3. Six cups of flour are required to make a batch of cookies. How many cups of flour are required to make enough cookies to fill 12 cookie jars, if each cookie jar holds 1.5 batches?

(A) 108
(B) 90
(C) 81
(D) 78
(E) 72

4. If n is an even integer, which of the following must be an odd integer?

(A) $3n - 2$
(B) $3(n + 1)$
(C) $n - 2$
(D) $\frac{n}{3}$
(E) n^2

5. In the coordinate plane, what is the midpoint of the line segment with endpoints at (3, 4) and (0, 0) ?

(A) (1.5, 2)
(B) (5, 0)
(C) (2.5, 0)
(D) (3.5, 3.5)
(E) (1.75, 1.75)

6. $x\sqrt{4} - x\sqrt{9} =$

(A) $-5x$
(B) $-x\sqrt{5}$
(C) $-x$
(D) x
(E) $3x$

GO ON TO THE NEXT PAGE

SECTION 3
Time — 25 minutes
20 Questions

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

Directions: For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratchwork.

Notes

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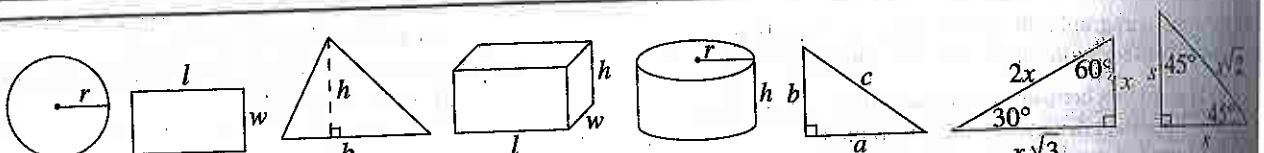


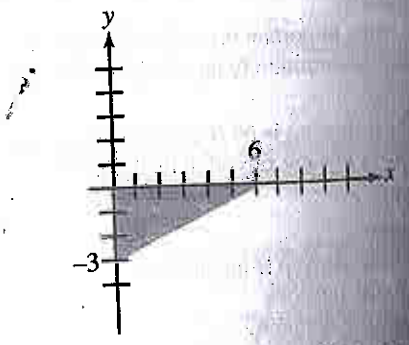
$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

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

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

1. If $\frac{12}{4} = x$, what is the value of $4x + 2$?

(A) 2
(B) 3
(C) 4
(D) 12
(E) 14



2. In the figure above, which of the following points lies within the shaded region?

(A) (–1, 1)
(B) (1, –2)
(C) (4, 3)
(D) (5, –4)
(E) (7, 0)

GO ON TO THE NEXT

	Number Sold	Average Weight per Parrot (in pounds)
Red Parrots	5	2
Blue Parrots	4	3

7. The chart above shows the number of red and blue parrots Toby sold in May and the average weight of each type of bird sold. If Toby sold no other parrots, what was the average (arithmetic mean) weight, in pounds, of the parrots that Toby sold in May?

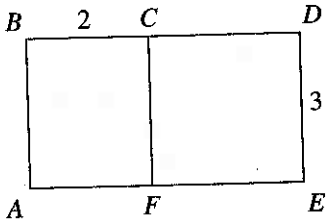
(A) 2

(B) $2\frac{4}{9}$

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

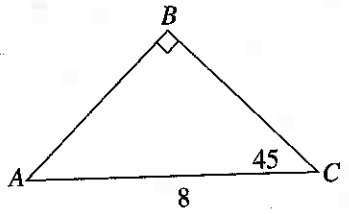
(D) 5

(E) 9



8. In the figure above, the perimeter of square $FCDE$ is how much smaller than the perimeter of rectangle $ABDE$?

(A) 2
(B) 3
(C) 4
(D) 7
(E) 16



9. In $\triangle ABC$ above, if $AC = 8$, what is the length of $\overline{BC}$?

(A) $8\sqrt{2}$
(B) 8
(C) 6
(D) $4\sqrt{2}$
(E) $3\sqrt{2}$

10. If $\frac{\sqrt{x}}{2} = 2\sqrt{2}$, what is the value of x ?

(A) 4
(B) 16
(C) $16\sqrt{2}$
(D) 32
(E) 64

GO ON TO THE NEXT PAGE

11. If b equals 40% of a, then in terms of b, 40% of $4a$ is equal to which of the following?

(A) $\frac{b}{40}$

(B) $\frac{b}{4}$

(C) b

(D) $4b$

(E) $16b$

Questions 12-13 refer to the following definition.

