart Association could theoretically be an example of "other interested organizations" that transportation planners work with, the sentence does not suggest this is the case. Instead, the association is merely the source for the general statement about the benefits of walking, a statement that only serves to interrupt the discussion of the actual community stakeholders with whom transportation planners work.

Choice D is incorrect because, although the underlined sentence should be deleted, it is not because the sentence lacks specific examples of the numerous benefits of walking. Adding such examples would only serve to blur the focus of the paragraph further with general factual information, as the paragraph's main purpose is to

Math

The Math questions test your ability to solve problems and use appropriate approaches and tools strategically. The test measures math skills across four areas:

- Heart of Algebra
- Problem Solving and Data Analysis
- Passport to Advanced Math
- Additional Topics in Math (covering relevant concepts learned in high school math, such as the Pythagorean theorem)

Math Test Overview

The Math Test includes a portion that allows the use of a calculator and a portion that does not. Total of 58 questions (20 questions on the no calculator portion and 38 questions on the calculator portion):

- 45 standard multiple-choice questions
 - 13 student-produced response questions
 - Time allotted for Math – No Calculator: 25 minutes
 - Time allotted for Math – Calculator: 55 minutes
- Some questions are like those you may have seen in your math courses. The ability to reason logically in a variety of situations, including ones related to career, science, and social studies,

discuss the community stakeholders with whom transportation planners work.

10

- A) NO CHANGE
- B) varied, and including
- C) varied and which include
- D) varied, which include

Estimated Difficulty: Hard	Key: A
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Choice A is the best answer because it effectively uses a comma and "including" to set off the list of varied fields in which transportation planners major.

Choice B is incorrect because "and including" results in an ungrammatical sentence.

Choice C is incorrect because "and which include" results in an ungrammatical sentence.

Choice D is incorrect because is it unclear from this construction to what exactly the relative pronoun "which" refers.

is tested throughout. You'll also encounter at least three item sets that include more than one question about a given scenario.

Tips for the Math Test

- Familiarize yourself with the directions ahead of time.
- The test does not require you to memorize formulas. Commonly used formulas are provided in the test booklet at the beginning of each math portion. Other formulas that are needed are provided in the questions themselves. It's up to you to decide which formula is appropriate to a question.
- Read the problem carefully. Look for key words that tell you what the problem is asking. Ask yourself the following questions before you solve each problem: What is the question asking? What do I know?
- With some problems, it may be useful to draw a sketch or diagram of the given information.
- Use the test booklet for scratch work. You won't receive credit for anything written in the booklet, but you'll be able to check your work later.
- In the portion of the test that allows calculator use, you should be strategic when choosing to use your calculator. (See Calculator Tips.)

- Pace yourself so you have time to try answering every question and don't spend too much time on any individual problem.
- Eliminate choices. It's sometimes easier to find the wrong answers than the correct one. Remember that you won't lose points for incorrect answers, so plan to make your best guess if you don't know the answer.
- Check your answer to make sure it's a reasonable answer to the question asked. This is especially true for student-produced response questions, where no answer choices are given.
- All figures are drawn to scale unless otherwise indicated.

Calculator Policy

You may not share calculators. You'll be dismissed and your scores will be canceled if you use your calculator to share information during the test or to remove test questions or answers from the test room.

Acceptable Calculators

All questions on the Math Test – Calculator section can be solved without a calculator, but you may find using a calculator helpful on some questions. A scientific or graphing calculator is recommended for the Math Test – Calculator section.

Calculators permitted during testing are:

- Most graphing calculators (see a list at sat.org/calculator).
- All scientific calculators that do not have prohibited features noted below.
- Four-function calculators (not recommended).

Unacceptable Calculators

Do NOT bring these types of calculators to the test:

- Laptops or other computers, tablets, cell phones, or smartphones
- Models that can access the internet, have wireless, Bluetooth, cellular, audio/video recording and playing, camera, or any other smartphone-type feature
- Models that have typewriter-like keypad, pen-input, or stylus
- Models that use electrical outlets, make noise, or have a paper tape (unless approved to use as an accommodation)

In addition, the use of hardware peripherals such as a stylus with an approved calculator is not permitted. Some models with touch-screen capability are not permitted (e.g., Casio ClassPad). Check the list of acceptable calculators for models that are permitted.

Calculator Tips

- Remember to bring your calculator on test day. Calculators will not be available at the test center. You should be familiar with how to use the calculator you bring to the test.
- Make sure your calculator is in good working order and that its batteries are fresh. If your calculator fails during testing and you have no backup, you will have to complete the test without it (or cancel your scores for the entire test).
- Don't buy an expensive, sophisticated calculator just to take the test. Although you can use them for the test, more sophisticated calculators are not required for any problem.
- Don't try to use a calculator on every question in the calculator portion. First, decide how you will solve the problem, and then decide whether to use the calculator. The calculator is meant to aid you in solving problems, not to get in the way.
- All questions in the calculator portion can be answered without a calculator, but for some questions, a calculator may be helpful. Look for algebra structures to solve problems first before reaching for your calculator.
- Take the calculator portion of the practice test with a calculator at hand. This will help you practice determining which types of questions you should use your calculator to answer.

Sample Math Materials

Following are samples of the kinds of Math Test – No Calculator and Math Test – Calculator questions that may appear on your test. For these sample materials:

- Review the notes shown at the beginning of the section. They match what you will see at the beginning of both sections on the actual test.
- Decide on the correct answer to each multiple-choice question, then read the explanation for the correct answer to each question and for the answer you chose (if the two are different).
- Follow the directions for the student-produced response questions, shown on page 24. The directions match what you'll see on both portions of the actual test.

Tips for Student-Produced Response Questions

- Know the rules for gridding mixed numbers and repeating decimals before taking the test.
- Check your work if your answer does not fit on the answer grid. If you obtain a negative value or a value greater than 9999, you have made an error.
- A zero cannot be gridded in the leftmost column of the answer grid.
- A fraction does not have to be reduced unless it will not fit on the answer grid.

Math Test – No Calculator Questions

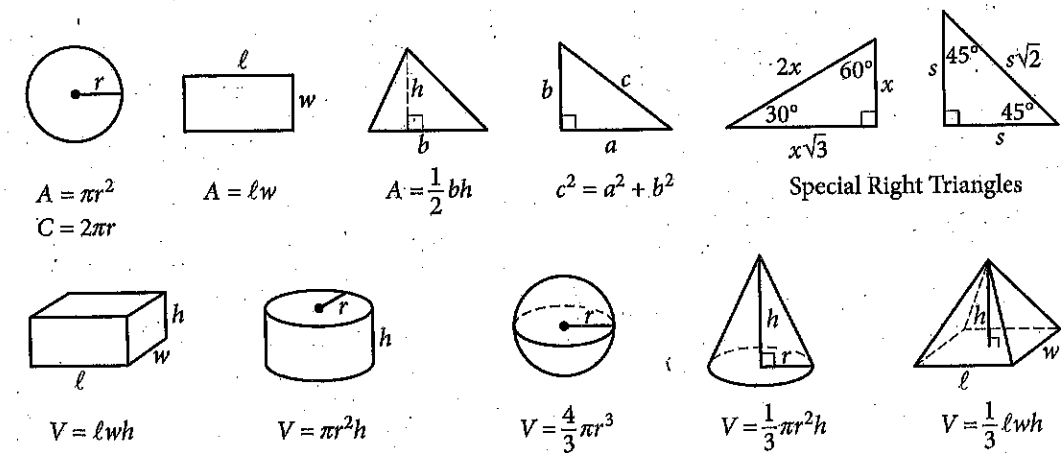
Directions

For questions 1-5, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For question 6, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 6 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

Notes

1. The use of a calculator is **not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

Reference



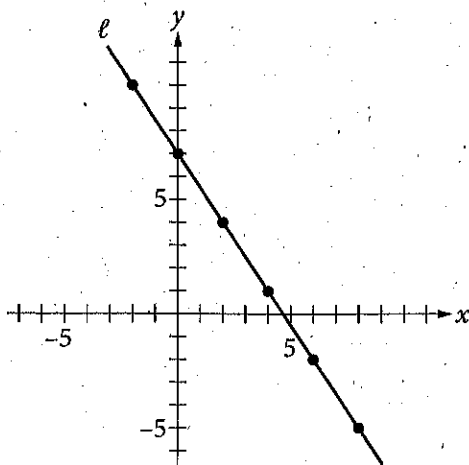
The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.

1

Line ℓ is graphed in the xy -plane below.



If line ℓ is translated up 5 units and right 7 units, then what is the slope of the new line?

- A) $-\frac{2}{5}$
- B) $-\frac{3}{2}$
- C) $-\frac{8}{9}$
- D) $-\frac{11}{14}$

Estimated Difficulty: Easy **Key:** B

Choice B is correct. The slope of a line can be determined by finding the difference in the y -coordinates divided by the difference in the x -coordinates for any two points on the line.

Using the points indicated, the slope of line ℓ is $-\frac{3}{2}$. Translating line ℓ moves all the points on the line the same distance in the same direction, and the image will be a line parallel to ℓ . Therefore, the slope of the image is also $-\frac{3}{2}$.

Choice A is incorrect. This value may result from a combination of errors. You may have erroneously determined the slope of the new line by adding 5 to the numerator and adding 7 to the denominator in the slope of line ℓ and gotten the result $\frac{-3+5}{-2+7}$.

Choice C is incorrect. This value may result from a combination of errors. You may have erroneously determined the slope of the new line by subtracting 5 from the numerator and subtracting 7 from the denominator in the slope of line ℓ .

Choice D is incorrect and may result from adding $\frac{5}{7}$ to the slope of line ℓ .

2

The mean number of students per classroom, y , at Central High School can be estimated using the equation $y = 0.8636x + 27.227$, where x represents the number of years since 2004 and $x \leq 10$. Which of the following statements is the best interpretation of the number 0.8636 in the context of this problem?

- A) The estimated mean number of students per classroom in 2004
- B) The estimated mean number of students per classroom in 2014
- C) The estimated yearly decrease in the mean number of students per classroom
- D) The estimated yearly increase in the mean number of students per classroom

Estimated Difficulty: Easy **Key:** D

Choice D is correct. When an equation is written in the form $y = mx + b$, the coefficient of the x -term (in this case 0.8636) is the slope. The slope of this linear equation gives the amount that the mean number of students per classroom (represented by y) changes per year (represented by x).

Choice A is incorrect and may result from a misunderstanding of slope and y -intercept. The y -intercept of the equation represents the estimated mean number of students per classroom in 2004.

Choice B is incorrect and may result from a misunderstanding of the limitations of the model. You may have seen that $x \leq 10$ and erroneously used this statement to determine that the model finds the mean number of students in 2014.

Choice C is incorrect and may result from a misunderstanding of slope. You may have recognized that slope models the rate of change but thought that a slope of less than 1 indicates a decreasing function.

3

The graph of $y = (2x - 4)(x - 4)$ is a parabola in the xy -plane. In which of the following equivalent equations do the x - and y -coordinates of the vertex of the parabola appear as constants or coefficients?

- A) $y = 2x^2 - 12x + 16$
- B) $y = 2x(x - 6) + 16$
- C) $y = 2(x - 3)^2 + (-2)$
- D) $y = (x - 2)(2x - 8)$

Estimated Difficulty: Medium **Key:** C

Choice C is correct. The equation $y = (2x - 4)(x - 4)$ can be written in vertex form, $y = a(x - h)^2 + k$, to display the vertex, (h, k) , of the parabola. To put the equation in vertex form, first multiply: $(2x - 4)(x - 4) = 2x^2 - 8x - 4x + 16$. Then, add like terms, $2x^2 - 8x - 4x + 16 = 2x^2 - 12x + 16$. The next step is completing the square.

$y = 2x^2 - 12x + 16$	
$y = 2(x^2 - 6x) + 16$	Isolate the x^2 term by factoring
$y = 2(x^2 - 6x + 9 - 9) + 16$	Make a perfect square in the parentheses
$y = 2(x^2 - 6x + 9) - 18 + 16$	Move the extra term out of the parentheses
$y = 2(x - 3)^2 - 18 + 16$	Factor inside the parentheses
$y = 2(x - 3)^2 - 2$	Simplify the remaining terms

Therefore, the coordinates of the vertex, $(3, -2)$, are both revealed only in choice C. Since you are told that all of the equations are equivalent, simply knowing the form that displays the coordinates of the vertex will save all of these steps — this is known as “seeing structure in the expression or equation.”

Choice A is incorrect; it displays the y -value of the y -intercept of the graph $(0, 16)$ as a constant.

Choice B is incorrect; it displays the y -value of the y -intercept of the graph $(0, 16)$ as a constant.

Choice D is incorrect; it displays the x -value of one of the x -intercepts of the graph $(2, 0)$ as a constant.

4

Which of the following is equal to $(14 - 2i)(7 + 12i)$? (Note: $i = \sqrt{-1}$)

- A) 74
- B) 122
- C) $74 + 154i$
- D) $122 + 154i$

Estimated Difficulty: Medium **Key:** D

Choice D is correct. Applying the distributive property to multiply the binomials yields the expression $98 + 168i - 14i - 24i^2$. The note in the question reminds you that $i = \sqrt{-1}$, therefore $i^2 = -1$. Substituting this value into the expression gives you $98 + 168i - 14i - (-24)$, and combining like terms results in $122 + 154i$.

Choice A is incorrect and may result from a combination of errors. You may not have correctly distributed when multiplying the binomials, multiplying only the first terms together and the second terms together. You may also have used the incorrect equality $i^2 = 1$.

Choice B is incorrect and may result from a combination of errors. You may not have correctly distributed when multiplying the binomials, multiplying only the first terms together and the second terms together.

Choice C is incorrect and results from misapplying the statement $i = \sqrt{-1}$.

5

Which of the following is equal to $\sin\left(\frac{\pi}{5}\right)$?

- A) $-\cos\left(\frac{\pi}{5}\right)$
- B) $-\sin\left(\frac{\pi}{5}\right)$
- C) $\cos\left(\frac{3\pi}{10}\right)$
- D) $\sin\left(\frac{7\pi}{10}\right)$

Estimated Difficulty: Hard **Key:** C

Choice C is correct. Sine and cosine are related

by the equation: $\sin(x) = \cos\left(\frac{\pi}{2} - x\right)$. Therefore,

$$\sin\left(\frac{\pi}{5}\right) = \cos\left(\frac{\pi}{2} - \frac{\pi}{5}\right), \text{ which reduces to } \cos\left(\frac{\pi}{10}\right).$$

Choice A is incorrect and may result from a misunderstanding about trigonometric relationships. You may have thought that cosine is the inverse function of sine and therefore reasoned that the negative of the cosine of an angle is equivalent to the sine of that angle.

Choice B is incorrect and may result from a misunderstanding of the unit circle and how it relates to trigonometric expressions. You may have thought that, on a coordinate grid, the negative sign only changes the orientation of the triangle formed, not the value of the trigonometric expression.

Choice D is incorrect. You may have confused the relationship between sine and cosine and erroneously added $\frac{\pi}{2}$ to the given angle measure

instead of subtracting the angle measure from $\frac{\pi}{2}$.

Student-Produced Response Math Questions

For some questions in the Math Tests, you will be asked to solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2 (If $\frac{31}{2}$ is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

← Fraction line

← Decimal point

Grid in result.

Answer: $\frac{7}{12}$

7	/	1	2
0	0	0	
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 2.5

2	.	5	
0	0	0	
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Acceptable ways to grid $\frac{2}{3}$ are:

2	/	3	
0	0	0	
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	6
0	0	0	
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
0	0	0	
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

2	0	1	
0	0	0	
1	1	1	1
2	2	2	2
3	3	3	3

2	0	1	
0	0	0	
1	1	1	1
2	2	2	2
3	3	3	3

NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

Math Test – Calculator Questions

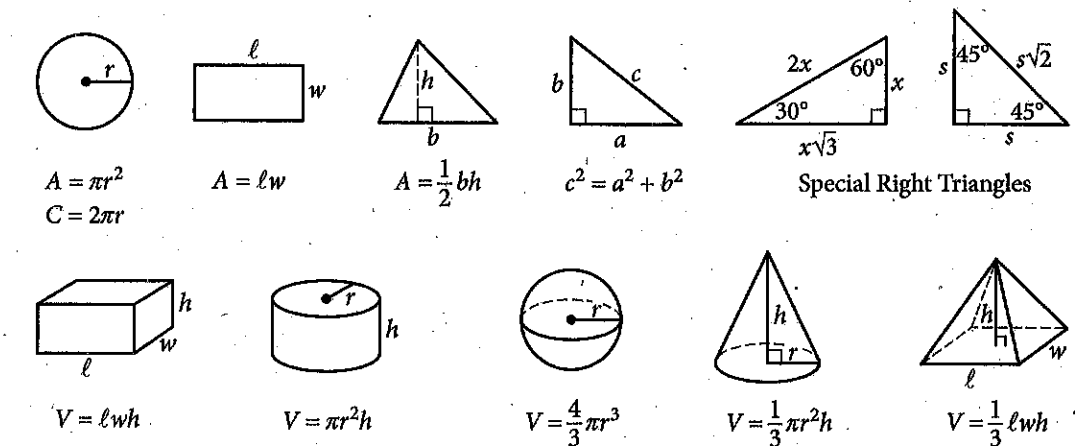
Directions

For questions 1-8, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 9-10, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 6 on page 24 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

Notes

- The use of a calculator is permitted.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

Reference



The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.

6

$$x^2 + y^2 - 6x + 8y = 144$$

The equation of a circle in the xy -plane is shown above. What is the diameter of the circle?

Estimated Difficulty: Hard

Key: 26

Completing the square yields the equation $(x - 3)^2 + (y + 4)^2 = 169$, the standard form of an equation of the circle. Understanding this form results in the equation $r^2 = 169$, which when solved for r gives the value of the radius as 13. Diameter is twice the value of the radius; therefore, the diameter is 26.

The recommended daily calcium intake for a 20-year-old is 1,000 milligrams (mg). One cup of milk contains 299 mg of calcium and one cup of juice contains 261 mg of calcium. Which of the following inequalities represents the possible number of cups of milk, m , and cups of juice, j , a 20-year-old could drink in a day to meet or exceed the recommended daily calcium intake from these drinks alone?

