Your Best Resource for the New SAT

The Princeton Review

11 Mathematics Practice Tests for the NEW SAT* & PSAT

Free Access to Online Help

The Staff of The Princeton Review

- 11 total practice tests: 10 New SATs and one New PSAT
- Detailed explanations for every question
- Personalized score reports accessible online
- Optional online essay grading by SAT experts

New Sat
Mathematics
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The New SAT

WHAT IS THE NEW SAT?

The SAT I, which has not changed much since 1994, will be significantly changed as of March 2005. If you're lucky, you may not be familiar with the old SAT. And this book contains practice tests and advice targeting only the new test, the one on which you are focused, so you won't be confused.

The new SAT I—from now on we'll refer to it as simply the SAT—runs 3 hours and 45 minutes and is divided into ten sections:

- Two 25-minute Math sections
- One 20-minute Math section
- Two 25-minute Critical Reading sections
- One 20-minute Critical Reading section
- One 25-minute multiple-choice Writing section
- One 10-minute multiple-choice Writing section
- One 25-minute essay section
- One additional 25-minute Writing, Math, or Critical Reading experimental section

The essay will be the first section of the SAT and will take 25 minutes. Be sure to visit your online resources for the latest updates on the SAT's format and a whole lot more!

HOW IS THE NEW SAT SCORED?

Four to five weeks after you take the SAT, you'll receive a report containing your Math, Critical Reading, and Writing scores. You may choose to access your scores online, in which case you'll get them a little faster. Each score will be reported on a scale that runs from 200 to 800, and the average student scores around 500. Scores go up or down in increments of 10 points.

The total maximum score is now 2400 points instead of 1600. (Before you know it, you'll be able to brag to older folks that their 1400s are nothing compared to your SAT scores.) You'll also hear about two other kinds of scores in connection with the SAT and other standardized tests: raw score and percentile scores. Your raw score is simply the number of questions you answered correctly, minus a fraction of the number of questions you answered incorrectly, and is used to calculate your final scaled score (200 to 800). A percentile score tells you how you did in relation to everyone else who took the test. If your score is in the 60th percentile, it means you did better on the test than 60 percent of the people who took it. People who are disappointed by their SAT scores can sometimes cheer themselves up by looking at their percentile scores.

WHERE DOES THE SAT COME FROM?

The SAT is published by the Educational Testing Service (ETS). ETS is a big company. It sells not only the SAT, but also about 500 other tests, including ones for CIA agents, golf pros, travel agents, firefighters, and barbers. ETS is located outside of Princeton, New Jersey, on a beautiful 400-acre estate that used to be a hunting club. The buildings where the SAT is written are surrounded by woods and hills. There is a swimming pool, a goose pond, a baseball diamond, lighted tennis courts, jogging trails, an expensive house for the company's president, a chauffeured motor pool, and a private hotel where rooms cost more than $200 a night.

You may have been told that ETS is a government agency or that it's part of Princeton University. It is neither. ETS is just a private company that makes a lot of money selling tests. The company that hires ETS to write the SAT is called the College Entrance Examination Board, or the College Board.

What Does the SAT Measure?

If you are like most high school students, you think of the SAT as a test of how smart you are. If you score 800 on the Verbal section (now called Critical Reading), you probably think of yourself as a "genius"; if you score 200, you probably think of yourself as an "idiot." You may even think of an SAT score as a permanent label, like your Social Security number. ETS encourages you to think this way by telling you that the test measures your ability to reason and by claiming that you cannot significantly improve your score through special preparation.

Nothing could be further from the truth. The SAT isn't a test of how well you reason, and it isn't a test of how smart you are. More than anything else, it's a test of how good you are at taking the SAT.

Can you learn to be better at taking the SAT? Of course you can. That's what this book is all about. You can improve your SAT score in exactly the same way you would improve your grade in chemistry: by learning the material you are going to be tested on. Let's get to know this test.

What Has Changed on the New SAT?

If you have not seen the old test, don't sweat it: In this book (and in general), you will focus exclusively on the new test. For those who do know the old SAT, the new test includes the following changes:

- The Verbal sections have been renamed "Critical Reading" but will still be scored on a scale that runs from 200 to 800. The best score will remain an 800, with the average score around 500.
- The new SAT includes a Writing section, which is scored in three parts: a student-written essay and two sections of multiple-choice grammar questions. For the essay, you will have to take a position on an issue and use examples to support your position. The multiple-choice questions will include grammar and usage questions very similar to those on the SAT II: Writing test and the writing skills section of the PSAT.
- On the Critical Reading sections of the new SAT, the analogy questions have been eliminated, and new, shorter critical reading passages with questions have been added.
- On the Math section of the new SAT, the quantitative comparison questions have been eliminated, and new, slightly more advanced topics have been added. Topics include exponential growth, absolute value, and functional notation. More emphasis is placed on additional topics such as linear functions, manipulating exponents, and tangent lines.
- Total testing time on the new SAT will be increased to 3 hours and 45 minutes, which is 45 minutes longer than the old test.

Why Is the Test Changing? The College Board's Excuse

The College Board, who administers the SAT, has said the following: "The new SAT will improve the alignment of the test with current curriculum and institutional practices in high school and college. By including a third measure of skills—writing skills—the new SAT will help colleges make better admissions and placement decisions. In that way, the new SAT will reinforce the importance of writing throughout a student's education."

Why Is the Test Changing? The Rest of the Story

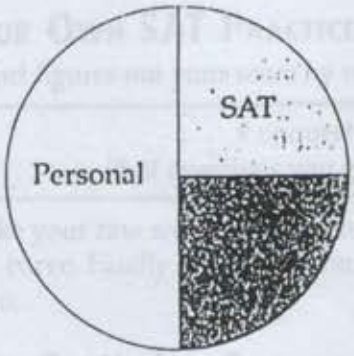
In February of 2001, the president of the University of California (UC) system made a speech asking UC to drop the SAT from its admissions requirements because the exam did not fulfill its goals. The UC system is the College Board's biggest client. Understandably, the College Board decided to change its business philosophy.

We've often said that a standardized test can best be judged by the behaviors it spawns in students or schools. The president of the UC system had noticed groups of teachers and students practicing techniques for SAT analogy questions instead of improving real skills. Students came home and told their parents things like, "We learned analogy techniques in third-period English today."

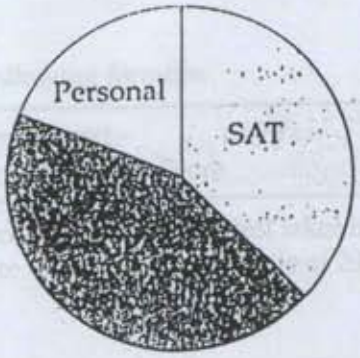
In any case, the real driver of the changes was that the test needed a facelift to keep it around and in use for another 10 years—or at least until the next time that an important educator challenges it! By the time you're done preparing for the new SAT, you'll agree: The new SAT, while a bit different on the surface, is still a bad standardized test. And unfortunately, this bad test still matters.

How Important Are SAT Scores?

Whether the old or new test, the SAT is an important factor when you apply to colleges. But it is not the only factor. A rule of thumb: The larger the college, the more important the SAT score. Small liberal arts colleges will heavily weigh your extracurricular activities, interview, essays, and recommendations. Large state universities, on the other hand, often admit students based on formulas consisting mostly of just two ingredients: test scores and grade point average.



Small Liberal Arts Colleges



Large State Universities

Even at a small liberal arts college, however, SAT scores can be a deciding factor. If your scores fall below a school's usual range, admissions officers will look very critically at the other elements in your application. For most college applicants, their SAT scores are the equivalent of a first impression. If your scores are good, an admissions officer will be more likely to give you the benefit of the doubt in other areas.

WHAT IS THE PRINCETON REVIEW?

The Princeton Review is the nation's largest SAT-preparation company. We give courses in over 500 locations and online, and we publish best-selling books and software to get students ready for this test. We also prepare students and schools for the PSAT, ACT, GRE, GMAT, LSAT, MCAT, USMLE, TOEFL, and a host of other national and state standardized tests.

The Princeton Review's techniques and tools are unique and powerful. Our team of crack experts in Research & Development (R&D) created them after spending countless hours scrutinizing real SATs, analyzing them with computers, and proving our theories with real students. Our methods are widely imitated, but no one else achieves our score improvements. And with the change to the SAT, it will take some time for others to catch up with our R&D through their usual methods: Rip off & Duplicate Princeton Review stuff. You're in the right place.

WHAT IS THE BEST WAY TO PREPARE FOR THE SAT?

First off, take your time. Do not try to prep in the week before the test. Ideally, you should spread the work out over a month or two. Second, give it some effort. The SAT is important enough to spend 40 hours getting ready. Just taking four practice tests will use up a third of that time; the rest should be spent reviewing the basic skills tested by the items you're getting wrong and practicing your pacing and test-taking skills.

Should you take a course or get a tutor? It depends on the gains you're looking for. A good course or tutor should enable you to raise your scores 200 points or more on this new SAT—and should be able to prove it. But if your scores are pretty good to begin with, or if you work very well on your own, you're probably fine with a book or CD-ROM.

HOW TO USE THIS BOOK

Scoring Your Own SAT Practice Test

The College Board figures out your score by using the following formula:

# of questions you get correct – (# of questions you get incorrect ÷ 4) = Raw Score

They then take your raw score, along with the raw score of every other test taker in the country, and figure out a curve. Finally they assign each raw score to a number on a scale of 200–800. This is your scaled score.

How Do I Figure Out My Score?

To figure out your scaled score for each subject, use the worksheet that follows every SAT practice test. Let's look at the subjects one at a time:

Writing

Step One Count up the number of your correct answers for the multiple-choice Writing Section. This is the number that goes in the first box.

Step Two Count up the number of your incorrect answers for the multiple-choice Writing Section. Divide this number by 4 and place this number in the second box.

Step Three Subtract the second number from the first. This is your Raw Subscore. This is the number that goes in the third box.

Step Four Look up the number from the third box in the Writing Multiple-Choice Subscore Conversion Table on the next page. This is your Scaled Subscore.

Step Five The essay is scored on a scale from 2–12. It is based upon the score that two graders give you, each on a scale from 1–6. The number that you should put in the fourth box depends upon how it was scored. If your essay is self-graded on a 1–6 scale, then double that number so that it is from 2–12. If your essay was graded by the Princeton Review then it already is on a 2–12 scale. Take your 2–12 grade and double it so that it is from 4–24. This is the number that goes in the fourth box.

Step Six Subtract the fourth box from the third. This is your Raw Score. This number goes in the fifth box.

Step Seven Look up the number from the fifth box in the SAT Score Conversion Table on the next page. This is your Scaled Score.

Critical Reading

Step One Count up the number of your correct answers for the three Critical Reading sections of the test. This is the number that goes in the first box.

Step Two Count up the number of your incorrect answers for the three Critical reading sections of the test. Divide this number by 4. This is the number that goes in the second box.

Step Three Subtract the second number from the first. This is your Raw Score. This is the number that goes in the third box.

Step Four Look up the number from the third box in the SAT Score Conversion Table on the next page. This is your Scaled Score.

Math

Step One Count up the number of correct grid-in answers. This is the number that goes in the first box.

Step Two Count up the number of your correct answers for the multiple-choice questions in the three Math sections of the test. This is the number that goes in the second box.

Step Three Count up the number of your incorrect answers for the multiple-choice questions in the three Math sections of the test. Do NOT include any grid-in questions you may have answered incorrectly. Divide this number by 4 and place this number in the second box.

Step Four Subtract the second number from the first. This is your Raw Score. This is the number that goes in the third box.

Step Four Look up the number from the third box in the SAT Score Conversion Table on the next page. This is your Scaled Score.

Scoring Your Own PSAT Practice Test

The College Board figures out your score by using the following formula:

# of questions you get correct –
(# of questions you get incorrect ÷ 4) = Raw Score

They then take your raw score, along with the raw score of every other test taker in the country, and figure out a curve. Finally they assign each raw score to a number on a scale of 200–800. This is your scaled score.

How Do I Figure Out My Score?

To figure out your scaled score for each subject, use the worksheet that follows the PSAT practice test. Let's look at the subjects one at a time:

Critical Reading

Step One Count up the number of your correct answers for the 2 Critical Reading sections of the test. This is the number that goes in the first box.

Step Two Count up the number of your incorrect answers for the 2 Critical reading sections of the test. Divide this number by 4. This is the number that goes in the second box.

Step Three Subtract the second number from the first. This is your Raw Score. This is the number that goes in the third box.

Step Four Look up the number from the third box in the Score Conversion Chart on the next page. This is your Scaled Score.

Math

Step One Count up the number of your correct answers for the 2 Math sections of the test. This is the number that goes in the first box.

Step Two Count up the number of your incorrect answers for the 2 Math sections of the test. Do NOT include any GRID IN questions you may have answered incorrectly. Divide this number by 4 and place this number in the second box.

Step Three Subtract the second number from the first. This is your Raw Score. This is the number that goes in the third box.

Step Four Look up the number from the third box in the Score Conversion Chart on the next page. This is your Scaled Score.

Writing

Step One Count up the number of your correct answers for the Multiple Choice Grammar Section. This is the number that goes in the first box.

Step Two Count up the number of your incorrect answers for the Multiple Choice Grammar Section. Divide this number by 4 and place this number in the second box.

Step Three Subtract the second number from the first. This is your Raw Score. This is the number that goes in the third box.

Step Four Look up the number from the fourth box in the Score Conversion Chart on the next page. This is your Scaled Score.

Getting the Most from Your Tests

We recommend five general approaches to using this book.

1. **Simulate the test experience by taking full, timed tests.** It would be pretty difficult to run a marathon without running just a bit before race day. Likewise, you will not want to risk taking the actual SAT without having trained yourself to test for nearly four hours. As we do in our courses, we recommend that you use at least four of the tests in this book as timed test simulations and space them out over your preparation calendar.
2. **Analyze your performance.** Taking test after test will help. But it will help more if you evaluate your work, learn from your mistakes, and adjust your approach before taking another test. For additional assistance here, be sure to access your free diagnostic score reports online after taking each test.
3. **Review—especially in areas of weakness.** Another benefit of the analysis of your performance after each test is that you can isolate your strengths and weaknesses. If you spend your time and energy on those areas of the test on which you need the most improvement, you'll make the most of your preparation time.
4. **When not testing, drill.** While taking full-length tests is critical, it's not the only way to use the tests in this book. If you've been focused on reviewing your math skills, for example, take a timed Math section or two in one of the tests to gauge your improvement.
5. **Use this book in conjunction with additional test preparation advice and resources.** You'll certainly pick up many of our strategies in the explanations to each question. But we also strongly recommend using the test practice strategies you may have learned elsewhere, perhaps in our *Cracking the SAT* book!

With that all being said, it's finally time to turn you loose. Good luck with the rest of this book, and good luck with preparing for the SAT!

Practice Test 1

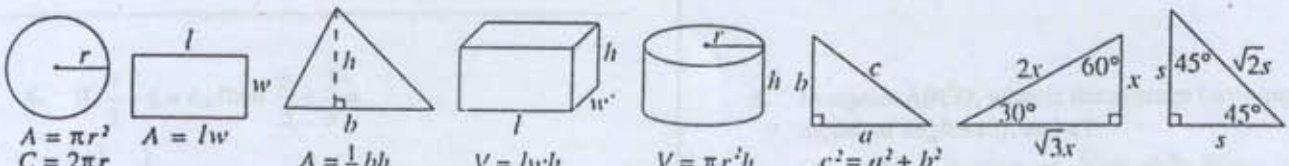
SECTION 2
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $\frac{4}{2x} = 1$, then $x =$

(A) 4

(B) 2

(C) 1

(D) $\frac{1}{2}$

(E) $\frac{3}{4}$

2. If the units digit of a four-digit number is 0, the number must be which of the following?

(A) Positive
(B) Divisible by 2
(C) Odd
(D) Divisible by 4
(E) Prime

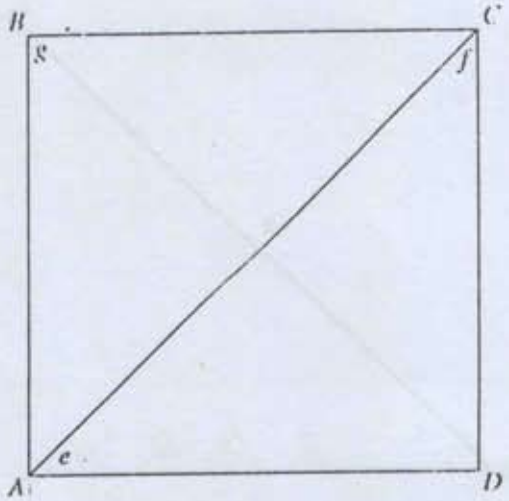
GO ON TO THE NEXT PAGE

3. For all possible values of a, if $a \bullet \frac{b}{2} = \frac{a}{2}$, what MUST b equal?

(A) $\frac{a}{2}$
(B) 0
(C) a
(D) 1
(E) $-a$

4. If $\frac{p}{3} - 4 = 6$, then $\frac{p}{3} + \frac{2}{3} =$

(A) 1
(B) p
(C) $\frac{32}{3}$
(D) 10
(E) $\frac{2p}{9}$



5. In square $ABCD$, what is the average (arithmetic mean) of angles e, f, and g?

(A) 45
(B) 60
(C) 90
(D) 100
(E) 180

6. If n is an odd integer greater than 9, then in terms of n, what would be the smallest even integer greater than n?

(A) $n + 3$
(B) $n - 5$
(C) n^2
(D) $5n$
(E) $n + 1$

GO ON TO THE NEXT PAGE

If f and m are integers, then $f - m$ is not greater than 5.

7. The statement above is true if

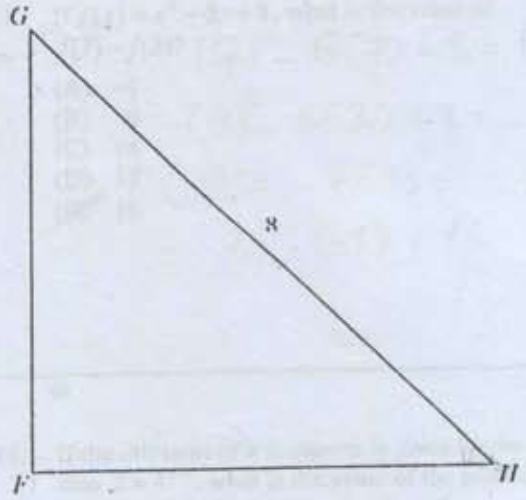
(A) $f = 10, m = -5$
(B) $f = 6, m = -1$
(C) $f = 8, m = 2$
(D) $f = 7, m = 1$
(E) $f = 2, m = -3$

8. In order to generate fractions, one standard six-sided die is rolled twice in a row. The result of the first roll is recorded as the numerator, and the result of the second roll is recorded as the denominator. The fractions are reduced, if possible. How many distinct fractions between 0 and 1 can be generated by this method?

(A) 15
(B) 11
(C) 9
(D) 8
(E) 7

9. If it takes a group of 10 people 5 hours to pick 300 apples, how many hours would it take 1 person to pick 300 apples?

(A) 25
(B) 50
(C) 100
(D) 200
(E) 250



Note: Figure not drawn to scale.

10. If ΔFGH is isosceles and $FG < 3$, which of the following statements must be true?

(A) $GH < GF$
(B) $GH = FH$
(C) $GF = GH$
(D) $FH < FG$
(E) $FH > GH$

11. Which of the following is the sum of 150 percent of 2 and 100 percent of 2?

(A) 2
(B) 3
(C) 5
(D) 100
(E) 150

GO ON TO THE NEXT PAGE

12. For $x > 0$, what is $\frac{7x}{2} + \frac{1}{4x}$?
(A) $3.5x$
(B) $14x$
(C) $28x$
(D) $14x^2$
(E) $28x^2$

13. If a cylindrical can with a radius of 2 feet and a volume of 30π cubic feet is filled up half way with water, how high up the side of the can will the water reach?

(A) $\frac{15}{4}$ feet

(B) 5 feet

(C) $\frac{15}{2}$ feet

(D) $\frac{19}{2}$ feet

(E) 10 feet

14. What is the greatest possible integer for which half that integer is less than -3.5?
(A) -15
(B) -12
(C) -10
(D) -8
(E) -7

15. If $f(x) = x^2 - 6x + 8$, what is the value of $f(7) - f(3)$?
(A) -1
(B) 0
(C) 14
(D) 15
(E) 16

16. If the nth term of a sequence is given by the expression $2 \times 4^{n-1}$, what is the value of the units digit of the 131st term in the sequence?
(A) 0
(B) 2
(C) 3
(D) 6
(E) 8

17. If $y = g^2 - h^2$, what is $\frac{y(g+h)}{(g-h)}$?
(A) $g^2 - h^2$
(B) $(g+h)^2$
(C) $g + h$
(D) $g - h$
(E) $(g-h)^2$

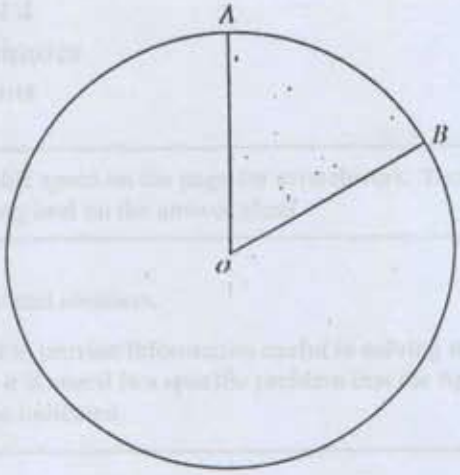
GO ON TO THE NEXT PAGE

18. A circle with center A has its center at $(6, -2)$ and a radius of 4. Which of the following is the equation of a line tangent to the circle with center A?

(A) $y = 3x + 2$
(B) $y = 2x + 1$
(C) $y = -x + 5$
(D) $y = -2$
(E) $y = -6$

19. In a square with vertices $WXYZ$, if point V is the midpoint of side YZ and the area of triangle XYV is $\frac{4}{5}$, what is the area of square $WXYZ$?

(A) 2
(B) $\frac{8}{5}$
(C) 4
(D) $\frac{16}{5}$
(E) $\frac{18}{5}$



20. In the figure above, the length of minor arc AB is $\frac{\pi}{2}$ and the area of the shaded region is $\frac{1}{6}$ the area of the entire circle. What is the radius of a circle that is $\frac{1}{2}$ the area of the above circle?

(A) 9
(B) $\frac{9}{8}$
(C) $\frac{3\sqrt{2}}{4}$
(D) $\left(\frac{9}{8}\right)^2$
(E) $\frac{9\sqrt{2}}{8}$

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 4
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

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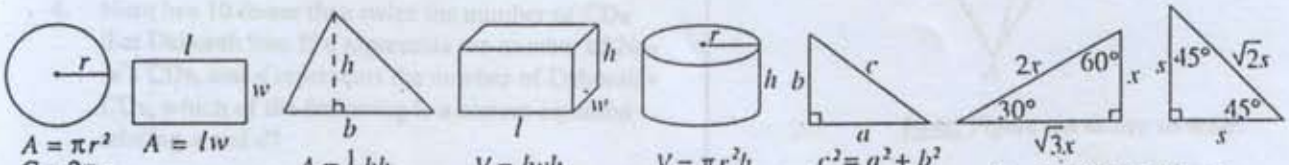


$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

DISTANCE TRAVELED BY A MIGRATORY BIRD			
Hours	5	10	t
Miles	249	498	996

1. In the table above, the total distance traveled by a particular migratory bird was recorded after various numbers of hours in flight. If migratory birds travel at a constant speed, what is the value of t?
   (A) 12
   (B) 15
   (C) 20
   (D) 25
   (E) 50

2. If $y^2 = \sqrt{x}$ and $y = 3$, what is the value of x?
   (A) 81
   (B) 27
   (C) 9
   (D) 3
   (E) −3

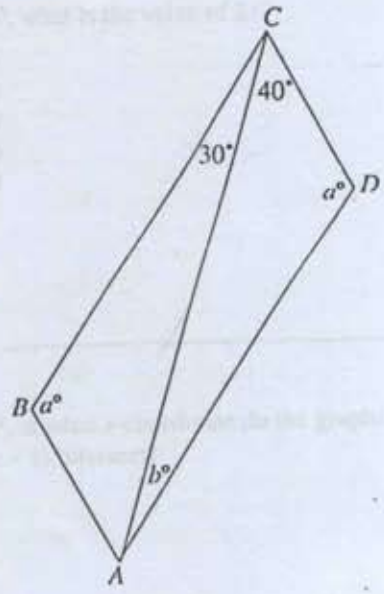
GO ON TO THE NEXT PAGE

3. A circular pizza is sliced into 12 equal slices. Doug cuts each slice from the center to the edge in equal parts. If Doug eats 2 slices, what is the sum of the degree measures of the slices he eats?

(A) 20
(B) 60
(C) 120
(D) 220
(E) 240

4. Nora has 10 fewer than twice the number of CDs that Deborah has. If n represents the number of Nora's CDs, and d represents the number of Deborah's CDs, which of the following is a correct equation relating n and d?

(A) $n = 2d - 10$
(B) $n = 2(d - 10)$
(C) $n = 10 - 2d$
(D) $n = 2(10 - d)$
(E) $n = 10 - (d + 2)$



Note: Figure not drawn to scale.

5. In parallelogram $ABCD$ above, what is the value of $2a + b$?

(A) 120
(B) 180
(C) 240
(D) 250
(E) 320

GO ON TO THE NEXT PAGE

6. If $f(x) = |-7x + 1|$, then $f(5) =$

(A) −36
(B) −34
(C) 34
(D) 35
(E) 36

7. $\dfrac{2x^2 + x - 28}{x^2 - 3x - 28} =$

(A) $\dfrac{2x-7}{x-7}$

(B) $\dfrac{2x+1}{x-3}$

(C) $\dfrac{x-2}{x+14}$

(D) $-\dfrac{2}{3}$

(E) The expression cannot be simplified.

8. Malik's collectibles consist of 5 baseball cards with an average value of 6 dollars each, 3 rare coins worth a total of 12 dollars, and 2 old comic books of unknown value. The information in which of the following statements would allow Malik to figure out the average value of his collectibles?

I. The total value of his collectibles
II. What percent greater the average value of a baseball card is than the average value of a rare coin
III. The sum of the average values of the baseball cards, rare coins and comic books

(A) I only
(B) II only
(C) I and II
(D) I and III
(E) I, II, and III

9. If $2^{4x-4} = 16^5$, what is the value of $2x$?

(A) 2.25
(B) 4.50
(C) 5.50
(D) 6.00
(E) 12.00

10. If $f(x) = 3x^2$, at what x-coordinate do the graphs of $f(x)$ and $f(x-1)$ intersect?

(A) $-\dfrac{1}{2}$

(B) $\dfrac{1}{2}$

(C) $\dfrac{3}{4}$

(D) 2

(E) 3

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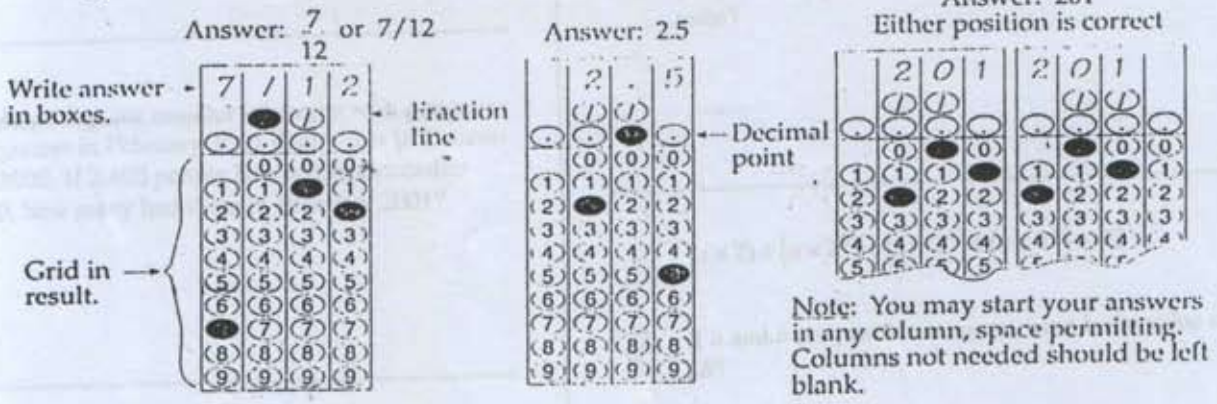
Directions for Student-Produced Response Questions

Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

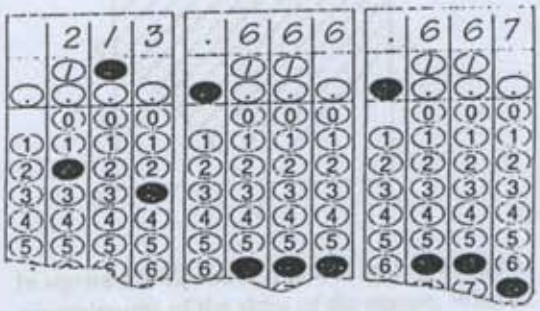


Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If 2 1 / 2 is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)

- **Decimal Accuracy:** If you obtain a decimal answer, **enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3} = .6666\ldots$



11. If $f(x) = 3x - 5$, what is the value of $f(7) - f(4)$?

12. The first term in a sequence is 8. Every term after the first is obtained by multiplying the term immediately preceding it by $1\frac{1}{2}$. For example, the second term is 12 because $8 \times 1\frac{1}{2} = 12$. What is the 4th term in the sequence?

13. If $2.5x = 25$, what is the value of $\frac{1}{x+10}$?

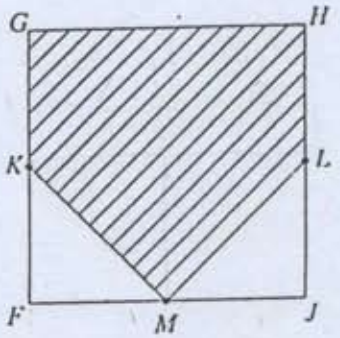
14. In a large city, the number of people with pets was 6% greater in February 2001 than it was in December 2000. If 2,400 people had pets in December 2000, how many had them in February 2001?

15. In the rectangular coordinate plane, what is the distance between the points (2, 6) and (10, −9)?

16. The faces of a cube are numbered with integers from 1 to 6 so that the sum of the numbers on opposite faces is 7. Thus, 1 is opposite 6, 2 is opposite 5, and 3 is opposite 4. If the cube is thrown on a flat surface so that 4 shows on the top face, what is the probability that 6 is on the bottom face of the cube?

$$(a\times 2)+(a\times 2^2)+(b\times 2^3)+(b\times 2^4)=42$$

17. If a and b are positive integers, what is the value of ab?



18. In square $FGHJ$ above, $FG = 2$, and K, L, and M are midpoints of the sides of the square. What is the area of the shaded region?

19. A farm has chickens that lay only white eggs and brown eggs. On a certain day, the chickens lay a total of 750 eggs in which the ratio of white eggs to brown eggs is 7:3. If the ratio of white eggs to brown eggs is to be changed to 3:4 by adding only brown eggs, how many brown eggs must be added?

20. The average (arithmetic mean) of five positive even integers is 60. If p is the greatest of these integers, what is the greatest possible value of p?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

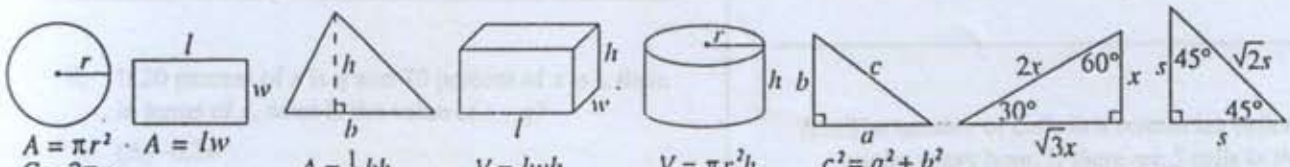
SECTION 6
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$ · $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$

Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $10 + a + a - a = -a + a + a + a + a + 6$, what is the value of a?
   (A) 0
   (B) 1
   (C) 2
   (D) 3
   (E) 8

2. The figure above is a parallelogram. What is the value of y?
   (A) 50
   (B) 55
   (C) 60
   (D) 65
   (E) 70

GO ON TO THE NEXT PAGE

3. If $0 < a$ and $b < 0$, which of the following must be true?

(A) $a + b = 0$

(B) $\frac{a}{b} < 0$

(C) $a + b < 0$

(D) $a + b > 0$

(E) $ab > 0$

4. If 20 percent of x is q and 70 percent of x is t, then, in terms of x, what is the value of $t - q$?

(A) $0.2x$
(B) $0.3x$
(C) $0.4x$
(D) $0.5x$
(E) $0.6x$

$$\begin{array}{r} 6P \\ -2P \\ \hline 4R \end{array}$$

5. Assume that the above subtraction problem with digits P and R is without error. If P and R are not equal to each other, how many distinct digits from 0 to 9 could R symbolize?

(A) One
(B) Four
(C) Five
(D) Nine
(E) Ten

$f(x)$	x
0	10
9	d
d	c

6. According to the figure above, $f(x) = \frac{1}{2}x - 5$ what is the value of c?

(A) 28
(B) 30
(C) 66
(D) 70
(E) 94

7. The number of cells in a certain lab experiment triples every hour. If there are 5 cells in the culture initially, then what is the number of cells in the culture after 4 hours?

(A) 15
(B) 20
(C) 135
(D) 405
(E) 1,875

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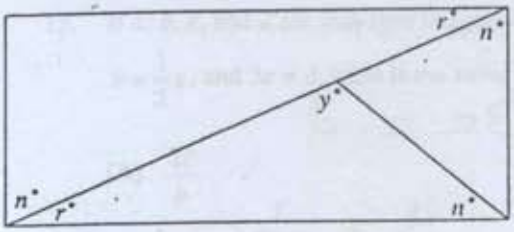


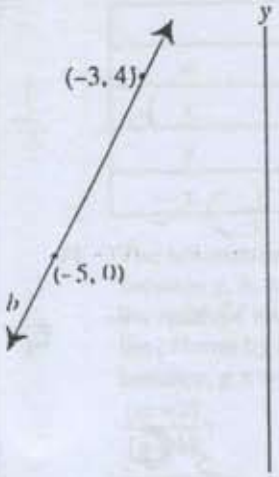
Note: Figure not drawn to scale.

8. In the rectangle above, what is the value of y?

(A) 85
(B) 90
(C) 95
(D) 100
(E) 120

9. Which of the following points is NOT in the solution set of $|-x|-|-y|=1$?

(A) $(-2, -3)$
(B) $(-7, -6)$
(C) $(4, -3)$
(D) $(-5, 4)$
(E) $(6, 5)$



10. If a line passes through points $(-3, 4)$ and $(-5, 0)$ on the xy-plane, what is the slope of line b?

(A) -2
(B) $-\frac{1}{2}$
(C) 0
(D) $\frac{1}{2}$
(E) 2

11. If $3^{3y} = 216$, what is the value of 3^y?

(A) 6
(B) 12
(C) 24
(D) 36
(E) 72

GO ON TO THE NEXT PAGE

12. If a, b, c, and d are non-zero integers and $2a = 3b$, $b = \frac{1}{2}c$, and $3c = d$, what is the value of $\frac{d}{a}$?

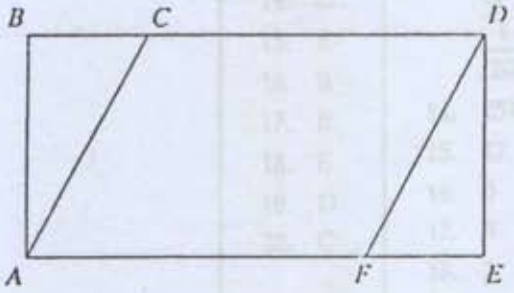
(A) $\frac{2c}{b}$

(B) bc

(C) ac

(D) $12c$

(E) $\frac{2c}{a}$



Note: Figure not drawn to scale.

13. In the figure above, $ABDE$ is a rectangle. The length of $\overline{BD}$ is 13, the length of $\overline{CD}$ is 5, and the length of $\overline{AC}$ is 10. What is the area of parallelogram $ACDF$?

(A) 24
(B) 30
(C) 50
(D) 60
(E) 78

	g	h
w	120	
x		28
y	216	
z	264	44

14. The information above shows the relationships between g, h, and w, x, y, z. Each number shown is the result of multiplying the number at the top of the column by the leftmost number on its row. For instance, $g \times w = 120$. If $y = 9$, what is the value of $\frac{(w \times z)}{(g + h)}$?

(A) 0.509
(B) 0.573
(C) 1.964
(D) 10.25
(E) 15.00

15. The shortest distance from the center of a wheel to the outside of its rim is 2.5 feet. The wheel rolls along smooth ground without slipping at a rate of 352 revolutions per minute. What is the rate of travel in miles per hour of a point on the outside of the rim of the wheel? (1 mile = 5,280 feet)

(A) 5π
(B) 17π
(C) 20π
(D) 30π
(E) 38π

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 1: ANSWER KEY

2 Math	4 Math	6 Math
1. B	1. C	1. C
2. B	2. A	2. E
3. D	3. B	3. B
4. C	4. A	4. D
5. B	5. D	5. A
6. E	6. C	6. C
7. E	7. A	7. D
8. B	8. D	8. B
9. B	9. E	9. A
10. B	10. B	10. E
11. C	11. 9	11. A
12. D	12. 27	12. A
13. A	13. .05 or $\frac{1}{20}$	13. B
14. D	14. 2544	14. C
15. E	15. 17	15. C
16. B	16. 0	
17. B	17. 3	
18. E	18. 3	
19. D	19. 475	
20. C	20. 292	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	690	21	490
70		45	680	20	480
69		44	670	19	480
68		43	670	18	470
67		42	660	17	460
66		41	660	16	450
65		40	650	15	440
64		39	640	14	430
63		38	630	13	430
62		37	620	12	420
61		36	620	11	410
60		35	610	10	400
59		34	600	9	390
58		33	590	8	390
57		32	580	7	380
56		31	570	6	370
55	800	30	570	5	360
54	780	29	560	4	350
53	760	28	550	3	340
52	750	27	540	2	340
51	740	26	530	1	330
50	730	25	520	0	320
49	720	24	520	−1	310
48	710	23	510	−2	260
47	700	22	500	−3	200

Practice Test 1: Answers and Explanations

1. B To solve for x, first cross multiply to get $4 = 2x$, then divide both sides by 2 to get $x = 2$.

2. B This question is testing our knowledge of even numbers. Because the units digit is 0 (which means that the ones digit in the number is zero like in the number "2420"), we know we have an even number and all even numbers are divisible by 2.

3. D This question is testing our knowledge of the "Rules of 1." The left side of the equation could be rewritten so that $\frac{ab}{2} = \frac{a}{2}$. The only way this equation can work out is if $b = 1$ leaving us with just the $\frac{a}{2}$. Another way of attacking this question is to plug in the answer choices until you get one that works.

4. C First figure out what $\frac{p}{3}$ equals by adding 4 to both sides of the equation. So, $\frac{p}{3} = 10$. Now add $\frac{2}{3}$ to 10 and you get $10\frac{2}{3}$, which in improper fraction form is $\frac{32}{3}$.

5. B Since the figure is a square, we know that $g = 90$. If you draw the diagonal of a square you get two 45:45:90 triangles. So, $e = 45$ and $f = 45$. If we add all three angles, we get 180. To find their average, we divide 180 by 3 and get 60.

6. E The question asks us for an "odd integer greater than 9" so lets try $n = 15$. Then, the question asks us for the "next greater even integer" and that would be 16. So circle 16 and plug $p = 15$ into the answer choices until you find the one that gives you 16.

7. E Make sure to plug the answer choices into the question, but be careful of the "not" in the question. Start with (C). $8 - 2 = 7$ which is greater than 5 so get rid of (C). Try (D) next. $7 - 1 = 6$ which is greater than 5 so get rid of (D). Now try (E). $2 - (-3) = 5$ which is not greater than 5. Thus, (E) is the correct answer.

8. B The possible fractions are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{2}{3}, \frac{2}{5}, \frac{3}{4}, \frac{3}{5}, \frac{4}{5}$, and $\frac{5}{6}$. Be careful! Choice (A) is a trap because it includes the fractions that can be reduced and that are equal in value to fractions in the list above.

9. B Ten people working for 5 hours is 50 hours of total work. So, divide 300 by 50 to get the number of apples that are picked each hour. $\frac{300}{50} = 6$. To figure out how long it would take one person to pick 300 apples, we divide the number of apples by the rate of 6 apples per hour. So, $\frac{300}{6} = 50$.

10. B This question is testing our knowledge of basic triangle fundamentals. If this is an isosceles triangle, then two sides must be equal. The question tells us that $GH = 8$ and $FG < 3$. Using the "third side rule" we can put the boundaries on FH as $8 - 3 < FH < 8 + 3$ or $5 < FH < 11$. Since the triangle is isosceles the third side must be 8, not something less than 3, and thus $GH = FH$.

11. C Translate into algebra to get $\left(\frac{150}{100}\times 2\right)+\left(\frac{100}{100}\times 2\right) = 5$. (A) and (B) are partial answers.

12. D You can plug in a number for x, or remember that to divide two fractions, you multiply the first fraction by the reciprocal of the second fraction. So $\frac{7x}{2}\times\frac{4x}{1}=\frac{28x^2}{2}=14x^2$.

13. A We must first figure out the total height of the can. To do this we use the equation for volume of a cylinder. $V = \pi r^2 h$. The question gives us the total volume and the radius so we write, $30\pi = \pi(2)r^2 h$. The π's cancel each other out and we get $h = \frac{15}{2}$. If the can is filled half way then the water level will reach up half the height of the can so $\frac{15}{2}\bullet\frac{1}{2}=\frac{15}{4}$.

14. D Try plugging in the answer choices until you get a value that is less than –3.5. If we try (C) we get $\frac{-10}{2} = -5$. So, (C) is less than –3.5, but the question asks us for the "greatest possible integer" so we still have to try (D) and (E). For (D) we get –4 which is still less than –3.5. If we try (E) we get –3.5 which is equal to but not less than –3.5 which means our answer is (D).

15. E By substituting 7 and 3 for x in the given equation, you can determine that $f(7)$ is equal to 15 and $f(3)$ is equal to –1. Therefore, $f(7) - f(3)$ is equal to 16. (A) and (D) are partial answers.

16. B By plugging in small numbers for n, you can see that the units digit of the term in the sequence is 2 when n is odd and 8 when n is even. Since 131 is odd, the units digit of the term must be 2.

17. B Plug in $g = 5$ and $h = 3$, or solve:

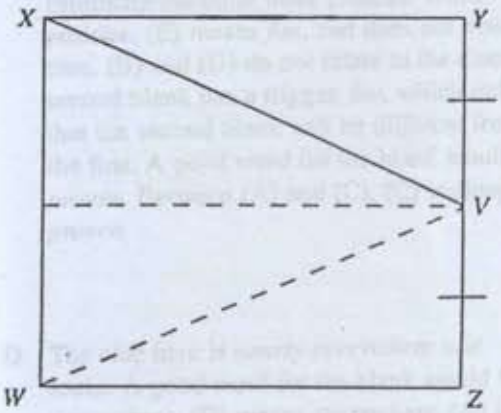
$$y = g^2 - h^2 = (g + h)(g - h)$$

$$y(g + h) = (g + h)^2(g - h)$$

$$\frac{y(g+h)}{(g-h)} = (g+h)^2$$

18. E A line tangent to a circle is a line that touches the edge of the circle but does not enter the circle. Sketch the coordinate plane and circle *A*, then plot the lines given in the answer choices. (A) and (B) do not intersect with the circle at all. (C) and (D) run across the circle rather than tangent to it. You can also use your graphing calculator if you are comfortable with the graphing functions.

19. D The question is describing a square like this:



If you imagine the dashed lines in this figure above, you can see that the triangle *XYV* takes up $\frac{1}{4}$ of the whole square. So, the square is 4 times the size of the triangle. The question tells us that the triangle has an area of $\frac{4}{5}$. So, $\frac{4}{5} \times 4 = \frac{16}{5}$.

20. C Since the question tells us that the area of the shaded region is $\frac{1}{6}$ the area of the whole circle, we also know that arc *AB* is $\frac{1}{6}$ the circumference of the circle. Thus, the total circumference is 3π. The radius of the circle is $r = \frac{3}{2}$. The area of the circle is $\frac{9}{4}\pi$. Half the area of this circle is $\frac{9}{4}\pi \bullet \frac{1}{2} = \frac{9}{8}\pi$. The radius of the new circle is $\sqrt{\frac{9}{8}}$ which is equal in value to $\frac{3\sqrt{2}}{4}$.

SECTION 3

1. C The clues *keystone* and *axis* both indicate a center of importance. A good word for the blank would be *connecting* or *joining*. (C) is the best answer choice. (D) is close in meaning to *support* and is not as strong as (C). (A), (B), and (E) do not relate to the clue.

2. C Start with the first blank. The clue is *acclaimed and popular album*. A good word for the blank would be *success*. (A) and (C) are close in meaning to success, so they should be kept. Eliminate the other three choices. While positive, (E) means *fun*, and does not match the clue. (B) and (D) do not relate to the clue. The second blank has a trigger, *but*, which indicates that the second blank will be different from the first. A good word for the blank would be *proven*. Between (A) and (C), (C) is closer to *proven*.

3. D The clue here is *nearly everywhere one looks*. A good word for the blank would be *everywhere*. (D) means *everywhere*. (A) is a word commonly associated with mosquitoes; it is a trap answer. None of the other answer choices agrees with the clue.

4. B The clue is *quieting the mind*. The trigger *even when* indicates that a word or phrase reflecting the body, rather than the mind, is needed here. (A) and (D) can be eliminated because they describe the mind's functions. (C) and (E) do not describe the body. (B) is correct because kinetic refers to movement, a function of the body.

5. E (E) is correct, as the proponents are acting in response to the opponents who do not want U.S. businesses included; this implies a word such as *changed* for the first blank. Only (E) and (B) fit this clue. The clue for the second blank, *opponents had threatened*, indicates a word meaning negative action, such as *stop* or *block*, so (B) is eliminated.

6. B The best phrase for the blank is *emphatically refuse*, recycled from the clue. *Repudiate* means to emphatically reject as untrue, and is closest in meaning. A xenophobe would not see open immigration as culturally beneficial, which eliminates (A), (C), and (D). (E) is a trap answer, because a xenophobe is someone who has unreasonable fear of foreign people or experiences, but fear doesn't fit the definition of emphatic refusal.

7. A The clue, *his unparalleled talents would ultimately...*, means that the rookie is skilled, and that this skill will bring the team up from last place. Words that fit into the blanks would be *skilled* and *save*, and the best answer choice is (A). (B) and (D) work for the second blank, but not the first.

8. A (A) is correct because the author uses the word *interestingly* and seems intrigued by the relationship between Warhol, his art, and his audience. There is no evidence in the passage for any of the other answer choices.

9. B (B) is correct because the author indicates why the art was *not a pleasant sight for fans of Monroe*: They were used to seeing beautiful photographs of her. (A) and (C) are extreme. (D) and (E) are not indicated by the passage.

10. D (D) is correct because Norman is saying that the future of the universe (its expansion or contraction) depends on the value of omega and whether it is greater or less than one. (B) is contradicted by information in the passage. There is no evidence in the passage for (A), (C), or (E).

1. C Set up a proportion and solve for s: $\frac{10}{498} = \frac{t}{996}$.

Cross multiply to get $966 \times 10 = 498 \times t$.

So, $498t = 9960$. Divide by 498 to get $t = \frac{9960}{498} = 20$. This problem can also be solved by estimating. Since 996 is twice as big as 498, t is twice as big as 10. Only (C) is close to twice the value of 10.

2. A Since we know that $y = 3$, we can substitute 9 for y^2 in the first equation: $9 = \sqrt{x}$. Square both sides and get $x = 81$, (A).

3. B Divide 360 degrees (in a circle) by 12 to get 30 degrees for each slice. If Doug eats two of these slices, he will have eaten $2 \cdot 30 = 60$, answer choice (B).

4. A If Nora had twice the CDs that Deborah has, it would be represented as $n = 2d$. Since Nora has 10 less than that number, we get $n = 2d - 10$.

5. D The value of angle b is 30 because of opposite interior angle principles formed by the diagonal. The value of either angle a is 110 because of parallel lines principles. Add the three angles to find the sum: 250 degrees.

6. C Substituting 5 for x, $f(5) = |-35 + 1| = |-34| = 34$. Remember, you're looking for the absolute value. Choice (B) is a trick answer.

7. A The numerator factors to $(x + 4)(2x - 7)$, and the denominator factors to $(x + 4)(x - 7)$.

Cancel the like terms to get $\frac{2x-7}{x-7}$.

8. D The information in statements I and III would give enough information to figure the average value of all the collectibles. Dividing the total value of all the collectibles (statement I) by the total number of collectibles would yield the average value of the collectibles. Subtracting the average value of the baseball cards and rare coins from the sum total of the average values (statement III) would yield the average value of the comic books. Using that value, the total value, and then the average, of all the collectibles could be determined. Statement II is of no use: we still need to know the value of the comic books in order to calculate the total average value of the collectibles.

9. E $16^5 = (2^4)^5 = 2^{20}$. So, $2^{4x-4} = 2^{20}$. Thus, $4x - 4 = 20$, so $x = 6$, so $2x = 12$.

10. B Test out the answers! The graphs intersect where $f(x) = f(x - 1)$. Start with (C). If $x = \frac{3}{4}$ then $x - 1 = -\frac{1}{4}$. Putting these values into the function, you get $3\left(\frac{3}{4}\right)^2 \neq 3\left(-\frac{1}{4}\right)^2$.

To get them equal, or even closer, you need a smaller number. Try (B) and it works:

$$3\left(\frac{1}{2}\right)^2 = 3\left(-\frac{1}{2}\right)^2.$$

11. 9 First, plug 7 into the given equation to get 16 for $f(7)$. Then plug 4 into the equation to get 7 for $f(4)$. Subtract to get the final answer: $16 - 7 = 9$.

12. 27 The third term is 18 $\left(1\frac{1}{2} \times 12 = 18\right)$. The fourth term is 27 $\left(1\frac{1}{2} \times 18 = 27\right)$.

13. $\frac{1}{20}$ or .05 Solve for x in the original equation by dividing each side by 2.5; $x = 10$. Plug 10 in for x in the fraction $\frac{1}{x+10}$ and you get $\frac{1}{20}$.

14. 2544 Use the percent increase/decrease formula. $\frac{difference}{original} = \frac{\%\ increase}{100}$ In this case, the unknown is the difference. The original is 2,400 and the percent increase is 6. Plug these values into the equation, and you find that the difference is 144. Since the question asks for the total number of people with the flu, not the difference, add the difference to the original to get the answer.

15. 17 You can use the distance formula to solve this problem: $(\text{distance})^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$. Then $(\text{distance})^2 = (10 - 2)^2 + (-9 - 6)^2 = 289$, so distance $= \sqrt{289} = 17$.

16. 0 Since no picture is given, draw one yourself. The question says that the cube is thrown so that 4 shows on top. It also tells you that 3 is opposite 4, so 3 must be on the bottom. Therefore, the probability that 6 is on the bottom is 0.

17. 3 Simplify the equation by replacing the 2^2 and other exponents with their actual values. You will then have $(a \times 2) + (a \times 4) + (b \times 8) + (b \times 16) = 42$. Simplify this further by distributing to get $6a + 24b = 42$. Divide through by 6 to get $a + 4b = 7$. Since a and b must be positive integers, a must be 3 and b must be 1. Therefore, their product is 3.

18. 3 The area of the shaded region is the area of square $FGHJ$ minus the areas of ΔFKM and ΔLJM. Since $FG = 2$, the area of square $FGHJ$ is 4 (area $= 2 \times 2 = 4$). K and M are midpoints, so $FK = FM = 1$, and the area of ΔFKM is $\frac{1}{2}$ (area $= \frac{1}{2}bh = \frac{1}{2} \times 1 \times 1 = \frac{1}{2}$). ΔLJM is the same, so its area is also $\frac{1}{2}$. So the area of the shaded region is 3 $(4 - \frac{1}{2} - \frac{1}{2} = 3)$. (Alternatively, if you see that ΔFKM and ΔLJM are each $\frac{1}{8}$ of the square, then the area of the shaded region is $\frac{3}{4}$ of the square, and $\frac{3}{4} \times 4 = 3$.)

19. 475 In the ratio of 7 to 3, the total is 10. The actual number of eggs is 750. So, there must be 75 sets of 10 eggs. That means there are $75 \times 7 = 525$ white eggs and $75 \times 3 = 225$ brown eggs. The ratio changes to 3:4 by changing brown eggs, while the 525 white eggs remains the same. If there are 3 white eggs per set and there are 525 white eggs total, there are 175 sets of eggs. That means the number of brown eggs is $175 \times 4 = 700$. To find the number of brown eggs we would have to add, subtract the number of brown eggs we had originally (225) from the brown eggs that we had in the second ratio (700).

20. 292 Find the total of the five integers (total = number of things × average = $5 \times 60 = 300$). So the total of the five numbers is 300. Since we want p to be as big as possible, we need the other four integers to be as small as possible. The smallest they each can be is 2 (because they have to be positive and even). Subtracting these four integers from 300 gives us the largest possible value of p $(300 - 2 - 2 - 2 - 2 = 292)$.

1. C The given equation can be written as $10 + a = 3a + 6$. Subtract a from both sides and subtract 6 from both sides to get $4 = 2a$. So, $a = 2$. Also, you could test out the answer choices.

2. E When two parallel lines are intersected by a third line, the result is that only two kinds of angles are created, big ones and small ones. A big angle plus a small angle will equal 180°. In a parallelogram, that rule applies. The big angle is 110°, and y is a small angle, so it will have to equal 70° because $110 + 70 = 180$.

3. B Test out some of your own numbers and eliminate answer choices that are not always true. Try different sets of numbers until only one answer remains. If you try $a = 2$ and $b = -2$, you will be able to eliminate (C), (D), and (E). If you try $a = 3$ and $b = -4$, you will be able to eliminate (A). (B) is correct because a $\frac{\text{positive}}{\text{negative}}$ will have to always be negative.

4. D Plug-in 100 for x. Then q will equal 20 and t will equal 70. So, $t - q = 70 - 20 = 50$. Find the answer that results in 50 when you plug in $x = 100$. Only (D) works.

5. A Plug-in digits for P. Remember, when the variables are capitalized like this, they are not telling you to multiply $6 \times P$ for instance. Rather, P is a digit, so $6P$ will be sixty-something. So, start with 0 and plug-in for P. You will notice that for every number you plug-in for P the resulting R is 0. So, the only possible value for R is 0.

6. C Put 9 into the formula in order to find d: so, $9 = \frac{1}{2}d - 5$. Add 5 to both sides and multiply both sides by 2. So, $d = 28$. Now, find c given that $d = 28$. Put it into the formula: $28 = \frac{1}{2}c - 5$. Solve again and find that $c = 66$.

7. D If there are 5 cells initially, and the number of cells triples every hour, then after 1 hour, there will be $(5)(3) = 15$ cells. After 2 hours, there will be $(5)(3)(3) = 45$ cells. After 4 hours there will be $(5)(3)(3)(3)(3) = 405$ cells. You can also just plug the given numbers into the formula: Final Amount = Original Amount × (Growth Multiplier)$^{\text{Number of Changes}}$. In this case, Final Amount $= 5(3)^4 = 405$.

8. B Plug in numbers for n and r. The quantity $n + r$ has to equal 90, so suppose $n = 60$ and $r = 30$. The value y will have to be 90 since $n + r + y = 180$ (all the degrees in a triangle have to add up to 180).

9. A Plug each point (x, y) from the answer choices into the question. All of them make the equation true except (A).

10. E The slope formula is: $slope = \frac{y_2 - y_1}{x_2 - x_1}$ where x and y are coordinate points on the line. The two points you know for this line are $(-5, 0)$ and $(-3, 4)$. Plug these into the slope formula to get $\frac{4-0}{-3-(-5)} = \frac{4}{2} = 2$.

11. A The problem here is how to get from 3^{3y} to 3^y. Another way to write 3^{3y} is $(3^y)^3$. So, $(3^y)^3 = 216$. Looking at it this way it is easier to see that you can take the cube root of both sides. Then you will have $3^y = 6$. Watch out for (C) $\left(\frac{216}{9}\right)$, (D) $\left(\frac{216}{6}\right)$, and (E) $\left(\frac{216}{3}\right)$.

12. A The best approach here is to test out your own numbers. Start with a. If $a = 9$, then $b = 6$, $c = 12$, and $d = 36$. So then, $\frac{d}{a} = \frac{36}{9} = 4$. So, find the answer that yields 4 when you put in your own numbers. In (A), $\frac{2 \times 12}{6} = 4$.

13. B Because the length of BD is 13 and the length of CD is 5, you know that the length of BC must be 8. Triangle ABC is a 6:8:10 triangle, so the hypotenuse AC is 10. The area of a parallelogram is base times height. The base of the parallelogram is 5 (the length of CD and AF) and the height is 6 (the height of the rectangle). (A) is the area of one of the triangles; (C) is base times the hypotenuse rather than height; and (E) is the total area of the rectangle.

14. C Start by plugging in $y = 9$. Since the values at the head of each column are multiplied by the values in the rows, we can now solve for g: $9g = 216$, which means that $g = 24$. Using the same approach, we can then find z: $24z = 264$, which gives us $z = 11$. Since $z = 11$, we know that $11h = 44$, which means $h = 4$. Now, we can fill in all the other values for w, x, and y: $w = 5$, $x = 7$, and $y = 9$. Plugging the appropriate values into $\frac{(w \times z)}{g + h}$, we get $\frac{5 \times 11}{24 + 4} = \frac{55}{28} = 1.96$, answer choice (C). Watch out for (A) and (B); they are the results you will get if you confuse the multiplication and addition signs in $\frac{(w \times z)}{(g + h)}$.