For all real numbers x, let $f(x) = 2x^2 + 4$.

12. What is the value of $f(4)$?

(A) 16
(B) 18
(C) 20
(D) 36
(E) 72

13. Which of the following is equal to $f(3) + f(5)$?

(A) $f(4)$
(B) $f(6)$
(C) $f(8)$
(D) $f(10)$
(E) $f(15)$

14. If the circle with center O has a diameter of 9, then what is the area of the circle with center O ?

(A) 81π

(B) $\frac{9}{2}\pi$

(C) $\frac{81}{4}\pi$

(D) 18π

(E) 9π

GO ON TO THE NEXT PAGE

15. The graph of which of the following equations is parallel to the line with equation $y = -3x - 6$?

(A) $x - 3y = 3$

(B) $x - \frac{1}{3}y = 2$

(C) $x + \frac{1}{6}y = 4$

(D) $x + \frac{1}{3}y = 5$

(E) $x + 3y = 6$

16. How many solutions exist to the equation $|x| = |2x - 1|$?

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

17. There are k gallons of gasoline available to fill a tank. After d gallons have been pumped, in terms of k and d, what percent of the gasoline has been pumped?

(A) $\frac{100d}{k}\%$

(B) $\frac{k}{100d}\%$

(C) $\frac{100k}{d}\%$

(D) $\frac{k}{100(k-d)}\%$

(E) $\frac{100(k-d)}{k}\%$

18. Ray and Jane live 150 miles apart. Each drives toward the other's house along a straight road connecting the two, Ray at a constant rate of 30 miles per hour and Jane at a constant rate of 50 miles per hour. If Ray and Jane leave their houses at the same time, how many miles are they from Ray's house when they meet?

(A) 40

(B) $51\frac{1}{2}$

(C) $56\frac{1}{4}$

(D) 75

(E) $93\frac{1}{4}$

GO ON TO THE NEXT PAGE

19. A bag contains 4 red hammers, 10 blue hammers, and 6 yellow hammers. If three hammers are removed from the bag at random and no hammer is returned to the bag after removal, what is the probability that all three hammers will be blue?

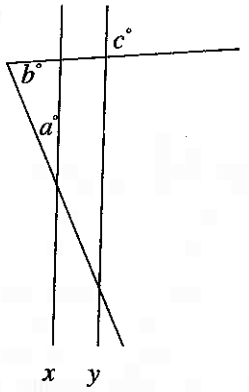
(A) $\frac{1}{2}$

(B) $\frac{1}{8}$

(C) $\frac{3}{20}$

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

(E) $\frac{3}{18}$



20. In the figure above, $x \parallel y$. What is the value of a in terms of b and c ?

(A) $b + c$
(B) $2b - c$
(C) $180 - b + c$
(D) $180 - b - c$
(E) $360 - b - c$

STOP

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

SECTION 5
Time — 25 minutes
18 Questions

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

Directions: For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratchwork.

Notes

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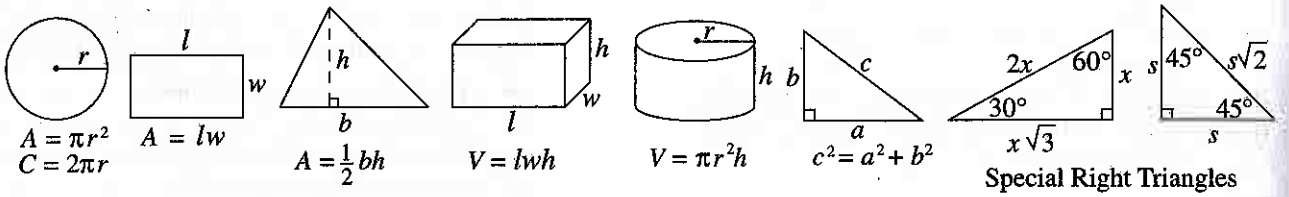


$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$

Special Right Triangles

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

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

1. If $2x + 10 = 16$, what is the value of $2x - 10$?

(A) −4
(B) −3
(C) 3
(D) 4
(E) 6

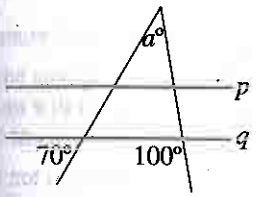
2. The only way to purchase Brand X muffins is to buy one or more boxes that each contain 6 muffins. Each box costs $1.50. If Alejandro needs at least 20 muffins, what is the least amount of money he could spend?