- A) $299m + 261j \geq 1,000$
 B) $299m + 261j > 1,000$
 C) $\frac{299}{m} + \frac{261}{j} \geq 1,000$
 D) $\frac{299}{m} + \frac{261}{j} > 1,000$

Estimated Difficulty: Easy	Key: A
----------------------------	--------

Choice A is correct. Multiplying the number of cups of milk by the amount of calcium each cup contains and multiplying the number of cups of juice by the amount of calcium each cup contains gives the total amount of calcium from each source. You must then find the sum of these two numbers to find the total amount of calcium. Because the question asks for the calcium from these two sources to meet or exceed the recommended daily intake, the sum of these two products must be greater than or equal to 1,000.

Choice B is incorrect and may result from a misunderstanding of the meaning of inequality symbols as they relate to real-life situations. This answer does not allow for the daily intake to meet the recommended daily amount.

Choice C is incorrect and may result from a misunderstanding of proportional relationships. Here the wrong operation is applied, with the total amount of calcium per cup divided by the number of cups of each type of drink. These values should be multiplied.

Choice D is incorrect and may result from a combination of mistakes. The inequality symbol used allows the option to exceed, but not to meet, the recommended daily value, and the wrong operation may have been applied when calculating the total amount of calcium intake from each drink.

A company's manager estimated that the cost C , in dollars, of producing n items is $C = 7n + 350$. The company sells each item for \$12. The company makes a profit when the total income from selling a quantity of items is greater than the total cost of producing that quantity of items. Which of the following inequalities gives all possible values of n for which the manager estimates that the company will make a profit?

- A) $n < 70$
 B) $n < 84$
 C) $n > 70$
 D) $n > 84$

Estimated Difficulty: Medium	Key: C
------------------------------	--------

Choice C is correct. One way to find the correct answer is to create an inequality. The income from sales of n items is $12n$. For the company to profit, $12n$ must be greater than the cost of producing n items; therefore, the inequality $12n > 7n + 350$ can be used to model the scenario. Solving this inequality yields $n > 70$.

Choice A is incorrect and may result from a misunderstanding of the properties of inequalities. You may have found the number of items of the break-even point as 70 and used the incorrect notation to express the answer, or you may have incorrectly modeled the scenario when setting up an inequality to solve.

Choice B is incorrect and may result from a misunderstanding of how the cost equation models the scenario. If you use the cost of \$12 as the number of items n and evaluate the expression $7n$, you will find the value of 84. Misunderstanding how the inequality relates to the scenario might lead you to think n should be less than this value.

Choice D is incorrect and may result from a misunderstanding of how the cost equation models the scenario. If you use the cost of \$12 as the number of items n and evaluate the expression $7n$, you will find the value of 84. Misunderstanding how the inequality relates to the scenario might lead you to think n should be greater than this value.

At a primate reserve, the mean age of all the male primates is 15 years, and the mean age of all female primates is 19 years. Which of the following must be true about the mean age m of the combined group of male and female primates at the primate reserve?

- A) $m = 17$
 B) $m > 17$
 C) $m < 17$
 D) $15 < m < 19$

Estimated Difficulty: Medium	Key: D
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Choice D is correct. You must reason that because the mean of the males is lower than that of the females, the combined mean cannot be greater than or equal to that of the females, while also reasoning that because the mean of the females is greater than that of the males, the combined mean cannot be less than or equal to the mean of the males. Therefore, the combined mean must be between the two separate means.

Choice A is incorrect and results from finding the mean of the two means. This answer makes an unjustified assumption that there are an equal number of male and female primates.

Choice B is incorrect and results from finding the mean of the two means and misapplying an inequality to the scenario. This answer makes an unjustified assumption that there are more females than males.

Choice C is incorrect and results from finding the mean of the two means and misapplying an inequality to the scenario. This answer makes an unjustified assumption that there are more males than females.

A biology class at Central High School predicted that a local population of animals will double in size every 12 years. The population at the beginning of 2014 was estimated to be 50 animals. If P represents the population n years after 2014, then which of the following equations represents the class's model of the population over time?

- A) $P = 12 + 50n$
 B) $P = 50 + 12n$
 C) $P = 50(2)^{12n}$
 D) $P = 50(2)^{\frac{n}{12}}$

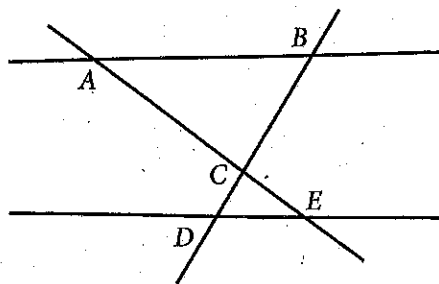
Estimated Difficulty: Medium	Key: D
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Choice D is correct. You must first recognize that a population that doubles in size over equal time periods is increasing at an exponential rate. In a doubling scenario, an exponential growth model can be written in the form $y = a(2)^{\frac{t}{b}}$, where a is the initial population (that is, the population when $n = 0$) and b is the number of years it takes for the population to double in size. In this case, the initial population is 50, the number of animals at the beginning of 2014. Therefore, $a = 50$. The text explains that the population will double in size every 12 years. Therefore, $b = 12$.

Choice A is incorrect and may result from a misunderstanding of exponential equations or of the context. This linear model indicates that the initial population is 12 animals and the population is increasing by 50 animals each year. However, this is not the case.

Choice B is incorrect and may result from a misunderstanding of exponential equations or of the context. This linear model indicates that the initial population is 50 animals and the population is increasing by 12 animals each year. However, this is not the case.

Choice C is incorrect. This exponential model indicates that the initial population is 50 animals and is doubling. However, the exponent $12n$ indicates that the population is doubling 12 times per year, not every 12 years. This is not the case.



Note: Figure not drawn to scale.

In the figure above, $\triangle ABC \sim \triangle EDC$. Which of the following must be true?

- A) $\overline{AE} \parallel \overline{BD}$
- B) $\overline{AE} \perp \overline{BD}$
- C) $\overline{AB} \parallel \overline{DE}$
- D) $\overline{AB} \perp \overline{DE}$

Estimated Difficulty: Medium

Key: C

Choice C is correct. Given that $\triangle ABC$ is similar to $\triangle EDC$, you can determine that the corresponding $\angle BAC$ is congruent to $\angle CED$. The converse of the alternate interior angle theorem tells us that $\overline{AB} \parallel \overline{DE}$. (You can also use the fact that $\angle ABC$ and $\angle CDE$ are congruent to make a similar argument.)

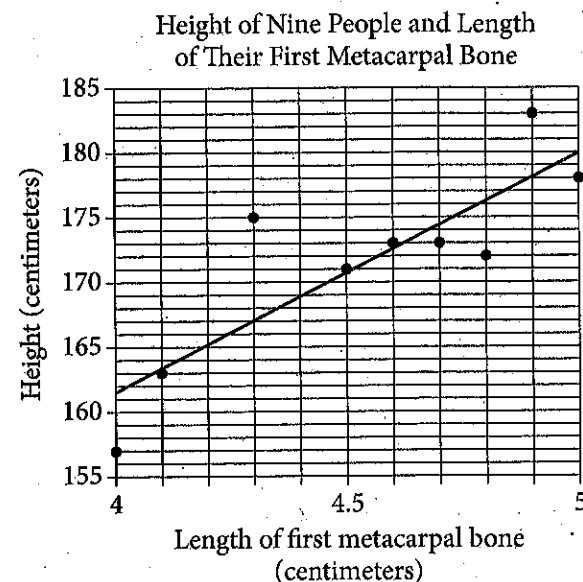
Choice A is incorrect and may result from multiple misconceptions. You may have misidentified the segments as perpendicular and used the wrong notation to express this statement.

Choice B is incorrect and may result from using only the diagram and not considering the given information. The line segments appear to be perpendicular, but need not be, given the information provided.

Choice D is incorrect and may result from misunderstanding either the notation or the vocabulary of parallel and perpendicular lines. You may have incorrectly identified parallel lines as perpendicular.

Questions 6-8 refer to the following information.

The first metacarpal bone is located in the hand. The scatterplot below shows the relationship between the length of the first metacarpal bone and height of 9 people. The line of best fit is also shown.



6

How many of the 9 people have an actual height that differs by more than 3 centimeters from the height predicted by the line of best fit?

- A) 2
- B) 4
- C) 6
- D) 9

Estimated Difficulty: Easy

Key: B

Choice B is correct. The people who have first metacarpal bones of length 4.0, 4.3, 4.8, and 4.9 centimeters have heights that differ by more than 3 centimeters from the height predicted by the line of best fit.

Choice A is incorrect. There are 2 people whose actual heights are more than 3 centimeters above the height predicted by the line of best fit. However, there are also 2 people whose actual heights are farther than 3 centimeters below the line of best fit.

Choice C is incorrect. There are 6 data points in which the absolute value between the actual height

and the height predicted by the line of best fit is greater than 1 centimeter.

Choice D is incorrect. The data on the graph represents 9 different people; however, the absolute value of the difference between actual height and predicted height is not greater than 3 for all of the people.

7

Which of the following is the best interpretation of the slope of the line of best fit in the context of this problem?

- A) The predicted height increase in centimeters for one centimeter increase in the first metacarpal bone
- B) The predicted first metacarpal bone increase in centimeters for every centimeter increase in height
- C) The predicted height in centimeters of a person with a first metacarpal bone length of 0 centimeters
- D) The predicted first metacarpal bone length in centimeters for a person with a height of 0 centimeters

Estimated Difficulty: Easy

Key: A

Choice A is correct. The slope is the change in the vertical distance divided by the change in the horizontal distance between any two points on a line. In this context, the change in the vertical distance is the change in the predicted height of a person, and the change in the horizontal distance is the change in the length of his or her first metacarpal bone. The unit rate, or slope, is the increase in predicted height for each increase of one centimeter of the first metacarpal bone.

Choice B is incorrect. If you selected this answer, you may have interpreted slope incorrectly as run over rise.

Choice C is incorrect. If you selected this answer, you may have mistaken slope for the y -intercept.

Choice D is incorrect. If you selected this answer, you may have mistaken slope for the x -intercept.

8

Based on the line of best fit, what is the predicted height for someone with a first metacarpal bone that has a length of 4.45 centimeters?

- A) 168 centimeters
- B) 169 centimeters
- C) 170 centimeters
- D) 171 centimeters

Estimated Difficulty: Easy

Key: C

Choice C is correct. First, notice that the scale of the x -axis is 0.1, and therefore the x -value of 4.45 is halfway between the unmarked value of 4.4 and the marked value of 4.5. Then find the y -value on the line of best fit that corresponds to an x -value of 4.45, which is 170.

Choice A is incorrect. If you mistakenly find the point on the line between the x -values of 4.3 and 4.4, you will likely find a predicted metacarpal bone length of 168 centimeters.

Choice B is incorrect. If you mistakenly find the point on the line that corresponds to an x -value of 4.4 centimeters, you will likely find a predicted height of approximately 169 centimeters.

Choice D is incorrect. If you mistakenly find the point on the line that corresponds to an x -value of 4.5 centimeters, you will likely find a predicted height of approximately 171 centimeters. You might also choose this option if you mistakenly use the data point that has an x -value closest to 4.45 centimeters.

Student-Produced Response Math Questions

For questions 9 and 10, you are asked to solve the problem and enter your answer in the grid, as described on page 24 of this booklet.

9

The table below classifies 103 elements as metal, metalloid, or nonmetal and as solid, liquid, or gas at standard temperature and pressure.

	Solids	Liquids	Gases	Total
Metals	77	1	0	78
Metalloids	7	0	0	7
Nonmetals	6	1	11	18
Total	90	2	11	103

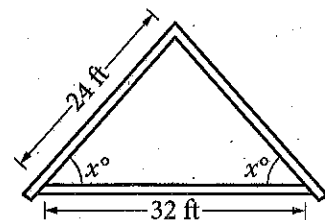
What fraction of all solids and liquids in the table are metalloids?

Estimated Difficulty: Easy	Key: $\frac{7}{92}$
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There are 7 metalloids that are solid or liquid, and there are 92 total solids and liquids. Therefore, the fraction of solids and liquids that are metalloids is $\frac{7}{92}$.

10

An architect drew the sketch below while designing a house roof. The dimensions shown are for the interior of the triangle.



Note: Figure not drawn to scale.

What is the value of $\cos x$?

Estimated Difficulty: Hard	Key: $\frac{2}{3}$
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Because the triangle is isosceles, constructing a perpendicular from the top vertex to the opposite side will bisect the base and create two smaller right triangles. In a right triangle, the cosine of an acute angle is equal to the length of the side adjacent to the angle divided by the length of the hypotenuse.

This gives $\cos x = \frac{16}{24}$, which can be simplified to $\cos x = \frac{2}{3}$. Note that $\frac{16}{24}$ cannot be entered into the answer grid, so this fraction must be reduced. Acceptable answers to grid are $\frac{2}{3}$, $\frac{4}{6}$, $\frac{6}{9}$, $\frac{8}{12}$, .666, and .667.

The SAT Essay

The SAT Essay assesses reading, analysis, and writing skills. It's optional and given at the end of the SAT. Some postsecondary institutions require it for admission, so if you know where you want to apply before testing, be sure to check each institution's requirements before you choose the SAT with Essay or without during registration. (Note that you may be able to change from one option to the other on test day, but this isn't guaranteed.)

The SAT Essay presents you with a passage and asks you to explain how the passage's author builds an argument to persuade an audience. Essay passages examine ideas, debates, trends, and the like in the arts, the sciences, and civic, cultural, and political life that have wide interest, relevance, and accessibility. The passages tend not to be simple pro/con debates on issues but rather efforts to convey nuanced views on complex subjects.

Your response will analyze the passage for the author's use of evidence, reasoning, and/or stylistic and persuasive elements, and/or other features that you believe contribute to the persuasiveness of the passage. Be sure to base your essay on the features of the passage that will help you respond to the prompt. If, for example, you feel that evidence use is not particularly important in a given passage, you don't have to write about it. Write instead about features that you believe help build the persuasive argument.

It's important to understand that your response should **not** focus on whether you agree or disagree with the claim made in the passage, but should instead focus on how the author builds an argument to persuade an audience.

While the source text (and a bit of the language in the prompt) will vary from test to test, you'll always be presented with a passage and asked to explain how its author builds an argument.

Essays are evaluated for demonstrated comprehension of the passage, quality of analysis, and quality of writing. See the SAT Essay Scoring Guide on pages 38 and 39 for more information.

The SAT Essay Overview

- Total questions: 1 prompt, with points to consider and directions
 - 1 passage
 - Time allotted: 50 minutes to read and analyze the passage and to develop a written response
- The Essay asks you to demonstrate college and career readiness in **reading, writing, and analysis** by comprehending a high-quality source text, producing a cogent and clear written analysis of that text, and supporting that analysis with critical reasoning and evidence drawn from the source. The essay doesn't ask you to take a stand on the author's point of view but instead to analyze how the author builds a persuasive argument.

Your essay will receive three scores, each on a scale of 2 to 8:

Reading: Demonstrated comprehension of the passage, its main ideas, and its important details

Analysis: Demonstrated understanding of the analytical task, and effective analysis of the author's use of evidence, reasoning, and/or stylistic or persuasive elements (and/or features of your own choice)

Writing: Communication of information and ideas in a structured, cohesive manner, using precise language and a variety of sentence structures and showing a command of the conventions of Standard Written English

These scores are not combined with each other or with any other scores on the SAT. (They don't, for instance, affect the Evidence-Based Reading and Writing section score or the total test score.)

Essay Prompt

Directions

The essay gives you an opportunity to show how effectively you can read and comprehend a passage and write an essay analyzing the passage. In your essay, you should demonstrate that you have read the passage carefully, present a clear and logical analysis, and use language precisely.

Your essay must be written on the lines provided in your answer booklet; except for the Planning Page of the answer booklet, you will receive no other paper on which to write. You will have enough space if you write on every line, avoid wide margins, and keep your handwriting to a reasonable size. Remember that people who are not familiar with your handwriting will read what you write. Try to write or print so that what you are writing is legible to those readers.

You have 50 minutes to read the passage and write an essay in response to the prompt provided inside this booklet.

Reminders:

- Do not write your essay in this prompt booklet. Only what you write on the lined pages of your answer booklet will be evaluated.
- An off-topic essay will not be evaluated.

The following sample illustrates the general format of the essay task in the context of a specific prompt, this one related to a passage adapted from an article by Paul Bogard about the value of natural darkness.

As you read the passage below, consider how Paul Bogard uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from Paul Bogard, "Let There Be Dark." ©2012 by Los Angeles Times. Originally published December 21, 2012.

- At my family's cabin on a Minnesota lake, I knew woods so dark that my hands disappeared before my eyes. I knew night skies in which meteors left smoky trails across sugary spreads of stars. But now, when 8 of 10 children born in the United States will never know a sky dark enough for the Milky Way, I worry we are rapidly losing night's natural darkness before realizing its worth. This winter solstice, as we cheer the days' gradual movement back toward light, let us also remember the irreplaceable value of darkness.
- All life evolved to the steady rhythm of bright days and dark nights. Today, though, when we feel the closeness of nightfall, we reach quickly for a light switch. And too little darkness, meaning too much artificial light at night, spells trouble for all.
- Already the World Health Organization classifies working the night shift as a probable human carcinogen, and the American Medical Association has voiced its unanimous support for "light pollution reduction efforts and glare reduction efforts at both the national and state levels." Our bodies need darkness to produce the hormone melatonin, which keeps certain cancers from developing, and our bodies need darkness for sleep. Sleep disorders have been linked to diabetes, obesity, cardiovascular disease and depression, and recent research suggests one main cause of "short sleep" is "long light." Whether we work at night or simply take our tablets, notebooks and smartphones to bed, there isn't a place for this much artificial light in our lives.

