

Chapter 18

Practice Exam 1

Welcome to SAT Land. If you read — or even glanced at — other chapters in this book, you already have a map of the territory. But as every traveler knows, reading *about* a place and actually *being* there are very different experiences. This chapter is an opportunity to visit. You won't send smiling photos to your friends from SAT Land. You aren't going on vacation! However, when you take this practice exam and check your answers in Chapter 19, you will end up with a few great souvenirs — a better understanding of your strengths and weaknesses.

You may decide to break this test into pieces, working on one section each day for a week, perhaps. Or you may block off an entire morning and do the whole thing at once, as you will at the testing center. Either way, keep to the time limit for each section. Also, be sure to read the explanations for every incorrect answer, and, if you can spare the time, for correct answers as well. The explanations in Chapter 19 are filled with tips and tricks to improve your score.

Ready? Tear out the bubble answer sheet, grab a pencil and four sheets of loose-leaf paper (if you're writing the optional essay), and place a timer where you can see it. Sit back, relax, and enjoy your trip through Practice Exam I.

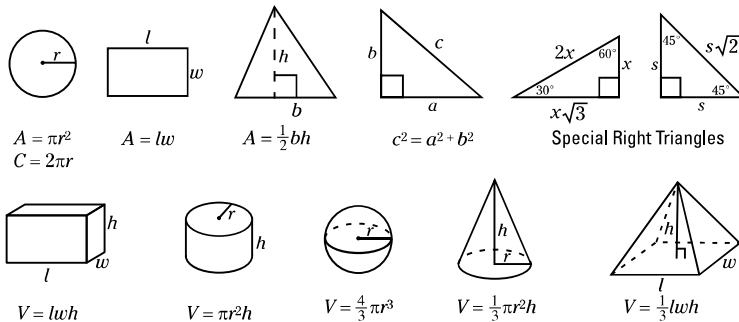
Section 2: Math — Calculator Section

Time: 55 minutes for 38 questions

Directions: This section contains two different types of questions. For Questions 1–30, choose the best answer to each question and darken the corresponding oval on the answer sheet. For Questions 31–38, follow the separate directions provided before those questions.

Notes:

- ✓ You may use a calculator.
- ✓ All numbers used in this exam are real numbers.
- ✓ All figures lie in a plane.
- ✓ All figures may be assumed to be to scale unless the problem specifically indicates otherwise.

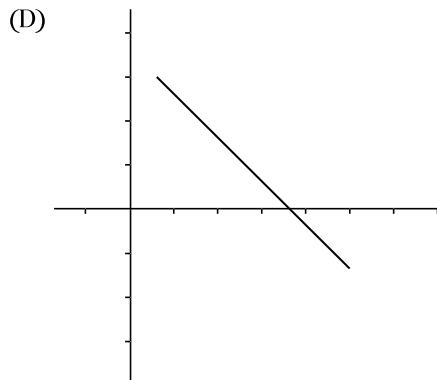
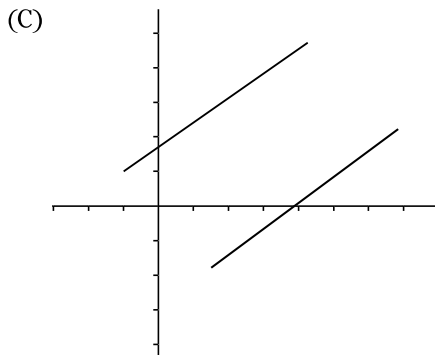
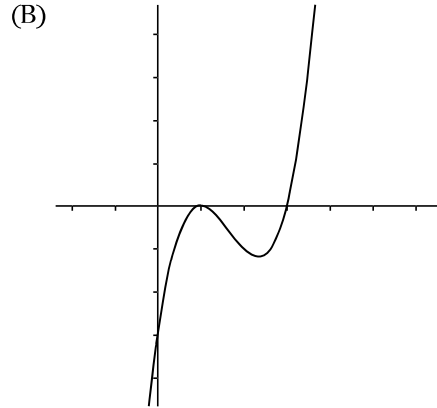
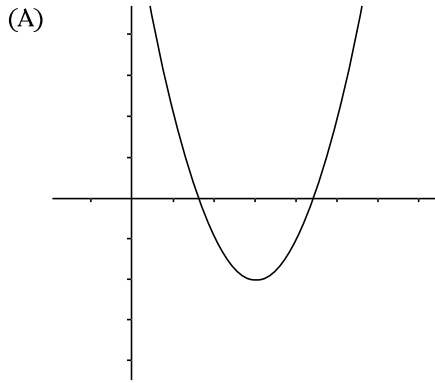


1. A box has exactly 11 marbles in it. Three of the marbles are green, six are yellow, and the rest are red. If one marble is drawn at random from the box, what is the probability that the marble is red?
 - (A) $\frac{1}{11}$
 - (B) $\frac{1}{9}$
 - (C) $\frac{2}{11}$
 - (D) $\frac{2}{9}$
2. Three cars drove past a speed-limit sign on a highway. Car A was traveling twice as fast as Car B, and Car C was traveling 20 miles per hour faster than Car B. If Car C was traveling at 60 miles per hour, how fast was Car A going?
 - (A) 20 miles per hour
 - (B) 30 miles per hour
 - (C) 40 miles per hour
 - (D) 80 miles per hour

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3. No two points on the graph have the same y-coordinate.

Which of the following graphs has this property?



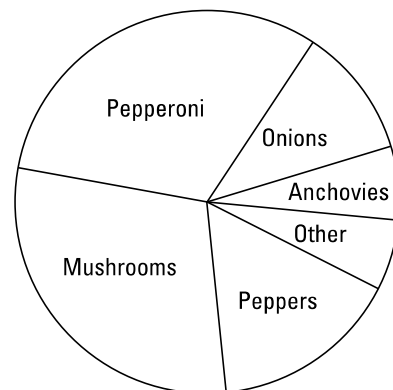
4. For integers a , b , and c , let $a \# b \# c$ be defined by $a \# b \# c = a^2 - bc + b$. What is the value of $6 \# 3 \# 4$?

- (A) 3
(B) 12
(C) 27
(D) 30

5. If 3 less than twice a number is 13, what is 5 times the number?

- (A) 8
(B) 30
(C) 40
(D) 50

Topping Sales

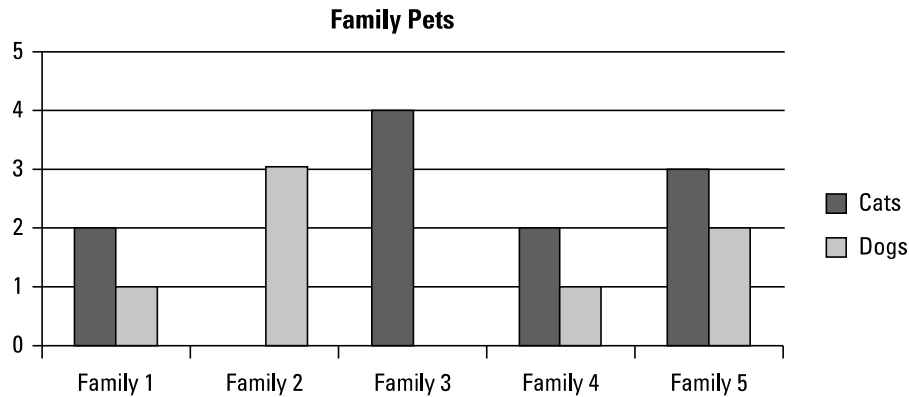


6. According to the circle graph, how many of the pizza toppings individually represent more than 25 percent of total sales?

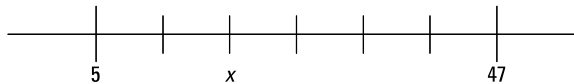
- (A) one
(B) two
(C) three
(D) four

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7. If $|10 - 3y| < 3$, which of the following is a possible value of y ?
- (A) 0
(B) 1
(C) 2
(D) 3



8. According to the chart, how many cats are kept as pets among the five families polled?
- (A) 4
(B) 7
(C) 9
(D) 11



9. In the figure above, tick marks are equally spaced on the number line. What is the value of x ?
- (A) 6
(B) 17
(C) 19
(D) 25

10. If a and b are positive integers and $2^{3a} \times 2^{3b} = 64$, what is the value of $a + b$?
- (A) 1
(B) $\frac{3}{2}$
(C) 2
(D) 4

11. If $(x - 4)^2 = 49$ and $x < 0$, what is the value of x ?
- (A) -11
(B) -5
(C) -3
(D) -1

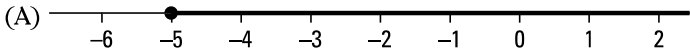
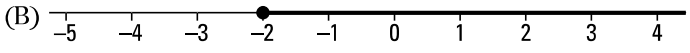
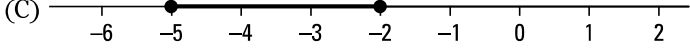
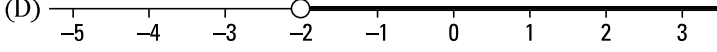
12. If $2a^2 = 56$, what is the value of $8a^2$?

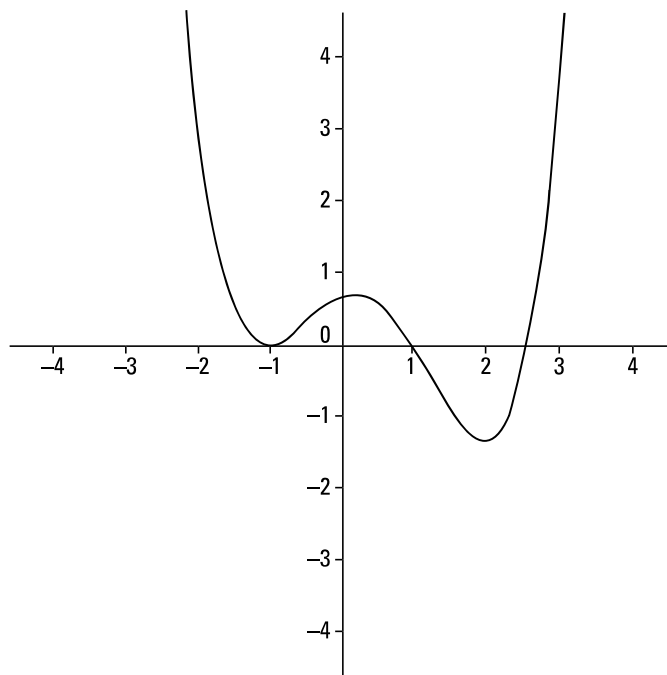
- (A) 144
- (B) 156
- (C) 212
- (D) 224

13. In the rectangular coordinate system, the line with equation $y = 2x + 4$ crosses the x -axis at the point with coordinates (f, g) . What is the value of f ?

- (A) -4
- (B) -2
- (C) 0
- (D) 2

14. Which of the following represents all values of x that satisfy this inequality: $7 \geq -2x + 3$?

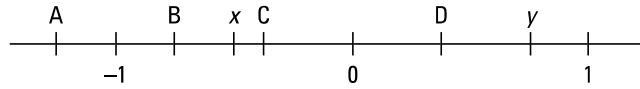
- (A) 
- (B) 
- (C) 
- (D) 



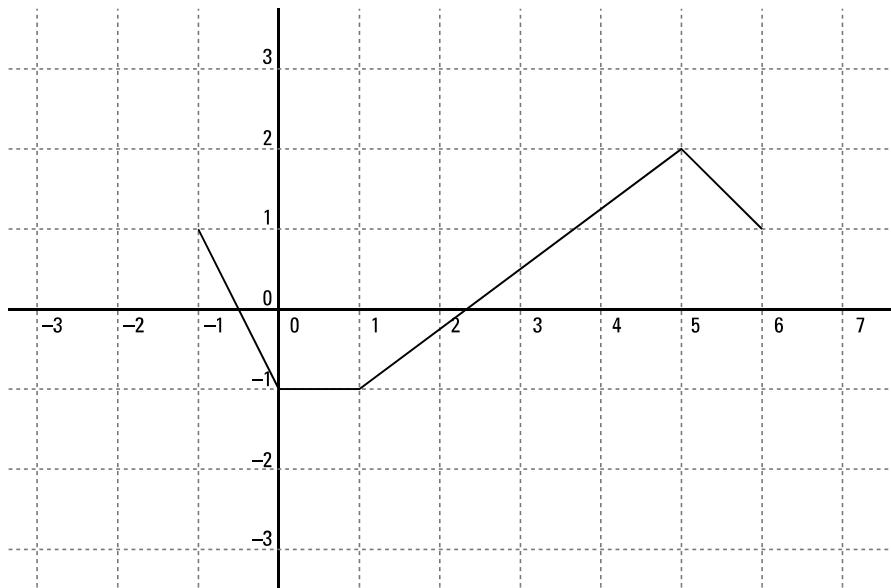
15. The figure above shows the graph of $y = f(x)$ from $x = -3$ to $x = 4$. For what value of x in this interval does the function f attain its minimum value?

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

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16. Above, which point on the number line best represents the product xy ?
- (A) A
 (B) B
 (C) C
 (D) D



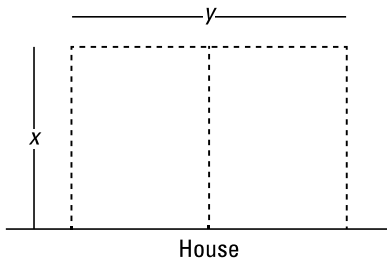
17. The graph of $y = f(x)$ is shown above. If $f(3) = ka$, which of the following could be the value of $f(k)$?
- (A) -1
 (B) $-\frac{1}{2}$
 (C) 0
 (D) $\frac{1}{2}$

18. If $-1 < x < 0$, which of the following statements must be true?

- I. $x > \frac{x}{2}$
 II. $x^2 > x$
 III. $x^3 > x^2$

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

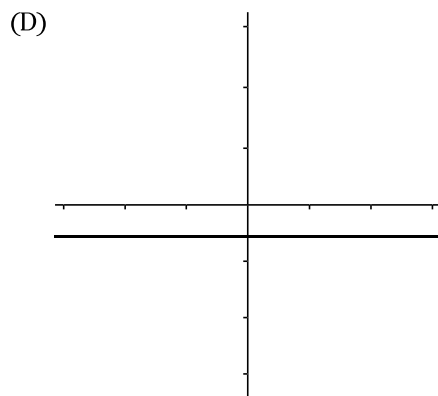
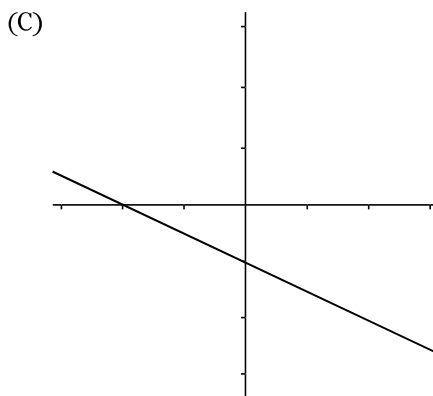
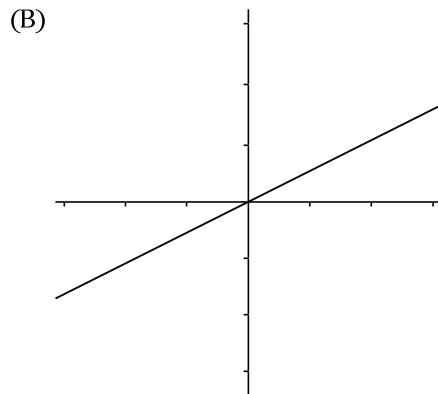
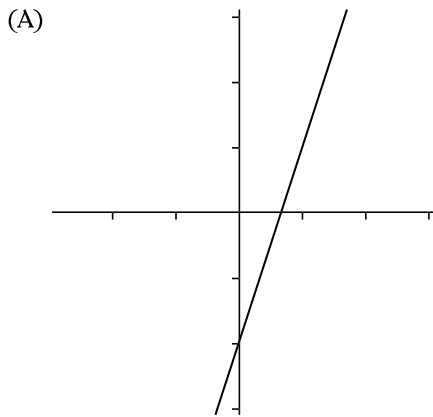
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19. A gardener is building a fence to enclose her garden and divide it in half, as shown above. The fourth side of the garden is adjacent to her house, so it does not require fencing. The total area of the garden is 2,400 square feet. In terms of x , how many feet of fencing does the gardener require?
- (A) $2,400 - 3x$
 (B) $x + \frac{2,400}{x}$
 (C) $3x + \frac{2,400}{x}$
 (D) $3x + \frac{1,200}{x}$