(A) $3.00
(B) $4.50
(C) $6.00
(D) $7.50
(E) $30.00

GO ON TO THE NEXT PAGE

3. How many even integers are there between 2 and 100, not including 2 and 100 ?

(A) 98
(B) 97
(C) 50
(D) 49
(E) 48



4. In the figure above, line p is parallel to line q. What is the value of a ?

(A) 10
(B) 30
(C) 35
(D) 40
(E) 70

5. If $f(3) = 6$ and $f(4) = 13$, then which of the following could be $f(x)$?

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

6. In rABC, $\overline{AB} \cong \overline{BC}$ and $\overline{AB} \perp \overline{BC}$. If AC = 10, what is the area of the triangle?

(A) $10\sqrt{2}$
(B) 25
(C) 50
(D) $50\sqrt{2}$
(E) 100

GO ON TO THE NEXT PAGE

7. In 1998, Andrei had a collection of 48 baseball caps. Since then, he has given away 13 caps, purchased 17 new caps, and traded 6 of his caps to Pierre for 8 of Pierre's caps. Since 1998, what has been the net percent increase in Andrei's collection?

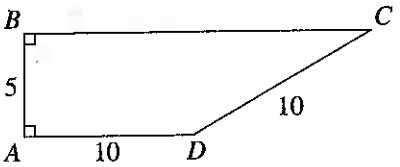
(A) 6%

(B) $12\frac{1}{2}\%$

(C) $16\frac{2}{3}\%$

(D) 25%

(E) $28\frac{1}{2}\%$



8. What is the area of quadrilateral *ABCD* in the figure above?

(A) 50

(B) $50+\frac{25\sqrt{2}}{2}$

(C) 70

(D) $50+\frac{25\sqrt{3}}{2}$

(E) 75

GO ON TO THE NEXT PAGE

SECTION 2
Time — 25 minutes
20 Questions

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

Directions: For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratchwork.

Notes

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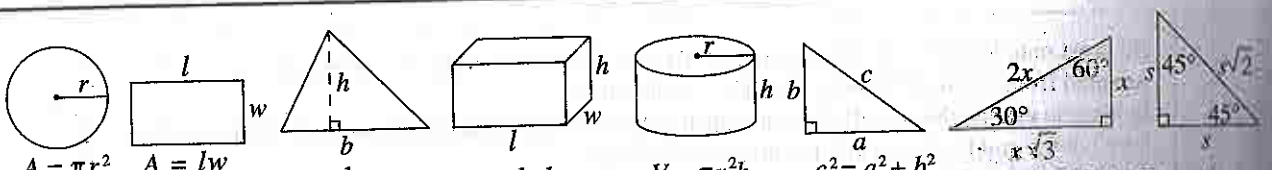


$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $V = lwh$ $V = \pi r^2 h$ $c^2 = a^2 + b^2$ Special Right Triangles

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

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

1. Andrea subscribed to four publications that cost \$12.90, \$16.00, \$18.00, and \$21.90 per year, respectively. If she made an initial payment of one-half of the total yearly subscription cost, and paid the rest in four equal monthly payments, how much was each of the four monthly payments?