- The rest of the world depends on darkness as well, including nocturnal and crepuscular species of birds, insects, mammals, fish and reptiles. Some examples are well known—the 400 species of birds that migrate at night in North America, the sea turtles that come ashore to lay their eggs—and some are not, such as the bats that save American farmers billions in pest control and the moths that pollinate 80% of the world's flora. Ecological light pollution is like the bulldozer of the night, wrecking habitat and disrupting ecosystems several billion years in the making. Simply put, without darkness, Earth's ecology would collapse. . . .
- In today's crowded, louder, more fast-paced world, night's darkness can provide solitude, quiet and stillness, qualities increasingly in short supply. Every religious tradition has considered darkness invaluable for a soulful life, and the chance to witness the universe has inspired artists, philosophers and everyday stargazers since time began. In a world awash with electric light . . . how would Van Gogh have given the world his "Starry Night"? Who knows what this vision of the night sky might inspire in each of us, in our children or grandchildren?
- Yet all over the world, our nights are growing brighter. In the United States and Western Europe, the amount of light in the sky increases an average of about 6% every year. Computer images of the United States at night, based on NASA photographs, show that what was a very dark country as recently as the 1950s is now nearly covered with a blanket of light. Much of this light is wasted energy, which means wasted dollars. Those of us over 35 are perhaps among the last generation to have known truly dark nights. Even the northern lake where I was lucky to spend my summers has seen its darkness diminish.
- It doesn't have to be this way. Light pollution is readily within our ability to solve, using new lighting technologies and shielding existing lights. Already, many cities and towns across North America and Europe are changing to LED streetlights, which offer dramatic possibilities for controlling wasted light. Other communities are finding success with simply turning off portions of their public lighting after midnight. Even Paris, the famed "city of light," which already turns off its monument lighting after 1 a.m., will this summer start to require its shops, offices and public buildings to turn off lights after 2 a.m. Though primarily designed to save energy, such reductions in light will also go far in addressing light pollution. But we will never truly address the problem of light pollution until we become aware of the irreplaceable value and beauty of the darkness we are losing.

Write an essay in which you explain how Paul Bogard builds an argument to persuade his audience that natural darkness should be preserved. In your essay, analyze how Bogard uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of his argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with Bogard's claims, but rather explain how Bogard builds an argument to persuade his audience.

Sample Essay Materials

The following student essays show you what kinds of attributes will be evaluated in the SAT Essay. Each essay is followed by an explanation of

why it received the assigned score on each of the three dimensions.

SAMPLE 1

Bogard builds an argument to persuade his audience about what he is concerning about and feels it important to take care about. His essay talks about so much facts about sleeping how so little can effect us health wise examples like getting sleep disorders, diabetes, obesity, cardiovascular disease and depression. This facts helps people persuade the audience he also say that the world health organization classifies working night shift is bad. In his argument is not all about how it bad for the body he also claims and have proof that light cost are expensive and really costing people because they

have light all night long. He also claims light is messing with mother nature that animals need darkness to feed eat move around because there noctuaral creatures. He has details facts about human body, animals and about mother nature that he can use to support his idea of not using so much light at night and how we need darkness. With these features he can persuade the audience because people dont know why darkness can be good for us. He was all of facts and examples that he claim is efficting us and there world.

This response scored a 2/1/1.

Reading—2: This response demonstrates some comprehension of the source text, although the writer's understanding of Bogard's central idea isn't conveyed until the latter part of the essay, where the writer indicates that Bogard includes *details facts about human body, animals and about mother nature that he can use to support his idea of not using so much light at night and how we need darkness*. Prior to this, the writer has included details from the text, but without contextualizing these details within Bogard's broader argument, suggesting that the writer is relaying ideas from the text without much understanding of how they contribute to the whole. For example, the writer mentions the health problems cited in the text, that working the night shift is classified as bad, and that light costs are high, but doesn't explain how these points relate to Bogard's main claim that we must preserve natural darkness. On the whole, this essay displays only a partial understanding of the source text.

Analysis—1: In this essay, the writer has merely identified aspects of Bogard's use of evidence without explaining how the evidence contributes to the argument. The writer notes that Bogard's text *talks about so much facts about sleeping how so little can effect us health wise examples like getting sleep disorders, diabetes, obesity, cardiovascular disease and depression. This facts helps people persuade the audience*. Other than identifying these as persuasive facts, however, the writer does nothing to indicate an understanding of the analytical task. The writer again mentions persuasion before the conclusion of the essay

(With these features he can persuade the audience because people dont know why darkness can be good for us), but once again, there is no explanation of how or why these features are persuasive. Thus, the essay offers inadequate analysis of Bogard's text.

Writing—1: This response demonstrates little cohesion and inadequate skill in the use and control of language. From the outset, problems with language control impede the writer's ability to establish a clear central claim (*Bogard builds an argument to persuade his audience about what he is concerning about and feels it important to take care about*). The response also lacks a recognizable introduction and conclusion, and sentences are strung together without a clear progression of ideas (for much of the response, the writer merely lists claims Bogard makes). The response also lacks variety in sentence structures, in part because of repetitive transitions. (For example, *he also claims* is used two sentences in a row in this brief response). Weak control of the conventions of standard written English, coupled with vague word choice, undermines the quality of writing. Overall, this response demonstrates inadequate writing skill.

SAMPLE 2

Paul Bogard strongly believes that natural darkness should be preserved. In order to prove the need for natural darkness, Bogard divides his argument into three main topics, saying that natural darkness is beneficial to humans, essential to humans, and essential to ecosystems.

According to Bogard, natural darkness can be a positive help to humans. One of the ways it can accomplish this is by giving enjoyment to onlookers. To supplant this, Bogard gives a personal example of how he enjoyed seeing meteors dart across the night sky in Minnesota as a child. Also he states that natural darkness can be a source of solitude. Supporting this claim, Bogard states that darkness is invaluable to every religion. Additionally Bogard says that the night sky has inspired countless numbers of philosophers, artists, and stargazers for millennia. He then gives an appealing allusion by asking how Van Gogh could have painted "Starry Night" in the mist of electric light. One of Bogard's primary arguments for natural darkness shows how it can benefit humans.

Bogard then gives a scientific case that shows why natural darkness is essential to humans. He states a find of the World Health Organization that declares the night shift can be detrimental to one's health. He points to the necessity of darkness in producing melatonin, a hormone that helps prevent certain cancers from developing in the human body. Bogard then concludes his argument that darkness is essential to human well-being by analyzing sleep. He first makes

This response scored a 4/1/3.

Reading—4: This response demonstrates thorough comprehension of Bogard's text and a clear understanding of the interrelation between the central idea and important details. The writer briefly summarizes Bogard's central idea (*natural darkness should be preserved*) and aptly notes that Bogard's argument encompasses three main points: *that natural darkness is beneficial to humans, essential to humans, and essential to ecosystems*. The writer provides various details from the text that support these points. In the first body paragraph, for example, the writer demonstrates comprehension of how Bogard's *personal example of how he enjoyed seeing meteors dart across the night sky in Minnesota as a child* relates to his claim that natural darkness can give *enjoyment to onlookers*. The writer also sees the connection between darkness as a *source*

the obvious claim that darkness is essential for sleep. Then, he talks about the negative health effects of sleep disorders.; these include "diabetes, obesity, cardiovascular disease and depression." To associate this with his argument for natural darkness, Bogard states the findings of recent research, which say that "long light" is one of the primary causes of "short sleep." Bogard uses scientific evidence to support his belief in the preservation of natural darkness.

Bogard's third primary defense of natural darkness declares that it is essential to nature. He notes that there are a variety of nocturnal and crepuscular species of birds, fish, mammals, insects, and reptiles worldwide. He gives two specific, well-known examples of these species; these discussed the 400 species of North American birds that migrate at night and the sea turtles that lay their eggs on the shore at night. He also gives a couple of lesser-known examples, involving bats and moths that show the positive actions that some nocturnal animals perform. He then concludes his argument for nocturnal darkness necessary to nature with persuasion, saying that removing natural darkness would essentially destroy an ecology that took billions of years to develop. Here, Bogard uses scientific fact to prove that natural darkness is a key to nature and ecology. Paul Bogard supports the preservation of natural darkness. He uses an argument to support his position that has three primary points—benefit to humans, need for humans and need for nature.

of solitude and it inspiring *countless numbers of philosophers, artists, and stargazers for millennia*. Providing these details highlights the writer's understanding of Bogard's claim that *natural darkness can benefit humans*. The writer continues to demonstrate how details in Bogard's text relate to each other and to Bogard's central idea in the subsequent discussion of how darkness is essential to humans' health and to nature. Although little is directly quoted from the text, the writer's thorough paraphrasing of multiple details taken from across the passage indicates that the writer comprehensively understands Bogard's argument and is able to convey it in his own words.

Analysis—1: The response offers ineffective analysis of Bogard's text and demonstrates little understanding of the analytical task. Although clearly comprehending the entirety of Bogard's

argument, the writer does not communicate how Bogard builds his argument with evidence, reasoning, or stylistic or persuasive elements, nor does the writer communicate what effect Bogard's argumentation has on his audience. Instead of providing effective analysis, the writer only identifies argumentative elements in Bogard's text, such as the *appealing allusion* Bogard offers regarding Van Gogh's *Starry Night* or the *scientific evidence* Bogard uses to support his belief in the preservation of natural darkness. The writer instead consistently lapses into summary. Overall, the response demonstrates inadequate analysis.

Writing—3: This mostly cohesive response demonstrates effective use and control of language. The writer presents an effective introduction with a clear central claim that lays out the three points discussed in the response (*In order to prove the need for natural darkness, Bogard divides his argument into three main topics, saying that natural darkness is beneficial to humans, essential to humans, and essential to the ecosystem*). The response also includes a generally effective

conclusion that summarizes rather than advances the essay (*Paul Bogard supports the preservation of natural darkness. He uses an argument to support his position that has three primary points—benefit to humans, need for humans and need for nature*) although the conclusion is not marked off by a paragraph break. The response is organized clearly around the three points identified in the introduction, and each body paragraph stays on topic. The writer also demonstrates a clear progression of ideas both within paragraphs and throughout the essay. Sentence structure tends to be repetitive and simple, however. For example, at or near the end of each body paragraph, the writer restates the point that introduces that paragraph (*Bogard then gives a scientific case that shows why natural darkness is essential to humans. . . . Bogard uses scientific evidence to support his belief in the preservation of natural darkness*). Although the writing in this response is proficient, it does not demonstrate the sentence variety, precise word choice, or highly effective progression of ideas that is expected at the advanced level.

SAMPLE 3

In response to our world's growing reliance on artificial light, writer Paul Bogard argues that natural darkness should be preserved in his article "Let There be dark". He effectively builds his argument by using a personal anecdote, allusions to art and history, and rhetorical questions.

Bogard starts his article off by recounting a personal story – a summer spent on a Minnesota lake where there was "woods so dark that [his] hands disappeared before [his] eyes." In telling this brief anecdote, Bogard challenges the audience to remember a time where they could fully amass themselves in natural darkness void of artificial light. By drawing in his readers with a personal encounter about night darkness, the author means to establish the potential for beauty, glamour, and awe-inspiring mystery that genuine darkness can possess. He builds his argument for the preservation of natural darkness by reminiscing for his readers a first-hand encounter that proves the "irreplaceable value of darkness."

This anecdote provides a baseline of sorts for readers to find credence with the author's claims. Bogard's argument is also furthered by his use of allusion to art – Van Gogh's "Starry Night" – and modern history – Paris' reputation as "The City of Light". By first referencing "Starry Night", a painting generally considered to be undoubtedly beautiful, Bogard establishes that the natural

magnificence of stars in a dark sky is definite. A world absent of excess artificial light could potentially hold the key to a grand, glorious night sky like Van Gogh's according to the writer. This urges the readers to weigh the disadvantages of our world consumed by unnatural, vapid lighting. Furthermore, Bogard alludes to Paris as "the famed 'city of light'". He then goes on to state how Paris has taken steps to exercise more sustainable lighting practices. By doing this, Bogard creates a dichotomy between Paris' traditionally alluded-to name and the reality of what Paris is becoming – no longer "the city of light", but moreso "the city of light...before 2 AM". This furthers his line of argumentation because it shows how steps can be and are being taken to preserve natural darkness. It shows that even a city that is literally famous for being constantly lit can practically address light pollution in a manner that preserves the beauty of both the city itself and the universe as a whole.

Finally, Bogard makes subtle yet efficient use of rhetorical questioning to persuade his audience that natural darkness preservation is essential. He asks the readers to consider "what the vision of the night sky might inspire in each of us, in our children or grandchildren?" in a way that brutally plays to each of our emotions. By asking this question, Bogard draws out heartfelt ponderance from his readers about the affecting power of an

untainted night sky. This rhetorical question tugs at the readers' heartstrings; while the reader may have seen an unobscured night skyline before, the possibility that their child or grandchild will never get the chance sways them to see as Bogard sees. This strategy is definitively an appeal to pathos, forcing the audience to directly face an emotionally-charged inquiry that will surely spur some kind of response. By doing this, Bogard develops his argument, adding gutthral power

This response scored a 4/4/4.

Reading—4: This response demonstrates thorough comprehension of the source text through skillful use of paraphrases and direct quotations. The writer briefly summarizes the central idea of Bogard's piece (*natural darkness should be preserved; we must preserve true, unaffected darkness*), and presents many details from the text, such as referring to the personal anecdote that opens the passage and citing Bogard's use of Paris' reputation as "The City of Light." There are few long direct quotations from the source text; instead, the response succinctly and accurately captures the entirety of Bogard's argument in the writer's own words, and the writer is able to articulate how details in the source text interrelate with Bogard's central claim. The response is also free of errors of fact or interpretation. Overall, the response demonstrates advanced reading comprehension.

Analysis—4: This response offers an insightful analysis of the source text and demonstrates a sophisticated understanding of the analytical task. In analyzing Bogard's use of *personal anecdote, allusions to art and history, and rhetorical questions*, the writer is able to explain carefully and thoroughly how Bogard builds his argument over the course of the passage. For example, the writer offers a possible reason for why Bogard chose to open his argument with a personal anecdote, and is also able to describe the overall effect of that choice on his audience (*In telling this brief anecdote, Bogard challenges the audience to remember a time where they could fully amass themselves in natural darkness void of artificial light. By drawing in his readers with a personal encounter . . . the author means to establish the potential for beauty, glamour, and awe-inspiring mystery that genuine darkness can possess. . . . This anecdote provides a baseline of sorts for readers to find credence with the author's claims*). The cogent chain of reasoning indicates an understanding of the overall effect of Bogard's personal narrative both in terms of its function in the passage and how it affects his audience. This type of insightful analysis is evident throughout the response and indicates advanced analytical skill.

to the idea that the issue of maintaining natural darkness is relevant and multifaceted.

Writing as a reaction to his disappointment that artificial light has largely permeated the presence of natural darkness, Paul Bogard argues that we must preserve true, unaffected darkness. He builds this claim by making use of a personal anecdote, allusions, and rhetorical questioning.

Writing—4: The response is cohesive and demonstrates highly effective use and command of language. The response contains a precise central claim (*He effectively builds his argument by using personal anecdote, allusions to art and history, and rhetorical questions*), and the body paragraphs are tightly focused on those three elements of Bogard's text. There is a clear, deliberate progression of ideas within paragraphs and throughout the response. The writer's brief introduction and conclusion are skillfully written and encapsulate the main ideas of Bogard's piece as well as the overall structure of the writer's analysis. There is a consistent use of both precise word choice and well-chosen turns of phrase (*the natural magnificence of stars in a dark sky is definite, our world consumed by unnatural, vapid lighting, the affecting power of an untainted night sky*). Moreover, the response features a wide variety in sentence structure and many examples of sophisticated sentences (*By doing this, Bogard creates a dichotomy between Paris' traditionally alluded-to name and the reality of what Paris is becoming – no longer "the city of light", but more so "the city of light...before 2AM"*). The response demonstrates a strong command of the conventions of written English. Overall, the response exemplifies advanced writing proficiency.

The SAT Essay Scoring Guide

Score	Reading	Analysis	Writing
4	<p>Advanced: The response demonstrates thorough comprehension of the source text.</p> <p>The response shows an understanding of the text's central idea(s) and of most important details and how they interrelate, demonstrating a comprehensive understanding of the text.</p> <p>The response is free of errors of fact or interpretation with regard to the text.</p> <p>The response makes skillful use of textual evidence (quotations, paraphrases, or both), demonstrating a complete understanding of the source text.</p>	<p>Advanced: The response offers an insightful analysis of the source text and demonstrates a sophisticated understanding of the analytical task.</p> <p>The response offers a thorough, well-considered evaluation of the author's use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student's own choosing.</p> <p>The response contains relevant, sufficient, and strategically chosen support for claim(s) or point(s) made.</p> <p>The response focuses consistently on those features of the text that are most relevant to addressing the task.</p>	<p>Advanced: The response is cohesive and demonstrates a highly effective use and command of language.</p> <p>The response includes a precise central claim.</p> <p>The response includes a skillful introduction and conclusion. The response demonstrates a deliberate and highly effective progression of ideas both within paragraphs and throughout the essay.</p> <p>The response has a wide variety in sentence structures. The response demonstrates a consistent use of precise word choice. The response maintains a formal style and objective tone.</p> <p>The response shows a strong command of the conventions of standard written English and is free or virtually free of errors.</p>
3	<p>Proficient: The response demonstrates effective comprehension of the source text.</p> <p>The response shows an understanding of the text's central idea(s) and important details.</p> <p>The response is free of substantive errors of fact and interpretation with regard to the text.</p> <p>The response makes appropriate use of textual evidence (quotations, paraphrases, or both), demonstrating an understanding of the source text.</p>	<p>Proficient: The response offers an effective analysis of the source text and demonstrates an understanding of the analytical task.</p> <p>The response competently evaluates the author's use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student's own choosing.</p> <p>The response contains relevant and sufficient support for claim(s) or point(s) made.</p> <p>The response focuses primarily on those features of the text that are most relevant to addressing the task.</p>	<p>Proficient: The response is mostly cohesive and demonstrates effective use and control of language.</p> <p>The response includes a central claim or implicit controlling idea.</p> <p>The response includes an effective introduction and conclusion.</p> <p>The response demonstrates a clear progression of ideas both within paragraphs and throughout the essay.</p> <p>The response has variety in sentence structures. The response demonstrates some precise word choice. The response maintains a formal style and objective tone.</p> <p>The response shows a good control of the conventions of standard written English and is free of significant errors that detract from the quality of writing.</p>

Score	Reading	Analysis	Writing
2	<p>Partial: The response demonstrates some comprehension of the source text.</p> <p>The response shows an understanding of the text's central idea(s) but not of important details.</p> <p>The response may contain errors of fact and/or interpretation with regard to the text.</p> <p>The response makes limited and/or haphazard use of textual evidence (quotations, paraphrases, or both), demonstrating some understanding of the source text.</p>	<p>Partial: The response offers limited analysis of the source text and demonstrates only partial understanding of the analytical task.</p> <p>The response identifies and attempts to describe the author's use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student's own choosing, but merely asserts rather than explains their importance.</p> <p>Or one or more aspects of the response's analysis are unwarranted based on the text.</p> <p>The response contains little or no support for claim(s) or point(s) made.</p> <p>The response may lack a clear focus on those features of the text that are most relevant to addressing the task.</p>	<p>Partial: The response demonstrates little or no cohesion and limited skill in the use and control of language.</p> <p>The response may lack a clear central claim or controlling idea or may deviate from the claim or idea over the course of the response.</p> <p>The response may include an ineffective introduction and/or conclusion. The response may demonstrate some progression of ideas within paragraphs but not throughout the response.</p> <p>The response has limited variety in sentence structures; sentence structures may be repetitive.</p> <p>The response demonstrates general or vague word choice; word choice may be repetitive. The response may deviate noticeably from a formal style and objective tone.</p> <p>The response shows a limited control of the conventions of standard written English and contains errors that detract from the quality of writing and may impede understanding.</p>
1	<p>Inadequate: The response demonstrates little or no comprehension of the source text.</p> <p>The response fails to show an understanding of the text's central idea(s), and may include only details without reference to central idea(s).</p> <p>The response may contain numerous errors of fact and/or interpretation with regard to the text.</p> <p>The response makes little or no use of textual evidence (quotations, paraphrases, or both), demonstrating little or no understanding of the source text.</p>	<p>Inadequate: The response offers little or no analysis or ineffective analysis of the source text and demonstrates little or no understanding of the analytical task.</p> <p>The response identifies without explanation some aspects of the author's use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student's choosing.</p> <p>Or numerous aspects of the response's analysis are unwarranted based on the text.</p> <p>The response contains little or no support for claim(s) or point(s) made, or support is largely irrelevant.</p> <p>The response may not focus on features of the text that are relevant to addressing the task.</p> <p>Or the response offers no discernible analysis (e.g., is largely or exclusively summary).</p>	<p>Inadequate: The response demonstrates little or no cohesion and inadequate skill in the use and control of language.</p> <p>The response may lack a clear central claim or controlling idea.</p> <p>The response lacks a recognizable introduction and conclusion. The response does not have a discernible progression of ideas.</p> <p>The response lacks variety in sentence structures; sentence structures may be repetitive. The response demonstrates general and vague word choice; word choice may be poor or inaccurate. The response may lack a formal style and objective tone.</p> <p>The response shows a weak control of the conventions of standard written English and may contain numerous errors that undermine the quality of writing.</p>

Official SAT Practice Test #2

About the Practice Test

Take the practice test, which starts on page 46, to reinforce your test-taking skills and to be more comfortable when you take the SAT. This practice test will give you a good idea of what to expect on the actual test.