20. An equilateral triangle has vertices at $(-1, 1)$ and $(5, 1)$. Which of the following might be the coordinates of the third vertex?
- (A) $(2, -5)$
 (B) $(2, 1 - 3\sqrt{3})$
 (C) $(2, 3\sqrt{3})$
 (D) $(3\sqrt{3}, 1)$
21. In the following sequence, the first term is 2, and each term after the first term is 3 less than 3 times the previous term. What is the value of k ?
- 2, 3, 6, k , 42
- (A) 10
 (B) 12
 (C) 14
 (D) 15

22. Which of the following is the graph of a linear function with a positive slope and a negative y -intercept?

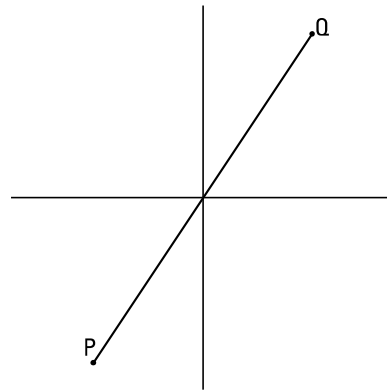


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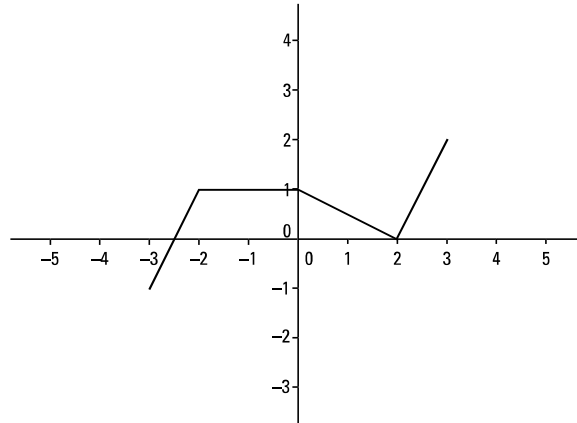
23. A baker can bake three dozen cookies in 45 minutes. How many cookies can the baker make in one hour?
- (A) 4
(B) 36
(C) 40
(D) 48

k	1	2	3	4	5	6
$f(k)$	15	11	7	n	-1	-5

24. The table above defines a linear function. What is the value of n ?
- (A) 1
(B) 2
(C) 3
(D) 4
25. When the number m is multiplied by 5, the result is the same as when 6 is subtracted from m . What is the value of $8m$?
- (A) -12
(B) -6
(C) $-\frac{3}{2}$
(D) 3

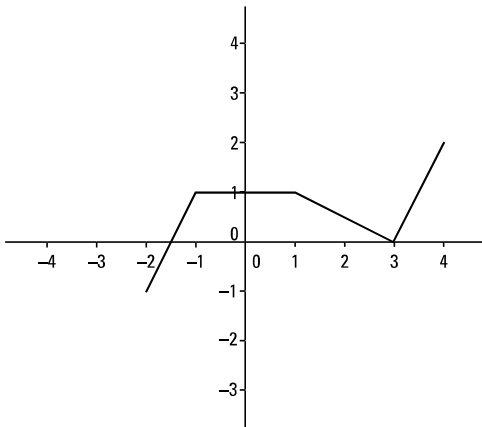


26. The coordinates of point P in the figure above are (a, b) , where $|b| > |a|$. Which of the following could be the slope of PQ ?
- (A) -3
(B) $-\frac{1}{2}$
(C) $\frac{1}{2}$
(D) $\frac{3}{2}$

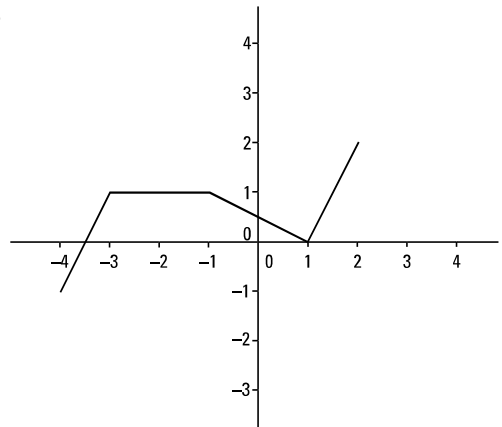


27. The graph of $y = g(x)$ is shown above. Which of the following could be the graph of $y = g(x-1)$?

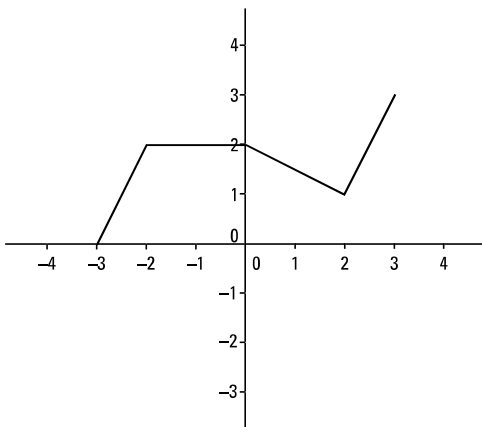
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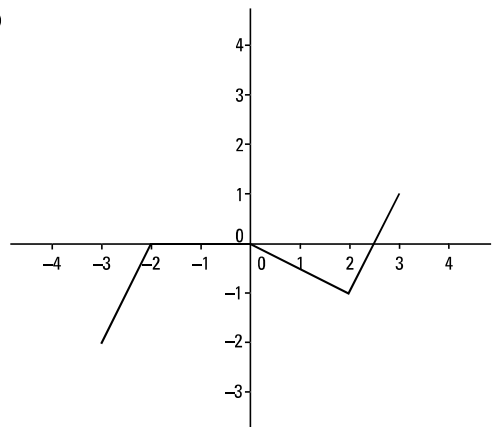
(B)



(C)



(D)



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28. In the xy -plane, lines p and q are perpendicular. If line p contains the points $(-2, 2)$ and $(2, 1)$, and line q contains the points $(-2, 4)$ and $(k, 0)$, what is the value of k ?
- (A) -3
 (B) -2
 (C) -1
 (D) 0
29. If the arithmetic mean of 4 , p , and q is 6 , what is the value of $\frac{p+q}{2}$?
- (A) 2
 (B) 3
 (C) 6
 (D) 7
30. On a number line, 27 is exactly halfway between the point at 15 and another point. What is the value of the other point?
- (A) 12
 (B) 39
 (C) 51
 (D) 60

Directions for student-produced response Questions 31–38: Solve the problem and then write your answer in the boxes on the answer sheet. Mark the ovals corresponding to the answer, as shown in the following example. Note the fraction line and the decimal points.

Answer: $\frac{7}{2}$	Answer: 3.25	Answer: 853																																																																																																																																																												
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Write your answer in the box. You may start your answer in any column.

Although you do not have to write the solutions in the boxes, you do have to blacken the corresponding ovals. You should fill in the boxes to avoid confusion. Only the blackened ovals will be scored. The numbers in the boxes will not be read.

There are no negative answers.

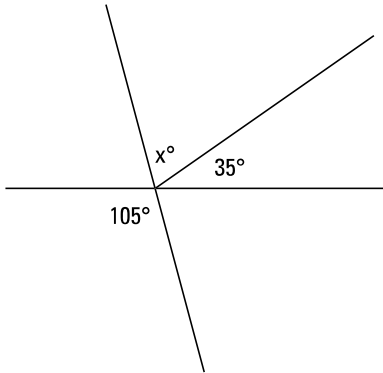
Mixed numbers, such as $3\frac{1}{2}$, may be gridded in as a decimal (3.5) or as a fraction ($\frac{7}{2}$). Do not grid in $3\frac{1}{2}$; it will be read as $31/2$.

Grid in a decimal as far as possible. Do not round your answer and leave some boxes empty.

A question may have more than one answer. Grid in one answer only.

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31. If $x^2 - y^2 = 39$ and $x - y = 3$, what is the value of y ?

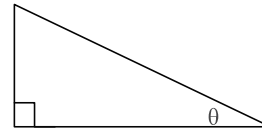


32. What is the value of x in the figure above?

33. Six times a number is the same as the number added to 6. What is the number?

34. $a, a + 5$

The first term of the sequence above is a , and each term after the first is 5 greater than the preceding term. If the sum of the first six terms is 177, what is the value of a ?



35. In the right triangle shown above, if angle $\theta = 30^\circ$, what is $\sin \theta$?

36. A circle lies in the xy -coordinate plane. The circle is centered at $(-3, 17)$ and touches the y -axis at one point only. What is the diameter of the circle?

Questions 37 and 38 are based on the following information. \$1,000 invested at i percent simple annual interest yields \$200 over a 2-year period.

37. How much interest would the \$1,000 investment yield if the i percent interest were compounded annually over the 2-year period? Ignore the dollar sign when gridding your answer.
38. What dollar amount invested at i percent simple annual interest will yield \$1,000 interest over a 5-year period? Ignore the dollar sign when gridding your answer.



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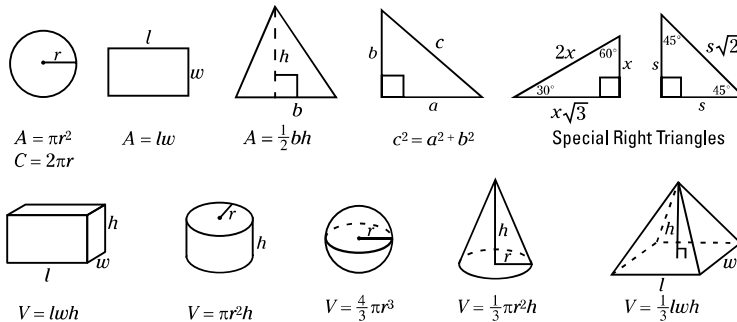
Section 4: Math — No-Calculator Section

Time: 25 minutes for 20 questions

Directions: This section contains two different types of questions. For Questions 1–15, choose the best answer to each question and darken the corresponding oval on the answer sheet. For Questions 16–20, follow the separate directions provided before those questions.

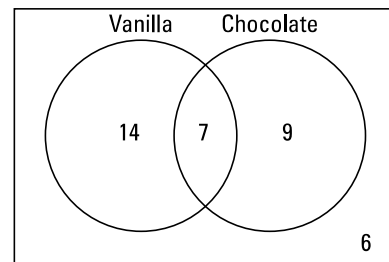
Notes:

- ✓ You may **not** use a calculator.
- ✓ All numbers used in this exam are real numbers.
- ✓ All figures lie in a plane.
- ✓ All figures may be assumed to be to scale unless the problem specifically indicates otherwise.



1. In the xy -coordinate plane, what is the area of the rectangle with opposite vertices at $(-3, -1)$ and $(3, 1)$?
- (A) 3
(B) 6
(C) 9
(D) 12

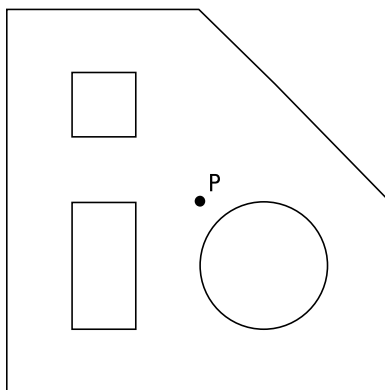
2. The following Venn diagram shows the ice-cream flavor choice of 36 children at an ice-cream party. Each child could choose vanilla ice cream, chocolate ice cream, both, or neither. What percent of the children had chocolate ice cream only?



- (A) 10%
(B) 25%
(C) 50%
(D) 75%

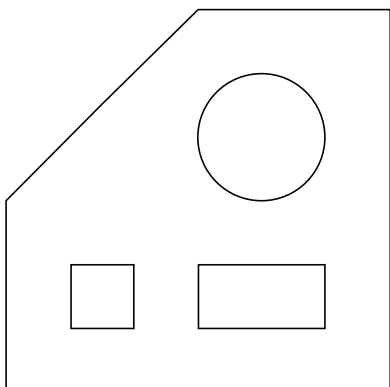
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3. If $\frac{4}{5}$ of a number is 24, what is $\frac{1}{5}$ of the number?
- (A) 5
(B) 6
(C) 8
(D) 18

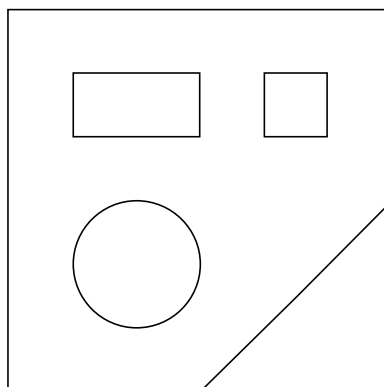


4. If the figure above were rotated 90 degrees clockwise about point P , which of the following would be the result?

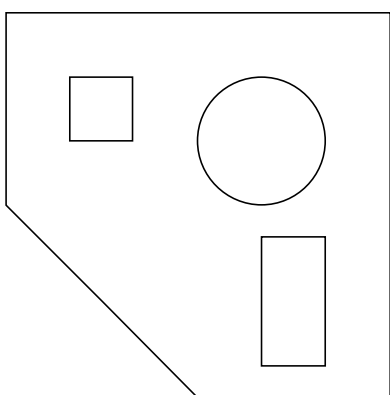
(A)



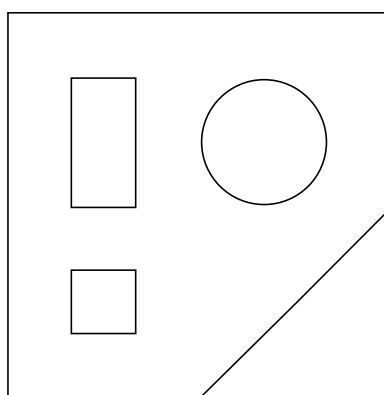
(B)



(C)

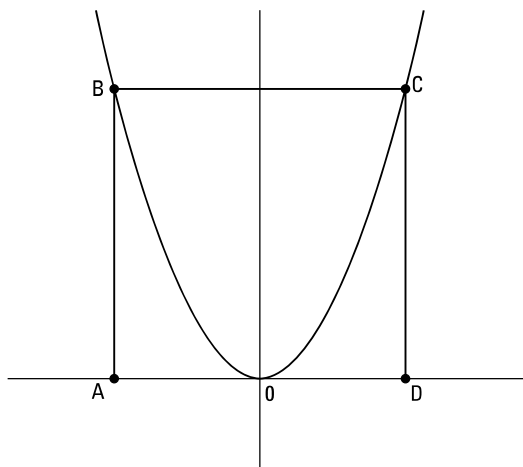


(D)



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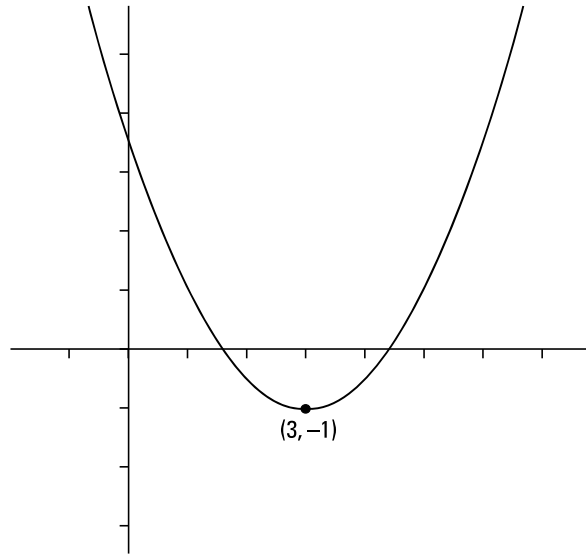
5. Kate has been snowboarding for three fewer years than Chandler. If Chandler has been snowboarding for n years, which of the following expressions represents the number of years that Kate has been snowboarding?
- (A) $n - 3$
 (B) $n + 3$
 (C) $3 - n$
 (D) $2n + 3$



6. In the figure above, $ABCD$ is a square and points B , C , and O lie on the graph of $y = \frac{x^2}{k}$, where k is a constant. If the area of the square is 36, what is the value of k ?
- (A) 1.5
 (B) 3
 (C) 4.5
 (D) 6

7. How much greater than $t - 5$ is $t + 2$?
- (A) 2
 (B) 4
 (C) 5
 (D) 7

8. For all integers n , let $*(n)$ be defined by $*(n) = (n - 1)(n + 1)$. What is the value of $*(-3)$?
- (A) -9
 (B) -8
 (C) 3
 (D) 8

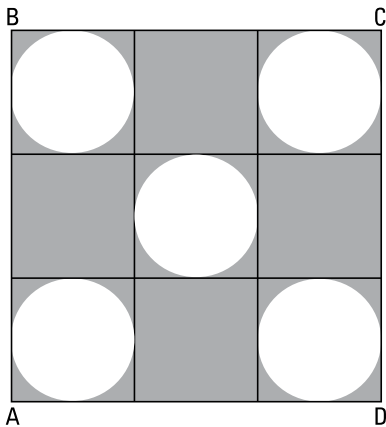


9. In the parabola above, the vertex is at $(3, -1)$. Which of the following are x -coordinates of two points on this parabola whose y -coordinates are equal?
- (A) 1 and 5
 (B) 1 and 6
 (C) 2 and 5
 (D) 2 and 6
10. The price of a television was first decreased by 10 percent and then increased by 20 percent. The final price was what percent of the initial price?
- (A) 88%
 (B) 90%
 (C) 98%
 (D) 108%

11. In the xy -plane, the center of a circle has coordinates $(-2, 4)$. If one endpoint of a diameter of the circle is $(-2, 1)$, what are the coordinates of the other endpoint of this diameter?
- (A) $(-5, 4)$
 (B) $(-2, 6)$
 (C) $(-2, 7)$
 (D) $(1, 4)$

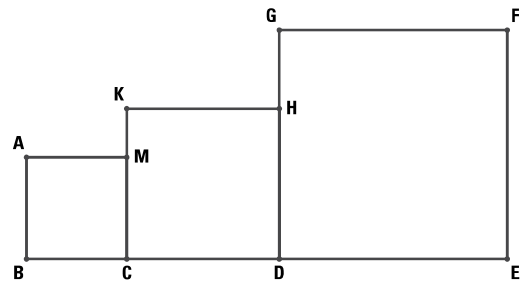
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12. The first term of a sequence is -1 . If each term after the first is the product of -3 and the preceding term, what is the fourth term of the sequence?
- (A) -27
 (B) -9
 (C) 9
 (D) 27



13. Square $ABCD$ is divided into nine equal squares, five of which have circles inscribed in them. If $AB = 6$, what is the total shaded area?
- (A) $24 - 10\pi$
 (B) $24 - 5\pi$
 (C) $36 - 10\pi$
 (D) $36 - 5\pi$

14. In the xy -plane, line l passes through $(-1, 3)$ and is parallel to the line $4x + 2y = k$. If line l passes through the point $(p, -p)$, what is the value of p ?
- (A) -2
 (B) -1
 (C) 1
 (D) 2



15. In the above figure, all shapes are squares, BC has length 4, and CD has length 7. Points A , K , and G all lie in the same line. Find the length of DE .
- (A) 10
 (B) 11
 (C) 11.5
 (D) 12.25

Directions for student-produced response Questions 16–20: Solve the problem and then write your answer in the boxes on the answer sheet. Mark the ovals corresponding to the answer, as shown in the following example. Note the fraction line and the decimal points.