(A) \$8.60
(B) \$9.20
(C) \$9.45
(D) \$17.20
(E) \$34.40

2. If $\frac{2x}{x^2+1} = \frac{2}{x+2}$, what is the value of x?

(A) $-\frac{1}{4}$
(B) $\frac{1}{4}$
(C) $\frac{1}{2}$
(D) 0
(E) 2

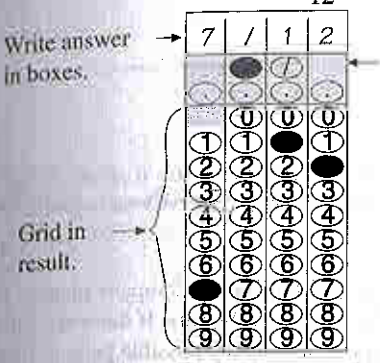
GO ON TO THE NEXT PAGE

5 ▭ 5 ▭ 5 ▭ 5

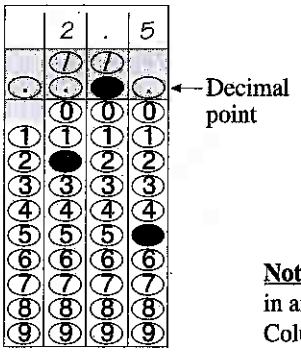
Directions: For Student-Produced Response questions 9–18, use the grids to the right of the answer document page on which you have answered questions 1–8.

Each of the remaining 10 questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

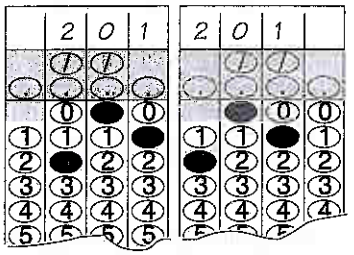
Answer: $\frac{7}{12}$



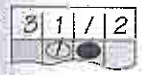
Answer: 2.5



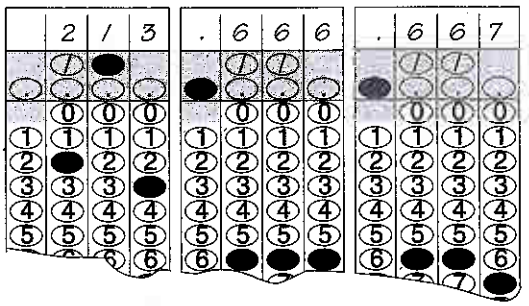
Answer: 201
Either position is correct.



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

- Mark no more than one circle in any column.
- Because the answer document will be machine-scored, **you will receive credit only if the circles are filled in correctly.**
- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is gridded, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
- **Decimal Answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666..., you should record your result as .666 or .667. **A less accurate value such as .66 or .67 will be scored as incorrect.**

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



9. A certain clothing store sells only T-shirts, sweatshirts, and turtlenecks. On Wednesday, the store sells T-shirts, sweatshirts, and turtlenecks in a ratio of 2 to 3 to 5. If the store sells 30 sweatshirts on that day, what is the total number of garments that the store sells on Wednesday?

10. A rectangular box has a height of 4.5 inches and a base with an area of 18 square inches. What is the volume of the rectangular box in cubic inches?

GO ON TO THE NEXT PAGE

11. If $5x - 4 = x - 1$, what is the value of x ?

12. If $a^b = 4$, and $3b = 2$, what is the value of a ?

13. If b is a prime number such that $3b > 10 \geq \frac{5}{6}b$, what is one possible value of b ?

14. The Tyler Jackson Dance Company plans to perform a piece that requires 2 dancers. If there are 7 dancers in the company, how many possible pairs of dancers could perform the piece?

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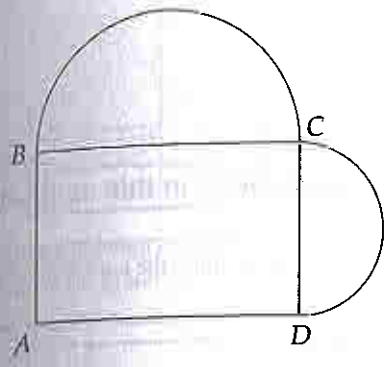

15. In the figure above, if semicircular arc BC has length 6π and semicircular arc CD has length 4π, what is the area of rectangle $ABCD$?

16. Let $f(x) = x^2 - 5$. If $f(6) - f(4) = f(y)$, what is $|y|$?

SPICE PRICES OF DISTRIBUTOR D	
Spice	**Price Per Pound**
Cinnamon	\$8.00
Nutmeg	\$9.00
Ginger	\$7.00
Cloves	\$10.00

17. The owner of a spice store buys 3 pounds each of cinnamon, nutmeg, ginger, and cloves from distributor D. She then sells all of the spices at \$2.00 per ounce. What is her total dollar profit (1 pound = 16 ounces)? (Disregard the \$ sign when gridding your answer.)