In addition, once you take the test using the answer sheet in this booklet, you can scan and upload your answers to satpractice.org to receive scores and to get instruction and practice in the areas where you need them most.

You need to set aside three hours to take the test — and an additional 50 minutes if you plan to take the optional essay.

Approaches to the Practice Test

The practice test will help you most if you take it under conditions as close as possible to those of the actual test.

- Plan to complete the entire test in one sitting.
 - ♦ The Reading Test takes 65 minutes, followed by a 10-minute break.
 - ♦ The Writing and Language Test is allotted 35 minutes, followed immediately (no break) by the Math Test – No Calculator section, which takes 25 minutes.
 - ♦ Allow yourself a 5-minute break, and then take the Math Test – Calculator section, which is 55 minutes long.
 - ♦ If you're taking the optional essay, take a stretch break, and then give yourself 50 minutes to write the essay.
- Pace yourself by using a watch (without an audible alarm).
- Sit at a desk or table cleared of any other papers or books. Do not use any prohibited items such as a dictionary, notes, or scratch paper.
- Use an acceptable calculator that is familiar to you for the Math Test – Calculator section.
- Read the test directions carefully.

Marking the Answer Sheet

Getting credit for the right answer depends on marking the answer sheet correctly. When filling out your answer sheet, whether for the practice test or on test day, follow these important instructions:

- Make sure you use a No. 2 pencil.
- Fill in the entire circle on the answer sheet darkly and completely.
- If you change your response, erase it as completely as possible.

NOTE: For this practice test, enter "02" in the Test Number field on the answer grid.

Calculating Your Scores

Your tests will be scored by counting the questions you answered correctly and converting this "raw" score to a score on the College Board scale of 200 to 800. You'll find more information about how to score your test at studentscores.collegeboard.org. Remember that you can have your practice test scored at satpractice.org.

If you took the optional essay included in this booklet, use the SAT Essay Scoring Guide on pages 38–39 to determine how your essay might be scored.

Reviewing

Once your practice test is scored, review your performance and ask yourself these questions:

- **Did I run out of time before I finished a section?** Remember, all multiple-choice questions are scored the same way. Be prepared to keep moving on test day and not spend too much time on any one question.
- **Did I make careless mistakes?** You may have misread a question, neglected to notice a word such as "except" or "best," or solved for the wrong value. Recognizing these small but critical errors will help you avoid them on test day.
- **Did I spend too much time reading directions?** Review any directions that gave you trouble so you don't have to spend as much time reading them when you take the actual test.
- **Keep learning and practicing at satpractice.org!**

SAT PRACTICE ANSWER SHEET

COMPLETE MARK ●

EXAMPLES OF INCOMPLETE MARKS



It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

TEST NUMBER

SECTION 1

ENTER TEST NUMBER

For Instance, for Practice Test #1, fill in the circle for 0 in the first column and for 1 in the second column.

0	○	○
1	○	○
2	○	○
3	○	○
4	○	○
5	○	○
6	○	○
7	○	○
8	○	○
9	○	○

1	A	B	C	D	14	A	B	C	D	27	A	B	C	D	40	A	B	C	D
2	○	○	○	○	15	○	○	○	○	28	○	○	○	○	41	○	○	○	○
3	○	○	○	○	16	○	○	○	○	29	○	○	○	○	42	○	○	○	○
4	○	○	○	○	17	○	○	○	○	30	○	○	○	○	43	○	○	○	○
5	○	○	○	○	18	○	○	○	○	31	○	○	○	○	44	○	○	○	○
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8	○	○	○	○	21	○	○	○	○	34	○	○	○	○	47	○	○	○	○
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Download the College Board SAT Practice app to instantly score this test. Learn more at sat.org/scoring.

SAT PRACTICE ANSWER SHEET

COMPLETE MARK EXAMPLES OF INCOMPLETE MARKS

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

SECTION 2

1 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	10 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	19 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	28 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D	37 <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
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If you're scoring with our mobile app we recommend that you cut these pages out. The scoring does best with a flat page.



SAT PRACTICE ANSWER SHEET

COMPLETE MARK EXAMPLES OF INCOMPLETE MARKS

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

SECTION 3

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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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NO CALCULATOR ALLOWED



Did you know that you can print out these test sheets from the web? Learn more at sat.org/scoring.



SAT PRACTICE ANSWER SHEET

COMPLETE MARK EXAMPLES OF INCOMPLETE MARKS

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

SECTION 4

1	A B C D ○ ○ ○ ○	7	A B C D ○ ○ ○ ○	13	A B C D ○ ○ ○ ○	19	A B C D ○ ○ ○ ○	25	A B C D ○ ○ ○ ○
2	A B C D ○ ○ ○ ○	8	A B C D ○ ○ ○ ○	14	A B C D ○ ○ ○ ○	20	A B C D ○ ○ ○ ○	26	A B C D ○ ○ ○ ○
3	A B C D ○ ○ ○ ○	9	A B C D ○ ○ ○ ○	15	A B C D ○ ○ ○ ○	21	A B C D ○ ○ ○ ○	27	A B C D ○ ○ ○ ○
4	A B C D ○ ○ ○ ○	10	A B C D ○ ○ ○ ○	16	A B C D ○ ○ ○ ○	22	A B C D ○ ○ ○ ○	28	A B C D ○ ○ ○ ○
5	A B C D ○ ○ ○ ○	11	A B C D ○ ○ ○ ○	17	A B C D ○ ○ ○ ○	23	A B C D ○ ○ ○ ○	29	A B C D ○ ○ ○ ○
6	A B C D ○ ○ ○ ○	12	A B C D ○ ○ ○ ○	18	A B C D ○ ○ ○ ○	24	A B C D ○ ○ ○ ○	30	A B C D ○ ○ ○ ○

CALCULATOR ALLOWED



If you're using our mobile app keep in mind that bad lighting and even shadows cast over the answer sheet can affect your score. Be sure to scan this in a well-lit area for best results.



SAT PRACTICE ANSWER SHEET

COMPLETE MARK EXAMPLES OF INCOMPLETE MARKS

It is recommended that you use a No. 2 pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.

SECTION 4 (Continued)

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

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CALCULATOR ALLOWED



1

Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

Questions 1-10 are based on the following passage.

This passage is from Charlotte Brontë, *The Professor*, originally published in 1857.

No man likes to acknowledge that he has made a mistake in the choice of his profession, and every man, worthy of the name, will row long against wind and tide before he allows himself to cry out, "I am baffled!" and submits to be floated passively back to land. From the first week of my residence in X—I felt my occupation irksome. The thing itself—the work of copying and translating business-letters—was a dry and tedious task enough, but had that been all, I should long have borne with the nuisance; I am not of an impatient nature, and influenced by the double desire of getting my living and justifying to myself and others the resolution I had taken to become a tradesman, I should have endured in silence the rust and cramp of my best faculties; I should not have whispered, even inwardly, that I longed for liberty; I should have pent in every sigh by which my heart might have ventured to intimate its distress under the closeness, smoke, monotony, and joyless tumult of Bigben Close, and its panting desire for freer and fresher scenes; I should have set up the image of Duty, the fetish of Perseverance, in my small bedroom at Mrs. King's lodgings, and they two should have been my household gods, from which

25 my darling, my cherished-in-secret, Imagination, the tender and the mighty, should never, either by softness or strength, have severed me. But this was not all; the antipathy which had sprung up between myself and my employer striking deeper root and spreading denser shade daily, excluded me from every glimpse of the sunshine of life; and I began to feel like a plant growing in humid darkness out of the slimy walls of a well.

Antipathy is the only word which can express the feeling Edward Crimsworth had for me—a feeling, in a great measure, involuntary, and which was liable to be excited by every, the most trifling movement, look, or word of mine. My southern accent annoyed him; the degree of education evinced in my language irritated him; my punctuality, industry, and accuracy, fixed his dislike, and gave it the high flavour and poignant relish of envy; he feared that I too should one day make a successful tradesman. Had I been in anything inferior to him, he would not have hated me so thoroughly, but I knew all that he knew, and, what was worse, he suspected that I kept the padlock of silence on mental wealth in which he was no sharer. If he could have once placed me in a ridiculous or mortifying position, he would have forgiven me much, but I was guarded by three faculties—Caution, Tact, Observation; and prowling and prying as was Edward's malignity, it could never baffle the lynx-eyes of these, my natural sentinels. Day by day did his malice watch my tact, hoping it would sleep, and prepared to steal snake-like on its slumber; but tact, if it be genuine, never sleeps.

I had received my first quarter's wages, and was returning to my lodgings, possessed heart and soul with the pleasant feeling that the master who had paid me grudged every penny of that hard-earned pittance—I had long ceased to regard Mr. Crimsworth as my brother—he was a hard, grinding master; he wished to be an inexorable tyrant: that was all). Thoughts, not varied but strong, occupied my mind; two voices spoke within me; again and again they uttered the same monotonous phrases. One said: "William, your life is intolerable." The other: "What can you do to alter it?" I walked fast, for it was a cold, frosty night in January; as I approached my lodgings, I turned from a general view of my affairs to the particular speculation as to whether my fire would be out; looking towards the window of my sitting-room, I saw no cheering red gleam.

1 Which choice best summarizes the passage?

- A) A character describes his dislike for his new job and considers the reasons why.
- B) Two characters employed in the same office become increasingly competitive.
- C) A young man regrets privately a choice that he defends publicly.
- D) A new employee experiences optimism, then frustration, and finally despair.

2 The main purpose of the opening sentence of the passage is to

- A) establish the narrator's perspective on a controversy.
- B) provide context useful in understanding the narrator's emotional state.
- C) offer a symbolic representation of Edward Crimsworth's plight.
- D) contrast the narrator's good intentions with his malicious conduct.

3 During the course of the first paragraph, the narrator's focus shifts from

- A) recollection of past confidence to acknowledgment of present self-doubt.
- B) reflection on his expectations of life as a tradesman to his desire for another job.
- C) generalization about job dissatisfaction to the specifics of his own situation.
- D) evaluation of factors making him unhappy to identification of alternatives.

4 The references to "shade" and "darkness" at the end of the first paragraph mainly have which effect?

- A) They evoke the narrator's sense of dismay.
- B) They reflect the narrator's sinister thoughts.
- C) They capture the narrator's fear of confinement.
- D) They reveal the narrator's longing for rest.

5 The passage indicates that Edward Crimsworth's behavior was mainly caused by his

- A) impatience with the narrator's high spirits.
- B) scorn of the narrator's humble background.
- C) indignation at the narrator's rash actions.
- D) jealousy of the narrator's apparent superiority.

6 The passage indicates that when the narrator began working for Edward Crimsworth, he viewed Crimsworth as a

- A) harmless rival.
- B) sympathetic ally.
- C) perceptive judge.
- D) demanding mentor.

7

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 28-31 (“the antipathy . . . life”)
- B) Lines 38-40 (“My southern . . . irritated him”)
- C) Lines 54-56 (“Day . . . slumber”)
- D) Lines 61-62 (“I had . . . brother”)

8

At the end of the second paragraph, the comparisons of abstract qualities to a lynx and a snake mainly have the effect of

- A) contrasting two hypothetical courses of action.
- B) conveying the ferocity of a resolution.
- C) suggesting the likelihood of an altercation.
- D) illustrating the nature of an adversarial relationship.

9

The passage indicates that, after a long day of work, the narrator sometimes found his living quarters to be

- A) treacherous.
- B) dreary.
- C) predictable.
- D) intolerable.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 17-21 (“I should . . . scenes”)
- B) Lines 21-23 (“I should . . . lodgings”)
- C) Lines 64-67 (“Thoughts . . . phrases”)
- D) Lines 68-74 (“I walked . . . gleam”)

Questions 11-21 are based on the following passage and supplementary material.

This passage is adapted from Iain King, “Can Economics Be Ethical?” ©2013 by Prospect Publishing.

Recent debates about the economy have rediscovered the question, “is that right?”, where “right” means more than just profits or efficiency.

Line Some argue that because the free markets allow
5 for personal choice, they are already ethical. Others have accepted the ethical critique and embraced corporate social responsibility. But before we can label any market outcome as “immoral,” or sneer at economists who try to put a price on being ethical,
10 we need to be clear on what we are talking about.

There are different views on where ethics should apply when someone makes an economic decision. Consider Adam Smith, widely regarded as the founder of modern economics. He was a moral
15 philosopher who believed sympathy for others was the basis for ethics (we would call it empathy nowadays). But one of his key insights in *The Wealth of Nations* was that acting on this empathy could be counter-productive—he observed people becoming
20 better off when they put their own empathy aside, and interacted in a self-interested way. Smith justifies selfish behavior by the outcome. Whenever planners use cost-benefit analysis to justify a new railway line, or someone retrains to boost his or her earning
25 power, or a shopper buys one to get one free, they are using the same approach: empathizing with someone, and seeking an outcome that makes that person as well off as possible—although the person they are empathizing with may be themselves in the
30 future.

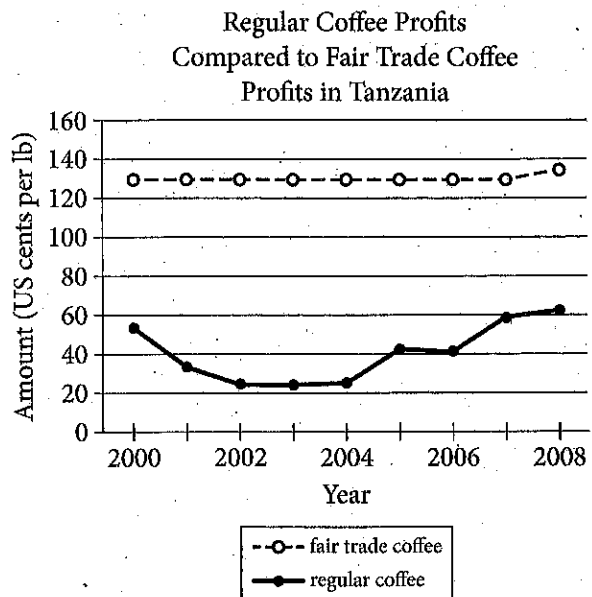
Instead of judging consequences, Aristotle said ethics was about having the right character—displaying virtues like courage and honesty. It is a view put into practice whenever
35 business leaders are chosen for their good character. But it is a hard philosophy to teach—just how much loyalty should you show to a manufacturer that keeps losing money? Show too little and you’re a “greed is good” corporate raider; too much and you’re wasting
40 money on unproductive capital. Aristotle thought there was a golden mean between the two extremes, and finding it was a matter of fine judgment. But if ethics is about character, it’s not clear what those characteristics should be.

45 There is yet another approach: instead of rooting ethics in character or the consequences of actions, we can focus on our actions themselves. From this perspective some things are right, some wrong—we should buy fair trade goods, we shouldn’t tell lies in
50 advertisements. Ethics becomes a list of commandments, a catalog of “dos” and “don’ts.” When a finance official refuses to devalue a currency because they have promised not to, they are defining ethics this way. According to this approach
55 devaluation can still be bad, even if it would make everybody better off.

Many moral dilemmas arise when these three versions pull in different directions but clashes are not inevitable. Take fair trade coffee (coffee that is
60 sold with a certification that indicates the farmers and workers who produced it were paid a fair wage), for example: buying it might have good consequences, be virtuous, and also be the right way to act in a flawed market. Common ground like this
65 suggests that, even without agreement on where ethics applies, ethical economics is still possible.

Whenever we feel queasy about “perfect” competitive markets, the problem is often rooted in a phony conception of people. The model of man on
70 which classical economics is based—an entirely rational and selfish being—is a parody, as John Stuart Mill, the philosopher who pioneered the model, accepted. Most people—even economists—now accept that this “economic man” is a fiction.
75 We behave like a herd; we fear losses more than we hope for gains; rarely can our brains process all the relevant facts.

These human quirks mean we can never make purely “rational” decisions. A new wave of behavioral
80 economists, aided by neuroscientists, is trying to understand our psychology, both alone and in groups, so they can anticipate our decisions in the marketplace more accurately. But psychology can also help us understand why we react in disgust at
85 economic injustice, or accept a moral law as universal. Which means that the relatively new science of human behavior might also define ethics for us. Ethical economics would then emerge from one of the least likely places: economists themselves.



Adapted from the Fair Trade Vancouver website.