Answer: $\frac{7}{2}$			
7	/	2	
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	0	0	0
1	1	1	1
2	2	<input checked="" type="radio"/>	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
<input checked="" type="radio"/>	7	7	7
8	8	8	8
9	9	9	9

Answer: 3.25			
3	.	2	5
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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	1	1	1
2	2	<input checked="" type="radio"/>	2
<input checked="" type="radio"/>	3	3	3
4	4	4	4
5	5	5	<input checked="" type="radio"/>
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 853			
8	5	3	
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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	1	1	1
2	2	2	2
3	3	<input checked="" type="radio"/>	3
4	4	4	4
5	<input checked="" type="radio"/>	5	5
6	6	6	6
7	7	7	7
<input checked="" type="radio"/>	8	8	8
9	9	9	9

Write your answer in the box. You may start your answer in any column.

Although you do not have to write the solutions in the boxes, you do have to blacken the corresponding ovals. You should fill in the boxes to avoid confusion. Only the blackened ovals will be scored. The numbers in the boxes will not be read.

There are no negative answers.

Mixed numbers, such as $3\frac{1}{2}$, may be gridded in as a decimal (3.5) or as a fraction ($\frac{7}{2}$). Do not grid in $3\frac{1}{2}$; it will be read as $31\frac{1}{2}$.

Grid in a decimal as far as possible. Do not round your answer and leave some boxes empty.

A question may have more than one answer. Grid in one answer only.

16. Find the smallest even number that is divisible by 3, 5, and 7.

17. A certain fraction is equivalent to $\frac{2}{3}$. If the fraction's denominator is 12 less than twice its numerator, find the denominator of the fraction.

18. If $p > 0$ and $p^2 = 3p + 40$, what is the value of p ?

19. A sequence of numbers begins 1, 5, 4, 8, 7, 11, 10. What is the 21st term of this sequence?

20. If $xy = 120$, and $\frac{1}{x} + \frac{1}{y} = \frac{1}{4}$, find $x + y$.



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Section 5: The Essay

Time: 50 minutes

As you read this passage, consider how the author uses the following:

- Facts, examples, and other types of evidence to support his assertions
- Logical structure to link ideas and evidence
- Elements of style, such as appeals to reason, word choice, and so forth, to make his case

The following is excerpted from The NOW Habit at Work by Neil Fiore (Wiley).

In *Emotions Revealed: Recognizing Faces and Feelings to Improve Communication and Emotional Life*, Paul Ekman describes how to determine if people are lying by observing the universal microfacial expressions of anger, disgust, fear, joy, sadness, surprise, and contempt. Even if a person doesn't consciously know that you're lying or trying to cover up your true feelings, she will have a gut reaction that something isn't right. The hidden and often subconscious message embedded in your words, actions, facial expressions, and body movements reflects your true attitude and affects your energy level. Others may subconsciously notice the disconnection between your words and your nonverbal message and sense that you're not telling the whole truth.

We all know how leaders often preach one thing and do the opposite, causing their actions to contradict their words and professed beliefs. Colleagues have said of Viktor Frankl, a Holocaust survivor and founder of logotherapy [a form of psychotherapy], that when he advocated that every life has meaning, there was a unity between his words, his actions, and the way he lived.

Are your messages and actions integrated around your higher brain and executive self? You may want to examine how your actions and stated values are aligned with what you consciously and rationally believe. Then ask yourself, "Is my walk congruent with my talk? What underlying and overarching beliefs are revealed in the way I talk to myself and others? Is it all struggle and sacrifice?" Are you saying, "Life is tough and then you die" or "You have to work harder, but it will never be good enough"?

Even more powerful than your actual words is the impact of what you think and expect from yourself and others. Research has repeatedly shown that teachers who are led to believe that certain children have high intelligence scores paid more attention to those children and encouraged them to do their best. As a result, the test scores and behaviors of those children improved significantly, even though these children actually had the lowest intelligence scores in their class. The teachers' beliefs and expectations influenced their behavior and had real, positive effects on the children they taught. The same is true of your beliefs about yourself and your employees.

Beliefs and expectations influence much more than just your attitude. What you believe affects your brain and body the way a placebo pill — an inert substance presented as effective medicine — improves depression and physical symptoms in as many as 30% of patients. You might want to consider, therefore, telling yourself, your children, and your employees that you believe in them and their willingness to learn and do good work and that you are a firm supporter of their worth and truer, higher self. You may find it more effective to communicate to yourself and others that life is an interesting puzzle, a mystery

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that you were meant to solve and that you have the innate ability to do so. Your words and actions might communicate that you enjoy your life and are optimistic about your future. Pessimists tend to be more accurate about the odds of success but give up sooner, while optimists keep trying until they come up with a creative solution and are happier. You may want to communicate the message “You’re going to make it, even though you don’t know how. Something will come to you, and you will pick yourself up and stand on your own two feet.”

Being optimistic is one way to motivate yourself to keep taking another shot at success and face the inevitable challenges of life while hoping to turn lemons into lemonade. An optimistic view of life — and of yourself, your co-workers, and employees — will turn your mind toward what’s going well and has the effect of lowering depression. Research by Martin Seligman of the University of Pennsylvania’s Positive Psychology Center found that those who wrote down three things that went well each day and their causes every night for one week had a significant increase in happiness and a decrease in depressive symptoms. Remarkably, the participants got so much value out of the exercise that they continued on their own for more than six months, and when tested again, they were found to be even happier. Other research points to the importance of meaning in life — interest in exploring a sense of purpose or mission for one’s life — as contributing to happiness, healthy self-esteem, and effectiveness.

Directions: Write an essay in which you analyze how Fiore makes an argument that one’s true beliefs influence both self and others. In your essay, discuss how Fiore uses the elements of style listed before the passage, as well as other stylistic choices, to strengthen his argument. Focus your response on the most important aspects of the passage.

Do not explain whether you agree or disagree with Fiore. Instead, focus on how the author builds his argument.



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Chapter 19

Practice Exam 1: Answers and Explanations

Answers for Section 2: Math — Calculator Section

1. **C.** You know that three marbles are green and six are yellow, so nine of the marbles are already accounted for. That leaves $11 - 9 = 2$ red marbles in the box. The probability of drawing a red marble is the number of red marbles divided by the number of marbles in the box, or $\frac{2}{11}$, Choice (C).
2. **D.** You know that Car C is traveling at 60 miles per hour. Because Car C is going 20 miles per hour faster than Car B, you can determine that Car B is traveling 40 miles per hour ($60 - 20 = 40$). Finally, because Car A is traveling twice as fast as Car B, Car A's speed is $2 \times 40 = 80$ miles per hour.
3. **D.** Because no two points on the correct graph have the same y -coordinate, you know that for any y -value you pick, a horizontal line drawn at that y -value will cross the graph only once. The only option where that is true is Choice (D), because all the other answers have parts where a horizontal line could cross the graph more than once.
4. **C.** For problems like this, your best bet is to follow the rule given and use substitution. You can see that 6 is in the place of a , 3 is in the place of b , and 4 is in the place of c . That means that you can change $a^2 - bc + b$ into $6^2 - (3)(4) + 3$, which you can then simplify to $36 - 12 + 3 = 27$.
5. **C.** Call the unknown number in the question x . You know that 3 less than twice x is 13. Turning that into math: $2x - 3 = 13$. You can solve that equation by adding 3 to both sides and then dividing by 2 to get $x = 8$. Make sure that you don't get fooled here and think that 8 is the answer! The question asks for what five times the number (x) is, so $5x = 5(8) = 40$, Choice (C).
6. **B.** In this problem, you need to remember that 25 percent of something is a quarter. Because you're looking for which pizza toppings represent more than a quarter of total sales, you're looking for toppings that take up more than a quarter of the circle. Keep in mind that a quarter of a circle has a central angle of 90 degrees, so any central angle that is bigger than 90 degrees is part of a sector that is more than 25 percent. Pepperoni and Mushroom seem to be the only toppings that take up more than a quarter, so your answer is *two*, Choice (B).
7. **D.** A great idea here is to simply plug in the answer choices and see which one works out. When you plug in 0, Choice (A), you quickly see that $|10 - 3(0)| = |10 - 0| = 10$, which is bigger than 3. Plugging in 1, you end up with 7, which is also bigger than 3. Plug in 2, and

the result is 4, which is still bigger than 3 (though you're getting closer!). Now try plugging in 3: $|10 - 3(3)| = |10 - 9| = 1$, and $1 < 3!$ Choice (D) must be the right answer.

8. **D.** First, read the chart and determine how many cats each family has. Cats are indicated by the darker bars on the chart, so Family 1 has two cats, Family 2 has no cats (only dogs), Family 3 has four cats, Family 4 has two cats, and Family 5 has three cats. Add all the cats together: $2 + 0 + 4 + 2 + 3 = 11$. There are 11 pet cats among these five families.
9. **C.** Count the spaces between the 5 and the 47. There are six spaces that are 42 apart (because $47 - 5 = 42$). Because the spaces are all the same size, you can find the length of each space by dividing 42 into 6, for a space length of 7. The unknown number is two spaces away from 5, so if each space is 7, find x by adding 2×7 to 5, $2(7) + 5 = 19$, for an answer of Choice (C).
10. **C.** Here's a problem where you need to remember the rules of exponents. Do you recall that $x^a \cdot x^b = x^{a+b}$? That means that, in this case, you can simplify: $2^{3a} \cdot 2^{3b} = 2^{3a+3b}$. Hopefully you also saw that 64 is a power of 2 — 2^6 to be exact. Rewriting the equation gives you $2^{3a+3b} = 2^6$. Because the base is the same on each side, 2, you can set the powers equal to each other so that $3a + 3b = 6$. You're looking for the value of $a + b$, so divide both sides by 3 and you get that $a + b = 2$, Choice (C).
11. **C.** For this problem, you could always just plug in the answer choices to find one that works, or you can see that because $(x - 4)^2 = 49$, you're looking for when $x - 4 = 7$ or -7 . The problem states that $x < 0$, so solve the $x - 4 = -7$ equation and discover that $x = -3$.
12. **D.** You know that $2a^2 = 56$, and you're looking for $8a^2$, which is $4(2a^2) = 4(56) = 224$.
13. **B.** When a line crosses the x -axis, you know that the y -value at that point has to be 0. That means you can plug 0 into the equation for y and solve for the x :

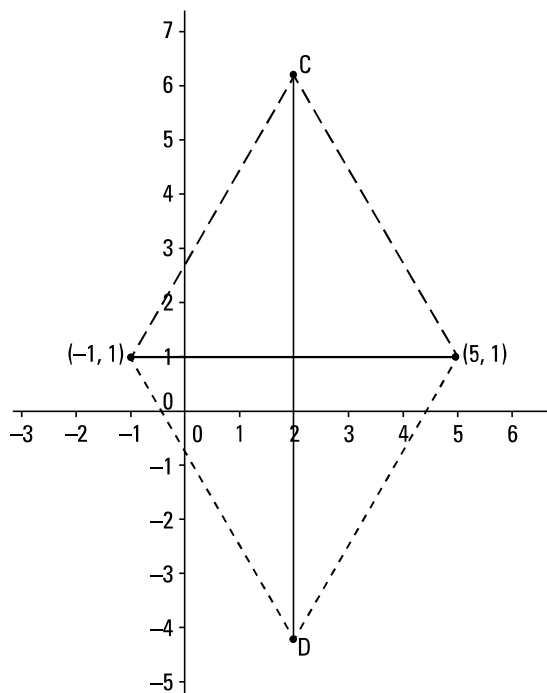
$$\begin{aligned} 0 &= 2x + 4 \\ -4 &= 2x \\ x &= -2 \end{aligned}$$

The key to this problem is remembering that when you're thinking about an x -intercept, the y -value is 0. Don't forget that it's also true that when you're working with y -intercepts, the x -value is 0.

14. **B.** The key to this problem is remembering that when you multiply or divide an inequality by a negative number, the inequality switches. For example: Subtract 3 from both sides of the original expression $7 \geq -2x + 3$ to get $4 \geq -2x$. Then divide both sides by -2 (remember to switch the inequality sign!), and you end up with $-2 \leq x$ or $x \geq -2$.
- So you're looking for a number line that includes values that are greater than or equal to -2 . Only Choices (B) and (D) have the number line shaded in for numbers greater than or equal to -2 . Choice (B) has the circle at -2 filled in, meaning that -2 is included in the solution set, which is exactly what you want because you're looking for all numbers greater than or *equal to* -2 .
15. **A.** The minimum value of a function is where the y -value is the lowest. So looking at the graph in this question, the y -value looks the lowest to the right of the y -axis, where the x 's are positive. That already eliminates Choice (D). When you're trying to determine *where* the minimum value is, you need to find the x -value that causes the function to have the lowest y -value. Looking at the graph, the lowest y -value occurs when x is 2, Choice (A).
16. **C.** This problem is much easier if you pick numbers for x and y . For example, you could say that x is at about -0.5 and that y is at about 0.75 on the number line. When you multiply those two numbers together, you get $(-0.5)(0.75) = -0.375$. Because you're looking for a negative number, you can already disregard Choice (D); it represents a positive number.

Similarly, Choice (A) is smaller than -1 , so it's outside of the range of numbers that you're interested in. You're left with Choices (B) and (C). When you multiply a number by a number between 0 and 1, the number will get smaller (closer to 0). Therefore, when you multiply x by y , the answer is going to be closer to 0 than x is. That means that Choice (C) is your best bet.