18. Points E, F, G, and H lie on a line in that order. If $EG = \frac{5}{3}EF$ and $HF = 5FG$, then what is $\frac{EF}{HG}$?

STOP

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

SECTION 6
Time — 25 minutes
18 Questions

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

Directions: For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratchwork.

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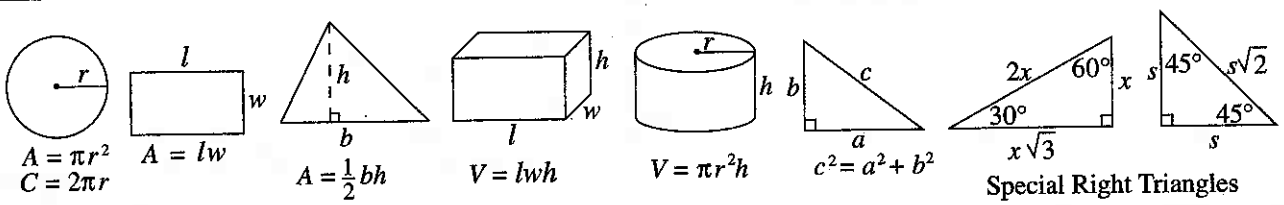

$A = \pi r^2$ $C = 2\pi r$ | $A = lw$ | $A = \frac{1}{2}bh$ | $V = lwh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

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

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

1. If $x + 6 > 0$ and $1 - 2x > -1$, then x could equal each of the following EXCEPT

(A) -6

(B) -4

(C) -2

(D) 0

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

2. Elsa has a pitcher containing x ounces of root beer. If she pours y ounces of root beer into each of z glasses, how many ounces of root beer will remain in the pitcher?

(A) $\frac{x}{y} + z$

(B) $xy - z$

(C) $\frac{x}{yz}$

(D) $x - yz$

(E) $\frac{x}{y} - z$

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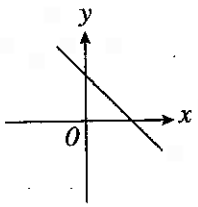


3. Which of the following could be the equation of the line represented in the graph above?

(A) $y = 2x + 4$
(B) $y = 2x - 4$
(C) $y = -2x - 1$
(D) $y = -2x - 4$
(E) $y = -2x + 4$

4. Starting with a blue light, a strand of colored lights contains lights in a repeating pattern of blue, orange, green, purple, red, and yellow. What is the color of the 53rd light?

(A) Blue
(B) Orange
(C) Green
(D) Purple
(E) Red

5. If x = y + 1 and y ≥ 1, then which of the following is equal to x2 – y2 ?

(A) $(x - y)^2$
(B) $x^2 - y - 1$
(C) $x + y$
(D) $x^2 - 1$
(E) $y^2 + 1$

6. Triangle ABC has a perimeter of 10, and the lengths of its sides are all integers. If a is the length of side $\overline{BC}$, what is the difference between the largest and smallest possible values of a ?

(A) 1
(B) 2
(C) 3
(D) 4
(E) 7

GO ON TO THE NEXT PAGE

7. What is the greatest number of regions into which an equilateral triangle can be divided using exactly three straight lines?

(A) 4
(B) 6
(C) 7
(D) 8
(E) 9

8. If $a = 4b + 26$, and b is a positive integer, then a could be divisible by all of the following EXCEPT

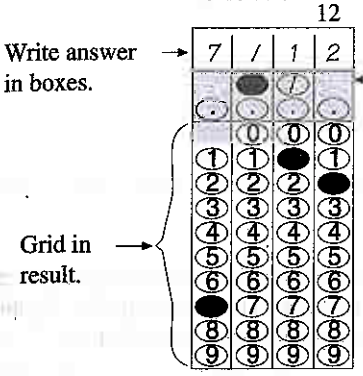
(A) 2
(B) 4
(C) 5
(D) 6
(E) 7

GO ON TO THE NEXT PAGE

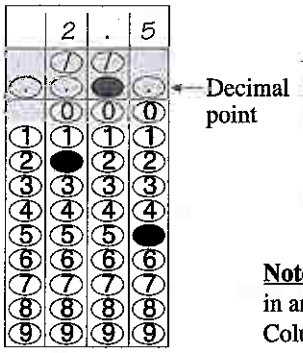
Directions: For Student-Produced Response questions 9–18, use the grids to the right of the answer document page on which you have answered questions 1–8.