- 11 The main purpose of the passage is to
- consider an ethical dilemma posed by cost-benefit analysis.
 - describe a psychology study of ethical economic behavior.
 - argue that the free market prohibits ethical economics.
 - examine ways of evaluating the ethics of economics.

- 12 In the passage, the author anticipates which of the following objections to criticizing the ethics of free markets?
- Smith's association of free markets with ethical behavior still applies today.
 - Free markets are the best way to generate high profits, so ethics are a secondary consideration.
 - Free markets are ethical because they are made possible by devalued currency.
 - Free markets are ethical because they enable individuals to make choices.

- 13 Which choice provides the best evidence for the answer to the previous question?
- Lines 4-5 ("Some . . . ethical")
 - Lines 7-10 ("But . . . about")
 - Lines 21-22 ("Smith . . . outcome")
 - Lines 52-54 ("When . . . way")

- 14 As used in line 6, "embraced" most nearly means
- lovingly held.
 - readily adopted.
 - eagerly hugged.
 - reluctantly used.

- 15 The main purpose of the fifth paragraph (lines 45-56) is to
- develop a counterargument to the claim that greed is good.
 - provide support for the idea that ethics is about character.
 - describe a third approach to defining ethical economics.
 - illustrate that one's actions are a result of one's character.

- 16 As used in line 58, "clashes" most nearly means
- conflicts.
 - mismatches.
 - collisions.
 - brawls.

- 17 Which choice best supports the author's claim that there is common ground shared by the different approaches to ethics described in the passage?
- Lines 11-12 ("There . . . decision")
 - Lines 47-50 ("From . . . advertisements")
 - Lines 59-64 ("Take . . . market")
 - Lines 75-77 ("We . . . facts")

- 18 The main idea of the final paragraph is that
- human quirks make it difficult to predict people's ethical decisions accurately.
 - people universally react with disgust when faced with economic injustice.
 - understanding human psychology may help to define ethics in economics.
 - economists themselves will be responsible for reforming the free market.

- 19 Data in the graph about per-pound coffee profits in Tanzania most strongly support which of the following statements?
- Fair trade coffee consistently earned greater profits than regular coffee earned.
 - The profits earned from regular coffee did not fluctuate.
 - Fair trade coffee profits increased between 2004 and 2006.
 - Fair trade and regular coffee were earning equal profits by 2008.

- 20 Data in the graph indicate that the greatest difference between per-pound profits from fair trade coffee and those from regular coffee occurred during which period?
- 2000 to 2002
 - 2002 to 2004
 - 2004 to 2005
 - 2006 to 2008

Data in the graph provide most direct support for which idea in the passage?

- A) Acting on empathy can be counterproductive.
- B) Ethical economics is defined by character.
- C) Ethical economics is still possible.
- D) People fear losses more than they hope for gains.

Questions 22-32 are based on the following passages.

Passage 1 is adapted from Nicholas Carr, "Author Nicholas Carr: The Web Shatters Focus, Rewires Brains." ©2010 by Condé Nast. Passage 2 is from Steven Pinker, "Mind over Mass Media." ©2010 by The New York Times Company.

Passage 1

The mental consequences of our online info-crunching are not universally bad. Certain cognitive skills are strengthened by our use of computers and the Net. These tend to involve
 5 more primitive mental functions, such as hand-eye coordination, reflex response, and the processing of visual cues. One much-cited study of video gaming revealed that after just 10 days of playing action games on computers, a group of young people had
 10 significantly boosted the speed with which they could shift their visual focus between various images and tasks.

It's likely that Web browsing also strengthens brain functions related to fast-paced problem
 15 solving, particularly when it requires spotting patterns in a welter of data. A British study of the way women search for medical information online indicated that an experienced Internet user can, at least in some cases, assess the trustworthiness and
 20 probable value of a Web page in a matter of seconds. The more we practice surfing and scanning, the more adept our brain becomes at those tasks.

But it would be a serious mistake to look narrowly at such benefits and conclude that the Web is making
 25 us smarter. In a *Science* article published in early 2009, prominent developmental psychologist Patricia Greenfield reviewed more than 40 studies of the effects of various types of media on intelligence and learning ability. She concluded that "every medium
 30 develops some cognitive skills at the expense of others." Our growing use of the Net and other screen-based technologies, she wrote, has led to the "widespread and sophisticated development of visual-spatial skills." But those gains go hand in hand
 35 with a weakening of our capacity for the kind of "deep processing" that underpins "mindful knowledge acquisition, inductive analysis, critical thinking, imagination, and reflection."

We know that the human brain is highly
 40 plastic; neurons and synapses change as circumstances change. When we adapt to a new cultural phenomenon, including the use of a new

medium, we end up with a different brain, says Michael Merzenich, a pioneer of the field of
 45 neuroplasticity. That means our online habits continue to reverberate in the workings of our brain cells even when we're not at a computer. We're exercising the neural circuits devoted to skimming and multitasking while ignoring those used for
 50 reading and thinking deeply.

Passage 2

Critics of new media sometimes use science itself to press their case, citing research that shows how
 "experience can change the brain." But cognitive neuroscientists roll their eyes at such talk. Yes, every
 55 time we learn a fact or skill the wiring of the brain changes; it's not as if the information is stored in the pancreas. But the existence of neural plasticity does not mean the brain is a blob of clay pounded into shape by experience.

Experience does not revamp the basic information-processing capacities of the brain. Speed-reading programs have long claimed to do just that, but the verdict was rendered by Woody Allen
 after he read Leo Tolstoy's famously long novel
 65 *War and Peace* in one sitting: "It was about Russia." Genuine multitasking, too, has been exposed as a myth, not just by laboratory studies but by the familiar sight of an SUV undulating between lanes as the driver cuts deals on his cell phone.

Moreover, the effects of experience are highly specific to the experiences themselves. If you train
 people to do one thing (recognize shapes, solve math puzzles, find hidden words), they get better at doing that thing, but almost nothing else. Music doesn't
 75 make you better at math, conjugating Latin doesn't make you more logical, brain-training games don't make you smarter. Accomplished people don't bulk up their brains with intellectual calisthenics; they immerse themselves in their fields. Novelists read
 80 lots of novels, scientists read lots of science.

The effects of consuming electronic media are likely to be far more limited than the panic implies. Media critics write as if the brain takes on the qualities of whatever it consumes, the informational
 85 equivalent of "you are what you eat." As with ancient peoples who believed that eating fierce animals made them fierce, they assume that watching quick cuts in rock videos turns your mental life into quick cuts or that reading bullet points and online postings turns
 90 your thoughts into bullet points and online postings.

The author of Passage 1 indicates which of the following about the use of screen-based technologies?

- A) It should be thoroughly studied.
- B) It makes the brain increasingly rigid.
- C) It has some positive effects.
- D) It should be widely encouraged.

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 3-4 ("Certain . . . Net")
- B) Lines 23-25 ("But . . . smarter")
- C) Lines 25-29 ("In a . . . ability")
- D) Lines 29-31 ("She . . . others")

The author of Passage 1 indicates that becoming adept at using the Internet can

- A) make people complacent about their health.
- B) undermine the ability to think deeply.
- C) increase people's social contacts.
- D) improve people's self-confidence.

As used in line 40, "plastic" most nearly means

- A) creative.
- B) artificial.
- C) malleable.
- D) sculptural.

26

The author of Passage 2 refers to the novel *War and Peace* primarily to suggest that Woody Allen

- A) did not like Tolstoy's writing style.
- B) could not comprehend the novel by speed-reading it.
- C) had become quite skilled at multitasking.
- D) regretted having read such a long novel.

27

According to the author of Passage 2, what do novelists and scientists have in common?

- A) They take risks when they pursue knowledge.
- B) They are eager to improve their minds.
- C) They are curious about other subjects.
- D) They become absorbed in their own fields.

28

The analogy in the final sentence of Passage 2 has primarily which effect?

- A) It uses ornate language to illustrate a difficult concept.
- B) It employs humor to soften a severe opinion of human behavior.
- C) It alludes to the past to evoke a nostalgic response.
- D) It criticizes the view of a particular group.

29

The main purpose of each passage is to

- A) compare brain function in those who play games on the Internet and those who browse on it.
- B) report on the problem-solving skills of individuals with varying levels of Internet experience.
- C) take a position on increasing financial support for studies related to technology and intelligence.
- D) make an argument about the effects of electronic media use on the brain.

30

Which choice best describes the relationship between the two passages?

- A) Passage 2 relates first-hand experiences that contrast with the clinical approach in Passage 1.
- B) Passage 2 critiques the conclusions drawn from the research discussed in Passage 1.
- C) Passage 2 takes a high-level view of a result that Passage 1 examines in depth.
- D) Passage 2 predicts the negative reactions that the findings discussed in Passage 1 might produce.

31

On which of the following points would the authors of both passages most likely agree?

- A) Computer-savvy children tend to demonstrate better hand-eye coordination than do their parents.
- B) Those who criticize consumers of electronic media tend to overreact in their criticism.
- C) Improved visual-spatial skills do not generalize to improved skills in other areas.
- D) Internet users are unlikely to prefer reading onscreen text to reading actual books.

32

Which choice provides the best evidence that the author of Passage 2 would agree to some extent with the claim attributed to Michael Merzenich in lines 41-43, Passage 1?

- A) Lines 51-53 ("Critics . . . brain")
- B) Lines 54-56 ("Yes . . . changes")
- C) Lines 57-59 ("But . . . experience")
- D) Lines 83-84 ("Media . . . consumes")

Questions 33-42 are based on the following passage.

This passage is adapted from Elizabeth Cady Stanton's address to the 1869 Woman Suffrage Convention in Washington, DC.

I urge a sixteenth amendment, because "manhood suffrage," or a man's government, is civil, religious, and social disorganization. The male element is a destructive force, stern, selfish, aggrandizing, loving war, violence, conquest, acquisition, breeding in the material and moral world alike discord, disorder, disease, and death. See what a record of blood and cruelty the pages of history reveal! Through what inquisitions and imprisonments, pains and persecutions, black codes and gloomy creeds, the soul of humanity has struggled for the centuries, while mercy has veiled her face and all hearts have been dead alike to love and hope!

The male element has held high carnival thus far; it has fairly run riot from the beginning, overpowering the feminine element everywhere, crushing out all the diviner qualities in human nature, until we know but little of true manhood and womanhood, of the latter comparatively nothing, for it has scarce been recognized as a power until within the last century. Society is but the reflection of man himself, untempered by woman's thought; the hard iron rule we feel alike in the church, the state, and the home. No one need wonder at the disorganization, at the fragmentary condition of everything, when we remember that man, who represents but half a complete being, with but half an idea on every subject, has undertaken the absolute control of all sublunary matters.

People object to the demands of those whom they choose to call the strong-minded, because they say "the right of suffrage will make the women masculine." That is just the difficulty in which we are involved today. Though disfranchised, we have few women in the best sense; we have simply so many reflections, varieties, and dilutions of the masculine gender. The strong, natural characteristics of womanhood are repressed and ignored in

dependence, for so long as man feeds woman she will try to please the giver and adapt herself to his condition. To keep a foothold in society, woman must be as near like man as possible, reflect his ideas, opinions, virtues, motives, prejudices, and vices. She must respect his statutes, though they strip her of every inalienable right, and conflict with that higher law written by the finger of God on her own soul. . . . [M]an has been molding woman to his ideas by direct and positive influences, while she, if not a negation, has used indirect means to control him, and in most cases developed the very characteristics both in him and herself that needed repression. And now man himself stands appalled at the results of his own excesses, and mourns in bitterness that falsehood, selfishness, and violence are the law of life. The need of this hour is not territory, gold mines, railroads, or specie payments but a new evangel of womanhood, to exalt purity, virtue, morality, true religion, to lift man up into the higher realms of thought and action.

We ask woman's enfranchisement, as the first step toward the recognition of that essential element in government that can only secure the health, strength, and prosperity of the nation. Whatever is done to lift woman to her true position will help to usher in a new day of peace and perfection for the race.

In speaking of the masculine element, I do not wish to be understood to say that all men are hard, selfish, and brutal, for many of the most beautiful spirits the world has known have been clothed with manhood; but I refer to those characteristics, though often marked in woman, that distinguish what is called the stronger sex. For example, the love of acquisition and conquest, the very pioneers of civilization, when expended on the earth, the sea, the elements, the riches and forces of nature, are powers of destruction when used to subjugate one man to another or to sacrifice nations to ambition.

Here that great conservator of woman's love, if permitted to assert itself, as it naturally would in freedom against oppression, violence, and war, would hold all these destructive forces in check, for woman knows the cost of life better than man does, and not with her consent would one drop of blood ever be shed, one life sacrificed in vain.

1
33

The central problem that Stanton describes in the passage is that women have been

- A) denied equal educational opportunities, which has kept them from reaching their potential.
- B) prevented from exerting their positive influence on men, which has led to societal breakdown.
- C) prevented from voting, which has resulted in poor candidates winning important elections.
- D) blocked by men from serving as legislators, which has allowed the creation of unjust laws.

34

Stanton uses the phrase "high carnival" (line 15) mainly to emphasize what she sees as the

- A) utter domination of women by men.
- B) freewheeling spirit of the age.
- C) scandalous decline in moral values.
- D) growing power of women in society.

35

Stanton claims that which of the following was a relatively recent historical development?

- A) The control of society by men
- B) The spread of war and injustice
- C) The domination of domestic life by men
- D) The acknowledgment of women's true character

36

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 3-7 ("The male . . . death")
- B) Lines 15-22 ("The male . . . century")
- C) Lines 22-25 ("Society . . . home")
- D) Lines 48-52 ("[M]an . . . repression")

37

As used in line 24, "rule" most nearly refers to

- A) a general guideline.
- B) a controlling force.
- C) an established habit.
- D) a procedural method.

38

It can reasonably be inferred that "the strong-minded" (line 32) was a term generally intended to

- A) praise women who fight for their long-denied rights.
- B) identify women who demonstrate intellectual skill.
- C) criticize women who enter male-dominated professions.
- D) condemn women who agitate for the vote for their sex.

39

As used in line 36, "best" most nearly means

- A) superior.
- B) excellent.
- C) genuine.
- D) rarest.

40

Stanton contends that the situation she describes in the passage has become so dire that even men have begun to

- A) lament the problems they have created.
- B) join the call for woman suffrage.
- C) consider women their social equals.
- D) ask women how to improve civic life.

41

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 25-30 ("No one . . . matters")
- B) Lines 53-55 ("And now . . . life")
- C) Lines 56-60 ("The need . . . action")
- D) Lines 61-64 ("We ask . . . nation")

42

The sixth paragraph (lines 67-78) is primarily concerned with establishing a contrast between

- A) men and women.
- B) the spiritual world and the material world.
- C) bad men and good men.
- D) men and masculine traits.

Questions 43-52 are based on the following passage and supplementary material.

This passage is adapted from Geoffrey Giller, "Long a Mystery, How 500-Meter-High Undersea Waves Form Is Revealed." ©2014 by Scientific American.

Some of the largest ocean waves in the world are nearly impossible to see. Unlike other large waves, these rollers, called internal waves, do not ride the ocean surface. Instead, they move underwater, undetectable without the use of satellite imagery or sophisticated monitoring equipment. Despite their hidden nature, internal waves are fundamental parts of ocean water dynamics, transferring heat to the ocean depths and bringing up cold water from below. And they can reach staggering heights—some as tall as skyscrapers.

Because these waves are involved in ocean mixing and thus the transfer of heat, understanding them is crucial to global climate modeling, says Tom Peacock, a researcher at the Massachusetts Institute of Technology. Most models fail to take internal waves into account. "If we want to have more and more accurate climate models, we have to be able to capture processes such as this," Peacock says.

Peacock and his colleagues tried to do just that. Their study, published in November in *Geophysical Research Letters*, focused on internal waves generated in the Luzon Strait, which separates Taiwan and the Philippines. Internal waves in this region, thought to be some of the largest in the world, can reach about 500 meters high. "That's the same height as the Freedom Tower that's just been built in New York," Peacock says.

Although scientists knew of this phenomenon in the South China Sea and beyond, they didn't know exactly how internal waves formed. To find out, Peacock and a team of researchers from M.I.T. and Woods Hole Oceanographic Institution worked with France's National Center for Scientific Research using a giant facility there called the Coriolis Platform. The rotating platform, about 15 meters (49.2 feet) in diameter, turns at variable speeds and can simulate Earth's rotation. It also has walls, which means scientists can fill it with water and create accurate, large-scale simulations of various oceanographic scenarios.

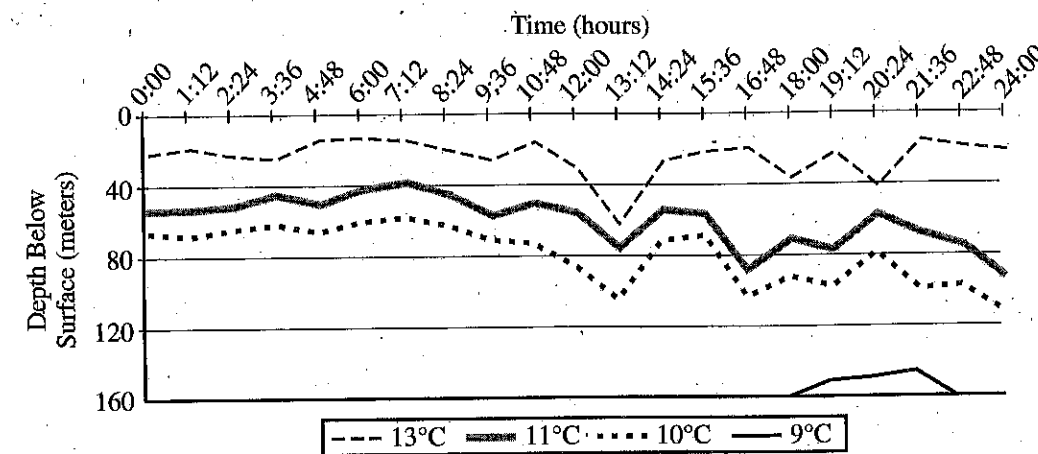
Peacock and his team built a carbon-fiber resin scale model of the Luzon Strait, including the islands and surrounding ocean floor topography. Then they filled the platform with water of varying salinity to replicate the different densities found at the strait, with denser, saltier water below and lighter, less briny water above. Small particles were added to the solution and illuminated with lights from below in order to track how the liquid moved. Finally, they re-created tides using two large plungers to see how the internal waves themselves formed.