17. **A.** If you look at the graph, you can figure out what k is. The question tells you that $f(3)$ represents the y -value on the graph when the x -value is 3. If you look on the graph, when x is 3, you can see that y is $\frac{1}{2}$, so you know that $k = \frac{1}{2}$. Now, $f(k) = f\left(\frac{1}{2}\right)$, so you're looking for the y -value when x is $\frac{1}{2}$. Check out the graph again, and you'll see that when x is $\frac{1}{2}$, y is -1 .
18. **B.** This problem is easiest if you pick a number for x . One number that would work is $x = -0.5 = -\frac{1}{2}$. So now you want to test each of the statements out. Is $-0.5 > \frac{-0.5}{2}$? Simplifying, is $-0.5 > -0.25$? That's clearly not true, so Statement I is false, meaning that you can eliminate Choices (A) and (C). Choices (B) and (D) both claim that Statement II is true, so you need to check Statement III to decide which answer choice is best. Statement III says that $(-0.5)^3 > (-0.5)^2$? Using a calculator, you can simplify this inequality to $-0.125 > 0.25$, which lets you see that it's clearly not true. Because Statement III is false, Choice (B) is the best choice. You can check Statement II to make sure: Is $(-0.5)^2 > (-0.5)$? Simplifying, you get $0.25 > -0.5$, which is absolutely true. Choice (B) really is the correct answer.
19. **C.** You can see that the fence the gardener will need is equal to $3x + y$, so what you really need to do is figure out a way to represent y in terms of x . The problem tells you that the area of the garden is 2,400 square feet, so you can use your knowledge of the area of a rectangle to see that $2,400 = xy$. Divide both sides by x to solve for y , which gives you $y = \frac{2,400}{x}$, and then you can substitute that back in to the original expression for the total fencing needed: $3x + y = 3x + \frac{2,400}{x}$, Choice (C).
20. **B.** To help solve this problem, sketch a picture. Keep in mind that the triangle can point upward or downward.



The third vertex of the triangle will lie along the line that cuts through the midpoint between the two given vertices. You can find the coordinates of that midpoint by finding the average of the x 's and the average of the y 's: $\left(\frac{-1+5}{2}, \frac{1+1}{2}\right) = (2,1)$. So the x -coordinate of the third vertex will be 2, which eliminates Choice (D). Because equilateral triangles have 60-degree angles in them, you can drop an altitude from the unknown vertex to make a 30-60-90 triangle. You know that the leg connecting a vertex to the midpoint is going to be 3 units long, and from there, you can use your knowledge of special triangles to see that the unknown altitude is $3\sqrt{3}$. That means that the unknown vertex is $3\sqrt{3}$ away from $3\sqrt{3}$, so it's either at $(2, 1+3\sqrt{3})$ or $(2, 1-3\sqrt{3})$. Choice (B) is the only choice that fits.

21. **D.** You're looking for the term that comes after 6. Because each term is three less than three times the previous term, you have to multiply 6 by 3 and then subtract 3: $6(3) - 3 = 18 - 3 = 15$. You can then check that 15 is the right answer by making sure that 42 would be the next term: $15(3) - 3 = 45 - 3 = 42$. That works, so you know that k is 15, and the answer is Choice (D).
22. **A.** For this problem, remember that a line with a positive slope looks like it's traveling uphill as you read it from left to right. Choices (A) and (B) are the only two that look like they have positive slopes; Choice (C) has a negative slope (travel downhill as you read left to right); and Choice (D) has a slope of zero. Now you're looking for the option with a negative y -intercept. The y -axis is the vertical one, so you're looking for the option where the line hits the vertical axis below the origin. Choice (A) is the only option that satisfies both the requirement for positive slope and the requirement for a negative y -intercept. In case you're wondering, Choice (C) also has a negative y -intercept, but as you saw earlier, the slope is negative.
23. **D.** If a baker bakes three dozen cookies in 45 minutes, you can deduce that the baker bakes one dozen cookies in 15 minutes. Because you want to know how many cookies are made in an hour (60 minutes), you multiply by 4 and get 4×1 dozen = 4 dozen cookies. One dozen equals 12, so in one hour, the baker can make $4 \times 12 = 48$ cookies.
24. **C.** Looking at the chart, you can see that the top row increases by one in each box. In the bottom row, each box is four fewer than the previous one. That means that n will be four fewer than 7, or n is $7 - 4 = 3$.
25. **A.** For this problem, you want to set up an equation. The problem says that when m is multiplied by 5, the result is the same as when 6 is subtracted from m . Translating that into math: $5m = m - 6$. Gather all the m terms on one side. Now you can solve for m and then determine what $8m$ equals, or you can go multiply both sides of this equation by 2 to go straight to the answer because $2(4m) = 8m$: $2(4m) = 2(-6) = -12$.
26. **D.** Looking at the picture, you can see that the line has a positive slope (as you read left to right, the line goes up). Already you can eliminate Choices (A) and (B). To find the slope of the line, use the points (a, b) and $(0, 0)$:

$$m = \frac{b-0}{a-0} = \frac{b}{a}$$

You know from $|b| > |a|$ that the fraction will be larger than 1, making Choice (D) the only viable choice.

27. **A.** When you change the x -value in a function, the graph changes horizontally. In this case, you're subtracting 1 from x before plugging it into the function g , so the graph shifts either left or right. Knowing this narrows your choices down to Choices (A) and (B). You can look at the original graph and see that $g(2) = 0$. To get $y = g(x-1)$ to equal 0, you need $x-1$ to equal 2: $x-1 = 2$, $x = 3$. That means that $(3, 0)$ will be a point on the transformed graph. Choice (A) is the only graph with that point on it.

28. **A.** Your first step is to find the slope of line p .

$$m = \frac{2-1}{-2-2} = \frac{1}{-4} = -\frac{1}{4}$$

You know that perpendicular lines have opposite (negative) reciprocal slopes, so the slope of line q must be 4. So far, you know that line q has a slope of 4 and passes through the point $(-2, 4)$. You can use the equation $y = 4x + b$ and substitute the point in to figure out what b is: $4 = 4(-2) + b$ becomes $b = 12$ when you solve it. Now you have the equation of line q : $y = 4x + 12$. Substitute in the point $(k, 0)$ and solve for k : $0 = 4k + 12$, $-12 = 4k$, and $k = -3$.

29. **D.** To find the arithmetic mean (the average) of a set of numbers, you simply add the numbers together and then divide by the number of numbers. That means that if the average of 4, p , and q is 6, then $\frac{4+p+q}{3} = 6$. You can manipulate this equation by multiplying both sides by 3 ($4 + p + q = 18$) and then subtracting 4 from both sides: $p + q = 14$. You're looking for the value of $\frac{p+q}{2}$, so just divide 14 by 2 and get 7.
30. **B.** There are two good ways to solve this problem. The easy way is to figure out that 27 and 15 are 12 units away from each other, and then simply add 12 to 27 to get the other point, 39. Alternatively, you can use the idea that the average of 15 and the other point, x , is 27. Set that up like this:

$$\frac{15+x}{2} = 27$$

After you multiply both sides by 2 and then subtract 15, you get that x is 39.

31. **5.** For this problem, you need to factor a difference of perfect squares: $x^2 - y^2 = (x - y)(x + y)$. Substitute in the numbers that you know, $39 = (3)(x + y)$, and then divide both sides by 3 to get $x + y = 13$. Because you know both $x + y$ and $x - y$, you can add the two together: $(x + y) + (x - y) = 2x = 13 + 3 = 16$. Now you know that x is 8. If x is 8 and $x + y = 13$, y is 5.
32. **70.** The trick is to see that 105° is a vertical angle to $35^\circ + x^\circ$. Because vertical angles are equal, you know that $105 = 35 + x$.
33. **1.2 or 6/5.** Call the number x . Translating the words into math: "Six times x is the same as x added to 6" becomes $6x = 6 + x$. You can then gather all the x terms onto one side of the equation, $5x = 6$, and divide by 5: $x = \frac{6}{5} = 1.2$.
34. **17.** First, start by listing out each of the terms: $a, a + 5, a + 10, a + 15, a + 20$, and $a + 25$. Now add all six terms together: $a + a + 5 + a + 10 + a + 15 + a + 20 + a + 25 = 6a + 75$. You can set that equal to 177 and then solve for a :

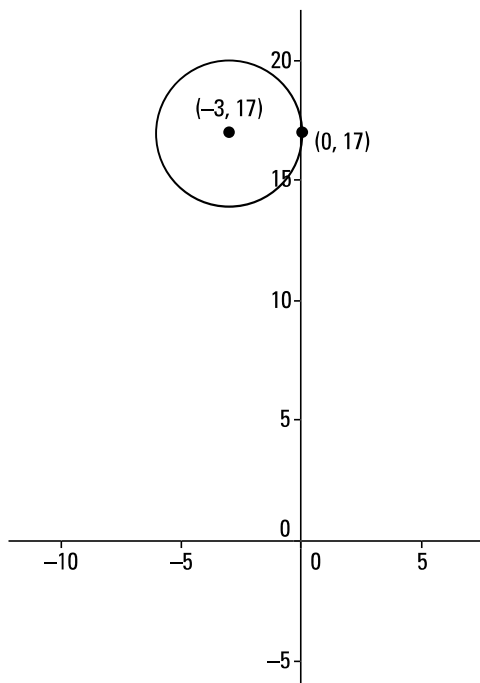
$$6a + 75 = 177$$

$$6a = 102$$

$$a = 17$$

35. **1/2 or .5.** If one angle is 90° and angle $\theta = 30^\circ$, then the third angle is 60° , making this a 30-60-90 triangle with a side ratio of $1 : \sqrt{3} : 2$. The sin of an angle is the angle's opposite side, which in this case the triangle's smallest side, over the triangle's hypotenuse. From the ratio, you know that the smallest side is half the length of the hypotenuse, for an answer of $\frac{1}{2}$ or 0.5. When you grid in your answer, either 1/2 or .5 is considered correct.

36. **6.** Sketch out the problem to help you solve:



You can quickly see that for the circle to touch the y -axis in only one place, it must touch the y -axis at $(0, 17)$. That point is three units away from the center of the circle, meaning that the radius of the circle is 3. Now just multiply that by 2 to determine the diameter of the circle is 6.

37. **210.** If \$1,000 invested at i percent simple annual interest yields \$200 over a two-year period, you can deduce that it earns \$100 over one year. To find i , the interest rate, yielding \$100 simple annual interest on \$1,000, divide the amount of interest by the amount of the investment:

$$\frac{100}{1,000} = 0.1 = 10\%$$

Now you know that $i = 10$, for an interest rate of 10 percent.

To calculate compound interest, you can use the compound interest formula. However, for only two cycles, you can find the answer without the formula. Simply calculate the simple interest twice: once for the first year, and once for the second year. Start with the original \$1,000 investment, and increase it 10 percent:

$$\$1,000 + (10\% \times \$1,000) = \$1,000 + \$100 = \$1,100$$

The investment is worth \$1,100 at the end of the first year. To find its value at the end of the second year, increase \$1,100 by ten percent:

$$\$1,100 + (10\% \times \$1,100) = \$1,100 + \$110 = \$1,210$$

The question asks for the amount of interest yielded, not the final value. To find the amount of interest, subtract the original value from the final value:

$$\$1,210 - \$1,000 = \$210$$

38. **2,000.** Knowing the interest rate is 10 percent simple annual interest, how much should be invested at this rate for five years to yield \$1,000? To yield \$1,000 over five years, the investment should yield \$200 per year. Set the equation up for one year's worth of interest with x as the investment and 10 percent as the interest rate:

$$10\%x = \$200$$

$$\frac{10x}{100} = \$200$$

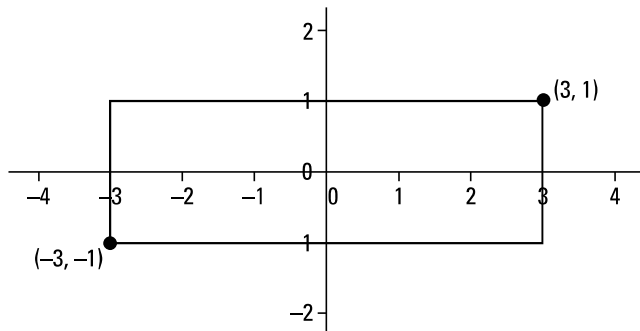
$$\frac{x}{10} = \$200$$

$$x = \$2,000$$

At 10 percent simple annual interest, a \$2,000 investment will yield \$200 per year and \$1,000 over five years.

Answers for Section 4: Math — No-Calculator Section

1. **D.** Sketch out this problem to help you solve it:



The length of the rectangle is 6, and the height is 2. The area of a rectangle is *length* times *width*, so the area of this rectangle is $(6)(2) = 12$.

2. **B.** Because you're interested in the children who had only chocolate ice cream, you want to look in the chocolate circle where it doesn't overlap with the vanilla circle; the number in that section is 9. That means 9 kids had only chocolate ice cream, out of the 36 kids at the party. To find the percent of children who had chocolate ice cream, simply divide the part that you're interested in (9) by the whole (36):

$$\frac{9}{36} = \frac{1}{4} = 25\%$$

3. **B.** Set up the equation with x as the number and solve for x .

$$\frac{4}{5}x = 24$$

$$4x = 120$$

$$x = 30$$

Now find $\frac{1}{5}$ of 30, which is 6.

4. **B.** The best way to do this problem is to simply turn the test booklet. Look at the original image after turning the booklet 90 degrees clockwise (to the right), and then find the answer that looks most like the original did when it was turned. Choice (B) turns out to be the right one.
5. **A.** A good method for solving this one is to pick numbers for the variable. You could say, for example, that Chandler has been snowboarding for ten years — now you're using $n = 10$. If Kate has been snowboarding for three fewer years than Chandler, she has been snowboarding for 7 years. So you're looking for an answer choice where if you plug in $n = 10$, you get 7 as the result. Choice (A) works perfectly.
6. **A.** The key to this problem is paying attention to the fact that the figure is a square. Knowing that the area is 36, you can immediately deduce that the length of a side of the square is 6 because $6^2 = 36$. You also know that the length of half the side of the square is 3. That means that the (x, y) coordinates of point C will be $(3, 6)$. You can then plug those coordinates into the equation $y = \frac{x^2}{k}$ and solve for k :

$$6 = \frac{3^2}{k}$$

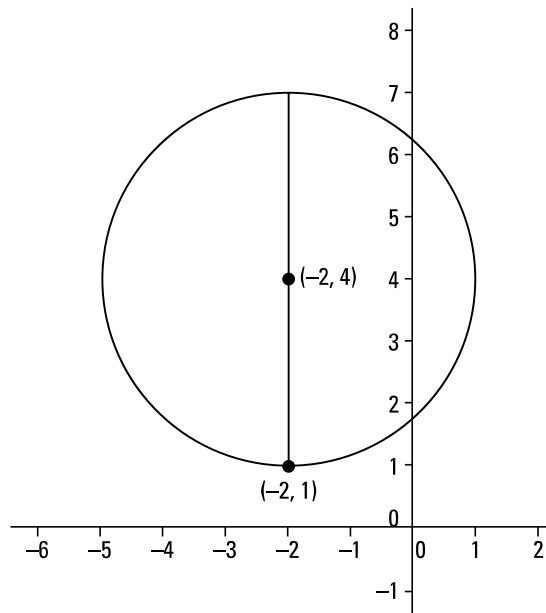
$$6 = \frac{9}{k}$$

$$6k = 9$$

$$k = \frac{3}{2} \text{ or } 1.5$$

7. **D.** Get rid of the t , and the question becomes, "How much greater than -5 is 2 ?" Well, that would be 7, so Choice (D) is the right answer.
8. **D.** You want to use substitution to solve this problem. Wherever you see n in the original definition, substitute in -3 : $(n-1)(n+1) = (-3-1)(-3+1) = (-4)(-2) = 8$. Choice (D) is the best answer.
9. **A.** The key to this problem is remembering that parabolas are symmetrical along the line that passes vertically through the vertex (known as the *axis of symmetry*). That means that if you were to fold the parabola along that line, both sides would line up. For the purpose of this problem, it means that x -values with the same y -coordinates must be the same distance from the axis of symmetry, which is at $x = 3$ in this case. Both values in Choice (A) are two away from 3, so that looks like a great option. In Choice (B), 1 is two away from 3, but 6 is three away, so that option doesn't work. For Choice (C), 2 is one away from 3, but 5 is two away; again they're not the same distance from the axis of symmetry. Choice (D) keeps 2, which is still one away from 3, and moves the other point further away, to 6. Choice (A) it is!
10. **D.** Whenever you're working on percentage problems, it's a great idea to assume that the starting price is \$100. So if the TV cost \$100 to start, and then the price was decreased by 10 percent (\$10), the reduced price is \$90. You add 20 percent on to 90 by finding 20 percent of 90 and adding it to \$90: $0.20(90) = 18$; $\$90 + \$18 = \$108$. It's easy to see that \$108 is 108 percent of \$100: $\frac{\$108}{\$100} = 1.08 = 108\%$.

11. C. It's always a great idea to sketch problems where you're told the coordinates but not given a picture.



Looking at your picture, it's easy to see that the other endpoint of the diameter is also going to have -2 as its x -coordinate. Now all you need to do is determine the radius of the circle so you can figure out the y -coordinate. Looking at the two points that were given in the problem, you can see that the radius is 3 ($4 - 1 = 3$). That means that the y -coordinate of the other endpoint will be 3 away from the center: $(-2, 4 + 3) = (-2, 7)$.

