

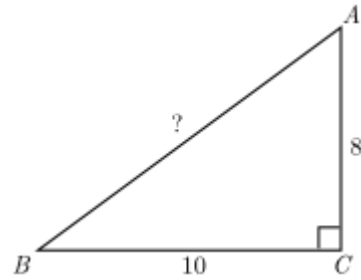
ACT MATH PREP - GEOMETRY

1. A cube has a volume of 27 in^3 . What is the length of each of its edges?
- A. 3
 - B. 6
 - C. 9
 - D. 27
 - E. 81

2. A triangle has an area of 24 square inches and a height of 8 inches. What could be the length of its base?
- A. 3
 - B. 4
 - C. 6
 - D. 12
 - E. 48

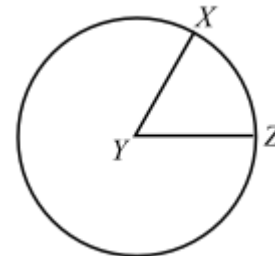
3. Cylinder *A* and cylinder *B* have a height of 3 inches, but cylinder *B* has a diameter four inches greater than that of cylinder *A*. If the diameter of cylinder *B* is 12 inches, how much greater is the volume of cylinder *B* than cylinder *A*?
- A. 4π
 - B. 12π
 - C. 20π
 - D. 60π
 - E. 240π

4. In right triangle *ABC* below, $\overline{AC} = 8$ and $\overline{BC} = 10$. What is the length *AB*?



- A. 6
- B. $\sqrt{82}$
- C. $4\sqrt{5}$
- D. $2\sqrt{41}$
- E. $4\sqrt{41}$

5. In the figure below, *X* and *Z* lie on the circle *Y*, which has a radius of 6. If the angle *XYZ* is 60° , what is the area of sector *XYZ*?



- A. 2π
- B. 3π
- C. 6π
- D. 9π
- E. 36π

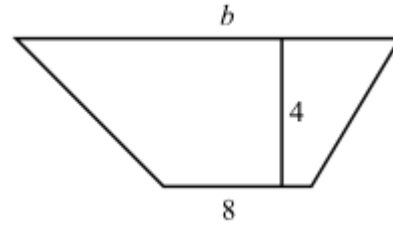
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6. A square has a side length of 6 inches. What is the length of its diagonal?
- A. $2\sqrt{6}$
 - B. $6\sqrt{2}$
 - C. $6\sqrt{3}$
 - D. 6
 - E. 12

7. What is the slope of the linear equation $3x - 2y - 4 = 0$?
- A. $\frac{3}{2}$
 - B. $-\frac{3}{2}$
 - C. $\frac{2}{3}$
 - D. $-\frac{2}{3}$
 - E. 3

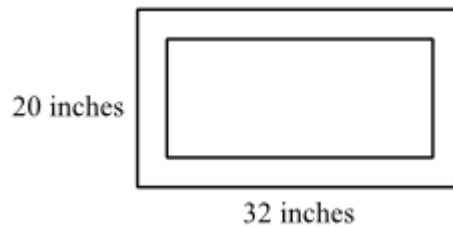
8. What is the distance between the points $(-2, 3)$ and $(4, -5)$ on the standard (x, y) coordinate plane?
- A. 10
 - B. $\sqrt{10}$
 - C. 100
 - D. $\sqrt{106}$
 - E. $2\sqrt{17}$

9. The area of the trapezoid below is 36 square inches, the altitude is 4 inches, and the length of one base is 8 inches. What is the length, b , of the other base, in inches?



- A. 10
- B. 12
- C. 16
- D. 26
- E. 32

10. The picture shown below has a uniform frame-width of $\frac{3}{4}$ inches. What is the approximate area, in square inches, of the viewable portion of the picture?



- A. 49.00
- B. 50.50
- C. 564.25
- D. 601.56
- E. 640.00

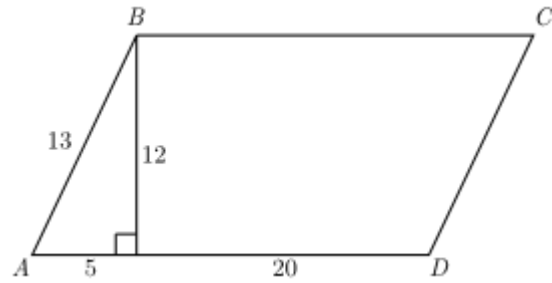
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11. Two sides of a triangle measure 5 inches and 6 inches, respectively. Which of the following could be the length of the third side?
- A. 10
 - B. 11
 - C. 12
 - D. 13
 - E. 14

12. A circle in the standard (x, y) coordinate plane is tangent to the x -axis at 5 and tangent to the y -axis at 5. Which of the following is an equation of the circle?
- A. $x^2 + y^2 = 5$
 - B. $x^2 + y^2 = 25$
 - C. $(x-5)^2 + (y-5)^2 = 5$
 - D. $(x-5)^2 + (y-5)^2 = 25$
 - E. $(x+5)^2 + (y+5)^2 = 25$

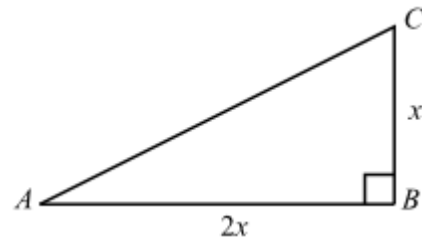
13. If the volume of a cube is 8, what is the shortest distance from the center of the cube to the base of the cube?
- A. 1
 - B. 2
 - C. 4
 - D. $\sqrt{2}$
 - E. $2\sqrt{2}$

14. What is the area, in square units, of the parallelogram shown below?



- A. 150
- B. 240
- C. 260
- D. 300
- E. 325

15. In the figure below, $\triangle ABC$ is a right triangle with legs that measure x and $2x$ inches, respectively. What is the length, in inches, of the hypotenuse?