The Luzon Strait's underwater topography, with a distinct double-ridge shape, turns out to be responsible for generating the underwater waves. As the tide rises and falls and water moves through the strait, colder, denser water is pushed up over the ridges into warmer, less dense layers above. This action results in bumps of colder water trailed

by warmer water that generate an internal wave. As these waves move toward land, they become steeper—much the same way waves at the beach become taller before they hit the shore—until they break on a continental shelf.

The researchers were also able to devise a mathematical model that describes the movement and formation of these waves. Whereas the model is specific to the Luzon Strait, it can still help researchers understand how internal waves are generated in other places around the world. Eventually, this information will be incorporated into global climate models, making them more accurate. "It's very clear, within the context of these [global climate] models, that internal waves play a role in driving ocean circulations," Peacock says.

CHANGES IN DEPTH OF ISOTHERMS*
IN AN INTERNAL WAVE OVER A 24-HOUR PERIOD



* Bands of water of constant temperatures

Adapted from Justin Small et al., "Internal Solitons in the Ocean: Prediction from SAR." ©1998 by Oceanography, Defence Evaluation and Research Agency.

43

The first paragraph serves mainly to

- A) explain how a scientific device is used.
- B) note a common misconception about an event.
- C) describe a natural phenomenon and address its importance.
- D) present a recent study and summarize its findings.

44

As used in line 19, "capture" is closest in meaning to

- A) control.
- B) record.
- C) secure.
- D) absorb.

45

According to Peacock, the ability to monitor internal waves is significant primarily because

- A) it will allow scientists to verify the maximum height of such waves.
- B) it will allow researchers to shift their focus to improving the quality of satellite images.
- C) the study of wave patterns will enable regions to predict and prevent coastal damage.
- D) the study of such waves will inform the development of key scientific models.

46

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-2 ("Some . . . see")
- B) Lines 4-6 ("they . . . equipment")
- C) Lines 17-19 ("If . . . this")
- D) Lines 24-26 ("Internal . . . high")

47

As used in line 65, "devise" most nearly means

- A) create.
- B) solve.
- C) imagine.
- D) begin.

48

Based on information in the passage, it can reasonably be inferred that all internal waves

- A) reach approximately the same height even though the locations and depths of continental shelves vary.
- B) may be caused by similar factors but are influenced by the distinct topographies of different regions.
- C) can be traced to inconsistencies in the tidal patterns of deep ocean water located near islands.
- D) are generated by the movement of dense water over a relatively flat section of the ocean floor.

49

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 29-31 ("Although . . . formed")
- B) Lines 56-58 ("As the . . . it")
- C) Lines 61-64 ("As these . . . shelf")
- D) Lines 67-70 ("Whereas . . . world")

50

In the graph, which isotherm displays an increase in depth below the surface during the period 19:12 to 20:24?

- A) 9°C
- B) 10°C
- C) 11°C
- D) 13°C

51

Which concept is supported by the passage and by the information in the graph?

- A) Internal waves cause water of varying salinity to mix.
- B) Internal waves push denser water above layers of less dense water.
- C) Internal waves push bands of cold water above bands of warmer water.
- D) Internal waves do not rise to break the ocean's surface.

52

How does the graph support the author's point that internal waves affect ocean water dynamics?

- A) It demonstrates that wave movement forces warmer water down to depths that typically are colder.
- B) It reveals the degree to which an internal wave affects the density of deep layers of cold water.
- C) It illustrates the change in surface temperature that takes place during an isolated series of deep waves.
- D) It shows that multiple waves rising near the surface of the ocean disrupt the flow of normal tides.

STOP

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.

No Test Material On This Page

Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a "NO CHANGE" option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

Librarians Help Navigate in the Digital Age

In recent years, public libraries in the United States have experienced **1** reducing in their operating funds due to cuts imposed at the federal, state, and local government levels. **2** However, library staffing has been cut by almost four percent since 2008, and the demand for librarians continues to decrease, even though half of public libraries report that they have an insufficient number of staff to meet their patrons' needs. Employment in all job sectors in the United States is projected to grow by fourteen percent over the next

1

- A) NO CHANGE
- B) reductions
- C) deducting
- D) deducts

2

- A) NO CHANGE
- B) Consequently,
- C) Nevertheless,
- D) Previously,

decade, yet the expected growth rate for librarians is predicted to be only seven percent, or half of the overall rate. This trend, combined with the increasing accessibility of information via the Internet, **3** has led some to claim that librarianship is in decline as a profession. As public libraries adapt to rapid technological advances in information distribution, librarians' roles are actually expanding.

The share of library materials that is in nonprint formats **4** is increasing steadily; in 2010, at least 18.5 million e-books were available **5** for them to circulate. As a result, librarians must now be proficient curators of electronic information, compiling **6** catalog, and updating these collections. But perhaps even more importantly, librarians function as first responders for their communities' computer needs. Since

3

- A) NO CHANGE
- B) have
- C) which have
- D) which has

4

At this point, the writer is considering adding the following information.

—e-books, audio and video materials, and online journals—

Should the writer make this addition here?

- A) Yes, because it provides specific examples of the materials discussed in the sentence.
- B) Yes, because it illustrates the reason for the increase mentioned later in the sentence.
- C) No, because it interrupts the flow of the sentence by supplying irrelevant information.
- D) No, because it weakens the focus of the passage by discussing a subject other than librarians.

5

- A) NO CHANGE
- B) to be circulated by them.
- C) for their circulating.
- D) for circulation.

6

- A) NO CHANGE
- B) librarians cataloging,
- C) to catalog,
- D) cataloging,

one of the fastest growing library services is public access computer use, there is great demand for computer instruction. **7** In fact, librarians' training now includes courses on research and Internet search methods. Many of whom teach classes in Internet navigation, database and software use, and digital information literacy. While these classes are particularly helpful to young students developing basic research skills, **8** but adult patrons can also benefit from librarian assistance in that they can acquire job-relevant computer skills. **9** Free to all who utilize their services, public libraries and librarians are especially valuable, because they offer free resources that may be difficult to find elsewhere, such as help with online job

7

Which choice most effectively combines the underlined sentences?

- A) In fact, librarians' training now includes courses on research and Internet search methods; many librarians teach classes in Internet navigation, database and software use, and digital information literacy is taught by them.
- B) In fact, many librarians, whose training now includes courses on research and Internet search methods, teach classes in Internet navigation, database and software use, and digital information literacy.
- C) Training now includes courses on research and Internet search methods; many librarians, in fact, are teaching classes in Internet navigation, database and software use, and digital information literacy.
- D) Including courses on research and Internet search methods in their training is, in fact, why many librarians teach classes in Internet navigation, database and software use, and digital information literacy.

8

- A) NO CHANGE
- B) and
- C) for
- D) DELETE the underlined portion.

9

Which choice most effectively sets up the examples given at the end of the sentence?

- A) NO CHANGE
- B) During periods of economic recession,
- C) Although their value cannot be measured,
- D) When it comes to the free services libraries provide,

searches as well as résumé and job material development. An overwhelming number of public libraries also report that they provide help with electronic government resources related to income taxes, **10** law troubles, and retirement programs.

In sum, the Internet does not replace the need for librarians, and librarians are hardly obsolete. **11** Like books, librarians have been around for a long time, but the Internet is extremely useful for many types of research.

10

- A) NO CHANGE
- B) legal issues,
- C) concerns related to law courts,
- D) matters for the law courts,

11

Which choice most clearly ends the passage with a restatement of the writer's primary claim?

- A) NO CHANGE
- B) Although their roles have diminished significantly, librarians will continue to be employed by public libraries for the foreseeable future.
- C) The growth of electronic information has led to a diversification of librarians' skills and services, positioning them as savvy resource specialists for patrons.
- D) However, given their extensive training and skills, librarians who have been displaced by budget cuts have many other possible avenues of employment.

Questions 12-22 are based on the following passage.

Tiny Exhibit, Big Impact

— 1 —

The first time I visited the Art Institute of Chicago, I expected to be impressed by its famous large paintings.

12 On one hand, I couldn't wait to view **13** painter, Georges Seurat's, 10-foot-wide *A Sunday Afternoon on the Island of La Grande Jatte* in its full size. It took me by surprise, then, when my favorite exhibit at the museum was one of **14** it's tiniest; the Thorne Miniature Rooms.

12

- A) NO CHANGE
- B) For instance,
- C) However,
- D) Similarly,

13

- A) NO CHANGE
- B) painter, Georges Seurat's
- C) painter Georges Seurat's,
- D) painter Georges Seurat's

14

- A) NO CHANGE
- B) its tiniest;
- C) its tiniest:
- D) it's tiniest,

— 2 —

Viewing the exhibit, I was amazed by the intricate details of some of the more ornately decorated rooms. I marveled at a replica of a salon (a formal living room) dating back to the reign of French king Louis XV.

15 Built into the dark paneled walls are bookshelves stocked with leather-bound volumes. The couch and chairs, in keeping with the style of the time, are characterized by elegantly curved arms and **16** legs, they are covered in luxurious velvet. A dime-sized portrait of a French aristocratic woman hangs in a golden frame.

— 3 —

This exhibit showcases sixty-eight miniature rooms inserted into a wall at eye level. Each furnished room consists of three walls; the fourth wall is a glass pane through which museumgoers observe. The rooms and their furnishings were painstakingly created to scale at 1/12th their actual size, so that one inch in the exhibit correlates with one foot in real life. A couch, for example, is seven inches long, and **17** that is based on a seven-foot-long couch. Each room represents a distinctive style of European, American, or Asian interior design from the thirteenth to twentieth centuries.

15

At this point, the writer is considering adding the following sentence.

Some scholars argue that the excesses of King Louis XV's reign contributed significantly to the conditions that resulted in the French Revolution.

Should the writer make this addition here?

- A) Yes, because it provides historical context for the Thorne Miniature Rooms exhibit.
- B) Yes, because it explains why salons are often ornately decorated.
- C) No, because it interrupts the paragraph's description of the miniature salon.
- D) No, because it implies that the interior designer of the salon had political motivations.

16

- A) NO CHANGE
- B) legs, the couch and chairs
- C) legs and
- D) legs,

17

Which choice gives a second supporting example that is most similar to the example already in the sentence?

- A) NO CHANGE
- B) a tea cup is about a quarter of an inch.
- C) there are even tiny cushions on some.
- D) household items are also on this scale.

— 4 —

The plainer rooms are more sparsely **18** furnished. Their architectural features, furnishings, and decorations are just as true to the periods they represent. One of my favorite rooms in the whole exhibit, in fact, is an 1885 summer kitchen. The room is simple but spacious, with a small sink and counter along one wall, a cast-iron wood stove and some hanging pots and pans against another wall, and **19** a small table under a window of the third wall. Aside from a few simple wooden chairs placed near the edges of the room, the floor is open and obviously well worn.

18

Which choice most effectively combines the sentences at the underlined portion?

- A) furnished by their
- B) furnished, but their
- C) furnished: their
- D) furnished, whereas

19

Which choice most closely matches the stylistic pattern established earlier in the sentence?

- A) NO CHANGE
- B) a small table is under the third wall's window.
- C) the third wall has a window and small table.
- D) the third wall has a small table against it and a window.

— 5 —

As I walked through the exhibit, I overheard a **20** visitors' remark, "You know, that grandfather clock actually runs. Its glass door swings open, and the clock can be wound up." **21** Dotted with pin-sized knobs, another visitor noticed my fascination with a tiny writing desk and its drawers. "All of those little drawers pull out. And you see that hutch? Can you believe it has a secret compartment?" Given the exquisite craftsmanship and level of detail I'd already seen, I certainly could.

Question 22 asks about the previous passage as a whole.

20

- A) NO CHANGE
- B) visitors remarking,
- C) visitor remarked,
- D) visitor remark,

21

- A) NO CHANGE
- B) Another visitor, dotted with pin-sized knobs, noticed my fascination with a tiny writing desk and its drawers.
- C) Another visitor dotted with pin-sized knobs noticed my fascination with a tiny writing desk and its drawers.
- D) Another visitor noticed my fascination with a tiny writing desk and its drawers, dotted with pin-sized knobs.

Think about the previous passage as a whole as you answer question 22.

22

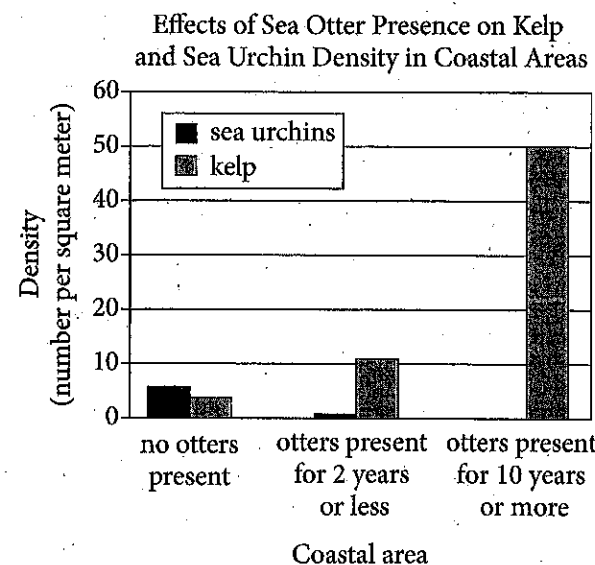
To make the passage most logical, paragraph 2 should be placed

- A) where it is now.
- B) after paragraph 3.
- C) after paragraph 4.
- D) after paragraph 5.

Questions 23-33 are based on the following passage and supplementary material.

Environmentalist Otters

It has long been known that the sea otters **23** living along the West Coast of North America help keep kelp forests in their habitat healthy and vital. They do this by feeding on sea urchins and other herbivorous invertebrates that graze voraciously on kelp. With sea otters to keep the population of sea urchins in check, kelp forests can flourish. In fact, **24** two years or less of sea otters can completely eliminate sea urchins in a coastal area (see chart).



Adapted from David O. Duggins, "Kelp Beds and Sea Otters: An Experimental Approach." ©1980 by the Ecological Society of America.

Without sea otters present, **25** nevertheless, kelp forests run the danger of becoming barren stretches of coastal wasteland known as urchin barrens.

23

- A) NO CHANGE
- B) living along the West Coast of North America, they help
- C) that live along the West Coast of North America and help to
- D) that live along the West Coast of North America, where they help

24

Which choice offers an accurate interpretation of the data in the chart?

- A) NO CHANGE
- B) even two years or less of sea otter presence can reduce the sea urchin threat
- C) kelp density increases proportionally as sea urchin density increases
- D) even after sea otters were present for ten years or more, kelp density was still lower than sea urchin density

25

- A) NO CHANGE
- B) however,
- C) hence,
- D) likewise,

[1] What was less well-known, until recently at least, was how this relationship among sea otters, sea urchins, and kelp forests might help fight global warming. [2] The amount of carbon dioxide in the atmosphere has increased 40 percent **26**. [3] A recent study by two professors at the University of California, Santa Cruz, Chris Wilmers and James Estes, **27** suggests, that kelp forests protected by sea otters can absorb as much as twelve times the amount of carbon dioxide from the atmosphere as those where sea urchins are allowed to **28** devour the kelp. [4] Like **29** their terrestrial plant cousins, kelp removes carbon dioxide from the atmosphere, turning it into sugar fuel through photosynthesis, and releases oxygen back into the air.

26

At this point, the writer is considering adding the following information.

since the start of the Industrial Revolution, resulting in a rise in global temperatures

Should the writer make this addition here?

- A) Yes, because it establishes the relationship between the level of carbon dioxide in the atmosphere and global warming.
- B) Yes, because it explains the key role sea otters, sea urchins, and kelp forests play in combating global warming.
- C) No, because it contradicts the claim made in the previous paragraph that sea otters help keep kelp forests healthy.
- D) No, because it mentions the Industrial Revolution, blurring the focus of the paragraph.

27

- A) NO CHANGE
- B) suggests—that
- C) suggests, “that
- D) suggests that

28

- A) NO CHANGE
- B) dispatch
- C) overindulge on
- D) dispose of

29

- A) NO CHANGE
- B) they're
- C) its
- D) it's

[5] Scientists knew this but did not recognize **30** how large a role they played in helping kelp forests to significantly decrease the amount of carbon dioxide in the atmosphere. [6] Far from making no difference to the ecosystem, the presence of otters was found to increase the carbon storage of kelp forests by 4.4 to 8.7 megatons annually, offsetting the amount of carbon dioxide emitted by three million to six million passenger cars each year. **31**

Wilmers and Estes caution, however, that **32** having more otters will not automatically solve the problem of higher levels of carbon dioxide in the air. But they suggest that the presence of otters provides a good model of how carbon can be sequestered, **33** or removed; from the atmosphere through the management of animal populations. If ecologists can better understand what kinds of impacts animals might have on the environment, Wilmers contends, "there might be opportunities for win-win conservation scenarios, whereby animal species are protected or enhanced, and carbon gets sequestered."

30

- A) NO CHANGE
- B) how large a role that it played
- C) how large a role sea otters played
- D) that they played such a large role

31

Where is the most logical place in this paragraph to add the following sentence?

What Wilmers and Estes discovered in their study, therefore, surprised them.

- A) After sentence 1
- B) After sentence 3
- C) After sentence 4
- D) After sentence 5

32

- A) NO CHANGE
- B) increasing the otter population
- C) the otters multiplying
- D) having more otters than other locations

33

- A) NO CHANGE
- B) or removed from,
- C) or, removed from,
- D) or removed, from

Questions 34-44 are based on the following passage.

A Quick Fix in a Throwaway Culture

Planned obsolescence, a practice **34** at which products are designed to have a limited period of **35** usefulness, has been a cornerstone of manufacturing strategy for the past 80 years. This approach increases sales, but it also stands in **36** austere contrast to a time when goods were produced to be durable. Planned obsolescence wastes materials as well as energy in making and shipping new products. It also reinforces the belief that it is easier to replace goods than to mend them, as repair shops are rare and **37** repair methods are often specialized. In 2009, an enterprising movement, the Repair Café, challenged this widely accepted belief.

34

- A) NO CHANGE
- B) from which
- C) so that
- D) whereby

35

- A) NO CHANGE
- B) usefulness—
- C) usefulness;
- D) usefulness

36

- A) NO CHANGE
- B) egregious
- C) unmitigated
- D) stark

37

Which choice provides information that best supports the claim made by this sentence?

- A) NO CHANGE
- B) obsolete goods can become collectible items.
- C) no one knows whether something will fall into disrepair again.
- D) new designs often have "bugs" that must be worked out.