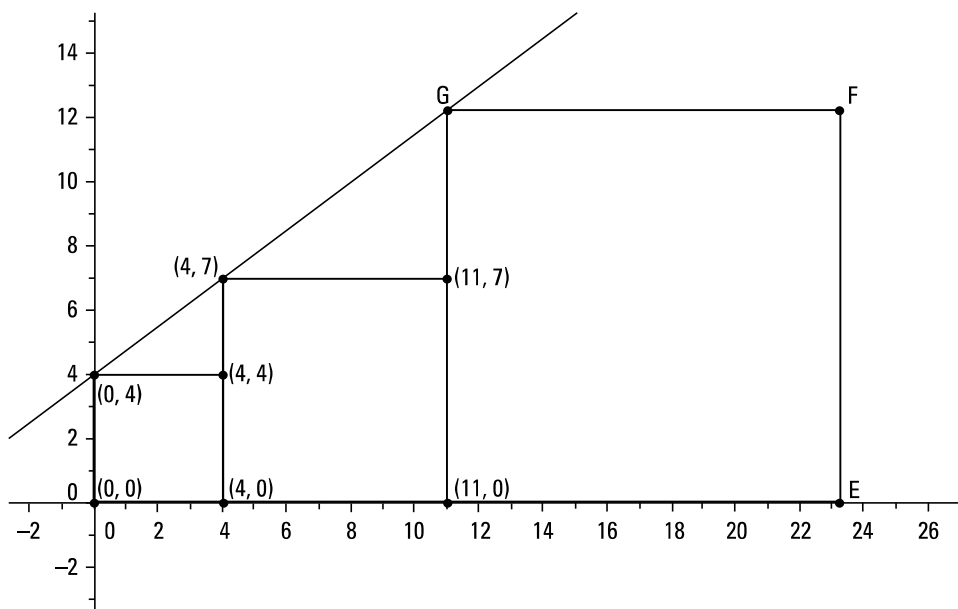
12. D. For this problem, it's a good idea to just calculate each of the terms. You know that the first term is -1 . To get the second term, multiply -1 by -3 : $(-1)(-3) = 3$. To get the third term, multiply the second term by -3 : $(-1)(-3) = 3$. For the fourth term, multiply the third term by -3 : $(-9)(-3) = 27$. Therefore the fourth term is 27 , Choice (D).
13. D. The first step is to find the area of square $ABCD$. You know the length of one of the sides, so you know that the area is that length squared: $6^2 = 36$. Now you just need to subtract off the area of the five circles. You can see that each of the nine smaller squares has a side length equal to one-third of the length of the big square: $\frac{1}{3}(6) = 2$. That means that the diameter of each of the circles is 2 , so the radius is 1 . The area of a circle is $A = \pi r^2$, so the area of each of these circles is $A = \pi(1)^2 = \pi$. Now you can find the area of the shaded part of the diagram. The area will be the total square area minus the area of five circles: $36 - 5\pi$, or Choice (D).
14. C. The first step is to find the slope of the given line by solving for y :

$$2y = -4x + k$$

$$y = -2x + \frac{k}{2}$$

The slope of this line is -2 . Because you know that line l is parallel to this line, you now know that line l has a slope of -2 . Now you can use the point $(1, 3)$ and $y = mx + b$ to determine the equation of l . Substitute -2 for m , -1 in for x , and 3 in for y , and then solve for b : $3 = -2(-1) + b$, so $b = 1$. Now you know the equation for l is $y = -2x + 1$. You can substitute p and $-p$ in for x and y , respectively, to solve the problem: $-p = -2(p) + 1$. Simplifying, $-p = -2p + 1$, or $p = 1$.

15. **D.** This is a tricky question! It's a good idea to sketch some axes in on the diagram so you can play with coordinates. You might choose to sketch them in so that the origin is at the lower left corner of the smallest square, like so:



Now you can call point $A(0, 4)$ and point $K(4, 7)$. Because you have two points, you can determine the equation of the line passing through them (and through point G). The slope is $m = \frac{7-4}{4-0} = \frac{3}{4}$. You already know the y -intercept is 4, so the equation of the line is $y = \frac{3}{4}x + 4$. To figure out the coordinates of point G , you just need to plug the known x -value ($4 + 7 = 11$) into the equation of the line:

$$y = \frac{3}{4}(11) + 4 = \frac{33}{4} + \frac{16}{4} = \frac{49}{4} = 12\frac{1}{4} = 12.25$$

Therefore, the coordinates of point G are $(11, 12.25)$. Because you set the axes up so that the square was sitting on the x -axis, the y -coordinate of point G is equal to the length of a side of the largest square. DE is just another side of the same square, so the length of DE is also 12.25, Choice (D).

16. **210.** Every even number must be divisible by 2, so $2 \times 3 \times 5 \times 7 = 210$.
17. **36.** If you let the numerator equal n , then the denominator is $2n - 12$; thus,

$$\frac{2}{3} = \frac{n}{2n-12}$$

So $2(2n - 12) = 3n$, or $4n - 24 = 3n$. Subtracting $4n$ from both sides gives you $-24 = -n$, and dividing by -1 gives you $n = 24$. But wait! That's not the answer: n is the numerator, but the problem asks for the denominator. So plug 24 into $2n - 12$: $2(24) - 12 = 36$. And, of course,

$$\frac{2}{3} = \frac{24}{36}$$

18. **8.** Although you may be able to get the answer by trial and error, this problem is really begging to be factored. To factor a *quadratic equation* (that is, an equation with something “squared” in it), you must first set the equation equal to 0. Making the squared term negative is never a good idea, so you should solve as follows. Start with the equation: $p^2 = 3p + 40$. And set everything equal to 0: $p^2 - 3p - 40 = 0$. This equation factors out to $(p - 8)(p + 5) = 0$. It has two solutions: $p = 8$ and $p = -5$. Because $p > 0$, $p = 8$.
19. **31.** This problem is an example of an alternating sequence; it alternates between adding 4 and subtracting 1 from each term. You could just follow the pattern out to the 21st term, but there’s an easier way. Look at all the odd terms: 1, 4, 7, 10. Each term is 3 more than the previous term. So the 21st term must follow this pattern. You can solve this problem by making a list of only the odd terms, like this:

1st	3rd	5th	7th	9th	11th	13th	15th	17th	19th	21st
1	4	7	10	13	16	19	22	25	28	31

20. **30.** This question is all about working with fractions. Consider the following:

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{4}$$

When you’re working with fractions, getting a common denominator on each side is a good idea. Here’s how it works out:

$$\begin{aligned} \left(\frac{y}{y}\right)\frac{1}{x} + \left(\frac{x}{x}\right)\frac{1}{y} &= \frac{1}{4} \\ \frac{y}{xy} + \frac{x}{xy} &= \frac{1}{4} \\ \frac{x+y}{xy} &= \frac{1}{4} \end{aligned}$$

Notice how letters are put in alphabetical order; that’s standard practice in algebra. Does anything about the fraction on the left side look familiar? It should: The numerator is $x + y$, which is what you’re looking for; the denominator is xy , which equals 120. Now you can write $\frac{x+y}{120} = \frac{1}{4}$, so $4(x + y) = 120$, and $x + y = 30$.

Answer Key

Section 2: Math – Calculator Section

- | | |
|--------------------------|-----------|
| 1. C | 2. D |
| 3. D | 4. C |
| 5. C | 6. B |
| 7. D | 8. D |
| 9. C | 10. C |
| 11. C | 12. D |
| 13. B | 14. B |
| 15. A | 16. C |
| 17. A | 18. B |
| 19. C | 20. B |
| 21. D | 22. A |
| 23. D | 24. C |
| 25. A | 26. D |
| 27. A | 28. A |
| 29. D | 30. B |
| 31. 5 | 32. 70 |
| 33. 1.2 or $\frac{6}{5}$ | 34. 17 |
| 35. $\frac{1}{2}$ or .5 | 36. 6 |
| 37. 210 | 38. 2,000 |

Section 4: Math — No-Calculator Section

- | | |
|--------|---------|
| 1. D | 2. B |
| 3. B | 4. B |
| 5. A | 6. A |
| 7. D | 8. D |
| 9. A | 10. D |
| 11. C | 12. D |
| 13. D | 14. C |
| 15. D | 16. 210 |
| 17. 36 | 18. 8 |
| 19. 31 | 20. 30 |

Chapter 20

Practice Exam 2

If you survived Practice Exam 1 in Chapter 18, you may be on your way to the movies right now to see the latest Hollywood vampire movie. Still here? Okay, that means you want to try again. Follow the procedures described at the beginning of Chapter 18 (the first practice exam): Sit in a quiet room, turn off the phone, and place a timer (an ordinary watch or clock works fine) right in front of your face. Spend no more than the allotted time on each part (check the number of minutes at the beginning of each section) and resist the temptation to (a) fold the answer sheet into a paper airplane and fly it out the window, (b) peek at Chapter 21, which contains the answers and explanations, or (c) call a friend to set up your weekend party schedule.

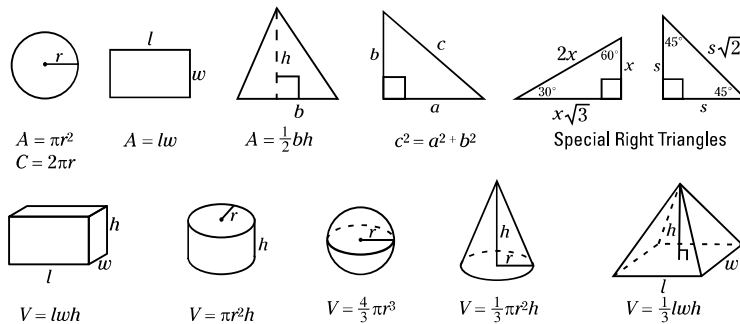
Section 2: Mathematics — Calculator Section

Time: 55 minutes for 38 questions

Directions: This section contains two different types of questions. For Questions 1–30, choose the best answer to each question and darken the corresponding oval on the answer sheet. For Questions 31–38, follow the separate directions provided before those questions.

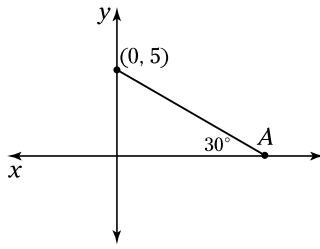
Notes:

- ✓ You may use a calculator.
- ✓ All numbers used in this exam are real numbers.
- ✓ All figures lie in a plane.
- ✓ All figures may be assumed to be to scale unless the problem specifically indicates otherwise.



1. In a 28-student class, the ratio of boys to girls is 3:4. How many girls are there in the class?
 - (A) 4
 - (B) 9
 - (C) 12
 - (D) 16
2. If $f(x) = 2x^4$, then $f(-2) =$
 - (A) -256
 - (B) -32
 - (C) 32
 - (D) 256
3. In a drawer are seven pairs of white socks, nine pairs of black socks, and six pairs of brown socks. Getting dressed in a hurry, Josh pulls out a pair at a time and tosses them on the floor if they are not the color he wants. Looking for a brown pair, Josh pulls out and discards a white pair, a black pair, another black pair, and another white pair. What is the probability that on his next reach into the drawer he will pull out a brown pair of socks?
 - (A) $\frac{1}{3}$
 - (B) $\frac{3}{11}$
 - (C) $\frac{6}{17}$
 - (D) $\frac{7}{18}$

Go on to next page



4. What are the coordinates of point A in the diagram above?

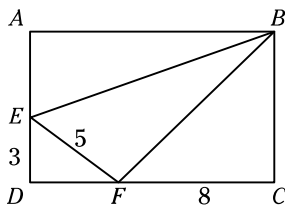
(A) $(0, 10)$
 (B) $(5, 0)$
 (C) $(5\sqrt{3}, 0)$
 (D) $(10\sqrt{3}, 0)$

5. Evaluate $(4^0 + 64^{1/2})^{-2}$

(A) -81
 (B) $\frac{1}{81}$
 (C) $\frac{1}{6}$
 (D) 3

6. The ratio of Dora's money to Lisa's money is 7:5. If Dora has \$24 more than Lisa, how much does Dora have?

(A) \$10
 (B) \$14
 (C) \$60
 (D) \$84



7. Given that $ABCD$ is a rectangle, and triangle BCF is isosceles, find the length of the line segment BE in this diagram.

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

8. On a number line, point A is at -4 , and point B is at 8 . Where would a point be placed $\frac{1}{4}$ of the distance from A to B ?

(A) -2
 (B) -1
 (C) 1
 (D) 2

9. A batch of mixed nuts was created by adding 5 pounds of peanuts, costing \$5.50 per pound, to 2 pounds of cashews, costing \$12.50 per pound. What would be the cost, per pound, of the resulting mixture?

(A) \$7.35
 (B) \$7.50
 (C) \$9.00
 (D) \$10.50

10. If $\frac{x-1}{x-2} = \frac{x+7}{x+2}$, then x equals:

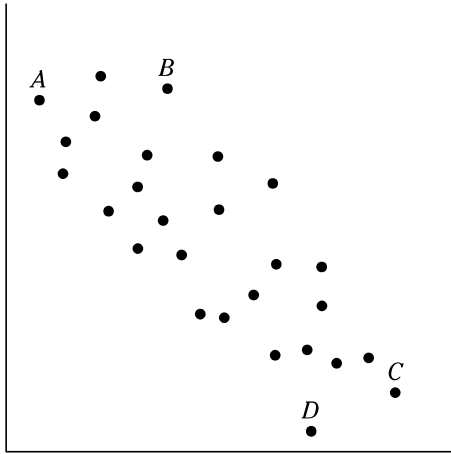
(A) 1
 (B) 2
 (C) 3
 (D) 4

11. Let $*x$ be defined as $x+3$ if x is prime and $2x$ if x is composite. Which of the following would produce a result of 18?

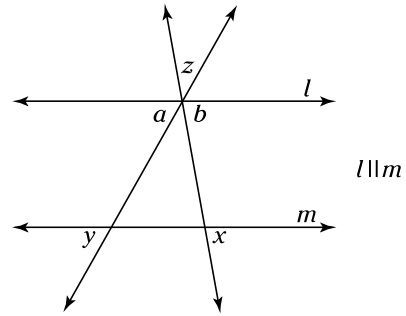
I. $*15$
 II. $*9$
 III. $*36$
 (A) I only
 (B) II only
 (C) both I and II
 (D) both II and III

12. The volume of a gas, V , in cubic centimeters (cc), is directly proportional to its temperature, T , in Kelvins (K). If a gas has a volume of 31.5 cc at 210 K, then its volume at 300 K would be

(A) 121.5 cc
 (B) 49 cc
 (C) 45 cc
 (D) 22.05 cc

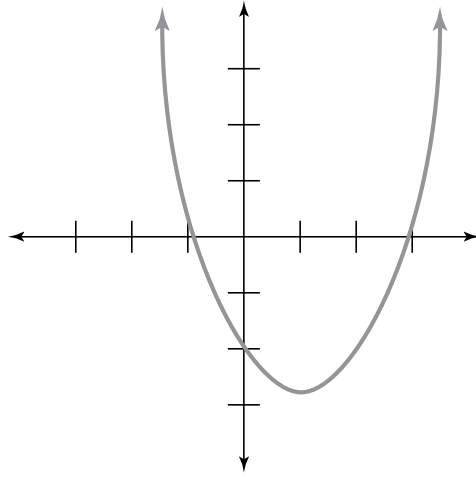


13. If the data in the scatter plot above were approximated by a linear function, the line would come closest to which pair of points?
- (A) A and B
 (B) A and C
 (C) B and C
 (D) C and D

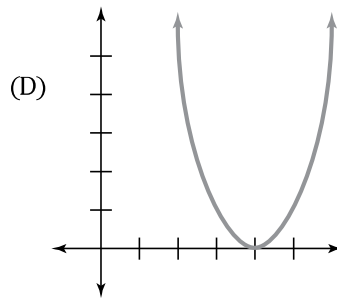
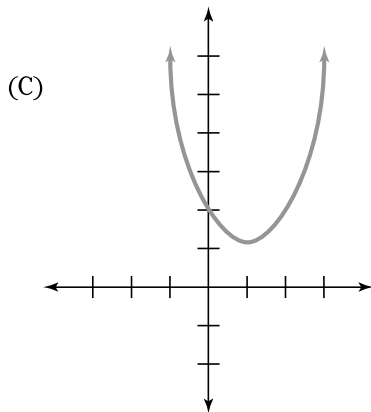
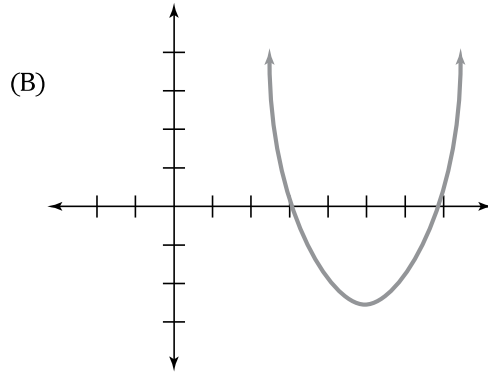
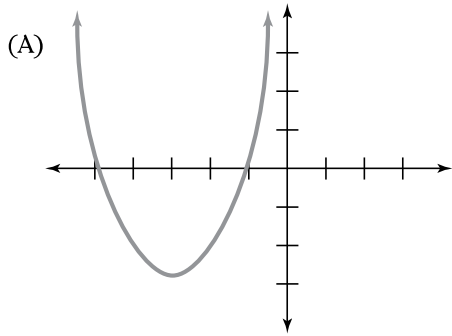


14. In the above diagram, $x = 70^\circ$ and $y = 30^\circ$. The sum $a + b + z$ equals
- (A) 90°
 (B) 100°
 (C) 120°
 (D) 180°
15. In a sequence of evenly spaced numbers, the first term is 7, and the 20th term is 159. The fourth term of the sequence would be
- (A) 32
 (B) 31
 (C) 30
 (D) 29

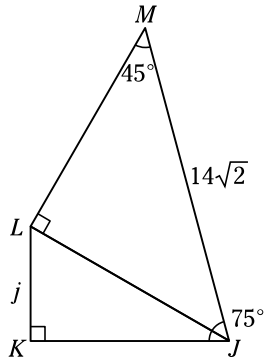
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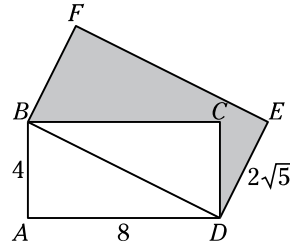
16. This graph represents a function, $f(x)$. Which of the following graphs could represent $f(x + 4)$?



