

1. Assume the statements in the box below are true.

All drivers who live in Ohio have car insurance.
 Antonia does not live in Ohio.
 Catherine has car insurance.
 Tai has car insurance.
 Jorge lives in Maine.
 Maria is a licensed driver who lives in Ohio.

Considering only the statements in the box, which of the following statements must be true?

- A. Maria has car insurance.
- B. Antonia does not have car insurance.
- C. Catherine lives in Ohio.
- D. Tai lives in Ohio.
- E. Jorge does not have a driver's license.

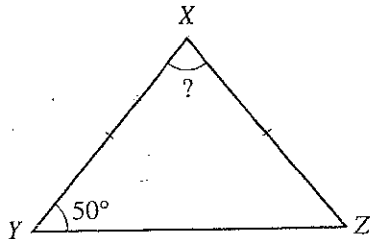
2. If $x = -3$, what is the value of $\frac{x^2 - 1}{x + 1}$?

- F. -4
- G. -2
- H. 2
- J. $3\frac{2}{3}$
- K. 5

3. Mr. Jones earns a total of \$320 each week at his job in Shaba's Supermarket. If 18% of his pay is withheld for taxes, insurance, and other deductions, what is his take-home pay each week?

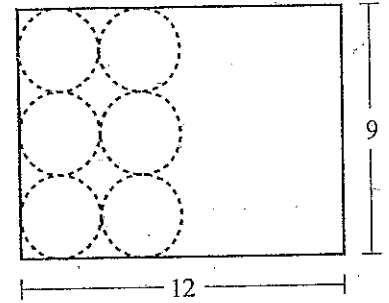
- A. \$ 57.60
- B. \$262.40
- C. \$300.50
- D. \$320.00
- E. \$338.00

4. In $\triangle XYZ$ shown below, $\overline{XY} \cong \overline{XZ}$, and the measure of $\angle Y$ is 50° . What is the measure of $\angle X$?



- F. 40°
- G. 50°
- H. 65°
- J. 80°
- K. 100°

5. Shari and Juan are in charge of the art classes for summer camp. They plan to have the children make flowers out of construction paper. They have decided to let the 10-year-olds cut out the circles, each 3 inches in diameter, for the centers of the flowers. If the pieces of construction paper are 9 inches by 12 inches, and the circles are laid out as shown below, what is the *least* number of pieces of construction paper Shari and Juan will need for the centers of 50 flowers?



- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

6. On the real number line below, numbers increase in value from left to right, and B is positive. The value of A must be:



- F. negative.
- G. positive.
- H. less than B .
- J. greater than B .
- K. between 0 and B .

7. If $2(x - 5) = -11$, then $x = ?$

- A. $-\frac{21}{2}$
- B. -8
- C. $-\frac{11}{2}$
- D. -3
- E. $-\frac{1}{2}$

8. Which of the following is a factor of the polynomial $x^2 - x - 20$?

- F. $x - 5$
- G. $x - 4$
- H. $x + 2$
- J. $x + 5$
- K. $x + 10$

9. A line in the standard (x, y) coordinate plane is parallel to the x -axis and 7 units above it. Which of the following is an equation of this line?

- A. $y = 7$
- B. $x = 7$
- C. $y = 7x$
- D. $y = x + 7$
- E. $x = y + 7$

10. $\frac{3p}{5} + \frac{3q}{2}$ is equivalent to:

- F. $\frac{9pq}{10}$
- G. $\frac{6p + 15q}{10}$
- H. $\frac{6p + 3q}{2}$
- J. $\frac{3p + 15q}{5}$
- K. $\frac{3p + 3q}{7}$

11. Amelia Earhart's Lockheed Vega was a 27-foot-long airplane with a wingspan of 41 feet. If you are making a $\frac{1}{20}$ scale model of this airplane, what should be the length of the model's wingspan, in feet?