Each of the remaining 10 questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

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



Answer: 2.5



Answer: 201
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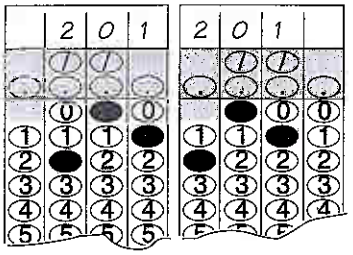

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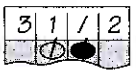
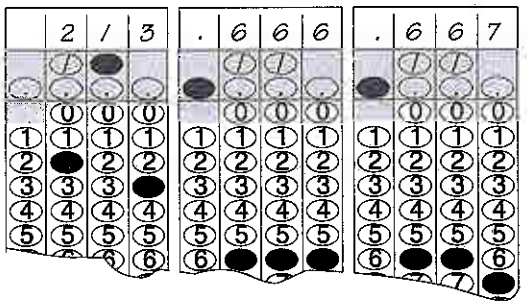
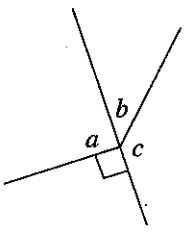
- Mark no more than one circle in any column.
- Because the answer document will be machine-scored, **you will receive credit only if the circles are filled in correctly.**
- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is gridded, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)

- **Decimal Answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666..., you should record your result as .666 or .667. **A less accurate value such as .66 or .67 will be scored as incorrect.**

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



9. If $3x = 12$, what is the value of $\frac{8}{x}$?



10. In the figure above, what is the value of $a + b + c$?

GO ON TO THE NEXT PAGE

11. Y is a point on $\overline{XZ}$ such that $XY = \frac{1}{2}XZ$. If the length of $\overline{YZ}$ is $4a + 6$, and the length of $\overline{XZ}$ is 68, what is the value of a ?

12. If $4x + 2y = 24$ and $\frac{7y}{2x} = 7$, what is the value of x ?

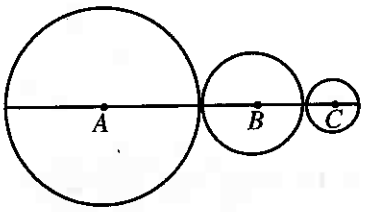
13. If $\frac{x^2 + x - 6}{x^2 - 8x + 12} = 4$, what is the value of x ?

14. Twenty bottles contain a total of 8 liters of apple juice. If each bottle contains the same amount of apple juice, how many liters of juice are in each bottle?

GO ON TO THE NEXT PAGE

15. The American Ballet Repertory Company will choose 4 new corps members from its apprentice program. The apprentice program is made up of 6 women and 6 men. If 3 women and 1 man are to be chosen for the corps, how many different groupings are possible?

16. The estimated population of rabbits in a certain forest is given by the function $P(t) = at + 120$ where t is an integer which represents the number of years after the rabbit population was first counted, $0 \le t \le 10$, and a is a constant. If there were 192 rabbits 3 years after the population was first counted, how many rabbits will there be 7 years after the population was first counted?



17. In the figure above, the radius of the circle with center A is twice the radius of the circle with center B and four times the radius of the circle with center C. If the sum of the areas of the three circles is 84π, what is the length of $\overline{AC}$?

18. One-fifth of the cars in a parking lot are blue and $\frac{1}{2}$ of the blue cars are convertibles. If $\frac{1}{4}$ of the convertibles in the parking lot are blue, then what percent of the cars in the lot are neither blue nor convertibles? (Disregard the % sign when gridding your answer.)