15. C Start by finding the circumference of the wheel. Circumference = $\pi \times$ diameter. So, $C = 5\pi$. That is how far a point on the wheel will travel in one revolution. The wheel completes 352 revolutions in a minute, so the point will travel $\frac{5\pi \text{ ft}}{1 \text{ rev}} \times \frac{352 \text{ rev}}{1 \text{ min}}$. To convert to hours, multiply by $\frac{60 \text{ min}}{1 \text{ hour}}$. That will result in $\frac{105600\pi \text{ ft}}{1 \text{ hour}}$. Now, the last step. So far, you have $\frac{\text{ft}}{\text{hour}}$. You need $\frac{\text{miles}}{\text{hour}}$. So, multiply $\frac{105600\pi \text{ ft}}{1 \text{ hour}} \times \frac{1 \text{ mile}}{5280 \text{ ft}}$. Your ft units will cancel out and you will be left with $\frac{20\pi \text{ miles}}{1 \text{ hour}}$.

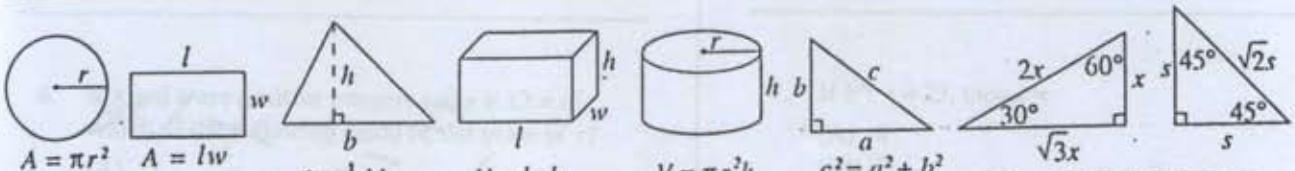
Practice Test 2

SECTION 1
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:
1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

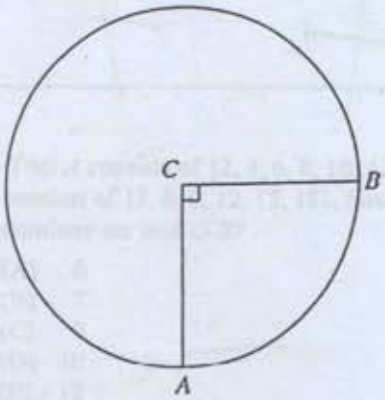
Reference Information



$A = \pi r^2$, $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $2x + 3 = 9$, what is $10 - x$?
   (A) 3
   (B) 4
   (C) 6
   (D) 7
   (E) 10



2. If C is the center of the circle, then sector ACB is what percent of the circle's total area?
   (A) 25
   (B) 40
   (C) 55
   (D) 70
   (E) 90

GO ON TO THE NEXT PAGE

3. If $|x| \neq 0$, which of the following statements must be true?

(A) x is positive.

(B) $2x$ is positive.

(C) $\frac{1}{x}$ is positive.

(D) x^2 is positive.

(E) x^3 is positive.

4. If r and h are positive integers and $r + 12 = h^2$, which of the following could be the value of r?

(A) 2
(B) 3
(C) 4
(D) 5
(E) 6

5. If $x < 0 < y$, which of the following must be true?

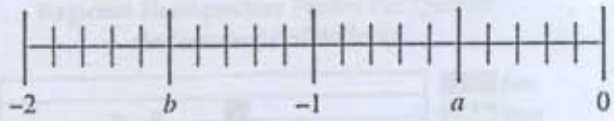
(A) $x + y > 0$

(B) $x^2 + y^2 < 0$

(C) $xy > 0$

(D) $\frac{x}{y} < 0$

(E) $x - y > 0$



6. On the number line above, the tick marks are evenly spaced. What is the value of $b - a$?

(A) −2
(B) −1
(C) 0
(D) 1
(E) 2

7. If $5^{10-x} = 25$, then $x =$

(A) 4
(B) 5
(C) 6
(D) 7
(E) 8

8. If set A consists of $\{2, 4, 6, 8, 10, 12\}$ and set B consists of $\{3, 6, 9, 12, 15, 18\}$, how many even numbers are in $A \cup B$?

(A) 6
(B) 7
(C) 9
(D) 10
(E) 12

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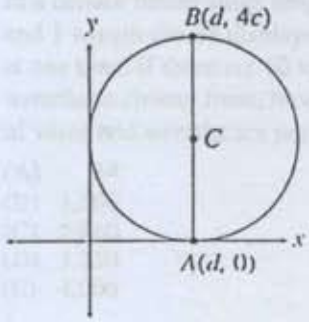


9. In the figure above, C is the center of the circle and lies on $\overline{AB}$. What is the area of the circle?

(A) $\frac{1}{2}\pi c^2$

(B) πc^2

(C) $2\pi c^2$

(D) $4\pi c^2$

(E) $4\pi c^3$

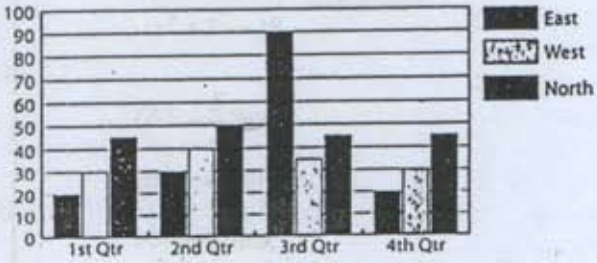
10. If r is the remainder when 80 is divided by 9 and n is the remainder when r is divided by 3, what is the value of rn?

(A) 0
(B) 2
(C) 6
(D) 8
(E) 16

11. The average (arithmetic mean) of three consecutive even integers a, b, and c is 8. What is the median of the set $\{a, b, c, 20\}$?

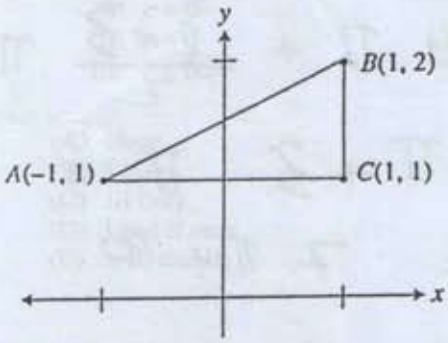
(A) 8
(B) 9
(C) 10
(D) 11
(E) 12

Regional Headquarters Profits Per Quarter
(in thousands of dollars)



12. From second to third quarter, the total profits for East Regional Headquarters increased by what percent?

(A) 33
(B) 60
(C) 66
(D) 200
(E) 300



13. In the figure above, what is the slope of the hypotenuse of ΔABC?

(A) -2

(B) $-\frac{1}{2}$

(C) 0

(D) $\frac{1}{2}$

(E) 2

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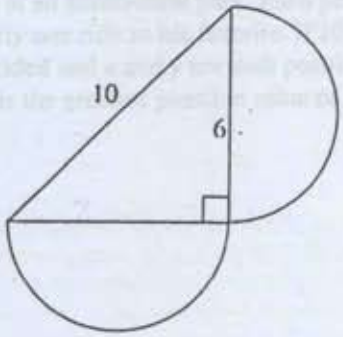
14. In a certain flower shop, only 3 vases of flowers and 1 wreath can be displayed in the front window at one time. If there are 10 vases of flowers and 4 wreaths to choose from, how many arrangements of vases and wreaths are possible?

(A) 34
(B) 1,500
(C) 2,880
(D) 3,250
(E) 4,000



Note: Figure not drawn to scale.

15. The figure above is composed of two semi-circles and one triangle. What is the perimeter of the figure?

(A) $6\pi + 10$
(B) $7\pi + 7$
(C) $7\pi + 10$
(D) $14\pi + 7$
(E) $14\pi + 10$

16. In the sequence 12, 24, 72, 264..., where 12 is the first term, which of the following could denote the nth term?

(A) $12 \times n$
(B) n^{12}
(C) 12^n
(D) $4^{(n+1)} - n$
(E) $4^n + 8$

17. For which of the following values of x is $\dfrac{4x^2 - 7x - 15}{x^2 + 3x - 18}$ undefined?

(A) $-\frac{5}{4}$ and 3
(B) -6 and 3
(C) -6 only
(D) 3 only
(E) $-\frac{5}{4}$ only

18. If $(c + 1)^2 = -b$, where b and c are both real numbers, which of the following statements could be true?

I. $c > 0$
II. $c = 0$
III. $c < 0$

(A) None
(B) I only
(C) III only
(D) I and II only
(E) I, II, and III

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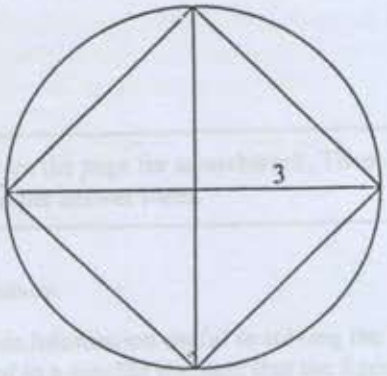
Ride	Number of People Choosing Ride
Rollercoaster	93
Swings	69
Merry-Go-Round	18
Bumper Cars	45
Tilt-A-Whirl	x
Log Ride	y

19. The table above shows the results of a survey of 300 people at an amusement park. Each person chose exactly one ride as his favorite. If 10 people were undecided and x and y are both positive integers, what is the greatest possible value of y ?

(A) 60
(B) 64
(C) 65
(D) 74
(E) 75



20. In the figure above, a square is inscribed in a circle with a radius of 3. What is the perimeter of the square?

(A) $6\sqrt{2}$
(B) 12
(C) $6+6\sqrt{2}$
(D) $12\sqrt{2}$
(E) 22

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 3
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

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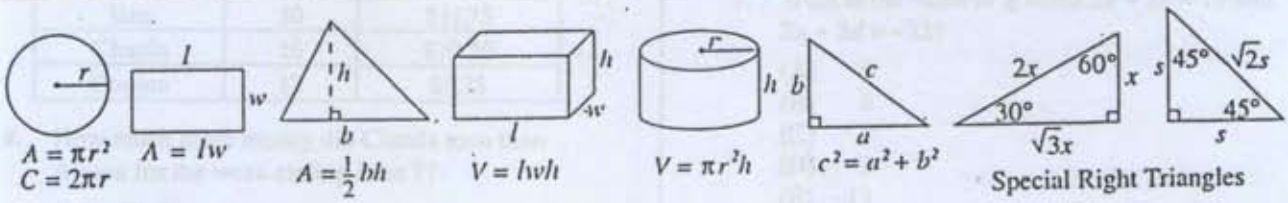

$A = \pi r^2$, $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $x^2 + y + \sqrt{9} = 16 - y + c$, what is the value of $c - 2y$ when $x = 8$?
   (A) 36
   (B) 51
   (C) 72
   (D) 89
   (E) 101

2. Yuri buys a brand new pinball machine. In the part of the game shown above, a ball arrives via the entry lane at the top and follows a path to the cup at the bottom. How many different paths can the ball follow from the entry lane to the cup?
   (A) Four
   (B) Five
   (C) Six
   (D) Seven
   (E) Eight

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3. What is the slope of the line given by $2y = 6x + 8$?
   (A) 2
   (B) 3
   (C) 4
   (D) 6
   (E) 8

PAYROLL FOR WEEK ENDING JUNE 7

Employee	Hours	Hourly Pay
Alyssa	12	$12.00
Ben	10	$11.75
Chaula	16	$10.50
Damon	12	$9.75

4. How much more money did Chaula earn than Alyssa for the week ending June 7?
   (A) $1.50
   (B) $4.00
   (C) $18.00
   (D) $24.00
   (E) $30.00

5. Nancy and James went to the library and James borrowed 4 less than three times the number of books that Nancy did. If Nancy borrowed n books, how many books did James borrow?
   (A) $4(n-3)$
   (B) $4n-3$
   (C) $3n+4$
   (D) $3(n+4)$
   (E) $3n-4$

6. If w, x, y, and z are consecutive positive integer multiples of 6 such that $z > y > x > w$, then $x + z$ is how much greater than $w + y$?
   (A) 0
   (B) 3
   (C) 6
   (D) 12
   (E) 24

7. What is the value of q when $3d - 2q = 17$ and $2q + 2d = -32$?
   (A) 9
   (B) 6
   (C) 0
   (D) −3
   (E) −13

8. A, B, C, D, and E are all distinct points that lie in the same plane. If $\overline{AB} \parallel \overline{CD}$ and $\overline{AC} \parallel \overline{BD}$, then which of the following is a set of points all of which could lie on the same line?
   (A) $\{A, B, C, E\}$
   (B) $\{B, C, D, E\}$
   (C) $\{C, D, E\}$
   (D) $\{A, C, D\}$
   (E) $\{A, B, D\}$

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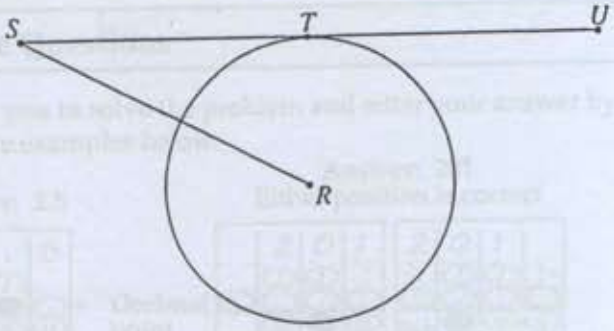
9. If f is a positive integer, $fg > 0$, and $6f + 2g = 25$, then what is the sum of all possible values of g?

(A) 1
(B) 10
(C) 20
(D) 40
(E) 60



Note: Figure not drawn to scale.

10. In the figure above, $\overline{SU}$ is tangent to the circle with center R at point T. If $\overline{ST}$ has a length of 40 and the area of the circle is 81π, what is the length of $\overline{SR}$?

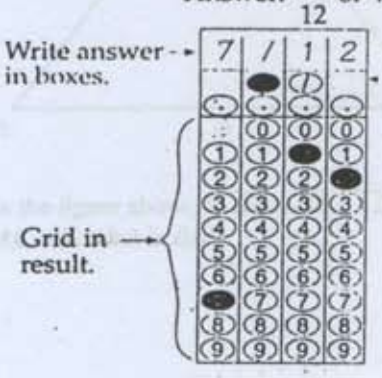
(A) 31
(B) 35
(C) 41
(D) 45
(E) It cannot be determined from the information given.

GO ON TO THE NEXT PAGE

Directions for Student-Produced Response Questions

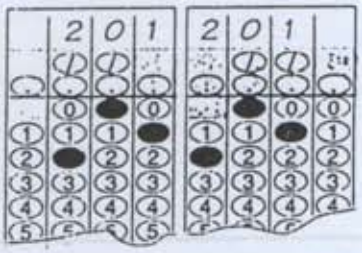
Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

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

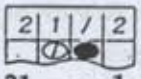


Answer: 2.5

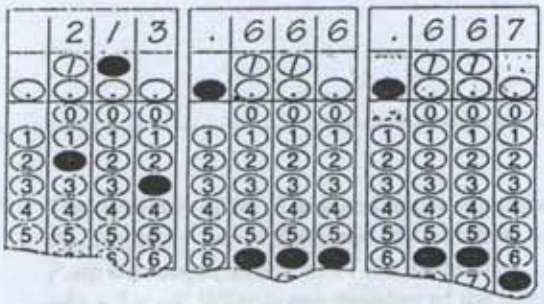
Answer: 201
Either position is correct



Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If  is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)
- Decimal Accuracy: **If you obtain a decimal answer, enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . ., you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3}$ = .6666 . . .



11. If $(2^7)^x = 2^{28}$, what is the value of x?

12. If $2 < x < 3$ and $-2 < y < -1$ and if $a = 0.2x$ and $b = -4y$, what is one possible value of $a + b$?

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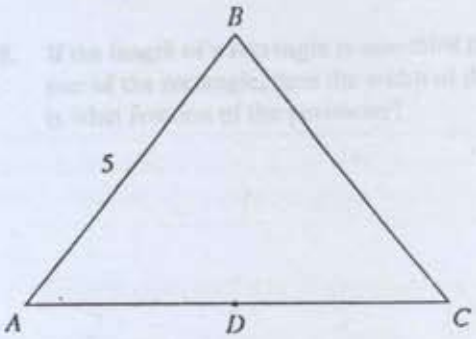


13. In the figure above, if $\overline{AB} \cong \overline{BC}$, $\overline{AD} \cong \overline{CD}$, and $AC = 6$, what is BD?

14. The fare for a taxi ride is \$3 plus 30 cents per mile. If the fare for a trip to Norwalk is \$8.10, how far, in miles, is the trip?

15. The product of two positive numbers is 24 and their difference is 5. What is the sum of the two numbers?

16. A bag of dry concrete covers an area of 25 square feet. If only whole bags of dry concrete can be purchased, how many bags must be purchased to pave a sidewalk that is 3.5 feet wide and 225 feet long?

17. The members of set O are the integer solutions of the inequality $3x - 4 \leq 11$, and the members of set P are the integer solutions of the inequality $-4x + 5 < -7$. What is one member of the intersection of O and P?

GO ON TO THE NEXT PAGE

18. If the length of a rectangle is one-third the perimeter of the rectangle, then the width of the rectangle is what fraction of the perimeter?

19. If t is a positive integer, and $18t$ is the cube of an integer, then what is the least possible value of t?

20. The average (arithmetic mean) of 6 distinct numbers is 71. One of these numbers is −24, and the rest of the numbers are positive. If all of the numbers are even integers with at least two digits, what is the greatest possible value of any of the 6 numbers?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

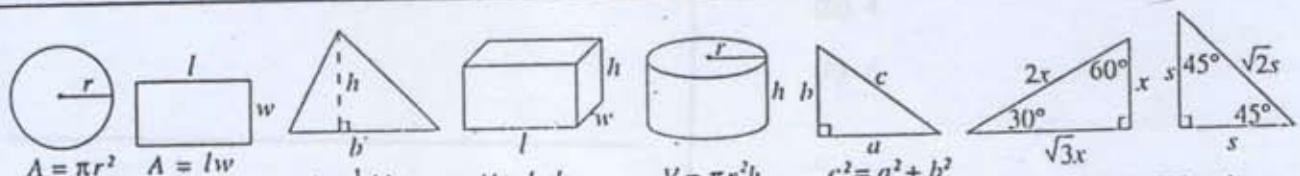
SECTION 7
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information

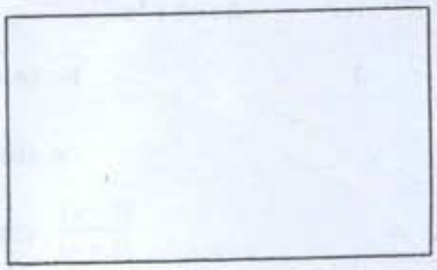


$A = \pi r^2$, $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. $5^2 =$

(A) $(2 \times 2) + (3 \times 2)$
(B) $(3 + 2)^2$
(C) $5^5 - 5^3$
(D) 7
(E) $3^2 + 2^2$



2. The above figure is a rectangle. How many different ways could one line be drawn within the rectangle to create 2 triangles?

(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

GO ON TO THE NEXT PAGE

3. For positive number y, 20 is $4y\%$ of what?

(A) $0.25y$

(B) $5y$

(C) $\frac{50}{y}$

(D) $\frac{200}{y}$

(E) $\frac{500}{y}$

4. Webb and his son Kenny are selling cookies. They have $20q$ cookies on sale for $2p$ dollars each. If they received r dollars from cookie sales, how many cookies were NOT sold?

(A) $20q - \left(\frac{r}{2p}\right)$

(B) $2rp$

(C) $q - 2rp$

(D) $20q - \left(\frac{2p}{r}\right)$

(E) $q(20 - rp)$

$X = \{1, 2, 3, 4\}$
$Y = \{2, 4, 6, 8\}$
$Z = X \cup Y$

5. Sets X, Y, and Z are shown above. What is the average (arithmetic mean) of the elements of set Z?

(A) $\frac{5}{2}$

(B) 3

(C) $\frac{15}{4}$

(D) 4

(E) 5

6. For $x > 0$, $\frac{x^2 + x - 6}{x^2 + 5x + 6} =$

(A) -1

(B) x

(C) $\frac{(x-2)}{(x+2)}$

(D) $\frac{(x+2)}{(x-2)}$

(E) $\frac{(x-6)}{(5x+6)}$

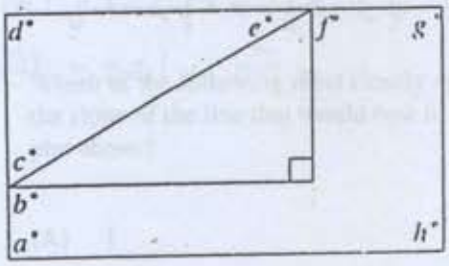
7. If $4^{\frac{y}{2}} = 16$, then $y =$

(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

GO ON TO THE NEXT PAGE

8. The units digit of a 3 digit number is B, and the hundreds and tens digits of that same number are 4. If this 3 digit number is a multiple of B, then all of the following are possible values for B EXCEPT

(A) 1
(B) 2
(C) 4
(D) 5
(E) 6



9. In the figure above, what is the sum of a, b, c, d, e, f, g, and h?

(A) 100
(B) 180
(C) 360
(D) 500
(E) 630

10. While running the marathon, Emily averages 10 minutes a mile for the first b hours where $b < 4.3$. In terms of b, how much farther does Emily have to run in order to complete the 26 mile race?

(A) $26 - 6b$

(B) $26 - 600b$

(C) $6b - 26$

(D) $26 - \frac{6}{b}$

(E) $26 - \frac{b}{6}$

11. On a number line, point D is $\frac{2}{5}$ of the way from point C to point E and is located at -2. If C is at -10, what is the coordinate of point E?

(A) -4
(B) 4
(C) 5
(D) 10
(E) 20

12. For what values of x does $\sqrt{4x^2+1} = 2x+1$?

(A) $x = 0$
(B) $x > 0$
(C) $x \geq 0$
(D) All real numbers
(E) No real numbers

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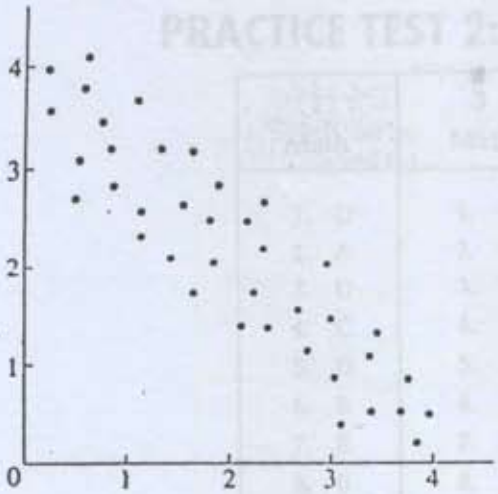


13. Which of the following most closely approximates the slope of the line that would best fit the scatterplot above?

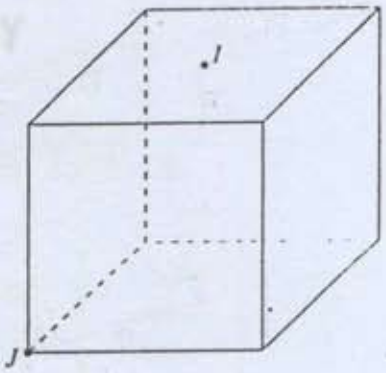
(A) 1

(B) $\frac{1}{2}$

(C) 0

(D) $-\frac{1}{2}$

(E) -1



14. The figure above is a cube. The length of each edge is 10 cm, and point I is placed at the center of the side. If a line is drawn through the cube from point I to point J, what is IJ in centimeters?

(A) $\sqrt{110}$ (approximately 10.488)

(B) $\sqrt{150}$ (approximately 12.247)

(C) $\sqrt{162}$ (approximately 12.728)

(D) $\sqrt{175}$ (approximately 13.229)

(E) $\sqrt{184}$ (approximately 13.565)

15. When the base and height of an isosceles right triangle are each decreased by 4, the area decreases by 72. What is the height of the original triangle?

(A) 4
(B) 8
(C) 16
(D) 20
(E) 32

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 2: ANSWER KEY

1 Math	3 Math	7 Math
1. D	1. B	1. B
2. A	2. C	2. C
3. D	3. B	3. E
4. C	4. D	4. A
5. D	5. E	5. D
6. B	6. D	6. C
7. E	7. E	7. E
8. B	8. C	8. E
9. D	9. C	9. E
10. E	10. C	10. A
11. B	11. 4	11. D
12. D	12. 4.4 < $a + b$ < 8.6	12. A
13. D	13. 4	13. E
14. C	14. 17	14. B
15. C	15. 11	15. D
16. E	16. 32	
17. B	17. 4 or 5	
18. E	18. .166, .167, or $\frac{1}{6}$	
19. B	19. 12	
20. D	20. 398	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	670	21	480
70		45	660	20	470
69		44	650	19	460
68		43	640	18	460
67		42	640	17	450
66		41	630	16	440
65		40	620	15	430
64		39	610	14	430
63		38	610	13	420
62		37	600	12	410
61		36	590	11	400
60		35	580	10	400
59		34	580	9	390
58		33	570	8	380
57		32	560	7	370
56		31	550	6	370
55	800	30	550	5	360
54	770	29	540	4	350
53	740	28	530	3	340
52	710	27	520	2	300
51	700	26	520	1	280
50	700	25	510	0	250
49	690	24	500	−1	240
48	680	23	490	−2	220
47	670	22	490	−3	200

Practice Test 2: Answers and Explanations

SECTION 1

1. D First solve $2x + 3 = 9$ by subtracting 3 from both sides to get $2x = 6$. Divide both sides by 2 to get $x = 3$. Now plug 3 into $10 - x$ and this yields a final answer of 7.

2. A The fraction of the sector ACB is clearly less than 50% which eliminates (C), (D), and (E). The sector appears to be nearly a quarter of the circle, which is why (A) is a better choice than (B). Since $\angle C$ is a right angle, this is in fact the case.

3. D The statement says that x is not zero which means is can be either positive or negative. Any number, positive or negative, squared will always be positive. This eliminates (A), (B), and (C). If x were negative, then x^3 would also be negative eliminating (E).

4. C Try plugging in the answers on this question. If $r = 4$, $h = \sqrt{16} = 4$, the correct answer. If $r = 2$, $h = \sqrt{14}$, which is not an integer. Likewise, if $r = 3$, $h = \sqrt{15}$, which again is not an integer. If $r = 5$, $h = \sqrt{17}$ and if $r = 6$, $h = \sqrt{18}$, so the only possibility is (C).

5. D Since this is a "must be" question and there are variables in the question and answer choices, try plugging in numbers and eliminating. If $x = -2$ and $y = 2$, (D) would yield -1 which is less than 0. Using these same numbers would eliminate (A), (B), (C), and (E).

6. B Since the tick marks are evenly spaced, $a = -0.5$ and $b = -1.5$. Therefore, $b - a = (-1.5) - (-0.5) = -1$. (A) is incorrect because this represents $b + a$ and (D) is $a - b$, both potential trap answers.

7. E Since $5^{10-x} = 5^2$, then, by comparing exponents, $10 - x = 2$. Subtracting 10 from both sides and multiplying by -1 gives $x = 8$.

8. B The union of A and B will have all the even numbers from each set and the sets don't count the same number multiple times. Since 6 and 12 are in each set, you should only count them once along with the unique numbers 2, 4, 8, 10, and 18 for a total of 7 numbers.

9. D In the figure, line AB is the diameter of the circle, so the radius is $2c$. Use the formula for area of a circle (Area $= \pi r^2$) with radius $2c$ ($\pi r^2 = \pi(2c)^2 = \pi 4c^2$). Plugging in values can make this easier. If $d = 2$ and $c = 4$, point A's coordinates are (2, 0) and point B's coordinates are (2, 16). The radius of the circle is 8 and the area is $\pi r^2 = \pi 8^2 = 64\pi$, your target for plugging into the answer choices. When $c = 4$, (A) is 8π, (B) is 16π, (C) is 32π, and (E) is 256π, all of which are incorrect. Only (D) gives the correct value of 64π.

10. E When 80 is divided by 9, the remainder is 8, thus $r = 8$. When 8 is divided by 3, the remainder is 2, so $n = 2$. The question asks for the value of rn, so multiply 8 and 2 to get 16. (B) is equal to only n, (D) is equal to only r, and (C) equals $r - n$.

11. B Since the average is 8 and there are 3 items, the sum of a, b, and c is 24. Therefore, the three consecutive even integers are $a = 6$, $b = 8$, $c = 10$. This means that the set is {6, 8, 10, 20}. The median of this set is between 8 and 10, so the correct answer is 9.

12. D East headquarters made \$30,000 during the second quarter and \$90,000 in the third quarter. To find the percent increase, use the following equation:

$$\%Increase = \frac{difference}{original} \times 100 =$$

$$\frac{\$90,000 - \$30,000}{\$30,000} \times 100 = 200\%$$

(C) is a trap answer that might be chosen if the equation is divided by \$90,000 instead of \$30,000. (E) might be chosen if the question was misread as "third quarter is what percent of second quarter."

13. D Apply the slope formula using points (1, 2) and (−1, 1). $\frac{y_2 - y_1}{x_1 - x_2} = \frac{2-1}{1-(-1)} = \frac{1}{2}$. The hypotenuse has a positive slope, which eliminates (A), (B), and (C). (E) can be incorrectly obtained by accidentally inverting the slope formula.

14. C There are four slots to fill; three vases and one wreath. Start by identifying how many objects are available for each slot. There are 10 possibilities for the first vase slot, 9 possibilities for the second vase slot after one was used to fill the first, 8 remaining possibilities for the third vase plus the four possibilities for the wreath spot. To find the total possible combinations, multiply all of the numbers that represent the number of possibilities for each spot, (4)(10)(9)(8) = 2880.

15. C This is a 6:8:10 right triangle. The circumference of the semi-circle with diameter 6 is $\frac{\pi d}{2}$, which equals $\frac{\pi \times 6}{2} = 3\pi$. Likewise, the circumference of the semi-circle with diameter 8 is $\frac{\pi d}{2} = \frac{\pi \times 8}{2} = 4\pi$. So, the total perimeter is $3\pi + 4\pi + 10 = 7\pi + 10$. (E) is a distracter that might be chosen if the individual circumferences are not divided by 2 to account for half of a circle.

16. E Plug in numbers for the sequences and check with the existing numbers to verify the equations work. If $n = 1$, then the equations should yield 12. This eliminates (B) and (D). If $n = 2$, then the equations should yield 24 which eliminates (C). If $n = 3$, the equation should equal 72 according to the given sequence which eliminates (A), leaving only (E).

17. B The fraction will be undefined when the denominator is equal to 0. Begin by factoring the denominator to get $(x - 3)(x + 6)$ on the bottom. Setting the individual factors equal to 0, you should get $x = 3$ and $x = -6$. These are the values for which the equation is undefined. (C) and (D) are incorrect because they each correctly identify only one of the undefined values for x.

18. E Try plugging in to answer this question. If $c = 5$, $b = -36$. If $c = 0$, $b = -1$. If $c = -5$, $b = -16$. This shows that all statements are possible.

19. **B** Since 10 people were undecided, the total number reported in the chart is 290. Both x and y must be positive integers, and since each person has chosen one ride, the smallest x can be is 1. Subtract all of the other reported totals from 290 including the 1 for x to get 64, the largest possible value for y. (C) is incorrect because that assumes that x is allowed to equal 0, which it is not. (D) and (E) are incorrect but may have been chosen if you forgot to subtract the 10 undecided people from 300

20. **D** The key to this is to realize that the diagonal of the square is the hypotenuse of a 45:45:90 triangle with legs of length 3. Since the ratio of the lengths of the sides of this type of triangle is $s:s:s\sqrt{2}$, where s is the side of the square. So, $6 = s\sqrt{2}$ or $s = 3\sqrt{2}$. The perimeter is found by finding $4s$ which is $12\sqrt{2}$. (A) can be incorrectly obtained if a mistake is made when solving for s. (B) is incorrect because it just multiplies the given number by 4.

SECTION 3

1. B 51 is the correct value for the quantity $c - 2y$ because after replacing x with its designated value of 8, combining like terms, and manipulating the equation, you find that $c - 2y = 51$.

2. C On the left side of the game, four possible paths exist for the marble to take and on the right side, there are two possible paths for a total of six.

3. B Divide the coefficients in the equation by 2 to obtain the equation in the form $y = mx + b$, where m is the slope. You will get $y = 3x + 4$, which is a line with a slope of 3.

4. D The money earned is the product of the number of hours worked and the hourly pay. Chaula earned \$168.00 and Alyssa earned \$144.00, so Chaula earned \$24.00 more than Alyssa (\$168 − \$144 = \$24).

5. E Plug in your own number for n. If Nancy borrowed $n = 6$ books, then James borrowed four less than 3×6 books or 14 books. This makes 14 the target when plugging $n = 6$ into the answer choices. (E) is the only answer choice that gives you 14.

6. D Plug in values such as 12, 18, 24, 30 for w, x, y, and z respectively. Then $x + z = 18 + 30$ and $w + y = 12 + 24 = 36$. Taking $48 - 36 = 12$, gives the correct answer.

7. E You can find the value of q by using simultaneous equations. By placing one equation on top of the other, rearranging the second one since addition is communicative, and adding the two equations, you are left with $5d = -15$ or $d = -3$. Now use $d = -3$ in either equation to determine the value of q. Taking $3(-3) - 2q = 17$, you find that $q = -13$.

8. C Draw the picture and use process of elimination. Looking at your picture, you can eliminate (D) and (E). (A) and (B) are eliminated since B and C cannot be on the same line. Point E could be on any of the lines so (C) is correct.

9. C Since f is a positive integer and $fg > 0$, g must be positive. Now, f could be 1, 2, 3, or 4. If $f = 1$, $6(1) + 2g = 25$, so $g = 9.5$. Similarly, substituting 2, 3, and 4 into the equation gets values for g of 6.5, 3.5, and .5 respectively. These values add up to 20.

10. C Because the tangent line makes a right angle with the radius at point T, a right triangle is made by drawing a line from R to T. Since the area of the circle is 81π, the radius is 9. Use the Pythagorean theorem to solve for the length of the hypotenuse when the legs have lengths 9 and 40.

11. 4 Remember that exponents that are outside of the parentheses are multiplied by the ones inside, so $2^{7x} = 2^{28}$. Comparing the exponents, you get $7x = 28$ or $x = 4$.

12. 4.4 < 8.6 Plug in using values for x and y that agree with the given inequalities. For example, let $a + bx = 2.5$ and $y = -1.5$. Then multiply x by 0.2 and multiply y by -4 to get $a = 0.5$ and $b = 6$. Adding these values together you find $a + b = 6.5$.

13. 4 Since $\overline{AD} \cong \overline{CD}$, each segment is equal to 3. Drawing a line from B to D gives a 3:4:5 right triangle.

14. 17 The total fare was \$8.10. There is a flat fee of \$3, so subtract that from the total fare to get \$5.10. This is the part of the fee that depends on the mileage. Since the taxi costs 30 cents per mile, divide \$5.10 by \$0.30 to get the total number of miles.

15. 11 Since the product of the two numbers is 24, use the factors of 24. The two numbers could be 1 and 24, 2 and 12, 3 and 8, or 4 and 6. Now find the pair whose difference is 5. Only 3 and 8 work and their sum is 11.

16. 32 Solve this problem in bite-sized pieces. First, find the area that needs to be covered by the concrete. The sidewalk is 3.5 feet by 225 feet, so the total area is 787.5 square feet. Since each bag of concrete will cover 25 square feet, divide 787.5 by 25, which gives you 31.5. Since only whole bags are available, 32 bags must be purchased to complete the sidewalk.

17. 4 or 5 The members of set O are the integers less than or equal to 5 (because $3x \le 15$ and $x \le 5$), and the members of set P are the integers greater than 3 (because $-4x < -12$ and $x > 3$). The intersection of two sets includes only the members of both sets, so the intersection of set O and set P is 4 and 5.

18. $\frac{1}{6}$, .166, or .167 Draw a rectangle and plug in a number for the perimeter. The length is one-third the perimeter, so you want to plug in a number that is divisible by 3. Making the perimeter 6, the length is $\frac{1}{3} \times 6 = 2$. Then the width has to be 1 $(2 + 2 + 1 + 1 = 6)$. So the width is $\frac{1}{6}$ of the perimeter.

19. 12 Cubes of integers get very large very fast, so start with small numbers to check. Cube small numbers and divide by 18 to find the first cube that is a multiple of 18. $1^3 = 1$, $2^3 = 8$, $3^3 = 27$, $4^3 = 64$, and $5^3 = 125$, none of which are evenly divisible by 18. The next one, $6^3 = 216$ is divisible by 18. Since $18 \times 12 = 216$, $t = 12$.

20. 398 The total of the 6 numbers added together is 6×71 (the average) which gives us 426. One number is -24, so subtract -24 from 426. Therefore, the sum of the other five numbers must be 450. The next four numbers must be as small as possible in order to maximize the final number. The smallest even two-digit distinct integers are 10, 12, 14, and 16. If you subtract these numbers from 450, you are left with the sixth number, 398.

SECTION 7

1. B $5^2 = 25$ and $(3 + 2)^2 = (5)^2 = 25$. (A) is incorrect since $4 + 6 = 10$. The remaining choices can also be calculated to show that they do not equate to 25.

2. C There are two ways to divide this rectangle into two triangles. One way is to draw a line from the top right to the bottom left corner; the other is to draw a line from the top left to the bottom right corner.

3. E Plug in a number for y. Suppose $y = 10$. Then you can translate the question into the equation $20 = \frac{4y}{100} \times x = \frac{40}{100} \times x$. Reduce the fraction to get $20 = \frac{2}{5}x$. Multiply both sides by $\frac{5}{2}$ and $x = 50$. This is the target. Now plug $y = 10$ into the answers choices to find that (E) is the only answer choice that works.

4. A Choose numbers to plug in for the variables. Suppose $q = 3$, $p = 4$, and $r = 16$. That means they have 60 cookies on sale for \$8 each and they received \$16 for the sale of the two cookies. This leaves 58 cookies that were not sold. This answers the question and 58 is the target. Plugging the chosen values into the answer choices, (A) is the only one that yields 58.

5. D First, find Z. The union of two sets includes any element in either set. So Z = {1, 2, 3, 4, 6, 8}. The sum of the elements in Z is 24. To find the average, divide this by the number of elements in Z, which is 6, so the average is 4.

6. C There are variables in the question and answer choices so plug in. Let $x = 3$. Then, $\frac{x^2+x-6}{x^2+5x+6} = \frac{9+3-6}{9+15+6} = \frac{6}{18} = \frac{1}{3}$ which is your target. Plugging $x = 3$ into the answer choices, you find only (C) gives $\frac{1}{3}$ for an answer.

7. E Since $4^2 = 16$ and $4^{\frac{x}{2}} = 16$, then $4^2 = 4^{\frac{x}{2}}$. Comparing exponents gives $2 = \frac{x}{2}$. Now, multiply both sides by 2 to find that $y = 4$. You can also use the answer choices to plug into $4^{\frac{x}{2}} = 16$.

8. E The question is asking for what value of B is $\frac{44B}{B}$ not equal to an integer. Plug in the answer choices to find the correct value. (A), (B), (C), and (D) all yield integer values while (E) give you a fraction, $\frac{446}{6} = 74\frac{1}{3}$.

9. E Plug in numbers for the variables representing the angles. Just make sure you choose numbers that follow the rules of geometry. Start with the triangle marked with the 90° angle and plug in for the other two angles. Suppose one is 30 and the other is 60. Then $c = 60$ and $e = 30$ and the remaining angle in that triangle, d, will be $180 - 30 - 60 = 90$. Now, $f + e + 60 = f + 30 + 60 = 180$, so, $f = 90$. Likewise, $c + b + 30 = 60 + b + 30 = 180$, so, $b = 90$. Since $d = 90$ and it is one angle in a quadrilateral, the degree measures of the remaining angles must sum to 270. So, $a + g + h = 270$. Finally, $(a + g + h) + b + c + d + e + f = 270 + 90 + 60 + 90 + 30 + 90 = 630$. (A), (B), and (C) should have been eliminated from the start since the angles must total more than 360, which is the total degrees in a quadrilateral alone.

10. A Plug in a number for b. Suppose $b = 2$, then Emily runs for 2 hours at 10 min. per mile. First convert 2 hours to 120 minutes and then set up as a proportion in order to find how many miles she travels. So, $\frac{10\text{ min}}{1\text{ mile}} = \frac{120\text{ min}}{x\text{ mile}}$. Cross multiply to get $10x = 120$ or $x = 12$ miles. Now, $26 - 12 = 14$ miles left, giving you a target of 14. Plugging $b = 2$ into the answer choices eliminates all but (A).

11. D Draw a number line labeling point C at -10 and D at -2 as stated. The distance between C and D is 8. Since D is $\frac{2}{5}$ of the way from point C to point E, the distance can be found by solving $8 = \frac{2}{5}x$ to get $x = 20$. Point C is at -10 so E has to be at 10 on the number line. (A) could be eliminated immediately since it is between points C and D.

12. A Plug in the answers. If $x = 3$, the equation yields $\sqrt{37} = 7$, which is not true eliminating (B), (C), and D. If $x = 0$, then $0 = 0$. This eliminates (E) leaving (A) as the correct answer choice.

13. E Since the question asks for an approximate slope, you can use (4, 0) and (0, 4) as the x and y intercepts as they are close to the other points shown. Using these points, $\frac{y_1 - y_2}{x_1 - x_2} = \frac{4-0}{0-4} = -1$.

14. B Draw a line connecting points I and J, and also draw a line straight down through the center of the cube. And then connect the point in the center of the bottom face of the cube with point J. Now you have a right triangle. You know the height because it will be the same as the height of the cube, which is 10. And you can find the length of the base of the triangle by using the properties of a 45:45:90 triangle. Since I is the center, the triangle on the base is formed with legs of length 5, which means the hypotenuse, or leg of the larger triangle, is $5\sqrt{2}$. Using the Pythagorean theorem to solve for IJ, $\left(5\sqrt{2}\right)^2 + 10^2 = 150$ giving a final answer of $IJ = \sqrt{150}$.

15. D Plug in the answer choices starting with (C). The original base would also have to be 16 because the triangle is an isosceles right triangle. Use the formula area $= \frac{1}{2}$ base $\times$ height, so original area $= \frac{1}{2} \times 16 \times 16 = 128$. Now, decrease the sides of the original triangle by four and find the new area. Area $= \frac{1}{2} \times 12 \times 12 = 72$. Now you have to check and see if the original area (128) decreased by 72 to end up at the new area (72), so (C) is an incorrect answer. Since the difference was not large enough, eliminate (A) and (B). Plug in (D) for the original height. This yields an original area of 200 and the new area of 128. Subtract the two, 200 – 128 = 72, proving (D) correct.

Practice Test 3

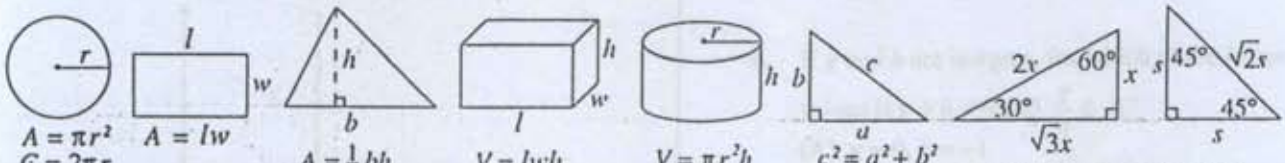
SECTION 2
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



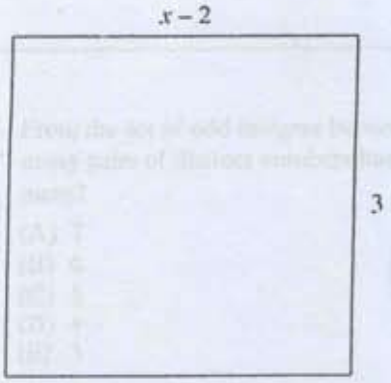
$A = \pi r^2$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$

$C = 2\pi r$

Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. A 10-gallon bucket is losing 2 gallons of water every 10 minutes. In how many minutes will the bucket be completely empty?
   (A) 20
   (B) 22
   (C) 40
   (D) 50
   (E) 100



2. If the figure above is a square, what is the value of $x + 1$?
   (A) 3
   (B) 4
   (C) 5
   (D) 6
   (E) 9

GO ON TO THE NEXT PAGE

3. If $2d + 3 = 4$, what is the value of $12d + 18$?

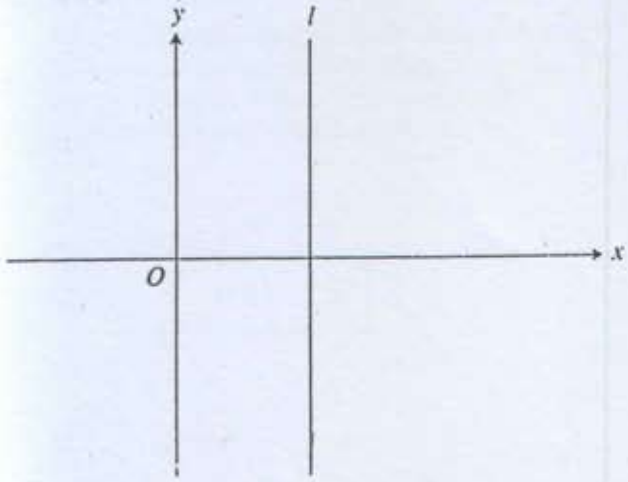
(A) $\frac{1}{2}$

(B) 2

(C) 4

(D) 12

(E) 24



4. In the figure above, line l is represented by the equation $x = 3$. All of the following points lie on line l EXCEPT

(A) (3, 4)
(B) (4, 3)
(C) (3, 0)
(D) (3, −1)
(E) (3, 4)

5. If $10a + 150 = b$, what is the value of $a + 15$?

(A) $10b$

(B) $b + 135$

(C) $b + 10$

(D) $b - 10$

(E) $\frac{b}{10}$

6. If g and h are integers, for which of the following values is $g + h = 0$ and $\frac{g}{h} \leq -1$?

(A) $g = 0, h = -1$
(B) $g = -1, h = -1$
(C) $g = 3, h = -3$
(D) $g = -3, h = -3$
(E) $g = -1, h = 0$

7. From the set of odd integers between 6 and 16, how many pairs of distinct numbers have a sum of 23 or more?

(A) 7
(B) 6
(C) 5
(D) 4
(E) 3

GO ON TO THE NEXT PAGE

8. If the sum of a and b is c, what is the average (arithmetic mean) of a and b in terms of a, b, and c?

(A) $2c$

(B) $c-(a+b)$

(C) $\frac{c}{2}$

(D) $\frac{a+b}{c}$

(E) $\frac{c}{a+b}$

9. Stephanie, Damon, and Karissa have been contracted to paint an office building that contains 72 rooms. If Stephanie paints half as many rooms as Karissa and 12 more than Damon, how many rooms does Karissa paint?

(A) 9
(B) 21
(C) 30
(D) 42
(E) 48

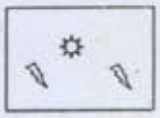
GO ON TO THE NEXT PAGE

10. Heinrich uses his computer to produce "abstract coordinate art" which is based on the following specifications:

- ordered pairs (x, y) are plugged into the computer to produce the art.
- x and y must be positive integers.
- the number of suns within the artwork is the sum of all x values.
- the number of lightning bolts within the artwork is the sum of all the y values.

Which of the following pieces of abstract art would be represented when Heinrich plugs in coordinate sets (1, 2) and (3, 3) into his computer to be produced on a single piece of art?

(A)



(B)

(C)

(D)

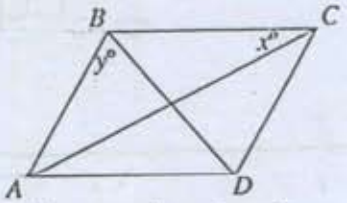
(E)

11. Let $f(x)$ be defined for any positive integer x greater than 2 as the sum of all prime numbers less than x.

For example,
$f(4) = 2 + 3 = 5$ and $f(8) = 2 + 3 + 5 + 7 = 17$.

What is the value of $f(81) - f(78)$?

(A) 2
(B) 3
(C) 23
(D) 57
(E) 79



Note: Figure not drawn to scale.

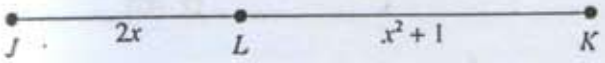
12. If $ABCD$, shown above, is a parallelogram and $\overline{AD} = \overline{CD}$, then which of the following must be true?

I. $\overline{BD} \perp \overline{AC}$
II. The measure of $\angle A$ = the measure of $\angle B$
III. $x = y$

(A) I only
(B) II only
(C) I and II only
(D) II and III only
(E) None

GO ON TO THE NEXT PAGE

13. For $x > 0$, what is $\frac{7x}{2} + \frac{1}{4x}$?
(A) $3.5x$
(B) $14x$
(C) $28x$
(D) $14x^2$
(E) $28x^2$



14. $\overline{JK}$ shown above, is 20.25 inches long. If point L is on $\overline{JK}$ such that JL is equal to $2x$ and LK is equal to $x^2 + 1$, what is the value of x?
(A) 2.5
(B) 2.75
(C) 3.25
(D) 3.5
(E) 4.5

15. If $q = \frac{1}{s}$ and $qs \neq 0$, what is the result of $\frac{(1+q)}{(1+s)}$?
(A) 0
(B) $-q$
(C) 1
(D) s
(E) q

16. A box with volume v has n compartments each of which has the same volume. If x of the n compartments are filled with sand and assuming all space in the box is given to the n compartments, which of the following gives the volume of the sand?
(A) $\frac{xv}{n}$
(B) nxv
(C) $\frac{n}{xv}$
(D) $\frac{xn}{v}$
(E) $\frac{v}{n}$

17. In a list of 4 positive even numbers, the mean, median, and mode are all equal. Which of the following CANNOT be done to the list if the mean, median, and mode are to remain equal?
(A) Add one number to the list.
(B) Add one number to the list that is greater than the mean.
(C) Add two distinct numbers to the list.
(D) Add 2 to each number in the list.
(E) Remove the first and last numbers from the list.

GO ON TO THE NEXT PAGE

18. If $x = \frac{x^2 - y^2}{x + y} + y$ and the square of x minus the square of y is equal to 48, what is the value of $2x + 2y$ when $x - y = 3$?

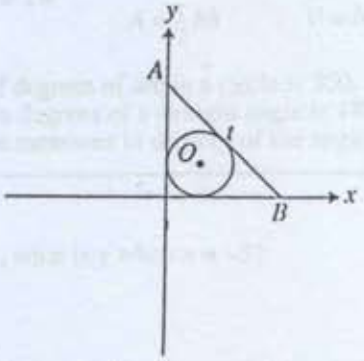
(A) $\frac{3}{2}$

(B) $2\sqrt{48}$

(C) 16

(D) 32

(E) 144



19. The above circle with center O is tangent to the x-axis and the y-axis. The circle has a radius of 1, and is tangent to $\overline{AB}$ at point t. $\overline{AB}$ has a slope of -1. What are the coordinates of t?

(A) (1, 1)

(B) $(\sqrt{2}, \sqrt{2})$

(C) $\left(1 + \frac{\sqrt{2}}{2}, 1 + \frac{\sqrt{2}}{2}\right)$

(D) $(1 + \sqrt{2}, 1 + \sqrt{2})$

(E) $(2\sqrt{2}, 2\sqrt{2})$

20. What is the product of $\begin{bmatrix} 1 & 3 & 5 \\ 7 & 9 & 11 \end{bmatrix} \times \begin{bmatrix} 2 & 4 \\ 6 & 8 \\ 10 & 12 \end{bmatrix}$?

(A) $\begin{bmatrix} 70 & 88 \\ 178 & 232 \end{bmatrix}$

(B) $\begin{bmatrix} 1800 & 5760 \\ 83160 & 266112 \end{bmatrix}$

(C) $\begin{bmatrix} 18 & 54 & 90 \\ 168 & 216 & 264 \end{bmatrix}$

(D) $\begin{bmatrix} 16 & 32 \\ 72 & 96 \\ 160 & 192 \end{bmatrix}$

(E) $\begin{bmatrix} 30 & 42 & 54 \\ 62 & 90 & 118 \\ 94 & 138 & 182 \end{bmatrix}$

STOP

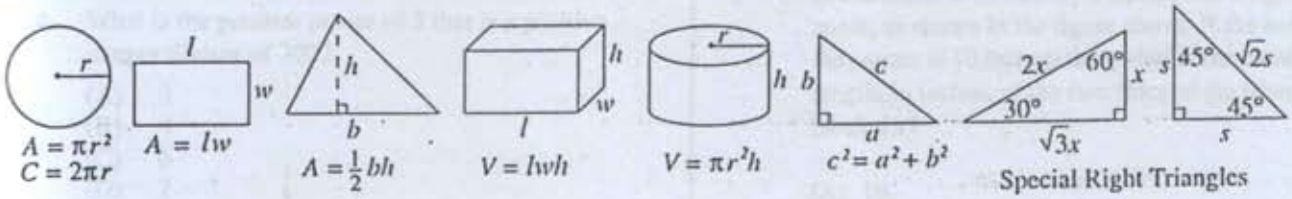
If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 3
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.



$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $y = |x| + 1$, what is y when $x = -5$?
   (A) −6
   (B) −5
   (C) −4
   (D) 4
   (E) 6

$$\begin{array}{r} 72X \\ +\ X3 \\ \hline 78Y \end{array}$$

2. X and Y represent digits in the correctly worked addition problem above. What digit does Y represent?
   (A) 0
   (B) 2
   (C) 6
   (D) 7
   (E) 9

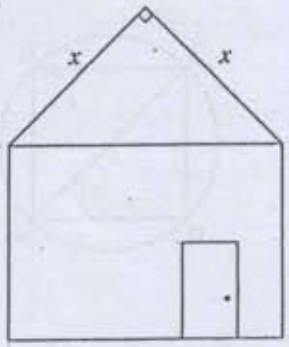
GO ON TO THE NEXT PAGE

3. Carlos paid $154.00 for two tickets to a concert. This price included a 25% handling fee for each ticket and a $2 transaction fee for the total sale. What was the price for a single ticket before the additional fees?

(A) $95.00
(B) $60.80
(C) $57.50
(D) $57.00
(E) $38.00

4. What is the greatest power of 3 that is a positive integer divisor of 702?

(A) 3
(B) 4
(C) 6
(D) 7
(E) 13



Note: Figure not drawn to scale.

5. Jane is building a gingerbread house. The front face of the house is formed by a square and a right triangle, as shown in the figure above. If the height of the square is 10 inches, then what is the combined length, in inches, of the two sides of the triangle labeled x?

(A) 10

(B) 15

(C) $\frac{10}{\sqrt{2}}$ (approximately 7.07)

(D) $\frac{20}{\sqrt{2}}$ (approximately 14.14)

(E) $\frac{30}{\sqrt{3}}$ (approximately 17.32)

GO ON TO THE NEXT PAGE

6. Kathleen's phone company charges 35 cents per minute of calling time during peak hours and 15 cents per minute of calling time during non-peak hours. If Kathleen's phone company charged her \$7.90 for a 30-minute phone call, how many minutes of that call were during peak hours?

(A) 7
(B) 12
(C) 15
(D) 17
(E) 21

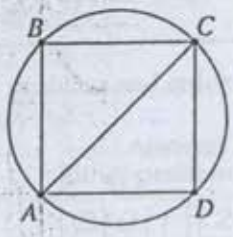
246810121416182022. . . . .

7. The number above is formed by writing down, in increasing order, the consecutive even integers from 2 to 98, inclusive. What is the 40th digit in the number?

(A) 0
(B) 2
(C) 3
(D) 4
(E) 7

8. What is the range of $f(x) = 3x^2 - 5x + 3$, if $f(x)$ is defined for $-1 < x < 4$ and x is an integer?

(A) $1 < f(x) < 31$
(B) $3 < f(x) < 31$
(C) $11 < f(x) < 31$
(D) $1 < f(x) < 11$
(E) $3 < f(x) < 11$



9. If the area of the circle in the figure above is 36 and $ABCD$ is a square, what is the area of ΔACD?

(A) 12
(B) 18
(C) 6π
(D) 12π
(E) $\frac{36}{\pi}$

10. Seven friends, four boys and three girls, enter a subway car. They all decide to sit in a row of seven seats on one side of the car. If no boys sit next to each other, how many different seating arrangements exist for the seven friends?

(A) 12
(B) 28
(C) 144
(D) 210
(E) 256

GO ON TO THE NEXT PAGE

Directions for Student-Produced Response Questions

Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

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

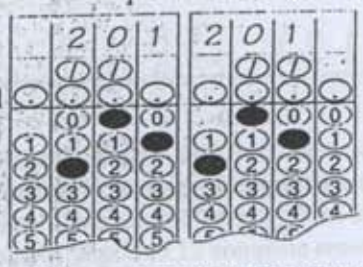
Write answer in boxes. → Fraction line

Grid in result. →

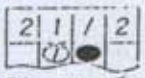
Answer: 2.5

← Decimal point

Answer: 201
Either position is correct

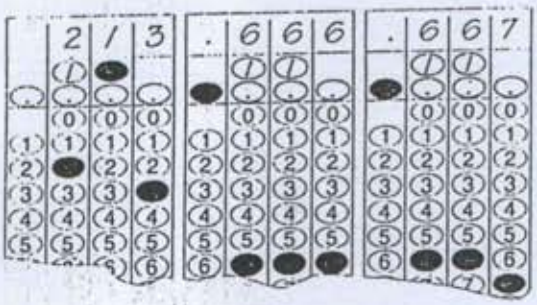


Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If  is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)

- **Decimal Accuracy:** If you obtain a decimal answer, **enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3} = .6666\ldots$



11. If $4 + 5(r + s) = 24$, what is the value of $r + s$?

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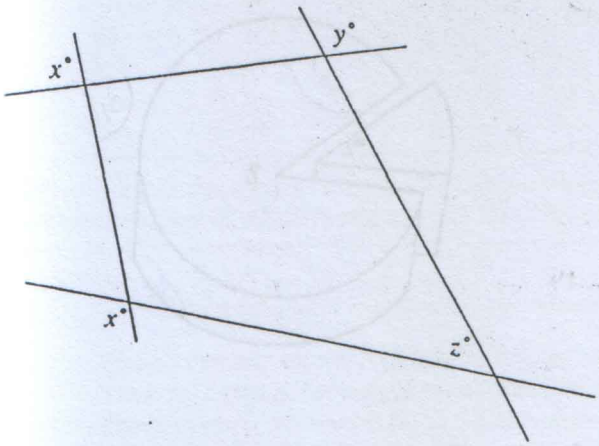


Note: Figure not drawn to scale.