- A. $\frac{1}{20}$
- B. $1\frac{1}{20}$
- C. $2\frac{1}{20}$
- D. $2\frac{7}{20}$
- E. $2\frac{1}{2}$

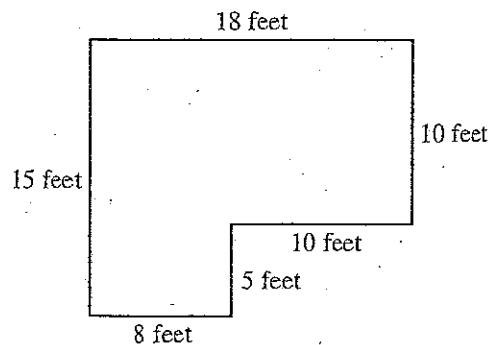
12. Ahn, Bill, and Carl are eating a pizza. If Ahn ate 4 slices, Bill ate 3 slices, Carl ate 2 slices, and 1 slice more than half of the slices remain, into how many slices was the original pizza cut?

- F. 16
- G. 17
- H. 18
- J. 19
- K. 20

13. The shipping costs for the Acme Furniture Company increased by 60% because the company moved. If it cost Acme \$80 to ship some furniture before the company moved, how much would it cost to ship the same furniture after the move?

- A. \$ 48.00
- B. \$ 84.80
- C. \$108.00
- D. \$128.00
- E. \$140.00

14. Teria plans to paint the ceiling of an L-shaped room in her apartment. Her ceiling is flat and all adjacent sides meet at right angles, as shown below. She is going to take advantage of a paint sale that discounts the cost of each 1-quart can of paint. Using her painting experience, Teria estimates that each quart of paint covers approximately 100 square feet. Based on her estimate, what is the minimum number of 1-quart cans of paint she must buy to paint 1 coat?

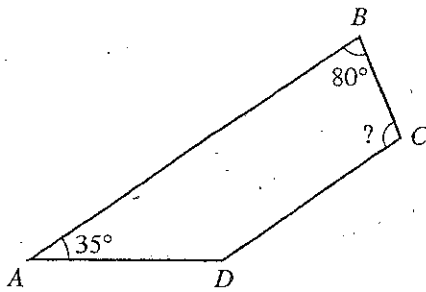


- F. 1
- G. 2
- H. 3
- J. 4
- K. 5

15. If $x = -4$, what is the value of $3x^2 - 15x$?

- A. -108
- B. -12
- C. 12
- D. 29
- E. 108

16. In the trapezoid below, \overline{AB} is parallel to \overline{DC} . What is the measure of $\angle C$?



- F. 65°
 G. 100°
 H. 115°
 J. 122.5°
 K. 145°
17. $(6a^3 - 5ac^2 + 14c) - (8c - 3a^3 - 2ac^2)$ is equivalent to:

- A. $3a^6 - 7a^2c^4 + 22c^2$
 B. $3a^3 - 7ac^2 + 22c$
 C. $9a^6 - 3a^2c^4 + 6c^2$
 D. $9a^3 - 3ac^2 + 6c$
 E. $-2a^2 - 2ac + 16ac^3$

18. If $f(x) = 3x^2 + 5x - 5$, then $f(-2) = ?$

- F. 21
 G. 17
 H. 3
 J. -3
 K. -27

19. An advertisement for tires says, "Buy 3 tires at the regular price and get the fourth tire free!" This offer is equivalent to what discount off the regular price of all 4 tires?

- A. $\frac{1}{3}\%$
 B. $\frac{1}{4}\%$
 C. 25%
 D. 33%
 E. 40%

20. You tossed a fair coin 10 times, recording H when the head side landed up and T when the tail side landed up. You recorded: T H H H H T H H H H. What is the probability that the head side will land up on your next toss?

- F. 0
 G. $\left(\frac{1}{2}\right)^{11}$
 H. $\left(\frac{1}{2}\right)^9$
 J. $\frac{1}{2}$
 K. 1

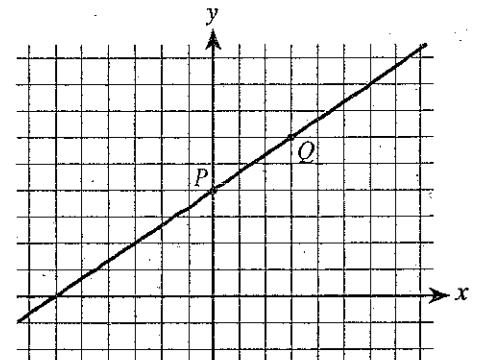
21. At the Airtight Security Company, every employee must wear a badge with an identification code consisting of 2 letters of the 26 letters A-Z followed by 2 of the digits 0-9. Letters and digits may be repeated, but the first letter CANNOT be the letter O. How many different codes can be made?

