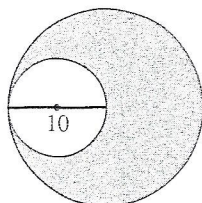


10. Joseph will have a 200-foot-long fence installed around his yard. The A+ Fence Company charges a \$500.00 fee, plus a set amount per foot of fence. The A+ Fence Company has given Joseph an estimate of \$2,200.00 to install the fence around his yard. What is the set amount per foot of fence?

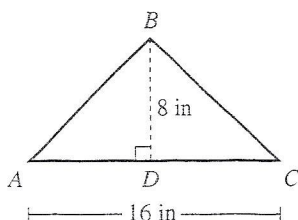
F. \$ 4.00  
 G. \$ 4.80  
 H. \$ 8.50  
 J. \$11.00  
 K. \$13.50

30. The figure below shows 2 tangent circles such that the 10-centimeter diameter of the smaller circle is equal to the radius of the larger circle. What is the area, in square centimeters, of the shaded region?



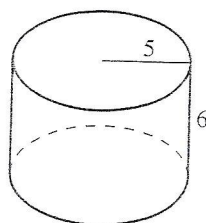
F. 10  
 G. 75  
 H.  $5\pi$   
 J.  $10\pi$   
 K.  $75\pi$

32. For  $\triangle ABC$  shown below, base  $\overline{AC}$  has a length of 16 inches and altitude  $\overline{BD}$  has a length of 8 inches. The area of a certain square is equal to the area of  $\triangle ABC$ . What is the length, in inches, of a side of the square?



F. 6  
 G. 8  
 H. 12  
 J. 16  
 K. 32

43. The height and radius of the right circular cylinder below are given in meters. What is the volume, in cubic meters, of the cylinder?

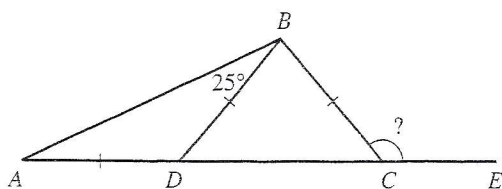


A.  $30\pi$   
 B.  $31\pi$   
 C.  $150\pi$   
 D.  $180\pi$   
 E.  $900\pi$

21. A 5-inch-by-7-inch photograph was cut to fit exactly into a 4-inch-by-6-inch frame. What is the area, in square inches, of the part of the photograph that was cut off?

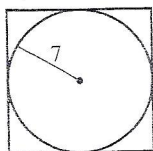
A. 2  
 B. 10  
 C. 11  
 D. 12  
 E. 24

10. In the figure below,  $A$ ,  $D$ ,  $C$ , and  $E$  are collinear.  $\overline{AD}$ ,  $\overline{BD}$ , and  $\overline{BC}$  are all the same length, and the angle measure of  $\angle ABD$  is as marked. What is the degree measure of  $\angle BCE$ ?



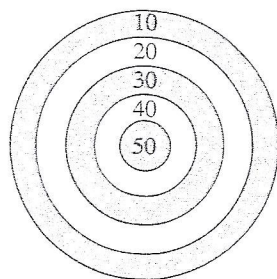
- F.  $50^\circ$
- G.  $100^\circ$
- H.  $105^\circ$
- J.  $130^\circ$
- K.  $160^\circ$

18. A square is circumscribed about a circle of 7-foot radius, as shown below. What is the area of the square, in square feet?



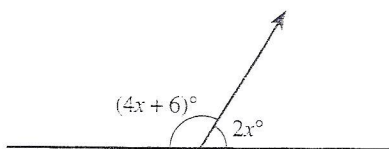
- F. 49
- G. 56
- H. 98
- J.  $49\pi$
- K. 196

29. Thomas and Jonelle are playing darts in their garage using the board with the point values for each region shown below. The radius of the outside circle is 10 inches, and each of the other circles has a radius 2 inches smaller than the next larger circle. All of the circles have the same center. Thomas has only 1 dart left to throw and needs at least 30 points to win the game. Assuming that his last dart hits at a random point within a single region on the board, what is the percent chance that Thomas will win the game?