12. In the figure above, $x = 110$ and $y = 105$. What is the value of z?

13. If $9 < a < 14$ and $11 < b < 13$ and a and b are integers, what is one possible value of $a + b$?

$G = \{10, 20, 30, 40\}$

$H = \{2, 3, 4, 5, 6\}$

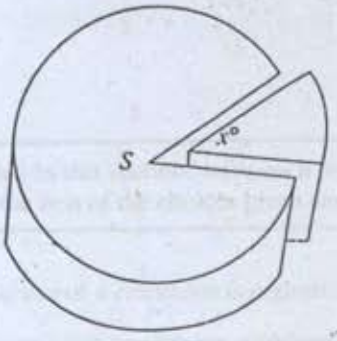
14. How many elements does the union of sets G and H contain?

15. k is an integer between 50 and 90 and is a multiple of 4. When k is divided by 5, the remainder is 3. When k is divided by 3, the remainder is 2. What is the value of k?

16. Circular bicycle wheels A and B roll down a ramp without slipping. Wheel A has circumference 54, and wheel B has circumference 36. If, over a certain distance, B makes 12 complete revolutions, then how many complete revolutions does A make over the same distance?

17. If $x^3 = x^4$, what is one possible value of x?

GO ON TO THE NEXT PAGE



18. At a certain cheese store, the price of a wedge of cheese is directly proportional to the volume of the wedge. For example, if the volume of a wedge of cheese is $\frac{1}{3}$ of the volume of the whole wheel of cheese, then the price of the wedge is $\frac{1}{3}$ of the price of the whole wheel. The price of the wedge shown above is \$7. If the price of the whole wheel is \$35, and S is the center of the wheel, what is the value of x?

19. If $4+\sqrt{3x-2}=9$, then what is the value of x?

20. All of the students in a history class are juniors or seniors. There are twice as many girls as boys in the class, and there are 3 times as many senior girls as junior girls. If a student is selected at random, what is the probability that the student is a junior girl?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 6
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

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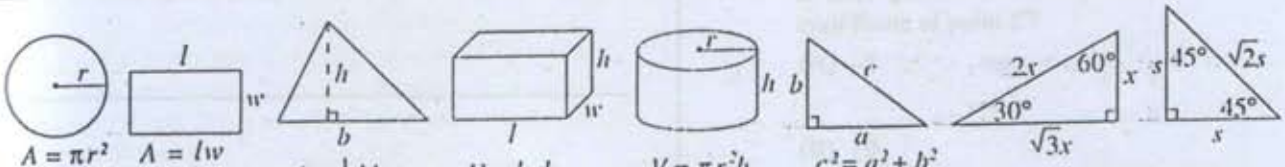

$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. 34.09, rounded to the nearest tenth, is equal to what?
   (A) 34
   (B) 34.01
   (C) 34.09
   (D) 34.1
   (E) 35

2. If $3d - 7 = 51$, what is $3d + 51$?
   (A) 7
   (B) 58
   (C) 97
   (D) 109
   (E) 115

GO ON TO THE NEXT PAGE

3. If 7 apples cost x dollars, how much do 70 apples cost, in terms of x?

(A) $7x$

(B) $10x$

(C) $70x$

(D) $\frac{70}{x}$

(E) $\frac{7x}{70}$

4. If $f(x) = x^2 - 2$ then $f(3) =$

(A) 1

(B) 2

(C) $\sqrt{5}$

(D) 7

(E) 9

5. When Peter subtracts a value p from 80 and then divides the difference by the same value p, he calculates the result to be 3. What number is Peter using for the value p?

(A) 4
(B) 10
(C) 20
(D) 24
(E) 34

6. What is the slope of the line with equation $y + 3 = 5(x - 2)$?

(A) 7
(B) 5
(C) 3
(D) −10
(E) −13

7. Points A, B, and C lie on a number line. A has coordinate −10 and B has coordinate 26. If point C is three-quarters of the way from A to B, what is the coordinate of point C?

(A) −1

(B) 10

(C) $\frac{26}{4}$

(D) $\frac{13}{2}$

(E) 17

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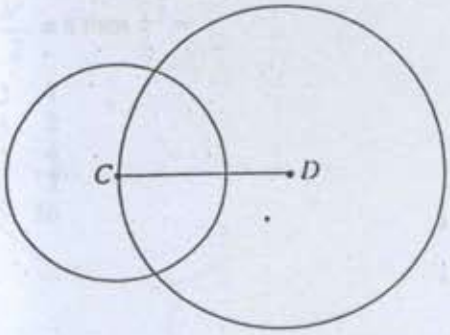


Note: Figure not drawn to scale.

8. In the figure above, point C is the center of the smaller circle and point D is the center of the larger circle. The radius of circle with center D is three times larger than the radius of circle with center C and the distance from C to the edge of the smaller circle is 6. If x is the difference between the radii of the two circles, then what is x?

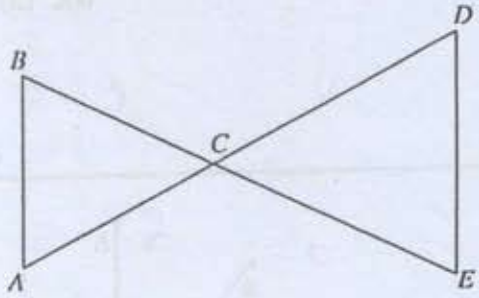
(A) 2
(B) 6
(C) 12
(D) 18
(E) 30

9. 2 plus 200 percent of 1 is equal to which of the following?

(A) 100 percent of 2
(B) 150 percent of 2
(C) 300 percent of 2
(D) 300 percent of 1
(E) 400 percent of 1

10. Video games are rated in two categories: interest level and player participation. If a video game is rated in each category on a scale of 1 to 8, how many combinations of rankings are possible?

(A) 8
(B) 16
(C) 24
(D) 56
(E) 64



Note: Figure not drawn to scale.

11. In the figure above if $AC = 2$, $BC = 3$, $DC = 4$, $EC = 6$, $AB = 4$, and $\overline{AB}$ is parallel to $\overline{DE}$, what is the sum of the perimeters of ΔABC and ΔCDE?

(A) 27
(B) 25
(C) 20
(D) 18
(E) 15

GO ON TO THE NEXT PAGE

12. If $\frac{b^x}{2} = 8$ then $b^{\frac{x}{2}} =$

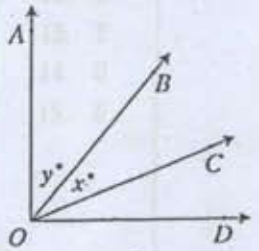
(A) 1
(B) 2
(C) 4
(D) 8
(E) 16

13. If $f = \frac{3}{g}$, where g is not equal to 0 and f is not equal to 1, which of the following is equal to $\frac{g-3}{f-1}$?

(A) g
(B) f
(C) $g-f$
(D) $-f$
(E) $-g$

14. In a lottery drawing, tickets will be drawn randomly out of a hat. If $\frac{1}{10}$ of the tickets in the hat are green, $\frac{1}{2}$ of them are white, $\frac{1}{4}$ of them are blue, and the remaining 30 tickets are pink, what is the number of blue tickets in the hat?

(A) 25
(B) 50
(C) 75
(D) 120
(E) 200



Note: Figure not drawn to scale.

15. In the figure above, $\overrightarrow{OA} \perp \overrightarrow{OC}$ and $\angle COB \cong \angle DOC$. If $3x + 2y = 220$, then what is the measure of $\angle AOD$?

(A) 40°
(B) 50°
(C) 90°
(D) 120°
(E) 130°

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 3: ANSWER KEY

2 Math	3 Math	6 Math
1. D	1. E	1. D
2. D	2. E	2. D
3. E	3. B	3. B
4. B	4. A	4. D
5. E	5. D	5. C
6. C	6. D	6. B
7. D	7. D	7. E
8. C	8. A	8. C
9. D	9. E	9. E
10. B	10. C	10. E
11. E	11. 4	11. A
12. A	12. 35	12. C
13. D	13. 22,23, 24, or 25	13. E
14. D	14. 9	14. B
15. E	15. 68	15. E
16. A	16. 8	
17. B	17. 0 or 1	
18. D	18. 72	
19. C	19. 9	
20. A	20. .166, .167, or $\frac{1}{6}$	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	690	21	470
70		45	680	20	460
69		44	670	19	460
68		43	670	18	450
67		42	660	17	440
66		41	650	16	430
65		40	640	15	420
64		39	630	14	410
63		38	620	13	400
62		37	610	12	390
61		36	600	11	390
60		35	600	10	380
59		34	590	9	370
58		33	580	8	360
57		32	570	7	350
56		31	560	6	340
55	800	30	550	5	330
54	790	29	540	4	330
53	780	28	530	3	320
52	770	27	530	2	310
51	750	26	520	1	310
50	730	25	510	0	280
49	720	24	500	-1	250
48	710	23	490	-2	220
47	700	22	480	-3	200

Practice Test 3: Answers and Explanations

SECTION 2

1. D Since 2 gallons goes into 10 gallons five times, multiply 10 minutes by 5 to get 50 minutes.

2. D Since all sides of a square are equal, $x - 2 = 3$, therefore x is 5. The question asks for the value of $x + 1$, so the answer is 6.

3. E By multiplying both sides by 6, we get $12d + 18 = 24$.

4. B Since the equation is $x = 3$, the x-value must be 3. Only in (B) is the x-value not 3.

5. E Since $10a + 150$ divided by 10 is $a + 15$, the correct answer must be b divided by 10, (E).

6. C Plug in the answer choices until you find one that meets both requirements of the question: $g + h = 0$ and $\frac{g}{h} \leq -1$. Only (C) satisfies both requirements.

7. D Write out the numbers: 7, 9, 11, 13, 15. Be methodical, since we're adding and want large numbers, start at the right: $15 + 13 = 28$, $15 + 11 = 26$, $15 + 9 = 25$, $15 + 7$ is not greater than 23. We have 3 pairs so far. Do the same thing for 13: $13 + 11 = 24$, $13 + 9$ is not greater than 23. We now have 4 pairs. $11 + 9$ is not greater than 23 and all of the remaining sums are smaller than $11 + 9$, so the answer is 4 pairs.

8. C When there are variables in the answer choices, plug in numbers. Let $a = 10$ and $b = 4$. c must then be 14. The question asks for the average of a and b: $\frac{a+b}{2} = \frac{14}{2} = 7$. Plug in the values chosen for a, b, and c into the answer choices and eliminate any that don't equal 7. Only (C) remains.

9. D Read carefully. The first sentence translates to: $s + d + k = 72$. If Stephanie paints half as many rooms as Karissa, then $s = \frac{1}{2}k$. Stephanie also paints 12 more than Damon: $s = d + 12$. Since the question asks the value of k, eliminate s and d from the first equation. s can easily be replaced with $\frac{1}{2}k$. Replacing d is trickier, so first replace the s in the third equation with $\frac{1}{2}k$: $\frac{1}{2}k = d + 12$, then solve for d: $d = \frac{1}{2}k - 12$. Now d can be replaced in the first equation with $\frac{1}{2}k - 12$. The first equation now looks like this: $\frac{1}{2}k + \frac{1}{2}k - 12 + k = 72$. Solve for k. $k = 42$, (D). Want an easier way? Plug in. Start with (C). If Karissa paints 30 rooms, then Stephanie paints 15, and Damon paints 3, totaling 48 rooms. The answer must be greater than 30 which eliminates (A), (B), and (C).

Plug in (E). If Karissa paints 48 rooms, then Stephanie paints 24, and Damon 12, totaling 84 rooms. This is too large, and eliminates (E).

10. B The two coordinates are (1, 2) and (3, 3). The x-values are 1 and 3. The computer adds them and prints 4 suns. The y-values are 2 and 3. The computer adds them and prints 5 lightning bolts. (B) is the only picture that matches this description.

11. E Any prime number less than 78 will be canceled when $f(78)$ is subtracted from $f(81)$. The answer is therefore, the sum of the prime numbers between 78 and 81. Since 79 is the only such number, the answer is (E).

12. A Since $\overline{AD} = \overline{CD}$ and $ABCD$ is a parallelogram, then by definition all sides are equal. $\overline{BD}$ divides $ABCD$ into two equilateral triangles. This means that $y = 60$ and $x = 30$, which disproves statement II. This eliminates (B), (C), (D), and (E) leaving only (A).

13. D When dividing fractions, multiply the first fraction by the reciprocal of the second fraction: $\frac{7x}{2} \times \frac{4x}{1} = \frac{28x^2}{2} = 14x^2$.

14. D Set up the equation $2x + 2^2 + 1 = 20.25$, then plug in the answer choices for x to see which makes the equation equal. Only (D) works.

15. E Plug in a value for q and s. Using $q = \frac{1}{2}$ and $s = 2$, $\frac{\left(1+\frac{1}{2}\right)}{(1+2)} = \frac{1}{2}$. Plug q and s into the answer choices and eliminate any not equal to $\frac{1}{2}$. Only (E) works.

16. A Each compartment has the same volume. Since x out of n compartments have sand, $\frac{x}{n}$ is the fraction of the box that is filled with sand. The volume of the entire box is v, so $\frac{x}{n}$ times v is the volume of the sand: $\frac{x}{n}v = \frac{xv}{n}$. Want an easier way? Plug in. Let's say that $v = 25$, $n = 5$, and $x = 3$. First, the fraction of boxes filled with sand would be $\frac{3}{5}$. Then multiply this by 25, the total volume, to get 15. Plug in for the variables in the answer choices to see which will also result in 15.

17. B One example of a list that follows the rules is {2, 4, 4, 6}. If we add a 4 to the set it changes nothing thereby eliminating (A). If we add a 0 and a 8 to the set it also adds nothing thereby eliminating (C). Adding 2 to each number leaves us with {4, 6, 6, 8} which has a mean of 6, mode of 6, and median of 6 which lets us get rid of (D). Removing the first and last numbers would leave us with {6, 6} which is fine; therefore eliminate (E).

18. D Translate "the square of x minus the square of y is equal to 48" into an equation: $x^2 - y^2 = 48$, the numerator of the fraction in the first equation is 48. Subtract y from both sides of the equation. The left side of the equation is now $x - y$, which, according to the problem, equals 3. The equation now looks like this: $3 = \frac{48}{x+y}$. 48 divided by 16 is 3, so $x + y = 3$. The question asks for the value of $2x + 2y$, which is twice the value of $x + y$, so the answer is 6.

19. C Since O has a radius of 1, the center of the circle is at (1, 1). If $\overline{AB}$ has a slope of -1, that means the line from the center of the circle to point t must have a slope of 1, in other words, a 45° angle (remember, a *tangent* is perpendicular to the radius). Make this radius the hypotenuse of a 45:45:90 right triangle (relationships between the sides of a 45:45:90 triangle are given at the beginning of each math section). The other two sides are parallel to the axes. Since the hypotenuse has a length of 1, the two legs must each have a length of $\frac{1}{\sqrt{2}}$. The x-value of point t is the radius plus the bottom of the triangle, which is $1 + \frac{1}{\sqrt{2}}$. None of the answer choices have this as an x-value, try rationalizing. Rationalizing gets rid of the radical in the denominator. Taking just the fraction: $\frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$. This makes the x-value $1 + \frac{\sqrt{2}}{2}$. The y-value is the radius plus the height of the triangle, which is also $1 + \frac{\sqrt{2}}{2}$. The correct answer is (C).

20. A The product of two matrices has the same number of rows as the first matrix and the same number of columns as the second. Eliminate (C), (D), and (E). To calculate the product, multiply each element in the top row of the first matrix with the corresponding element in the first column of the second and add the products: $(1 \times 2) + (3 \times 6) + (5 \times 10) = 70$, this value came from the *top* row of the first matrix and

the *left* column of the second matrix so it goes in the *top left* spot in the answer matrix. The top right value is:

$(1 \times 4) + (3 \times 8) + (5 \times 12) = 88.$

Next, the bottom left:

$(7 \times 2) + (9 \times 6) + (11 \times 10) = 178.$

Finally, the bottom right:

$(7 \times 4) + (9 \times 8) + (11 \times 12) = 232.$

The answer is then: $\begin{bmatrix} 70 & 88 \\ 178 & 232 \end{bmatrix}$, (A).

SECTION 3

1. E $|x|$ means the absolute value of x, which is how far x is from 0 on the number line. -5 is 5 units away from 0, so $|-5| = 5$, and $5 + 1 = 6$.

2. E Looking at the tens column, and note that there is no "carry over" into the hundreds column, so, $2 + x = 8$, so $x = 6$. In the units column, $6 + 3 = y$, so $y = 9$.

3. B First, subtract the \$2.00 transaction fee. That leaves \$152.00 for two tickets, including handling fee. The handling fee is 25 percent of the ticket price before fees, so he pays 125 percent of the ticket price (100 percent of the ticket price plus 25 percent of the ticket price) which is \$152.00. Translate and solve for x: $\frac{125}{100}x = 152$, $x = 121.60$. That is for two tickets. The price of each ticket was \$60.80.

4. A Plug in the answers. The question is asking for the greatest value for x so we actually have to start with the greatest answer choice, which is 13. $\frac{702}{3^{13}} = 0.0004$. This is not an integer. Eliminate (E). Try answer choice (D) and continue until you get an integer. $\frac{702}{3^7} = 0.32$. (C): $\frac{702}{3^6} = 0.\overline{962}$. (B): $\frac{702}{3^4} = 8.\overline{6}$. Only (A) remains: $\frac{702}{3^4} = 78$.

5. D Since one side of the square is 10, all sides are 10. Since the triangle is a right triangle and two sides are the same length (isosceles), it is a 45:45:90 triangle (relationships between the sides of a 45:45:90 triangle are given at the beginning of each math section) with hypotenuse of 10. Therefore, $x = \frac{10}{\sqrt{2}}$. The question asks for the length of both sides labeled x, so double the length of one side to get $\frac{20}{\sqrt{2}}$.

6. D Plug in the answers. Be sure to take bite-sized pieces and plug in as shown in the chart below where p = peak and np = non-peak.

	p min	p charge $= 35 \times p$ min	np min $= 30 - p$ min	np charge $= 15 \times np$ min	p charge $+ np$ charge	790?
(A)	7					
(B)	12					
(C)	15	525	15	225	750	Too small
(D)	17	595	13	195	790	Yup!
(E)	21					

(D) works so stop there.

7. D Look for the patterns. After the first 4 digits, there is a pattern where the "tens" take up 10 digits, the "twenties" take up 10 digits, etc. So the 35th digit is the 4, followed by 04244. Thus, the 40th digit is a 4.

SECTION 3

8. A To find it, either graph the equation or plug the integers between −1 and 4 into the function to see what values result. Remember that the range is the smallest and largest y values that can result from a function. When $x = 1$, $f(x) = 1$, and when $x = 4$, $f(x) = 31$. Be careful of (C) because you will get this incorrect answer if you only plug in $x = -1$ and $x = 4$. If you plug in $x = 4$ and get 31, eliminate (D) and (E), whose largest value is only 11.

9. E Since the area of the circle is given, find the radius using the formula $A = \pi r^2$. The radius is $\sqrt{\frac{36}{\pi}} = \frac{6}{\sqrt{\pi}}$. The hypotenuse of the triangle is twice the radius (diameter), $\frac{12}{\sqrt{\pi}}$. Since the triangle is isosceles and right (half of a square), it is a 45:45:90 triangle (relationships between the sides of a 45:45:90 triangle are given at the beginning of each math section). Each leg of the triangle equals $\frac{12}{\sqrt{2\pi}}$. The area of a triangle is $\frac{1}{2}bh = \frac{1}{2} \times \frac{12}{\sqrt{2\pi}} \times \frac{12}{\sqrt{2\pi}} = \frac{144}{2 \times 2\pi} = \frac{36}{\pi}$.

10. C The friends can only sit in a very specific alignment (B G B G B G B) but the different arrangements within that alignment are greater. Figure out how many possibilities there are for the first spot, then second spot, then how many are left for the third spot, etc.: 4, 3, 3, 2, 2, 1, 1. The product of the number of possible people who can sit in each seat gives the total number of possible arrangements; in this case 144.

11. 4 Subtract 4 from each side of the equation then divide each side by 5: $r + s = 4$.

12. 35 Using opposite (vertical) angles, the three angles in the quadrilateral other than z are 110, 110, and 105, for a total of 325. Since there are 360 degrees in a quadrilateral, z must be equal to 360 − 325.

13. 22, 23, 24, or 25 Plug in using integers that agree with the inequalities given. Add them to get your final answer. For example, make a equal to 11. Since b has to be an integer between 11 and 13, it must be 12. The sum of 11 and 12 is 23.

14. 9 The union of 2 sets is the combination of them. Since G has 4 elements and H has 5 and none overlap, there are 9 altogether.

15. 68 First, find the multiples of 4 between 50 and 90. They are 52, 56, 60, 64, 68, 72, 76, 80, 84, and 88. Next, find the members of this set that have a remainder of 3 when divided by five. That leaves 68 and 88. Finally, see which number has a remainder of 2 when divided by 3, leaving only 68.

SECTION 3

16. 8 Bicycle wheel B has a circumference of 36 and makes 12 complete revolutions, for a total distance of 432. Since bicycle wheel A has a circumference of 54, divide 432 by 54 to find the number of revolutions for bicycle wheel A over that distance.

17. 0 or 1 0 raised to any exponent remains 0, and 1 raised to any exponent remains 1.

18. 72 Set up a proportion. Since a whole wheel costs \$35 and a whole circle has 360°: $\frac{\$7}{\$35} = \frac{x°}{360°}$.

$x = 72$.

19. 9 Subtract 4 from both sides, square both sides, add 2 to both sides, and divide both sides by 3. $x = 9$.

20. $\frac{1}{6}$ or .166 or .167 Start with the junior girls. Plug in a number such as 10. There are 3 times as many senior girls as junior girls, so there must be 30 senior girls, and 40 girls total. We know that there are twice as many girls as there are boys, so there must be 20 boys, for a total of 60 students. If we are determining the probability of a junior girl being selected at random, we divide the number of junior girls by the number of total students: $\frac{10}{60} = \frac{1}{6}$.

SECTION 6

1. D The 0.09 must be rounded to 0.1. (B) is close, but adds an extra 0 in the tenths place.

2. D Since $3d - 7 = 51$, $3d = 58$. Substitute this value in for $3d$ in the second equation given, and $58 + 51 = 109$.

3. B Buy 10 times the apples, pay 10 times the price: $10x$.

4. D Plug 3 into the function. So $f(3) = (3)^2 - 2 = 9 - 2 = 7$

5. C $\frac{80-p}{p} = 3$, so $80 - p = 3p$ and $80 = 4p$. Solving this equation yields $p = 20$.

6. B The equation of a line with slope m and y-intercept b is $y = mx + b$. Manipulate the given equation into that form. Distribute the 5, then subtract 3 from both sides. This gives you $y = 5x - 13$ so the slope is 5.

7. E The distance from A to B is 36 units. three-quarters of 36 is 27, so point C is 27 units from point A. Since A is at -10, C is at 17.

8. C The radius of the circle with center C is 6, and the radius of the circle with center D is three times as large or 18. The difference of 18 and 6 is 12.

9. E Translate: $20 + \frac{200}{100} \times 1 = 2 + 2 = 4$. When evaluating the answer choices, only (E) is equal to 4.

10. E There are 8 possibilities for interest level and 8 possibilities for player participation. $8 \times 8 = 64$.

11. A Since $\overline{AB}$ and $\overline{DE}$ are parallel and angles ABC and DCE are the same (vertical angles). The two triangles are similar (angles are the same measure and lengths of sides are proportional), so if $AB = 4$ then $DE = 8$. If we add up the sides of the two triangles we get a total perimeter of 27.

12. C Multiply both sides of the equation by 2 to get $b^x = 16$. The denominator of a fractional exponent represents taking the root of a number. In this case, the second (square) root: $\sqrt{b^x} = \sqrt{16}$, which is 4.

13. E Plug in numbers. Try $g = 6$, $f = 0.5$, then $\frac{g-3}{f-1} = \frac{6-3}{0.5-1} = \frac{3}{-0.5} = -6$. Now plug in f and g into the answer choices and eliminate any not equal to -6. Only (E) remains.

14. B Calculate the fraction of the tickets that are pink: $\frac{1}{2}+\frac{1}{10}+\frac{1}{4}=\frac{17}{20}$. Since $\frac{17}{20}$ of the tickets are NOT pink, $\frac{3}{20}$ of the tickets are pink.

We also know that 30 tickets are pink, both represent the pink tickets, so set them equal:

$\frac{3}{20} \cdot x = 30$. Solve for x to find that there are 200 tickets. Since $\frac{1}{4}$ of the tickets are blue:

$\frac{1}{4} \times 200 = 50$. There are 50 blue tickets.

Practice Test 4

15. E Redraw the figure, so that $\angle AOC$ actually looks like a right angle. This means that $x + y = 90$. Since $\angle COB$ and $\angle DOC$ are congruent, mark $\angle DOC$ as $x°$. $\angle AOD$ is $2x + y$. Since we know that $x + y = 90$ and the problem states that $3x + 2y = 220$. Solve for $2x + y$ using simultaneous equations: Subtract the first equation from the second. This leaves you with $2x + y = 130$.

Practice Test 4

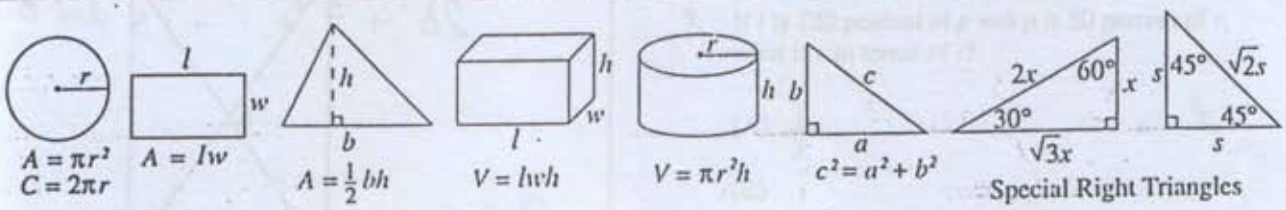
SECTION 2
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information

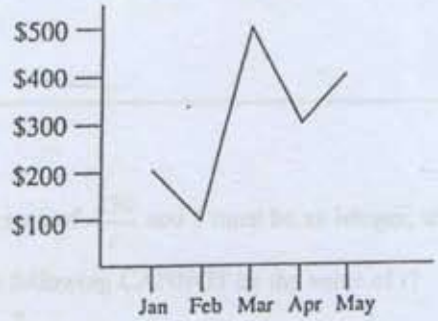


$A = \pi r^2$, $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. $4(2 + 3) - 1 =$
   (A) 10
   (B) 12
   (C) 19
   (D) 20
   (E) 21

Checking Account Activity for Sally

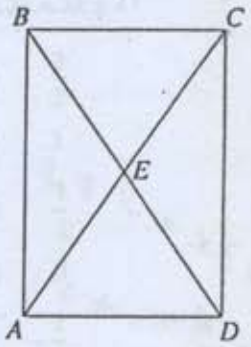


2. According to the chart above, what was the difference in Sally's account from the beginning of the 5-month period to the end of the 5-month period?
   (A) –$200
   (B) –$100
   (C) $200
   (D) $300
   (E) $400

GO ON TO THE NEXT PAGE

3. What is the result when 0.2438 is rounded to the nearest hundredth?

(A) 0.24
(B) 0.244
(C) 0.25
(D) 0.254
(E) 0.255



4. $ABCD$ is a rectangle. $\overline{AC}$ and $\overline{BD}$ intersect at point E. If the length of $\overline{AC}$ is 16, the length of $\overline{BE}$ is

(A) 4
(B) 6
(C) 8
(D) 12
(E) 16

5. If $\{\{\{r = a \times b$ and $\{\{\{r$ is an odd integer, which of the following could be the values of a and b ?

(A) 1 and 2
(B) 4 and 8
(C) 7 and 3
(D) 2 and 9
(E) 0 and 1

6. When 28 is added to 3 times a number y and the sum is divided by 2, the result is 2 times the number y. What is the value of y?

(A) 25
(B) 28
(C) 30
(D) 33
(E) 34

7. If t is 120 percent of p and p is 50 percent of r, what is r in terms of t?

(A) $\frac{1}{3}t$

(B) t

(C) $\frac{5}{3}t$

(D) $3t$

(E) $5t$

8. If the sum of $\frac{230}{t}$ and 1 must be an integer, which of the following CANNOT be the value of t?

(A) 2
(B) 4
(C) 5
(D) 10
(E) 23

GO ON TO THE NEXT PAGE

9. If a rectangle has corners at (−2, 2), (−2, 6), and (4, 6), what is the location of the fourth corner?
(A) (0, 0)
(B) (2, 4)
(C) (−2, −2)
(D) (4, 2)
(E) (−4, 2)

10. What is the slope of the line expressed by the equation $2y = 3x + 2$?
(A) $\frac{3}{2}$
(B) 1
(C) $\frac{1}{2}$
(D) 0
(E) $-\frac{1}{2}$

$f(x)$	x
1	1
4	s
$s+4$	m

11. According to the table above, if $f(x) = \frac{3x-1}{2}$, what is the value m?
(A) 1
(B) 3
(C) 4
(D) 5
(E) 7

−7, −5, −3, −1, 0, 1, 3, 5, 7

12. How many distinct products can be obtained by multiplying any two numbers in the list of numbers above?
(A) 9
(B) 17
(C) 19
(D) 21
(E) 31

13. If $3^2 = 11^n$, then 11^{2n} is equal to
(A) 3
(B) 4
(C) 9
(D) 11
(E) 81

14. If $\frac{6}{g} = \frac{h}{j}$ and $\frac{g}{j} = \frac{3}{1}$, then $h =$
(A) $\frac{1}{2}$
(B) 2
(C) 3
(D) 6
(E) 10

GO ON TO THE NEXT PAGE

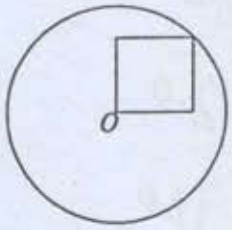
15. If 48 ounces of soda have a volume of 32 cubic centimeters, what is the volume, in cubic centimeters, of 6 pounds of soda? (1 pound = 16 ounces)

(A) 192
(B) 96
(C) 80
(D) 68
(E) 64

16. In a jar of cookies, $\frac{1}{8}$ of the cookies are oatmeal raisin, $\frac{1}{4}$ are peanut butter, $\frac{1}{2}$ are chocolate chip, and the remaining 12 cookies in the jar are mint.

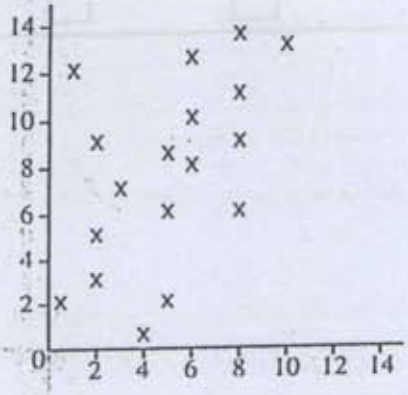
How many peanut butter cookies are in the jar?

(A) 24
(B) 28
(C) 32
(D) 48
(E) 50



17. In the figure above, one vertex of the square is touching the center of the circle and a second vertex touches a point on the circle. If one side of the square is 2, what is the area of the shaded region?

(A) $8\pi - 4$
(B) $8\pi - 2$
(C) 8π
(D) 9π
(E) $9\pi - 4$



18. If m is the slope of the line, beginning at the origin, that best fits the data above, then which of the following must be true of m?

(A) $m < -1$
(B) $-1 < m < 0$
(C) $m = 0$
(D) $0 < m < 1$
(E) $m > 1$

19. Joe fills his 100 mL mug with b mL of coffee and then adds a mL of cream so that the mug is totally full. In terms of a, what percent of the mug is filled with coffee?

(A) $100 - a\%$

(B) $100 + a\%$

(C) $\frac{100 - a}{100}\%$

(D) $\frac{a}{100}\%$

(E) $a\%$

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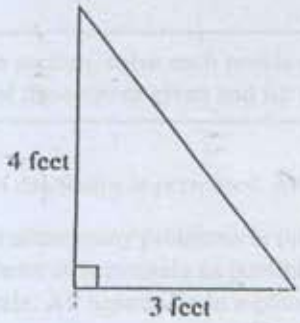


20. How many glass panels of the size and shape shown above would be needed to make a glass window measuring 20 feet by 36 feet?

(A) 75
(B) 80
(C) 100
(D) 105
(E) 120

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

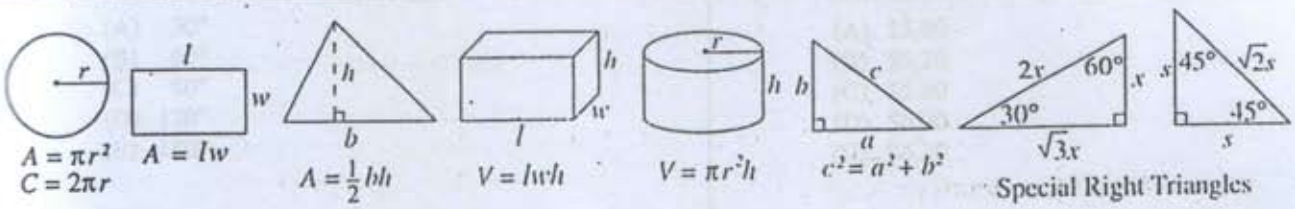
SECTION 4
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$
$C = 2\pi r$

$A = lw$

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

$V = lwh$

$V = \pi r^2 h$

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

Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $x - 3 = 8$, then $(x - 4)^2 =$
   (A) 25
   (B) 49
   (C) 64
   (D) 81
   (E) 121

Degrees-Radians Conversion					
Degrees	0°	90°	180°	360°	720°
Radians	0	$\frac{\pi}{2}$	π	p	4π

2. In the table above, what is the value of p?
   (A) 1
   (B) $\frac{3\pi}{2}$
   (C) 2π
   (D) $\frac{5\pi}{2}$
   (E) 3π

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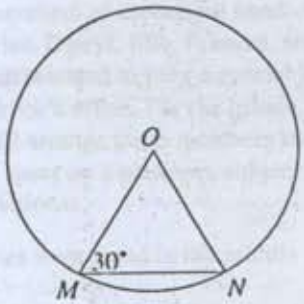

Note: Figure not drawn to scale.

3. In the figure above, O is the center of the circle. What is the measure of $\angle MNO$?

(A) 30°
(B) 60°
(C) 90°
(D) 120°
(E) 180°

4. If $f(x) = 3x^2 + 7$, for which of the following values of x does $f(x) = 19$?

(A) −4
(B) −2
(C) 0
(D) 1
(E) 4

5. A babysitter is trying to determine the ages of three children, Jerome, Keenan, and Leitha. She knows the following facts about their ages: the sum of Jerome's and Keenan's ages is 20 years; the sum of Jerome's and Leitha's ages is 21 years; and the sum of Keenan's and Leitha's ages is 23 years. How many years old is Leitha?

(A) 9
(B) 10
(C) 11
(D) 12
(E) 13

Weekly allowance	Number of third-graders receiving that allowancce
\$2	1
\$3	3
\$5	3
\$8	2
\$10	1

6. A study recorded the weekly allowances received by 10 third-graders, as shown in the table above. What is the average (arithmetic mean) weekly allowance received by the third-graders in the study?

(A) \$5.00
(B) \$5.20
(C) \$5.60
(D) \$6.00
(E) \$6.20

7. The three-digit integer ABC is formed from the digits A, B, and C, where $A = ab$, $B = bc$, and $C = ac$. If a is an element of $\{1, 3\}$, b is an element of $\{2, 3\}$, and c is an element of $\{1, 2\}$, then which of the following numbers CANNOT be ABC?

(A) 221
(B) 222
(C) 262
(D) 313
(E) 646

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8. Seven members of the school band—Aretha, Benny, Charles, Darryl, Ella, Frances, and Gerald—have been selected to play a special jazz tribute for the governor's office. For the tribute, the governor's office will arrange these members standing in a row of seven spots on a platform, subject to the following restrictions:

Charles must stand in the middle spot.

Aretha must stand in the left-most spot

There must be exactly two spots between Benny and Frances.

Darryl cannot stand next to Charles.

In which of the following pairs could neither person be placed in the last position from the left?

(A) Benny and Darryl
(B) Darryl and Aretha
(C) Charles and Ella
(D) Benny and Frances
(E) Ella and Gerald

9. A certain recipe uses b tablespoons of butter and f cups of flour to make a batch of cookies. If Mario wants to make a larger batch using $b+2$ tablespoons of butter, how many cups of flour must he use to maintain the proportion in the original recipe?

(A) $\frac{b}{(b+2)f}$

(B) $\frac{f}{b}$

(C) $\frac{b+2}{f}$

(D) $\frac{(b+2)f}{b}$

(E) $\frac{bf}{b+2}$

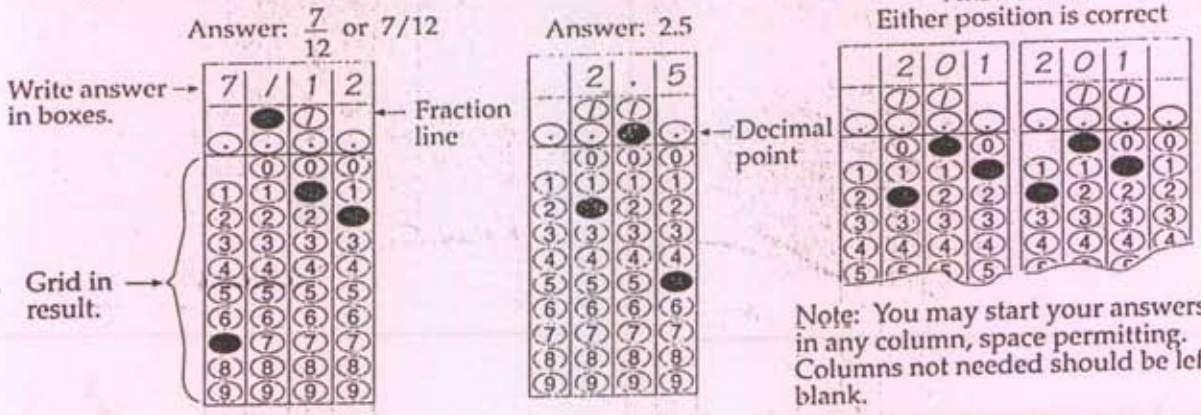
10. Three identical cubes, each with edges of length 8, are to be cut into a total of 384 identical rectangular solids of length 4. If the width and height of each solid are integers, what is the surface area of each solid?

(A) 4
(B) 8
(C) 12
(D) 16
(E) 18

GO ON TO THE NEXT PAGE

Directions for Student-Produced Response Questions

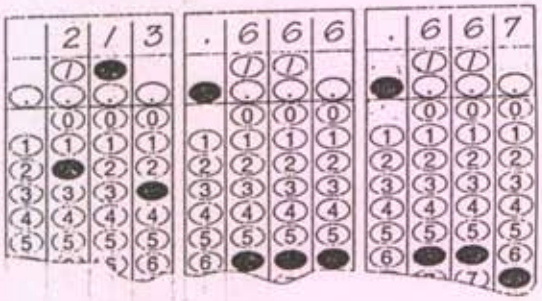
Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.



Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If 2 1 / 2 is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)
- Decimal Accuracy: **If you obtain a decimal answer, enter the most accurate value the grid will accommodate. For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3} = .6666\ldots$



11. If $8a + 4 = 10a$, what is the value of a?

12. A cookie jar contains various types of cookies. When a cookie is selected at random from the jar, the probability that it will be a chocolate chip cookie is $\frac{1}{5}$. If the jar contains 4 chocolate chip cookies, what is the total number of cookies in the jar?

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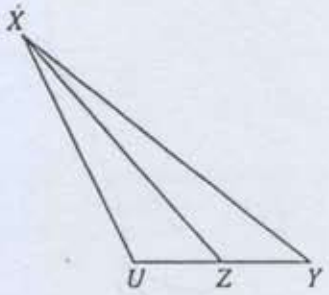
13. If $2^{\frac{y+3}{2}} = 16$, what is the value of y?



Note: Figure not drawn to scale.

14. If the length of $\overline{UZ}$ is 30% of the length of $\overline{UY}$ and the area of ΔXYZ is 210, what is the area of ΔUXZ?

15. If $(4x + 7)^2 = fx^2 + gx + h$, what is the value of $f + g$?

16. Alejandro is sending postcards to his friends and relatives, and he wants each postcard to be unique. He has 8 styles of postcards, 3 types of stamps, and two different colors of ink from which to choose. How many different combinations of postcard style, stamp, and ink color can Alejandro create?

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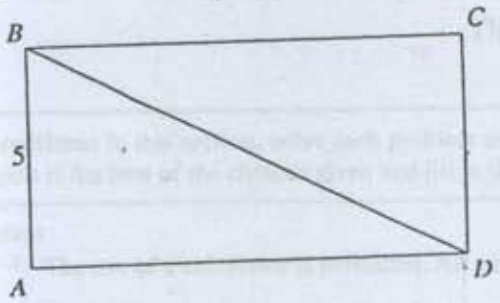


17. If the perimeter of rectangle $ABCD$ is 34, what is the perimeter of triangle ABD ?

18. Machine X produces paper clips at a constant rate of 20 paper clips per hour. Machine Y produces 10 more paper clips per hour than does machine X. Working together, how many hours will it take machines X and Y to produce 300 paper clips?

19. Let $f(x)$ be defined as the absolute value of the difference between the smallest and largest odd factors of x greater than 1. For example, $f(42) = |3 - 21| = 18$. What is the value of $f(90)$?

20. What is the x-coordinate of the point of intersection of a line passing through the points $(1, -3)$ and $(4, 4)$ and a line with a slope of $-\frac{2}{3}$ that crosses the y-axis at the point $(0, 2)$?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

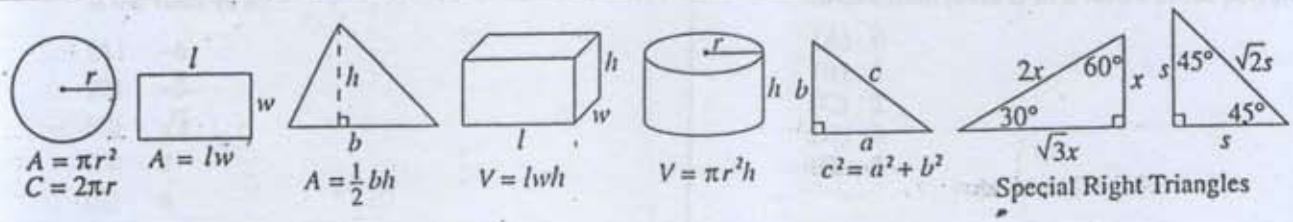
SECTION 6
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

Parking Violations at Shawnee Mission East High School

	Year	
Month	2000	2001
September	30	29
October	31	25
November	27	35
December	19	33

1. According to the information given in the table above, what was the overall increase from 2000 to 2001 in the number of parking violations for September through December?
   (A) 13
   (B) 15
   (C) 20
   (D) 27
   (E) 30

2. If $x = 7$, then $|5 - x|$
   (A) −2
   (B) 2
   (C) 7
   (D) 12
   (E) 35

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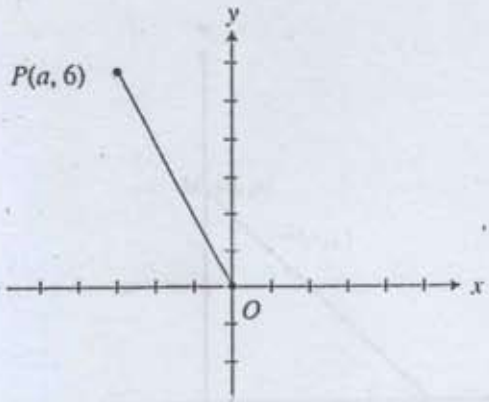
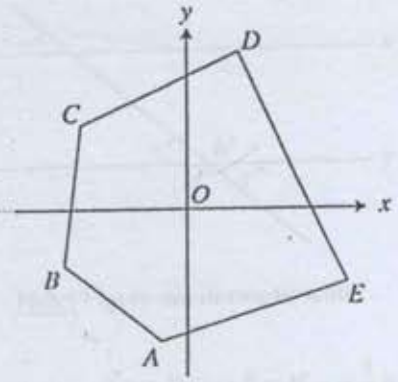


3. In the figure above, $\overline{OP}$ has a length of $3\sqrt{5}$. What is the value of a?

(A) -6
(B) -3
(C) $\sqrt{3}$
(D) 3
(E) 6

4. If m is a negative number, which of the following is also negative?

(A) $-m$
(B) $-\frac{1}{m}$
(C) $(-m)^2$
(D) m^2
(E) $-m^2$



5. A polygon $ABCDE$ is drawn on a coordinate plane. How many lines with a negative slope can be drawn from point O to a vertex of the polygon?

(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

6. The members of the Superstars diving team have only two training programs. There are 10 team members in training program A, and 7 team members in training program B. If 3 of the team members in training program A are also in training program B, how many divers are on the team?

(A) 13
(B) 14
(C) 17
(D) 20
(E) 23

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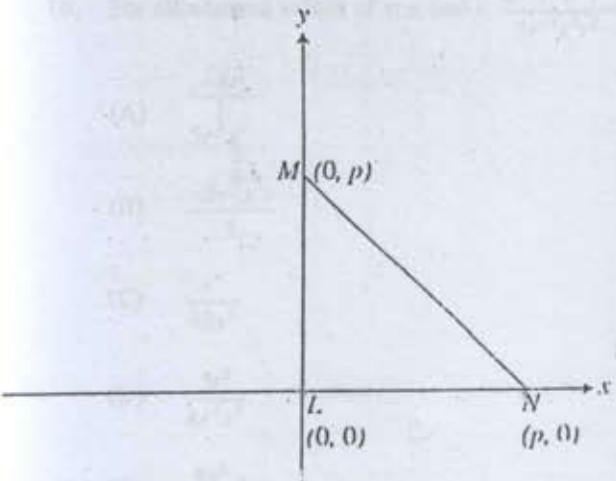
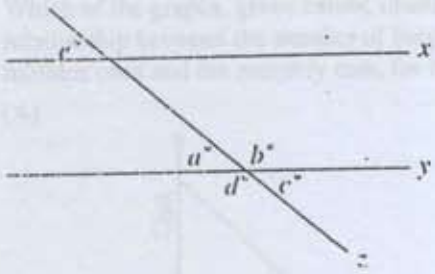


7. In the figure above, what is the area of triangle *LMN*?

(A) $\frac{1}{2}p^2$
(B) p
(C) $2p$
(D) p^2
(E) $\frac{1}{2}p$



Note: Figure not drawn to scale.

8. In the figure above, lines $x \parallel y$. If $e = \frac{1}{4}b$, which of the following must be the equivalent of $a + c$?

(A) 36
(B) 45
(C) 72
(D) 135
(E) 180

9. In a sequence of numbers, the first term is 6. Each successive term following the first is calculated by adding 2 to the previous term and then dividing by −1. What is the value of the 101st term subtracted from the 70th term?

(A) 31
(B) 14
(C) 4
(D) −14
(E) −31

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10. For all nonzero values of r, s, and t, $\frac{2^{-3}r^2s^{-4}t^3}{5r^{-4}s^2t^3} =$

(A) $\frac{-8t}{5r^{\frac{1}{2}}s^2}$

(B) $\frac{-2r^{\frac{1}{2}}s^2t}{5}$

(C) $\frac{r^6}{40s^6}$

(D) $\frac{5t^6}{8r^2s^2}$

(E) $\frac{8s^2}{5r^2}$

Questions 11–12 refer to the following information:

A phone company has two different plans for long distance.

Plan A costs \$0.35 a minute with no monthly fee.

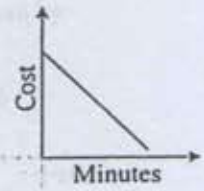
Plan B costs \$20.00 a month for the first 300 minutes, and \$0.15 a minute for each minute over the first 300 minutes.

11. If m represents the number of minutes Monte spends on the phone every month, in terms of m, what is Monte's monthly phone bill on Plan A?

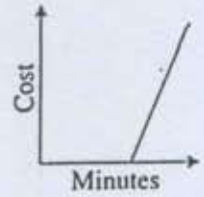
(A) $0.15m$
(B) $0.35m$
(C) $0.35 + m$
(D) $20 + .15m$
(E) $20 + .35m$

12. Which of the graphs, given below, illustrates the relationship between the number of long distance minutes used and the monthly cost, for Plan B?

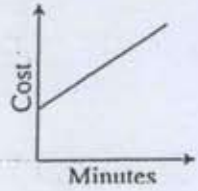
(A)



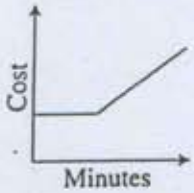
(B)



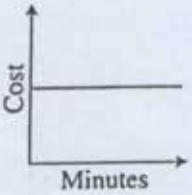
(C)



(D)



(E)



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13. For all real numbers, $f(x) = \frac{(x^2+1)}{2}$. If $f(a) = 25$ and $f(11) = b$, which of the following could be the value of $b - a$?

(A) -14
(B) 36
(C) 68
(D) 77
(E) 86

14. Lois divides her birthday candy into t equal piles. If she gives 3 piles to her friend Marek, in terms of t, which of the following represents the percent of her candy that she has left?

(A) $\frac{(t-3)100}{t}\%$

(B) $\frac{(t-3)}{100t}\%$

(C) $\frac{(t-3)}{t}\%$

(D) $\frac{(100t)}{(t-3)}\%$

(E) $\frac{(t-3)}{100}\%$

15. The number of baseball cards in Caleb's collection doubles every three months. If after 9 months he has b baseball cards, then an expression for the number of baseball cards in his collection after y years is given by

(A) $2^y b$
(B) $2^{4y-3} b$
(C) $2^{4y} b$
(D) $2b^{4y-3}$
(E) $2^y b^{y+2}$

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 4: ANSWER KEY

2 Math	4 Math	6 Math
1. C	1. B	1. B
2. C	2. C	2. B
3. A	3. A	3. B
4. C	4. B	4. E
5. C	5. D	5. C
6. B	6. B	6. B
7. C	7. D	7. A
8. B	8. D	8. C
9. D	9. D	9. D
10. A	10. E	10. C
11. D	11. 2	11. B
12. B	12. 20	12. D
13. E	13. 5	13. C
14. B	14. 90	14. A
15. E	15. 72	15. B
16. A	16. 48	
17. A	17. 30	
18. E	18. 6	
19. A	19. 42	
20. E	20. 2.44 or $\frac{22}{9}$	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	640	21	430
70		45	630	20	420
69		44	620	19	410
68		43	610	18	400
67		42	600	17	400
66		41	600	16	390
65		40	590	15	380
64		39	580	14	370
63		38	570	13	360
62		37	560	12	350
61		36	550	11	350
60		35	550	10	340
59		34	540	9	330
58		33	530	8	320
57		32	520	7	310
56		31	510	6	300
55	800	30	500	5	300
54	790	29	500	4	290
53	780	28	490	3	280
52	760	27	480	2	270
51	710	26	470	1	260
50	690	25	460	0	250
49	670	24	450	-1	240
48	660	23	450	-2	220
47	650	22	440	-3	200

Practice Test 4: Answers and Explanations

SECTION 2

1. C Order of Operations. First, add 2 + 3 to get 5. Then, multiply 5 × 4 = 20. 20 − 1 = 19. (D) is a partial answer and (E) is obtained if you incorrectly added 1.

2. C Sally starts off with $200 in her bank account in January and ends with $400 in May. This is an overall gain of $200 over the 5-month period.

3. A The number 4 falls in the hundredths place. The number to its right, in the thousandths place, is a 3 which is rounded down. Therefore the result is 0.24.

4. C Since *ABCD* is a rectangle, diagonals $\overline{AC}$ and $\overline{BD}$ are of equal length, and point *E* is the midpoint of both $\overline{AC}$ and $\overline{BD}$. Therefore, the length of $\overline{BE}$ must be 8.

5. C By definition, *a* and *b* must both be odd integers in order for $\iiint r$ to equal an odd integer. Only in (C) are both numbers odd.

6. B Translating into algebra yields the equation $\frac{28+3y}{2}=2y$. Multiply both sides of the equation by 2 to get $28 + 3y = 4y$. Subtract $3y$ from each side to get $y = 28$.

7. C Translate, then Plug in $t=\frac{120}{100}$ and $p=\frac{50}{100}r$. Plug in 100 for *r*, we get $p = 50$. If $p = 1$, then $t = 60$. Plug 60 into the answer choices and only (C) works.

8. B Plug in the answers and eliminate any that do not yield an integer. Since 230 is not evenly divisible by 4, (B) is the answer that cannot be the value for *t*.

9. D Since the question does not show you the coordinate plane, draw one yourself and plot the points you are given. The fourth corner must be directly to the right of the point (−2, 2), so the y-coordinate must be 2. The corner must be directly below the point (4, 6), so the *x*-coordinate must be 4. The ordered pai is therefore (4, 2).

10. A To find the slope, put the equation in $y = mx + b$ form by dividing both sides by 2. The new equation is $y=\frac{3}{2}x+1$, the slope is $\frac{3}{2}$

11. D Use the table to plug in according to the equation. Since *s* is the value of *x* when *f*(*x*) is 4, plug in 4 for *f* (*x*) and solve for *x*. *x* = 3, therefore, *s* = 3. Since *m* is the value of *x* whe *f*(*x*) is *s* + 4, plug in 7 for *f* (*x*) and solve for *x* *x* = 5, therefore, *m* = 5.

12. B Watch your signs and be sure to count only *distinct* products. Be methodical, start at the left and multiply that number by each of the other numbers, then do the same for the next number, don't write down any products that aren't distinct:
−7: 35, 21, 7, 0, −7, −21, −35, −49
−5: 15, 5, −5, −15, 25
−3: 3, −3, −9
0: (no distinct products)
1: −1,
3, 5, and 7 have no distinct products.
The number of distinct products is 17.

13. E Rules of exponents. 11^{2a} is 11^a squared, so 3^2 must also be squared, which is 81.

14. B Plug in for the variable. Start with the second proportion. Plug in 12 for g and 4 for j. Solve the first proportion for h and get 2.

15. E Set up a proportion to do the conversion from ounces to pounds first: $\frac{1 \text{ lb}}{16 \text{ oz}} = \frac{x \text{ lb}}{48 \text{ oz}}$, cross multiply and divide both sides by 16, $x = 3$ lb. 48 ounces of soda is 3 pounds. Now, set up a second proportion: $\frac{32 \text{ cm}^3}{3 \text{ lb}} = \frac{y \text{ cm}^3}{6 \text{ lb}}$, cross multiply and divide both sides by 3, $y = 64$ cubic centimeters.

16. A Start with a full jar: 1, subtract $\frac{1}{8}$, subtract $\frac{1}{4}$, subtract $\frac{1}{2}$. We're left with $\frac{1}{8}$ of a jar of cookies remaining, and we're told that the remaining cookies are mint. We're also told that there are 12 mint cookies. So $\frac{1}{8}$ of the jar are mint. Translate: $\frac{1}{8} \times$ jar $= 12$. Solve to get 96 cookies in jar. Since $\frac{1}{4}$ of the cookies in the jar are peanut butter, $\frac{1}{4}(96) = 24$.

17. A The key here is to see that the diagonal of the square is the radius of the circle. To find the diagonal of the square we use our knowledge of 45:45:90 triangles and we get $2\sqrt{2}$ which is the radius. From this we see we can calculate the area of the circle by $A = \pi r^2$. The area of the circle is 8π. Then we calculate the area of the square, which is 4, and subtract the two numbers giving us $8\pi - 4$.

18. E Use estimation to make this question easier. The "best fit line" goes through the middle of the cluster of points, so about half of the marked points are above the line and about half are below. Sketch a line and make sure that the line goes through the origin. Ballpark the slope: The line goes up from left to right so the slope is positive. Cross out (A), (B), and (C). A line with a slope of 1 is at a 45 degree angle with the x-axis. This line is steeper so it's slope is greater than 1, cross out (D).

19. A Plug in for the variables. In order to fill the mug, a and b must add to 100, which is convenient since this problem also deals with percent. Try $a = 10$ and $b = 90$. Plug 10 into the answers and eliminate any that don't equal 90. Only (A) works.

20. E Put two panels together to make a rectangle 4 feet tall and 3 feet wide. The window is 5 feet tall ($4 \times 5 = 20$) and 12 wide ($3 \times 12 = 36$). $2 \times 5 \times 12 = 120$ (don't forget to multiply by 2 because it took 2 panels to make the rectangle).

SECTION 4

1. B Add 3 to both sides of the first equation to get $x = 11$. Plug that into $(x - 4)^2$ to get $(11 - 4)^2 = 7^2 = 49$.

2. C To go from 180° to 360°, you must multiply by 2. So multiply π by 2 to get 2π. Don't get trapped by $\frac{3\pi}{2}$; that would be correct for 270°, but not for 360°.

3. A Since *OM* and *ON* are radii of the same circle they must be equal. Equal sides are opposite equal angles, so angles *OMN* and *MNO* are equal. Therefore, *MNO* is also 30°.

4. B Plug in the Answers (PITA). If $x = -2$, then $f(x) = (3)(-2)^2 + 7 = 12 + 7 = 19$. Be careful squaring –2 on your calculator!