- A. $26 \cdot 26 \cdot 10 \cdot 10$
 B. $26 \cdot 26 \cdot 10 \cdot 9$
 C. $25 \cdot 26 \cdot 10 \cdot 10$
 D. $25 \cdot 25 \cdot 10 \cdot 10$
 E. $25 \cdot 26 \cdot 10 \cdot 9$

22. The length of a rectangle is 6 inches longer than its width. If the perimeter of the rectangle is 48 inches, what is the width, in inches?

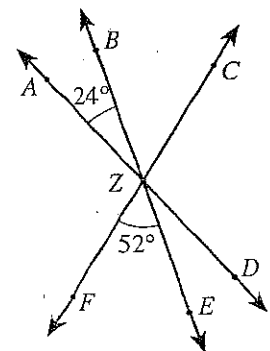
- F. 27
 G. 21
 H. 15
 J. 9
 K. 8

23. What is the slope of \overleftrightarrow{PQ} in the graph below?
 (Note: Grid lines are spaced every $\frac{1}{2}$ unit.)



- A. $\frac{2}{3}$
 B. $-\frac{2}{3}$
 C. $\frac{3}{2}$
 D. $-\frac{3}{2}$
 E. $\sqrt{3^2 + 2^2}$

24. In the figure below, \overleftrightarrow{AD} , \overleftrightarrow{BE} , and \overleftrightarrow{CF} all intersect at point Z, with angle measures as marked. What is the measure of $\angle CZE$?



- F. 76°
 G. 104°
 H. 114°
 J. 118°
 K. 128°

25. The parallelogram below was cut from a piece of graph paper with squares that are 5 millimeters by 5 millimeters. What is the area of the parallelogram, in square millimeters?

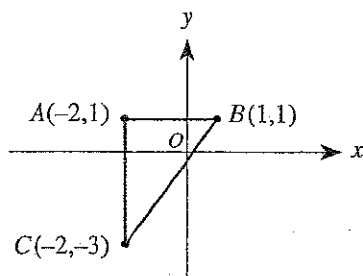
- A. 800
B. 950
C. 1,100
D. 1,400
E. 1,600



26. The flight of a projectile is modeled by the function $d = -5t^2 + 18t + 8$, where d represents distance above the ground measured in meters, and t represents time of flight measured in seconds. According to this model, the projectile will hit the ground when $t = ?$

- F. 1
G. 2
H. 4
J. 4.4
K. 5.2

27. In the standard (x,y) coordinate plane, if a triangle has vertices at $A(-2,1)$, $B(1,1)$, and $C(-2,-3)$, what is its area in square coordinate units?



- A. 5
B. 6
C. $\frac{15}{2}$
D. 10
E. 12

28. $-(-3a^3)^2$ is equivalent to:

- F. $-9a^6$
G. $-3a^5$
H. $3a^5$
J. $6a^6$
K. $9a^6$

29. 120 is $\frac{5}{12}$ of what number?

- A. 50
B. 64
C. 102
D. 204
E. 288

30. If b is any even integer, which of the following is a more simplified way to express $\left[\frac{b+3}{b^2-9} \div \frac{1}{b-3} \right]$?

- F. 1
G. 2
H. $\frac{1}{b^2+9}$
J. $\frac{2}{(b-3)^2}$
K. $\frac{1}{b^2-6b+9}$

31. Among the following 5 fractions, which one is greater than the rest?

- A. $-\frac{1}{2}$
B. $-\frac{3}{4}$
C. $-\frac{7}{8}$
D. $-\frac{9}{16}$
E. $-\frac{5}{32}$

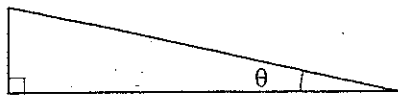
32. If $\frac{4}{3}x > -1$, what is the set of all possible values of x ?