[1] More like a **38** fair than an actual café, the first Repair Café took place in Amsterdam, the Netherlands. [2] It was the brainchild of former journalist Martine Postma, **39** wanting to take a practical stand in a throwaway culture. [3] Her goals were **40** straightforward, however: reduce waste, maintain and perpetuate knowledge and skills, and strengthen community. [4] Participants bring all manner of damaged articles—clothing, appliances, furniture, and more—to be repaired by a staff of volunteer specialists including tailors, electricians, and carpenters. [5] Since the inaugural Repair Café, others have been hosted in theater foyers, community centers, hotels, and auditoriums. [6] While **41** they await for service, patrons can enjoy coffee and snacks and mingle with their neighbors in need. **42**

38

- A) NO CHANGE
- B) fair than
- C) fare than
- D) fair, then

39

- A) NO CHANGE
- B) whom wants
- C) who wanted
- D) she wanted

40

- A) NO CHANGE
- B) straightforward, therefore:
- C) straightforward, nonetheless:
- D) straightforward:

41

- A) NO CHANGE
- B) awaiting
- C) they waited
- D) waiting

42

- To make this paragraph most logical, sentence 5 should be placed
- A) where it is now.
 - B) before sentence 1.
 - C) after sentence 3.
 - D) after sentence 6.

Though only about 3 percent of the Netherlands' municipal waste ends up in landfills, Repair Cafés still raise awareness about what may otherwise be mindless acts of waste by providing a venue for people to share and learn valuable skills that are in danger of being lost. **43** It is easy to classify old but fixable items as “junk” in an era that places great emphasis on the next big thing. In helping people consider how the goods they use on a daily basis work and are made, Repair Cafés restore a sense of relationship between human beings and material goods.

Though the concept remained a local trend at first, international Repair Cafés, all affiliated with the Dutch Repair Café via its website, have since arisen in France, Germany, South Africa, the United States, and other countries **44** on top of that. The original provides a central source for start-up tips and tools, as well as marketing advice to new Repair Cafés. As a result, the Repair Café has become a global network united by common ideals. Ironically, innovators are now looking back to old ways of doing things and applying them in today's cities in an effort to transform the way people relate to and think about the goods they consume.

43

At this point, the writer is considering adding the following sentence.

As the number of corporate and service-based jobs has increased, the need for people who work with their hands has diminished.

Should the writer make this addition here?

- A) Yes, because it provides an example of specific repair skills being lost.
- B) Yes, because it elaborates on the statistic about the Netherlands' municipal waste.
- C) No, because it blurs the paragraph's focus by introducing a topic that is not further explained.
- D) No, because it contradicts the claims made in the rest of the paragraph.

44

- A) NO CHANGE
- B) in addition.
- C) likewise.
- D) DELETE the underlined portion, and end the sentence with a period.

STOP

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

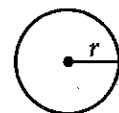
DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

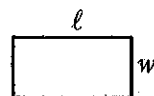
- The use of a calculator is not permitted.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE



$$A = \pi r^2$$

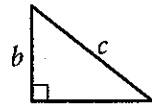
$$C = 2\pi r$$



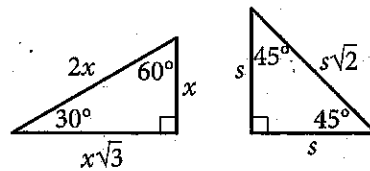
$$A = \ell w$$



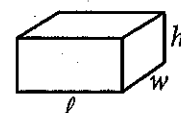
$$A = \frac{1}{2}bh$$



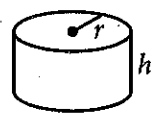
$$c^2 = a^2 + b^2$$



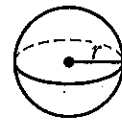
Special Right Triangles



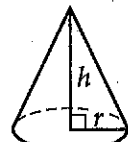
$$V = \ell wh$$



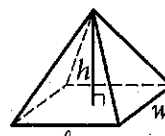
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$

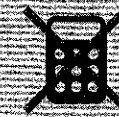


$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.



1 If $5x + 6 = 10$, what is the value of $10x + 3$?

- A) 4
B) 9
C) 11
D) 20

2

$$x + y = 0$$

$$3x - 2y = 10$$

Which of the following ordered pairs (x, y) satisfies the system of equations above?

- A) $(3, -2)$
B) $(2, -2)$
C) $(-2, 2)$
D) $(-2, -2)$

3

A landscaping company estimates the price of a job, in dollars, using the expression $60 + 12nh$, where n is the number of landscapers who will be working and h is the total number of hours the job will take using n landscapers. Which of the following is the best interpretation of the number 12 in the expression?

- A) The company charges \$12 per hour for each landscaper.
B) A minimum of 12 landscapers will work on each job.
C) The price of every job increases by \$12 every hour.
D) Each landscaper works 12 hours a day.

4

$$9a^4 + 12a^2b^2 + 4b^4$$

Which of the following is equivalent to the expression shown above?

- A) $(3a^2 + 2b^2)^2$
B) $(3a + 2b)^4$
C) $(9a^2 + 4b^2)^2$
D) $(9a + 4b)^4$



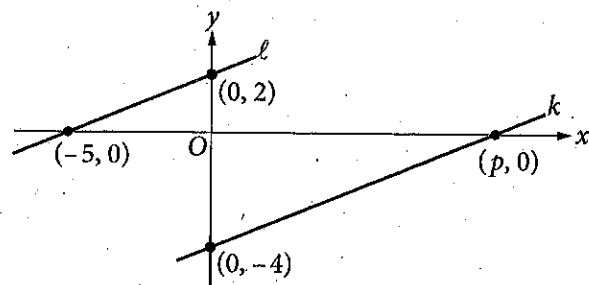
5

$$\sqrt{2k^2 + 17} - x = 0$$

If $k > 0$ and $x = 7$ in the equation above, what is the value of k ?

- A) 2
- B) 3
- C) 4
- D) 5

6



In the xy -plane above, line ℓ is parallel to line k . What is the value of p ?

- A) 4
- B) 5
- C) 8
- D) 10

7

If $\frac{x^{a^2}}{x^{b^2}} = x^{16}$, $x > 1$, and $a + b = 2$, what is the value

of $a - b$?

- A) 8
- B) 14
- C) 16
- D) 18

8

$$nA = 360$$

The measure A , in degrees, of an exterior angle of a regular polygon is related to the number of sides, n , of the polygon by the formula above. If the measure of an exterior angle of a regular polygon is greater than 50° , what is the greatest number of sides it can have?

- A) 5
- B) 6
- C) 7
- D) 8



9

The graph of a line in the xy -plane has slope 2 and contains the point $(1, 8)$. The graph of a second line passes through the points $(1, 2)$ and $(2, 1)$. If the two lines intersect at the point (a, b) , what is the value of $a + b$?

- A) 4
- B) 3
- C) -1
- D) -4

10

Which of the following equations has a graph in the xy -plane for which y is always greater than or equal to -1 ?

- A) $y = |x| - 2$
- B) $y = x^2 - 2$
- C) $y = (x - 2)^2$
- D) $y = x^3 - 2$

11

Which of the following complex numbers is equivalent to $\frac{3 - 5i}{8 + 2i}$? (Note: $i = \sqrt{-1}$)

- A) $\frac{3}{8} - \frac{5i}{2}$
- B) $\frac{3}{8} + \frac{5i}{2}$
- C) $\frac{7}{34} - \frac{23i}{34}$
- D) $\frac{7}{34} + \frac{23i}{34}$

12

$$R = \frac{F}{N + F}$$

A website uses the formula above to calculate a seller's rating, R , based on the number of favorable reviews, F , and unfavorable reviews, N . Which of the following expresses the number of favorable reviews in terms of the other variables?

- A) $F = \frac{RN}{R - 1}$
- B) $F = \frac{RN}{1 - R}$
- C) $F = \frac{N}{1 - R}$
- D) $F = \frac{N}{R - 1}$



13

What is the sum of all values of m that satisfy $2m^2 - 16m + 8 = 0$?

- A) -8
 B) $-4\sqrt{3}$
 C) $4\sqrt{3}$
 D) 8

14

A radioactive substance decays at an annual rate of 13 percent. If the initial amount of the substance is 325 grams, which of the following functions f models the remaining amount of the substance, in grams, t years later?

- A) $f(t) = 325(0.87)^t$
 B) $f(t) = 325(0.13)^t$
 C) $f(t) = 0.87(325)^t$
 D) $f(t) = 0.13(325)^t$

15

The expression $\frac{5x-2}{x+3}$ is equivalent to which of the following?

- A) $\frac{5-2}{3}$
 B) $5 - \frac{2}{3}$
 C) $5 - \frac{2}{x+3}$
 D) $5 - \frac{17}{x+3}$

**DIRECTIONS**

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If $\frac{3|1|2}{}$ is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

Answer: $\frac{7}{12}$

7	/	1	2
●			
0	0	0	
1	1	●	1
2	2	2	●
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
●	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Grid in result.

Answer: 2.5

2	.	5
●		
0	0	0
1	1	1
2	●	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

← Decimal point

Acceptable ways to grid $\frac{2}{3}$ are:

2	/	3
●		
0	0	0
1	1	1
2	●	2
3	3	●
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

.	6	6	6
●			
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	●	●	●
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
●			
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	●	●	6
7	7	7	●
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

2	0	1
●		
0	●	0
1	1	1
2	●	2
3	3	3

2	0	1
●		
0	0	0
1	1	●
2	2	2
3	3	3

NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

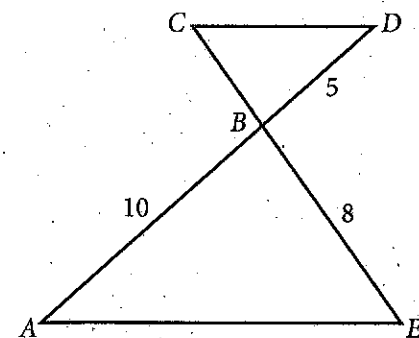
The sales manager of a company awarded a total of \$3000 in bonuses to the most productive salespeople. The bonuses were awarded in amounts of \$250 or \$750. If at least one \$250 bonus and at least one \$750 bonus were awarded, what is one possible number of \$250 bonuses awarded?

17

$$2x(3x + 5) + 3(3x + 5) = ax^2 + bx + c$$

In the equation above, a , b , and c are constants. If the equation is true for all values of x , what is the value of b ?

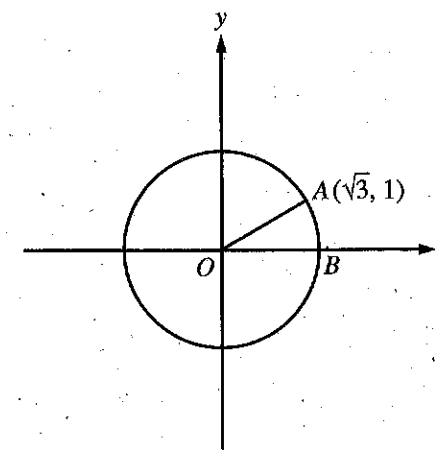
18



In the figure above, $\overline{AE} \parallel \overline{CD}$ and segment AD intersects segment CE at B . What is the length of segment CE ?



19



In the xy -plane above, O is the center of the circle, and the measure of $\angle AOB$ is $\frac{\pi}{a}$ radians. What is the value of a ?

20

$$ax + by = 12$$

$$2x + 8y = 60$$

In the system of equations above, a and b are constants. If the system has infinitely many solutions, what is the value of $\frac{a}{b}$?

STOP

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

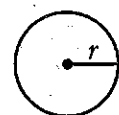
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

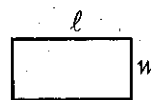
- The use of a calculator is permitted.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE



$$A = \pi r^2$$

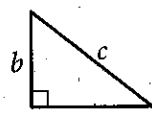
$$C = 2\pi r$$



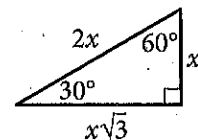
$$A = lw$$



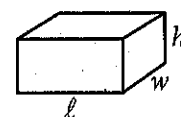
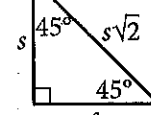
$$A = \frac{1}{2}bh$$



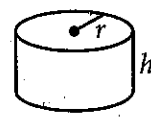
$$c^2 = a^2 + b^2$$



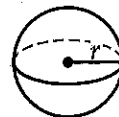
Special Right Triangles



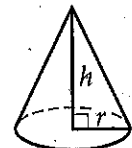
$$V = lwh$$



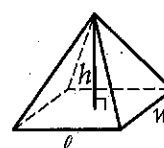
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.



1

A musician has a new song available for downloading or streaming. The musician earns \$0.09 each time the song is downloaded and \$0.002 each time the song is streamed. Which of the following expressions represents the amount, in dollars, that the musician earns if the song is downloaded d times and streamed s times?

- A) $0.002d + 0.09s$
 B) $0.002d - 0.09s$
 C) $0.09d + 0.002s$
 D) $0.09d - 0.002s$

2

A quality control manager at a factory selects 7 lightbulbs at random for inspection out of every 400 lightbulbs produced. At this rate, how many lightbulbs will be inspected if the factory produces 20,000 lightbulbs?

- A) 300
 B) 350
 C) 400
 D) 450

3

$$\ell = 24 + 3.5m$$

One end of a spring is attached to a ceiling. When an object of mass m kilograms is attached to the other end of the spring, the spring stretches to a length of ℓ centimeters as shown in the equation above. What is m when ℓ is 73?

- A) 14
 B) 27.7
 C) 73
 D) 279.5



Questions 4 and 5 refer to the following information.

The amount of money a performer earns is directly proportional to the number of people attending the performance. The performer earns \$120 at a performance where 8 people attend.

4

How much money will the performer earn when 20 people attend a performance?

- A) \$960
- B) \$480
- C) \$300
- D) \$240

5

The performer uses 43% of the money earned to pay the costs involved in putting on each performance. The rest of the money earned is the performer's profit. What is the profit the performer makes at a performance where 8 people attend?

- A) \$51.60
- B) \$57.00
- C) \$68.40
- D) \$77.00

6

When 4 times the number x is added to 12, the result is 8. What number results when 2 times x is added to 7?

- A) -1
- B) 5
- C) 8
- D) 9

7

$$y = x^2 - 6x + 8$$

The equation above represents a parabola in the xy -plane. Which of the following equivalent forms of the equation displays the x -intercepts of the parabola as constants or coefficients?

- A) $y - 8 = x^2 - 6x$
- B) $y + 1 = (x - 3)^2$
- C) $y = x(x - 6) + 8$
- D) $y = (x - 2)(x - 4)$



8

In a video game, each player starts the game with k points and loses 2 points each time a task is not completed. If a player who gains no additional points and fails to complete 100 tasks has a score of 200 points, what is the value of k ?

- A) 0
- B) 150
- C) 250
- D) 400

9

A worker uses a forklift to move boxes that weigh either 40 pounds or 65 pounds each. Let x be the number of 40-pound boxes and y be the number of 65-pound boxes. The forklift can carry up to either 45 boxes or a weight of 2,400 pounds. Which of the following systems of inequalities represents this relationship?

- A) $\begin{cases} 40x + 65y \leq 2,400 \\ x + y \leq 45 \end{cases}$
- B) $\begin{cases} \frac{x}{40} + \frac{y}{65} \leq 2,400 \\ x + y \leq 45 \end{cases}$
- C) $\begin{cases} 40x + 65y \leq 45 \\ x + y \leq 2,400 \end{cases}$
- D) $\begin{cases} x + y \leq 2,400 \\ 40x + 65y \leq 2,400 \end{cases}$

10

A function f satisfies $f(2) = 3$ and $f(3) = 5$. A function g satisfies $g(3) = 2$ and $g(5) = 6$. What is the value of $f(g(3))$?

- A) 2
- B) 3
- C) 5
- D) 6

11

Number of hours Tony plans to read the novel per day	3
Number of parts in the novel	8
Number of chapters in the novel	239
Number of words Tony reads per minute	250
Number of pages in the novel	1,078
Number of words in the novel	349,168

Tony is planning to read a novel. The table above shows information about the novel, Tony's reading speed, and the amount of time he plans to spend reading the novel each day. If Tony reads at the rates given in the table, which of the following is closest to the number of days it would take Tony to read the entire novel?

- A) 6
- B) 8
- C) 23
- D) 324



12

On January 1, 2000, there were 175,000 tons of trash in a landfill that had a capacity of 325,000 tons. Each year since then, the amount of trash in the landfill increased by 7,500 tons. If y represents the time, in years, after January 1, 2000, which of the following inequalities describes the set of years where the landfill is at or above capacity?

- A) $325,000 - 7,500 \leq y$
- B) $325,000 \leq 7,500y$
- C) $150,000 \geq 7,500y$
- D) $175,000 + 7,500y \geq 325,000$

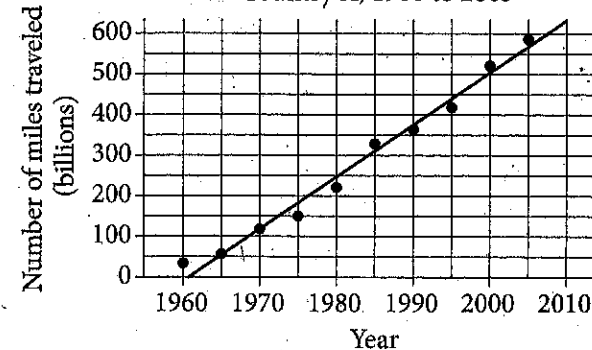
13

A researcher conducted a survey to determine whether people in a certain large town prefer watching sports on television to attending the sporting event. The researcher asked 117 people who visited a local restaurant on a Saturday, and 7 people refused to respond. Which of the following factors makes it least likely that a reliable conclusion can be drawn about the sports-watching preferences of all people in the town?

- A) Sample size
- B) Population size
- C) The number of people who refused to respond
- D) Where the survey was given

14

Miles Traveled by Air Passengers
in Country X, 1960 to 2005



According to the line of best fit in the scatterplot above, which of the following best approximates the year in which the number of miles traveled by air passengers in Country X was estimated to be 550 billion?

- A) 1997
- B) 2000
- C) 2003
- D) 2008



15

The distance traveled by Earth in one orbit around the Sun is about 580,000,000 miles. Earth makes one complete orbit around the Sun in one year. Of the following, which is closest to the average speed of Earth, in miles per hour, as it orbits the Sun?