5. D Plug in the answers (PITA). Take bite-size pieces...

	L	J = 21 – L	K = 23 – L	J + K	20?
(A)	9				
(B)	10				
(C)	11	10	12	22	L must be bigger
(D)	12	9	11	20	Yes
(E)	13				

6. B To find the average, you need the total amount of allowance received, divided by the number of kids. To find total allowance, multiply each allowance by the number of kids receiving it, and add it all together: $(\$2 \times 1) + (\$3 \times 3) + (\$5 \times 3) + (\$8 \times 2) + (\$10 \times 1) = \$52$. The average is $\$52 \div 10 = \$5.20$. Note that you can't simply average the allowance levels or you may incorrectly arrive at (C); you must multiply them by the number of kids.

7. D First look at digit A. Since *ab* could only be 2, 3, 6, or 9, that eliminates no answer choices. Now, look at digit B. Since *bc* could only be 2, 3, 4, or 6, that leaves (D) as the answer. Remember that you are looking for the one answer choice that *cannot* be *ABC*.

8. D Set up a horizontal row of seven spaces in which the musicians may be placed. Two places are already definitely filled—the *left-most* space, by Aretha (*A*), and the *middle* space by Charles (*C*). Also, Darryl (*D*) cannot be next to Charles—this can be indicted by placing a "*D*" with a slash across it in the spaces to either side of the middle space (this leaves Darryl with only the second, sixth, and seventh spaces as options). Now Benny (*B*) and Frances (*F*) must be separated by exactly two others, in which leaves only the second and fifth, or the third and sixth, positions. This can be designated above those spots with "*B* or *F*" on one level for second and fifth and another for third or sixth. The answers now become a process of elimination. (A) and (B) are eliminated, as Darryl could be in the seventh or last position from the left. Neither Ella nor Gerald is restricted from being last, and that drops (C) and (E). But since Benny and Frances are restricted to second and fifth, or third and sixth, neither can be in the last position, leaving (D).

9. D Plug In. Let $b = 4$ tablespoons of flour and $f = 6$ cups of flour. Adding 2 tablespoons of butter is like adding 50% to the recipe (butter went from 4 tablespoons to 6 tablespoons). That means you need $6 + 3 = 9$ cups of flour, so that is your target. Only (D) matches the target.

10. E The three identical cubes would each have volumes of 512 cubic inches ($8 \times 8 \times 8$); altogether, their volumes would total 3 times that or 1536 cubic inches. They are now to be divided so that in the end there are 384 *identical* rectangular blocks. The total volume of these blocks must still be equal to that of the original cubes, so each of those rectangular blocks would have a volume of 1536 ÷ 384 or 4 cubic inches. Since the blocks are rectangular, there are a few ways this could happen (if they're identical), but the only way to satisfy the requirement for all sides to be integers and for the longest dimension to be 4 inches is for them to have dimensions of 1 inch by 1 inch by 4 inches (that's a volume of 4). This means the blocks have two square faces or surfaces of 1 inch by 1 inch and four rectangular surfaces of 1 inch by 4 inches, giving each block a total surface area of 1 + 1 + 4 + 4 + 4 + 4 or 18 square inches. (A) is the volume of each solid.

11. 2 In the equation $8a + 4 = 10a$, subtract $8a$ from both sides to find $4 = 2a$. Divide both sides by 2 to find $a = 2$.

12. 20 Since probability is the number of outcomes fulfilling the requirements divided by the total number of possible outcomes, which is: $\frac{\text{choc chip}}{\text{total cookies}}$, set up a proportion: $\frac{1}{5} = \frac{4}{x}$, $x = 20$.

13. 5 First thing is to realize $16 = 2^4$, which in turn means $\frac{y+3}{2} = 4$. Solving for y shows that $y = 5$.

14. 90 Notice that the height for both triangles is the same (it would be a line straight down from point X). The base is the only difference between the triangles. The areas of the triangles are proportional to the bases of the triangles. Since $\overline{UZ}$ is 30% of $\overline{UY}$, the area of triangle UXZ is 30% of triangle UXY. That makes the area of triangle UXZ 70% of the area of triangle UXY. Set up a proportion: $\frac{30}{70} = \frac{x}{210}$. Solve for x, $x = 90$.

15. 72 FOIL out $(4x + 7)^2$ to get $16x^2 + 56x + 49$. That means f is 16 and g is 56. So $f + g = 72$.

16. 48 This problem uses three different types of items (style, stamp, ink) and each type can be reused. To find the number of combinations when choosing one item from different sources, multiply the total of each type of item. $8 \times 3 \times 2 = 48$.

17. 30 Since the perimeter is 34, then $5 + 5 + w + w = 34$. So, $10 + 2w = 34$. Subtract 10 to find $2w = 24$. Divide by 2 to find that the width of the rectangle is 12. Triangle ABD is a right triangle because the angles in a rectangle are right angles. This is a special right triangle 5:12:13. So, $BD = 13$. To find the perimeter, add the three sides: $5 + 12 + 13 = 30$.

18. 6 Machine X's rate is 20 clips/hour. Machine Y's rate is $20 + 10 = 30$ clips/hour. Working together, they make $20 + 30 = 50$ clips/hour. Amount = Rate × Time. So, $300 = 50 \times$ Time. Divide by 50 to find that the time is 6 hours.

19. **42** The largest odd factor of 90 is 45. The smallest odd factor of 90 that is greater than 1 is 3. So, $45 - 3 = 42$.

20. $\frac{22}{9}$ or 2.44 When we generate the equations defining these two lines, following the equation for a line $y = mx + b$. Find the slope of the first equation and then plug in one set of points to find the y-intercept. This should give $y = \frac{7}{3}x - \frac{16}{3}$. For the second line, the slope is given and since the x-value of the point given is zero, the y-value *is* the y-intercept. So the second equation is: $y = -\frac{2}{3}x + 2$. Use simultaneous equations to find the x-value where they intersect (to eliminate the y-value, multiply both equations by 3 and subtract). $x = \frac{22}{9}$, or as a decimal, 2.44.

SECTION 6

1. B Add the two columns and subtract: The total number of parking violations for 2000 is 107. The total for 2001 is 122. So, the increase from 107 to 122 is 15.

2. B Plug in 7 for x, and you get $|5 - 7| = |-2| = 2$. (A) is a partial answer. Remember, the absolute value of a number must be positive.

3. B Draw a line from point P straight down. Now you have a right triangle. If b has a value of 6, that means the height of the triangle is 6, and the hypotenuse is $3\sqrt{5}$. Use the Pythagorean theorem to calculate the length of the base. $6^2 + x^2 = \left(3\sqrt{5}\right)^2$. $36 + x^2 = 45$, so $x^2 = 9$, and $x = 3$. Since the base has a length of 3, but given where P lies the x-coordinate must be negative, $a = -3$. Want a shorter way? The x-value is negative so cross out (C), (D), and (E). They y-value is 6, but the magnitude of the x-value is less than the y-value, cross out (A).

4. E Plug in for the variable: Try $m = -2$. Only (E) is still negative.

5. C Draw a line from O to each vertex (a vertex is where the sides of a polygon meet). A line with a negative slope slants down as it goes from left to right, only CO and OE have negative slopes: The answer is 2.

6. B Add the participants of programs 1 and 2. That's $10 + 7 = 17$. But 3 team members participate in both programs, and so have been counted twice. So, subtract 3 from the total. There are $17 - 3 = 14$ team members. Be careful of (C); that is the result of adding 10 and 7. And (D) is the result if you add 3 to 10 and 7 instead of subtracting it.

7. A Plug in. Let $p = 10$. The height and base of the triangle will also be 10. Now find the area of the triangle. Use the formula. $A = \frac{1}{2}bh$. So, $\frac{1}{2} \times 10 \times 10 = 50$. 50 is your target. Now, Plug in 10 for p in the answer choices and find that (A) is 50.

8. C Whenever you have two parallel lines intersected by a third line, you will have two kinds of angles created: big ones and small ones. All the big angles will be the same size and all the small angles will be the same size. If you add a big angle and a small angle the sum will always be 180. So, $e + b = 180$. Since $e = \frac{1}{4}b$, $4e = b$. Combining the two equations, $e + 4e = 180$. $e = 36$. Since a and c are small angles, they also equal 36. So, $a + c = 36 + 36 = 72$.

9. D Start by writing out the first few terms of the sequence and look for a pattern. The first term is 6, the second term is: $(6 + 2) + (-1) = 8 + (-1) = -8$. The third term is $(-8 + 2) + (-1) = 6$. The pattern is 6, −8, 6, −8,... Notice all the odd-numbered terms are 6 and all the even-numbered terms are −8. 101 is an odd number, so the 101st term will be 6. And the 70th term will be −8. So, $-8 - 6 = -14$. Make sure you don't do $6 - (-8) = 14$ (B).

10. C First, deal with the numbers: $2^{-3} = \frac{1}{8}$. Dividing by 5 gives you $\frac{1}{40}$. Then, handle the variables. When dividing, remember to subtract exponents: $r^{2-(-4)} = r^6$, and $s^{-4-2} = s^{-6} = \frac{1}{s^6}$. Cancel t^3 from the top and bottom of the fraction, and then multiply everything together. Want a shorter way? Cross off all of the answer choices without 40 in the denominator. Only (C) remains.

11. B Plug in for the number of minutes: Try $m = 10$. Be sure to use Plan A. $0.35 \times 10 = 3.5$. Plug in 10 and eliminate all answer choices that don't match your target of 3.5; only (B) works.

12. D The horizontal part of the line of the graph depicts the cost incurred if you did not surpass 300 minutes, the slanted part of the line depicts the cost for the minutes surpassing 300.

13. C Solve for a first. $25 = \frac{(x^2+1)}{2}$, which simplifies to $x^2 = 49$, which means $x = \pm 7$. For b, $\frac{(11^2+1)}{2} = \frac{122}{2}$. The two possibilities for answers are $61 - 7$ and $61 - (-7)$ which yield 54 and 68 respectively. However, only 68 is a choice.

14. A Plug in. Let $t = 8$. Then, once Lois gives away 3 piles of candy, she has 5 left. So, the percent she has left is $\frac{5}{8} = 0.625 = 62.5\%$. This is your target. When you plug $t = 8$ into your answer choices, (A) = 62.5. Watch out for (C), which is 0.625%, not 62.5%.

15. B Plug in 3 for b, and 2 for y. If Caleb has 3 cards at the end of 9 months, he'll have 6 cards three months later, which is the end of the first year. He'll have 12 cards after 15 months, 24 cards after 18 months, 48 cards after 21 months, and 96 cards (your target number) after two years. Plug in 3 for b and 2 for y in the answers. Only (B) yields 96 as an answer.

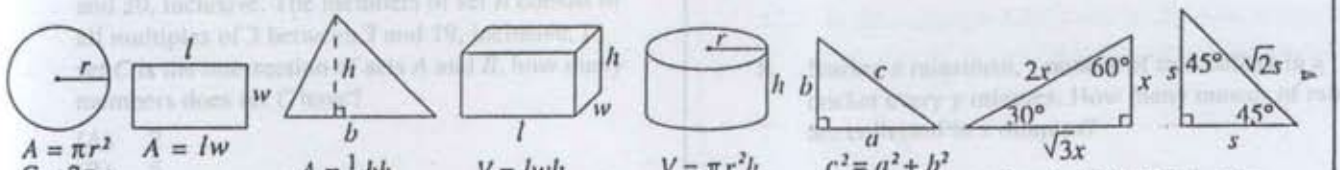
Practice Test 5

SECTION 1
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.



$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If x and n are integers and $9x + n$ is negative, what is the largest possible value for n when $x = 2$?
   (A) −20
   (B) −19
   (C) −17
   (D) 17
   (E) 19

2. Driving continuously, Brady can travel 240 miles in 4 hours. At this rate, how many miles can he travel in 3 hours?
   (A) 120
   (B) 150
   (C) 180
   (D) 210
   (E) 270

3. If a student reads 12 pages of a book each night, which of the following is the closest approximation of how many pages the student will have read in two weeks?
   (A) 170
   (B) 165
   (C) 160
   (D) 155
   (E) 150

GO ON TO THE NEXT PAGE

4. While playing darts, Larry hits the bull's-eye 15% of the time. How many darts would Larry need to throw in order to hit 6 bull's-eyes?

(A) 34
(B) 40
(C) 42
(D) 60
(E) 90

5. Set A is the set of all even numbers between 10 and 20, inclusive. The members of set B consist of all multiples of 3 between 7 and 19, inclusive. If set C is the intersection of sets A and B, how many members does set C have?

(A) 2
(B) 5
(C) 7
(D) 8
(E) 10

6. If half of a number is equal to 4 more than twice the number, what is the number?

(A) -3
(B) $-\frac{8}{3}$
(C) 0
(D) $\frac{7}{2}$
(E) 4

7. Points F and G are the endpoints of a line segment and $FG = 30$. Points H and I lie on $\overline{FG}$ such that FH is $\frac{1}{3}$ of FG and FI is $\frac{3}{5}$ of FG. How long is $\overline{HI}$?

(A) 4
(B) 8
(C) 10
(D) 18
(E) 20

8. During a rainstorm, z ounces of rain collect in a bucket every y minutes. How many ounces of rain are collected in x minutes?

(A) $\frac{z}{xy}$
(B) $\frac{y}{xz}$
(C) $\frac{xz}{y}$
(D) $\frac{xy}{z}$
(E) $\frac{yz}{x}$

GO ON TO THE NEXT PAGE

9. In a certain parking lot, there are 2 silver cars, 3 blue cars, 4 red cars, and 3 white cars. There are no other cars in the parking lot. What is the probability that a car randomly chosen from the parking lot is not blue?

(A) $\frac{1}{6}$

(B) $\frac{1}{4}$

(C) $\frac{1}{3}$

(D) $\frac{3}{4}$

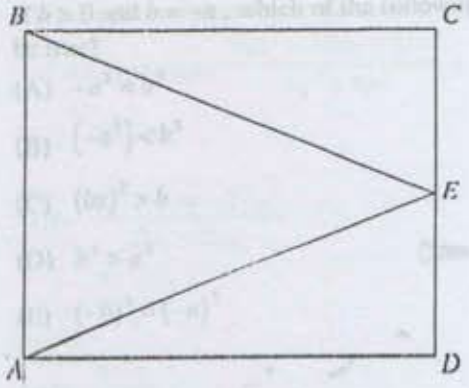
(E) $\frac{5}{6}$

10. If $x^{\frac{2}{3}} + 6 = 10$ which of the following is a possible value for x?

(A) 4
(B) 6
(C) 8
(D) 27
(E) 64

11. Let $f(x) = 7x - 3$, and let $g(x) = kx - x + 10$. If $k = 4$, what is $f(g(5))$?

(A) 172
(B) 162
(C) 139
(D) 116
(E) 106



Note: Figure not drawn to scale.

12. In the rectangle $ABCD$ above, if ΔABE is equilateral, and $\overline{BC} = 9$, what is the sum of the lengths of $\overline{AE}$ and $\overline{BE}$?

(A) 9
(B) 18
(C) $12\sqrt{3}$
(D) $18\sqrt{3}$
(E) 36

13. In a deck of cards, there is a ratio of 4 to 3 for spades to clubs. Which of the following statements about the number of spades and clubs must be true?

(A) Their sum is an odd number.
(B) Their sum is an even number.
(C) Their product is a multiple of 5.
(D) Their product is a multiple of 12.
(E) Their product is a multiple of 36.

GO ON TO THE NEXT PAGE

14. If $2\sqrt{x-8} = 7y^2$ the value of x in terms of y is

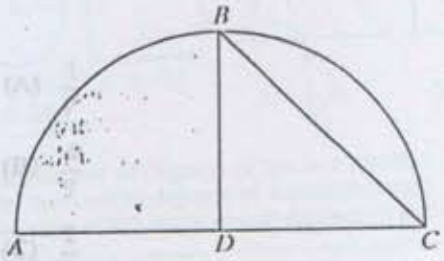
(A) $\frac{49}{4}y^2 + 8$

(B) $\frac{49}{4}y^4 + 8$

(C) $\frac{49}{4}y^2 + 64$

(D) $\frac{49}{2}y^2 + 64$

(E) $\frac{49}{2}y^2 + 8$



15. The half circle shown above has a radius of 6 and the center is D. If $AC \perp BD$, what is the area of the shaded region?

(A) $18\pi - 9$

(B) $18\pi - 18$

(C) $18\pi - 6\sqrt{3}$

(D) $36\pi - 9$

(E) $36\pi - 18$

16. If $b > 0$ and $b = -a$, which of the following must be true?

(A) $-a^3 = b^3$

(B) $(-a^3) < b^3$

(C) $(ba)^3 > b$

(D) $b^2 > a^2$

(E) $(-b)^3 = (-a)^3$

17. The first three terms of a geometric sequence are k, $6k$, and $36k$. For how many values of k between 1 and 10 inclusive does the sequence contain only even integers?

(A) 6
(B) 5
(C) 4
(D) 3
(E) 2

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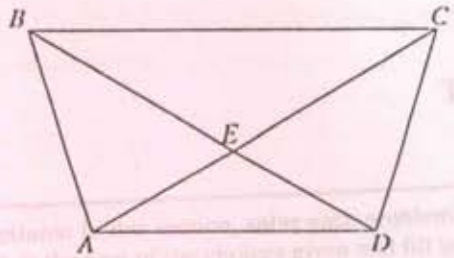


Note: Figure not drawn to scale.

18. In the figure above, $\overline{AC}$ and $\overline{BD}$ intersect at point E. If $m\angle ABC = 80^\circ$, $m\angle BCE = 50^\circ$, and $m\angle CEB = \frac{3}{4}\ m\angle ABC$, what fraction of $m\angle CEB$ is $\angle BAC$?

(A) $\frac{1}{7}$

(B) $\frac{4}{7}$

(C) $\frac{2}{3}$

(D) $\frac{5}{7}$

(E) $\frac{5}{6}$

19. Which of the following is the most simplified form of the expression $\frac{12x^2 - 18xy - 54y^2}{6y^2 + 4xy}$?

(A) $3x - 9$

(B) $\frac{6x^2 - 9xy - 27y^2}{3y^2 + 2xy}$

(C) $\frac{3x - 9y}{y}$

(D) $\frac{x - y}{y}$

(E) $\frac{x^2 - 2xy - 6y^2}{y^2 + xy}$

20. A sphere with a radius of 4 is inscribed in a cube whose edge length is 8. What is the distance from the center of the sphere to a corner of the cube?

(A) $4\sqrt{3}$

(B) $8\sqrt{2}$

(C) 8

(D) $8\sqrt{3}$

(E) $\sqrt{35}$

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

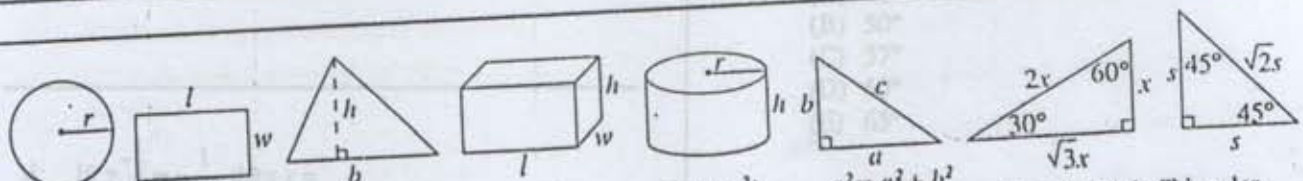
SECTION 3
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$, $C = 2\pi r$ $\quad A = lw$ $\quad A = \frac{1}{2}bh$ $\quad V = lwh$ $\quad V = \pi r^2 h$ $\quad c^2 = a^2 + b^2$ $\quad$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $y = 3x + 2$ and $3x + 4 = 9$, then $y =$
   (A) 1
   (B) 2
   (C) 3
   (D) 5
   (E) 7

2. Points J, K, L, M, and N all lie on the same line. L is the midpoint of $\overline{JK}$, and the length of $\overline{JL}$ is 3. If K is the midpoint of $\overline{JM}$ and M is the midpoint of $\overline{JN}$, then $JN =$
   (A) 3
   (B) 6
   (C) 12
   (D) 18
   (E) 24

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3. For all $x > 0$, which of the following expressions is equivalent to $7\sqrt{x^3}+6$?

(A) $\frac{7}{x^3}+6$

(B) $7\sqrt{x}+6$

(C) $7x+6$

(D) $7x\sqrt{x}+6$

(E) $7x^6+6$

4. If $x^{-\frac{1}{3}} = -\frac{1}{9}$, then $x =$

(A) −729
(B) −27
(C) 3
(D) 81
(E) 243

5. Two high school track and field teammates, Olga and Vanessa, are entered in a 4,000-meter race, which is to be run in 200-meter laps around an indoor track. Olga runs the race at an average speed of 250 meters per minute, while Vanessa runs it at an average speed of 200 meters per minute. At the moment Olga completes the race, how many laps behind is Vanessa?

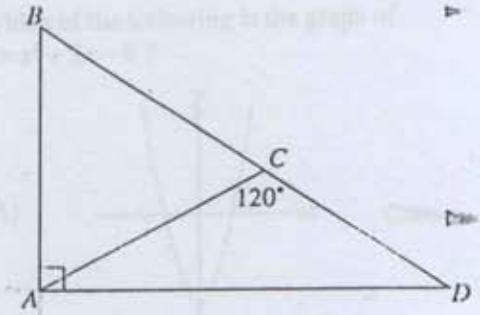
(A) 3

(B) $3\frac{1}{2}$

(C) 4

(D) $4\frac{1}{2}$

(E) 5



6. In the figure above, if $AC = DC$, what is the measure of $\angle ABC$?

(A) 40°
(B) 50°
(C) 57°
(D) 60°
(E) 65°

7. On the board for a certain game, the first square is colored blue, and the following squares are colored in a repeating pattern of orange, red, green, yellow, gray, blue, orange, red, green, yellow, gray, and so forth. What is the color of the 97th square on the board?

(A) Blue
(B) Orange
(C) Red
(D) Green
(E) Yellow

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8. A system for choosing winning lottery numbers begins with a computer generating a random positive integer less than 25 and assigning this value to the variable x. The computer then uses the following set of instructions to determine the winning lottery number:

STEP 1: Add x to the greatest even integer less than x.

STEP 2: If the result of STEP 1 is even, triple it.

If the result of STEP 1 is odd, double it.

STEP 3: If the result of STEP 2 is at least 11, subtract 9 from that number.

If the result of STEP 2 is not at least 11, leave the number unchanged.

STEP 4: Multiply the result of STEP 3 by 3.

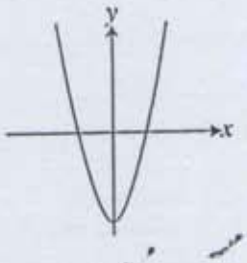
STEP 5: Assign the result of STEP 4 to the variable y.

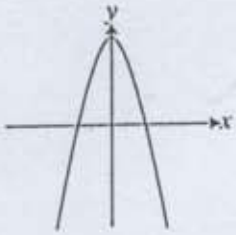
Which of the following must be true?

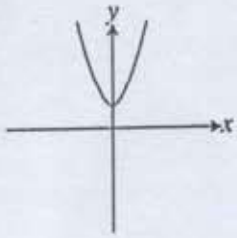
I. y is even.
II. y has at least two digits.
III. y is divisible by 6.

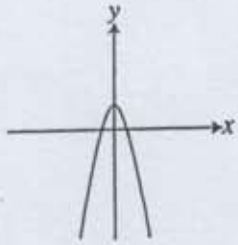
(A) None of the above
(B) I only
(C) II only
(D) I and II only
(E) I and III only

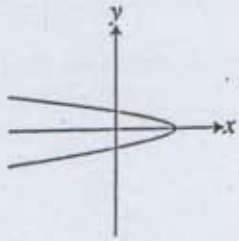
9. Which of the following is the graph of $y = x^2 + 2x - 8$?

(A)


(B)


(C)


(D)


(E)


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10. Newly hired employees of Bag O' Burgers must complete a training period. During this period, they earn a training wage of $10 per hour, which is 20% less than the standard wage they will earn after completing the period. Employees who work more than 40 hours per week earn an overtime wage that is 50% greater than the standard wage. How much is the overtime wage?

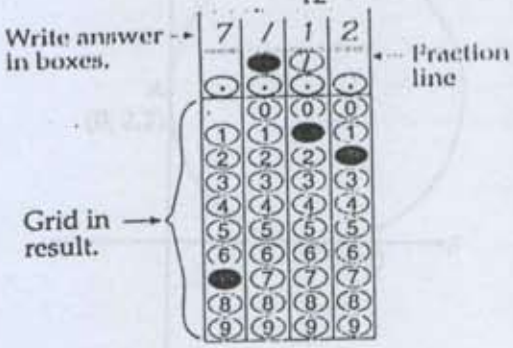
(A) $12.00 per hour
(B) $13.00 per hour
(C) $13.75 per hour
(D) $18.00 per hour
(E) $18.75 per hour

GO ON TO THE NEXT PAGE

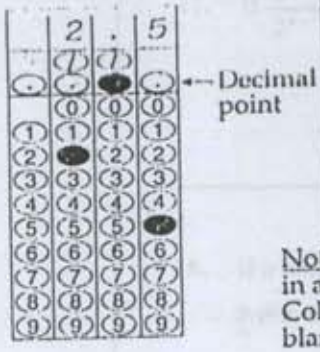
Directions for Student-Produced Response Questions

Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

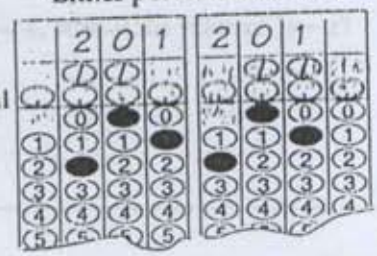
Answer: $\frac{7}{12}$ or 7/12



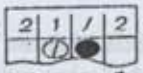
Answer: 2.5



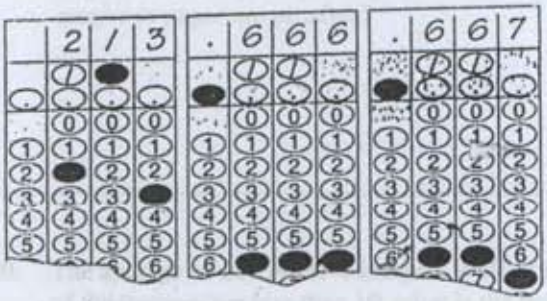
Answer: 201
Either position is correct



Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If**  **is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)**
- Decimal Accuracy: **If you obtain a decimal answer, enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3}$ = .6666 . . .

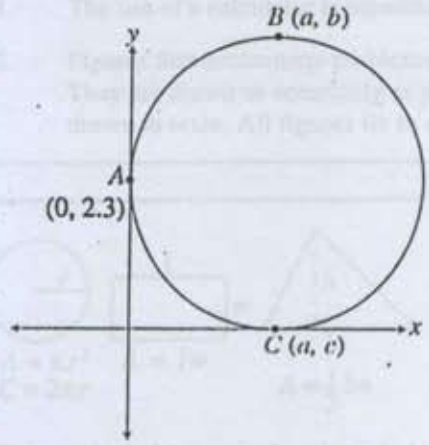


11. If $10x = 40y$, what is the value of $\frac{x}{y}$?

12. Jini ran 186 yards. How many feet did she run? (3 feet = 1 yard)

GO ON TO THE NEXT PAGE

13. If $10a + 4b = 32$ and $9a + 2b = 24$, what is the value of $a + 2b$?



14. In the figure above, the circle is tangent to the x-axis at point C and tangent to the y-axis at point A. What is the value of b?

2, 5, 7, 2, 5, 7, . . .

15. In the sequence of numbers above, the numbers 2, 5, and 7 repeat in that order indefinitely, beginning with 2. What is the sum of the 12th and 91st terms of the sequence?

16. $\overline{BC}$ is the hypotenuse of right triangle ABC. If $AC = 3$, and $BC = 6$, then what is the measure, in degrees, of $\angle B$?

17. If $\frac{8^y}{2^x} = 4$, what is the value of $3y - x$?

18. If a and b are distinct integers such that $ab < 1$ and $b \neq 0$, what is the greatest possible value of $\frac{a}{b}$?

19. The yearbook staff must assign four distinct photographs, one photograph per page, to four different pages. How many different assignments of photographs to pages are possible?

20. The average of five positive integers is 20. If four of the integers are less than 10, what is the least possible value for the remaining integer?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

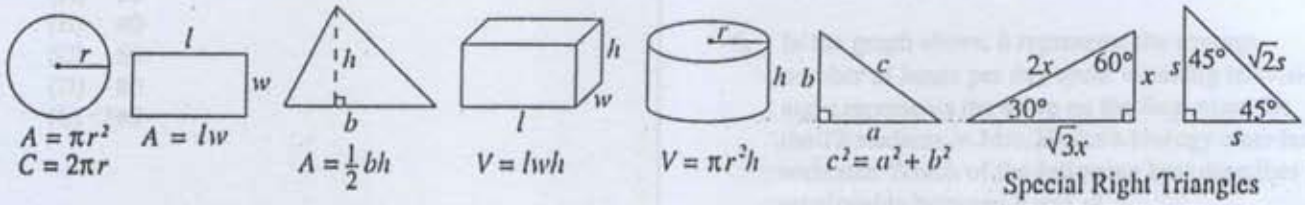
SECTION 7
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $8 - w = -2w - 8 + 5w$, then $w =$
   (A) 8
   (B) 4
   (C) 0
   (D) −4
   (E) −8

Type of Fruit	Number of Pieces of Fruit in a Display	Number of Displays in Store
Apples	25	4
Oranges	13	3
Bananas	50	5

2. William keeps an inventory of the fruit he displays in his grocery store. The table above accounts for the number of pieces of fruit in a display as well as the number of displays in the store. According to the table, how many total oranges and bananas are displayed in the store?
   (A) 39
   (B) 100
   (C) 250
   (D) 289
   (E) 389

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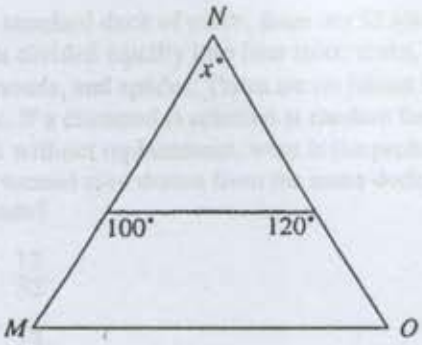
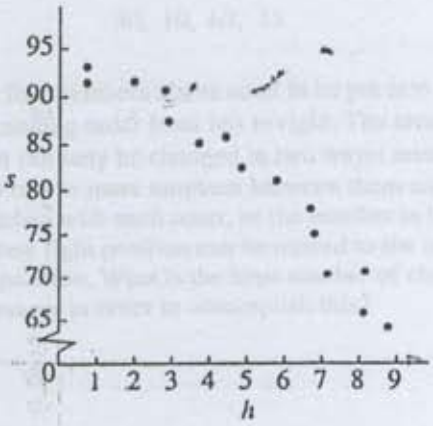


Note: Figure not drawn to scale.

3. In ΔMNO above, what is the value of x?
   (A) 20
   (B) 40
   (C) 60
   (D) 80
   (E) 140

4. There are 140 people in a room. 12 of those people leave. What percent of the original group would remain if another 9 people leave?
   (A) 5%
   (B) 15%
   (C) 65%
   (D) 75%
   (E) 85%



5. In the graph above, h represents the average number of hours per day spent watching television and s represents the score on the final exam for the 12 students in Mrs. Hasko's biology class last semester. Which of the following best describes the relationship between h and s?
   (A) $s = h + 90$
   (B) $s = 90h$
   (C) There is no relationship between h and s.
   (D) h and s vary directly.
   (E) h and s vary indirectly.

GO ON TO THE NEXT PAGE

6. In a standard deck of cards, there are 52 total cards divided equally into four suits: clubs, hearts, diamonds, and spades. There are no jokers in the deck. If a diamond is selected at random from the deck without replacement, what is the probability that second card drawn from the same deck is NOT a spade?

(A) $\frac{12}{52}$

(B) $\frac{13}{51}$

(C) $\frac{13}{52}$

(D) $\frac{38}{51}$

(E) $\frac{38}{52}$

7. If $\frac{a^2}{b} = \frac{a^4}{x}$, what is the value of x, in terms of a and b?

(A) b^2
(B) a^2
(C) a^2b
(D) ab^2
(E) $4b$

8. If $a = 4b = 5c$, what is the value of $60a - 28b$ in terms of c?

(A) $32c$
(B) $88c$
(C) $160c$
(D) $250c$
(E) $265c$

30, 10, 67, 15

9. The four numbers above need to be put into descending order from left to right. The arrangement can only be changed in two ways: numbers with one or more numbers between them can be switched with each other, or the number in the farthest right position can be moved to the farthest left position. What is the least number of changes necessary in order to accomplish this?

(A) 2
(B) 3
(C) 4
(D) 5
(E) 6

10. $\overline{PR}$ is tangent to a circle with center O and radius 4 at point Q. If the measure of $\angle PQR$ is 90°, $OR = 5$, and $OP = \frac{20}{3}$, then $PQ =$

(A) $-\frac{7}{3}$

(B) $\frac{7}{3}$

(C) $\frac{16}{3}$

(D) $\frac{20}{3}$

(E) $\frac{23}{3}$

GO ON TO THE NEXT PAGE

Questions 11–13 refer to the following definition:

$$g(x) = \frac{\frac{1}{2}x^2}{3}$$

11. Which of the following is an integer?
(A) $g(3)$
(B) $g(4)$
(C) $g(5)$
(D) $g(6)$
(E) $g(7)$

12. How many distinct integer values of $g(x)$ are there that are less than or equal to 150 when x is a positive integer?
(A) 5
(B) 10
(C) 15
(D) 30
(E) 150

13. If $g(x) = 24$, what is the value of $x^2 - g(x)$?
(A) 100
(B) 120
(C) 132
(D) 500
(E) 552

14. If $y = ax + b$ and $y = cx + d$ are the equations of parallel lines, then all of the following must be true EXCEPT
(A) $a = c$
(B) $ac = -1$
(C) $\frac{a^2}{c^2} = 1$
(D) $|a| = \sqrt{c^2}$
(E) $ac > 0$

15. A circle with center O has a diameter of $2\sqrt{2}$. If square $KLMN$ is inscribed in the circle, with all four of its vertices lying on the circle, what is the perimeter of ΔKOL?
(A) $4\sqrt{2}$
(B) $2+\sqrt{2}$
(C) $4+\sqrt{2}$
(D) $2+2\sqrt{2}$
(E) $4+2\sqrt{2}$

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 5: ANSWER KEY

1 Math	3 Math	7 Math
1. B	1. E	1. B
2. C	2. E	2. D
3. A	3. D	3. B
4. B	4. A	4. E
5. A	5. C	5. E
6. B	6. D	6. D
7. B	7. A	7. C
8. C	8. A	8. E
9. D	9. A	9. B
10. C	10. E	10. C
11. A	11. 4	11. D
12. C	12. 558	12. A
13. D	13. 8	13. B
14. B	14. 4.6	14. B
15. B	15. 9	15. D
16. A	16. 30	
17. B	17. 2	
18. E	18. 0	
19. C	19. 24	
20. A	20. 64	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	740	21	460
70		45	730	20	450
69		44	720	19	440
68		43	710	18	430
67		42	690	17	420
66		41	680	16	410
65		40	670	15	400
64		39	660	14	380
63		38	650	13	370
62		37	640	12	360
61		36	630	11	350
60		35	620	10	340
59		34	610	9	330
58		33	590	8	320
57		32	580	7	310
56		31	570	6	300
55	800	30	560	5	280
54	790	29	550	4	270
53	780	28	540	3	260
52	770	27	530	2	250
51	760	26	520	1	310
50	760	25	510	0	280
49	750	24	500	-1	250
48	750	23	480	-2	220
47	740	22	470	-3	200

Practice Test 5: Answers and Explanations

SECTION 1

1. B When $x = 2$, $9x + n = 18 + n$. In order for $18 + n$ to be negative, n has to be -19 or smaller.

2. C Set up a tproportion: $\frac{240 \text{ miles}}{4 \text{ hr}} = \frac{x \text{ miles}}{3 \text{ hr}}$, cross multiply and divide both sides by 4. $x = 180$ miles.

3. A There are 14 days in 2 weeks, and the student reads 12 pages each of these days. The number of pages the student reads is 12×14, which is 168. 170 is the closest approximation.

4. B 15% of the throws will be bull's eyes. Translate: $\frac{15}{100} \times x = 6$ (percent means "divide by 100"). Solve for x: $x = 40$.

5. A The intersection of two sets is the numbers that both sets have in common. Set $A = \{10, 12, 14, 16, 18, 20\}$. Set $B = \{9, 12, 15, 18\}$. Both sets include 12 and 18, so the intersection of sets A and B has two members, (A). (E) is the number of members of the union of the two sets.

6. B Translate: $\frac{1}{2}x = 2x + 4$. Solve for x: $x = -\frac{8}{3}$.

7. B Draw segment FG and label its length 30. FH is $\frac{1}{3} \times 30$, which is 10. FI is $\frac{3}{5} \times 30$, which is 18. HI is $FI - FH$, $18 - 10 = 8$.

8. C Plug in your own numbers when there are variables in the answer choices. Let $z = 6$, $y = 20$, and $x = 80$. 80 minutes is 4 times as long as 20 minutes, so 4 times the amount of rain will fall: $4 \times 6 = 24$. Plug the values for x, y, and z into the answer choices and eliminate any answer choice that does not equal 24. Only (C) is left.

9. D Probability is the number of outcomes fulfilling the requirements divided by the total number of possible outcomes. There are 12 total cars, and 3 are blue. So $\frac{\text{cars that are not blue}}{\text{total number of cars}} = \frac{9}{12} = \frac{3}{4}$, (D).

10. C Plug in the answer choices. Start with (C) which is the middle value. $8^{\frac{2}{3}} + 6 = 10$, so (C) is correct. Be careful using your calculator, put the exponent in parentheses like this $8^{\left(\frac{2}{3}\right)}$ otherwise your calculator will do this $\frac{8^2}{3}$.

11. A Start by plugging in 5 for x in the function $g(x)$, with $k = 4$. $g(5) = 4(5) - 5 + 10 = 20 - 5 + 10 = 25$. Then plug this value (25) in for x in function $f(x)$. $f(25) = 7(25) - 3 = 175 - 3 = 172$, (A). Make sure that you work the inside function first. If you plugged in to function $f(x)$ and then into $g(x)$ you would incorrectly get answer (E).

12. C Since ΔBCE is equilateral and $ABCD$ is a rectangle, $\angle CBE$ is 30° and $\angle BCE$ is 90°. That makes ΔBCE is 30:60:90 triangle. Since BC is 9, CE is $\frac{9}{\sqrt{3}}$, and BE is $\frac{18}{\sqrt{3}}$ (relationships between the sides of a 30:60:90 triangle is given at the beginning of each math section), the sum of AE and BE is then $\frac{36}{\sqrt{3}}$, which is not an answer choice. Try rationalizing, multiply both the numerator and the denominator by the denominator to get rid of the root in the denominator: $\frac{36}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{36\sqrt{3}}{3} = 12\sqrt{3}$, (C).

13. D In order to find which statement *must* be true, find which four statements don't have to be true. Since the ratio of spades to clubs is 4:3, there could be 4 spades and 3 clubs, the sum of which is 7. Eliminate (B). The product of 4 and 7 is 12, so eliminate (C) and (E). Another possibility is 8 spades and 6 clubs, the sum of which is 14. Eliminate (A). Only (D) remains.

14. B Since there are variables in the answer choices, plug in a number for the variable. Plugging in 2 for y yields 204 for x. This is your target answer. Plug in 2 for y in the answer choices and eliminate any answer choice that does not equal 204. Only (B) remains.

15. B The area of the whole circle is 36π, so the area of the half circle is 18π. The area of the triangle is $\frac{1}{2}bh = \frac{1}{2}(6)(6) = 18$, so the area of the shaded region is $18\pi - 18$.

16. A Plug in values and eliminate answer choices that aren't true. When only one answer choice remains, it must be true. Try $b = 6$ and $a = -6$. All but (A) can be eliminated.

17. B Write out a few of the sequences, and see that only if k is even are all the terms of the sequence even.
$k = 1$: 1, 6, 36, 216
$k = 2$: 2, 12, 72, 432
$k = 3$: 3, 18, 108, 648
$k = 4$: 4, 24, 144, 864
Since there are 10 numbers total in question, exactly half are even which means the answer is (B).

18. E Since $m\angle CEB = \frac{3}{4} m\angle ABC$, then $m\angle CEB = 60°$. Since $m\angle ABC = 80°$ and $m\angle BCE = 50°$, then $m\angle BAC = 50°$. The fraction would now be written as $\frac{50}{60}$ or $\frac{5}{6}$.

19. C Start by factoring out the coefficients. All of the terms on the top of the fraction are divisible by 6, so factor that out. Both of the terms on the bottom of the fraction are divisible by 2, so factor that out. Since 6 is divisible by 2, cancel out the 2 and cancel the 6 to a 3. Now factor the quadratics. On the top of the fraction, the quadratic can be factored into $(2x + 3y)(x - 3y)$. The bottom part of the fraction can be factored into $y(2x + 3y)$. Since these two expressions share a common factor, cancel out the $(2x + 3y)$. $\frac{3x-9y}{y}$ is left (C). Answer (B) is a partial answer.

20. A The center of the sphere is 4 units away from each side of the cube, so we can use the Super Pythagorean theorem ($a^2 + b^2 + c^2 = d^2$) to find the distance (d) between opposite corners of a cube. Since it's a cube, $a = b = c$, we have $3a^2 = d^2$, and $a = 4$. So $d^2 = 48$, and d (which is the distance from the center of the sphere to the corner of the cube) is $\sqrt{48} = 4\sqrt{3}$.

SECTION 3

1. E The question asks for the value of y. We are told that it is $3x + 2$, which is two less than $3x + 4$. Since $3x + 4 = 9$, subtract 2. The correct answer is 7.

2. E Draw and label the segment. Since JL is 3 and L is the midpoint of JK, LK must be 3. Since K is the midpoint of JM, KM must be 6. Since M is the midpoint of JN, MN must be 12. Adding up the distances gives you $3 + 3 + 6 + 12 = 24$.

3. D Plug In. Try $x = 4$, then $7\sqrt{4^3} + 6 = 62$, this is your target. Plug in for x in the answer choices. Only answer choice (D) works.

4. A Plug in the answer choices, only one can be true. Be careful using your calculator, use parentheses like this $(-729)^{\left(-\frac{1}{3}\right)}$, otherwise your calculator will do this $-\left(\frac{729^{-1}}{3}\right)$. (A) is the correct answer.

5. C If Olga runs the race at 250 meters per minute, she will finish it in 16 minutes ($4000 \div 250 = 16$); Vanessa, running 200 meters per minute, will finish it in 20 minutes ($4000 \div 200 = 20$). At the moment Olga crosses the finish line, Vanessa, has 4 minutes to go. $4 \text{ minutes} \times 200 \frac{\text{meters}}{\text{minute}} = 800 \text{ meters}$, since each lap is 200 meters, Vanessa has 4 laps to go, (C).

6. D Since, $AC = DC$, ACD is isosceles. From that, we know that angles DAC and ADC are equal and must each be 30°, since ACD is 120°. We now know that triangle ABC is a 30:60:90 right triangle, so $\angle ABC$ is 60°.

7. A There are 6 colors in the repeating pattern: write out the pattern: B O R Gn Y Gy, every sixth square (6th, 12th, 18th, etc.) will be gray. That means the 96th square will be gray, so the 97th square starts the cycle over again with blue.

8. A The best way to start going about this problem is to try all of the positive integers less than 25, but trying the extremes (1 and 24) and perhaps something in the middle should handle the problem much more efficiently. With 1, adding the greatest even integer (0!—it's even) less than that number to that number still leaves 1, which, being odd, will be doubled to 2. That result is not at least 11, so it is left unchanged until the final step of multiplying it by three, which gives 6. Since this does not have two digits, numeral II, and answers (C) and (D), can be eliminated. Trying 24 will lead to 46 (adding the smallest even integer less than that number—22—to 24), then to 138 (tripling the even 46), then to 129 (it's bigger than 11, so 9 is subtracted), and finally to 387 (129 multiplied by 3). This number is neither even, nor divisible by 6 (no odd numbers are), so I and III, and answers (B) and (E), can be eliminated, leaving only (A).

9. A The graph of this equation can be identified by the way the parabola is opening (the equation is positive next to the x^2 so the parabola opens upward), eliminate (E). Plug in 0 for x, $y = -8$, eliminate (B), (C), and (D). In each of these answer choices, the y-value is positive when the x-value is 0.

10. E If \$10 is 20% off the standard wage, it can also be thought of as 80% of the standard wage. Translate that to $10 = \frac{80}{100}x$. $x = \$12.50$, which is the standard wage. Note that you don't want 20% of \$10; that will lead you to incorrectly choose (D). The overtime wage is 50% greater than the standard wage, so it is $\frac{150}{100} \times 12.50 = 18.75$.

11. 4 Divide both sides by 10 to find $x = 4y$. Divide by y to find $\frac{x}{y} = 4$.

12. 558 Set up a proportion: $\frac{3\text{ feet}}{1\text{ yard}} = \frac{x\text{ feet}}{186\text{ yards}}$. Cross multiply to find $x = 558$.

13. 8 Simultaneous Equations: instead of trying to find a or b first, then the other, try to get $a + 2b$ right away. Stacking the equations and subtracting the second one ($9a + 2b = 24$), yields $a + 2b = 8$.

14. 4.6 Put a dot in the center of the circle and label it O. $\overline{OA}$, $\overline{OB}$, and $\overline{OC}$ are all radii. Since the center has the same y-value as point A, the radius is 2.3. b is the y-value for point B, which is twice the radius, 4.6.

15. 9 The pattern repeats every 3 numbers. 12 is a multiple of 3, so the 12th term must be 7. The 90th term is 7, so the 91st term is 2. Add these: $7 + 2 = 9$.

16. 30 Since no figure is provided, draw one. You have a 30:60:90 triangle, with the short leg $\overline{AC}$ opposite $\angle B$, so that $\angle B$ must be the 30° angle.

17. 2 Convert the 8 and 4 to 2 raised to a power: $\frac{(2^3)^y}{2^x} = 2^2$. When a power is raised to a power, multiply: $\frac{2^{3y}}{2^x} = 2^2$. When dividing, if the bases are the same, the exponents can be subtracted: $2^{3y-x} = 2^2$. That means $3y - x = 2$.

18. 0 Since the product of a and b is less than 1 and each is an integer, then the product must be 0 or a negative number. Since 0 is larger than any negative number, try to get zero: $a = 0$, b can be anything except zero: $\frac{0}{b} = 0$.

19. 24 There are 4 options for the 1st page, which leaves 3 options for the 2nd page, 2 options for the 3rd page, and 1 option for the 4th page. So, the number of different assignments are $4 \times 3 \times 2 \times 1 = 24$.

20. 64 Since the average of 5 integers is equal to 20, multiply them to find the total of the 5 numbers which is 100 (average is total divided by the number of things, so the total must be the average times the number of things). If the fifth number is to be small, the other numbers must be as great as possible. They have to be integers and less then 10, so make each 9. Their total is 36. That makes the last number $100 - 36 = 64$.

SECTION 7

1. B Combine $-2w$ and $5w$ to get $3w$. Subtract 8 from both sides: $-w = 3w - 16$. Subtract $3w$ from both sides to get $-4w = -16$, then divide both sides by -4 to get $w = 4$.

2. D The total number of oranges is $13 \times 3 = 39$ and the total number of bananas is $50 \times 5 = 250$. So, the total number of oranges and bananas is $39 + 250 = 289$.

3. B The angle above the one labeled 100° is 80° because together they form a straight line and there are 180° in a straight line. Similarly, the angle above the angle labeled 120° is 60°. Since the sum of the angles in a triangle is 180° and two of the angles are 80° and 60°, x must be 40.

4. E Subtract the total number of people that have left, 21, from the original 140 people, to get 119. $\frac{119}{140} = 0.85$, which is 85%.

5. E Since the data points slope downward to the right and resemble a line with negative slope, there is an inverse relationship between h and s, (E).

6. D Since the pack is equally divided, there are initially 13 of each suit. After one diamond has been taken out, there are 51 cards total: 12 diamonds, 13 clubs, 13 hearts, and 13 spades.

$$\text{Probability} = \frac{\text{\# of outcomes fulfilling the requirements}}{\text{total \# of possible outcomes}} = \frac{\text{\# of cards that aren't spades}}{\text{\# of cards}} = \frac{38}{51}$$

7. C Plug in numbers: Let $a = 2$, $b = 3$, then $\frac{4}{3} = \frac{16}{x}$. x is 12. Plug the values of a and b into the answer choices and eliminate any answer choice that doesn't equal 12. Eliminate (A), (B) and (D). Try again with different numbers. Let $a = 3$, $b = 2$. $\frac{9}{2} = \frac{27}{x}$. x is 6. This eliminates (B) leaving (C).

8. E Plug in numbers. Let $c = 4$, then $b = 5$, and $a = 20$. So the value of $60(20) - 28(5) = 1060$. Plug 4 in for c in the answer choices and eliminate any that don't equal 1060. Only (E) remains.

9. B Start off by switching the two outside numbers so you will have 15, 10, 67, 30. Then move the 30 to the beginning of the sequence, so you will have 30, 15, 10, 67. Now, move the 67 to the beginning and you will have 67, 30, 15, 10. This was 3 steps total, (B).

10. C Draw it. Since $\overline{PR}$ is tangent to the circle, it forms a right angle with radius $\overline{OQ}$. Therefore ΔQOR is a right triangle. Since $OR = 5$, ΔQOR is a 3:4:5 right triangle, which means $QR = 3$. ΔPOR is a right triangle. Using Pythagorean theorem: $5^2 + \left(\frac{20}{3}\right)^2 = PR^2$. Solving for PR gives you $\frac{25}{3}$. PQ is PR minus QR, so $PQ = \frac{25}{3} - 3 = \frac{16}{3}$, (C).

11. D Plug in the answer choices. $g(6)$ is the only answer choice that yields an integer.

12. A To solve this problem, start by plugging in values for x. Remember that you have to use integers. If you start with $x = 1$ and work your way up, you will find that $x = 6$ is the first value for x that will give you a result that is an integer. $g(6) = \frac{\frac{1}{2}(6)^2}{3} = 6$. Because the first number to work is a 6, try the next multiple of 6. $g(12) = \frac{\frac{1}{2}(12)^2}{3} = 24$. Keep trying multiples of 6 and you will find that $g(18) = 54$, $g(24) = 96$, and $g(30) = 150$. So the total number of positive integer values of $g(x) \leq 150$ is 5.

13. B We know from the previous problem that $g(12) = 24$. $x^2 - g(x) = 12^2 - 24 = 144 - 24 = 120$.

14. B The slopes of parallel lines are equal, but their y-intercepts must be different (or the lines would be identical, not parallel). Plug in for a, b, c, and d accordingly. Let $a = -2$, therefore $c = -2$. Let $b = 5$, and $d = 7$. Now plug these into the answer choices to see which ones are true. All of the answers are true except (B).

15. D If square $ABCD$ is inscribed in the circle, then all four of its vertices are on the circle, therefore the circle's diameter is also the square's diagonal. Since point O is the center of the circle, it bisects the diameter and thus also the square's diagonal. ΔKOL is a 45:45:90 right triangle (because the diagonals bisect at right angles in a square), therefore the ratio of the sides is $x:x:x\sqrt{2}$. In this case our x is half of $2\sqrt{2}$, or $\sqrt{2}$, so the side of the square must be $\sqrt{2} \times \sqrt{2} = 2$. Add up all three sides for the perimeter: $2 + \sqrt{2} + \sqrt{2} = 2 + 2\sqrt{2}$

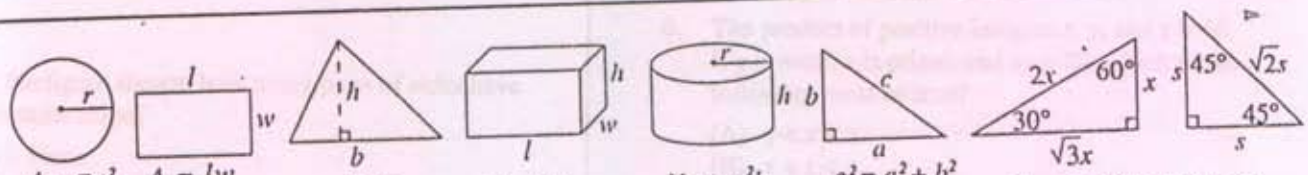
Practice Test 6

SECTION 2
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.



$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $\frac{x}{10} + \frac{1}{5} = \frac{3}{5}$, then $x =$

(A) $\frac{4}{5}$

(B) 4

(C) 5

(D) 8

(E) 10

2. If $3a + 8 = 2$, then $3a \times 5 =$

(A) −30
(B) −2
(C) −1
(D) 2
(E) 30

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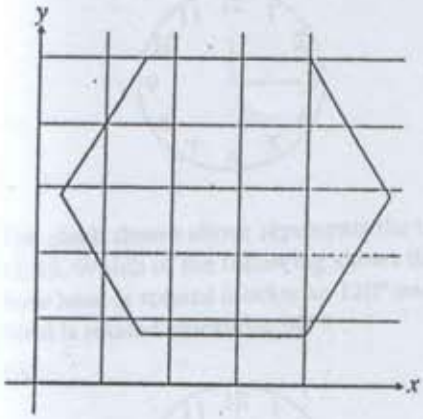

3. In the figure shown, how many pairs of sides have the same slope?

(A) None
(B) Two
(C) Three
(D) Four
(E) Five

4. Which of the following could be the ordered pair (r, p) if $r = p + 2$ and $r + p < 1$?

(A) $(-3, -4)$
(B) $(-1, 1)$
(C) $(5, 3)$
(D) $(2, 4)$
(E) $(1, -1)$

5. If wallpaper costs \$2.00 per square yard, how much will it cost to completely cover a rectangular wall that measures 15 feet by 21 feet? (1 yard = 3 feet)

(A) \$35.00
(B) \$42.00
(C) \$70.00
(D) \$315.00
(E) \$630.00

6. The product of positive integers x, y, and z is 66. If y is even, x is prime, and $xy = 22$, which of the following must be true?

(A) $y < x < z$
(B) $x < z < y$
(C) $x < y < z$
(D) $z < x < y$
(E) $y < z < x$

7. In ΔJKL, $\overline{JK} \cong \overline{KL}$, JL is 40% of JK, and KL is 20. What is the perimeter of ΔJKL?

(A) 28
(B) 40
(C) 48
(D) 54
(E) 60

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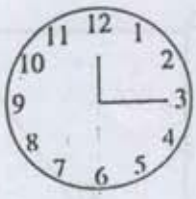
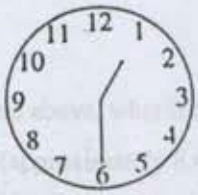
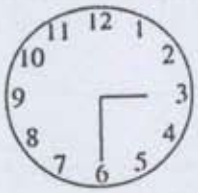


8. The clock shown above represents the time as 12:15. Which of the following shows the time if the hour hand is rotated clockwise 120° and the minute hand is rotated clockwise 90°?

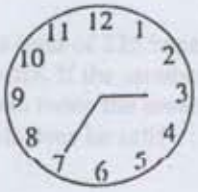
(A)



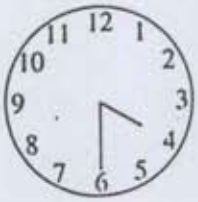
(B)



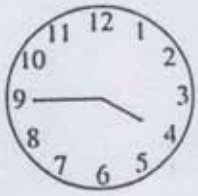
(C)



(D)



(E)



9. If $x > 0$, which of the following is equivalent to $12x^2$?

(A) $\sqrt{12x^4}$

(B) $\sqrt{144x^2}$

(C) $2\sqrt{36x^4}$

(D) $2\sqrt{36x^2}$

(E) $6\sqrt{4x}$

10. If the members of set A are all the positive even factors of 24, and the members of set B are all the positive even factors of 18, then $A \cap B$

(A) has one member
(B) has two members
(C) has three members
(D) has five members
(E) has seven members

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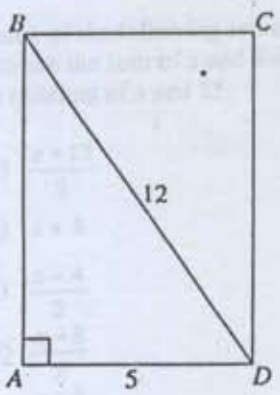


11. In the figure above, what is the length of $\overline{AB}$?

(A) $5\sqrt{3}$ (approximately 8.66)
(B) $\sqrt{119}$ (approximately 10.91)
(C) $\sqrt{139}$ (approximately 11.79)
(D) 13
(E) 17

12. Josh sells a total of 225 bagels and muffins in one day at his cafe. If the number of muffins he sells is 15 more than twice the number of bagels sold, how many bagels does he sell?

(A) 60
(B) 70
(C) 80
(D) 145
(E) 155

13. A local bank offers its customers two checking account plans.

Plan A: An unlimited number of checks can be written each month for a monthly account maintenance fee of $7.50.

Plan B: A monthly account maintenance fee of $2.50 and a transaction fee of $0.50 for each check written during the month.

If Plan A costs a certain customer less than Plan B, what is the least number of checks that this customer writes per month?

(A) 5
(B) 10
(C) 11
(D) 15
(E) 16

14. In a list of five integers, if the mode of the list is two less than the median, which of the following could be true?

(A) The list contains three equal numbers.
(B) The average (arithmetic mean) is less than the median.
(C) The average (arithmetic mean) is equal to the mode.
(D) The mode is greater than the average (arithmetic mean).
(E) Only two numbers in the list are distinct.

GO ON TO THE NEXT PAGE

15. Which of the following represents the difference between the sum of x and 8 and the quantity 4 plus the quotient of x and 2?