- F. $x > -\frac{3}{4}$
G. $x > \frac{4}{3}$
H. $x < -\frac{4}{3}$
J. $x < -\frac{3}{4}$
K. $x < \frac{4}{3}$

33. The owner of a dance studio wants to double the area of a rectangular 8-foot-by-10-foot dance floor. The 8-foot width will be increased by 2 feet. By how many feet must the length increase?

- A. 2
B. 4
C. 6
D. 8
E. 10

34. In the right triangle below, if $\tan \theta = \frac{2}{\sqrt{77}}$, then $\sin \theta = ?$



- F. $\frac{2}{9}$
 G. $\frac{4}{77}$
 H. $\frac{\sqrt{77}}{9}$
 J. $1 - \frac{2\sqrt{77}}{77}$
 K. $\sqrt{1 - \left(\frac{2\sqrt{77}}{77}\right)^2}$
35. What is the slope of a line that is parallel to $x + 2y = 6$?

- A. -2
 B. $-\frac{1}{2}$
 C. $\frac{1}{2}$
 D. 3
 E. 6

36. In the formula $A = P(1 + rt)$, A is the principal plus simple interest, P is the principal, r is the interest rate, and t is the time. Which of the following solves this formula for r ?

- F. $r = \frac{A}{2Pt}$
 G. $r = \frac{A-P}{Pt}$
 H. $r = \frac{A}{P+Pt}$
 J. $r = \frac{A}{P} - Pt$
 K. $r = A - P - Pt$

37. Tanya and Charles bought their brother Jerome a concert ticket for his birthday. When Jerome thanked Charles for the ticket, Charles said, "I contributed only $\frac{1}{2}$ as much as Tanya." If the ticket price was \$24, how much money did Tanya contribute?

- A. \$ 6
 B. \$ 8
 C. \$12
 D. \$16
 E. \$18

38. Which of the following is the solution set for the inequality below?

$$|x - 1| > 5$$

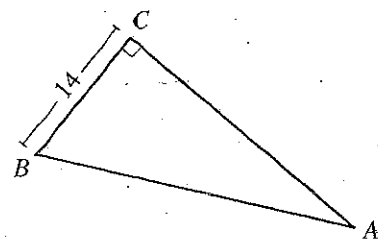
- F. $x < -4$ or $x > 6$
 G. $x < -5$ or $x > 5$
 H. $x > -1$ and $x < 1$
 J. $x > -4$ and $x < 6$
 K. $x > -5$ and $x < 5$

39. Saying that $4 < \sqrt{x} < 9$ is equivalent to saying what about x ?

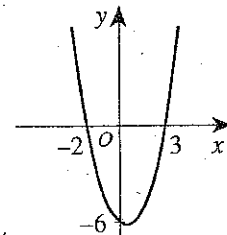
- A. $0 < x < 5$
 B. $0 < x < 65$
 C. $2 < x < 3$
 D. $4 < x < 9$
 E. $16 < x < 81$

40. In $\triangle ACB$ shown below, $\sin A = \frac{3}{7}$ and the measure of \overline{CB} is 14 inches. What is the measure of \overline{AB} in inches?

- F. 6
 G. $\sqrt{40}$
 H. $\sqrt{58}$
 J. $\frac{98}{3}$
 K. 40



41. Which of the following could be the equation for the parabola graphed in the standard (x, y) coordinate plane below?



- A. $y = (x + 2)(x - 3)$
 B. $y = (x - 2)(x + 3)$
 C. $y = -(x - 2)(x + 3)$
 D. $y = -(x - 2)(x - 3)$
 E. $y = -(x + 2)(x + 3)$

42. The average of a set of 5 integers is 4. If one of the integers in the set is 3, what is the average of the other 4 integers in the set?