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17. In this diagram, the measure of side j is
- (A) 7
 (B) $7\sqrt{2}$
 (C) $7\sqrt{3}$
 (D) 14
18. In a class of 100 students, 65 take Spanish, 32 take art, and 14 take both Spanish and art. How many students do not take either Spanish or art?
- (A) 3
 (B) 11
 (C) 17
 (D) 35
19. Max has three hours to study for his tests the next day. He decides to spend k percent of this time studying for math. Which of the following represents the number of minutes he will spend studying for math?
- (A) $\frac{k}{300}$
 (B) $\frac{3k}{100}$
 (C) $\frac{100k}{180}$
 (D) $\frac{180k}{100}$



20. Given that $ABCD$ and $BDEF$ are rectangles, find the shaded area in this diagram.
- (A) 24
 (B) $16\sqrt{5}$
 (C) 20
 (D) $8\sqrt{5}$
21. A 26-inch-diameter bicycle wheel rotates a half turn. What is the exact distance traveled, in inches, of the logo printed on the edge of the wheel?
- (A) 26π
 (B) 13π
 (C) 6.5π
 (D) 3.25π
22. Find x if $2(x + 4) = 6$.
- (A) -1
 (B) 0
 (C) 1
 (D) 2
23. A certain radioactive element has a half-life of 20 years. Thus, a sample of 100 grams deposited in 1980 would have decayed to 50 grams by 2000 and to 25 grams by 2020. How much of this sample would remain in 2100?
- (A) $\frac{25}{16}$ grams
 (B) $\frac{25}{8}$ grams
 (C) $\frac{25}{4}$ grams
 (D) $\frac{25}{2}$ grams

24. Set S contains the numbers 20 to 40, inclusive. If a number is chosen at random from S , what is the probability that the number is even?

(A) $\frac{1}{2}$
 (B) $\frac{10}{21}$
 (C) $\frac{11}{21}$
 (D) $\frac{11}{20}$

25. The number n satisfies the following properties:

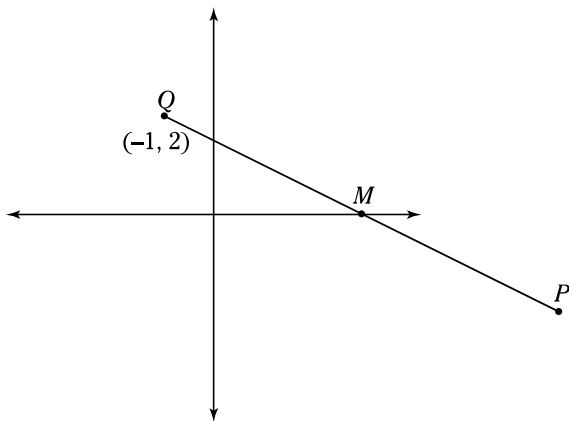
It has three digits.

Its units digit is the sum of its tens digit and its hundreds digit.

It is a perfect square.

Which number could be n ?

(A) 156
 (B) 400
 (C) 484
 (D) 729



26. In this figure, the slope of line m is $-\frac{1}{3}$, and M is the midpoint of the line PQ . What are the coordinates of point P ?

(A) $(8, -1)$
 (B) $(9, -1)$
 (C) $(10, -2)$
 (D) $(11, -2)$

27. If $ab = n$, $b + c = x$, and $n \neq 0$, which of the following must equal n ?

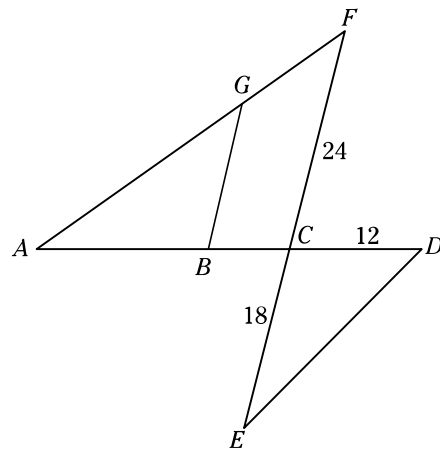
(A) $ax + c$
 (B) $ax - c$
 (C) $ax + ac$
 (D) $ax - cx$

28. The number g is divisible by 3 but not by 9. Which of the following could be the remainder when $7g$ is divided by 9?

(A) 0
 (B) 2
 (C) 4
 (D) 6

29. If $a > 0$, which of the following statements must be true?

(A) $a^2 > a$
 (B) $a > \frac{1}{a}$
 (C) $2a > a$
 (D) $\frac{1}{a} < 1$



30. In this diagram, $AF \parallel ED$, $GB \parallel EF$, and $AG = GF$. What is the length of AB ?

(Note: Figure not drawn to scale.)

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

Directions for Questions 31–38. Solve the problem and then write your answer in the box provided on the answer sheet. Mark the ovals corresponding to the answer, as shown in the following example. Note the fraction line and the decimal points.

Answer: $\frac{7}{2}$

7	/	2	
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	1	1	1
2	2	<input checked="" type="radio"/>	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
<input checked="" type="radio"/>	7	7	7
8	8	8	8
9	9	9	9

Answer: 3.25

3	.	2	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	1	1	1
2	2	<input checked="" type="radio"/>	2
<input checked="" type="radio"/>	3	3	3
4	4	4	4
5	5	5	<input checked="" type="radio"/>
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 853

8	5	3	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	1	1	1
2	2	2	2
3	3	<input checked="" type="radio"/>	3
4	4	4	4
5	<input checked="" type="radio"/>	5	5
6	6	6	6
7	7	7	7
<input checked="" type="radio"/>	8	8	8
9	9	9	9

Write your answer in the box. You may start your answer in any column.

Although you do not have to write the solutions in the boxes, you do have to blacken the corresponding ovals. You should fill in the boxes to avoid confusion. Only the blackened ovals will be scored. The numbers in the boxes will not be read.

There are no negative answers.

Mixed numbers, such as $3\frac{1}{2}$, may be gridded in as a decimal (3.5) or as a fraction ($\frac{7}{2}$). Do not grid in $3\frac{1}{2}$; it will be read as 31/2.

Grid in a decimal as far as possible. Do not round it.

A question may have more than one answer. Grid in only one answer.

31. Darren receives \$9 an hour for his after-school job, but gets paid $1\frac{1}{2}$ times this rate for each hour he works on a weekend. If he worked 18 hours one week and received \$189, how many of these hours did he work during the weekends?

32. In a school survey, 40% of all students chose history as their favorite subject; 25% chose English; and 14 students chose some other subject as their favorite. How many students were surveyed?

33. Find the value of x that satisfies $\sqrt{4x-8} + 1 = 7$.

34. For all numbers p and q , where $p \neq 4$, let $p \cdot q$ be defined as $\frac{pq}{p-4}$. For what value of p does $p \cdot 7 = 21$?

35. The ratio of a rectangle's width to its length is 2:5. If its perimeter is 84 feet, find its width, in feet.

36. To rent a private party room in a restaurant, there is a fixed cost plus an additional fee per person. If the cost of a party of 8 is \$270 and the cost of a party of 10 is \$320, find the cost, in dollars, of a party of 18.

Questions 37 and 38 are based on the following information. Tom invested \$1,200 into two accounts. One account yields 5 percent simple annual interest, and the other yields 7 percent simple annual interest.

37. If after exactly one year, the two investments yielded a total of \$74 in interest, how much, in dollars, was invested into the account earning 5 percent interest? Ignore the dollar sign when gridding your answer.

38. If Tom wants his investment to yield a total of \$160 in interest over a period of exactly two years, how much, in dollars, must he transfer from the account yielding 5 percent to the account yielding 7 percent? Ignore the dollar sign when gridding your answer.



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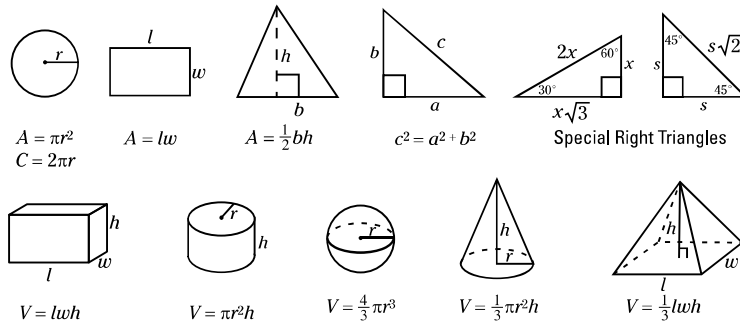
Section 4: Mathematics — No-Calculator Section

Time: 25 minutes for 20 questions

Directions: This section contains two different types of questions. For Questions 1–15, choose the best answer to each question and darken the corresponding oval on the answer sheet. For Questions 16–20, follow the separate directions provided before those questions.

Notes:

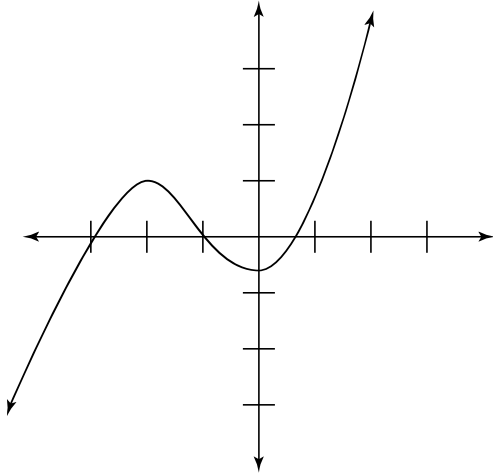
- ✓ You may **not** use a calculator.
- ✓ All numbers used in this exam are real numbers.
- ✓ All figures lie in a plane.
- ✓ All figures may be assumed to be to scale unless the problem specifically indicates otherwise.



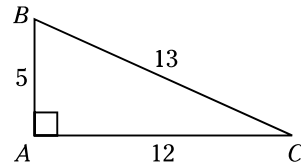
1. If $2a + 3b = 17$ and $2a + b = 3$, then $a + b =$
 - (A) 1
 - (B) 5
 - (C) 7
 - (D) 10
2. A bicycle has a front wheel radius of 15 inches. If the bicycle wheel travels 10 revolutions, how far has a point on the outside of the wheel traveled, in inches?
 - (A) 10π
 - (B) 30π
 - (C) 300π
 - (D) 450π
3. If p and q are positive integers, then $(5^{-p})(5^{q+1})^p$ is equivalent to
 - (A) 5^{pq+p}
 - (B) 5^{pq}
 - (C) 5^{pq-p}
 - (D) 5^{q+1}
4. In a set of five positive whole numbers, the mode is 90 and the average (arithmetic mean) is 80. Which of the following statements is false?
 - (A) The number 90 appears two, three, or four times in the set.
 - (B) The number 240 cannot appear in the set.
 - (C) The number 80 must appear exactly once in the set.
 - (D) The five numbers must have a sum of 400.

Go on to next page

5. In a triangle, the second side is 3 centimeters longer than the first side. The length of the third side is 5 centimeters less than twice the length of the first side. If the perimeter is 34 centimeters, find the length, in centimeters, of the longest side.
- (A) 3
(B) 9
(C) 12
(D) 13
-
6. Melvin, Chris, Enoch, Dave, Carey, Mike, Dan, and Peter are choosing dorm rooms for college. Each room holds four people. They have the following requirements:
- (i) Mike and Melvin refuse to live together.
(ii) Enoch will live with Chris or Carey (or possibly both).
(iii) If Dave and Dan live together, Peter will live with them.
- When rooms are chosen, Melvin, Carey, and Dan live together. Which of the following groups must live in the other room?
- (A) Chris, Dave, and Mike
(B) Chris, Mike, and Peter
(C) Dave, Enoch, and Peter
(D) Dave, Mike, and Peter
-
7. If the distance from Springfield to Watertown is 13 miles and the distance from Watertown to Pleasantville is 24 miles, then the distance from Pleasantville to Springfield in miles could not be
- (A) 10
(B) 11
(C) 13
(D) 24
-
8. In a certain game, there are only two ways to score points; one way is worth 3 points, and the other is worth 5 points. If Brandon's total score is 61, which of the following could be the number of 3-point scores that Brandon had?
- (A) 10
(B) 11
(C) 12
(D) 13
-
9. A number n is defined as a "tweener" if both $n-1$ and $n+1$ are prime. Which of the following numbers is a tweener?
- (A) 2
(B) 8
(C) 30
(D) 36
-
10. If the square of x is 12 less than the product of x and 5, which of the following expressions could be used to solve for x ?
- (A) $x^2 = 5x - 12$
(B) $x^2 = 12 - 5x$
(C) $2x = 12 - 5x$
(D) $2x = 5x - 12$
-
11. If $2y - c = 3c$, then $y =$
- (A) $\frac{c}{2}$
(B) c
(C) $\frac{3c}{2}$
(D) $2c$
-
12. The solution set to the equation $|3x - 1| = 7$ is
- (A) $\{2\}$
(B) $\left\{2, \frac{2}{3}\right\}$
(C) $\{-2\}$
(D) $\left\{2, 2\frac{2}{3}\right\}$



13. If this graph represents $f(x)$, then the number of solutions to the equation $f(x) = 1$ is
- (A) zero
(B) one
(C) two
(D) three
14. A square with an area of 25 is changed into a rectangle with an area of 24 by increasing the width and reducing the length. If the length was reduced by 2, by how much was the width increased?
- (A) 2
(B) 3
(C) 4
(D) 5



15. In the triangle ABC above, what is the value of $\tan C$?
- (A) $\frac{5}{13}$
(B) $\frac{12}{13}$
(C) $\frac{5}{12}$
(D) $\frac{12}{5}$

Directions for Questions 16–20: Solve the problem and then write your answer in the box provided on the answer sheet. Mark the oval corresponding to the answer, as shown in the following example. Note the fraction line and the decimal points.

Answer: $7\frac{1}{2}$

7	/	2	
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	1	1	1
2	2	<input checked="" type="radio"/>	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
<input checked="" type="radio"/>	7	7	7
8	8	8	8
9	9	9	9

Answer: 3.25

3	.	2	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	1	1	1
2	2	<input checked="" type="radio"/>	2
<input checked="" type="radio"/>	3	3	3
4	4	4	4
5	5	5	<input checked="" type="radio"/>
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 853

8	5	3	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	0	0
1	1	1	1
2	2	2	2
3	3	<input checked="" type="radio"/>	3
4	4	4	4
5	<input checked="" type="radio"/>	5	5
6	6	6	6
7	7	7	7
<input checked="" type="radio"/>	8	8	8
9	9	9	9

Write your answer in the box. You may start your answer in any column.

Although you do not have to write the solutions in the boxes, you do have to blacken the corresponding ovals. You should fill in the boxes to avoid confusion. Only the blackened ovals will be scored. The numbers in the boxes will not be read.

There are no negative answers.

Mixed numbers, such as $3\frac{1}{2}$, may be gridded in as a decimal (3.5) or as a fraction ($\frac{7}{2}$). Do not grid in $3\frac{1}{2}$; it will be read as 31/2.