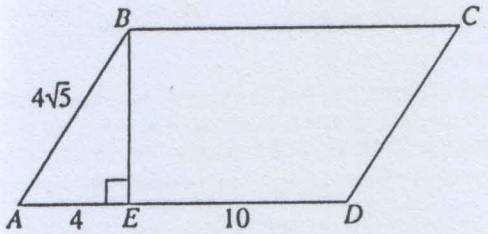
(A) $\frac{x+12}{2}$

(B) $x+8$

(C) $\frac{x-4}{2}$

(D) $\frac{x-8}{2}$

(E) $\frac{x+8}{2}$



16. What is the area of parallelogram $ABCD$ shown above?

(A) 8

(B) $40\sqrt{50}$

(C) 56

(D) 112

(E) $56\sqrt{5}$

17. If the points A (–2, 1), B (– 2, 5), C (8, 5), and D (8, 1) are the vertices of a quadrilateral, and point E is the midpoint of $\overline{AD}$, what is BE?

(A) 3

(B) 5

(C) 6

(D) $\sqrt{41}$ (approximately 6.40)

(E) $4\sqrt{29}$ (approximately 21.54)

18. If $f(x+2) = x^2 + 4x + 4$, then $f(x) =$

(A) x

(B) $x+2$

(C) x^2

(D) $x^2 + 4x + 2$

(E) $x^2 + 4x + 6$

19. If $x = \frac{x^2 + y^2}{-2y}$ and $y \neq 0$, then y is equal to which of the following?

(A) $-2x - x^2$

(B) $\frac{x^2 - y}{2}$

(C) $\frac{x^2 + y}{-2}$

(D) $-x$

(E) x

GO ON TO THE NEXT PAGE

20. Karen buys a stock for s dollars. The price of the stock rises 10 percent per month for the first two months that she owns it. During the third month, the price drops by 20 percent. In terms of s, what is the price of the stock at the end of the third month?

(A) $0.968s$
(B) $0.99s$
(C) s
(D) $1.25s$
(E) $1.454s$

STOP

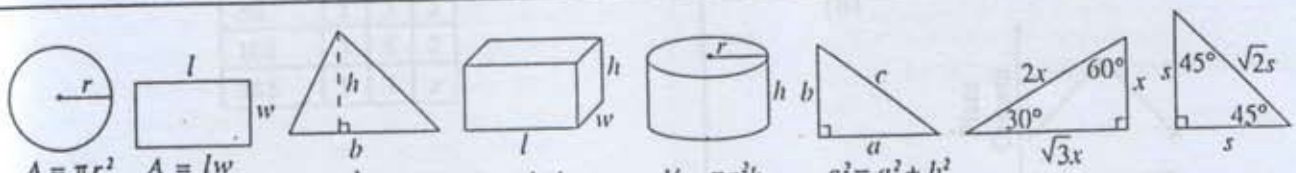
If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 3
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.



$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $4c = d$ and $0.4f = c$, what is the value of d when $f = 40$?
   (A) 80
   (B) 64
   (C) 40
   (D) 32
   (E) 25

2. K, L, and M are points on a line, such that L lies somewhere between K and M. If $\overline{KL} \cong \overline{LM}$ and the length of $\overline{KM}$ is 6, then what is the length of $\overline{KL}$?
   (A) 3
   (B) 4
   (C) 6
   (D) 9
   (E) 27

3. The product of two integers is between 125 and 145, inclusive. Which of the following CANNOT be one of the integers?
   (A) 15
   (B) 17
   (C) 20
   (D) 25
   (E) 30

GO ON TO THE NEXT PAGE

4. If $a = -7$ and $b = a + 3$, what is the value of $\frac{b^3(a-b)}{b-a}$?

(A) −64
(B) −32
(C) 16
(D) 32
(E) 64

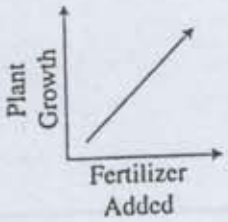
30	2	3	5
105	3	5	7
385	5	7	x

5. In the table above, the first number in each row is followed by its three prime factors. What is the value of x?

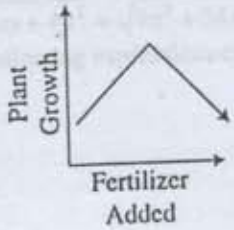
(A) 9
(B) 11
(C) 13
(D) 15
(E) 17

6. A scientist performs an experiment to test the effect of the use of fertilizer on plant growth. The scientist finds that adding fertilizer to soil increases plant growth up to a point, beyond which any additional fertilizer does not affect the growth of the plant. Which of the following graphs most accurately reflects this information?

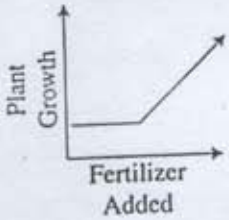
(A)



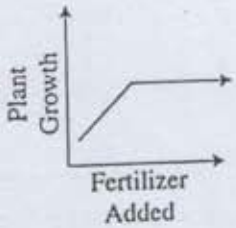
(B)



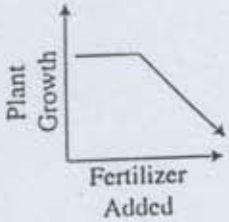
(C)



(D)



(E)



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7. If the price of a certain product is increased by 15 percent, by approximately what percent must the new price be reduced to obtain the original price?

(A) 13
(B) 15
(C) 17
(D) 85
(E) 115

8. In order to raise money for a school dance, Shanice, Raphael, and Mohamed sold candies. Raphael had three times as many candies as Mohamed and twenty fewer than Shanice. Shanice then gave twelve candies to Raphael, who in turn gave one quarter of his new total to Mohamed. If Raphael then had twelve more candies than Mohamed, how many candies did Shanice have originally?

(A) 39
(B) 56
(C) 60
(D) 73
(E) 88

9. The distance from which a certain light is visible is directly proportional to the wattage of the light bulb. If the light is visible from 16 meters when a 40 watt bulb is used, from what distance is the light visible if a 75 watt bulb is used?

(A) 30 meters
(B) 35 meters
(C) 51 meters
(D) 89 meters
(E) 91 meters

10. If $\sqrt{36x^2+24xy+4y^2}=\sqrt{9x^2+54xy+81y^2}$ then which of the following expressions could be equal to y?

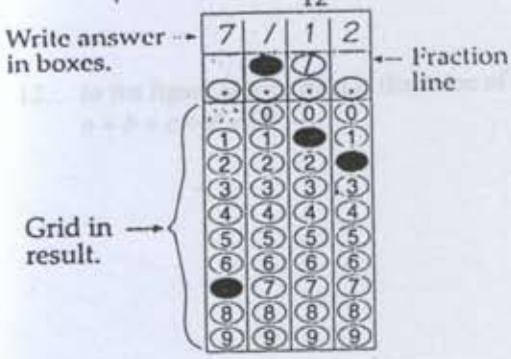
(A) $y=-2x$
(B) $y=-\frac{9}{11}x$
(C) $y=\frac{3}{7}x$
(D) $y=\frac{9}{11}x$
(E) $y=3x$

GO ON TO THE NEXT PAGE

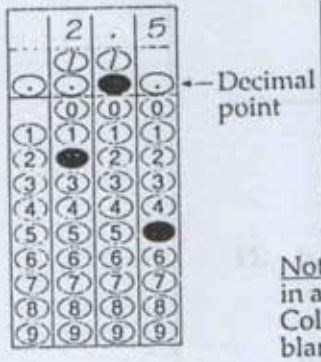
Directions for Student-Produced Response Questions

Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

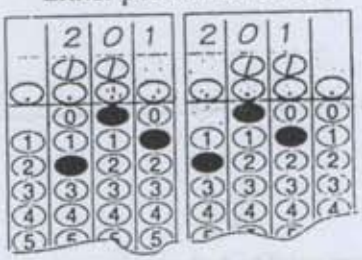
Answer: $\frac{7}{12}$ or 7/12



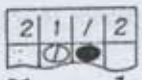
Answer: 2.5



Answer: 201
Either position is correct

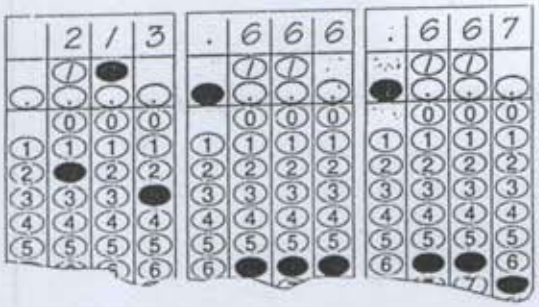


Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If  is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)

- Decimal Accuracy: If you obtain a decimal answer, **enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3} = .6666\ldots$



11. What is the value of 2×4^{-3}?

12. The ratio of a to b is the same as the ratio of 1.4 to 7. If $a = 14$, what is the value of b?

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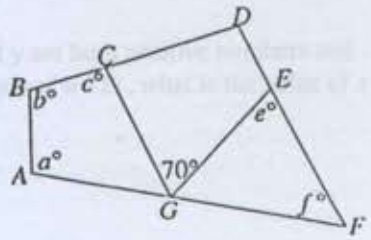

13. In the figure above, what is the value of $a+b+c+e+f$?

14. If the sum of 4 consecutive odd integers is 144, what is the least of these integers?

15. A right triangle with area 24 has vertices at $(-3, 2)$, $(5, 2)$, and $(5, b)$, where $b > 0$. What is the value of b?

16. The base of a rectangular box has an area of 24. The area of one of the faces of the box is 15. If each of the dimensions of the solid is an integer greater than 1, what is the surface area of the box?

$$\begin{array}{r} XY \\ +\,YX \\ \hline WW0 \end{array}$$

17. In the correctly worked addition problem above, each letter represents a nonzero digit. If $X > Y$, what is one possible value of the two-digit number XY?

$$\frac{2a-4}{5}+\frac{3a+1}{5}=b$$

18. In the equation above, how much greater is a than b?

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19. If x and y are both positive numbers and $x^2 + 2xy + y^2 = 121$, what is the value of $x + y$?

20. If the fifth and sixth terms of a geometric sequence are 112 and 224, what is the average (arithmetic mean) of the second and third terms of the sequence?

STOP

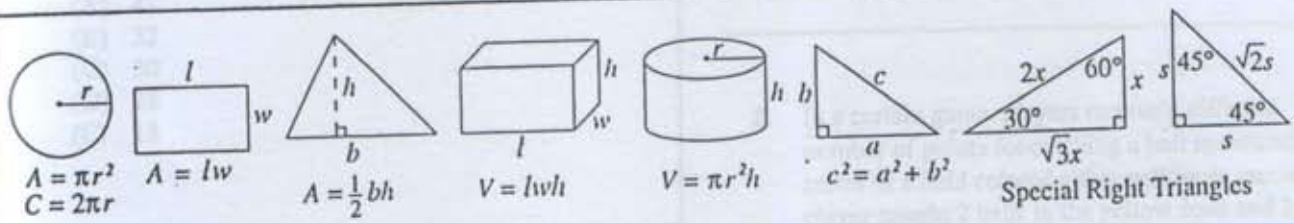
If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 6
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.



The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

$$\begin{array}{r} 1M9 \\ -3M \\ \hline 14N \end{array}$$

1. In the correctly worked subtraction problem above, if M and N represent two distinct digits, then what is the value of N?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

2. If a pencil manufacturer can produce 2,400 pencils per hour, in how many minutes can the pencil manufacturer produce 120 pencils?

(A) 3
(B) 15
(C) 20
(D) 120
(E) 180

3. If $r = \frac{s+t}{10}$, what is the value of s when $t = 200$ and $r = 30$?

(A) 10
(B) 20
(C) 100
(D) 200
(E) 300

4. If $\sqrt{9-x} = 4$, then what is the value of x?

(A) 9
(B) 7
(C) 5
(D) −7
(E) −9

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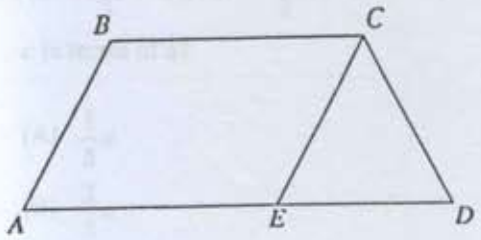

5. In the figure above, $ABCE$ is a parallelogram and ΔECD is equilateral. $AE = 8$, and the perimeter of ΔECD is 18, what is the perimeter of $ABCE$?

(A) 42
(B) 32
(C) 30
(D) 28
(E) 18

6. Points X, Y, and Z lie on a number line. If X has coordinate 2, Y has coordinate 6, and Z has coordinate 10, what is the distance from the midpoint of $\overline{XY}$ to point Z?

(A) 6
(B) 7
(C) 8
(D) 9
(E) 10

7. Kathleen's phone company charges 35 cents each minute of use during peak hours and 15 cents each minute of use during non-peak hours. If Kathleen's phone company charged her $7.90 for a half-hour phone call, what is the number of minutes charged at peak hour rates?

(A) 7
(B) 13
(C) 15
(D) 17
(E) 21

8. In a certain game, players receive a different number of points for catching a ball in different zones of a field colored either yellow or green. One player caught 2 balls in the yellow zone and 3 balls in the green zone for a score of 31. Another player caught 3 balls in the yellow zone and 1 ball in the green zone for a score of 22. How many points are earned for a ball caught in the yellow zone?

(A) 5
(B) 6
(C) 7
(D) 8
(E) 9

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9. If b is $\frac{4}{5}$ of a, and c is $\frac{1}{2}$ of b, what is the value of c in terms of a?

(A) $\frac{1}{5}a$
(B) $\frac{2}{5}a$
(C) $\frac{3}{5}a$
(D) $\frac{4}{5}a$
(E) $\frac{8}{5}a$

10. If $x \neq -\frac{3}{2}$, $\frac{2x^3 - x^2 - 6x}{2x+3} =$

(A) $x-2$
(B) $2x-2$
(C) x^2-2x
(D) $2x^2-2$
(E) $2x^2-2x$

11. When an integer r is divided by 5, the remainder is 2. If the product of 7 and r is divided by 5, what is the remainder?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

12. If $\frac{x}{y} = 1.25$, where x and y are positive integers, which of the following statements CANNOT be true?

(A) xy is an even integer.
(B) xy is an odd integer.
(C) xy is divisible by 5.
(D) $x+y$ is an even integer.
(E) $x+y$ is an odd integer.

13. If 28 kilograms of a certain material has a volume of 24 liters, what will be the volume, in milliliters, of 14 grams of the same material? (1 kilogram = 1,000 grams, 1 liter = 1,000 milliliters)

(A) 0.012
(B) 0.032
(C) 12
(D) 32
(E) 1,200

14. What is the measure of each internal angle of a regular octagon?

(A) 100°
(B) 115°
(C) 120°
(D) 135°
(E) 160°

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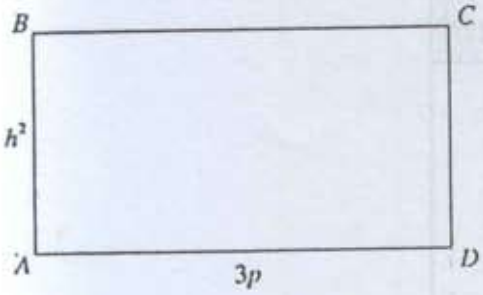


Note: Figure not drawn to scale.

What happens to the area of rectangle $ABCD$ above if h is doubled and side p is halved?

(A) The area is squared.
(B) The area is multiplied by 4.
(C) The area is doubled.
(D) The area is halved.
(E) The area remains the same.

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 6: ANSWER KEY

2 Math	3 Math	6 Math
1. B	1. B	1. B
2. A	2. A	2. A
3. C	3. E	3. C
4. E	4. E	4. D
5. C	5. B	5. D
6. E	6. D	6. A
7. C	7. A	7. D
8. D	8. B	8. A
9. C	9. A	9. B
10. B	10. C	10. C
11. B	11. .031 or $\frac{1}{32}$	11. D
12. B		12. B
13. C		13. C
14. B		14. D
15. E	12. 70	15. C
16. D	13. 430	
17. D	14. 33	
18. C	15. 8	
19. D	16. 158	
20. A	17. 64,73, 82, or 91	
	18. .6 or $\frac{3}{5}$	
	19. 11	
	20. 21	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	650	21	470
70		45	640	20	470
69		44	630	19	460
68		43	630	18	450
67		42	620	17	450
66		41	610	16	440
65		40	610	15	430
64		39	600	14	430
63		38	590	13	420
62		37	590	12	410
61		36	580	11	410
60		35	570	10	400
59		34	570	9	390
58		33	560	8	380
57		32	550	7	380
56		31	540	6	370
55	800	30	540	5	360
54	760	29	530	4	360
53	720	28	520	3	350
52	690	27	520	2	340
51	680	26	510	1	310
50	680	25	500	0	280
49	670	24	500	-1	250
48	660	23	490	-2	220
47	660	22	480	-3	200

Practice Test 6: Answers and Explanations

1. B Start by subtracting $\frac{1}{5}$ from each side of the equation to get $\frac{x}{10} = \frac{2}{5}$. Now, just solve the equation by cross multiplying. As an alternative, go through the answers until you get something that reduces to $\frac{2}{5}$.

2. A Start by subtracting 8 from both sides of the equation. So, $3a = -6$. Now, simply multiply $-6 \times 5 = -30$ to get the answer. Notice that there is no need to actually solve for the value of a.

3. C Each side of the hexagonal figure can be paired with another side that has the same slope. The top can be paired with the bottom. The bottom left side can be paired with the top right side. The top left can be paired with the bottom right. Look for sides that slant in the same direction.

4. E Use a process of elimination. (D) and (C) can be eliminated because their sum is greater than 1. (A) and (B) can be eliminated because neither satisfies the $r = p + 2$ restriction.

5. C The wall measures 5 yards by 7 yards since there are 3 feet in a yard, so its area is 35 square yards. The wallpaper cost \$2.00 per square yard, so the total cost will be $35 \times 2 = \$70$.

6. E Since y is even, and x is prime, and $xy = 22$, then y must be 2 and x is 11. So, $z = 3$. The correct order for the variables is $y < z < x$.

7. C If $\overline{KL}$ is congruent to $\overline{JK}$, both must equal 20. If JL is 40% of JK, JL must equal 8. This gives a perimeter (20 + 20 + 8) of 48.

8. D Rotate the hour hand first. It needs to rotate one third of the way around the circle since 120° is one third of 360°. The correct answer must have the hour hand pointing to 4. Eliminate (A), (B), and (C). Now, rotate the minute hand. It must turn one fourth of the way around the circle from its starting position since 90° is one fourth of 360°. The time must now show 4:30.

9. C Look at the answers to see which one is equivalent to $12x^2$. (A) simplifies as $2x^2\sqrt{3}$. (B) simplifies as $12x$. (C) simplifies as $12x^2$. (D) simplifies as $12x$. (E) simplifies as $12\sqrt{x}$. Another approach is to try making up a value for x. If $x = 3$, then $12x^2 = 12(3)^2 = 108$. (C) is the only answer that equals 108 when $x = 3$.

10. B The members of set A are 2, 4, 6, 8, 12, and 24, and the members of set B are 2, 6, and 18. Intersection ($\cap$) refers to members that are common to both sets, of which there are two in this case (2 and 6). (E) is the number of members in a *union* ($\cup$) of the sets.

11. B Use the Pythagorean theorem ($a^2 + b^2 = c^2$) to solve for the length of AB. $12^2 = 5^2 + b^2$ and $b\ \sqrt{119}$.

12. B Use b for bagels and m for muffins. We know that $b + m = 225$, and $2b + 15 = m$. Combine the equations, and we find that $b + 2b + 15 = 225$. Solving for b, we find that $3b = 210$, and $b \doteq 70$.

13. C The difference between the 2 plans is \$5 per month, so find the number of checks that must be written to go over that amount. If 10 checks are written, the plans cost the same, so 11 checks will make Plan B cost more than plan A.

14. B Try creating a list of numbers that matches the description. For example, the list could be {4, 4, 6, 7, 8}. Now, evaluate the answers by thinking about how the numbers in the list could change. (A) cannot be true since out of five numbers, the third one must be the median. The question indicates that the mode must be less than the median, and since it is the most frequently occurring score, both numbers below the median must be at the mode. There are only two numbers left to work with, so there cannot be three the same. (C) and (D) are not possible because the other three numbers must be greater than the mode, and therefore the mean is greater than the mode. (E) would imply that either the mode consists of four numbers—which would make the mode equal to the median—or that there is more than one mode. Both interpretations are contradicted by the question. Finally, notice that for the list given, the median is 6 and the average is 5.8, so the average is less than the median. Since this question asks for what *could be true*, we only need to find one list of numbers for which the answer choice is true.

15. E "The difference between the sum of x and 8 and the sum of 4 plus the quotient of x divided by 2" turns into: $(x + 8) - \left(4 + \frac{x}{2}\right)$. Give everything a denominator of 2 so that the terms can be combined, which looks like: $\left(\frac{2x+16}{2}\right) - \left(\frac{8+x}{2}\right)$. The subtraction yields an answer of $\frac{x+8}{2}$. Another approach is to try creating a value for x. If $x = 6$, then the statement will translate as $(6 + 8) - \left(4 + \frac{6}{2}\right) = 7$. (E) is the only answer that equals 7 when $x = 6$.

16. D Use the Pythagorean theorem to find the length of BE which is the height of the parallelogram. $\left(4\sqrt{5}\right)^2 = 4^2 + BE^2$ and $BE = 8$. For a parallelogram, area = bh. So, Area = (14)(8) = 112.

17. D The coordinates of midpoint E can be determined by using the midpoint formula. Drawing the figure is helpful. The x-coordinate of the midpoint E is the average of the x-coordinates of the two endpoints A and D, and the same can be done for the y-coordinate. Point E is (3, 1), so now triangle ABE has sides of 5 and 4. By using the Pythagorean theorem, $5^2 + 4^2 = (BE)^2$. $BE = \sqrt{41}$.

18. C A function for $f(x)$ that gives out $x^2 + 4x + 4$ when $(x + 2)$ is the input is needed. $(x + 2)^2 = x^2 + 4x + 4$, so the original function $f(x) = x^2$. Also try creating a value for x. For instance, try putting $x = 3$ into the given function. This gives you $f(5) = 25$. The question asks for the value of $f(x)$, and we know that $f(5) = 25$, so we plug 5 in for x in all of the answer choices to see which turns into 25.

19. D Rearrange the expression to get a quadratic. Start by cross multiplying to get $-2xy = x^2 + y^2$. Now, move all the terms to one side to produce the quadratic $x^2 + 2xy + y^2 = 0$. The factors of this equation are $(x + y)$ and $(x + y)$. Since both of these factors must be equal to 0, and y doesn't equal 0, than $y = -x$.

20. A Algebraically do this one month at a time. Karen starts with s, but after the first month she has $s + 0.1s$ (gains 10% giving her $1.1s$). After the next month she has $1.1s + 0.1 \times 1.1s$ (gains another 10%, giving her $1.21s$). After the third month she has $1.21s - 0.2 \times 1.21s$ (loses 20%, giving her $0.968s$). Another approach is to make up a stock price. Try $s = 100$. The price at the end of the first month is \$110. The price increases by another 10% during the second month so add another \$11 to the price to get \$121. Now, the price decreases by 20%. Since 20% of \$121 is \$24.20, the stock now sells for \$96.80 (A) gives 96.80 when $s = 100$.

1. B Substitute 40 in for f in the second equation to get a value of 16 for c ($.4 \times 40$), and then multiplying this by 4 in the first equation gives $d = 64$.

2. A First, draw it. The symbol ≅ means congruent, or equal in measurement. Since KL and LM are both equal, they both must be half of KM, or half of 6.

3. E $30 \times 4 = 120$, $30 \times 5 = 150$, so there is no multiple of 30 that lies between 125 and 145 inclusive. Each of the other numbers has a multiple within the stated range: $15 \times 9 = 135$, $17 \times 8 = 136$, $20 \times 7 = 140$, $25 \times 5 = 125$.

4. E The first step before tackling the fractional expression is to determine the value of b, which is $-4(-7 + 3)$. Substituting (and keeping your positives and negatives straight) gives the expression $\frac{-4^3(-7 - -4)}{-4 - -7}$ or $\frac{-64(-3)}{3}$, or, 64.

5. B Read carefully. The first column is numbers and the remaining columns are prime factors of the respective numbers. To get the prime factors of a number, do a factor tree, and keep factoring until you have only prime numbers at the ends of the branches: 385 is divisible by 5 (prime) and 77, and 77 can be factored to 7 and 11, which are both prime. Therefore, the numbers after 385 in the table should be 5, 7, and 11. The only number missing is 11. $x = 11$.

6. D You want to choose the graph that shows an increase for a while, and then no change after that.

7. A Use x for the price of the product. When the price is increased by 15%, the new price becomes $x + 0.15x$, or $1.15x$. In order to get back to the original price, the new price needs to lose $0.15x$. The percent will be the decrease divided by the total, or $\frac{0.15x}{1.15x}$. This is approximately 0.13, or 13%. Another option is to create a value for the original price. Try 100 for the original price. Now increase 100 by 15%. Since we're starting with 100, just add 15. The new price is 115. To get back to 100 we need to know the percent change from 115 to 100. This should be the amount decreased divided by the total, $\frac{15}{115}$. Use your calculator to get the value of 0.13043. This is approximately 13%.

8. B Set up equations for each of the descriptions given. s, r, and m represent the number of candies that Shanice, Raphael, and Mohamed have respectively. $r = 3m$, and $r = s - 20$. Through the description of the problem, $\frac{r+12}{4} + m = r - 12$. By substituting $3m$ for r, the equation gives 12 for m. Therefore, $r = 36$, and $s = 56$. Another approach could be to try answer choices as possible values for Shanice's candies to see which one agrees with

the information. For example, with the correct answer (B) the original number of candies Shanice would have had was 56. This means that originally Raphael had 36 and Mohamed 12. After the exchanges take place Shanice would have 12 less than 56 (44 candies), Raphael would have 48 and then 36 again after receiving 12 from Shanice and giving a quarter of that total to Mohamed, and Mohammed would have a total of 24 after receiving 12 from Raphael. As it turns out Raphael ends up with the same number of candies he had originally and Mohamed gains 12 candies. This satisfies the rule that at the end of the exchanges Raphael only has 12 more candies than Mohammed.

9. **A** The question indicates "directly proportional," so this is a proportion problem. Set up two proportions equal to each other: $\frac{16 \text{ meters}}{40 \text{ watts}} = \frac{x \text{ meters}}{75 \text{ watts}}$. Cross multiply and solve for x: $1200 = 40x$, so $x = 30$.

10. **C** Factor the left side into $\sqrt{4(3x+y)^2}$ or $2(3x + y)$, and the right side into $\sqrt{9(x+3y)^2}$, or $3(x + 3y)$. Carry the coefficients into the parentheses to solve for y in terms of x. $3(x + 3y) = 2(3x + y)$, so $3x + 9y = 6x + 2y$. Subtract $2y$ from the left side and $3x$ from the right side to get $7y = 3x$. Divide both sides by 7 to get $y = \frac{3x}{7}$.

11. $\frac{1}{32}$ or .031 Remember that $4^{-3} = \frac{1}{4^3}$, which is $\frac{1}{64}$. Multiplying by 2 gives $\frac{1}{32}$.

12. **70** Although it looks like a ratio problem, this is really a proportion problem. Set up two fractions that are equal to each other. One is $\frac{1.4}{7}$ and the other is $\frac{14}{b}$. Cross multiply to find b. $1.4b = 98$, so $b = \frac{98}{1.4} = 70$

13. **430** Plug in 50 for m$\angle CGA$. Since m$\angle CGE = 70$, this means m$\angle EGF$ must be 60 (because the angles in a straight line must add up to 180). Now plug in numbers for a, b, and c. Try $a = 100$ and $b = 130$. Then $c = 80$, because the sum of the angles inside quadrilateral $ABCG$ must be 360 ($a + b + c +$ m$\angle CGA = 100 + 130 + 80 + 50 = 360$). Now plug in numbers for e and f. Try $e = 55$. Then $f = 65$, because the sum of the angles inside ΔEFG must be 180 ($e + f +$ m$\angle EGF = 55 + 65 + 60 = 180$). So $a + b + c + e + f = 100 + 130 + 80 + 55 + 65 = 430$.

14. **33** Start out by estimating. Divide 144 by 4 to estimate the range of the consecutive numbers. The quotient is 36. That should be in the middle of the consecutive numbers. Try out the two consecutive odd numbers below 36 (33 and 35) and the two consecutive odd numbers above 36 (37 and 39). Check that these numbers add up to 144, and choose the smallest.

15. **8** Draw the figure. The base of the triangle should be 8, since that is the distance from the point at (–3, 2) to the point at (5, 2). Since the area equals 24 and the base equals 8, the height has to equal 6. (area $= \frac{1}{2}bh = \frac{1}{2} \times 8 \times h = 24$; $h = 6$). So the other coordinate (5, b) must be 6 above the base, or at (5, 8).

16. **158** If the area of one of the solid's faces is 15 and all of the dimensions are integers, the dimensions of this face must be 3 and 5. The area of the base is 24. It can't share the 5 side with the other face, since 5 is not a factor of 24. It must share the third side, so the other dimension must be 8. Now find the areas of each of the faces. Since this is a rectangular box, there must be six sides, and sides opposite to each other have the same area. The question says that there are faces with areas of 24 and 15, so there must be one more area to find. It must have dimensions of 5 and 8, so its area is 40. To find the surface area, multiply each of the areas by 2 and add them together.

17. **64, 73, 82, or 91** In the units place, X and Y add up to either 0 or 10. Since the question says that X and Y are nonzero, they must add up to 10. Therefore, X and Y must be 1 and 9, 2 and 8, 3 and 7, 4 and 6, or 5 and 5, but not necessarily in that order. Since the question says that the digits are different and that $X > Y$, 55, 19, 28, 37, and 46 are out, leaving 64, 73, 82, and 91. If you add 64 and 46, or 73 and 37, 82 and 28, or 91 and 19, the sum is 110, which matches the answer $WW0$, making 64, 73, 82, and 91 all possible answers.

18. **.6 or $\frac{3}{5}$** Try plugging in 2 for a, which makes $b = 1.4$. Then subtract 1.4 from 2.

19. **11** Factoring $x^2 + 2xy + y^2$ gives you $(x + y)^2 = 121$. Take the square root of both sides to isolate $x + y = 11$.

20. **21** Notice that the 5th term (112) is half of the 6th term (224). In a geometric sequence, consecutive terms have the same ratio. So the fourth term is half of 112 (which is 56), the third term is half of 56 (which is 28), and the second term is half of 28 (which is 14). The average of 14 and 28 is 21.

SECTION 6

1. B Subtract the digits in the tens place ($M - 3 = 4$), to find that M is 7. Substitute the value of M in the units (ones) place and get ($9 - 7 = 2$): thus $N = 2$.

2. A If 2,400 pencils can be manufactured in 60 minutes (one hour), then 40 pencils can be manufactured in one minute. In three minutes, the manufacturer can make 120 pencils. If you set this up as a proportion, it should look like this: $\frac{2400 \text{ pencils}}{60 \text{ minutes}} = \frac{x \text{ pencils}}{3 \text{ minutes}}$. Cross-multiply to solve for x.

3. C Plug in the numbers given. $30 = \frac{s+200}{10}$, so $300 = s + 200$ and therefore $s = 100$.

4. D Square both sides of the equation, which gives you $9 - x = 16$. Solve for x to get -7.

5. D If ECD is an equilateral triangle with perimeter 18, each side length is equal to 6. Since opposite sides of a parallelogram have equal lengths, $AB = CE = 6$ and $BC = AE = 8$, so the perimeter of the parallelogram is $8 + 6 + 8 + 6 = 28$.

6. A The midpoint of XY is coordinate 4, and the distance from coordinate 4 to coordinate 10 is 6.

7. D Try one of the answers to see if it works. For instance, try (C) for the number of peak minutes. 15×35 cents = \$5.25. 15 peak minutes must mean that there were 15 off-peak minutes. 15×15 cents = \$2.25. Total cost is \$7.50, which is too low. More of the expensive minutes are needed. (D) gives: 17×35 cents = \$5.95. 17 peak minutes must mean that there were 13 off-peak minutes. 13×15 cents = \$1.95. Total cost is \$7.90.

8. A Set up equations for each situation. Use y and g for yellow and green respectively. Thus $2y + 3g = 31$, and $3y + 1g = 22$. Stack the equations and solve as simultaneous equations.

$$\begin{aligned} 2y + 3g &= 31 \\ 3y + 1g &= 22 \end{aligned}$$

Multiply the bottom equation by -3 and add the equations down.

$$\begin{aligned} 2y + 3g &= 31 \\ -9y - 3g &= -66 \\ -7y &= -35 \\ y = 5,\ g &= 7 \end{aligned}$$

9. B Try plugging in a value on this problem. For instance, if $a = 20$, then $b = 16$ and $c = 8$. 8 is $\frac{2}{5}$ of 20, so $c = \frac{2}{5}a$.

10. C Try plugging in a value on this problem. For instance, if $x = 3$, the expression turns into 3. Plug the x value into the answers, and only (C) turns into 3. Alternatively, try factoring. The top of the fraction becomes $2x^3 - x^2 - 6x = x(2x^2 - x - 6) = x(2x + 3)(x - 2)$. Cancel $(2x + 3)$ from the top and bottom of the fraction, and you are left with $x(x - 2) = x^2 - 2x$.

11. D Try plugging in a value on this problem. For instance, if r is 12, $7r$ is equal to 84. The remainder when 84 is divided by 5 is equal to 4.

12. B The product cannot be an odd integer because the smallest possible x is 5 and the smallest y possible is 4. $5 \times 4 = 20$, which is an even number. All other possible values of x and y are even, so odd products are not possible.

13. C If 28 kg has a volume of 24L, then 7 kg has a volume of 6L. $\frac{28\text{kg}}{24\text{L}} = \frac{7\text{kg}}{6\text{L}}$. Now, make sure you keep track of all of the units and conversions you do. $14\text{g} \times \frac{1\text{kg}}{1000\text{g}} = 0.014\text{kg}$. So, 14 grams is equal to 0.014 kg. Now, find how many liters 0.014 kg corresponds to. $0.014\text{kg} \times \frac{6\text{L}}{7\text{kg}} = 0.012\text{L}$. The last step is translating 0.012 L into the appropriate units, milliliters. $0.012\text{L} \times \frac{1000\text{ml}}{1\text{L}} = 12\text{ml}$ (or convert units at first – then it's one step: $\frac{28000\text{g}}{24000\text{mL}} = \frac{14}{x}$).

14. D A regular octagon is a shape with eight equal sides and eight equal angles. You can find the total internal degrees of an octagon by using the equation (# of sides − 2) × 180 = (8 − 2) × 180 = 1080. So, the total internal measure of an octagon is 1080°. To find the measures of the individual angles, divide 1080° by the number of angles. $\frac{1080°}{8} = 135°$, which is the measure of each internal angle of the octagon.

15. C Try plugging in values on this problem. For instance, if $h = 2$ and $p = 4$ then AB is 4 and BC is 12, making the area 48. Applying the changes stipulated by the problem to our values will generate another area. Our new $h = 4$, so AB is 16 and BC becomes 6, making the area 96. This area is twice the original answer, so (C) is the answer.

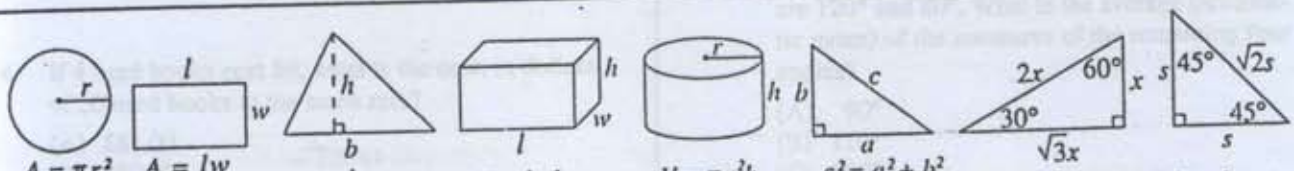
Practice Test 7

SECTION 2
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.



$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. What is the value of a, if $5a - b - c = 36$ and $b = c = \frac{1}{2}a$?

(A) 12
(B) 9
(C) 6
(D) 4
(E) 3

2. If a given number is divided by x, and the result is 5 times the original number, what is the value of x?

(A) $\frac{1}{5}$
(B) $\frac{1}{2}$
(C) 2
(D) 5
(E) 10

GO ON TO THE NEXT PAGE

3. A certain line segment in the rectangular coordinate plane has endpoints A and B and is perpendicular to the y-axis. If Point A is located at $(-2, -3)$, which of the following could be the location of Point B?
   (A) $(-2, 3)$
   (B) $(-2, -6)$
   (C) $(-6, -2)$
   (D) $(2, 3)$
   (E) $(2, -3)$

4. If 4 used books cost \$9, what is the cost, in dollars, of 20 used books at the same rate?
   (A) \$81.00
   (B) \$80.00
   (C) \$60.00
   (D) \$45.00
   (E) \$36.00

5. If $a - b = 0$, which of the following is equal to $a \times b$?
   (A) $2a$
   (B) $2b$
   (C) a^2
   (D) $\frac{a}{b}$
   (E) 0

6. If $5\sqrt{z} - 30 = 2\sqrt{z} + 54$, then $z =$
   (A) 632
   (B) 696
   (C) 724
   (D) 756
   (E) 784

7. The measures of two of the six angles of a hexagon are 120° and 80°. What is the average (arithmetic mean) of the measures of the remaining four angles?
   (A) 90°
   (B) 110°
   (C) 130°
   (D) 520°
   (E) 720°

8. $5(x^4 y^5 z^6)^3 =$
   (A) $\frac{5x^7z^9}{y^2}$
   (B) $\frac{5x^{12}z^{18}}{y^{15}}$
   (C) $\frac{25x^{12}z^{18}}{y^{15}}$
   (D) $\frac{125x^7z^9}{y^2}$
   (E) $\frac{125x^{12}z^{18}}{y^{15}}$

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9. One painter can paint two identical rooms of a certain size in 90 minutes. If a hotel has 50 of these identical rooms, how many painters working continuously at this rate are needed to paint all the rooms in the hotel in $7\frac{1}{2}$ hours?

(A) 8
(B) 7
(C) 6
(D) 5
(E) 4

10. Random two-digit integers can be generated using ten cards numbered from zero to nine. A card is drawn at random from the ten cards, and that number is recorded as the first digit of the two-digit integer. The card is replaced, and a card is again drawn at random from the ten cards. This number is recorded as the second digit of the two-digit integer. If the first card drawn is a 2, how many prime two-digit integers can result?

(A) 2
(B) 3
(C) 4
(D) 5
(E) 6

11. If $x > 0$, $\frac{4x^2-6x-40}{6x^2-14x-40} =$

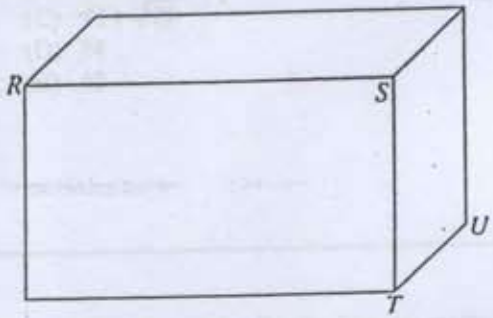
(A) $\frac{2x}{3}-8$

(B) $\frac{2x^2}{3}-\frac{2x}{7}$

(C) $\frac{2x+5}{3x+5}$

(D) $\frac{4x-6}{6x-14}$

(E) $\frac{4x+1}{6x+1}$



12. In the figure above, if $RS = 12$, $ST = 6$, and $TU = 8$, what is the distance from the center of the rectangular solid to the midpoint of $\overline{RS}$?

(A) 4
(B) 5
(C) 6
(D) 8
(E) 10

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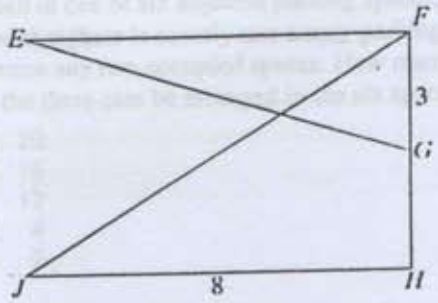
13. If $f(x) = 3x - 9$, what is $f(7) + f(5)$?

(A) $f(2)$
(B) $f(3)$
(C) $f(9)$
(D) $f(12)$
(E) $f(18)$

14. The length of a line segment with endpoints M and N is an integer less than 12. Point L is the midpoint of $\overline{MN}$, point O is the midpoint of $\overline{ML}$ and point P is the midpoint of $\overline{LN}$. Which of the following could be the distance between points O and N?

(A) 10
(B) 9
(C) 8
(D) 7
(E) 6



Note: Figure not drawn to scale.

15. In the figure above, G is the midpoint of $\overline{FH}$ and $\overline{EF} \perp \overline{FH}$. If $\angle EGF \cong \angle JFH$ and $\angle FJH \cong \angle FEG$, what is the perimeter of ΔEFG?

(A) 12
(B) $6\sqrt{8}$
(C) $11 + \sqrt{73}$
(D) 24
(E) 48

16. A certain bacterial cell culture under study quadruples its population every five days. If the sample started out with 3 cells, which of the following expressions would give the population of this culture after 35 days?

(A) 3×4^7
(B) 3×4^8
(C) 3×35^2
(D) 4×5^7
(E) 4×35^7

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17. For what value of n does $(2n + 5)(n - 5) = (2n - 7)(n - 3)$?

(A) $\frac{23}{4}$
(B) 5
(C) $\frac{9}{4}$
(D) 2
(E) $\frac{7}{4}$

18. ΔABC is equilateral and has an area of $1\frac{3}{5}$. Point D is the midpoint of side AB, point E is the midpoint of side BC, and point F is the midpoint of side AC. What is the area of parallelogram $DECF$?

(A) $\frac{2}{5}$
(B) $\frac{2}{3}$
(C) $\frac{4}{5}$
(D) $\frac{13}{15}$
(E) 1

19. At a car dealership, each of three cars must be parked in one of six adjacent parking spaces, provided that there is exactly one empty parking space between any two occupied spaces. How many ways can the three cars be arranged in the six spaces?

(A) 20
(B) 16
(C) 12
(D) 4
(E) 2

20. If the circumference of circle M is 2 times the circumference of circle N, what is the ratio of $\frac{1}{3}$ the area of circle M to $\frac{1}{4}$ the area of circle N?

(A) 16:3
(B) 12:1
(C) 4:3
(D) 3:1
(E) 3:8

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

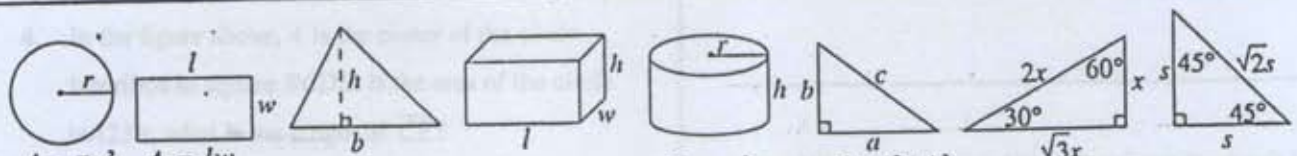
SECTION 4
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. Andy and Bob are picking apples. Andy picks 16 apples per hour and Bob picks 10 apples per hour. In 30 minutes, how many more apples has Andy picked than Bob?
   (A) 3
   (B) 5
   (C) 6
   (D) 8
   (E) 10

2. An "unprime number" is an integer whose only factors, other than 1 and itself, are prime. Which of the following is an unprime number?
   (A) 18
   (B) 20
   (C) 22
   (D) 24
   (E) 28

Set A: 1, 2, 3, 6, 8, 12

3. Which of the following numbers, when added to the set above, would make the average of the new set equal to the median of the new set?
   (A) 6
   (B) 8
   (C) 10
   (D) 12
   (E) 14

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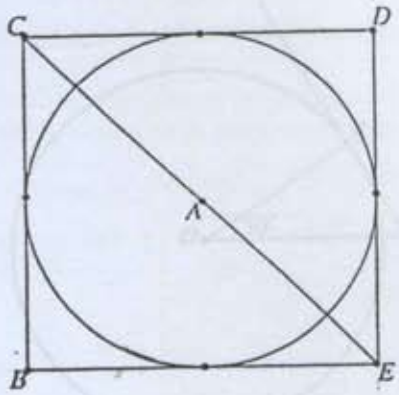

4. In the figure above, A is the center of the circle inscribed in square $BCDE$. If the area of the circle is 121π, what is the length of $\overline{CE}$?

(A) $11\sqrt{2}$ (approximately 15.556)
(B) $11\sqrt{3}$ (approximately 19.053)
(C) $18\sqrt{2}$ (approximately 25.456)
(D) $22\sqrt{2}$ (approximately 31.113)
(E) $22\sqrt{3}$ (approximately 38.105)

5. Tiles marked 1 to 1,000 are placed in a bag. If a tile is chosen at random, what is the probability that the tile's number is even and a multiple of 5?

(A) $\frac{1}{10}$
(B) $\frac{21}{100}$
(C) $\frac{3}{10}$
(D) $\frac{1}{2}$
(E) $\frac{141}{200}$

6. An amusement park ride has an elevator that brings riders to the top of a tower. Riders step off the elevator onto a slide, which is a straight line from the top of the tower to level ground. The base of the slide is 400 feet from the base of the tower and the length of the slide is 500 ft. If the elevator rises at a rate of 10 feet per second, how many seconds does the elevator take to rise from the ground to the top of the slide?

(A) 30
(B) 40
(C) 50
(D) 150
(E) 300

7. When s is increased by 100 percent the result is r. If s is 20 percent of t, and the ratio of t to u is 5 to 4, what is the ratio of r to u?

(A) $\frac{1}{5}$
(B) $\frac{1}{4}$
(C) $\frac{1}{2}$
(D) $\frac{4}{5}$
(E) $\frac{5}{2}$

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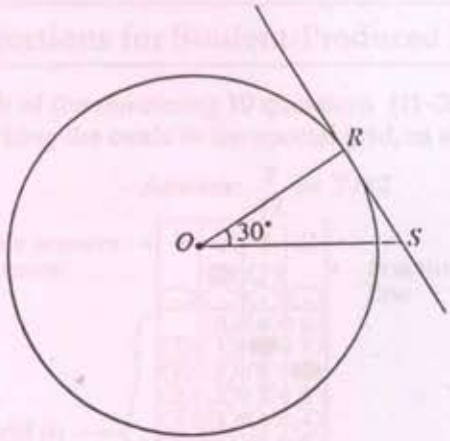

8. The figure above shows a circle tangent to $\overleftrightarrow{RS}$ at point R. If O is the center of the circle and $RS = 4$, what is the radius of the circle?

(A) 4
(B) $4\sqrt{2}$
(C) $4\sqrt{3}$
(D) 8
(E) It cannot be determined from the information given.

9. If a and b are integers and their product is -10, what is the greatest possible value for $a - b$?

(A) 3
(B) 7
(C) 9
(D) 11
(E) 25

10. After the first term in a sequence, the ratio of each term to the preceding term is x. If the first term is y, what is the third term?

(A) $\frac{y}{x}$
(B) x^2y
(C) $\frac{x}{y}$
(D) $\frac{x^2}{y}$
(E) x^3y

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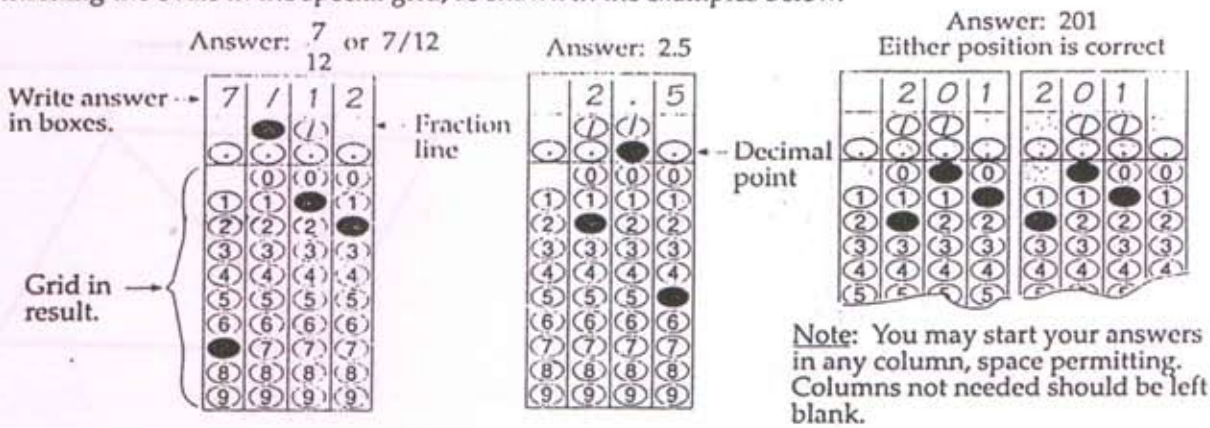
Directions for Student-Produced Response Questions

Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

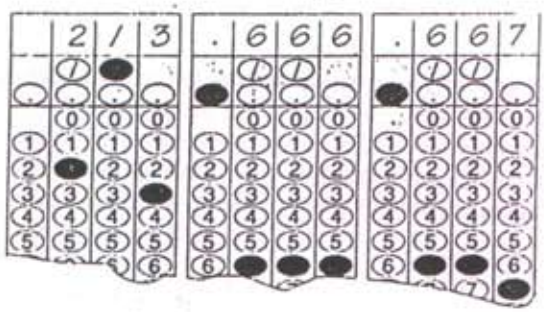


Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If 2 1 / 2 is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)

- Decimal Accuracy: If you obtain a decimal answer, **enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3} = .6666\ldots$

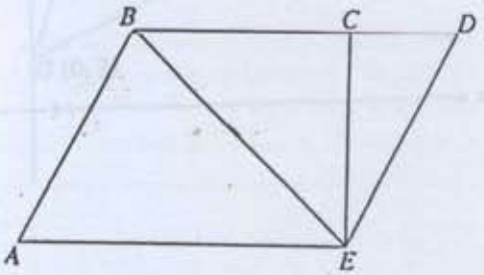


11. Marvin has a collection of baseball cards, each depicting a single player. If there are 420 cards in the collection, and a randomly drawn card has a probability of $\frac{5}{6}$ for depicting a pitcher, how many of the baseball cards in Marvin's collection depict pitchers?

12. If $5p + 5 = p + 12$, then $p =$

GO ON TO THE NEXT PAGE

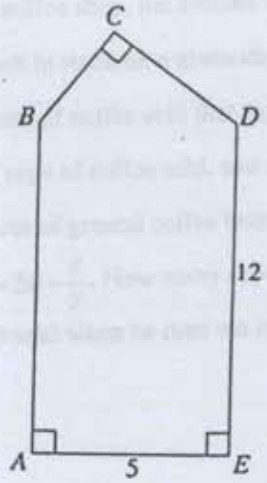
13. If $m + n = 11$ and $3m - 2n = 23$, what is the value of $12m - 3n$?



14. In the figure above, $ABDE$ is a parallelogram and the length of $\overline{AE}$ is 24. If the area of triangle BCE is three times the area of triangle CDE, and $\overline{CE}$ is the height, what is the length of $\overline{BC}$?

$$-1, 2, 3, 1, \frac{1}{2}$$

15. The 5 numbers shown above are repeated indefinitely, in that order, to form a sequence. What is the product of the first 20 terms of the sequence?



Note: Figure not drawn to scale.

16. If the length of $\overline{BC}$ is 3 and $AB = DE$, what is the perimeter of figure $ABCDE$ shown above?

17. Alberto is trying to remember the last four digits of his friend's phone number. He can recall the first digit, but he has forgotten the last three digits (each from 0 to 9). How many different arrangements of three digits are possible for the forgotten portion of the phone number?

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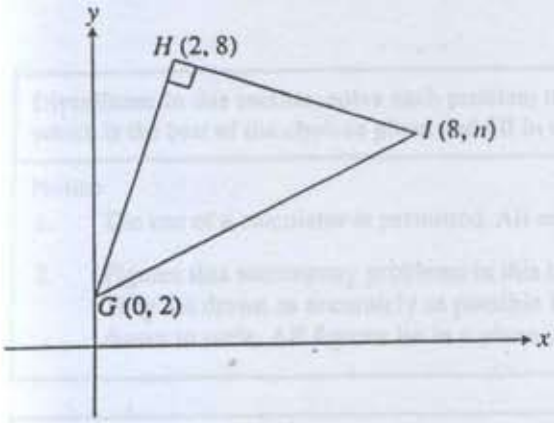


18. In the figure shown above, points G, H, and I in the xy-plane have coordinates of (0, 2), (2, 8), and (8, n), respectively. If $GH = HI$, what is the value of n?

19. On Mindy's guitar, the frequency of a vibrating string varies inversely as the length of the string. When a guitar string of s inches in length that vibrates at a frequency of 80 cycles per second is shortened to 6 inches in length, it vibrates at a frequency of 120 cycles per second. What is the value of s?

20. At Uriah's coffee shop, the amount of ground coffee beans left in stock on a given day is a function of the amount of coffee sold that day. If c is the number of cups of coffee sold, and $z(c)$ is the number of ounces of ground coffee beans left in stock, then $z(c) = 50 - \frac{c}{7}$. How many cups of coffee will Uriah have sold when he runs out of ground coffee beans?

STOP

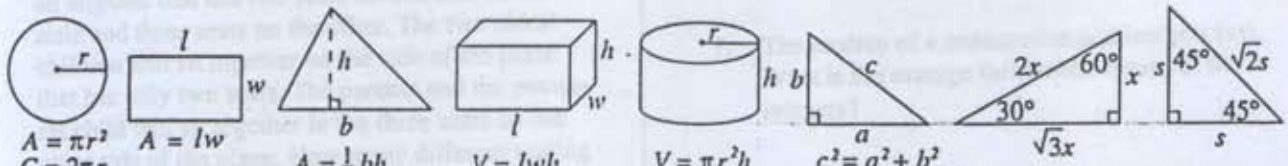
If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 6
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

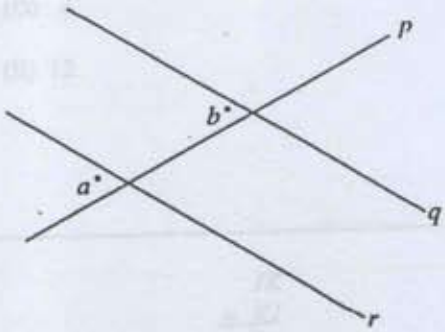
1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.



$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $5x + 2x + 6 = 3x + x + 12$, what is the value of x?
   (A) 6
   (B) 5
   (C) 4
   (D) 3
   (E) 2



Note: Figure not drawn to scale.

2. In the figure above, if lines q and r are not parallel, which of the following must be true?
   (A) $a \neq b$
   (B) $a = b$
   (C) $a > b$
   (D) $a < b$
   (E) $a \leq b$

GO ON TO THE NEXT PAGE

3. What is the value of $7g(3h+9)$ if $h=6$?

(A) $27g$
(B) $63g$
(C) $84g$
(D) $189g$
(E) $378g$

4. The Jones family is going on vacation. The five members of the family will sit in the same row on an airplane that has two seats on one side of the aisle and three seats on the other. The two oldest children will sit together on the side of the plane that has only two seats. The parents and the youngest child will sit together in the three seats on the other side of the plane. How many different seating arrangements are possible?

(A) 5
(B) 10
(C) 12
(D) 60
(E) 120

5. 18 is what percent of 45?

(A) 15%
(B) 20%
(C) 25%
(D) 40%
(E) 50%

6. If $3<|x|<5$ and $4<|y|<6$, which of the following must be true?

(A) $y<x$
(B) $x<y$
(C) $xy>0$
(D) $|xy|>12$
(E) $|x+y|>7$

7. The median of n consecutive odd integers is 6. What is the average (arithmetic mean) of the n integers?

(A) $\frac{n}{2}$
(B) n
(C) $\frac{6}{n}$
(D) 6
(E) 12

$$\begin{array}{r} JK \\ +\ KJ \\ \hline 18L \end{array}$$

8. In the correctly worked addition problem above, J, K, and L represent distinct digits. What is the value of the digit L?

(A) 5
(B) 6
(C) 7
(D) 8
(E) 9

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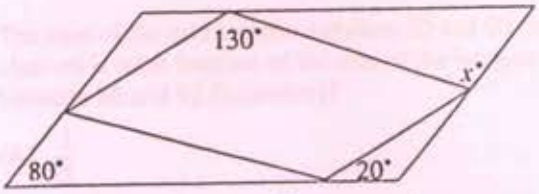
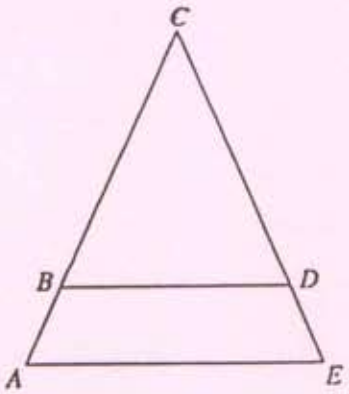


Note: Figure not drawn to scale.

9. In the figure above, a small parallelogram is inscribed in a large parallelogram. What is the value of x?

(A) 50
(B) 60
(C) 70
(D) 80
(E) 100



10. In the figure above, $\overline{AE} \parallel \overline{BD}$. If $AE = 9$, $BD = 6$, and the area of ΔACE is 54, what is the area of ΔBCD?

(A) 54
(B) 48
(C) 24
(D) 18
(E) 12

11. If r is the remainder when a positive integer is divided by a single-digit prime integer, what is the largest possible value of r?

(A) 6
(B) 7
(C) 8
(D) 9
(E) It cannot be determined from the information given.

12. If r, s, t, and u are consecutive integers such that $r < s < t < u$, which of the following is the median of these integers?

(A) $\frac{r+u}{2}$

(B) $\frac{r+t}{2}$

(C) $\frac{s+u}{2}$

(D) $\frac{r+s+t}{3}$

(E) $\frac{s+t+u}{3}$

13. In ΔDEF, $m\angle EFD < m\angle EDF$. Which of the following must be true?

(A) $DE < EF$
(B) $DF > EF$
(C) $DE > DF$
(D) $m\angle EDF > m\angle DEF$
(E) $m\angle EFD < m\angle DEF$

GO ON TO THE NEXT PAGE

14. The sum of the odd integers between 80 and 90 (inclusive) is what fraction of the sum of the integers between 80 and 90 (inclusive)?