- A. 36%
- B. 30%
- C. 16%
- D. 9%
- E.  $1\frac{1}{2}\%$

43. What is the degree measure of the smaller of the 2 angles formed by the line and the ray shown in the figure below?

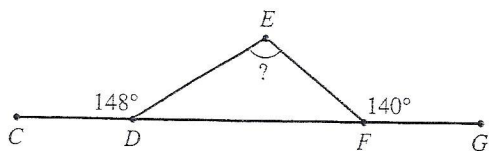


- A.  $14^\circ$
- B.  $28^\circ$
- C.  $29^\circ$
- D.  $58^\circ$
- E. Cannot be determined from the given information

29. Which of the following inequalities is equivalent to  $-2x - 6y > 2y - 4$ ?

- A.  $x < -4y + 2$
- B.  $x > -4y + 2$
- C.  $x < 2y + 2$
- D.  $x < 4y + 2$
- E.  $x > 4y + 2$

16. In the figure below, vertices  $D$  and  $F$  of  $\triangle DEF$  lie on  $\overline{CG}$ , the measure of  $\angle CDE$  is  $148^\circ$ , and the measure of  $\angle EFG$  is  $140^\circ$ . What is the measure of  $\angle DEF$ ?



- F.  $72^\circ$
- G.  $98^\circ$
- H.  $100^\circ$
- J.  $108^\circ$
- K.  $116^\circ$

28. 40% of 250 is equal to 60% of what number?

- F. 150
- G. 160
- H.  $166\frac{2}{3}$
- J. 270
- K. 375

13. In  $\triangle ABC$ , side  $c=3$  and side  $a=7$ . If  $\angle B$  is the largest angle, then side  $b$  could be:

- (A) 3
- (B) 4
- (C) 9
- (D) 10
- (E) 11

14. What is the area of a 30-60-90 triangle whose shortest leg is 2?

- (A) 2
- (B)  $2\sqrt{2}$
- (C)  $2\sqrt{3}$
- (D)  $4\sqrt{2}$
- (E)  $4\sqrt{3}$
- (E) 11

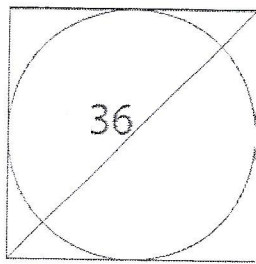
5. What is the side of an equilateral triangle whose altitude is 3?

- (A) 1.5
- (B)  $\sqrt{3}$
- (C)  $2\sqrt{3}$
- (D) 3
- (E) 6

6. What is the area of a square whose diagonal is 2?

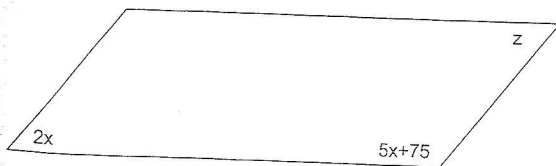
- (A) -2
- (B) 1
- (C) 2
- (D)  $\sqrt{2}$
- (E) 4

14. A circle is inscribed in a square, as shown below. If the diagonal of the square is 36 units, then what is the diameter of the circle?



- (A)  $3\sqrt{2}$
- (B)  $9\sqrt{2}$
- (C)  $18\sqrt{2}$
- (D)  $36\sqrt{2}$
- (E)  $64\sqrt{2}$

4. In the parallelogram below, what is the measure of  $z$  (in degrees)?



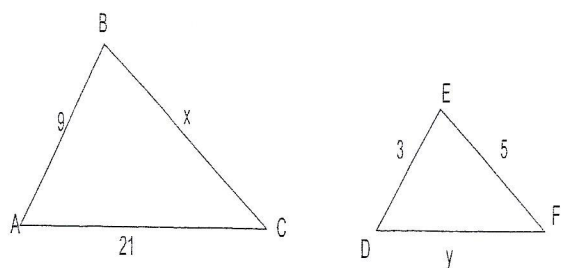
- (A) 15
- (B) 30
- (C) 45
- (D) 60
- (E) 90

9. One side of a triangle is 7 and another side is 10. Which of the values below could be the third side of the triangle?