STOP

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

SECTION 8
Time — 20 minutes
16 Questions

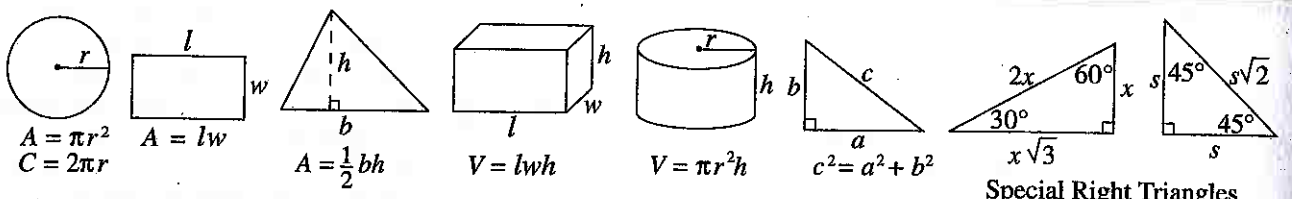
Turn to Section 8 of your answer sheet to answer the questions in this section.

Directions: For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratchwork.

Notes

1. The use of a calculator is permitted.
2. All numbers used are real numbers.
3. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless other wise indicated.
4. Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

Reference Information



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

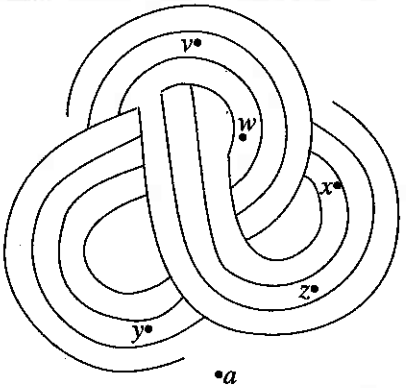
Special Right Triangles

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

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

1. If $6 - y = 2y - 6$, what is the value of y ?

(A) 0
(B) 2
(C) 4
(D) 6
(E) 12



2. Which of the following points can be connected to point a by a continuous path without crossing any line or curve in the figure above?

(A) v
(B) w
(C) x
(D) y
(E) z

GO ON TO THE NEXT PAGE

	Computer Production	
	Morning Shift	Afternoon Shift
Monday	200	375
Tuesday	245	330
Wednesday	255	340
Thursday	250	315
Friday	225	360

3. Computer production at a factory occurs during two shifts, as shown in the chart above. If computers are only produced during the morning and afternoon shifts, on which of the following pairs of days is the greatest total number of computers produced?

(A) Monday and Thursday
(B) Tuesday and Thursday
(C) Tuesday and Wednesday
(D) Tuesday and Friday
(E) Monday and Friday

4. If a rectangular swimming pool has a volume of 16,500 cubic feet, a uniform depth of 10 feet, and a length of 75 feet, what is the width of the pool, in feet?

(A) 22
(B) 26
(C) 32
(D) 110
(E) 1,650

5. Cindy has a collection of 80 records. If 40% of her records are jazz records, and the rest are blues records, how many blues records does she have?

(A) 32
(B) 40
(C) 42
(D) 48
(E) 50

6. A science class has a ratio of girls to boys of 4 to 3. If the class has a total of 35 students, how many more girls are there than boys?

(A) 20
(B) 15
(C) 7
(D) 5
(E) 1

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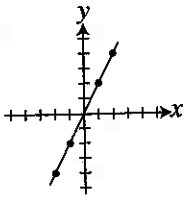
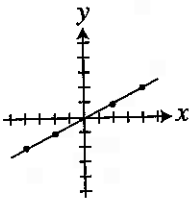
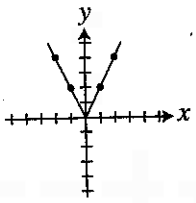
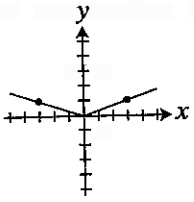
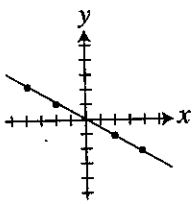


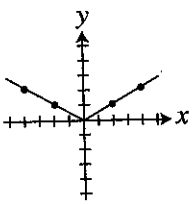
7. The graph above shows $y = 2x$. Which of the following graphs represents $y = |2x|$?

(A)


(B)


(C)


(D)


(E)


8. The length of a certain rectangle is twice the width. If the area of the rectangle is 128, what is the length of the rectangle?