(A) $\frac{1}{3}$

(B) $\frac{4}{9}$

(C) $\frac{5}{11}$

(D) $\frac{3}{5}$

(E) $\frac{3}{4}$

$$\begin{bmatrix} 3 & 2 \\ -2 & 1 \\ x & -1 \end{bmatrix}\begin{bmatrix} 1 & 0 \\ 5 & 2 \end{bmatrix}=\begin{bmatrix} 13 & 4 \\ 3 & 2 \\ -1 & -2 \end{bmatrix}$$

15. In the correctly worked matrix multiplication shown above, what is the value of x?

(A) $-\frac{1}{5}$

(B) $-\frac{1}{2}$

(C) -1

(D) 2

(E) 4

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 7: ANSWER KEY

2 Math	4 Math	6 Math
1. B	1. A	1. E
2. A	2. C	2. A
3. E	3. C	3. D
4. D	4. D	4. C
5. C	5. A	5. D
6. E	6. A	6. D
7. C	7. C	7. D
8. B	8. C	8. C
9. D	9. D	9. C
10. A	10. B	10. C
11. C	11. 350	11. A
12. B	12. 1.75	12. A
13. C	or	13. A
14. E	$\frac{7}{4}$	14. C
15. A		15. E
16. A	13. 102	
17. A	14. 18	
18. C	15. 81	
19. C	16. 36	
20. A	17. 1000	
	18. 6	
	19. 9	
	20. 350	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	720	21	510
70		45	710	20	500
69		44	710	19	490
68		43	700	18	480
67		42	700	17	470
66		41	690	16	460
65		40	680	15	450
64		39	670	14	440
63		38	670	13	430
62		37	660	12	420
61		36	660	11	410
60		35	650	10	400
59		34	650	9	380
58		33	640	8	370
57		32	630	7	360
56		31	620	6	350
55	800	30	610	5	340
54	800	29	600	4	330
53	790	28	590	3	320
52	780	27	580	2	310
51	770	26	570	1	300
50	760	25	550	0	280
49	750	24	540	-1	250
48	740	23	530	-2	220
47	730	22	520	-3	200

Practice Test 7: Answers and Explanations

SECTION 2

1. B One way to solve this is to plug in the answer choices. Start by plugging in 6 for a. If $a = 6$, then b and c are both 3, and $5a - b - c = 24$. Because 24 does not equal 36, you need a different number for a. If $a = 9$, then b and c are both 4.5, and $5a - b - c = 36$, so this is the correct answer. You could also solve algebraically by substituting $\frac{1}{2}a$ for b and c. $5a - \frac{1}{2}a - \frac{1}{2}a = 36$, so $4a = 36$, and $a = 9$.

2. A The best way to approach this is to decide on a value for the given number, and then try out the answers. For instance, set the given number to 8, and try (C). $\frac{8}{2} = 4$, which is not equal to 5×8. For (B), $8 + \frac{1}{2}$ is 16, which is not 5×8. For (A), $8 + \frac{1}{5} = 40$, which is 5×8.

3. E The best way to approach this is to draw a picture. Any line that is perpendicular to the y-axis contains only points with the same y value, so the correct answer must have $y = -3$.

4. D Set up a proportion as follows: $\frac{4}{9} = \frac{20}{x}$ Then $4x = 180$, so $x = 45$.

5. C Notice a and b are equal because their difference is zero, so their product is equal to either one of them squared. Another solution is to plug in $a = 5$, which makes $b = 5$, and so $a \times b = 25$. Using $a = 5$ and $b = 5$, (A) gives 10, (B) gives 10, (C) gives 25, (D) gives 1, and (E) gives 0.

6. E Simplify the equation to get $\sqrt{z} = 28$, so that $z = 28^2$ or 784.

7. C The sum of the angles in any hexagon is 720°, and since we know that two of the angles add to 200°, the other four angles must add to 520°. 520° ÷ 4 = 130°.

8. B All terms in the parentheses must be raised to the third power (which involves multiplying each exponent by 3), but not the 5, as it is outside the parentheses. The negative power produced (y^{-15}) can also be expressed as the reciprocal of the same power expressed positively $\left(\frac{1}{y^{15}}\right)$.

9. D One painter paints one room in 45 minutes. Since $7\frac{1}{2}$ hours equals 450 minutes, one painter can paint 10 rooms in $7\frac{1}{2}$ hours (450 minutes), so 5 painters will be needed to paint 50 rooms.

SECTION 2

10. A A simple way to ask the question is, "How many prime numbers are there between 20 and 29, inclusive?" There are two—they are 23 and 29.

11. C Factoring the numerator gives $(2x + 5)(2x - 8)$; factoring the denominator, $(2x - 8)(3x + 5)$. The two $(2x - 8)$ terms cancel, leaving the expression in C. One can also divide both top and bottom terms by 2 to simplify the factoring.

12. B The length of $\overline{RS}$ is irrelevant. Imagine a right triangle, with one end of the hypotenuse as the midpoint of $\overline{RS}$, and the other end of the hypotenuse as the center of the box. The height of this right triangle is half the distance from S to T, which is 3, and the length of the base is 4, which is half the distance from T to U. This is a 3:4:5 triangle, so the distance from the center of the box to the midpoint of $\overline{RS}$ is 5 minus the hypotenuse of the triangle.

13. C Use the values of 7 and 5 to find the number you are looking for. $3 \times 7 - 9 = 12$, and $3 \times 5 - 9 = 6$. Which of the answers equals $12 + 6$? (A) and (B) are too small, (E) is too big, and (D) is a trap answer since $7 + 5 = 12$. Only (C) works: $9 \times 3 - 9 = 18$.

14. E It is best to draw the line and plot the points according to what is described. If you do this carefully, you should see that $ON = \frac{3}{4}MN$, and remember that the length of MN must be an integer less than 12. If you plug in the answer choices for ON, you get the following lengths for MN: for (A), MN would be $13\frac{1}{3}$; for (B), MN would be 12; for (C), MN would be $10\frac{2}{3}$; for (D), MN would be $9\frac{1}{3}$; and for (E), MN would be 8 which is an integer less than 12.

15. A Because G is the midpoint of $\overline{FH}$, and $FG = 3$, $FH = 6$. Next, because $\angle EGF \cong \angle JFH$ and $\angle FJH \cong \angle FEG$, triangles JFH and EFG are similar, meaning that their side lengths are proportional. Therefore $\frac{3}{6} = \frac{EF}{8}$, so $6EF = 24$ and $EF = \frac{24}{6} = 4$. We are also told that ΔEFG is a right triangle, so we can use the Pythagorean theorem to find the length of $\overline{EG}$: $3^2 + 4^2 = (EG)^2$, so $25 = (EG)^2$ and $5 = EG$. So, to find the perimeter of ΔEFG, you simply add the side lengths: $3 + 4 + 5 = 12$.

16. A This expression gives a total of 49,152 cells, which would be the population after 35 days. The population quadruples 7 times (seven five-day periods) from its original 3 cells to the 35-day 49,152 count.

17. A To solve algebraically,

$(2n + 5)(n - 5) = (2n - 7)(n - 3)$ expands

to $2n^2 - 5n - 25 = 2n^2 - 13n + 21$, which

simplifies to:

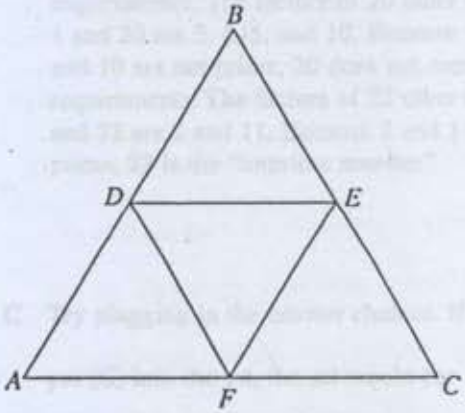
$-5n - 25 = -13n + 21$, or: $8n = 46$. Therefore,

$n = \frac{46}{8} = \frac{23}{4}$. Another option would be to plug

in the answers for n to see which one lets the

equations be equal.

18. C Make sure you draw the picture when it is described.



We have four smaller equilateral triangles that

have equal areas. Parallelogram $DECF$ is made

up of two of these triangles, so its area is half

of the area of ΔABC. Half of $1\frac{3}{5}$ is $\frac{4}{5}$.

19. C The best way to approach this is to consider how the cars must be arranged. There must be a space between each of the cars, so X_X_X_, or _X_X_X must be how the cars are arranged (where X is a car). With 3 cars available, any of the 3 could be the first car parked, any of 2 could be the second car parked, and the last car automatically goes in the last spot. So, $3 \times 2 \times 1 = 6$ gives the combinations of cars. However, remember to double this, because there were 2 different ways to arrange the cars in the lot. Another approach is to systematically write out all of the combinations (using A, B, and C as different cars): A_B_C_, _A_B_C, A_C_B_, _A_C_B, B_A_C_, _B_A_C, B_C_A_, _B_C_A, C_A_B_, _C_A_B, C_B_A_, _C_B_A.

20. A Test out different numbers and see what

happens. If the radius of circle with center M is

12, its area is 144π, and $\frac{1}{3}$ of this is 48π. If the

radius of circle with center N is 6, its area is

36π, and $\frac{1}{4}$ of this is 9π. Therefore, the ratio is

$48\pi:9\pi$, which is 16:3.

1. A Thirty minutes is half an hour. Andy picked $\frac{16\text{ apples}}{1\text{ hour}} = \frac{x\text{ apples}}{\frac{1}{2}\text{ hour}}$. Cross multiply to find that Andy picked 8 apples. Bob picked $\frac{10\text{ apples}}{1\text{ hour}} = \frac{x\text{ apples}}{\frac{1}{2}\text{ hour}}$. Cross multiply to find that Bob picked 5 apples. So, $8 - 5 = 3$ more apples.

2. C Test the answer choices. The factors of 18 other than 1 and 18 are 2, 3, 6, and 9. Because 6 and 9 are not prime, 18 does not meet the requirements. The factors of 20 other than 1 and 20 are 2, 4, 5, and 10. Because 4, 5, and 10 are not prime, 20 does not meet the requirements. The factors of 22 other than 1 and 22 are 2 and 11. Because 2 and 11 ARE prime, 22 is the "unprime number."

3. C Try plugging in the answer choices. If you put (C) into the set, the set would be: 1, 2, 3, 6, 8, 10, 12. The median is 6. The average is $\frac{1+2+3+6+8+10+12}{7} = 6$.

4. D The area of the circle is $121\pi = \pi r^2$. Divide by π to find $121 = r^2$. Take the square root of both sides to find $r = 11$. The diameter is 22. The length of the side of the square is equal to the diameter. So, the square's sides are each 22. Triangle BCE is a 45:45:90 triangle. So, the length of side $\overline{CE} = 22\sqrt{2}$.

5. A If a number is even, it's a multiple of 2. To be a multiple of 2 and 5, a number must be a multiple of 10. This means every 10th number meets the requirements. So, there are $\frac{1}{10} \times 1000 = 100$ numbers that meet the requirements. Probability is the number of possibilities that meet the requirement divided by the total number of possibilities. So, $\frac{100}{1000}$.

6. A The tower, the ground, and the slide make a giant right triangle. If you didn't recognize it as a 3:4:5 triangle times 100, you could use the Pythagorean theorem: $a^2 + (400)^2 = (500)^2$. So, $a = 300$ feet. The rate of the elevator is 10 feet/second. Distance = Rate × Time. So, $300 = 10 \times t$. Divide by 10 to find the time is 30 seconds.

7. C The best approach to this problem is to plug in a value for s and work from there. For instance, try $s = 10$. Increase 10 by 100% of 10, to find $10 + 10 = 20$. So, $r = 20$. If 10 is 20 percent of t, then $10 = \frac{20}{100} \times t$. So, $t = 50$. Next set up a proportion: $\frac{t}{u} : \frac{5}{4} = \frac{50}{u}$. Cross multiply to find $5u = 200$. Divide by 5 to find $u = 40$. The ratio of r to u is $\frac{20}{40} = \frac{1}{2}$.

8. C A tangent line is perpendicular to a circle's radius at the point of contact. So the angle at point R is right. Using the rule of 180, you can calculate that this is a 30:60:90 triangle. Use the ratio of sides $(s, s\sqrt{3}, 2s)$ to get that the side opposite the 60° angle (the radius) is $4\sqrt{3}$. (A) and (E) are trap answers. (B) has the wrong ratio of sides (45:45:90). (D) is the other side of the triangle.

9. D The pairs of factors of 10 are 1 and 10 or 2 and 5. In −10, one of the factors must be negative. To get a large number for $a - b$, make a positive and b negative. Try out the possibilities: $10 - (-1) = 11$, $5 - (-2) = 7$, $2 - (-5) = 7$, $1 - (-10) = 11$. So, 11 is the greatest possible value.

10. B If y is the first term, and x is the ratio to the next term, then the second term must be $y \bullet x$. To get the third term, multiply by x again, to get $y \bullet x \bullet x$ or, x^2y. Another option is to plug in sample values. For instance, try $x = 6$, and $y = 2$. So, to find the second term, set up a proportion: $\frac{6\,\text{term}}{1\,\text{preceding}} = \frac{s}{2}$. Cross-multiply to find $s = 12$ for the second term. Set up another proportion to find the third term: $\frac{6\,\text{term}}{1\,\text{preceding}} = \frac{t}{12}$. Cross-multiply to find $t = 72$ as the third term. Plug $x = 6$ and $y = 2$ into the answers to find 72. Only (B) works.

11. 350 Since the probability of drawing a pitcher is $\frac{5}{6}$, that means pitcher's cards are $\frac{5}{6}$ of the total. Set up a proportion: $\frac{5}{6} = \frac{x}{420}$. Cross-multiply to solve for x, and you get $x = 350$.

12. $\frac{7}{4}$ or 1.75 Subtract p from each side to get $4p + 5 = 12$. Subtract 5 from each side to get $4p = 7$. Divide each side by 4 to get $p = \frac{7}{4}$.

13. 102 Since the question asks for a combination of the two variables, you don't need to solve for each variable individually. Instead, manipulate the equations until you get $12m - 3n$ on one side. First, stack the two equations and add them together. This gives you $4m - n = 34$. Next, multiply both sides by 3 to get $12m - 3n = 102$.

14. 18 Opposite sides in a parallelogram are equal, so $BD = 24$. Triangles BCE and CDE share the same height; draw a vertical line from E to the top. Plug in a number for the height, such as 10. You can calculate the area of triangle BED, which is 120. Since BCE has three times the area of CDE, the areas must be 90 and 30 respectively. (They must sum to 120.) Now you can use the height of 10 and the area of 90 to find the length for BC. If $90 = \frac{1}{2}(BC)(10)$, then $BC = 18$.

15. **81** The product of the first 5 terms is $(-1)\times 2\times 3\times 1\times \frac{1}{2}=-3$. The product of the first 20 terms is the same as multiplying 4 sets of the given numbers, which is $(-3)(-3)(-3)(-3)=81$.

16. **36** Draw a line from B to D to divide the figure into a rectangle and a right triangle. Opposite sides of a rectangle are equal, so AB is 12 and BD is 5. That makes BCD a 3:4:5 right triangle, so CD is 4. The perimeter is $12+3+4+12+5=36$.

17. **1000** Each of the digits has 10 possible values (0 to 9). To find all of the possible arrangements, multiply the numbers of possibilities for each of the three digits: $10\times 10\times 10=1000$.

18. **6** You can draw a horizontal line from H to the y-axis to create a right triangle with G. Using the coordinates, you can tell that the vertical leg has a length of 6 and horizontal leg is 2. Draw another right triangle with a horizontal line to the right of H and a vertical line up from I. Because $GH = HI$, these triangles are congruent. So the horizontal leg is 6 (which matches the coordinate), and the vertical leg must be 2. That means the y-coordinate of I (which is n) must be $8-2=6$.

19. **9** For inverse variation questions, use the formula $a_1b_1=a_2b_2$ Here, $(s)(80)=(6)(120)$. Solving gives you $s=9$.

20. **350** Set $z(c)=0$, and solve $0=50-\frac{c}{7}$ for the value of c. $-50=-\frac{c}{7}$, so $c=350$.

SECTION 6

1. E You can solve the equation algebraically:

$$5x + 2x + 6 = 3x + x + 12$$
$$7x + 6 = 4x + 12$$
$$3x = 6$$
$$x = 2$$

2. A If the lines were parallel, then a would have to equal b, and if they are not parallel, then a cannot equal b.

3. D Plug 6 in for h in the equation:

$$7g(3h + 9)$$
$$7g[3(6) + 9]$$
$$7g(18 + 9)$$
$$7g(27)$$
$$189g$$

4. C First, deal with the older children. The oldest child has a choice of 2 seats and the second oldest child must sit in the other seat. There are $(2)(1) = 2$ different arrangements for the older children. On the other side of the aisle, the first person to sit down has a choice of 3 seats, the second to sit down has a choice of 2 seats, and the last person to sit must use the remaining seat. There are $(3)(2)(1) = 6$ different seating arrangements for the parents and the youngest child. Finally, to get the total possible seating arrangements for the entire group, multiply the possibilities for the older children by the possibilities for the parents and younger child. There are $(2)(6) = 12$ possible seating arrangements for the entire group.

5. D Translate to an equation and solve:

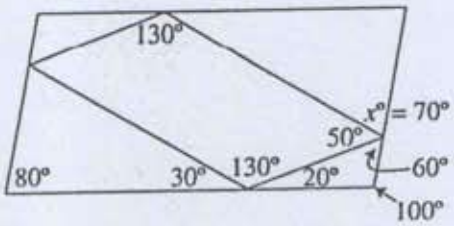
$$18 = \frac{x}{100} \times 45$$
$$1800 = 45x$$
$$40 = x$$

6. D The best way to approach this problem is to plug in numbers for x and y. For instance, try $x = 4.5$, and $y = 4.5$. (A) and (B) cannot be true. Now make $x = -4.5$. (C) and (E) cannot be true.

7. D Remember that the median is the middle number in a group of numbers. The numbers must be in consecutive order and if there is no middle number, take the average of the middle two numbers. Since our numbers must be odd and the median is even, there must be an even number of numbers. Try picking a number for n, for instance 4. Our 4 numbers must be: 3, 5, 7, 9. The median (average of 5 and 7) is 6. Now calculate the average for all 4 integers: $24 \div 4 = 6$. Plug in $n = 4$ to the answers and cross out all answers that do not equal 6. Only (D) is left.

8. C The only possibilities for JK and KJ are 89 and 98, because no other pair of numbers adds to more than 180. Since $89 + 98 = 187$, L is 7.

9. C Remember that opposite angles in a parallelogram are equal, and neighboring angles in a parallelogram add to 180°. Also, 180° is the sum of the angles in a triangle and in a straight line. The final picture looks like this:



10. C For ΔABC, $area = \frac{1}{2}bh$, so $54 = \frac{1}{2}(9)h$ and $12 = h$. The two triangles are similar because their angles are the same, so the side lengths (and heights) are proportional. Therefore, we can find the height of ΔDBE by setting up a proportion comparing the heights and bases of ΔDBE and ΔABC where the x is the height of ΔDBE: $\frac{6}{9} = \frac{x}{12}$ so $9x = 72$ and $x = 8$. Therefore, the area of ΔDBE is $area = \frac{1}{2}(6)8 = 24$.

11. A Since the remainder cannot be larger than the number that you are dividing by, and 7 is the largest single-digit prime number, only (A) makes any sense. Another solution is to try numbers. For instance, when 13 is divided by 7, the remainder is 6.

12. A A good approach to this problem is to plug in numbers. For instance, try $r = 7$, $s = 8$, $t = 9$, and $u = 10$. The median is the number in the middle, or in this case, it is the average of the middle two numbers, which is 8.5. (A) gives 8.5, (B) gives 8, (C) gives 9, (D) gives 8, and (E) gives 9.

13. A Remember that the largest side of a triangle is opposite the largest angle, and the smallest side of a triangle is opposite the smallest angle. If $\angle EDF$ is larger, then the side opposite it (EF) must be longer.

14. C The sum of the odd integers is $81 + 83 + 85 + 87 + 89 = 425$, and the sum of the integers is $80 + 81 + 82 + 83 + 84 + 85 + 86 + 87 + 88 + 89 + 90 = 935$. We are asked for the fraction $\frac{425}{935} = \frac{5}{11}$.

15. E To determine the value of x, you need to determine which values in the final matrix depend upon x. The only value that depends upon x is the first term on the bottom row. Since matrix multiplication requires multiplying each row of the first matrix by each column of the second, the first term of the third row in the resulting matrix was found by multiplying the third row of the first matrix by the first column of the second matrix: $(x)(1) + (-1)(5) = -1$. Hence, $x = 4$.

Practice Test 8

SECTION 1
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

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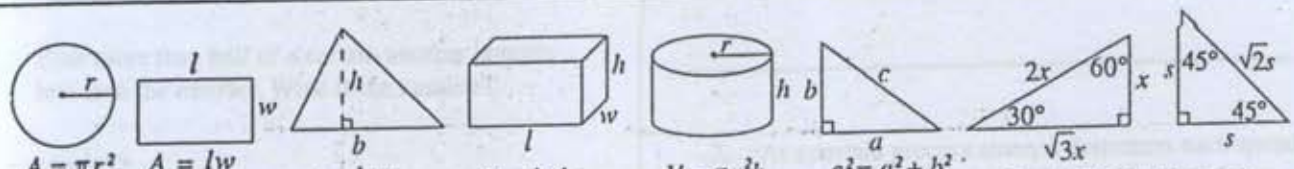

$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. Fred can read 3 pages of a book in 5 minutes. At this rate, how many pages will he read in an hour and a half?

(A) 6
(B) 18
(C) 36
(D) 54
(E) 90

2. If $6k + 18 = 15$, what is $2k + 6$?

(A) 9
(B) 6
(C) 5
(D) 3
(E) $-\frac{1}{2}$

GO ON TO THE NEXT PAGE

3. If each of 11 packages is to be decorated using exactly 2.5 feet of ribbon, which of the following is the smallest number of yards of ribbon that would be sufficient to decorate the packages with the least length of extra ribbon if one must buy the ribbon in yards? (1 yard = 3 feet)

(A) 83
(B) 28
(C) 27
(D) 10
(E) 9

4. Four more than half of a certain number is seven less than the number. What is the number?

(A) 22
(B) $14\frac{2}{3}$
(C) 11
(D) 6
(E) $5\frac{1}{2}$

5. A triangle has 2 sides of lengths 5 and 3 respectively. What could be the length of the 3rd side?

(A) 15
(B) 12
(C) 10
(D) 8
(E) 6

6. At a certain time of day, a 25-foot-tall tree casts a 7-foot-long shadow. What is the length of the shadow of a 90-foot-tall radio antenna at the same time?

(A) $3\frac{4}{7}$
(B) 14
(C) $15\frac{1}{2}$
(D) 18
(E) $25\frac{1}{5}$

7. At a certain grocery store, a customers each spend an average of \$30 every b hours. How much revenue, in dollars, does the store collect in c hours?

(A) $\frac{30c}{ab}$
(B) $\frac{bc}{30a}$
(C) $\frac{30bc}{a}$
(D) $\frac{30ac}{b}$
(E) $\frac{30b}{ac}$

GO ON TO THE NEXT PAGE

8. The vertex of a rectangle whose side lengths are 6 and 8 lies at the point (−4, 6) in the rectangular coordinate plane. Which of the following points could also be a vertex of this rectangle?

(A) (2, −2)
(B) (2, 8)
(C) (−4, −10)
(D) (−4, −4)
(E) (−10, 2)

9. A circular dartboard is divided into nine wedges of equal area that are numbered from one to nine. To generate three-digit numbers, three darts are thrown at the dartboard. The number that the first dart hits becomes the hundreds digit of the three-digit number; the number that the second dart hits becomes the tens digit of the three-digit number; and the number that the third dart hits becomes the units digit of the three-digit number. How many three-digit numbers with three distinct digits can be generated by this method?

(A) 504
(B) 576
(C) 729
(D) 810
(E) 999

10. If $f(x) = 5x^3 - 2x + 8$, and $g(x) = 6x - 4$, what is $g(f(x))$?

(A) $11x^2 + 4x + 4$
(B) $11x^2 - 12x + 44$
(C) $18x^3 - 8x + 32$
(D) $30x^3 + 4x + 4$
(E) $30x^3 - 12x + 44$

11. If d divided by 7 has a remainder of 1, which of the following divided by 7 has a remainder of 6?

(A) $d - 6$
(B) $d - 5$
(C) $d - 4$
(D) $d - 3$
(E) $d - 2$

12. Which of the following is true for all negative values of x?

I. $3x + 2 < 0$
II. $x^3 - 25 > 0$
III. $x^2 + 1 > 0$

(A) None
(B) III only
(C) I and III only
(D) II and III only
(E) I, II and III

13. Where defined, what is the value of 5 divided by $\frac{20}{3g}$?

(A) $\frac{100g}{3}$
(B) $\frac{4g}{3}$
(C) $\frac{4}{3g}$
(D) $\frac{3g}{4}$
(E) $\frac{g}{12}$

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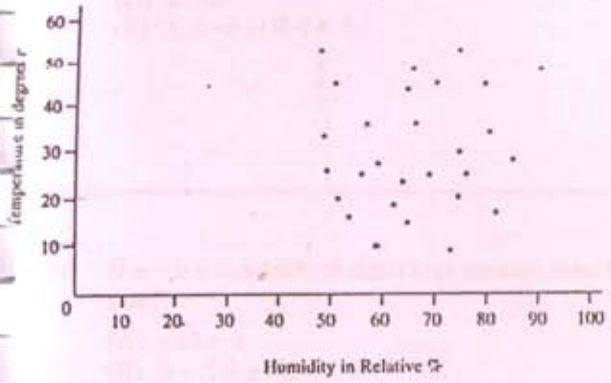
4. For her atmospheric physics project, Kaita tracked the relative humidity and temperature outside her house during a week in January. Temperature and humidity readings were taken every four hours and later graphed as below.



What percentage of all readings below 30°F was also above 60% in relative humidity?

(A) 50.0%
(B) 57.5%
(C) 60.0%
(D) 62.5%
(E) 67.5%

15. When the four numbers b, b^2, b^3, and b^4 are arranged in order from smallest to largest, the result is b, b^3, b^4, and b^2. Which of the following is a possible value for b?

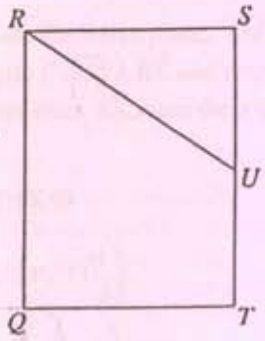
(A) $\frac{7}{2}$

(B) $\frac{11}{6}$

(C) $\frac{7}{10}$

(D) $-\frac{2}{5}$

(E) $-\frac{7}{4}$



16. In rectangle $QRST$ shown above, if m$\angle SUR$ is $\frac{4}{5}$ of m$\angle SRU$, what is the sum of the measures of $\angle RUT$ and $\angle RQT$?

(A) 230°
(B) 245°
(C) 260°
(D) 275°
(E) 290°

GO ON TO THE NEXT PAGE

17. What is the domain of $f(x)=\frac{15}{x-3}$?

(A) All integer values of x
(B) $x<0$ or $x>0$
(C) $x\le -3$ or $x\ge 3$
(D) $x\ne 3$
(E) $x<-3$ or $0<x<3$

18. If $a-b<0$, which of these expressions must be true?

(A) $-ab>a$
(B) $b+5>a-5$
(C) $b^4>a^4$
(D) $b^3>a^2$
(E) $2a>b$

19. On the Cartesian plane, $\overline{LM}$ passes through the origin. If $\overline{LM}\perp\overline{RS}$ and they intersect at (5, 3), where does $\overline{RS}$ cross the x-axis?

(A) (0, 6)
(B) $\left(0,\ 11\frac{1}{3}\right)$
(C) $\left(6\frac{4}{5},\ 0\right)$
(D) (10, 0)
(E) (15, 0)

20. The cost of a certain new car is g dollars. The car is on sale for h% off this price. What is the total cost of the car on sale after the addition of 7% sales tax?

(A) $1.07g-0.93\left(\frac{gh}{100}\right)$
(B) $1.07g-1.07\left(\frac{gh}{100}\right)$
(C) $g+0.93\left(\frac{gh}{100}\right)$
(D) $g+1.07\left(\frac{gh}{100}\right)$
(E) $0.93g-1.07\left(\frac{gh}{100}\right)$

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.

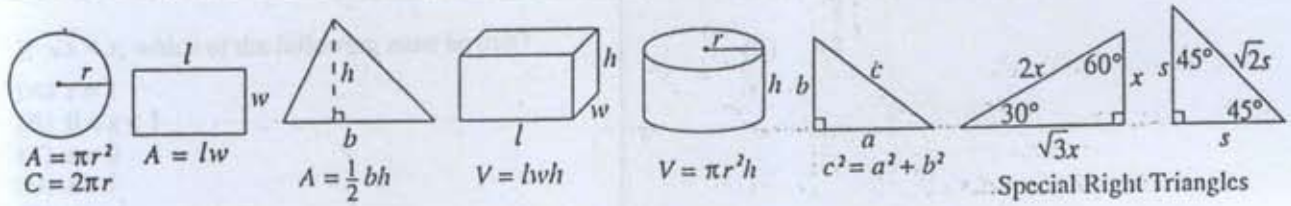
SECTION 3
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information

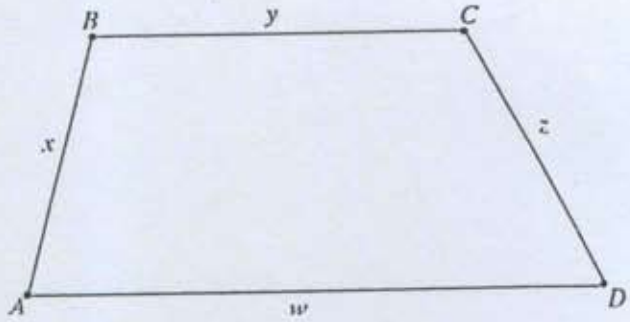


$A = \pi r^2$, $C = 2\pi r$ $\quad A = lw$ $\quad A = \frac{1}{2}bh$ $\quad V = lwh$ $\quad V = \pi r^2 h$ $\quad c^2 = a^2 + b^2$ $\quad$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. What is the value of $(\sqrt{x} + \sqrt{y})(x + y)$ when $x = 16$ and $y = 47$

(A) 400
(B) 120
(C) 26
(D) 20
(E) 6



2. If the perimeter of $ABCD$ is 36, $w = 2x$, $x + 4 = y$, and $z = x + 2$, what is the value of x?

(A) 12
(B) 10
(C) 9
(D) 8
(E) 6

GO ON TO THE NEXT PAGE

3. If the number of male students and female students in each of 3 classes is equal, and the average number of males in each class is 30, what is the total number of students in all 3 classes?

(A) 10
(B) 30
(C) 60
(D) 90
(E) 180

4. If $\sqrt{s} < s$, which of the following must be true?

(A) $s = 1$
(B) $0 < s < 1$
(C) $s = 0$
(D) $s > 1$
(E) $s > s^2$

5. David is d years old. In $\frac{d}{5}$ years, Marco will be twice as old as David is now. What is Marco's age now in terms of d?

(A) $\frac{11d}{5}$
(B) $\frac{9d}{5}$
(C) $\frac{4d}{5}$
(D) $\frac{7d}{10}$
(E) $\frac{3d}{10}$

6. $\overline{AB}$ and $\overline{CD}$ lie in the xy-coordinate plane. $\overline{AB}$ has a slope of $\frac{1}{2}$ and a y-intercept of -3. $\overline{CD}$ intercepts the origin and is perpendicular to $\overline{AB}$. What is the slope of $\overline{CD}$?

(A) 2
(B) $\frac{1}{2}$
(C) 0
(D) $-\frac{1}{2}$
(E) -2

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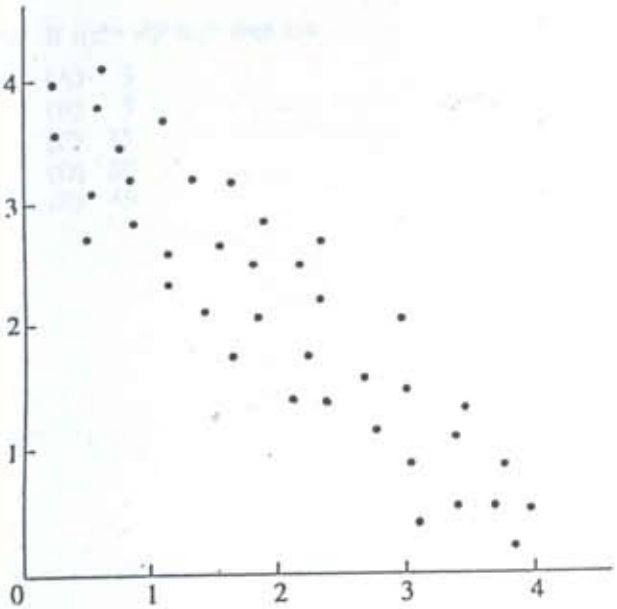


7. Which of the following most closely approximates the slope of the line that would best fit the scatterplot above?

(A) -4

(B) -1

(C) 0

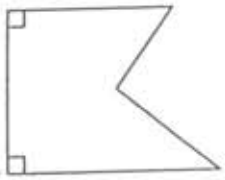
(D) $\frac{1}{2}$

(E) 1

8. A "rightum shape" is a shape that has at least two right angles and the sum of the remaining angles is 180°. Which of the following shapes must be a rightum shape?

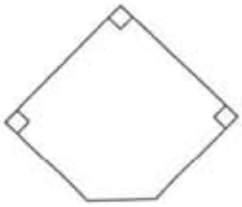
(A)

(B)

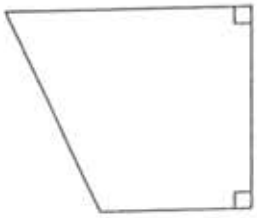


(C)

(D)



(E)



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9. If $z(z^4 \cdot z^3)^2 = z^{3x}$ then $x =$

(A) 3
(B) 5
(C) 15
(D) 30
(E) 45

10. If $x = yz$, $\frac{1}{2}y = w$, and $z = 4w$, then, in terms of x, what does w equal?

(A) $\sqrt{\frac{x}{8}}$

(B) $\sqrt{\frac{x}{4}}$

(C) $4x$

(D) $\sqrt{4x}$

(E) $\sqrt{8x}$

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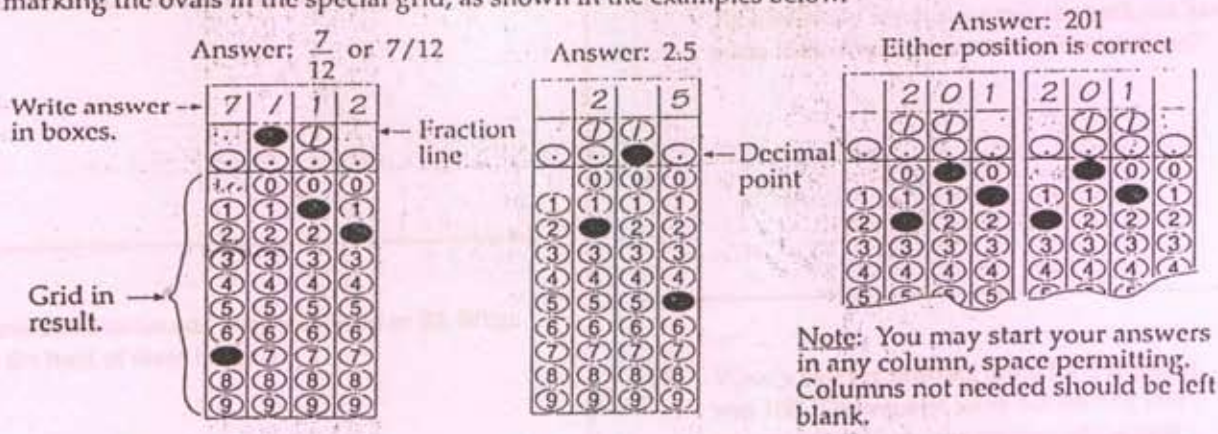
Directions for Student-Produced Response Questions

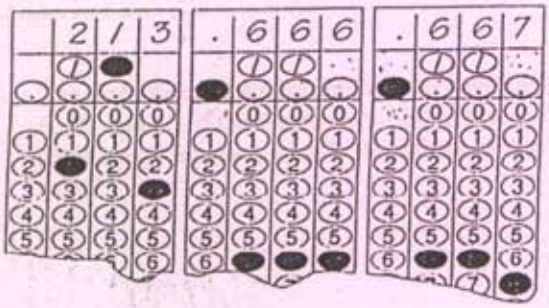
Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.



Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the ovals are filled in correctly.
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If 2 1 / 2 is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)
- Decimal Accuracy: If you obtain a decimal answer, enter the most accurate value the grid will accommodate. For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. Less accurate values such as .66 or .67 are not acceptable.

Acceptable ways to grid $\frac{2}{3} = .6666\ldots$



11. If $m^3 = \frac{m^{15}}{m^n}$ and n is a positive integer, what is the value of n?

12. If the ratio of blue balls to red balls is 2.5 to 4, and there are 25 blue balls, how many red balls are there?

GO ON TO THE NEXT PAGE

13. A certain number y has a remainder of 3 when divided by 5. That same number has a remainder of 2 when divided by 4. If y is an integer between 10 and 40, what is one possible value of y?

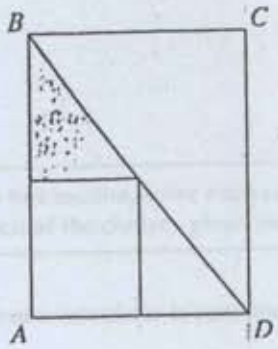
14. Four consecutive odd integers add up to 80. What is the least of these integers?

15. A model plane is built to scale such that each $2\frac{1}{4}$ centimeters of the model represent 3 meters of the actual plane. If the length of the model plane's wing is 12 cm, what is the length in meters of actual plane's wing?

16. An old-fashioned bicycle has two different size tires, with the front tire larger than the rear. If the front tire of one such bicycle has a circumference of 63 inches, and the back tire a circumference of 27, how many revolutions will the back tire have made if the front tire has made 3 revolutions?

17. Vince's average bowling score for five games was 106. The average score for the first two games was 102, and the average of the next two games was 108. What was the score of his fifth game?

18. The three faces of a rectangular solid have areas 6, 10, and 15. If the dimensions of the rectangular solid are all integers, what is the volume of the solid?



19. If, in the figure above, the shaded region has an area of 3, what is the area of rectangle $ABCD$?

20. If $f(x)=\frac{5x+2}{3}-\frac{2x-4}{3}$, what is the value of $f(x)-x$?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 7
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

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2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

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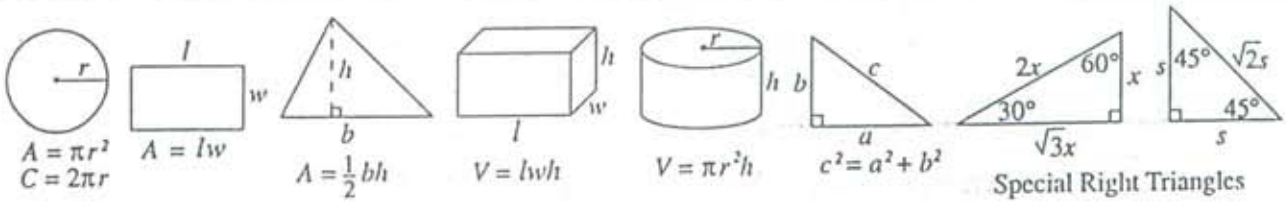

$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. Which of the following equations represents the statement: the square of the product of x and y is equal to the square root of the difference of x and y?

(A) $\sqrt{xy} = (x-y)^2$
(B) $(x-y)^2 = \sqrt{xy}$
(C) $(xy)^2 = \sqrt{x-y}$
(D) $(xy)^2 = \sqrt{x} - \sqrt{y}$
(E) $\sqrt{x} \times \sqrt{y} = (xy)^2$

2. Karen is ordering a hamburger. The restaurant offers 2 different kinds of bread, 3 different condiments, and 2 different kinds of cheese. If Karen selects one type of bread, one condiment, and one type of cheese, how many ways can she order her burger?

(A) 6
(B) 7
(C) 9
(D) 12
(E) 24

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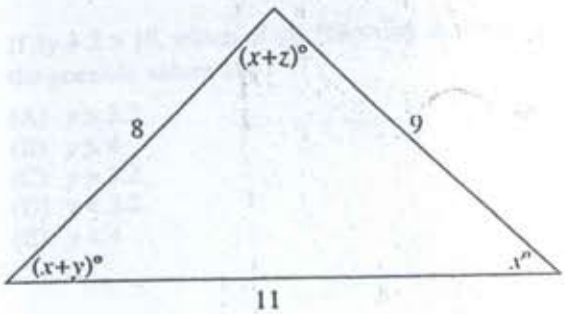
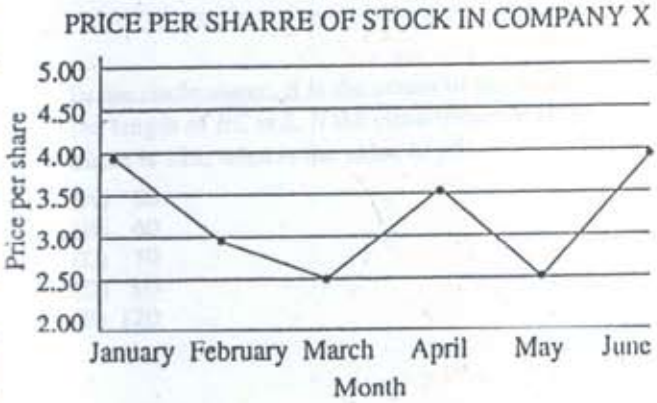
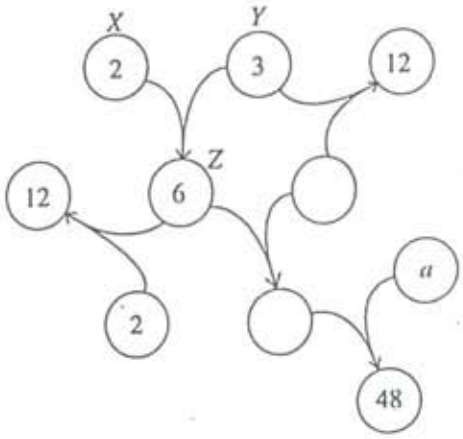


3. In the triangle above, which of the following must be true?
   (A) $3x = 180$
   (B) $z + y = 180$
   (C) $z = y$
   (D) $2x + z = x + y$
   (E) $z > y$



4. The graph above shows the price per share of stock in Company X. What was the greatest change in the price between two consecutive months?
   (A) 0.50
   (B) 1.00
   (C) 1.25
   (D) 1.50
   (E) 2.00

5. If a and b are distinct single-digit prime integers and the remainder when b is divided by a is also prime, which of the following are possible values for a and b?
   (A) $a = 1, b = 2$
   (B) $a = 3, b = 2$
   (C) $a = 5, b = 5$
   (D) $a = 3, b = 6$
   (E) $a = 2, b = 2$

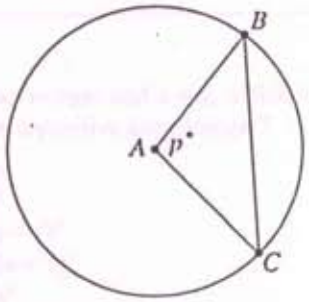


6. In the "multiplication map" above, the product of the numbers at the two tails of an arrow is placed in the circle to which the arrow points. For example, the circles labeled X and Y are at the tails of an arrow. Their product is placed in circle Z. What is the value of a?
   (A) 2
   (B) 4
   (C) 6
   (D) 12
   (E) 24

GO ON TO THE NEXT PAGE

7. If $5y + 2 > 18$, which of the following shows all of the possible values of y?

(A) $y > 3.2$
(B) $y > 4$
(C) $y = 3.2$
(D) $y < 3.2$
(E) $y < 4$



Note: Figure not drawn to scale.

8. In the circle above, A is the center of the circle and the length of $\overline{BC}$ is 6. If the circumference of the circle is 12π, what is the value of p?

(A) 50
(B) 60
(C) 70
(D) 80
(E) 120

9. A rectangular box has a length of 6, a width of 8, a height of 10, and a volume of v. Which of the following represents the volume of a rectangular box that has a length of 6, a width of 4, a height of 10, in terms of v?

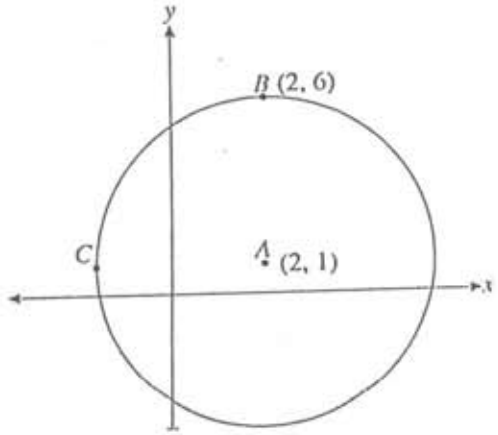
(A) $\frac{v}{4}$

(B) $\frac{v}{2}$

(C) v

(D) $2v$

(E) $4v$



10. In the figure above, A is the center of the circle. B is the point on the circle that has the greatest y-coordinate. C is the point on the circle that has the least x-coordinate. What are the coordinates of C?

(A) (1, –4)
(B) (–5, 1)
(C) (–4, 1)
(D) (–3, 1)
(E) (–2, 1)

GO ON TO THE NEXT PAGE

11. If a set of $2x$ consecutive numbers has y even numbers and the first number in the set is 1, which of the following must be the largest odd number in the set?

(A) $y-1$
(B) y
(C) $2y-1$
(D) $2y$
(E) $y+1$

12. If n is an integer and $n \neq 0$, which of the following must be a positive even integer?

(A) $2n$
(B) n^2
(C) $(n-1)^2$
(D) $2(n-1)$
(E) $2n^2$

13. $\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}\begin{bmatrix} 0 & -1 \\ 2 & 0 \end{bmatrix} =$

(A) $\begin{bmatrix} 6 & -2 \\ 8 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & -3 \\ -2 & 0 \end{bmatrix}$

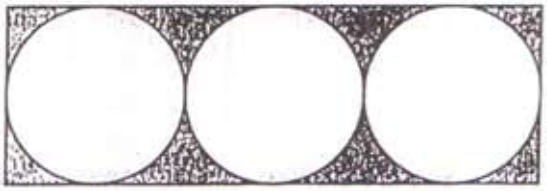
(C) $\begin{bmatrix} 2 & 2 \\ 1 & 4 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & -4 \\ 4 & 6 \end{bmatrix}$

(E) $\begin{bmatrix} 8 & 1 \\ 6 & -2 \end{bmatrix}$

14. If $1 \leq f \leq 10$ and $-3 \leq g \leq 5$, which of the following shows all of the possible values of $(f-g)$?

(A) $4 \leq (f-g) \leq 13$
(B) $4 \leq (f-g) \leq 5$
(C) $2 \leq (f-g) \leq 15$
(D) $-4 \leq (f-g) \leq 5$
(E) $-4 \leq (f-g) \leq 13$



15. The figure above shows the pattern used to lay rectangular tiles of equal size in a certain floor. Each tile has three inscribed tangent circles. If the radius of each circle is r and the area of the floor is $480r^2$, what is the area of the floor that is shaded?

(A) $12r^2 - 3\pi r^2$

(B) $40(12r^2 - 3\pi r^2)$

(C) $\dfrac{12-3\pi}{r^2}$

(D) $160(2r^2 - 3\pi r^2)$

(E) $480r^2 + 3\pi r^2$

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 8: ANSWER KEY

1 Math	3 Math	7 Math
1. D	1. B	1. C
2. C	2. E	2. D
3. D	3. E	3. E
4. A	4. D	4. D
5. E	5. B	5. B
6. E	6. E	6. A
7. D	7. B	7. A
8. A	8. E	8. B
9. A	9. B	9. B
10. E	10. A	10. D
11. E	11. 12	11. C
12. B	12. 40	12. E
13. D	13. 18, 38	13. A
14. D	14. 17	14. E
15. D	15. 16	15. B
16. A	16. 7	
17. D	17. 110	
18. B	18. 30	
19. C	19. 12	
20. B	20. 2	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	700	21	490
70		45	700	20	480
69		44	690	19	470
68		43	680	18	470
67		42	670	17	460
66		41	660	16	450
65		40	650	15	440
64		39	640	14	430
63		38	640	13	420
62		37	630	12	410
61		36	620	11	410
60		35	610	10	400
59		34	600	9	390
58		33	590	8	380
57		32	580	7	370
56		31	580	6	360
55	800	30	570	5	350
54	780	29	560	4	350
53	770	28	550	3	340
52	760	27	540	2	310
51	750	26	530	1	290
50	740	25	530	0	270
49	730	24	520	-1	250
48	720	23	510	-2	230
47	710	22	500	-3	200

Practice Test 8: Answers and Explanations

1. D The best way to solve it is to set up this proportion after converting an hour and a half to 90 minutes:
$\frac{3}{5} = \frac{x}{90}$, $270 = 5x$, so $54 = x$.

2. C Notice that $2k + 6$ is $\frac{1}{3}$ of $6k + 18$, so its value is 5, which is $\frac{1}{3}$ of 15.

3. D The total length of ribbon needed is $2.5 \times 11 = 27.5$ feet. To convert this into yards, divide by 3, which is $9\frac{1}{6}$. Therefore, 10 yards of ribbon are needed.

4. A "Four more than half of a certain number is seven less than the number" algebraically looks like: $\frac{1}{2}x + 4 = x - 7$. Solve for x to get $x = 22$.

5. E This question tests our knowledge of the "third side rule" which states that the third side of a triangle is less than the sum of the other two sides and greater than the difference of the other two sides. So the third side of this triangle must be less than $5 + 3 = 8$ and greater than $5 - 3 = 2$. The only value greater than 2 and less than 8 is 6.

6. E This can be solved with a proportion:
$\frac{25}{7} = \frac{90}{x}$. Cross multiply to solve for x, so that $25x = 630$, or $x = 25\frac{1}{5}$.

7. D One easy approach to this problem is to plug in values for the variables. For instance, try $a = 8$, $b = 2$, and $c = 3$. Eight customers each spend \$30 every 2 hours, which is \$240 in two hours, or \$120 per hour. Therefore, in 3 hours, the store will make \$360. Use the same variables in the answers to see which agrees with \$360. (A) is $5\frac{5}{8}$, (B) is $\frac{1}{40}$, (C) is $22\frac{1}{2}$, (D) is 360, and (E) is $2\frac{1}{2}$.

8. A If you sketch out a coordinate plane and plot the point you are given, you can quickly plot the points in the answer choices and pick the one that fits the description in the problem. (A) is the only on that works. The other points would be at (–4, –2) and (2, 6).

9. A Consider that there are a total of nine digits that can go in the first position, eight digits that can go in the second position (since the digit in the first position is not allowed to go in the second position), and seven digits that can go in the third position (since the digits in the first and second positions are not allowed to go in the third position). The answer is $9 \times 8 \times 7 = 504$.

10. E $g(f(x))$ becomes $6(5x^3 - 2x + 8) - 4$, or $30x^3 - 12x + 44$ when you plug $f(x)$ into $g(x)$.

11. E One approach is to plug in a number. For instance, try $d = 22$. Then (A) is 16, which has a remainder of 2 when divided by 7. (B) is 17, which has a remainder of 3 when divided by 7. (C) is 18, which has a remainder of 4 when divided by 7. (D) is 19, which has a remainder of 5 when divided by 7, and (E) is 20, which has a remainder of 6 when divided by 7.

12. B Statement I is not *always* true. For example, if $x = -\frac{1}{2}$, the left side of Statement I is $\frac{1}{2}$, which is not less than 0. Statement II is *never* true. Remember that when you cube a negative number, the result is always negative, and subtracting 25 makes it even more negative. Therefore $x^3 - 25$ can never be greater than 0. Statement III is *always* true. Any number squared is always positive, and adding 1 makes it even more positive, so $x^2 + 1$ will always be larger than 0.

13. D One good approach to this problem is to plug in a value for g. For instance, try $g = 4$; $5 + \frac{20}{12} = 3$. (A) is $\frac{400}{3}$, (B) is $\frac{80}{15} = \frac{16}{3}$, (C) is $\frac{1}{3}$, (D) is 3, and (E) is $\frac{1}{3}$.

14. D Careful counting of the points reveals that 16 of them are below 30°F; of those, 10 are above 60% relative humidity. Therefore, 10 out of 16, or $\frac{10}{16} \times 100 = 62.5\%$ are both.

15. D A negative number raised to an even power is positive, while a negative number raised to an odd power is negative; and fractions between 0 and 1 get smaller with larger exponents. A negative number is needed, since b and b^3 are the smallest, so eliminate (A), (B), and (C). Our number also needs to be between −1 and 0, because b^2 is greater than b^4. Another solution would be to try out the answers until one fit the pattern.

16. A Since $QRTU$ is a rectangle, its angles are 90° each. Therefore, m$\angle RQS$ and m$\angle RSQ$ must add up to 90°, which means that m$\angle RQS$ = 50° and m$\angle RSQ$ = 40°. Therefore, m$\angle QST$ = 140°, and the sum of m$\angle QST$ and m$\angle QUT$ is 140° + 90° = 230°.

17. D Use numbers from the range given in each answer to find a value that makes $f(x)$ undefined. Eliminate (A), (B), and (C) because if $x = 3$, the denominator equals zero. If a number not included in the range of an answer choice could be used in place of x, eliminate that choice. If $x = 5$, $f(x)$ is defined. Since 5 is not included in the range shown in (E), eliminate it. The correct answer is (D); x can be any number except 3.

18. B Since $a - b < 0$, then $b > a$. Adding 5 makes b even larger, and subtracting 5 makes a even smaller. Alternatively, you could plug in several values to show that the other answers are not always correct. For example, (A) is incorrect if $a = \frac{1}{2}$ and $b = \frac{3}{5}$. (C) is incorrect if $a = -\frac{3}{5}$ and $b = -\frac{1}{2}$. (D) is incorrect if $a = -2$ and $b = -\frac{1}{2}$. (E) is incorrect if $a = -4$ and $b = 10$.

19. C At the point where a line crosses the x-axis $y = 0$, so eliminate (A) and (B). Because $\overline{LM}$ contains points (0, 0) and (5, 3), its slope is $\frac{3}{5}$. Since $\overline{LM} \perp \overline{RS}$, the slope of $\overline{RS}$ is the negative reciprocal of the slope of $\overline{LM}$: $-\frac{5}{3}$. The point where $\overline{RS}$ crosses the x-axis is $(x, 0)$. Another point on $\overline{RS}$ is (5, 3). Use the slope formula, $\frac{y_2 - y_1}{x_2 - x_1}$, with values for from choices (C), (D), and (E) to see which gives a slope of $-\frac{5}{3}$. Only (C) gives the correct slope.

20. B A good way to approach this problem is to plug in values for the variables. For instance, try $g = 200$, and $h = 10$. The cost of the car on sale is \$180 (which is 10% off of 200). Now add 7% tax to \$180 by multiplying 180 by 1.07. The result is \$192.60. Now use those same values in the answers. (A) is 195.40, (B) is 192.60, (C) is 181.40, (D) is 178.60, and (E) is 164.60.

SECTION 3

1. **B** Plug the values into the expression: $(\sqrt{x}+\sqrt{y})(x+y)=(\sqrt{16}+\sqrt{4})(16+4)=$ $(4+2)(16+4)=(6)(20)=120$.

2. **E** $w+x+y+z=36$. The question tells you each variable in terms of x; so, replace them in this equation: $(2x)+x+(x+4)+(x+2)=36$. Combine like terms: $5x+6=36$. Subtract 6: $5x=30$. Divide by 5 to find $x=6$.

3. **E** The total number of males is $3\times 30=90$ males. The number of males is equal to the number of females. So, the total is $90+90=180$.

4. **D** A good way to approach this problem is to test out the answers. (A) If $s=1$, could it be true that $\sqrt{1}<1$? No, $1=1$. (B) If s is a fraction between 0 and 1, such as $\frac{1}{4}$, could it be true that $\sqrt{\frac{1}{4}}<\frac{1}{4}$? No, $\frac{1}{2}>\frac{1}{4}$. (C) If $s=0$, could it be true that $\sqrt{0}<0$? No, $\sqrt{0}=0$. (D) Could it be true that $s>1$, such as 4? Yes, $\sqrt{4}<4$ because $2<4$.

5. **B** A good approach to this problem is to plug in values for the variable. For instance, try $d=25$. $\frac{25}{5}=5$ years, so in 5 years Marco will be $2\times 25=50$. So, Marco is $50-5=45$ years old, now. Plug $d=25$ into the answers to find 45. In (B), $\frac{9\times 25}{5}=45$.

6. **E** When two lines are perpendicular, each line's slope is the negative reciprocal of the other's. The negative reciprocal of $\frac{1}{2}$ is -2.

7. **B** Draw a straight line through the middle of the dots to approximate. The line goes down toward the right, so you know the slope is negative; eliminate (C), (D), and (E). The approximate line is not very steep, so (B) is much better than (A).

8. **E** The sum of the angles in any quadrilateral is 360. Two of the angles are 90. So, 90 + 90 + (the sum of the other angles) = 360. That means the sum of the other angles must be 180. Only (E) meets the requirements of a *rightum* shape.

9. **B** You need to add exponents inside the parentheses, multiply them by 2, and then add 1; then set this equal to $3x$ and solve. (A) occurs if you do not treat the exponent of the first z, which is 1, correctly. You should add it to the result of the calculations from the parentheses, not multiply it.

10. **A** Plug in 2 for y. If the value of $y=2$, then the value of $w=1$, so the value of $z=4$ and the value of $x=8$. (B) and (C) are meant to be traps. (E) is a mistake in solving the final equation.