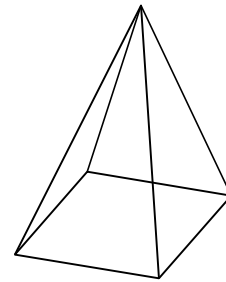
Grid in a decimal as far as possible. Do not round it.

A question may have more than one answer. Grid in one answer only.

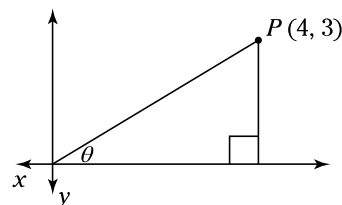
16. Lauren took four exams. Her scores on the first three are 89, 85, and 90. If her average (arithmetic mean) on all four exams is 90, what did she get on the fourth exam?

17. If $p > 0$ and the distance between the points $(4, -1)$ and $(-2, p)$ is 10, find p .

18. If $a - b = 8$ and $ab = 10$, find $a^2 + b^2$.



19. The pyramid above has a square base of length 10 centimeters and a height of 12 centimeters. Determine the total surface area of all five faces, in square centimeters.



20. In the drawing above, what is $5(\sin \theta)$?



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Section 5: The Essay

Time: 50 minutes

As you read this passage, consider how the author uses the following:

- Facts, examples, and other types of evidence to support his assertions
- Logical structure to link ideas and evidence
- Elements of style, such as figurative language, word choice, and so forth, to make his case

This passage is excerpted from Content Nation by John Blossom (Wiley).

If you use technology to create information and experiences that can be shared with others, you're a publisher. Some of your personal activities may seem to be too small in scope to put under the banner of a word like "publishing." After all, not everything that we publish has a huge audience or seems to be very important, but if others find that what you've shared is valuable, then you've achieved what every publisher in the world tries to achieve.

With the advent of the Internet and other advanced communication networks, though, the scale of what one person can do with publishing tools has changed radically. Affordable computers, mobile phones, and many other types of devices connected to communications networks have enabled billions of people to share content with one another locally and globally as never before. Technology now allows any person on the planet to publish things to virtually any number of people in any place at any time at little or no cost — without their knowing in great detail how it happens. Worldwide publishing, once the pursuit of a handful of wealthy and powerful people, is now a tool in the hands of the world. Students, farmers, business professionals, teachers, researchers, politicians, homemakers, and anyone else who can access our global communications networks are now engaging with other people who have similar interests and establishing appreciation for one another through their common publishing capabilities. Much of this publishing takes place on social media.

Because of its publishing capability, social media offers us the opportunity to consider what it is to be human in ways that humankind has not been able to explore effectively for thousands of years. When the people with whom we build close bonds and upon whom we rely for success in life could be anywhere in the world from any way of life, the potential for our future as a species of life on this planet takes on a new and startling form. Instead of the organism of centralized civilization, we have been handed back the keys to create our own new civilizations as we please. Many will choose to enhance very traditional forms of human existence through social media, with many rapidly evolving and shifting points of highly valuable collaboration and production, which can scale to mass goods and services very efficiently.

In enabling major shifts in where value is produced in human society, we will not be throwing away the advantages and legacies of modern civilization. Instead, we will be leveraging them to support new forms of value, allowing mass production and mass culture to benefit us when and where it pleases us, but being able to produce more value independent of the highly centralized distribution and control mechanisms of traditional civilization. The culture of artificial scarcity, encouraged by highly centralized publishing and marketing

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mechanisms, will give way through social media to a culture more focused on identifying and exploiting the natural abundance of human insight and innovation rapidly and efficiently, enabling more people to collaborate on projects large and small that respond to the threats and opportunities in a changing world more effectively.

In the process of becoming a society focused on exploiting the abundance found in human abilities, we are likely to see political changes as well. It will become ever harder to communicate political themes and objectives that don't have authentic support from everyday people. If the era of television ushered in mass communications that enabled the selling of politicians like tubes of toothpaste, social media ushers in the era of politics in which most facts impacting politics and policies are known instantly and openly. Political victories go to politicians who know how to influence grass-roots political conversations most effectively. Like many things in social media, the transformation that can come in political circles is less about technologies than it is about the ability of those technologies to scale rapidly and effectively to any level of human organization to build effective bonds between people.

The impact of social media's influence can be deceptively simple depending on the scale you use to apply it, just like the changes that a piece of ice can make may be deceptively simple based on scale. Let a small cube of ice melt on a table, and something simple has changed. Put a mile of ice over a continent and life is changed forever. So it will be with the scale and depth of Content Nation's influential impact as it begins to reach into the lives of every person on the planet.

Directions: Write an essay in which you explain how Blossom builds an argument to persuade his audience that social media has created a fundamental change in the way human beings relate to one another. In your essay, analyze how Blossom uses elements of style to persuade readers to agree with his argument. Concentrate your analysis on the most important features of the passage.

Do not state whether you agree with Blossom's claims. Instead, show how Blossom argues his point.



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Chapter 21

Practice Exam 2: Answers and Explanations

After you finish taking Practice Exam 2 in Chapter 20, spend some time going through the answers and explanations in this chapter to find out which questions you missed and why. Even if you answered every question correctly, read the explanations in this chapter because you'll find some tips and warnings in the explanations that will help you be ready-set-go for the actual SAT. If you're short on time, you can quickly check your answers with the abbreviated answer key at the end of the chapter.

Note: To determine your score on this practice test, turn to the appendix.

Answers for Section 2: Mathematics — Calculator Section

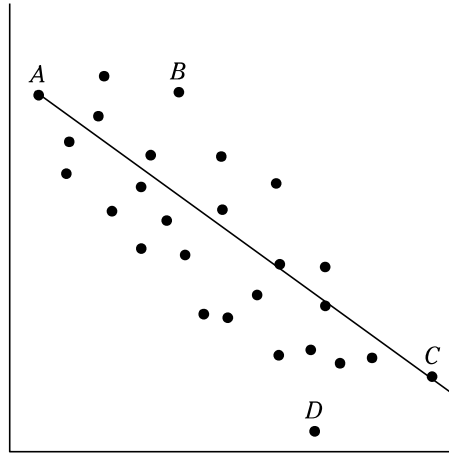
1. **D.** If you add the numbers in the ratio, you get 7. There are 28 total students, which is 7×4 . Therefore, multiply the original ratio numbers by 4 to get 12 boys and 16 girls. Double-check to see that $12 + 16 = 28$.
2. **C.** Plugging in the numbers gives you $2(-2)^4$. Using PEMDAS (see Chapter 12), do the exponents first, and then multiply by 2: $(-2)^4 = (-2)(-2)(-2)(-2) = +16$, and $2(16) = 32$.
3. **A.** The drawer had 22 pairs of socks originally. However, Josh has thrown four pairs on the floor (and you can bet his mom's going to have something to say about that). So there are now 18 pairs to choose from, of which 6 are brown. His probability of success is therefore $\frac{6}{18} = \frac{1}{3}$.
4. **C.** There is no shortage of the 30-60-90 triangle on these practice exams. In these triangles, the hypotenuse is always twice the shorter leg, while the longer leg equals the shorter leg

times $\sqrt{3}$. Because you know the shorter leg equals 5, that makes the longer leg $5\sqrt{3}$, and so the coordinates are $(5\sqrt{3}, 0)$.

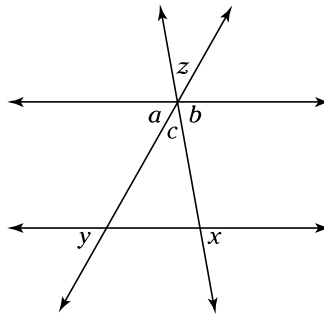
5. **B.** You did fine on this one if you remembered your exponent rules: $4^0 = 1$ by definition (because anything to the 0 power equals 1), and $64^{1/2}$ is the square root of 64, which is 8. So the expression in parentheses equals $1 + 8 = 9$. And 9^{-2} is the reciprocal of 9^2 , which is 81, so the answer is $\frac{1}{81}$.
6. **D.** Find two numbers in the ratio 7:5 that have a difference of 24. Then set it up with algebra: Call Dora's money $7x$ and Lisa's money $5x$, so $7x = 5x + 24$. Thus, $2x = 24$, and $x = 12$. Plugging the numbers back in (always an important step) tells you that Lisa's money is $5(12) = \$60$, and Dora's is $7(12) = \$84$.
7. **D.** Because triangle BCF is isosceles, $BC = CF = 8$. Because angle D is a right angle, triangle DEF is the world-famous 3-4-5 right triangle, and $DF = 4$. Because $DC = 4 + 8 = 12$, AB is also 12. And, because $AD = BC = 8$, $AE = 8 - 3 = 5$. Now you're ready to find EB , the hypotenuse of the right triangle ABE . You can, of course, use the Pythagorean theorem, but you'll save time if you realize that you're face to face with a 5-12-13 right triangle, and $BE = 13$.
8. **B.** You can draw the line and count spaces to determine that the points are 12 units apart, or you can simply subtract: $8 - (-4) = 12$ (distance always involves a difference). Because $\frac{1}{4}$ of 12 is 3, you're looking for the point 3 units to the right of -4 , and $-4 + 3 = -1$.
9. **B.** Five pounds of peanuts times \$5.50 per pound is \$27.50, and 2 pounds of cashews times \$12.50 per pound is \$25.00, so the total cost is \$52.50 for 7 pounds. Divide \$52.50 by 7 pounds to get \$7.50 per pound.
10. **C.** You could solve for x by cross-multiplying or plugging in answers. Pick your poison. Cross-multiplying is probably more straightforward and saves you the risk of having to go through the process four times.

$$\begin{aligned}\frac{x-1}{x-2} &= \frac{x+7}{x+2} \\ (x-1)(x+2) &= (x-2)(x+7) \\ x^2 + x - 2 &= x^2 + 5x - 14 \\ x - 2 &= 5x - 14 \\ -4x &= -12 \\ x &= 3\end{aligned}$$

11. **B.** A composite number is made from two or more primes multiplied together (see Chapter 10). Because 15 is composite (it's 3×5), $*15 = 2(15) = 30$. And 9 is also composite, so $*9 = 2(9) = 18$. Finally, 36 is composite, too, so $*36 = 2(36) = 72$. Only Statement II, $*9$, produces a result of 18.
12. **C.** Direct proportion problems require a ratio — in this case, the ratio of volume to temperature. Thus, you can write $\frac{CC_1}{K_1} = \frac{CC_2}{K_2}$ and $\frac{31.5}{210} = \frac{x}{300}$. Cross-multiply to get $210x = 9,450$, and divide by 210 to get $x = 45$.
13. **B.** This scatter plot shows a negative trend, so the line of best fit would go roughly from the top left to the bottom right. However, point D is significantly lower than the rest of the points. If you try drawing a line between A and D , or B and D , you'll see that it's really not that close to a lot of the points. However, the line from A to C is a good approximation of the scatter plot as a whole, as you can see in this diagram.



14. **D.** You don't even need to know what x and y equal in this problem. Look at the angle marked c in the following diagram. c and z are vertical angles, which means that their measures are equal. Also, a , c , and b form a straight line, so $a + c + b = 180^\circ$. Therefore, $a + b + z = 180^\circ$.



15. **B.** There are 19 terms between 7 and 159. Because $159 - 7 = 152$ and $152 \div 19 = 8$, each term must be 8 units greater than the one before it. So the sequence begins 7, 15, 23, 31, and there's your answer.
16. **A.** This question is based on the rules of graphed figures. $f(x)$ is another name for the y -value based on x . A higher x -value moves the point farther to the right. $f(x + 4)$ reads the value inside the parentheses (usually x , but in this case $x + 4$) as four spaces farther to the right than it actually is, so the graph moves four spaces to the left to compensate.
17. **A.** Do you remember your special triangle ratios? If not, it's okay: They're at the top of each Math section of the SAT. First, you have to realize that the triangles in this problem are special, by breaking up the 75° angle at the bottom right into a 45° and a 30° angle. The top right triangle is a 45-45-90 triangle, which makes both of its legs equal to 14. The bottom leg is also the hypotenuse of the 30-60-90 triangle at the bottom. In a 30-60-90 triangle, the hypotenuse must be twice the shortest leg, which is j . Therefore, j is 7.
18. **C.** This problem can be solved with simple arithmetic. If you add up the 65 Spanish students and the 32 art students, you get 97 total students. However, the 14 students who take both are counted twice, so subtract 14, leaving 83 students in either Spanish or art. If 83 students are in Spanish and/or art, you're left with $100 - 83 = 17$ who don't take either subject.

19. **D.** Because the answer is supposed to be in minutes, start by turning 3 hours into 180 minutes. You know that k percent of these 180 minutes is going to be used for math. Remember that k percent means $\frac{k}{100}$. Taking a percent of a number involves multiplication, so your answer is $180 \times \frac{k}{100}$, or $\frac{180k}{100}$.
20. **A.** You need the areas of rectangle $BDEF$ and triangle BCD . For the rectangle, you need the length of segment BD , which is also part of triangle ABD . Because you have two sides of right triangle ABD , use the Pythagorean theorem to find the length of the third side, which is your target BD : $4^2 + 8^2 = (BD)^2$, so $BD = \sqrt{80}$, or $4\sqrt{5}$. The area of the rectangle is $4\sqrt{5} \times 2\sqrt{5} = 8 \times 5 = 40$. The area of triangle BCD is $\frac{8 \times 4}{2} = 16$. Subtract the two, and $40 - 16 = 24$.
21. **B.** The circumference of the wheel is πd , where d is the diameter of the wheel. Because $d = 26$ inches, the circumference is 26π inches. The logo traveled half this distance, so divide the circumference by 2, for an answer of 13π inches.
22. **A.** Just distribute the 2 and isolate x :

$$\begin{aligned} 2(x + 4) &= 6 \\ 2x + 8 &= 6 \\ 2x &= -2 \\ x &= -1 \end{aligned}$$

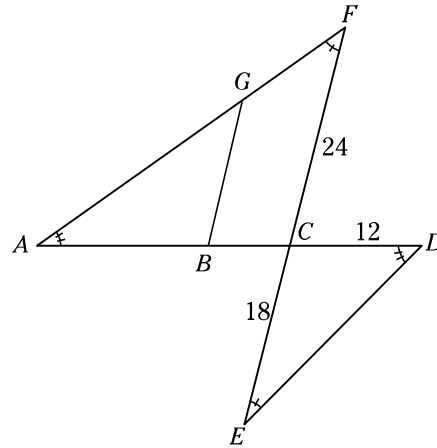
23. **A.** Make a table for this one, dividing by 2 every 20 years:

2000	2020	2040	2060	2080	2100
50	25	$\frac{25}{2}$	$\frac{25}{4}$	$\frac{25}{8}$	$\frac{25}{16}$

The final answer is $\frac{25}{16}$ grams.

24. **C.** First of all, there are 21 numbers, not 20, to choose from. Remember that to find the size of a list of numbers, you subtract the first and last numbers, and then add one. (You can also count them to be sure.) Now, the even numbers are 20, 22, . . . and so on, up to 40, which makes five numbers in the 20s, five in the 30s, and 40, which is 11 numbers out of 21.
25. **D.** All the numbers have three digits. Only Choices (A) and (D) have a units (ones) digit that equals the sum of the other two digits. A calculator can tell you that the square root of 156 is a decimal, while the square root of 729 is 27.
26. **D.** A slope of $-\frac{1}{3}$ means that the line goes down 1 unit every time it moves 3 units to the right. Because M is on the x -axis, the line has gone down 2 units by the time it reaches M , so it must have moved 6 units to the right. That means that M is at $(5, 0)$. M is the midpoint, which means that it's halfway to P . So, to get to P , move another 2 units down and 6 units right, which puts you at $(11, -2)$.
27. **C.** Because $b + c = x$, $b = x - c$. So you can substitute $(x - c)$ for b in the first equation, and write $a(x - c) = n$. It's vital that you remember the parentheses, because now you have to use the distributive property to get $ax - ac = n$, which is Choice (C).
28. **D.** Possible numbers for g are numbers like 3, 6, 12, 15, 21, and so on. If you try multiplying these numbers by 7 and then dividing by 9, you discover that the remainder is always 3 or 6. Because 3 isn't one of the answer choices, the correct answer is 6. Note that the problem asks for which *could* be the remainder.