- A) 66,000
- B) 93,000
- C) 210,000
- D) 420,000

16

Results on the Bar Exam of Law School Graduates

	Passed bar exam	Did not pass bar exam
Took review course	18	82
Did not take review course	7	93

The table above summarizes the results of 200 law school graduates who took the bar exam. If one of the surveyed graduates who passed the bar exam is chosen at random for an interview, what is the probability that the person chosen did not take the review course?

- A) $\frac{18}{25}$
- B) $\frac{7}{25}$
- C) $\frac{25}{200}$
- D) $\frac{7}{200}$

17

The atomic weight of an unknown element, in atomic mass units (amu), is approximately 20% less than that of calcium. The atomic weight of calcium is 40 amu. Which of the following best approximates the atomic weight, in amu, of the unknown element?

- A) 8
- B) 20
- C) 32
- D) 48

18

A survey was taken of the value of homes in a county, and it was found that the mean home value was \$165,000 and the median home value was \$125,000. Which of the following situations could explain the difference between the mean and median home values in the county?

- A) The homes have values that are close to each other.
- B) There are a few homes that are valued much less than the rest.
- C) There are a few homes that are valued much more than the rest.
- D) Many of the homes have values between \$125,000 and \$165,000.



Questions 19 and 20 refer to the following information.

A sociologist chose 300 students at random from each of two schools and asked each student how many siblings he or she has. The results are shown in the table below.

Students' Sibling Survey

Number of siblings	Lincoln School	Washington School
0	120	140
1	80	110
2	60	30
3	30	10
4	10	10

There are a total of 2,400 students at Lincoln School and 3,300 students at Washington School.

19

What is the median number of siblings for all the students surveyed?

- A) 0
- B) 1
- C) 2
- D) 3

20

Based on the survey data, which of the following most accurately compares the expected total number of students with 4 siblings at the two schools?

- A) The total number of students with 4 siblings is expected to be equal at the two schools.
- B) The total number of students with 4 siblings at Lincoln School is expected to be 30 more than at Washington School.
- C) The total number of students with 4 siblings at Washington School is expected to be 30 more than at Lincoln School.
- D) The total number of students with 4 siblings at Washington School is expected to be 900 more than at Lincoln School.

21

A project manager estimates that a project will take x hours to complete, where $x > 100$. The goal is for the estimate to be within 10 hours of the time it will actually take to complete the project. If the manager meets the goal and it takes y hours to complete the project, which of the following inequalities represents the relationship between the estimated time and the actual completion time?

- A) $x + y < 10$
- B) $y > x + 10$
- C) $y < x - 10$
- D) $-10 < y - x < 10$



Questions 22 and 23 refer to the following information.

$$I = \frac{P}{4\pi r^2}$$

At a large distance r from a radio antenna, the intensity of the radio signal I is related to the power of the signal P by the formula above.

22

Which of the following expresses the square of the distance from the radio antenna in terms of the intensity of the radio signal and the power of the signal?

- A) $r^2 = \frac{IP}{4\pi}$
- B) $r^2 = \frac{P}{4\pi I}$
- C) $r^2 = \frac{4\pi I}{P}$
- D) $r^2 = \frac{I}{4\pi P}$

23

For the same signal emitted by a radio antenna, Observer A measures its intensity to be 16 times the intensity measured by Observer B. The distance of Observer A from the radio antenna is what fraction of the distance of Observer B from the radio antenna?

- A) $\frac{1}{4}$
- B) $\frac{1}{16}$
- C) $\frac{1}{64}$
- D) $\frac{1}{256}$

24

$$x^2 + y^2 + 4x - 2y = -1$$

The equation of a circle in the xy -plane is shown above. What is the radius of the circle?

- A) 2
- B) 3
- C) 4
- D) 9

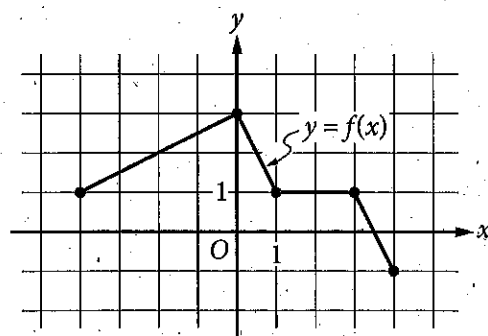


25

The graph of the linear function f has intercepts at $(a, 0)$ and $(0, b)$ in the xy -plane. If $a + b = 0$ and $a \neq b$, which of the following is true about the slope of the graph of f ?

- A) It is positive.
- B) It is negative.
- C) It equals zero.
- D) It is undefined.

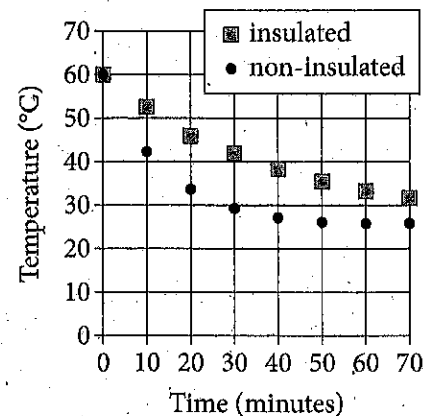
26



The complete graph of the function f is shown in the xy -plane above. Which of the following are equal to 1?

- I. $f(-4)$
 - II. $f\left(\frac{3}{2}\right)$
 - III. $f(3)$
- A) III only
 - B) I and III only
 - C) II and III only
 - D) I, II, and III

27

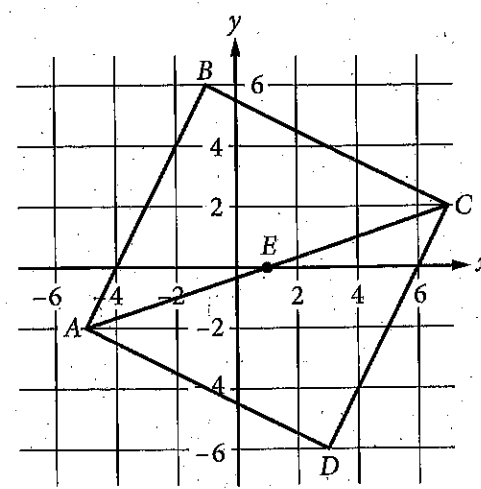


Two samples of water of equal mass are heated to 60 degrees Celsius ($^{\circ}\text{C}$). One sample is poured into an insulated container, and the other sample is poured into a non-insulated container. The samples are then left for 70 minutes to cool in a room having a temperature of 25°C . The graph above shows the temperature of each sample at 10-minute intervals. Which of the following statements correctly compares the average rates at which the temperatures of the two samples change?

- A) In every 10-minute interval, the magnitude of the rate of change of temperature of the insulated sample is greater than that of the non-insulated sample.
- B) In every 10-minute interval, the magnitude of the rate of change of temperature of the non-insulated sample is greater than that of the insulated sample.
- C) In the intervals from 0 to 10 minutes and from 10 to 20 minutes, the rates of change of temperature of the insulated sample are of greater magnitude, whereas in the intervals from 40 to 50 minutes and from 50 to 60 minutes, the rates of change of temperature of the non-insulated sample are of greater magnitude.
- D) In the intervals from 0 to 10 minutes and from 10 to 20 minutes, the rates of change of temperature of the non-insulated sample are of greater magnitude, whereas in the intervals from 40 to 50 minutes and from 50 to 60 minutes, the rates of change of temperature of the insulated sample are of greater magnitude.



28



In the xy -plane above, $ABCD$ is a square and point E is the center of the square. The coordinates of points C and E are $(7, 2)$ and $(1, 0)$, respectively. Which of the following is an equation of the line that passes through points B and D ?

- A) $y = -3x - 1$
- B) $y = -3(x - 1)$
- C) $y = -\frac{1}{3}x + 4$
- D) $y = -\frac{1}{3}x - 1$

29

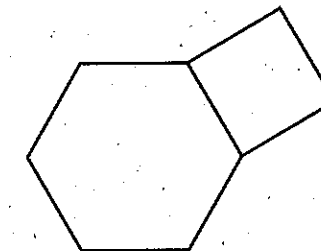
$$y = 3$$

$$y = ax^2 + b$$

In the system of equations above, a and b are constants. For which of the following values of a and b does the system of equations have exactly two real solutions?

- A) $a = -2, b = 2$
- B) $a = -2, b = 4$
- C) $a = 2, b = 4$
- D) $a = 4, b = 3$

30



The figure above shows a regular hexagon with sides of length a and a square with sides of length a . If the area of the hexagon is $384\sqrt{3}$ square inches, what is the area, in square inches, of the square?

- A) 256
- B) 192
- C) $64\sqrt{3}$
- D) $16\sqrt{3}$

**DIRECTIONS**

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or $7/2$. (If $31/2$ is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer in boxes. →

Grid in result. →

← Fraction line

← Decimal point

Answer: $\frac{7}{12}$

7	/	1	2
●			
0	0	0	0
①	①	●	①
②	②	②	●
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
●	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

Answer: 2.5

2	.	5	
		●	
0	0	0	0
①	①	①	①
②	●	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	●
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

Acceptable ways to grid $\frac{2}{3}$ are:

2	/	3	
		●	
0	0	0	0
①	①	①	①
②	●	②	②
③	③	③	●
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

.	6	6	6
●			
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	●	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

.	6	6	7
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	●	⑥	⑥
⑦	⑦	⑦	●
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

Answer: 201 – either position is correct

2	0	1	
0	●	0	
①	①	①	●
②	●	②	②
③	③	③	③

2	0	1	
0	●	0	0
①	①	●	①
②	●	②	②
③	③	③	③

NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

A coastal geologist estimates that a certain country's beaches are eroding at a rate of 1.5 feet per year. According to the geologist's estimate, how long will it take, in years, for the country's beaches to erode by 21 feet?

32

If h hours and 30 minutes is equal to 450 minutes, what is the value of h ?

33

In the xy -plane, the point $(3, 6)$ lies on the graph of the function $f(x) = 3x^2 - bx + 12$. What is the value of b ?

34

In one semester, Doug and Laura spent a combined 250 hours in the tutoring lab. If Doug spent 40 more hours in the lab than Laura did, how many hours did Laura spend in the lab?

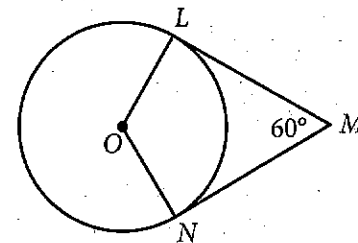


35

$$a = 18t + 15$$

Jane made an initial deposit to a savings account. Each week thereafter she deposited a fixed amount to the account. The equation above models the amount a , in dollars, that Jane has deposited after t weekly deposits. According to the model, how many dollars was Jane's initial deposit? (Disregard the \$ sign when gridding your answer.)

36



In the figure above, point O is the center of the circle, line segments LM and MN are tangent to the circle at points L and N , respectively, and the segments intersect at point M as shown. If the circumference of the circle is 96, what is the length of minor arc \widehat{LN} ?



Questions 37 and 38 refer to the following information.

A botanist is cultivating a rare species of plant in a controlled environment and currently has 3000 of these plants. The population of this species that the botanist expects to grow next year, $N_{\text{next year}}$, can be estimated from the number of plants this year, $N_{\text{this year}}$, by the equation below.

$$N_{\text{next year}} = N_{\text{this year}} + 0.2 \left(N_{\text{this year}} \right) \left(1 - \frac{N_{\text{this year}}}{K} \right)$$

The constant K in this formula is the number of plants the environment is able to support.

37

According to the formula, what will be the number of plants two years from now if $K = 4000$? (Round your answer to the nearest whole number.)

38

The botanist would like to increase the number of plants that the environment can support so that the population of the species will increase more rapidly. If the botanist's goal is that the number of plants will increase from 3000 this year to 3360 next year, how many plants must the modified environment support?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

SAT® Practice Essay #2

DIRECTIONS

The essay gives you an opportunity to show how effectively you can read and comprehend a passage and write an essay analyzing the passage. In your essay, you should demonstrate that you have read the passage carefully, present a clear and logical analysis, and use language precisely.

Your essay must be written on the lines provided in your answer booklet; except for the Planning Page of the answer booklet, you will receive no other paper on which to write. You will have enough space if you write on every line, avoid wide margins, and keep your handwriting to a reasonable size. Remember that people who are not familiar with your handwriting will read what you write. Try to write or print so that what you are writing is legible to those readers.

You have 50 minutes to read the passage and write an essay in response to the prompt provided inside this booklet.

REMINDERS

- Do not write your essay in this booklet. Only what you write on the lined pages of your answer booklet will be evaluated.
- An off-topic essay will not be evaluated.

Follow this link for more information on scoring your practice test:
www.sat.org/scoring

As you read the passage below, consider how Martin Luther King Jr. uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from Martin Luther King Jr., “Beyond Vietnam—A Time to Break Silence.” The speech was delivered at Riverside Church in New York City on April 4, 1967.

- 1 Since I am a preacher by calling, I suppose it is not surprising that I have . . . major reasons for bringing Vietnam into the field of my moral vision. There is at the outset a very obvious and almost facile connection between the war in Vietnam and the struggle I, and others, have been waging in America. A few years ago there was a shining moment in that struggle. It seemed as if there was a real promise of hope for the poor—both black and white—through the poverty program. There were experiments, hopes, new beginnings. Then came the buildup in Vietnam, and I watched this program broken and eviscerated, as if it were some idle political plaything of a society gone mad on war, and I knew that America would never invest the necessary funds or energies in rehabilitation of its poor so long as adventures like Vietnam continued to draw men and skills and money like some demonic destructive suction tube. So, I was increasingly compelled to see the war as an enemy of the poor and to attack it as such.
- 2 Perhaps a more tragic recognition of reality took place when it became clear to me that the war was doing far more than devastating the hopes of the poor at home. It was sending their sons and their brothers and their husbands to fight and to die in extraordinarily high proportions relative to the rest of the population. We were taking the black young men who had been crippled by our society and sending them eight thousand miles away to guarantee liberties in Southeast Asia which they had not found in southwest Georgia and East Harlem. And so we have been repeatedly faced with the cruel irony of watching Negro and white boys on TV screens as they kill and die together for a nation that has been unable to seat them together in the same schools. And so we watch them in brutal solidarity burning the huts of a poor village, but we realize that they would hardly live on the same block in Chicago. I could not be silent in the face of such cruel manipulation of the poor.

3 My [next] reason moves to an even deeper level of awareness, for it grows out of my experience in the ghettos of the North over the last three years—especially the last three summers. As I have walked among the desperate, rejected, and angry young men, I have told them that Molotov cocktails¹ and rifles would not solve their problems. I have tried to offer them my deepest compassion while maintaining my conviction that social change comes most meaningfully through nonviolent action. But they ask—and rightly so—what about Vietnam? They ask if our own nation wasn't using massive doses of violence to solve its problems, to bring about the changes it wanted. Their questions hit home, and I knew that I could never again raise my voice against the violence of the oppressed in the ghettos without having first spoken clearly to the greatest purveyor of violence in the world today—my own government. For the sake of those boys, for the sake of this government, for the sake of the hundreds of thousands trembling under our violence, I cannot be silent.

4 For those who ask the question, “Aren't you a civil rights leader?” and thereby mean to exclude me from the movement for peace, I have this further answer. In 1957 when a group of us formed the Southern Christian Leadership Conference, we chose as our motto: “To save the soul of America.” We were convinced that we could not limit our vision to certain rights for black people, but instead affirmed the conviction that America would never be free or saved from itself until the descendants of its slaves were loosed completely from the shackles they still wear. . . . Now, it should be incandescently clear that no one who has any concern for the integrity and life of America today can ignore the present war. If America's soul becomes totally poisoned, part of the autopsy must read: Vietnam. It can never be saved so long as it destroys the deepest hopes of men the world over. So it is that those of us who are yet determined that America *will* be are led down the path of protest and dissent, working for the health of our land.

Write an essay in which you explain how Martin Luther King Jr. builds an argument to persuade his audience that American involvement in the Vietnam War is unjust. In your essay, analyze how King uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of his argument. Be sure that your analysis focuses on the most relevant features of the passage.

Your essay should not explain whether you agree with King's claims, but rather explain how King builds an argument to persuade his audience.

¹ A crude bomb made from glass bottles filled with flammable liquids and topped with wicks

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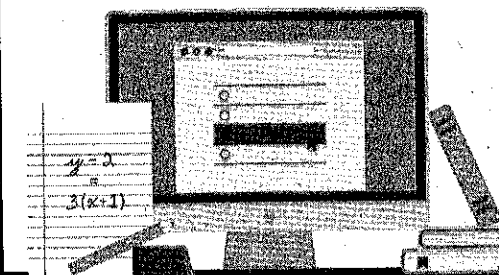
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The SAT[®] and SAT Subject Tests[™] Calendar 2016-17

Deadlines expire at 11:59 p.m. U.S. Eastern Time.

Test Dates*	2016			2017				
	Oct 1	Nov 5	Dec 3	Jan 21	Mar 11	May 6	Jun 3	
Domestic Registration Deadline	Sep 1	Oct 7	Nov 3	Dec 21	Feb 10	Apr 7	May 9	
Domestic Late Registration Deadline, Paper	Sep 13	Oct 18	Nov 15	Jan 3	Feb 21	Apr 18	May 16	
Domestic Late Registration Deadline, Online and Phone	Sep 20	Oct 25	Nov 22	Jan 10	Feb 28	Apr 25	May 24	
International Registration Deadline	Sep 1	Oct 7	Nov 3	Dec 21	Not Available	Apr 7	May 9	
International Early Registration Deadline**	Aug 22	Sep 21	Oct 19	Dec 7		Mar 22	Apr 25	
SAT	•	•	•	•	•	•	•	
SAT Subject Tests								
Biology E/M, Chemistry, Physics	•	•	•	•	SAT Subject Tests are not offered on this date.	•	•	
Literature	•	•	•	•		•	•	
Mathematics Levels I and II	•	•	•	•		•	•	
United States (U.S.) History	•	•	•	•		•	•	
World History			•				•	
Languages: Reading Only								
French, Spanish	•		•	•			•	•
German, Italian, and Modern Hebrew								•
Latin			•					•
Languages with Listening <i>You may take only one listening test on this date.</i>								
Chinese, French, German, Japanese, Korean, and Spanish		•						

Domestic Registration: sat.org/register

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International Fees: sat.org/intl-fees

Fee Waivers: sat.org/fee-waivers

* Sunday tests are given the next day, except for Oct. 9, 2016, and March 19, 2017.

**If registering through a representative, you will need to submit by the early registration deadline.

Be sure to review the test calendar carefully as not all subjects are offered on every test date.

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