- I. 2                      IV. 16
- II. 3                     V. 17
- III. 4                    VI. 18

- (A) I and IV only
- (B) II and V only
- (C) III and IV only
- (D) I, II and III only
- (E) IV, V, and VI only

10. In the diagram below,  $\triangle ABC \sim \triangle DEF$ . What is the value of  $y-x$ ?



- (A) -53
- (B) -8
- (C)  $5/3$
- (D) 7
- (E) -63

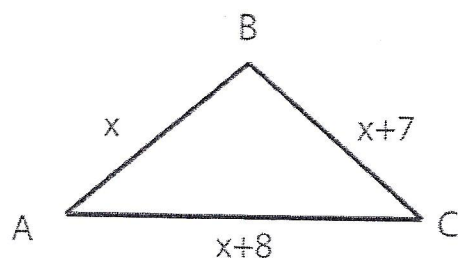
11. A six foot tall man stands in the shadow of a 18 foot tall telephone pole. If the man is standing three feet from the base of the telephone pole, what is the length of the telephone pole's shadow?

- (A) 3
- (B) 3.5
- (C) 4
- (D) 4.5
- (E) Cannot be determined

8. If the area of a square is 10 square units, what is the sum of its diagonals?

- (A)  $2\sqrt{5}$
- (B)  $4\sqrt{5}$
- (C)  $2\sqrt{10}$
- (D)  $4\sqrt{10}$
- (E) 20

The diagram below pertains to problems 1-3.



1. What is the perimeter of  $\triangle ABC$ ?

- (A)  $3x+15$
- (B)  $x+15$
- (C)  $x(x+7)(x+8)$
- (D)  $x^2 + (x+7)^2 + (x+8)^2$
- (E)  $\sqrt{x^2 + (x+7)^2}$

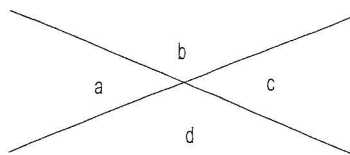
2. If B is a right angle, what is the area of  $\triangle ABC$ .

- (A)  $3x+15$
- (B)  $x+15$
- (C)  $\frac{1}{2}x(x+7)$
- (D)  $\frac{1}{2}x(x+8)$
- (E)  $\frac{1}{2}(x+7)(x+8)$

3. If B is a right angle, what is the value of  $x$ ?

- (A) 3
- (B) 4
- (C) 5
- (D) 12
- (E) 13

Questions 1 and 2 refer to the diagram below.



1. Which of the following statements must be true?

- I.  $a=c$
- II.  $a=d$
- III.  $a+b=c+d$

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

2. Which of the following may not be supplementary?

- (A)  $a$  and  $b$
- (B)  $a$  and  $c$
- (C)  $a$  and  $d$
- (D)  $b$  and  $c$
- (E)  $c$  and  $d$

6. Which of the following mathematical expressions is equivalent to the verbal expression "A number,  $x$ , squared is 39 more than the product of 10 and  $x$ "?

F.  $2x = 39 + 10x$   
G.  $2x = 39x + 10x$   
H.  $x^2 = 39 - 10x$   
J.  $x^2 = 39 + x^{10}$   
K.  $x^2 = 39 + 10x$

8. Discount tickets to a basketball tournament sell for \$4.00 each. Enrico spent \$60.00 on discount tickets, \$37.50 less than if he had bought the tickets at the regular price. What was the regular ticket price?