- F. 3
 G. $3\frac{2}{5}$
 H. 4
 J. $4\frac{1}{4}$
 K. 5

43. If one solution to $x^2 - kx - 8 = 0$ is $x = -k$, what are the possible values of k ?

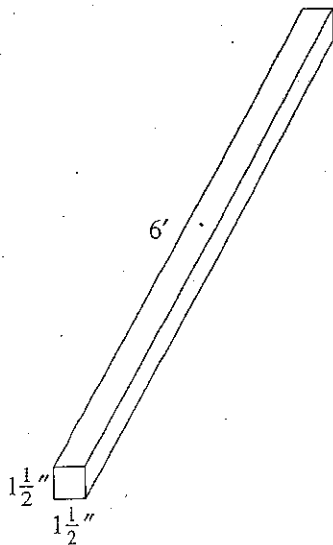
- A. $\{-4, 4\}$
- B. $\{-2, 2\}$
- C. $\{0, -2\}$
- D. $\{-\sqrt{2}, \sqrt{2}\}$
- E. $\{-2\sqrt{2}, 2\sqrt{2}\}$

44. Triangle T_1 is congruent to triangle T_2 . Triangle T_1 is similar to triangle T_3 . Which of the following relations is(are) also true between such triangles?

- I. Triangle T_1 *must* be congruent to triangle T_3 .
- II. Triangle T_2 *must* be similar to triangle T_3 .
- III. Triangle T_1 *can* be congruent to triangle T_3 .

- F. II only
- G. III only
- H. I and II only
- J. II and III only
- K. I, II, and III

45. George is making wooden building blocks for his grandchildren. As a first step, he wants to cut up a piece of lumber that is $1\frac{1}{2}$ inches by $1\frac{1}{2}$ inches by 6 feet (shown below) so that he will have cubes $1\frac{1}{2}$ inches on a side. He must allow an extra $\frac{1}{8}$ inch for each cut because his saw blade is $\frac{1}{8}$ inch wide. Assuming that the lumber has no knots or other flaws, what is the maximum number of blocks he can make from his 6-foot piece of lumber?



- A. 36
- B. 44
- C. 48
- D. 108
- E. 117

46. What is the value of k for which the lines $y = kx + 1$ and $y = x - 2$ intersect at the point $(4, 2)$ in the standard (x, y) coordinate plane?

- F. -1
- G. $\frac{1}{4}$
- H. $\frac{1}{2}$
- J. 1
- K. $\frac{3}{2}$

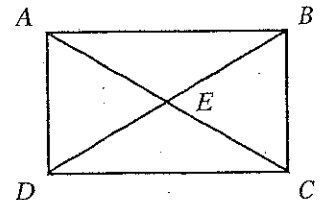
47. The equation of the line containing one side of a rectangle in the standard (x, y) coordinate plane is $y = \frac{3}{4}x - 2$. If one of the following equations is a line containing an adjacent side, which equation must it be?

- A. $y = -3x + 3$
- B. $y = \frac{3}{4}x + 3$
- C. $y = -\frac{3}{4}x - 5$
- D. $y = \frac{4}{3}x + 1$
- E. $y = -\frac{4}{3}x - 4$

48. How many positive integers are factors of 30?

- F. 3
- G. 5
- H. 6
- J. 8
- K. 10

49. Rectangle $ABCD$, with diagonals \overline{AC} and \overline{BD} intersecting at point E , is shown below. Rectangle $ABCD$ is a square *if and only if* $\triangle ABE$ is congruent to which of the triangles in the following list?



- A. $\triangle ACD$
- B. $\triangle ADE$
- C. $\triangle BAE$
- D. $\triangle BDC$
- E. $\triangle CDE$

50. A school supply store sells individual pencils and pens. Two pencils and a pen would cost \$0.55. Two pens and a pencil would cost \$0.95. How much would 1 pencil and 1 pen cost?