11. 5 With some manipulating of the equation, $m^3 = \frac{m^{15}}{m^n}$ turns into $m^n = \frac{m^{15}}{m^3}$. When you divide two numbers, you subtract their exponents, so the value of $n = 12$.

12. 40 Set up the ratios as equivalent fractions $\left(e.g., \frac{25}{4} = \frac{25}{x}\right)$ where x is the number of red balls. Cross multiply and solve for x.

13. 18 or 38 It is easiest to start by listing out the numbers between 10 and 40 that have a remainder of 3 when divided by 5. They are: 13, 18, 23, 28, 33, and 38. Then divide the numbers by 4 to see which give a remainder of 2. Only 18 and 38 do.

14. 17 If four numbers add up to 80, then their average must be 20 (80 ÷ 4 = 20). Since all the numbers must be consecutive odd integers, choose 4 odd consecutive numbers around 20. If you pick 19, 21, 23, and 25, the sum is too big (88), so try smaller numbers. If you pick 17, 19, 21, and 23, the sum is 80, therefore the answer is 17.

15. 16 Set up a proportion: $\frac{2\frac{1}{4}cm}{3m} = \frac{12cm}{x}$, where x is the actual length of the plane's wing. Cross multiply to find $2\frac{1}{4}x = 36$. Divide by $2\frac{1}{4}$ to find $x = 16$ meters.

16. 7 Both tires must travel the same distance (since they are on the same bike). The front tire (with a circumference of 63 inches) travels 3 revolutions, so travels a total of 189 inches (63 × 3 = 189). So the back tire travels the same distance, or 189 inches. Since (189 ÷ 27 = 7), the back tire travels 7 revolutions.

17. 110 Five scores with an average of 106 have a total of 530. For the first two games, with an average of 102, the total must be 204. The next two games (with an average of 108) have a total of 216. Since 530 − 204 − 216 = 110, the score for the fifth game is 110.

18. 30 The sides with an area of 6 have dimensions of 2 × 3. The sides with an area of 10 have dimensions of 2 × 5. The sides with an area of 15 have dimensions of 3 × 5. The dimensions of the rectangular solid are then 2 × 3 × 5, which gives a volume of 30.

19. 12 Realize that the two shaded triangles combined together make up $\frac{1}{4}$ of rectangle $ABCD$ ($\frac{1}{2}$ the base × $\frac{1}{2}$ the height = $\frac{1}{4}$ the area). Since 3 × 4 = 12, the area of rectangle $ABCD$ is 12.

20. 2 A good approach to this problem is to plug in a value for the variable. For instance, if $x = 3$, then $f(x) = \frac{17}{3} - \frac{2}{3} = \frac{15}{3} = 5$, and $f(x) - x = 5 - 3 = 2$.

SECTION 7

1. C Write out the equation. "The square of the product of x and y" becomes $(xy)^2$, and "the square root of the difference of x and y" becomes $\sqrt{x-y}$. Set those equal to each other to get (C).

2. D Since Karen is choosing only one thing from each group, she has 2 choices for the bread, 3 choices for the condiment, and 2 choices for the cheese. Choices are always multiplied together, so the answer is $(2)(3)(2) = 12$.

3. E The largest side of a triangle is opposite the largest angle, so $x + z$ is larger than $x + y$. Since x represents the same value in both cases, don't include it in your comparison: $z > y$.

4. D The greatest change in any two consecutive months is from May to June. The price changes from 4.5 to 3.0. This change of 1.5 is greater than any other month.

5. B Try eliminating the answers one by one. (A) and (D) can both be eliminated because they contain numbers that are not prime. (C) and (E) can be eliminated because a and b are supposed to be distinct. Only (B) is left. When 2 is divided by 3, the 3 goes in 0 full times and leaves a remainder of the 3 that you started with. Since 3 is prime, (B) works.

6. A Fill in the missing numbers by multiplying or dividing. First, fill in the circle to the right of 6 with "4" because $4 \times 3 = 12$. Next, use that 4 to lead to the next circle: $4 \times 6 = 24$. Finally, you know that $24 \times a = 48$, so $a = 2$.

7. A Solve for y by first subtracting 2 from both sides: $5y > 16$. Next, divide by 5: $y > 3.2$.

8. B All radii of a circle have equal lengths. So, the two sides of the triangle that make up angle p must be equal. The circumference is $2\pi r = 12\pi$. So, $r = 6$. Therefore, all three sides of the triangle have a length of 6. This means ΔABC is an equilateral triangle with all angles equal to 60.

9. B The volume of the first box is $6 \times 8 \times 10 = 480 = v$. The volume of the second box is 240. Since $v = 480$. $240 = \frac{v}{2}$.

10. D The distance from the center to the greatest y-coordinate is the radius of the circle. So, the radius is $6 - 1 = 5$. The distance from A to C must be the radius. So, $2 - 5 = -3$. The x-coordinate must be -3. The y-coordinate is the same as that of the center. Thus, point C must be $(-3, 1)$.

11. C A good approach to this problem is to plug in values for the variables. For instance if $x = 3$, there are 6 consecutive numbers in the set. The set starts at 1; so, the set is: 1, 2, 3, 4, 5, and 6. There are 3 even numbers in this set, so $y = 3$. The largest odd number in the set is 5, so the correct answer should be 5. Plug in $y = 3$ to the answers to find 5. Only (C) is 5.

12. E A good approach to this problem is to plug in a value for the variable and test the answers. (E) must be an even positive integer because raising anything to an even power makes it positive, and multiplying any integer by 2 makes it even. Thus, $2n^2$ must be even and positive.

13. A To perform matrix multiplication, multiply each row of the first matrix by each column of the second matrix. Be sure to add up the results.

$$\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}\begin{bmatrix} 0 & -1 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} (2)(0)+(3)(2) & (2)(-1)+(3)(0) \\ (-1)(0)+(4)(2) & (-1)(-1)+(4)(0) \end{bmatrix} = \begin{bmatrix} 6 & -2 \\ 8 & 1 \end{bmatrix}$$

14. E Try all four combinations of the extremes for f and g when producing $f - g$: $1 - (-3) = 4$; $1 - 5 = -4$; $10 - (-3) = 13$; and $10 - 5 = 5$. From this you know that the largest $f - g$ could be is 13. The smallest $f - g$ could be is -4. Thus, $-4 \leq f - g \leq 13$.

15. B The area of the entire floor is $480r^2$, however it is also important to find the area of each tile. The length of each tile is $6r$, and the width of each tile is $2r$, therefore the area of each tile is $12r^2$. To find how many tiles there are, divide total area by the area of each tile: $\frac{480r^2}{12r^2} = 40$. Now find the shaded area of each tile, and multiply by 40. The shaded area is equal to the area of each tile minus the area of the three circles. Therefore, the shaded area is: $12r^2 - 3\pi r^2$. $40(12r^2 - 3\pi r^2)$ is the area of the entire shaded region.

Practice Test 9

Practice Test 9

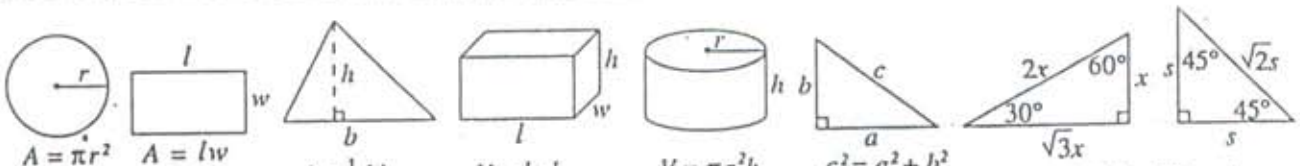
SECTION 2
Time — 25 minutes
25 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. Emma goes to the bakery and decides to purchase 3 muffins and 2 cupcakes. If the bakery charges \$5 per muffin and \$3 per cupcake, then how much more does she spend on muffins and cupcakes?
   (A) \$1
   (B) \$3
   (C) \$6
   (D) \$7
   (E) \$9

2. If $2x = 5$ and $3y = 9$, then $40 - (6x - 6y) =$
   (A) 7
   (B) 26
   (C) 37
   (D) 43
   (E) 73

GO ON TO THE NEXT PAGE

3. A rectangle with area 21 and one side of length 3 has one vertex at the point (0, 0) on the rectangular coordinate plane. Which of the following points could lie on the interior of this rectangle?

(A) (0, 4)
(B) (4, 4)
(C) (5, 2)
(D) (7, 4)
(E) (8, 2)

4. If a and b are integers and $70 < ab < 76$, then all of the following could be values of a EXCEPT

(A) 5
(B) 7
(C) 8
(D) 12
(E) 18

5. Which of the following represents the statement: "Seven less than one-third of n is equal to seven more than 3 times m?"

(A) $\frac{1}{3}n+7=3m-7$

(B) $3n+7=\frac{1}{3}m-7$

(C) $n=9m+28$

(D) $3n-7=\frac{1}{3}m+7$

(E) $\frac{1}{3}n=3m-14$

6. Set A consists of all prime numbers less than 12. Set B consists of all odd numbers less than 12 and greater than zero. Which of the following represents the intersection of sets A and B?

(A) {1, 3, 5}
(B) {1, 2, 9, 11}
(C) {1, 3, 5, 7, 11}
(D) {3, 5, 7}
(E) {3, 5, 7, 11}

7. A petri dish contains five bacteria at 8:00 AM, 15 bacteria at 9:00 AM, and 45 bacteria at 10:00 AM. How many bacteria will be present in the dish at noon?

(A) 135
(B) 225
(C) 315
(D) 405
(E) 525

GO ON TO THE NEXT PAGE

8. Gomez's stamp collection contains 4 stamps worth \$2 each, 3 stamps worth \$4 each, and 5 stamps worth \$6 each. If Gomez selects one stamp at random from his collection to put on display, what is the probability that the stamp on display will be worth less than \$6?

(A) $\frac{5}{12}$

(B) $\frac{1}{2}$

(C) $\frac{7}{12}$

(D) $\frac{3}{4}$

(E) $\frac{5}{6}$

9. The average age of a group of 12 people is 26. If 8 new people are added to the group, the average age of the group becomes 32. What is the average age of the 8 new people?

(A) 36
(B) 38
(C) 40
(D) 41
(E) 44

10. What is the midpoint of a line between point (0, 2) and point (2, 8)?

(A) (0, 5)
(B) (1, 4)
(C) (1, 5)
(D) (4, 1)
(E) (6, 2)

11. If the line containing the points $(a, 3)$ and $(b, 2)$ has a slope of $\frac{1}{7}$, then $a - b =$

(A) 1
(B) 2
(C) 3
(D) 6
(E) 7

12. Which of the following must be true about the product of a positive number greater than 1 and a negative number less than –2?

(A) It is a negative integer.
(B) It is a negative number less than –2.
(C) It is a negative number greater than –2.
(D) It is a negative integer less than –2.
(E) It is a negative integer greater than –2.

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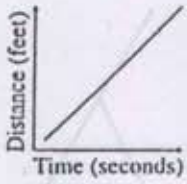
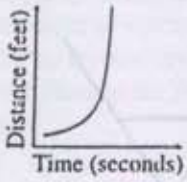
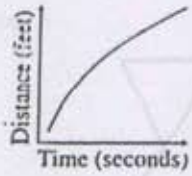
DISTANCE A BALL FALLS ON PLANET PHILLIPS

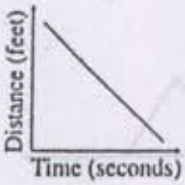
Time (in seconds)	Distance (in feet)
1	20
2	80
3	180
4	320

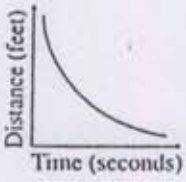
13. On Planet Phillips, a ball is dropped from an open window, and the total distance it has fallen is measured each second after it is dropped, as shown in the table above. Which of the following graphs best represents the information indicated in the table?

(A)


(B)


(C)


(D)


(E)


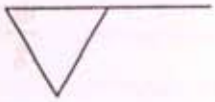
14. A certain list of numbers contains 19 consecutive even integers beginning with 20. What number is in the middle of this list?

(A) 36
(B) 38
(C) 40
(D) 56
(E) 58

GO ON TO THE NEXT PAGE

15. If the figure above is rotated 60° clockwise, which of the following represents the resulting figure?

(A)



(B)

(C)

(D)

(E)

16. Quadrilateral $ABCD$ has a perimeter of 26 and sides of integer lengths. If $AB = m$, and $BC = CD = DA = n$, then what is the difference between the greatest and least possible values of n?

(A) 7
(B) 6
(C) 5
(D) 4
(E) 3

17. Four people, Anna, Brittany, Casey, and Dawn, exit a building in the reverse order than that in which they entered it. If Casey entered the building first, and Brittany entered the building second, which of the following must be true?

I. Casey exited first.
II. Brittany exited third.
III. Casey exited last.

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) II and III only

GO ON TO THE NEXT PAGE

18. In January 2000, b boys and g girls belonged to an art club. If 3 girls joined the club in February 2000 and the ratio of boys to girls remained unchanged, how many boys joined the club in February 2000?

(A) 3

(B) $\frac{b}{g}$

(C) $\frac{3b}{g}$

(D) $b^2 - 5g$

(E) $\frac{b}{g(g+3)}$

19. Points A and B are distinct points which lie on the circumference of circle with center C. How many points on the circumference of the circle are exactly three times as far from point A as they are from point B?

(A) None
(B) One
(C) Two
(D) Three
(E) Six

20. A certain clock has a minute hand that is exactly twice as long as its hour hand. If point A is at the tip of the minute hand, and point B is at the tip of the hour hand, what is the ratio of the distance that point A travels in 3 hours to the distance that point B travels in 9 hours?

(A) 1:8
(B) 1:4
(C) 1:2
(D) 2:3
(E) 8:1

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

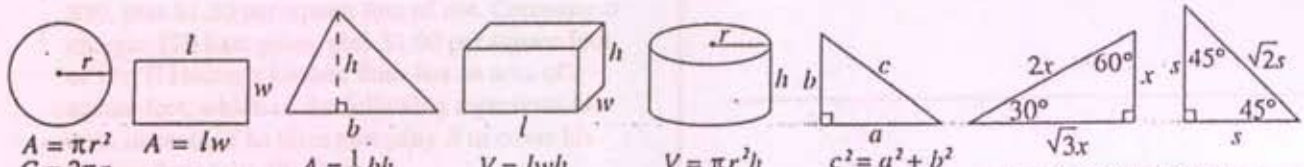
SECTION 3
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$ Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. There are 12 inches in one foot. One inch equals approximately 2.54 centimeters. If a snake is 13 feet long, approximately how many centimeters long is it?

(A) 60
(B) 160
(C) 250
(D) 300
(E) 400

2. If $7x = 4y$, and $\frac{y}{z} = \frac{7}{5}$, then $\frac{x}{z} =$

(A) $\frac{1}{20}$

(B) $\frac{4}{5}$

(C) $\frac{5}{4}$

(D) $\frac{7}{5}$

(E) $\frac{20}{7}$

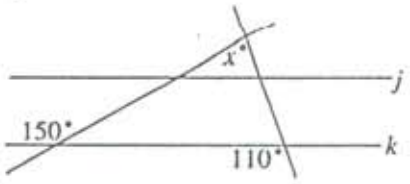
GO ON TO THE NEXT PAGE

3. If $3^4 = 9^k$, then $k =$

(A) 2
(B) 3
(C) 4
(D) 8
(E) 9

4. Two companies charge different rates to put tiles on a floor. Company A charges a base price of \$50, plus \$1.20 per square foot of tile. Company B charges \$20 base price, plus \$1.90 per square foot of tile. If Hector's kitchen floor has an area of s square feet, which of the following represents his cost, in cents, if he hires company B to cover his kitchen floor with tiles?

(A) $20 + 1.90s$
(B) $50 + 1.20s$
(C) $190s$
(D) $2000 + 190s$
(E) $5000 + 120s$



5. In the figure above, the four lines intersect as shown. If $j \parallel k$, what is the value of x?

(A) 55
(B) 70
(C) 80
(D) 90
(E) 130

6. If $\sqrt{x+7} = \sqrt{x} + 2$, then $x =$

(A) 0

(B) $\frac{9}{16}$

(C) $\frac{3}{4}$

(D) $\frac{\sqrt{3}}{2}$ (approximately 0.866)

(E) No solutions exist.

7. The integer 90 can be expressed as the sum of z consecutive integers. The value of z could be any of the following EXCEPT

(A) 3
(B) 4
(C) 5
(D) 6
(E) 9

GO ON TO THE NEXT PAGE

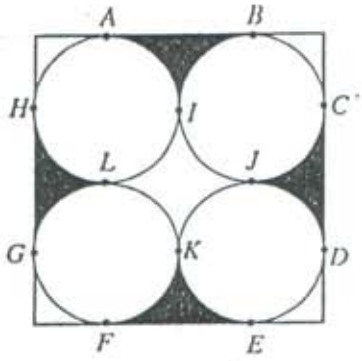
8. Which of the following expressions are equivalent to $9k^2$?

I. $\left(\frac{3}{k^{-1}}\right)^2$

II. $\frac{81k^6}{9k^3}$

III. $(27k^3)^{\frac{2}{3}}$

(A) None
(B) II only
(C) III only
(D) I and III only
(E) I, II, and III



9. In the figure above, the circles touch each other and the sides of the rectangle at the lettered points shown. Each circle has a circumference of 4π. Which of the following is the best approximation of the sum of the areas of the shaded regions?

(A) 4
(B) 7
(C) 10
(D) 12
(E) 15

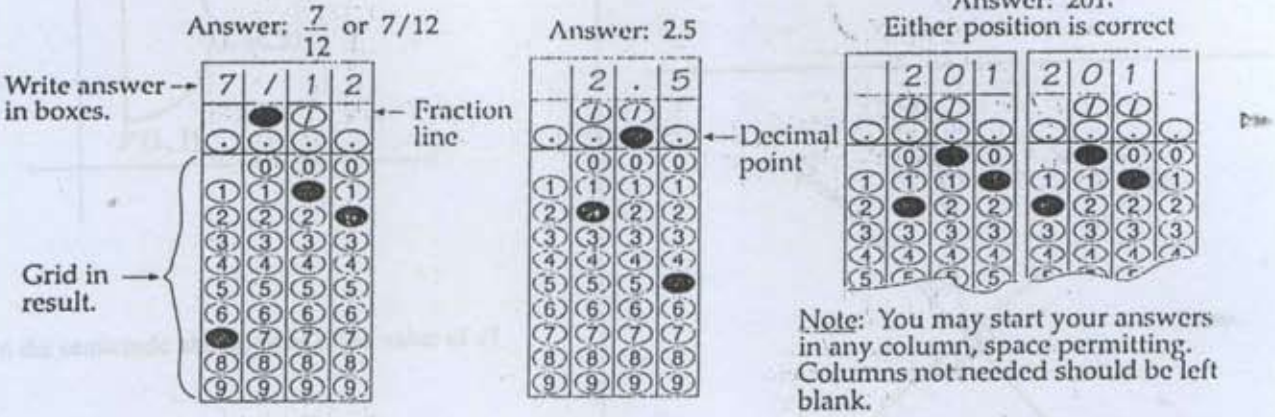
10. There are 6 large ferry boats that sail between Seaside City and George's Island. There are 3 small ferry boats that sail between George's Island and Lighthouse Rock. If Nina starts at Seaside City and goes to Lighthouse Rock and back, via George's Island in each direction, and she never rides the same ferry boat twice, how many different arrangements of ferry boats could she ride on?

(A) 18
(B) 36
(C) 54
(D) 180
(E) 324

GO ON TO THE NEXT PAGE

Directions for Student-Produced Response Questions

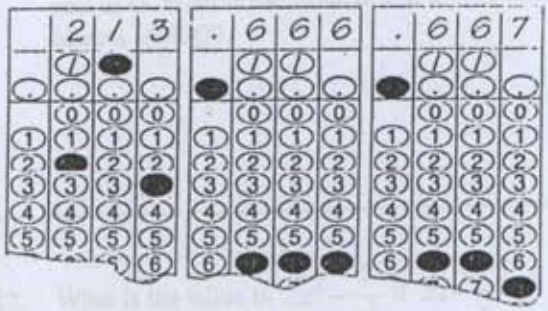
Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.



Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

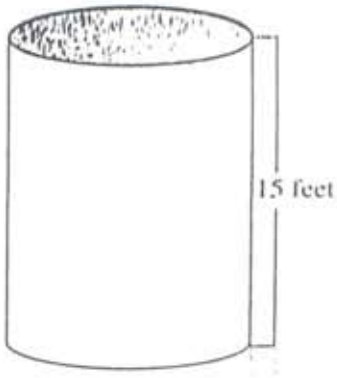
- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If 2 1 / 2 is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)
- Decimal Accuracy: If you obtain a decimal answer, **enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3} = .6666\ldots$



11. The public swimming pool holds 200 gallons of water when full. The pool is currently $\frac{4}{5}$ full. If pool water costs \$5.50 per gallon, what is the cost in dollars of the amount of water needed to fill the rest of the pool? (Disregard the \$ sign when gridding your answer.)

GO ON TO THE NEXT PAGE



18. The above figure is a right cylindrical solid with a volume of 480 cubic feet. If its height is 15 feet, what is the area in square feet of the shaded portion?

For all integers a, $f(a)$ is defined below:

$f(a) = 5a$ when a is odd.
$f(a) = a^3$ when a is even.

19. If $f(4) - f(11) = x$, what is the value of x^4?

20. For all numbers k, where $k \neq 4$, let $f(k) = \frac{k+8}{4-k}$. If $f(k) = \frac{5}{2}$, what is the value of k?

STOP

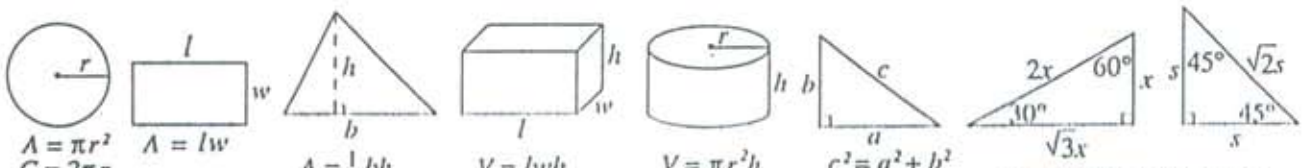
If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

SECTION 6
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.



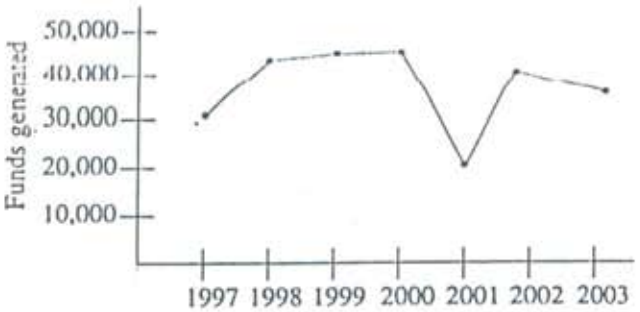
$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$

Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. In a certain game, a player must pay for letters to spell a word. If the letters s and t cost 3 tokens each, and all other letters cost 1 token each, then what is the cost, in tokens, of the word "thirteen"?
   (A) 8
   (B) 12
   (C) 13
   (D) 16
   (E) 24

FUNDS GENERATED BY ANNUAL FUNDRAING TELETHON

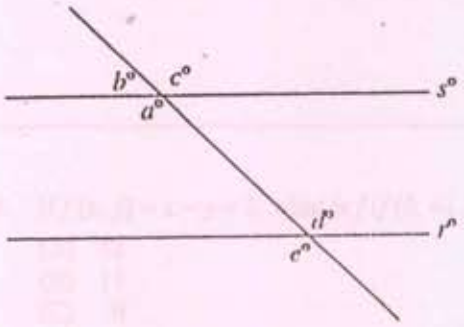


2. According to the graph above, the greatest decrease in funds occurred between which two consecutive years?
   (A) 1997 and 1998
   (B) 1998 and 1999
   (C) 1999 and 2000
   (D) 2000 and 2001
   (E) 2002 and 2003

GO ON TO THE NEXT PAGE

3. Which of the following is equivalent to 3.975312×10^4?

(A) 39.75312
(B) 397.5312
(C) 3,975.312
(D) 39,753.12
(E) 397,531.2



4. In the figure above, $r \parallel s$ and $a = 130$. What is the sum of b, c, d, and e?

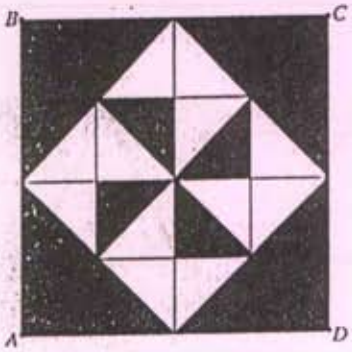
(A) 440
(B) 360
(C) 310
(D) 280
(E) 230

5. If the ratio of a to b is 4 to 5, and a is 3 less than b, what is the value of a?

(A) 3
(B) 7
(C) 9
(D) 12
(E) 15

6. If $x \neq -3$ and $\frac{x^2-2x-15}{x+3} > 4$, what is the value of x?

(A) $x > 1$
(B) $x > 9$
(C) $-1 < x < 7$
(D) $1 < x < 9$
(E) It cannot be determined from the information given.



7. The figure above is composed of congruent right triangles. If the area of square $ABCD$ is 80, what is the area of the shaded region?

(A) 50
(B) 46
(C) 40
(D) 32
(E) 20

GO ON TO THE NEXT PAGE

8. If $(a+2)(b-2)=0$, which of the following could be true?

I. $a=-2$
II. $b=2$
III. $a=-b$

(A) I only
(B) I and II
(C) I and III
(D) III only
(E) I, II, and III

9. If $f(x, y)=x-y+3$, what is $f(f(6, 4), 2)$?

(A) 12
(B) 11
(C) 6
(D) 3
(E) 2

10. If $x>0$, which of the following is equal to $(x^{\frac{1}{4}})(x^{\frac{1}{2}})$?

(A) $x^{\frac{1}{4}}$

(B) $x^{\frac{2}{5}}$

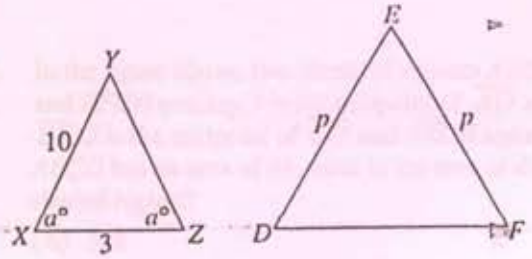
(C) x

(D) $x^{\frac{3}{2}}$

(E) $x^{\frac{5}{2}}$

11. Which of the following gives the solution set for the equation $\left|\frac{x+3}{2}\right|=5$?

(A) $\{7\}$
(B) $\{-13\}$
(C) $\{-13, -7\}$
(D) $\{-7, 13\}$
(E) $\{-13, 7\}$



Note: Figure not drawn to scale.

12. The perimeter of ΔXYZ is p. In ΔDEF, $DE=EF$ and $DF=23$. What is the perimeter of ΔDEF?

(A) 26
(B) 39
(C) 46
(D) 69
(E) 112.5

GO ON TO THE NEXT PAGE

13. In a certain library, there are r bookcases with s shelves in each bookcase. If a total of b books is to be distributed among each of the shelves, what is the number of books per shelf?

(A) $\frac{b}{rs}$

(B) $\frac{rb}{s}$

(C) rsb

(D) $\frac{r}{s}-b$

(E) $\frac{b}{s}-r$

14. Becky opened a savings account that earns a fraction x of its balance in interest every year. Three years ago Becky deposited \$800 into the account, and has not deposited or withdrawn any money since. If she has earned \$126.10 in interest, what is the value of x?

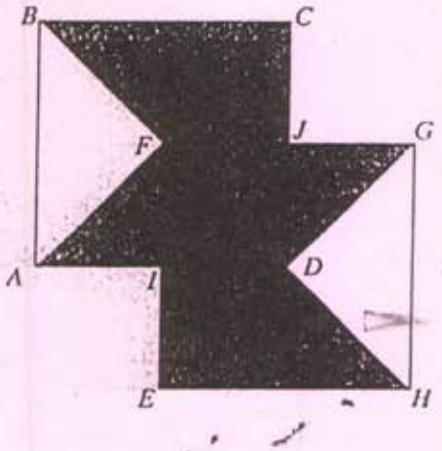
(A) $\frac{1}{4}$

(B) $\frac{1}{5}$

(C) $\frac{1}{10}$

(D) $\frac{1}{20}$

(E) $\frac{1}{25}$



15. In the figure above, two identical squares $ABCD$ and $EFGH$ overlap. I is the midpoint of $\overline{AD}$ and $\overline{EF}$. J is the midpoint of $\overline{CD}$ and $\overline{FG}$. If square $ABCD$ has an area of 64, what is the area of the shaded region?

(A) 128
(B) 118
(C) 104
(D) 96
(E) 80

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 9: ANSWER KEY

2 Math	3 Math	6 Math
1. E	1. E	1. B
2. D	2. B	2. D
3. C	3. A	3. D
4. B	4. D	4. A
5. C	5. C	5. D
6. E	6. B	6. B
7. D	7. D	7. A
8. C	8. D	8. E
9. D	9. B	9. C
10. C	10. D	10. E
11. E	11. 220	11. E
12. B	12. 5	12. D
13. B	13. 18	13. A
14. B	14. 70	14. D
15. D	15. 35	15. E
16. A	16. 60	
17. E	17. 0	
18. C	18. 32	
19. C	19. 6561	
20. D	20. .571 or $\frac{4}{7}$	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	700	21	480
70		45	700	20	470
69		44	690	19	460
68		43	680	18	450
67		42	670	17	450
66		41	660	16	440
65		40	650	15	430
64		39	640	14	420
63		38	630	13	410
62		37	620	12	400
61		36	610	11	390
60		35	610	10	380
59		34	600	9	370
58		33	590	8	360
57		32	580	7	360
56		31	570	6	350
55	800	30	560	5	340
54	790	29	550	4	330
53	770	28	540	3	320
52	760	27	530	2	310
51	750	26	530	1	300
50	740	25	520	0	250
49	730	24	510	-1	240
48	720	23	500	-2	220
47	710	22	490	-3	200

Practice Test 9: Answers and Explanations

SECTION 2

1. E She spends (3)($5) = $15 on muffins, and (2)($3) = $6 on cupcakes. Add the two amounts together to get $21.

2. D Multiply $2x = 5$ by 3 to get $6x = 15$. Multiply $3y = 9$ by 2 to get $6y = 18$. So $6x - 6y = 15 - 18 = -3$. Thus, $40 - (6x - 6y) = 40 - (-3) = 43$.

3. C If the area is 21, and one side is 3, the other side must be 7. Remember to draw the picture yourself. Only point (5, 2) sits inside this rectangle.

4. B If ab is 72, then a must divide evenly into 72. 8, 12, and 18 in the answer choices (C), (D), and (E) all divide into 72, so a could be any of those values. (A) If ab is 75, then a divides into 75, so a could be 5. On the other hand, 7 divides evenly into 70 and 77, neither of which are between 70 and 76.

5. C Translate the words into an equation, and cross out what doesn't match. You need one-third of n, so cross out (B), and cross out (A) because you need "7 less than" on the left side. Cross out (D), because you need three times m, and cross out (E) because you need "7 more than" on the right.

6. E Set A is {2, 3, 5, 7, 11}(remember 1 is not prime). Set B is {1, 3, 5, 7, 9, 11}. $A \cap B$ represents the intersection of the two sets, which is all numbers that exist in both sets: {3, 5, 7, 11}.

7. D This is a sequence of the form $5*3^{n-1}$. All you really need to know is that the number of bacteria multiplies by three each hour: 5, 15, 45, 135, and then 405 at noon.

8. C The total number of stamps is 12 and the number of stamps worth less than $6 is $4 + 3 = 7$. So the probability that a randomly selected stamp is worth less than $6 is

$$\frac{\text{\# of things that meet the condition}}{\text{total \# of possibilities}} = \frac{7}{12}.$$

9. D Since the average of 12 people is 26, the total is 312. When 8 people are added, the average of 20 people is 32 with a total of 640. Subtract the totals to get 328 and divide this by 8 to get a new average of 41.

10. C Just use the midpoint formula: $\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$ or draw a picture. You end up with $\frac{0+2}{2}, \frac{2+8}{2}$ or (1, 5).

11. E Since the slope of the line is $\frac{1}{7}$, use the formula for slope, and set it equal to $\frac{1}{7}$. So $\frac{y_2-y_1}{x_2-x_1} = \frac{1}{7}$ becomes $\frac{3-2}{a-b} = \frac{1}{7}$ and $a - b = 7$.

12. B Plug in your own numbers. Try 1.1 and −2.1: the product is −2.31, and only (B) includes this number.

13. B Draw an xy-plane, and plot points. If you plot the points (1, 20), (2, 80), (3, 180), and (4, 320), you'll see that the graph increases and also gets steeper as it goes to the right. Only (B) does this as well.

14. **B** The list of numbers is 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56. The number in the middle is 38, because there are 9 numbers on each side of 38.

15. **D** Draw it. The triangular part of the figure looks like an equilateral triangle, so its interior angles must be approximately 60°. So when you rotate the left side of the triangle 60° clockwise, that same side becomes horizontal, and the segment that sticks out from the right side rotates a little bit beyond where it would point straight down.

16. **A** Since three of the sides have length n, you can express the perimeter as $n + n + n + m = 26$, or $3n + m = 26$. Now plug in for n, starting with the least possible value, which is $n = 1$. This makes $m = 23$, which works, because m is an integer. Now try $n = 2$, which makes $m = 20$. Repeat with $n = 3, 4, 5, 6, 7$, and 8, which all work. However, if $n = 9$, then $m = -1$, which is impossible, since lengths can't be negative. Subtracting the least from the greatest possible value of n gives you $8 - 1 = 7$.

17. **E** Remember that the people come out of the building in reverse order, so if Casey goes in first, she must come out last. Therefore, I is wrong which eliminates (A) and (D). Since II and III are correct, you can select (E).

18. **C** Plug in 2 for b and 3 for g. So you can write the ratio of boys to girls as $\frac{2\text{ boys}}{3\text{ girls}}$. When 3 more girls join, there are a total of 6 girls in the club. To keep the same ratio of boys to girls, set up a proportion: $\frac{2\text{ boys}}{3\text{ girls}} = \frac{x\text{ boys}}{6\text{ girls}}$, where x is the total number of boys at the club in February. Cross-multiply and solve to get $x = 4$. In January there were 2 boys and in February there were 4, so the number of boys that joined the club is 2, our target number. Plug $b = 2$ and $g = 3$ into the answers to see which hits the target and only (C) does.

19. **C** If you put A and B on a circle, say, 90 degrees apart, there will be two points which are three times as far from A as they are from B. One of them will be between A and B, and the other will be on the opposite side of B from where A is. If A and B are on opposite sides of the circle, you will still have two points which work: one on either side of point B.

20. **D** Plug in 6 for the radius of the minute hand; the radius of the hour hand is 3. In one hour, point A travels $2\pi r = 12\pi$, so the distance in 3 hours is 36π. In one hour, point B travels $2\pi r = 6\pi$, so in 9 hours the distance is 54π. The ratio is $\frac{36\pi}{54\pi} = \frac{2}{3}$.

SECTION 3

1. **E** A 13-foot long snake is $13 \times 12 = 156$ inches long. At 2.55 centimeters per inch, the snake is approximately 396.24 centimeters long, which rounds to 400.

2. **B** Plug in 4 for x. Solve to get $y = 7$, $z = 5$, so $\frac{x}{z} = \frac{4}{5}$.

3. **A** $3^4 = 81$. Plug in the answer choices. $9^2 = 81$, so $k = 2$.

4. **D** Plug in 2 for s. The cost in cents for company B to tile 2 square feet is 2,380 cents. (D) is the correct answer.

5. **C** Fill in the other angles of the small triangle. Since the lines are parallel, the lower-left angle is 30° and the lower-right angle is 70°. Since the three angles must add up to 180°, x equals 80°.

6. **B** The easiest way to solve is to plug in the answer choices and test on your calculator. To solve algebraically, square both sides, which yields $x+7=x+4\sqrt{x}+4$, so $3=4\sqrt{x}$, so $\sqrt{x}=\frac{3}{4}$, so $x=\frac{9}{16}$.

7. **D** Plug in numbers! This one may take some time, but you will eventually find the answer. Three numbers: 29 + 30 + 31 = 90. Four numbers: 21 + 22 + 23 + 24 = 90. Five numbers: 16 + 17 + 18 + 19 + 20 = 90. Nine numbers: 6+ 7 + 8 + 9 + 10 + 11 + 12 + 13 + 14 = 90.

8. **D** You can plug in a value for k. For example, if $k = 2$, then $9k^2 = 36$. I and III also equal 36, while II equals 72. Alternatively, using exponent rules, both I and III can be simplified to $(3k)^2$, which equals $9k^2$. II, on the other hand, simplifies to $9k^3$, since exponents subtract when you divide, which means only I and III are correct.

9. **B** Each circle has a radius of 2, so the total area of the square is 64. Each circle has an area of 4π, so the total amount of area inside the square that is not inside a circle equals $64 - 16\pi$ or approximately 14. By observation, half of this area is shaded (if you wish, there are 4 shaded "half-diamonds," versus 1 unshaded "full diamond" and 4 unshaded "quarter-diamonds"), so the total shaded area is approximately 7.

10. **D** Count the number of options she has for each route. She can take 6 boats from Seaside City to George's Island. She can take 3 boats from George's Island to Lighthouse Rock. She can take 2 boats (since she can't take the same boat twice) from Lighthouse rock to George's Island, and she can take 5 boats from George's Island to Seaside City. (6)(3)(2)(5) = 180.

11. **220** The pool holds 200 gallons and is currently $\frac{4}{5}$ full. $\frac{4}{5}\times 200 = 160$. So, 40 more gallons are needed to fill the pool and $40 \times 5.5 = 220$.

12. **5** Since $\overline{PQ}$ is a diameter, the center of the circle must be halfway between points P and Q, at (1, 5). Since $\overline{PQ} = 8$, the radius of the circle must be 4. This means the distance between the center (1, 5) and the unknown point (x, 5) must also be 4, because all radii are equal. So $x = 5$.

13. **18** You are asked to find the union of sets A and B. The easiest way to do this is to write out both sets. The members of set A are {2, 3, 5, 7, 11, 13, 17, 19, 23, 29}, and the members of set B are {3, 6, 9, 12, 15, 18, 21, 24, 27}. Now, total up the number of distinct elements in the sets. Even though 3 appears twice, only count it once.

14. **70** Since $\angle DEC \cong \angle CEB$, we know that $\angle DEB = 110°$. Since the lines are parallel and $\angle DEB$ is a "big angle" and $\angle ABE$ is a "small angle," so $x = 70°$.

15. **35** If $\frac{1}{2}b = -10$, multiply both sides by 2 and find that $b = -20$. Now, plug-in -20 for b and find that $a = 40$ and $c = -5$. So, $a + c = 35$.

16. **60** $\angle NOQ$ and $\angle MOR$ have to be equal because they are vertical angles. Since a is half of $\angle NOQ$ and $a = 30°$, then $\angle NOQ = 60°$ and then $b = 60°$ as well.

17. **0** $2z + \frac{2}{z} = 4$ can be manipulated into a quadratic equation. Subtract $2z$ from both sides, multiply both sides by z, and then subtract 2 from both sides. You will get $-2z^2 + 4z - 2 = 0$, which is the same thing as $2z^2 - 4z + 2 = 0$. From here, you can simplify the equation by factoring out a 2. So then you end up with $2(z^2 - 2z + 1) = 0$. From there you can factor it out and get $2(z - 1)(z - 1) = 0$ so, $z = 1$. Therefore, $2z^2 + \frac{2}{z^2} = 0$.

18. **32** To find the volume, multiply (area of the base) times (height). So in this case, volume $= \pi r^2 \times$ height. You know already that the height is 15 and the volume is 480. So, plug these into your formula: $480 = \pi r^2 \times 15$. You cannot find the value of the radius, but you can find the value of πr^2, which is what the question asks for. Divide both sides by 15, and the area of the circle = 32.

19. **6561** Since $f(4) = 4^3$, then $f(4) = 64$ and $f(11) = 11 \times 5 = 55$. $64 - 55 = 9$. So, $x = 9$ and $x^4 = 6561$.

20. **$\frac{4}{7}$ or .571** $\frac{k+8}{4-k} = \frac{5}{2}$, cross-multiply to get $2k + 16 = 20 - 5k$. Then solve for k. Add $5k$ to both sides and get $7k + 16 = 20$. Now, subtract 16 from both sides; $7k = 4$. Divide by 7 and $k = \frac{4}{7}$ or .571.

SECTION 6

1. B The word *thirteen* has two letter *t*'s which cost 3 tokens each and 6 other letters which cost 1 token each, for a total cost of 12 tokens.

2. D Find the point on the graph where the line has the steepest negative slope. From 2000 to 2001, the line drops from approximately 47,000 to 25,000. This drop of 22,000 is the greatest decrease shown on the graph. (A) and (C) must be incorrect because the line shows an increase. (B) and (E) are incorrect because the decrease is not as great as it is in (D).

3. D In scientific notation, for each power of 10 you move the decimal point to the right one place. Since the problem uses 10 to the power of 4, you need to move the decimal four places to the right.

4. A Since the lines are parallel, all big angles are equal. The big angles are 130°. The sum of b and c must be 180° because they are on a straight line. Then, add the big angle d and big angle e: 130. So, 180° + 130° + 130° = 440°.

5. D Plug in the answers. Start with (C): a is 9. Nine is 3 less than b, which must be 12. Next, ask does $\frac{9}{12}=\frac{4}{5}$? No. We need a bigger b. Try answer (D): a is 12. That makes $b = 15$. Does $\frac{12}{15}=\frac{4}{5}$? Yes, (D) is the correct answer.

6. B Factor the top expression to get $\frac{(x+3)(x-5)}{x+3}>4$. Crossing out the like terms gives $(x-5)>4$. So, $x>9$. As an alternative, you can plug in to eliminate some answer choices. For example, since the expression is not true when $x = 2$, eliminate anything with 2 in the range. Eliminate (A), (C), and (D). Be careful not to fall for (E), which leaves (B) as the best answer.

7. A The little triangles all have the same area. There are 32 triangles total and 20 are shaded. That means $\frac{20}{32}$ of the area of the square is shaded. The shaded area is $\frac{20}{32}(80)=50$.

8. E When the product of two terms is 0, at least one of the terms is equal to 0. That means $(a + 2) = 0$ and/or $(b - 2) = 0$. Solve for a by subtracting 2. This means it could be true that $a = -2$. So, Statement I could be true. Solve for b by adding 2. This means it could be true that $b = 2$. So, Statement II could be true. Because a could equal -2 and b could equal 2, it could be true that $a = -b$ because $(-2) = -(2)$. Thus, all three statements could be true.

9. C Take it one step at a time. First, find $f(6, 4) = (6) - (4) + 3 = 5$. Next, put that into the question to find that it's really asking: $f(5, 2)$. Find $f(5, 2) = (5) - (2) + 3 = 6$.

10. E Plug in. If $x = 4$, then $\left(x^{\frac{1}{2}}\right)\left(x^2\right) = \left(4^{\frac{1}{2}}\right)\left(4^2\right) = \left(\sqrt{4}\right)(16) = 32$. For (E), $(4)^{\frac{5}{2}} = \sqrt{4^5} = \sqrt{1024} = 32$. Be sure to use your calculator when evaluating the answer choices.

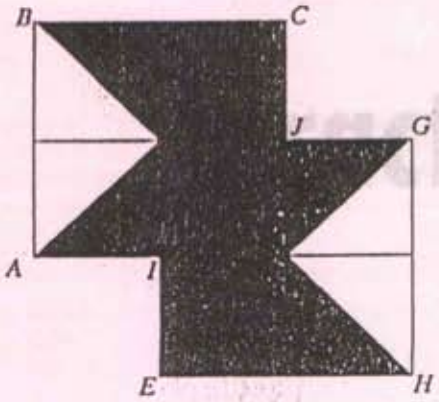
11. E Plug in numbers from the answer choices. For (C), $\left|\frac{-13+3}{2}\right| = 5$, so the correct answer must include -13. Eliminate answer choices (D) and (A). Now, test the other number from (C). Since $\left|\frac{-7+3}{2}\right| \neq 5$, eliminate (C). Since both remaining answer choices include -13, try the second number from answer choice (E). Since $\left|\frac{7+3}{2}\right| = 5$ eliminates (A), this leaves (E).

12. D In triangle XYZ, side YZ has a length of 10 because it is opposite an equal angle. The perimeter of triangle XYZ is $10 + 10 + 3 = 23$. So, $p = 23$. In triangle DEF, the remaining angles must be equal because they are opposite equal angles. To find the measure of these angles: $\frac{180-60}{2} = 60$. All of the angles are 60°, so it's an equilateral triangle and all of the sides must be 23. The perimeter is $23 + 23 + 23 = 69$.

13. A Try plugging in on this problem. Plug in $r = 10$, $s = 6$, and $b = 120$. If there are 10 rows and 6 shelves in each row, then there are 60 shelves total. With 120 books, 2 books can be distributed to each shelf. (A) is the only choice that gives 2.

14. D Try the answers and see which one works! Start with (C). If $\frac{1}{10}$ were the answer, she would have $1\frac{1}{10} \times 800 = \$880$ after one year. After two years at this rate, she would have $1\frac{1}{10} \times 880 = \$968$. This is too high so you should cross out (A), (B), and (C). Try (D); if $\frac{1}{20}$ were the answer, she would have $1\frac{1}{20} \times 800 = \$840$ after one year. After two years at this rate, she would have $1\frac{1}{20} \times 840 = \$882$. After three years at this rate, she would have $1\frac{1}{20} \times 882 = \$962.10$, the correct answer.

15. E Break the shaded area into smaller squares. The figure below shows the 7 small squares. If 4 of these squares have an area of 64, that means one small square has an area of $\frac{64}{4} = 16$. There are 7 small squares, so the area of the whole figure is $7 \times 16 = 112$. The two sections that are unshaded combined together make up one-half of the area of *ABCD*, which we know is 64, so we need to subtract half of 64, or 32, from 112, which gives us 80.



Practice Test 10

SECTION 2
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

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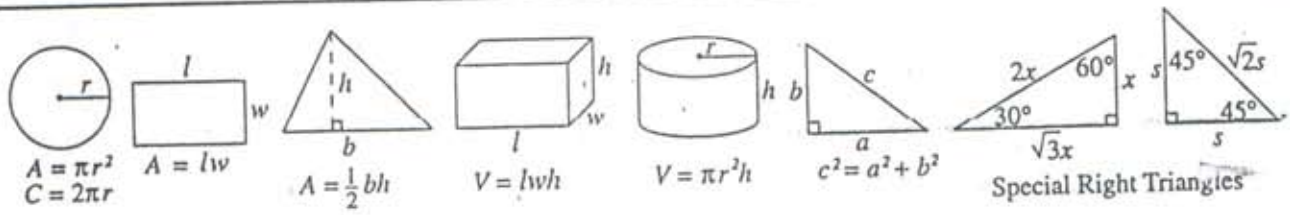
Reference Information



$A = \pi r^2$, $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $(0.008)x = 0.032$, then what is the value of x?
   (A) 0.004
   (B) 0.04
   (C) 0.4
   (D) 4
   (E) 40

2. What is the value of b if $5(b + 10) = 7(b - 4)$?
   (A) 39
   (B) 36
   (C) 28
   (D) 27
   (E) 11

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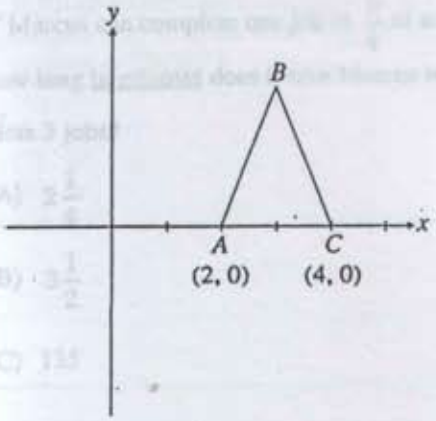

3. Isosceles ΔABC shown above has an area of 4. If $m\angle A = m\angle C$, what is the coordinate of point B?
   (A) (3, 2)
   (B) (3, 4)
   (C) (4, 4)
   (D) (4, 3)
   (E) (0, 3)

4. If $|3x - 6| = 36$, what is one possible value of x?
   (A) −30
   (B) −14
   (C) −10
   (D) 0
   (E) 10

5. If 20 percent of x is 10, what is x percent of 10?
   (A) 50
   (B) 30
   (C) 20
   (D) 10
   (E) 5

6. Five people stand in line: three men, Denzel, Melvin, and Aneet, and two women, Janine and Susan. The order in which they stand must match the following conditions:
   (1) A man is not first in line.
   (2) Denzel is ahead of Janine in the line.
   (3) A woman must stand fourth in line.
   (4) Melvin cannot stand next to Denzel.

   In which position does Melvin stand in the line?
   (A) First
   (B) Second
   (C) Third
   (D) Fourth
   (E) Fifth

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7. If Marcus can complete one job in $\frac{3}{4}$ of an hour, how long in minutes does it take Marcus to complete 3 jobs?

(A) $2\frac{1}{4}$

(B) $3\frac{1}{2}$

(C) 135

(D) 225

(E) 270

8. If $f(x) = 4\sqrt{x-3} + 7$, what is the domain of $f(x)$?

(A) All numbers greater than or equal to -4
(B) All numbers greater than or equal to 3
(C) All numbers greater than or equal to 3 or less than or equal to -3
(D) All positive numbers
(E) All real numbers

9. If w is a positive odd integer, which of the following gives a possible value of the product of one more than w and 2 less than w?

(A) 0
(B) 10
(C) 18
(D) 28
(E) 54

10. After selling $\frac{1}{3}$ of the muffins he made for the school bake sale, Alan then sold an additional 10 muffins, leaving him with $\frac{1}{2}$ of the number of muffins he started with. How many muffins did Alan start with?

(A) 30
(B) 42
(C) 50
(D) 60
(E) 75

11. Ruth opened a restaurant this year. She wants to open 4 more next year and 16 in her third year. Her plan is to quadruple the number of restaurant openings every year. Which of the following represents the number of restaurants she plans to open in year n?

(A) $1 \times 4^{n-1}$
(B) 1×4^{n}
(C) $4 \times n^{4}$
(D) $4 \times 4^{n-1}$
(E) 4×4^{n}

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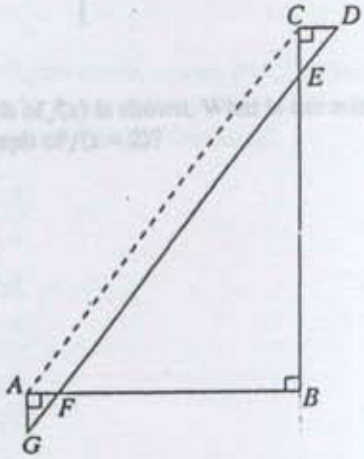
12. If r is an positive even integer and s is a prime integer, then all of the following are factors of the product rs EXCEPT

(A) r
(B) s
(C) $2s$
(D) $2r$
(E) 2



Note: Figure not drawn to scale.

13. In the figure above, AGF, BEF, and CDE are all isosceles right triangles. If $BE = 2x$, and both GF and $ED = x\sqrt{2}$, what is the value of AC?

(A) $3x\sqrt{2}$
(B) $4x$
(C) $2x\sqrt{2}$
(D) $3x$
(E) $x\sqrt{3}$

14. If 1,000 cubic meters of pine mulch can fertilize 0.02 square kilometers of soil, how many square kilometers of soil can be fertilized by 10^8 cubic meters of pine mulch?

(A) 20
(B) 200
(C) 2,000
(D) 20,000
(E) 200,000

15. If the ratio of a to b is equal to the ratio of $2a$ to b, and $b \neq 0$, which of the following must be true?

I. $b = 2a$
II. $a = 0$
III. $b = 2b$

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

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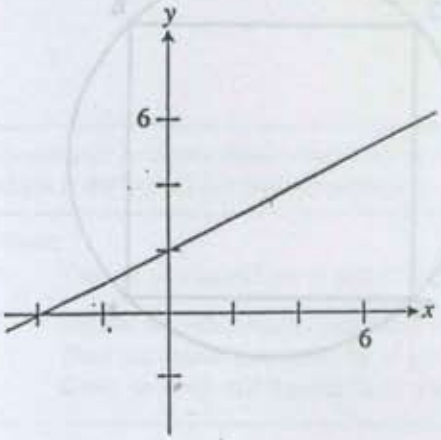
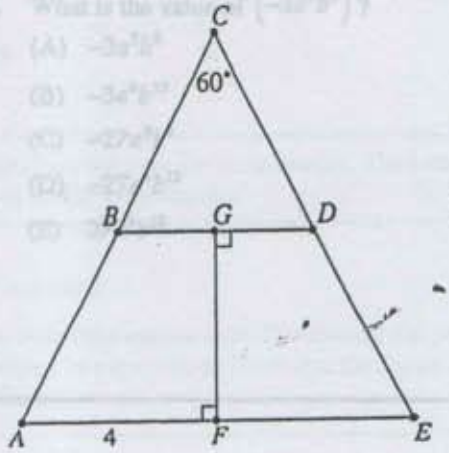


16. The graph of $f(x)$ is shown. What is the x-intercept of the graph of $f(x-2)$?

(A) -6
(B) -4
(C) -2
(D) 0
(E) 2



17. In the figure above, B is the midpoint of $\overline{AC}$, D is the midpoint of $\overline{CE}$, F is the midpoint of $\overline{AE}$, and G is the midpoint of $\overline{BD}$ and AF is 4. If $CB = CD$, what is FG?

(A) $2\sqrt{2}$
(B) $2\sqrt{3}$
(C) $3\sqrt{2}$
(D) $3\sqrt{3}$
(E) $4\sqrt{2}$

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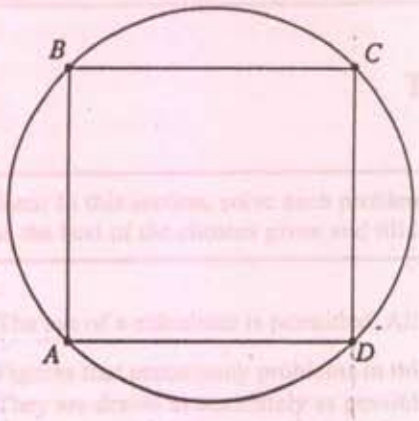

18. In the figure above, square $ABCD$ is inscribed in the circle. If the perimeter of $ABCD$ is 4, what is the circumference of the circle?

(A) $\frac{\pi}{2}$

(B) π

(C) $\frac{\sqrt{2}}{2}\pi$

(D) $\sqrt{2}\pi$

(E) 2π

19. What is the value of $\left(-3a^2b^5\right)^3$?

(A) $-3a^5b^8$

(B) $-3a^6b^{15}$

(C) $-27a^5b^8$

(D) $-27a^6b^{15}$

(E) $27a^6b^{15}$

20. If $3y^4 + xy - x^2 = y^2 - 25$ and $y = 0$, how many possible values of x are there?

(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

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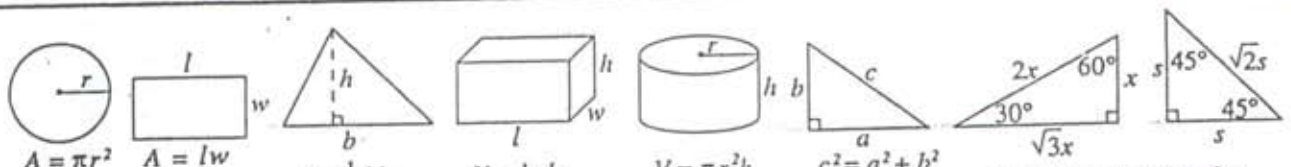


$A = \pi r^2$, $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $3x + x + x = 10$, then $(5x)(5x) =$
   (A) 2
   (B) 4
   (C) 20
   (D) 25
   (E) 100

$$\begin{array}{r} 83 \\ -AB \\ \hline 31 \end{array}$$

2. In the correctly solved subtraction problem above, A and B represent digits. What is the value of $A \times B$?
   (A) 2
   (B) 5
   (C) 7
   (D) 10
   (E) 52

GO ON TO THE NEXT PAGE

3. Points P, Q, R, S, and T lie on a line in that order. If $PR = 6$ and $PQ = QR = RS = ST$, then $PT =$

(A) 3
(B) 6
(C) 9
(D) 12
(E) 24

4. If $|x - 6| = x^2$, then x could equal which of the following?

(A) -3
(B) -2
(C) 3
(D) 4
(E) 9

5. Mr. Barua teaches for 3.5 hours on each day that he is scheduled to teach. If he teaches d days per year, then which of the following is an expression of the total number of hours he teaches per year?

(A) $3.5d$

(B) $365d$

(C) $d + 3.5$

(D) $\frac{d}{3.5}$

(E) $\frac{3.5}{d}$

6. If j, k, l, m, and n are consecutive integers and $j < k < l < m < n$, then what is the value of $(j + n) - (k + m)$?

(A) 0
(B) 1
(C) 2
(D) 4
(E) It cannot be determined from the information given.

7. When 1 is divided by 13 on a calculator, the repeating decimal $0.\overline{076923} = 0.076923076923...$ is produced. Which of the following is 7?