F. \$ 2.50  
G. \$ 6.40  
H. \$ 6.50  
J. \$ 7.50  
K. \$11.00

10. A rectangle has an area of 32 square feet and a perimeter of 24 feet. What is the shortest of the side lengths, in feet, of the rectangle?

F. 1  
G. 2  
H. 3  
J. 4  
K. 8

11. In  $\triangle ABC$ , the sum of the measures of  $\angle A$  and  $\angle B$  is  $47^\circ$ . What is the measure of  $\angle C$ ?

A.  $47^\circ$   
B.  $86^\circ$   
C.  $94^\circ$   
D.  $133^\circ$   
E.  $143^\circ$

13. For 2 consecutive integers, the result of adding the smaller integer and triple the larger integer is 79. What are the 2 integers?

A. 18, 19  
B. 19, 20  
C. 20, 21  
D. 26, 27  
E. 39, 40

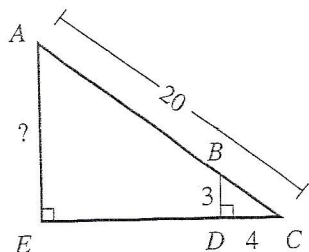
15. If  $3^x = 54$ , then which of the following must be true?

A.  $1 < x < 2$   
B.  $2 < x < 3$   
C.  $3 < x < 4$   
D.  $4 < x < 5$   
E.  $5 < x$

20. The length of a rectangle is 3 times the length of a smaller rectangle. The 2 rectangles have the same width. The area of the smaller rectangle is  $A$  square units. The area of the larger rectangle is  $kA$  square units. Which of the following is the value of  $k$ ?

F.  $\frac{1}{9}$   
 G.  $\frac{1}{3}$   
 H. 1  
 J. 3  
 K. 9

27. In right triangle  $\triangle ACE$  below,  $\overline{BD}$  is parallel to  $\overline{AE}$ , and  $\overline{BD}$  is perpendicular to  $\overline{EC}$  at  $D$ . The length of  $\overline{AC}$  is 20 feet, the length of  $\overline{BD}$  is 3 feet, and the length of  $\overline{CD}$  is 4 feet. What is the length, in feet, of  $\overline{AE}$ ?

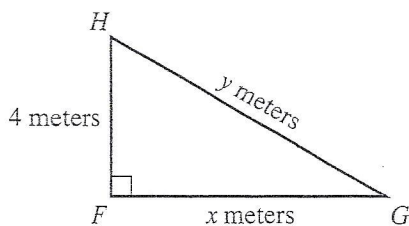


A. 10  
 B. 12  
 C. 15  
 D. 16  
 E. 17

35. Jerome, Kevin, and Seth shared a submarine sandwich. Jerome ate  $\frac{1}{2}$  of the sandwich, Kevin ate  $\frac{1}{3}$  of the sandwich, and Seth ate the rest. What is the ratio of Jerome's share to Kevin's share to Seth's share?

A. 2:3:6  
 B. 2:6:3  
 C. 3:1:2  
 D. 3:2:1  
 E. 6:3:2

31. For  $\triangle FGH$ , shown below, which of the following is an expression for  $y$  in terms of  $x$ ?



A.  $x + 4$   
 B.  $\sqrt{x^2 + 4}$   
 C.  $\sqrt{x^2 + 8}$   
 D.  $\sqrt{x^2 - 16}$   
 E.  $\sqrt{x^2 + 16}$

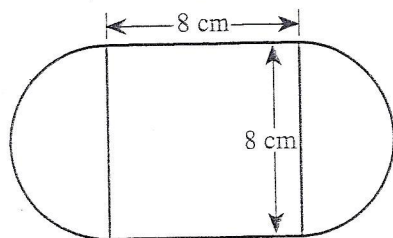
34. The graph of  $y = -5x^2 + 9$  passes through  $(1, 2a)$  in the standard  $(x, y)$  coordinate plane. What is the value of  $a$ ?