- F. \$0.15
- G. \$0.35
- H. \$0.50
- J. \$0.75
- K. Cannot be determined from the given information

51. The imaginary number, i , is defined such that $i^2 = -1$. What does $i + i^2 + i^3 + \dots + i^{49}$ equal?

- A. i
- B. $-i$
- C. -1
- D. 0
- E. 1

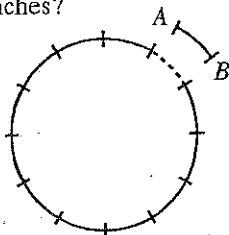
52. For $0 < x \leq 2\pi$, if $\sin x > 0$ and $\cos x < 0$, what are the possible values of x ?

- F. $0 < x < \frac{\pi}{2}$
- G. $\frac{\pi}{2} < x < \pi$
- H. $\pi < x < \frac{3\pi}{2}$
- J. $\frac{3\pi}{2} < x < 2\pi$
- K. $x = \pi$ or 2π

53. What is the area, in square centimeters, of the largest circle that can fit within a rectangle measuring 6 centimeters by 8 centimeters?

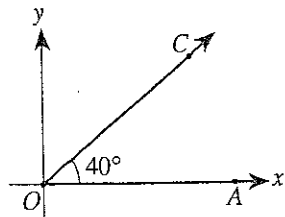
- A. 6π
- B. 8π
- C. 9π
- D. 16π
- E. 48π

54. A circle with a radius of 6 inches is cut into 12 equal pieces, one of which is arc \widehat{AB} , as shown below. What is the measure of arc \widehat{AB} in inches?



- F. 1
- G. 2
- H. π
- J. 2π
- K. 3π

55. When an angle is in standard position in the (x,y) coordinate plane, its vertex is $(0,0)$. One side (called the initial side) is along the positive x -axis. The other side (called the terminal side) is positioned counterclockwise from the initial side if the angle's measure is positive and clockwise if the angle's measure is negative. In the figure below, $\angle AOC$, which measures 40° , is in standard position. Which of the following gives the measure of an angle in standard position that does NOT have the same terminal side as $\angle AOC$?

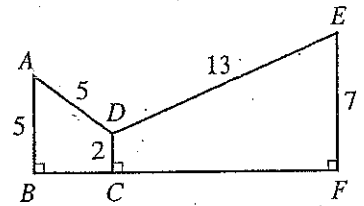


- A. -320°
- B. 400°
- C. 680°
- D. 760°
- E. $1,120^\circ$

56. An airplane flew for 8 hours at an airspeed of x miles per hour (mph), and for 7 more hours at 325 mph. If the average airspeed for the entire flight was 350 mph, which of the following equations could be used to find x ?

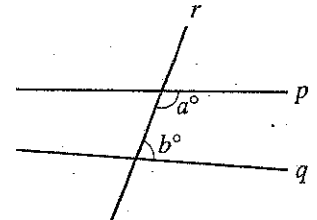
- F. $x + 325 = 2(350)$
- G. $x + 7(325) = 15(350)$
- H. $8x - 7(325) = 350$
- J. $8x + 7(325) = 2(350)$
- K. $8x + 7(325) = 15(350)$

57. In the figure below, \overline{BCF} is a straight line and all distances are given in centimeters. What is the ratio of the area of quadrilateral $ABCD$ to the area of quadrilateral $DCFE$?



- A. 5:7
- B. 7:5
- C. 7:9
- D. 7:27
- E. 7:34

58. In the figure below, transversal r crosses both p and q , and a° and b° are measures of the indicated angles, both between 0° and 180° . Lines p and q will cross somewhere to the left of transversal r (that is, on the side opposite the indicated angles). Which of the following statements best expresses a true relationship between a and b for all possible positions of transversal r ?



- F. $a < b$
- G. $a = b$
- H. $a + b < 180$
- J. $a + b = 180$
- K. $a + b > 180$

59. For what value of a will a circle centered at $(2,-3)$ pass through points $(1,a)$ and $(a,3)$ in the standard (x,y) coordinate plane?

- A. -3
- B. -0.4
- C. 1.4
- D. 2
- E. 3

60. If a and b are real numbers such that $a^2 \neq b^2$, then for what value(s) of x , if any, is the equation $|ax + b| = |bx + a|$ true?

- F. 1 only
- G. ± 1 only
- H. $\frac{a-b}{a+b}$ only
- J. All real numbers
- K. No real numbers