(A) The 300th digit to the right of the decimal point
(B) The 301st digit to the right of the decimal point
(C) The 302nd digit to the right of the decimal point
(D) The 303rd digit to the right of the decimal point
(E) The 304th digit to the right of the decimal point

GO ON TO THE NEXT PAGE

8. Which of the following expressions is equivalent to $\frac{2x^2-4x-16}{x^2-3x-4}$?

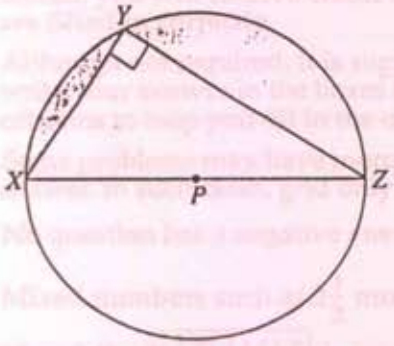
(A) $\frac{22}{3}$

(B) x^2-x-12

(C) $x^2+\frac{4}{3}x+4$

(D) $\frac{2x+4}{x+1}$

(E) $\frac{2x-4}{x-1}$



9. The circle with center P shown above has circumference 10π. If $XY = 6$, what is the area of the shaded region?

(A) 24

(B) $50\pi-24$

(C) $50\pi-48$

(D) $24-\frac{25\pi}{2}$

(E) $\frac{25\pi}{2}-24$

10. If $a = 2^{2m+2}$ and $b = 4$, then $\frac{a}{b} =$

(A) 2^{2m+1}

(B) 2^{2m}

(C) 2^{2m-2}

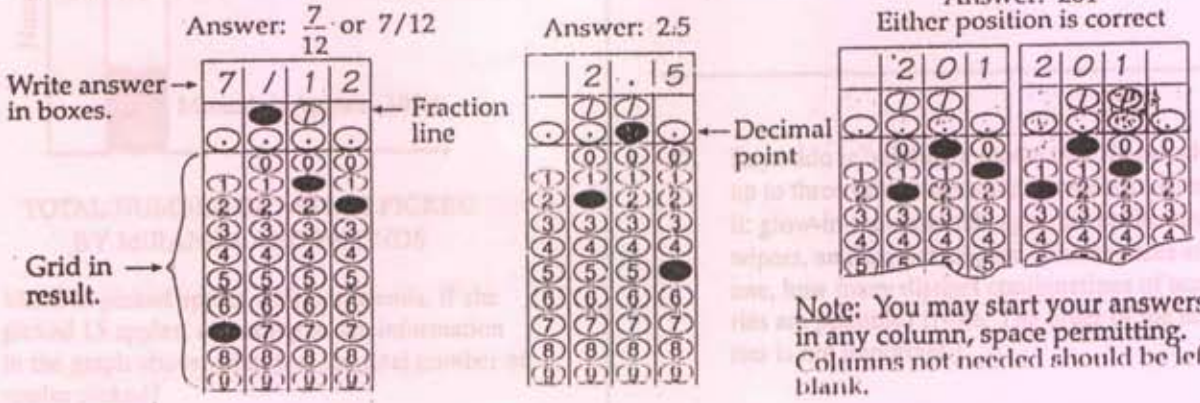
(D) $2^{\frac{m}{2}+\frac{1}{2}}$

(E) $\left(\frac{1}{2}\right)^{2m+2}$

GO ON TO THE NEXT PAGE

Directions for Student-Produced Response Questions

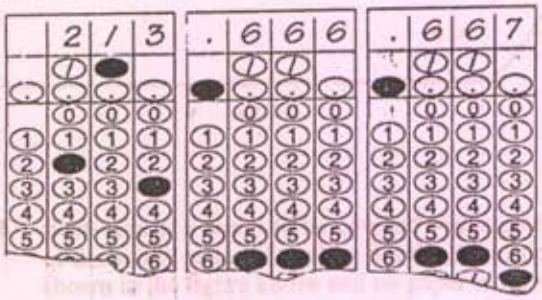
Each of the remaining 10 questions (11–20) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.



Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the ovals are filled in correctly.
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If 2 1 / 2 is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)
- Decimal Accuracy: If you obtain a decimal answer, enter the most accurate value the grid will accommodate. For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. Less accurate values such as .66 or .67 are not acceptable.

Acceptable ways to grid $\frac{2}{3}$ = .6666 . . .



11. If $(5 \times 10^5) - (4 \times 10^4) = b \times 10^5$, what is the value of b?

12. A rectangle has a perimeter of 10. If the lengths of the sides are all integer values, what is one possible value for the area of the rectangle?

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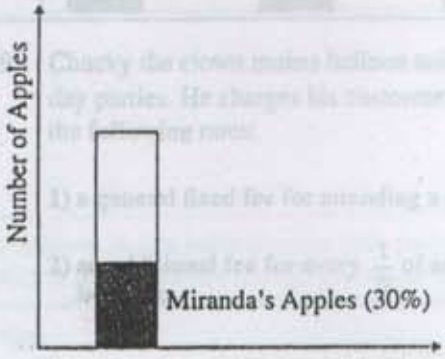


TOTAL NUMBER OF APPLES PICKED BY MIRANDA AND FRIENDS

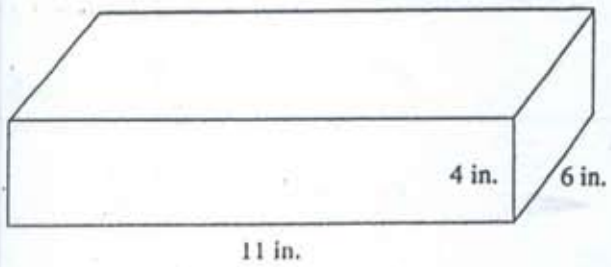
13. Miranda picked apples with her friends. If she picked 15 apples, according to the information in the graph above, what was the total number of apples picked?

14. If g_n is a geometric sequence whose nth term can be expressed at $8 \times 6^{n-1}$, what is the value of $\frac{g_6}{g_8}$?

15. If A is the set of all positive integers less than 300 which are divisible by 3, and B is the set of all prime numbers, the intersection of set A with set B has how many elements?

16. If $\frac{3}{5}$ of $\frac{1}{3}$ is divided into 4, what is the resulting value?

17. Reynaldo is building a model car. He can choose up to three of the following accessories to enhance it: glow-in-the-dark hubcaps, moveable windshield wipers, smiling passengers. If he chooses at least one, how many distinct combinations of accessories are possible? (Note: The order of the accessories is not important.)



18. Each face of a box is to be covered with a piece of decorated paper. If the box has the dimensions shown in the figure above and no paper is wasted, what is the total area of paper (in square inches) needed to complete the job?

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19. Chucky the clown makes balloon animals for birthday parties. He charges his customers according to the following rates:

1) a general fixed fee for attending a party, and

2) an additional fee for every $\frac{1}{5}$ of an hour that he works.

If the final bill for $2\frac{3}{5}$ hours of work is \$24.50

and the final bill for $4\frac{1}{2}$ hours of work is \$38.75,

what is the final bill, in dollars, for 1 hour of work?

(When gridding your answer, disregard the \$ sign.)

20. Adam, Justin, Doug, Dan, Ed, and Meredith go bowling. If Meredith's score is 6 times the average (arithmetic mean) score for the other 5 players, then her score is what portion of the total score for all 6 players?

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

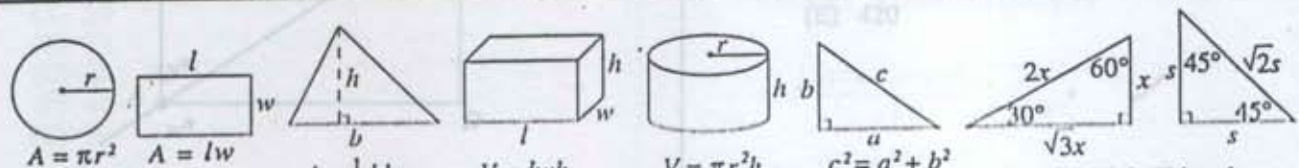
SECTION 6
Time — 20 minutes
15 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



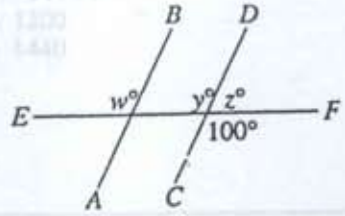
$A = \pi r^2$, $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

$$\begin{array}{r} 1M9 \\ -\ 3M \\ \hline 14N \end{array}$$

1. In the correctly worked subtraction problem above, if M and N represent two distinct digits, then what is the value of N?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

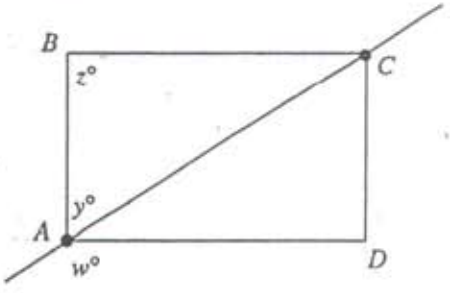


2. In the figure above, $\overline{AB}$ and $\overline{CD}$ are parallel and they are intersected by $\overline{EF}$. What is the value of $w + y + z$?

(A) 180
(B) 240
(C) 260
(D) 280
(E) 300

GO ON TO THE NEXT PAGE

3. If $x = y + 2$ and $y = 4$, then $\frac{3}{2}x =$
(A) 2
(B) 9
(C) 12
(D) 18
(E) 24



Note: Figure not drawn to scale.

4. In the figure above $ABCD$ is a rectangle. If $w = 100$, then $y + z =$
(A) 90
(B) 100
(C) 120
(D) 170
(E) 180

5. The total distance that a car can travel varies directly with the amount of gas in its tank. A certain car can travel 270 miles when its tank is $\frac{3}{4}$ full. If the car's tank has 12 gallons in it when it is $\frac{3}{4}$ full, how far, in miles, can the car travel on a full tank of gas?
(A) 16
(B) 22.5
(C) 192
(D) 360
(E) 420

6. If $10 + \sqrt{x} = 154$, then $10\sqrt{x} =$
(A) 12
(B) 120
(C) 144
(D) 1200
(E) 1440

7. If the point (1, 3) is on the graph of $f(x)$, which of the following points must be on the graph of $f(x + 2)$?
(A) (3, 3)
(B) (−1, 3)
(C) (1, 5)
(D) (−1, 5)
(E) (3, 5)

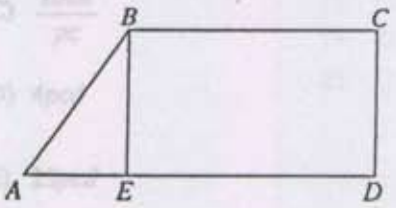
GO ON TO THE NEXT PAGE

8. 90 is 50 percent of 90 percent of what number?

(A) 180
(B) 200
(C) 450
(D) 1,800
(E) 2,000

9. How many 2-digit numbers have a tens digit that is an even number and a units digit that is an odd number?

(A) 10
(B) 15
(C) 20
(D) 40
(E) 50



Note: Figure not drawn to scale.

10. In the figure above ABE is a triangle and $EBCD$ is a rectangle. $AE = 9$, $AB = 15$ and the perimeter of $EBCD = 40$. What is the area of $EBCD$?

(A) 48
(B) 54
(C) 96
(D) 108
(E) 150

11. Stefan takes 240 minutes to draw 20 pictures. How many pictures will he draw in 6 hours if he draws 3 times faster than the given rate?

(A) 30
(B) 40
(C) 60
(D) 90
(E) 120

12. $x + 6$ is a factor of all of the following rational algebraic expressions EXCEPT

(A) $\dfrac{x^2+12x+36}{x+6}$

(B) $\dfrac{3x^2+16x-12}{3x^3-2x^2}$

(C) $\dfrac{3x^2-5x+3}{x+6}$

(D) $\dfrac{3x^2+20x+12}{10x^3+6x^2}$

(E) $\dfrac{x^2-36}{6x^2-x}$

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13. If the set of four integers n, $2n$, $n + 2n$, and $n + 4n$ consists only of prime numbers, then the set is called a "prime convergence." How many such sets exist?

(A) None
(B) One
(C) Three
(D) Four
(E) More than four

14. For the annual school fundraiser, Santiago has p pledges each for c cents per lap that he jogs. If his school track has 4 laps per mile and Santiago raises a total of d dollars, how many miles did he jog in terms of p, c, and d?

(A) $\frac{25d}{pc}$

(B) $\frac{4pc}{d}$

(C) $\frac{100d}{pc}$

(D) $4pcd$

(E) $25pcd$

15. If $(x + y)(x - y) + (4 - y)(2 - y) = 0$, then what is the value of y when x equals 8?

(A) -12

(B) $-9\frac{1}{3}$

(C) 6

(D) $9\frac{1}{3}$

(E) 12

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 10: ANSWER KEY

2 Math	4 Math	6 Math
1. D	1. E	1. B
2. A	2. D	2. D
3. B	3. D	3. B
4. C	4. A	4. B
5. E	5. A	5. D
6. E	6. A	6. E
7. C	7. C	7. B
8. B	8. D	8. B
9. C	9. E	9. C
10. D	10. B	10. C
11. A	11. 4.6	11. D
12. D	12. 4 or 6	12. C
13. A	13. 50	13. A
14. C	14. .027, .028 or $\frac{1}{36}$	14. A
15. B	15. 1	15. E
16. C	16. 20	
17. B	17. 7	
18. D	18. 268	
19. D	19. 12.5	
20. C	20. .545 or $\frac{6}{11}$	

SAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
71		46	710	21	480
70		45	700	20	470
69		44	690	19	460
68		43	680	18	460
67		42	670	17	450
66		41	660	16	440
65		40	650	15	430
64		39	640	14	420
63		38	630	13	410
62		37	630	12	400
61		36	620	11	390
60		35	610	10	380
59		34	600	9	370
58		33	590	8	370
57		32	580	7	360
56		31	570	6	350
55	800	30	560	5	340
54	790	29	550	4	330
53	770	28	540	3	320
52	760	27	540	2	310
51	750	26	530	1	310
50	740	25	520	0	280
49	730	24	510	1	250
48	720	23	500	2	220
47	720	22	490	-3	200

Practice Test 10: Answers and Explanations

1. D Solve for x on your calculator by dividing 0.032 by 0.008, which is 4.

2. A Solve the equation: $5(b + 10) = 7(b - 4)$. $5b + 50 = 7b - 28$, $78 = 2b$, $b = 39$.

3. B Since this is an isosceles triangle, the two sides $\overline{AB}$ and $\overline{BC}$ are the same length. Therefore point B's x-coordinate will be in the exact middle of the other two points, and so will be 3. This eliminates (C), (D), and (E). Since the area is 4, $4 = \frac{1}{2}(2)(h)$, so the height should be 4, which should be the y-coordinate.

4. C Since this is an absolute value question, there will be two answers, one for $3x - 6 = 36$, and one for $3x - 6 = -36$. Solve both of these equations for x to get 14 and -10. Since only -10 shows up in the answers, (C) is correct.

5. E Translate "20 percent of x is 10" into an equation: $\frac{200}{100} \times x = 10$. Multiply each side by $\frac{100}{20}$ to find $x = 50$. Next, translate "what is x percent of 10" into an equation: $y = \frac{(50)}{100} \times 10$. So, $y = 5$.

6. E Try to figure out the order. No man stands first, and since a woman stands 4th, the two women must be first and fourth. Since Denzel stands in front of Janine, Janine can't be first, so she must be fourth. That leaves Susan standing first. Denzel must be in front of Janine, so he must now be in spot 2 or 3. Since Denzel can't stand next to Melvin, the only place for Melvin to stand is in the fifth place.

7. C Since the question gives you information in hours, but asks you to solve in terms of minutes, change the hours in the problem to minutes, then solve. This means it takes Marcus 45 minutes to complete 1 job. Set up a proportion: $\frac{45\text{ min.}}{1\text{ job}} = \frac{x\text{ min.}}{3\text{ jobs}}$. Cross-multiply and solve for x: $x = 135$.

8. B The *domain* of a function is defined as all of the values that can be plugged in to the function that give a meaningful result. All numbers on the SAT are real numbers, so any value that gives a negative root can't be used here. If x is a value less than three, $f(x)$ will contain a negative root. Therefore, such values are outside the domain of $f(x)$.

9. C Translate "the product of one more than w and 2 less than w" into $(w + 1)(w - 2) = w^2 - w - 2$. Try possible values for w that are odd. Start with 1, and the answer should be -2, which isn't an answer choice. Next try 3, for which the answer should be 4, which isn't an answer choice. If 5 is used, the answer should be 18, which is a choice, so (C) is correct.

10. D Try plugging in the answers. If Alan started with 50 muffins, he can't sell one-third of them, because 50 is not evenly divisible by 3, so eliminate (C). Try other answers until you find the one that works. Try (D). If he starts with 60, that means he sells one-third, or 20, muffins, then an additional 10, leaving him with 30, which is half the number he started with, just what the problem is supposed to do.

11. A For geometric sequences, multiply the starting quantity (1 in this case) by the ratio between the consecutive terms (4 in this case) taken to the $n-1$ power. n is the number of terms in the sequence. If you forget this rule, another option in this kind of problem is to plug in your own number. If $n = 5$, then Ruth plans to open 1 in the first year, 4 ($= 1 \times 4$) in the second year, 16 ($= 4 \times 4$) in the third year, 64 ($=16 \times 4$) in the fourth year, and 256 ($= 64 \times 4$) in the fifth year. Only (A) equals 256 when $n = 5$.

12. D A good approach to this problem is to plug in values for the variables. For instance, try $r = 4$ and $s = 7$. The product of rs is 28 and all of the answers are factors of 28 except (D).

13. A Isosceles right triangles have a ratio of side:side:hypotenuse of $x:x:x\sqrt{2}$. This ratio will provide all the lengths needed. CE is x, since the hypotenuse of that triangle is $x\sqrt{2}$. So if CE is x, and $BE = 2x$, BC is $3x$, thus line AC is $3x\sqrt{2}$.

14. C Set it up as a proportion, $\frac{1{,}000}{0.02} = \frac{10^8}{x}$ or $\frac{10^3}{0.02} = \frac{10^8}{x}$ and cross multiply. $1{,}000x = 0.02 \times 10^8$, or $x = 2{,}000$.

15. B Set up the ratio as a proportion: $\frac{a}{b} = \frac{2a}{b}$. Because the bottoms of these proportions are the same and cannot be 0, the tops must be equal. So, $a = 2a$. The only number that makes this true is $a = 0$, so statement II is true. Statement I cannot be true because b cannot be 0. Statement III cannot be true because b cannot be 0 and that is the only number that would make the statement true.

16. C The graph of $f(x - 2)$ is 2 units to the right of $f(x)$. The x-intercept is where the line crosses the x-axis, so for the shifted function, this turns out to be -2.

17. B Because the length of $\overline{BD}$ is equal to the length of $\overline{BE}$ and D and E are midpoints, then AB and BC are of equal length. The angles across from these equal sides are equal. So, ΔABC is equilateral. The same logic applies to triangle BDE: it is also equilateral. Therefore, all of the line segments other than $\overline{FG}$ have lengths of 4. Next, find the heights of triangles ACE and BCD—the difference between the two will be FG. Using the 30:60:90 triangle rule, you know that the height of ΔACE is $4\sqrt{3}$, and the height of ΔBCD is $2\sqrt{3}$. The difference is $2\sqrt{3}$, which gives you FG.

18. D If the perimeter of the square is 4, the length of one of the 4 sides is $\frac{4}{4}=1$. To find the circumference, find the radius. Draw in your own diameter connecting A and C. This creates a right triangle with two sides of length equal to 1. It is a 45-45-90 triangle because two of the sides are equal. The ratio of the sides is $1:1:\sqrt{2}$ which means $AC=\sqrt{2}$. The radius is half the diameter so, $r=\frac{\sqrt{2}}{2}$. Circumference is $2\pi r$, so $2\pi\left(\frac{\sqrt{2}}{2}\right)=\sqrt{2}\pi$.

19. D Remember that the exponent outside of the parenthesis applies to each item within the parenthesis. When raising a power to a power, you multiply the exponents. So, $\left(-3a^2b^5\right)^3=(-3)^3\times\left(a^2\right)^3\times\left(b^5\right)^3=-27a^6b^{15}$.

20. C If the equation is going to work out for $y=0$, plug in 0 for y and see if the equation simplifies. $3(0)^4+x(0)-x^2=(0)^2-25$, which simplifies to: $x^2=25$. Therefore there are 2 possible values for x.

1. E Simplify the left side of the equation to get $5x = 10$. Multiply 10 by itself to get 100.

2. D Subtract AB just as you would a normal two-digit number. You get $3 - B = 1$ and $8 - A = 3$. Therefore $B = 2$ and $A = 5$. Multiplying the two gives 10. Alternatively, solve $83 - AB = 31$ and get $AB = 52$. Then just multiply the two digits.

3. D Draw a figure to see that R is the midpoint of $\overline{PT}$. Since PR is 6, double it to find PT, which is 12. Alternatively, if $PQ = QR$, then Q is the midpoint of $\overline{PR}$ (which has length 6), and PQ is therefore 3. Therefore, all four lengths that are given as equal to PQ must be 3 units long. So $PT = 3 + 3 + 3 + 3$, or 12.

4. A Try plugging in the answer choices: $|-3-6| = |-9| = 9 = 3^2$. Note: 2 is another solution. However, 2 does not appear among the answer choices.

5. A A good approach to this problem is to plug in a value for the variable. For instance, try $d = 10$. Then Mr. Barua works 35 hours in a year. Plug in 10 for d in the answers. Only (A) equals 35.

6. A A good approach to this problem is to plug in values for the variables. For instance, try 1, 2, 3, 4, and 5 for j, k, l, m, and n. $(j + n) - (k + m) = (1 + 5) - (2 + 4) = 0$.

7. C In this pattern question, the 6th digit after the decimal point is 3, as is the 12th digit, the 18th, and so on for every multiple of 6. Since 300 is a multiple of 6, the 300th digit is also 3, making the 301st digit 0, and the 302nd digit 7.

8. D A good approach to this problem is to plug in a value for the variable. For instance, try $x = 2$. Plugging in 2 into the expression yields $\frac{8}{3}$. When 2 is put in for x in the answer choices, (D) again yields $\frac{8}{3}$. Alternatively, you can fully factor both the top and the bottom to get $\frac{2(x-4)(x+2)}{(x-4)(x+1)}$, which simplifies to $\frac{2(x+2)}{x+1}$, or $\frac{2x+4}{x+1}$.

9. E Since the circumference is 10π, the diameter is 10. $XY = 6$, and $\angle XYZ$ is marked as a right angle in the figure, so ΔXYZ is a 6:8:10 right triangle. The base and height of a triangle are perpendicular, so you can use the legs of length 6 and 8 as the triangle's base and height. The area of ΔXYZ is therefore $A = \frac{1}{2}bh = \frac{1}{2}(6)(8) = 24$. If the diameter of the circle is 10, the radius is 5. Therefore, the area of the circle is $A = \pi r^2 = \pi(5)^2 = 25\pi$. The area of the top half of the circle is thus $\frac{25\pi}{2}$. Now subtract the area of the triangle (the unshaded region) from the circle to get the area of the shaded region: $\frac{25\pi}{2} - 24$.

10. B A good approach is to plug in a value for the variable. For instance, try $m = 3$. $2^{2(3)+2} = 2^8 = 256$ so $\frac{a}{b} = \frac{256}{64} = 64$. Plug 3 in for m in the answers to see which equals 64. Only (B) works.

11. 4.6 Use your calculator to solve the left side of the equation. You will find that $460{,}000 = b \times 10^5$ Divide both sides by 10^5 to find that $b = 4.6$.

12. 4 or 6 The perimeter of the rectangle is 10, and (2 × base) + (2 × height) = perimeter. So, possible lengths of the sides are 1 and 4 or 2 and 3. Then, to find area, plug your values for base and height into the formula: area = base × height.

13. 50 15 is 30% of the total number of apples picked. So, $15 = \frac{30}{100} \times x$. Multiply both sides of the equation by $\frac{100}{30}$ to find that $x = 50$.

14. $\frac{1}{36}$ or .027 or .028 $\frac{g_6}{g_8} = \frac{8 \times 6^5}{8 \times 6^7} = \frac{1}{6^2} = \frac{1}{36}$

15. 1 3 is the only number which is an element of both sets. Any other multiple of 3 is by definition not prime, since it equals 3 times another integer.

16. 20 $\frac{3}{5} \times \frac{1}{3} = \frac{3}{15}$ which reduces to $\frac{1}{5}$. And, $\frac{4}{\frac{1}{5}} = 4 \times 5 = 20$.

17. 7 The simplest way to solve this problem is to list out all the possibilities. Remember, 1, 2, or 3 items are possible. So, the options are H, W, P, HW, HP, WP, HWP. There are 7 different combinations.

18. 268 Find the surface area of the box in order to find how much paper is needed. To find the surface area, find the area of all the faces. $4 \times 6 = 24$, $6 \times 11 = 66$, $4 \times 11 = 44$. Then add the area of each face together and remember that there are two of each.
So, 24 + 24 + 66 + 66 + 44 + 44 = 268.

19. **12.5** To solve this problem, set up simultaneous equations. There is a fixed fee (x) and an additional fee (y). Multiply the y times the number of times $\frac{1}{5}$ goes into the number of hours worked. So, the first equation is $x + 13y = 24.50$. The second equation is $x + 22.5y = 38.75$. Stack these equations and notice that if you subtract the first one from the second one, you are left with $9.5y = 14.25$. So, $y = 1.50$. Now you can plug 1.50 in for y to find x, which equals 5. Now that you know x and y, you have to calculate the cost for 1 hour of work. 1 hour divided by $\frac{1}{5} = 5$, so $x + 5y =$ total. $5 + (5 \times 1.50) = 12.5$.

20. $\frac{6}{11}$ or .545 The best way to approach this problem is to plug in a value. Start with the average of the five players; 50 is a possible value. That means Meredith's score has to be $6 \times 50 = 300$. And the total for the five players has to be $50 \times 5 = 250$. Now, add Meredith's score to the total for the other five, you'll get 550. So, Meredith's portion of the total is $\frac{300}{550}$, which reduces to $\frac{6}{11}$ or .545.

1. B Subtract the digits in the tens place ($M - 3 = 4$), to find that M is 7. Substitute the value of M in the units (ones) place and get ($9 - 7 = 2$): thus $N = 2$.

2. D When lines are parallel, any line that crosses them both creates two kinds of angles, large and small. And since you know that a line has 180°, you can find out the measure of any angle. So add the two large and one small angles together. $100° + 100° + 80° = 280°$.

3. B $x = 6$, so $\frac{3}{2}x = 9$.

4. B The angle created by the intersection of $\overline{AB}$ with $\overline{AC}$ is the complement to w and therefore measures of 80°. Thus, $y = 10$. Since z is a right angle, $z + y = 100$.

5. D First, find out how many gallons the tank has in it when it is full. This can be done by solving the following equation: $\frac{3}{4}x = 12$, where x is the number of gallons in the tank. There are 16 gallons in the tank when it is full. Now, set up a proportion. Since the distance varies directly with the number of gallons, the proportion would be: $\frac{270\text{ miles}}{12\text{ gallons}} = \frac{x\text{ miles}}{16\text{ gallons}}$. Solve by cross-multiplying to get $x = 360$ miles.

6. E You know that 10 plus something gives you 156, so that something equals 144, or $\sqrt{x} = 144$, so $10 \times 144 = 1440$. Don't solve for x! It isn't necessary here—make sure to do only what you need to in order to answer the question.

7. B The question is asking: for what value of x does $f(x + 2) = 3$? The rule here is that the graph of $f(x + c)$ is shifted c units to the left of the graph of $f(x)$. Hence, you need to shift the x-coordinate 2 units to the left. So, the new x-coordinate is -1. This eliminates (A), (C), and (E). The y-coordinate stays the same in this shift, so eliminate (D).

8. B Convert to math to get $90 = 0.5 \times 0.9 \times x$. Solve for x.

9. C There are only 4 sets of numbers with an even number in the tens' place from 10 to 99, (20s, 40s, 60s, 80s). Each of these has 5 odd numbers. So there are 20 numbers that meet the criteria.

10. C ΔABE as a 3:4:5 triangle with each side multiplied by 3, and $BE = 12$. The perimeter of $EBCD$ is 40, so $BC = 8$. The area of $EBCD = 9 \times 12 = 96$.

11. D He originally took 4 hours $\left(\frac{240}{60}\right)$ to draw 20 pictures, so that is a pace of 5 pictures per hour. Triple the pace would be 15 pictures per hour, and in 6 hours he would draw 90 pictures.

12. C The numerator of (C) cannot be factored. Be careful: $x + 6$ in the denominator means that $\frac{1}{x+6}$ is a factor, but $x + 6$ itself is not a factor. For all the other choices, the numerator can be factored into $x + 6$ times some other expression. Even better, plug in your own number: if $x = 2$, $x + 6 = 8$. Check the numerator of each choice to find the one that is not a multiple of 8. Only (C), which equals 5 with these numbers, doesn't work.

13. A Since the first term must be prime, the smallest value that n can have is 2. The second term will always be even, and therefore the set could never be a "prime convergence."

14. A Try plugging in values for the variables presented. For instance, try $p = 20$, $c = 10$, and $d = 40$. (20 pledges) × (10 cents/lap) × (4 laps/mile) × (1 dollar/100 cents) × (number of miles) = \$40. $\frac{800}{100}$ × (number of miles) = \$40. Number of miles = $\frac{\$40}{8} = 5$. Algebraically, $p\left(\frac{c}{1}\right)\left(\frac{4}{1}\right)\left(\frac{1}{100}\right)(\text{miles}) = d$.

15. E Plug in $x = 8$, and solve the equation for y. $(8 + y)(8 - y) + (4 - y)(2 - y) = 0$ simplifies to $64 - y^2 + 8 - 6y + y^2 = 0$, or $6y = 72$. Thus $y = 12$.

PSAT Practice Test

PSAT Practice Test

Practice Test 11

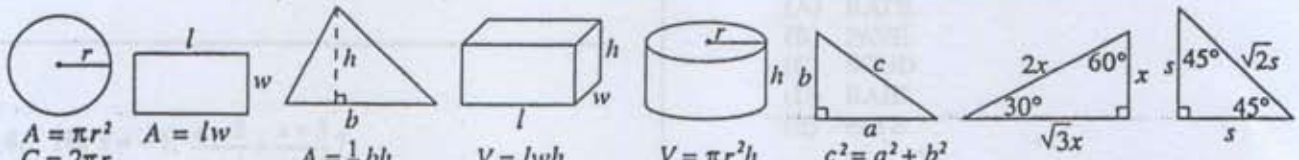
SECTION 2
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$, $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

1. If $4j - k = 11$ and $k = 3j$, then $j =$

(A) $\frac{1}{11}$

(B) $\frac{7}{11}$

(C) $\frac{11}{7}$

(D) $\frac{11}{4}$

(E) 11

2. If a gallon of lemonade requires 3 pints of lemon juice, how many pints of lemon juice would be needed to make z gallons of lemonade?

(A) $z - 3$

(B) $z + 3$

(C) $\frac{z}{3}$

(D) $3z$

(E) z^3

GO ON TO THE NEXT PAGE

3. Carol subscribed to four publications that cost \$12.90, \$16.00, \$18.00, and \$21.90, respectively. If she made an initial down payment of one half of the total amount and paid the rest in 4 equal payments, how much was each of the 4 payments?

(A) \$ 8.60
(B) \$ 9.20
(C) \$ 9.45
(D) \$ 17.20
(E) \$ 34.40

4. For $x \neq -1$, $\frac{x-2}{x+1} + \frac{x+3}{x+1}$?

(A) 1

(B) 2

(C) x

(D) $\frac{2x+1}{x+1}$

(E) $\frac{2x+1}{2x+2}$

1	ABC 2	DEF 3
GHI 4	JKL 5	MNO 6
PRS 7	TUV 8	WXY 9

5. In the keypad shown above, each digit from 2 through 9 can be represented by any of three certain letters. If each digit in a number is replaced by a letter, a "word" is formed. Which of the following "words" could NOT be formed from the four-digit number 7283?

(A) RATE
(B) PAVE
(C) SCUD
(D) RAID
(E) PATE

6. How many integers between 100 and 999 inclusive have a units digit of 7?

(A) 10
(B) 70
(C) 81
(D) 90
(E) 100

GO ON TO THE NEXT PAGE

7. On a map, $\frac{1}{2}$ inch represents 15 miles. If the distance between Dover and Portland is 50 miles, what is the distance, in inches, between the two cities on the map?

(A) 1
(B) $1\frac{2}{3}$
(C) $2\frac{1}{2}$
(D) $3\frac{1}{3}$
(E) $6\frac{2}{3}$

$$(0.4)(0.6)(0.8) = 0.192$$

8. In the multiplication problem above, if each of the three decimals on the left is divided by r, the new product is 24. What is the value of r?

(A) 0.08
(B) 0.02
(C) 0.8
(D) 0.2
(E) 2

9. A certain system of numbers uses dots and lines to represent two digit numbers. The lines represent the tens digit and the dots represent the units digit. For example,

73 = ||||| || ⁝ ∴
68 = ||||| | ⁝ ⁝ ⁝ ⁝

What is the value of the following expression?

||||| ⁝ ⁝ ⁝ ⁝ ∴ − |||| ⁝ ⁝ ⁝

(A) | ⁝ ∴
(B) || ⁝ ∴
(C) ||| ∴
(D) ||| ⁝ ∴
(E) |||| ∴

COSTS OF LEMONADE PRODUCTION					
Number of Pitchers	1	2	3	4	5
Total Cost	\$3	\$5	\$7	\$9	\$11

10. Merrily's costs for producing lemonade are shown in the table above. If c represents the cost, in dollars, of producing n pitchers of lemonade, then which of the following equations best expresses the relationship between c and n?

(A) $c = 2n + 1$
(B) $c = 3n$
(C) $c = 4n - 1$
(D) $c = n^2 + 2$
(E) $c = 2n^2 + 1$

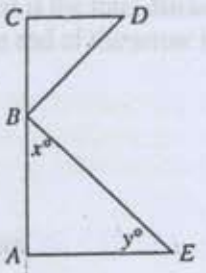
GO ON TO THE NEXT PAGE

11. If $r \neq -s$, what is the value of $\frac{(r-s)(r-s-r+s)}{(r+s)}$?

(A) 0
(B) 1
(C) 2
(D) $r+s$
(E) $2(r-s)$

12. At a certain hour, a lamppost which stands 108 inches tall casts a shadow 27 inches long. Sue is f inches tall. In terms of f, how many inches long is her shadow at the same hour?

(A) $3\sqrt{f}$
(B) $f+81$
(C) $\frac{f}{4}$
(D) $4f$
(E) $\left(\frac{f}{3}\right)^2$



13. In the figure above, $\overline{CD}$ and $\overline{AE}$ are both perpendicular to $\overline{AC}$, and $\overline{BD}$ is perpendicular to $\overline{BE}$. If $x = y$, the length of $\overline{BD}$ is 4, and the length of $\overline{BE}$ is 6, what is the length of $\overline{AC}$?

(A) $5\sqrt{2}$
(B) $6\sqrt{2}$
(C) $10\sqrt{2}$
(D) $2\sqrt{3}$
(E) $10\sqrt{3}$

14. The square root of the product of 4 and a number is 6. What is the number?

(A) 2
(B) $\sqrt{6}$
(C) 9
(D) 24
(E) 36

GO ON TO THE NEXT PAGE

$$\begin{array}{r} A4B7 \\ -\ A4B \\ \hline 5CA7 \end{array}$$

15. In the subtraction problem of a three-digit number from a four-digit number above, A, B, and C represent three different digits. What digit does C represent?

(A) 0
(B) 2
(C) 4
(D) 7
(E) 8

16. Which of the following equations represents this information: "Mr. Johnson distributed 85 beakers among the z students in his science class. Each student received 5 beakers."

(A) $z = \frac{5}{85}$

(B) $85 \times 5 = z$

(C) $5 = \frac{z}{85}$

(D) $85z = 5$

(E) $5z = 85$

17. The minute hand of a clock has a length of l from its point of rotation to the point at the end of the arrow. What is the total distance traveled by the point at the end of the arrow in m minutes?

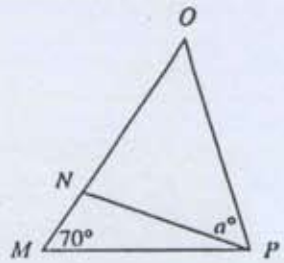
(A) $\frac{m\pi}{60l}$

(B) $\frac{lm\pi}{30}$

(C) $120lm\pi$

(D) $2l\pi$

(E) $\frac{30l\pi}{m}$



Note: Figure not drawn to scale.

18. In the figure above, if $MO = OP$ and $MP = NP$, then $a =$

(A) 30
(B) 40
(C) 50
(D) 55
(E) 70

GO ON TO THE NEXT PAGE

19. If a right circular cylinder has a volume of 144π and a height of 9, what is the area of its base?

(A) 8π
(B) 12π
(C) 16π
(D) 25π
(E) 32π

a, b, m, c, d

20. In the set of five distinct numbers ordered from smallest to largest above, m is the median. Which of the following must be FALSE?

(A) $bm > am$
(B) $b - a > d - c$
(C) $m - b > c - m$
(D) $a + d > b + c$
(E) $a + b > c + d$

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

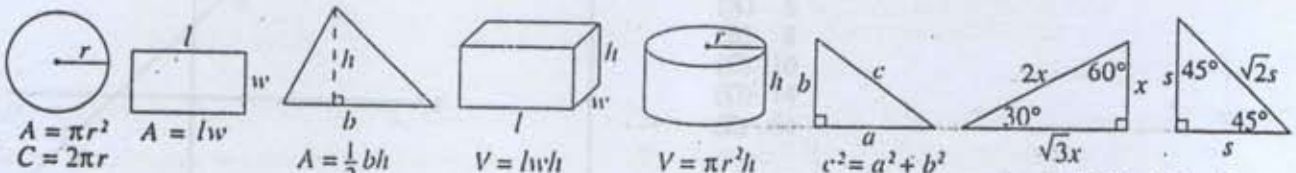
SECTION 4
Time — 25 minutes
20 Questions

Directions: In this section, solve each problem using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

Reference Information



$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

The number of degrees of arc in a circle is 360.
The measure in degrees of a straight angle is 180.
The sum of the measures in degrees of the angles of a triangle is 180.

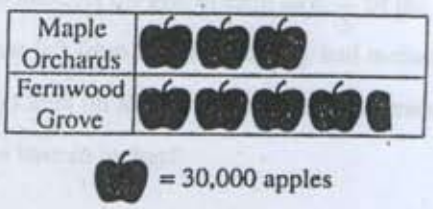
21. If $5x + 8 = 18$, what is the value of $10x$?

(A) 2
(B) 4
(C) 10
(D) 12
(E) 20

22. Carlos pets an animal at a petting zoo that contains only goats and pigs. Which of the following must be true of the animal Carlos pets?

(A) The animal is a goat.
(B) The animal is a pig.
(C) The animal is not a sheep.
(D) The animal is not a brown goat.
(E) The animal is not a pig weighing less than 200 pounds.

APPLES HARVESTED IN 2001



23. In 2001, Fernwood Grove harvested approximately how many more apples than did Maple Orchards?

(A) 10,000
(B) 15,000
(C) 30,000
(D) 45,000
(E) 60,000

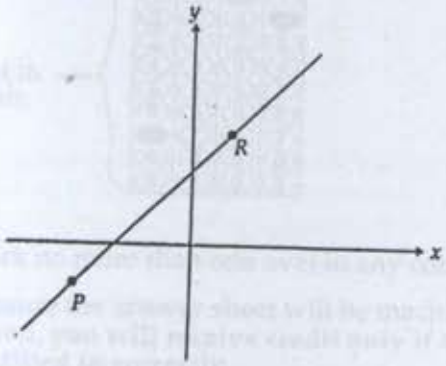
24. Which of the following values of c satisfies the equation $\sqrt{\frac{2c}{5}} - 2\sqrt{2} = 0$?

(A) $\sqrt{10}$
(B) 5
(C) 8
(D) 20
(E) 40

GO ON TO THE NEXT PAGE

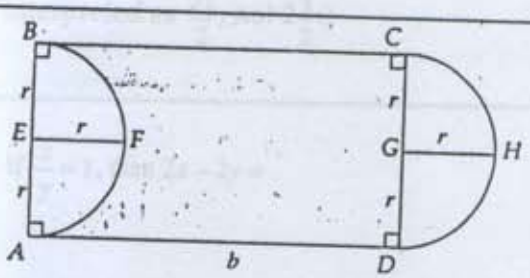
25. If $\frac{a^{10}}{a^f} = a^2$ and $(a^6)^g = a^{18}$, what is the value of $g - f$?

(A) -5
(B) -2
(C) 4
(D) 7
(E) 10



26. Which of the following could be the equation of $\overleftrightarrow{PR}$ in the figure above?

(A) $y = x + 2$
(B) $y = 2x + 1$
(C) $y = 2x + 2$
(D) $y = 2x + 3$
(E) $y = 3x$



27. In the figure above, what is the area of the shaded region?

(A) br
(B) $2br$
(C) $2br - \frac{\pi r^2}{2}$
(D) $2br + \frac{\pi r^2}{2}$
(E) $2br + \pi r^2$

28. Set F contains 5 consecutive even integers. Set G contains all the numbers that result from adding 5 to each of the elements of set F and also all the numbers that result from subtracting 5 from each of the elements of set F. Set G has how many more elements than set F?

(A) 0
(B) 2
(C) 5
(D) 6
(E) 10

29. If $x^{\frac{a+2}{3}} = 4$, then $x^{\frac{a+2}{2}} =$

(A) 6
(B) 8
(C) 10
(D) 14
(E) 64

30. On March 17, a town had an average snow base of x inches. Then, the weather warmed, and the snow began to melt. At the end of each day, $\frac{1}{5}$ of the snow base left from the previous day had melted. Four days later on March 21, what was the remaining snow base in inches?

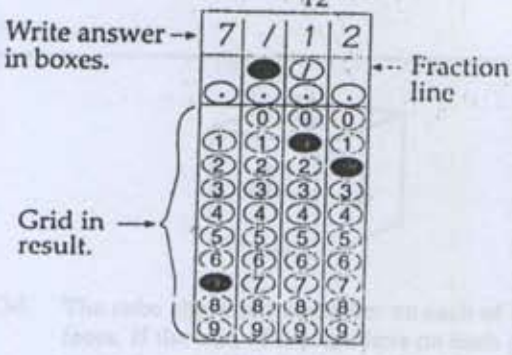
(A) $\frac{1}{5}x$
(B) $\frac{64}{125}x$
(C) $\frac{256}{625}x$
(D) $\frac{300}{625}x$
(E) $\frac{4}{5}x$

GO ON TO THE NEXT PAGE

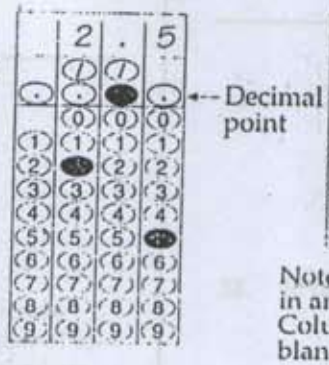
Directions for Student-Produced Response Questions

Each of the remaining 10 questions (31–40) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

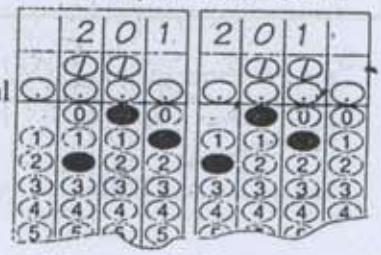
Answer: $\frac{7}{12}$ or 7/12



Answer: 2.5



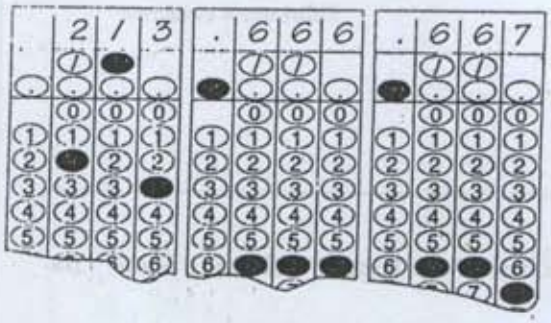
Answer: 201
Either position is correct



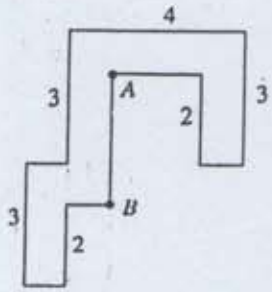
Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If 2 1 / 2 is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)
- **Decimal Accuracy:** If you obtain a decimal answer, **enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . ., you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3} = .6666\ldots$



31. If $\frac{x}{y} = 1$, then $2x - 2y =$



32. If all of the angles in the figure above are right angles, what is the length of $\overline{AB}$?

GO ON TO THE NEXT PAGE

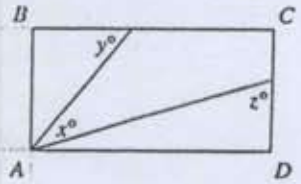
33. If point P lies on $\overline{TR}$ such that $TP = 2$ and $PR = 1$, what is the probability that a randomly selected point on $\overline{TR}$ will lie on $\overline{TP}$?

34. The cube above has a number on each of its six faces. If the sum of the numbers on each pair of opposite faces is 10, what is the sum of the numbers on the faces not shown?

35. The weight of the tea in a box of 100 identical tea bags is 8 ounces. What is the weight, in ounces, of the tea in one bag?

36. What is the product of all of the positive integer factors of 10?

37. If a varies inversely as b, and $a = 3$ when $b = 4$, then what is the value of b when $a = 48$?



38. In rectangle $ABCD$, if $x = 40$, then $y + z =$

39. At a clothing store, the price of a cashmere sweater is three times the price of a cotton sweater. If the store sold 25 cashmere sweaters for a total of \$1,500, and the combined sales of cashmere and cotton sweaters totaled \$1,800, how many cotton sweaters were sold?

40. If $n \neq 0$ and $125n^x$ is equal to n^{x+3}, then $125n =$

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section in the test.

PRACTICE TEST 11: ANSWER KEY

Section 2	Section 4
1. E	21. E
2. D	22. C
3. A	23. D
4. D	24. D
5. D	25. A
6. D	26. A
7. B	27. B
8. D	28. C
9. A	29. B
10. A	30. C
11. A	31. 0
12. C	32. 3
13. A	33. $\frac{2}{3}$, .666, or .667
14. C	34. 16
15. D	35. .08, $\frac{4}{50}$, or $\frac{2}{25}$
16. E	36. 100
17. B	37. $\frac{1}{4}$ or .25
18. A	38. 130
19. C	39. 15
20. E	40. 625

PSAT SCORE CONVERSION TABLE

Raw Score	Math Scaled Score	Raw Score	Math Scaled Score	Raw Score	Math Scaled Score
52		27	59	2	24
51		26	58	1	23
50		25	56	0	22
49		24	55	-1	21
48		23	54	-2	20
47		22	52	-3	20
46		21	51		
45		20	49		
44		19	48		
43		18	47		
42		17	45		
41		16	44		
40	80	15	42		
39	76	14	41		
38	75	13	40		
37	73	12	38		
36	72	11	37		
35	71	10	35		
34	69	9	34		
33	68	8	33		
32	66	7	31		
31	65	6	30		
30	64	5	28		
29	62	4	27		
28	61	3	26		

Practice Test 11: Answers and Explanations

1. **E** The question asks for the value of j. We are told $4j - k = 11$ and that $k = 3j$. Replace the k with $3j$. $4j - 3j = 11$, so $j = 11$.

2. **D** Plug in a number for z. If $z = 2$, then a proportion can be set up: 1 gallon lemonade make 3 pints lemon juice, so 2 gallons of lemonade make 6 pints lemon juice. Your target number is 6, only choice (D) gives you 6.

3. **A** Take bite size pieces. First add to find the total of all the magazines, which is \$68.80. The down payment is half the total, which is \$34.40. Be careful of choice (E)—it's a partial answer. The remainder is divided into four equal payments, which is \$8.60. This is what the question asks you to find, so (A) is correct. Be careful of choice (D). If you skipped the step of dividing the total by 2 for the down payment, you get (D).

4. **D** Plug in a number for x. If $x = 2$, then you are adding the fractions $\frac{0}{3}$ and $\frac{5}{3}$, which equals $\frac{5}{3}$. Only (D) gives you $\frac{5}{3}$.

5. **D** See what letters are possible for each digit of 7283. 7 gives PRS. All the words begin with those letters, so nothing is eliminated. 2 gives ABC. All the words have those letters second, so nothing is eliminated. 8 gives TUV. (D), RAID, is not possible.

6. **D** Write it out on pattern questions until you see the pattern to save yourself some work. There are 10 integers with a 7 in the units place between 100 and 199. Since you have 9 sets of these from 100 to 999, there are 90 integers with a units digit of 7.

7. **B** Set up a proportion and solve for x.

$\frac{(0.5)}{15} = \frac{x}{50}$. Cross-multiply, so $25 = 15x$.

$x = \frac{25}{15}$, which reduces to $1\frac{2}{3}$.

8. **D** Plug in the answer choices. Only (D) works. $0.4 \div 0.2 = 2$; $0.6 \div 0.2 = 3$; $0.8 \div 0.2 = 4$. Since $2 \times 3 \times 4 = 24$, (D) is the correct answer.

9. **A** First convert the lines and dots to real numbers. $59 - 46 = 13$, so you're looking for the symbols that represent 13, which you'll find in (A).

10. **A** Plug in the numbers from the chart into the equations in the answer choices until you find the one that always works. Only (A) always produces the correct cost when the values for n (the number of pitchers) is plugged in.

11. **A** Plug in!! No matter what numbers you plug in for r and s (as long as $r \neq -s$, as stated in the question) the numerator has a value of 0. In $(r - s - r + s)$ each value is cancelled out by its opposite.

12. **C** Plug in and make a proportion for height to shadow. If $f = 20$, then $\frac{108}{27} = \frac{20}{\text{Sue's shadow}}$.

$108 \div 27 = 4$. So if Sue is 20 inches tall, her shadow must be 5 inches long. Plug 20 into the answer choices and only (C) gives the target number 5.

13. A Because $\overline{CD}$ and $\overline{AE}$ are perpendicular to $\overline{AC}$, you've got two right triangles. Triangle BCD has a hypotenuse of 4, while triangle ABE had a hypotenuse of 6. Because $x = y$, triangle ABE is a 45:45:90 triangle. Triangle BCD is also 45:45:90 since $x = 45°$, $\overline{BD}$ is perpendicular to $\overline{BE}$, and there are 180° in a straight line. Now you can use special right triangles! Since the hypotenuse of triangle BCD is 4, then $4 = s\sqrt{2}$, and each leg is $\frac{4}{\sqrt{2}}$. Since the hypotenuse of triangle ABE is 6, $6 = s\sqrt{2}$, and each leg is $\frac{6}{\sqrt{2}}$. AC is thus $\frac{10}{\sqrt{2}}$, which simplifies to $5\sqrt{2}$ when you multiply numerator and denominator by $\sqrt{2}$

14. C Translate first, then you can solve or plug in the answer choices. The square root of $4n = 6$, so $4n = 36$, which makes $n = 9$.

15. D Note that the letters are standing in for a one-digit number. If $7 - B = 7$, B must represent 0. Now the problem is $A407 - A40 = 5CA7$. If we carry a one from the 4 to the 0, we get $10 - 4 = A$ which means A is equal to 6. Now we have $6407 - 640 = 5C67$. Once you evaluate from here you get $C = 7$.

16. E If Mr. Johnson is dividing the 85 beakers among his z students, you would divide 85 by z to find 5. So, $\frac{85}{z} = 5$. Multiply each side by z to find $5z = 85$.

17. B Plug in. Rotation questions are often about circumference ($C = 2\pi r$). Pick any number you like for l, but when you plug in for m, pick a number of minutes that is an 'easy' fraction of an hour (but not 60 or 30 because those are in the answer choices). So, if $l = 5$ and $m = 15$, the whole circumference is 10π. Fifteen minutes is $\frac{1}{4}$ of an hour, so the minute hand will move $\frac{1}{4}$ of the circumference, which is 2.5π. Plug into the answer choices and only (B) gives you 2.5π.

18. A Redraw figures not drawn to scale. Triangle MOP is isosceles, and so is triangle MNP. Equal sides are opposite equal angles, so the angles of the smaller triangle can thus be figured out: $\angle MNP$ is 70°, $\angle MPN$ is 40°. Since you know $\angle MPO$ is 70°, a is 30°.

19. C The volume for a cylinder is basically the area of a circle multiplied by the height ($\pi r^2 h$). You are given a height of 9, so $\pi r^2 9 = 144\pi$. Divide both sides by 9, and you see that $\pi r^2 = 16$. Go no farther; that is the base of the cylinder.

20. **E** Since the question asks which must be FALSE, if you can plug in any numbers that make a statement in the answer choices true, you can eliminate that choice. (E) never works, because the question states that the numbers are distinct and correctly ordered (that is, from lowest to highest). a and b are lower values than c and d, so $a + b$ can never be higher than $c + d$.

21. E Subtract 8 from both sides of the equation and you're left with $5x = 10$. Since you are asked for $10x$, simply multiply by 2, and you see that $10x = 20$. Read the question carefully, $x = 2$; so (A) is a trap answer.

22. C Since the question asks for what MUST be true, if you can think of one situation in which a statement is false, you can eliminate that answer. There are only pigs and goats. (A) could be false if Carlos is petting a pig. (B) could be false if Carlos is petting a goat. (C) is not possible, because there are no sheep, only pigs and goats. Carlos could be petting brown goats or underweight pigs, which rules out (D) and (E) respectively.

23. D Ballpark! Each apple on the chart represents 30,000 apples. Fernwood Grove has one and a half apples more than Maple Orchards, so eliminate (A), (B), and (C) because they are all too small. (E) would be represented by two apples, so it is eliminated because it is too big, leaving only (D).

24. D Simplify and solve or plug in the answer choices. The two terms given are equal to each other since one subtracted from the other equals 0. Then square each side of the equation to get rid of the root signs. Now you have $\frac{2c}{5} = 8$. $2c = 40$, so $c = 20$.

25. A Remember MADS PM for dealing with exponents when the bases are the same. $10 - f = 2$, so $f = 8$. $6g = 18$, so $g = 3$. Therefore, $g - f = 3 - 8 = -5$.

26. A Make up a couple numbers for x in each of the answer choices to see if the y forms a coordinate pair that would be on the line. (A) produces the pairs (–2, 0), (–1, 1), (0, 2), (1, 3), and (2, 4). These numbers could fit on $\overline{PR}$. All the other choices give some coordinate pairs which conflict with $\overline{PR}$. Try sketching them out.

27. B You know the semicircles on the inside and outside of the rectangle are identical because they each have a radius of r, therefore you only need to find the area of the rectangle which has length b and width $2r$. Length times width gives $2br$. Plugging in also works here.

28. C Plug in! Make a list of five consecutive even integers for Set F such as 2, 4, 6, 8, and 10. Make a list for set G, adding 5 to each number in set F gives 7, 9, 11, 13, 15. Subtracting 5 gives –3, –1, 1, 3, 5 for a total of ten integers in set G, which is 5 more than set F.

29. B Plug in! If $a = 4$, then $x^{\frac{a+2}{3}} = x^2 = 4$ and $x = 2$. Plug these values for a and x into $x^{\frac{a+2}{2}}$, which simplifies to 2^3, which equals 8.

30. C Be careful! Each day the snow is reduced by $\frac{1}{5}$ of what is left *from the previous day*, NOT $\frac{1}{5}$ of the total. (A) is a trap answer. Essentially, each day there is $\frac{4}{5}$ of the previous day's snow. It is safest to plug in. If $x = 100$, that's the measurement on March 17. Multiply by $\frac{4}{5}$ to find March 18 has 80 inches. Multiply that by $\frac{4}{5}$ (or 0.8) to find March 19 has 64 inches. Multiply that by 0.8 to find March 20 has 51.2 inches. Multiply that by 0.8 to find March 21 has 40.96 inches. This is the target answer. Plug your value for x into the answer choices, and only (C) gives 40.96. Be careful; (B) gives the result for March 20.

31. 0 Because $\frac{x}{y} = 1$, $x = y$. Therefore, any numbers you plug in will result in $2x - 2y = 0$.

32. 3 Because all angles are 90°, draw on the given figure to more clearly see the rectangles and squares within—helpful because opposite sides of rectangles are equal. A line perpendicular to $\overline{AB}$ from the bottom of the right-hand side of the figure shows that the top portion of $\overline{AB}$ is 2 units long. A line perpendicular to $\overline{AB}$ from point B shows that the rest of $\overline{AB}$ is 1 unit long, for a total of three units.

33. $\frac{2}{3}$ or .666 or .667 Draw figures whenever they are described but not given. Since TP is $\frac{2}{3}$ of TR, there is a $\frac{2}{3}$ chance of a random point landing on $\overline{TP}$.

34. 16 or $\frac{2}{25}$ or .08 Since opposite sides add up to 10 the three unseen sides are 8, 2, and 6, which add up to 16.

35. $\frac{4}{50}$ 8 ounces of tea must be divided evenly into 100 parts. $\frac{8}{100}$ can be reduced or converted into a decimal.

36. 100 First list the factors of ten: {1, 10, 2, 5}. Then multiply. $10 \times 2 \times 5 = 100$.

37. $\frac{1}{4}$ or .25 The formula for inverse variation is $a_1b_1 = a_2b_2$. Plug the original values for a and b into the first part of the equation to find that $12 = a_2b_2$.

Since the value $a = 48$ is given for the second part of the equation, solve for b. $12 = 48b$.

$b = .25$.

38. **130** Plug in! Since $ABCD$ is a rectangle, each corner has a value of 90°. As stated in the problem, $x = 40$. $\angle C$ is 90°. There are 360° in any 4-sided figure, so make up appropriate values for the remaining corners of the diamond-shaped figure within the rectangle. Then you can use the rule of 180° in a straight line to find values for x and y. If the corner of the diamond next to y is 100°, then y is 80°. The corner of the diamond next to x must then be 130°, thus x is 50°. $80 + 50 = 130$.

39. **15** Use bite-sized pieces. 25 cashmere sweaters cost \$1,500, so each is \$60. Cashmere is three times the cost of cotton, so cotton sweaters are \$20. The total cost of all the sweaters is \$1,800, \$1,500 of which is cashmere, leaving \$300 worth of cotton. \$300 ÷ \$20 = 15.

40. **625** Plug in! Then use the exponent rules, MADSPM, to solve for n. If $x = 2$, then $125n^2 = n^5$. Divide both sides by n^2. $125 = n^3$, so $n = 5$. $125n$ therefore is 625. You can't plug in values for both x and n. One of the values must be determined by the relationship of the equation.