F. 2  
G. 4  
H. 7  
J. -1  
K. -8

36. A particular circle in the standard  $(x, y)$  coordinate plane has an equation of  $(x - 5)^2 + y^2 = 38$ . What are the radius of the circle, in coordinate units, and the coordinates of the center of the circle?

	radius	center
F.	$\sqrt{38}$	$(5, 0)$
G.	19	$(5, 0)$
H.	38	$(5, 0)$
J.	$\sqrt{38}$	$(-5, 0)$
K.	19	$(-5, 0)$

37. The figure below consists of a square and 2 semicircles, with dimensions as shown. What is the outside perimeter, in centimeters, of the figure?

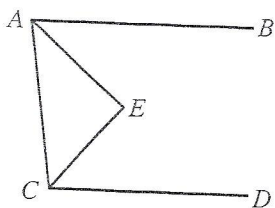


A.  $8 + 8\pi$   
B.  $16 + 8\pi$   
C.  $16 + 16\pi$   
D.  $32 + 8\pi$   
E.  $32 + 16\pi$

40. What is the surface area, in square inches, of an 8-inch cube?

F. 512  
G. 384  
H. 320  
J. 256  
K. 192

47. In the figure below,  $\overline{AB} \parallel \overline{CD}$ ,  $\overline{AE}$  bisects  $\angle BAC$ , and  $\overline{CE}$  bisects  $\angle ACD$ . If the measure of  $\angle BAC$  is  $82^\circ$ , what is the measure of  $\angle AEC$ ?

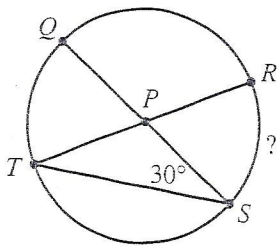


A.  $86^\circ$   
B.  $88^\circ$   
C.  $90^\circ$   
D.  $92^\circ$   
E. Cannot be determined from the given information

39. The coordinates of the endpoints of  $\overline{CD}$ , in the standard  $(x,y)$  coordinate plane, are  $(-4,-2)$  and  $(14,2)$ . What is the  $x$ -coordinate of the midpoint of  $\overline{CD}$ ?

A. 0  
B. 2  
C. 5  
D. 9  
E. 10

48. In the circle shown below, chords  $\overline{TR}$  and  $\overline{QS}$  intersect at  $P$ , which is the center of the circle, and the measure of  $\angle PST$  is  $30^\circ$ . What is the degree measure of minor arc  $\widehat{RS}$ ?



F.  $30^\circ$   
G.  $45^\circ$   
H.  $60^\circ$   
J.  $90^\circ$   
K. Cannot be determined from the given information

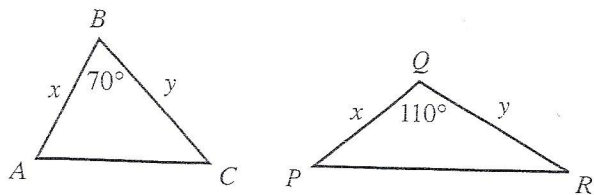
53. The determinant of a matrix  $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$  equals  $ad - cb$ .

What must be the value of  $x$  for the matrix  $\begin{bmatrix} x & 8 \\ x & x \end{bmatrix}$  to

have a determinant of  $-16$ ?

A.  $-4$   
B.  $-2$   
C.  $-\frac{8}{5}$   
D.  $\frac{8}{3}$   
E.  $4$

56. Triangles  $\triangle ABC$  and  $\triangle PQR$  are shown below. The given side lengths are in centimeters. The area of  $\triangle ABC$  is 30 square centimeters. What is the area of  $\triangle PQR$ , in square centimeters?



F. 15  
G. 19  
H. 25  
J. 30  
K. 33