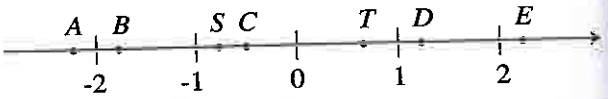
(A) 4

(B) 8

(C) 16

(D) $21\frac{1}{3}$

(E) $42\frac{2}{3}$



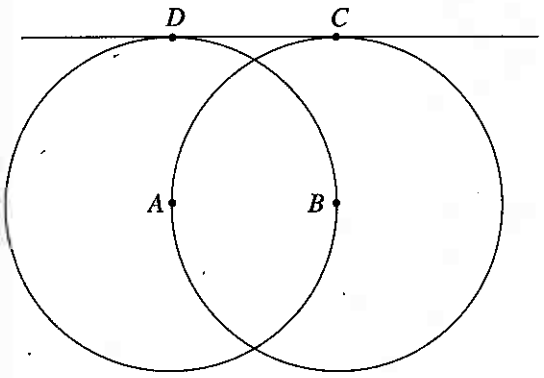
9. Which of the lettered points on the number line above could represent the result when the coordinate of point T is divided by the coordinate of point S ?

(A) A
(B) B
(C) C
(D) D
(E) E

GO ON TO THE NEXT PAGE

10. For positive integer x, 10 percent of x percent of 1,000 is equal to which of the following?

(A) x
(B) $10x$
(C) $100x$
(D) $1{,}000x$
(E) $10{,}000x$



11. In the figure above, A and B are the centers of two circles of identical circumference. $\overleftrightarrow{CD}$ is tangent to both circles and parallel to $\overleftrightarrow{AB}$ (not shown). If r is the radius of the circle with center A, what is the area of quadrilateral $ABCD$ (not shown) in terms of r ?

(A) $4r^2$
(B) $4r$
(C) $2r^2$
(D) $2r$
(E) r^2

12. Nails are sold in 8-ounce and 20-ounce boxes. If 50 boxes of nails were sold and the total weight of the nails sold was less than 600 ounces, what is the greatest possible number of 20-ounce boxes that could have been sold?

(A) 34
(B) 33
(C) 25
(D) 17
(E) 16

13. If $c = \frac{1}{x} + \frac{1}{y}$ and $x > y > 0$, then which of the following is equal to $\frac{1}{c}$?

(A) $x + y$

(B) $x - y$

(C) $\frac{x+y}{xy}$

(D) $\frac{xy}{x+y}$

(E) $\frac{1}{x} + \frac{1}{y}$

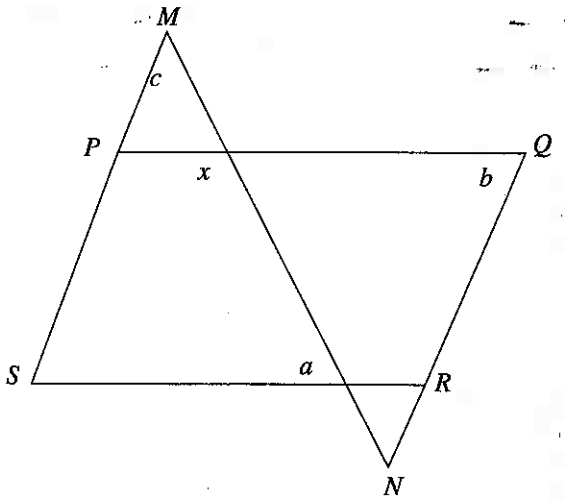
GO ON TO THE NEXT PAGE

14. In the xy-plane, which of the following is a point of intersection between the graphs of $y = x + 2$ and $y = x^2 + x - 2$?

(A) $(0, -2)$
(B) $(0, 2)$
(C) $(1, 0)$
(D) $(2, 4)$
(E) $(3, 5)$

15. If $f(g(a)) = 6$, $f(x) = \frac{x}{2} + 2$, and $g(x) = |x^2 - 10|$, which of the following is a possible value of a ?

(A) $\sqrt{2}$
(B) $\sqrt{3}$
(C) 2
(D) 6
(E) 18



16. If $PQRS$ is a parallelogram, then which of the following must be equal to x ?

(A) $180 - b$
(B) $180 - c$
(C) $a + b$
(D) $a + c$
(E) $b + c$

STOP

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