29. **C.** A lot of these answer choices look true. However, if you let a equal 1, or a number less than 1, you realize that most of answer choices become false. This question is an old SAT trap; numbers between 0 and 1 (such as fractions) behave in funny ways. The only statement that is true for all positive numbers is Choice (C): Twice any positive number must be bigger than the original number.
30. **D.** Because there are parallel lines in this problem, you need to look for angles that are congruent. You can find them by looking for lines that make a Z or a backward Z. Looking first at the bigger triangles, you can mark the diagram as follows:



Notice that the two angles in the middle are vertical, so they're also equal. This is a picture of similar triangles: Angle F matches angle E , angle A matches angle D , and angle C is the same for both triangles. Therefore, you can use a ratio to figure out the length of AC :

$$\frac{AC}{CD} = \frac{CF}{CE} \text{ and } \frac{AC}{12} = \frac{24}{18}, \text{ which reduces to } \frac{AC}{12} = \frac{4}{3}$$

Be very careful that you match up the right parts when writing a ratio. If you matched AC with CE by accident, you'd get the wrong answer. Cross-multiplying your ratio tells you that $3(AC) = 48$, and $AC = 16$. Now, because $GB \parallel EF$, triangle ABG is similar to ACF as well. And, because $AG = GF$, the line GB cuts triangle ACF in half. That means that AB is half of AC , or 8.

31. **6.** Trial and error can work, but algebra is more reliable. Darren makes \$9 an hour on weekdays, and $1\frac{1}{2} \times \$9 = \13.50 an hour on weekends. If you let d equal his weekday hours and e equal his weekend hours, you know that $\$9(d) + \$13.50(e) = \$189.00$. You also know that $d + e = 18$ (his total hours), so you can solve this by substitution: $d = 18 - e$, which you can plug into the other equation. This gives you $\$9(18 - e) + \$13.50e = \$189$. Distribute to get $\$162 - \$9e + \$13.50e = \189 . And then combine like terms: $\$162 + \$4.50e = \$189$. Now just subtract 162 from both sides and divide by 4.50, to get $e = 6$. He worked 6 hours during the weekends. Just like that.
32. **40.** Sixty-five percent chose history or English, leaving 35 percent for other subjects. This 35 percent represents 14 students, so you're basically being asked, "35 percent of what number is 14?" You can use the "is/of" method from Chapter 10:

$$\frac{\text{is}}{\text{of}} = \frac{\%}{100}, \text{ so } \frac{14}{x} = \frac{35}{100}$$

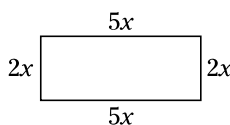
Cross-multiply to get $35x = 1,400$, and $x = 40$.

33. **11.** In a radical problem, you first need to isolate the radical. Therefore you have to subtract 1 from both sides before doing anything else, giving you $\sqrt{4x - 8} = 6$. Now, square both sides to eliminate the radical: $4x - 8 = 36$. Adding 8 and dividing by 4 gives you $x = 11$.

34. **6.** Plug in 7 for q , and set the expression equal to 21. Then use algebra to solve for p :

$$\begin{aligned} 21 &= \frac{p(7)}{p-4} \\ 21(p-4) &= p(7) \\ 21p-84 &= 7p \\ 14p &= 84 \\ p &= 6 \end{aligned}$$

35. **12.** If the ratio of the width to length is 2:5, then the actual length is $2x : 5x$, because you multiply both numbers by the same amount (represented by x) to maintain the ratio. Thus, the width is $2x$ and the length is $5x$. Now it can't hurt to draw and label a rectangle:



The perimeter is 84, so set up the equation to solve for x : $2x + 2x + 5x + 5x = 84$, and $x = 6$. Don't put 6, because that's not the width of the rectangle: it's the value of x . The length is $2x$, which is 12.

36. **520.** If the fee for each person is the same amount, and the difference in the total cost between eight people and ten people is \$50 (because $320 - 270 = 50$), then each addition of two people adds \$50 to the total price, and each person costs an extra \$25. So 10 people cost \$320, and 18 people is 8 more than 10, so these 8 people add \$200 to the price (because $8 \times 25 = 200$). Add the new \$200 to the existing \$320 for 10 people, and 18 people cost \$520.
37. **500.** You know that Tom's two investments total \$1,200, so set x as the amount earning 5 percent and $(1,200 - x)$ as the amount earning 7 percent. Five percent of x plus 7 percent of $(1,200 - x)$ equals \$74, so set the equation up like this:

$$5\%(x) + 7\%(1,200 - x) = 74$$

Remember that 5 percent is 5 "per hundred," so turn 5 percent into a decimal, 0.05. Do the same with 7 percent (0.07), and solve for x :

$$\begin{aligned} 0.05(x) + 0.07(1,200 - x) &= 74 \\ 0.05x + 84 - 0.07x &= 74 \\ 84 - 0.02x &= 74 \\ -0.02x &= -10 \\ x &= 500 \end{aligned}$$

Because x represents the number of dollars earning 5 percent, the answer is 500.

38. **300.** An investment that yields \$160 simple interest over a period of two years yields \$80 over a period of one year. Start by calculating the investment amounts needed to earn 5 percent and 7 percent. Just as in Part I, because Tom's two investments total \$1,200, set x as the amount earning 5 percent and $(1,200 - x)$ as the amount earning 7 percent. Five percent of x plus 7 percent of $(1,200 - x)$ equals \$80 (for one year), so set the equation up like this:

$$5\%(x) + 7\%(1,200 - x) = 80$$

Remember that 5 percent is 5 “per hundred,” so turn 5 percent into a decimal, 0.05. Do the same with 7 percent (0.07), and solve for x :

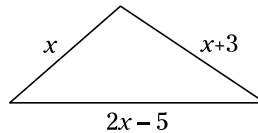
$$\begin{aligned}0.05(x) + 0.07(1,200 - x) &= 80 \\0.05x + 84 - 0.07x &= 80 \\84 - 0.02x &= 80 \\-0.02x &= -4 \\x &= 200\end{aligned}$$

To earn \$80 per year (totaling \$160 over two years), Tom would need to have \$200 in the account yielding 5 percent and the remaining \$1,000 in the account yielding 7 percent. The question asks for the amount to be transferred from the 5 percent account to the 7 percent account. You know from Part 1 that the 5 percent account currently has \$500, so Tom needs to transfer \$300 to the other account, because $\$500 - \$200 = \$300$.

Answers for Section 4: Mathematics — No-Calculator Section

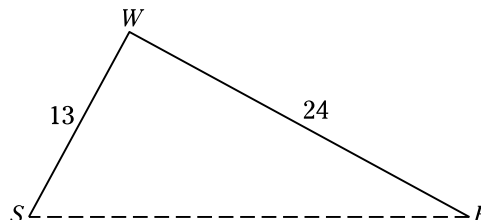
1. B. If you add the two expressions you're given, you discover that $4a + 4b = 20$, so $a + b = 5$.
2. C. Ah, yes, an SAT classic. (The SAT should have its own YouTube channel. Oh wait, it does.) If the wheel has a radius of 15 inches, it has a circumference of 30π (because circumference is $2\pi r$). Ten revolutions carries a point on the outside of the wheel 10 times the circumference for $10 \times 30\pi = 300\pi$.

3. **B.** Start with $(5^{q+1})^p$. When you take a power of a power, such as $(5^{q+1})^p$, you multiply the powers: $(5^{q+1})^p = 5^{p(q+1)}$. Next, multiply this by the other part of the question, (5^{-p}) . When you multiply the same numbers with exponents, you add the exponents, so leave the 5 and just add the exponents. In this case, the p and $-p$ cancel out, leaving the pq : $(5^{p(q+1)})(5^{-p}) = 5^{pq}$.
4. **C.** Look at the statements one at a time. Choice (A) is true. The mode appears most often, so there will be two, three, or four 90s. Choice (B) requires you to remember the formula $total = number \times mean$. In this case, the five numbers must add up to $5 \times 80 = 400$. Because you know there are at least two 90s, which add up to 180, the other three numbers must add up to 220. But because the numbers are all positive, and 240 is greater than 220, there is no room in the set for 240 and 2 additional values. However, for Choice (C), you can make a list that averages 80 but doesn't have 80 in it. The list *could* have 80 but doesn't *have to* have 80. Choice (D) is definitely true; you used this fact already when you checked Choice (A).
5. **D.** Quick quiz: What's the first thing you need to do when you read this problem? If you answered, "Draw the triangle," you win a prize. (The prize, of course, is improved SAT scores.) Drawing the triangle is only half the battle; you also have to label the triangle properly. Use this guideline: Let your variable stand for the second thing mentioned in the problem. In this case, the second thing mentioned is the first side, so let $x =$ the first side. The second side is then $x + 3$, and the third side is $2x - 5$. (Don't fall into the trap of thinking it's $5 - 2x$). The finished triangle looks like this:



The perimeter, 34, is the sum of all the sides, so $(x) + (x + 3) + (2x - 5) = 34$. Combining the like terms on the left side gives you $4x - 2 = 34$. Adding 2 to each side leaves you with $4x = 36$ and $x = 9$. Now you need to plug in the value of x : The first side is 9 centimeters, the second is $(9) + 3 = 12$ centimeters, and the third is $2(9) - 5 = 13$ centimeters. Because this side is the longest, it's also the answer.

6. **A.** Call the room shared by Melvin, Carey, and Dan room X, and the other room Y. Because Mike and Melvin won't live together, Mike must be in room Y. Now, if Dave and Dan live together, Peter will live with them, but you can't fit two more people into room X, so Dave and Dan must live apart, which puts Dave in room Y also. Similarly, you know that Enoch will live with Chris or Carey, so Chris can't be in room X, either. That puts Chris, Dave, and Mike in room Y.
7. **A.** Make a quick drawing of the situation. (Remember, the towns don't have to be in a straight line.)



The distance you're interested in is the dotted line. Hey, wait a minute: This is a triangle! So you can use the triangle inequality, which tells you that the sum of any two sides of a triangle must be greater than the third side. The number 10 doesn't satisfy the inequality, because $10 + 13 = 23$, which is less than 24.

8. **C.** If you multiply each of the choices by 3 points, you get 30, 33, 36, and 39. Because all the other scores are worth 5 points, you must be able to add a multiple of 5 to one of these numbers to get 61. The only one that works is 36, because $36 + 25 = 61$.
9. **C.** Don't fall into the trap of thinking that 1 is prime. Therefore, 2 isn't a tweener, because $2 - 1 = 1$ isn't prime. And 8 isn't a tweener, because $8 + 1 = 9$ isn't prime. But 30 works, because $30 - 1 = 29$ is prime, and so is $30 + 1 = 31$. Just to be sure, check that 36 doesn't work, and it doesn't, because $36 - 1 = 35$ isn't prime.
10. **A.** Twelve less than something is the thing minus 12, not the other way around. So you want an expression that says "x squared is 5 times x minus 12," and that's Choice (A).
11. **D.** To solve for y , isolate y on one side of the equation:

$$2y - c = 3c$$

$$2y = 4c$$

$$y = 2c$$

12. **D.** In general, absolute-value equations have two solutions. So if you were just guessing, guess either Choice (B) or Choice (D). Solving it the long way, you get

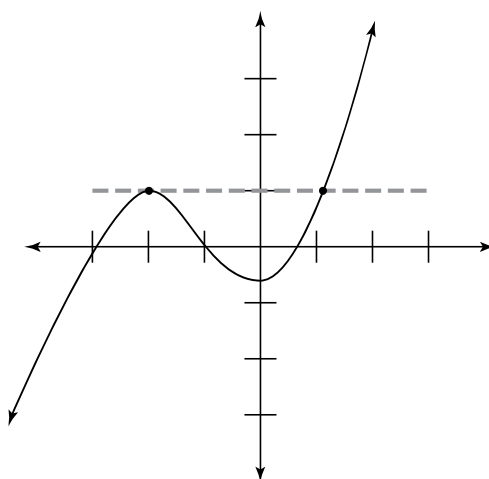
$$|3x - 1| = 7$$

$$3x - 1 = 7 \quad \text{or} \quad 3x - 1 = -7$$

$$\begin{array}{ccc} +1 & +1 & +1 & +1 \\ \frac{3x}{3} = \frac{8}{3} & & \frac{3x}{3} = \frac{-6}{3} & \end{array}$$

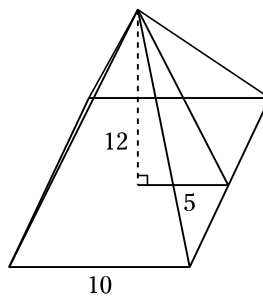
$$x = 2\frac{2}{3} \quad \text{or} \quad x = -2$$

13. **C.** The number of solutions to the equation $f(x) = 1$ is just the number of times that the graph has a height of 1, as shown here.



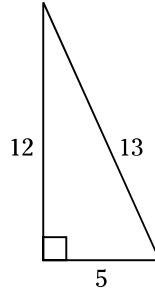
14. **C.** The length and width of the square are 5 (because $5 \times 5 = 25$), so the new length, being narrower by 2, is 3. And 3 times the new width is 24 (the area of the rectangle), so the new width is 8 (because $24 \div 3 = 8$). The width was 5 and increased by 3.

15. **C.** Using the ol' fallback SOH-CAH-TOA, focus on the TOA, which stands for “tangent opposite adjacent” but really means, $\text{tangent} = \frac{\text{opposite}}{\text{adjacent}}$. “Opposite” and “adjacent” refer to the sides of the triangle that are opposite and adjacent to the angle, C , which in this case are 5 and 12, respectively: $\tan C = \frac{5}{12}$.
16. **96.** This problem is easy if you remember an easy trick: $\text{total} = \text{number} \times \text{average}$. In this case, the total must equal $4 \times 90 = 360$. Adding up Lauren’s first three scores gives you 264, and $360 - 264 = 96$.
17. **7.** Remember the distance formula? It tells you that the distance between two points, (x_1, y_1) and (x_2, y_2) is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. Substituting your numbers, you get $10 = \sqrt{([-2] - [4])^2 + (p - [-1])^2} = \sqrt{(-6)^2 + (p + 1)^2} = \sqrt{36 + (p + 1)^2}$.
- Square both sides, and $100 = 36 + (p + 1)^2$. Now solve for p :
- $$64 = (p + 1)^2$$
- $$8 = p + 1$$
- $$7 = p$$
18. **84.** You could try to figure out what a and b equal, but you don’t need to. The key to getting this question right is remembering the formulas discussed in Chapter 12 — specifically, the one that says that $(a - b)^2 = a^2 - 2ab + b^2$. You know that $a - b = 8$, so $(a - b)^2 = a^2 - 2ab + b^2 = 64$. You’re being asked for $a^2 + b^2$, which is $(a^2 - 2ab + b^2) + 2ab$, or $64 + 2(10) = 84$.
19. **360.** The total surface area is the sum of the area of the square and the area of the four triangles. The square is easy: It’s $10 \times 10 = 100$. The triangles are tougher. They don’t have a height of 12. Twelve is the height of the pyramid, but the triangles are slanted. However, you can find the height of the slanted triangles by using the Pythagorean theorem, as shown in the following diagram:



That little triangle in the diagram is a right triangle. One leg is 12, the height of the pyramid. The second leg is half the width of the square, or 5. This is actually the world’s second-most

famous right triangle, the 5-12-13 triangle. (If you didn't remember this one, you could have figured it out with the Pythagorean theorem.)



The hypotenuse, 13, is the altitude of each of the tilted triangles that make up the sides of the pyramid. Because the triangle's area is $\frac{1}{2} \times \text{base} \times \text{height}$, each triangle's area is $\frac{1}{2} \times 10 \times 13 = 65$. The four triangles together have an area of $4 \times 65 = 260$. Adding in the 100 from the base gives you 360.

20. **3.** Find the value of $\sin \theta$ and multiply it by 5. If the coordinates of point P are $(4, 3)$, the diagonal is 5 (as in, 3-4-5 right triangle). Use the SOH from SOH-CAH-TOA to get that $\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$, which in this case is $\frac{3}{5}$. Multiply this by 5 for an answer of 3.

Answer Key

Section 2: Mathematics — Calculator Section

- | | |
|---------|---------|
| 1. D | 2. C |
| 3. A | 4. C |
| 5. B | 6. D |
| 7. D | 8. B |
| 9. B | 10. C |
| 11. B | 12. C |
| 13. B | 14. D |
| 15. B | 16. A |
| 17. A | 18. C |
| 19. D | 20. A |
| 21. B | 22. A |
| 23. A | 24. C |
| 25. D | 26. D |
| 27. C | 28. D |
| 29. C | 30. D |
| 31. 6 | 32. 40 |
| 33. 11 | 34. 6 |
| 35. 12 | 36. 520 |
| 37. 500 | 38. 300 |

Section 4: Mathematics — No-Calculator Section

- | | |
|---------|--------|
| 1. B | 2. C |
| 3. B | 4. C |
| 5. D | 6. A |
| 7. A | 8. C |
| 9. C | 10. A |
| 11. D | 12. D |
| 13. C | 14. C |
| 15. C | 16. 96 |
| 17. 7 | 18. 84 |
| 19. 360 | 20. 3 |