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

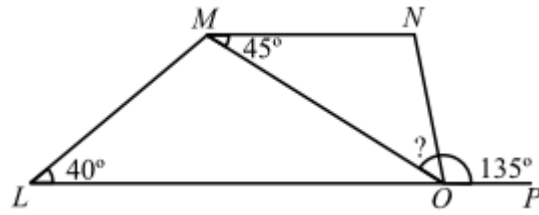
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16. A rectangular patio is 12 feet longer than it is wide. Its area is 160 square feet. How long, in feet, is it?
- A. 8
 - B. 10
 - C. 16
 - D. 20
 - E. 28

17. The ratio of the radii of two circles is 4:9. What is the ratio of their circumferences?
- A. 2:3
 - B. 4:6
 - C. 4:9
 - D. 8:18
 - E. 16:81

18. In $\triangle ABC$, $AB \cong BC$ and the measure of $\angle A$ is 42° . What is the measure of $\angle C$?
- A. 21°
 - B. 42°
 - C. 48°
 - D. 84°
 - E. 138°

19. In the figure below, $LMNO$ is a trapezoid, P lies on LO , and angle measures are as marked. What is the measure of angle MON ?



- A. 40°
 - B. 45°
 - C. 50°
 - D. 90°
 - E. 95°
20. For what value of n would the following system of equations have an infinite number of solutions?
- $$4x + 5y = 16$$
- $$20x + 25y = 2n$$
- A. 8
 - B. 10
 - C. 32
 - D. 40
 - E. 80

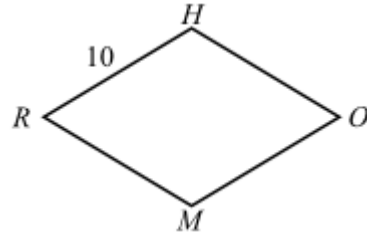
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21. The length of arc OP of a circle is equal to $\frac{1}{9}$ of the circumference of the circle. The length of the arc is 6π inches. What is the radius, in inches, of the circle?
- A. 9
 - B. 27
 - C. 54
 - D. 108
 - E. Not enough information

22. In an isosceles right triangle, the hypotenuse is 10. What is the length of one (1) of the sides?
- A. 5
 - B. 10
 - C. 20
 - D. $5\sqrt{2}$
 - E. $10\sqrt{2}$

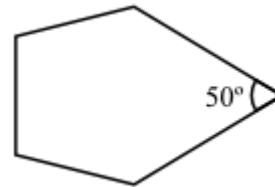
23. On the standard (x, y) coordinate plane, point A is located at $(-3, -2)$. Point M , the midpoint of AB , is located at $(1, 1)$. What are the coordinates of point B ?
- A. $(-1, -1)$
 - B. $(-7, -5)$
 - C. $(3, 4)$
 - D. $(-2, -1)$
 - E. $(5, 4)$

24. In rhombus $RHOM$ shown below, one side measures 10 inches. If $OR = 16$, what is the length of diagonal HM , in inches?



- A. 6
- B. 12
- C. 22
- D. 24
- E. 26

25. In the pentagon, shown below, one interior angle measures 50° . What is the total measure of the other 4 interior angles?



- A. 130°
- B. 310°
- C. 490°
- D. 590°
- E. 670°

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26. Which of the following lines has the greatest slope?

- A. $y = \frac{5}{2}x + 10$
- B. $y = 3x - 1$
- C. $2y = 8x - 5$
- D. $3y = 6x + 4$
- E. $5x - y = -20$

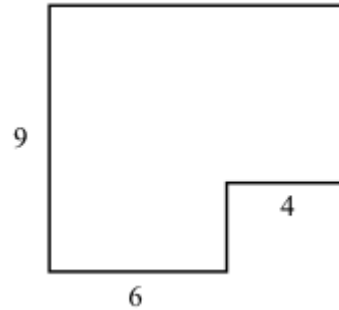
27. In the standard (x, y) coordinate plane, what is the slope of the line joining the points $(-3, 1)$ and $(6, -2)$?

- A. $-\frac{1}{9}$
- B. -3
- C. $-\frac{1}{3}$
- D. $\frac{1}{3}$
- E. 3

28. The ratio of the side lengths for a triangle is exactly 5:10:12. In a second triangle similar to the first, the shortest side is 8 inches long. To the nearest tenth of an inch, what is the length of the longest side of the second triangle?

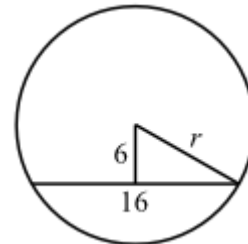
- A. 6.3
- B. 7.5
- C. 16.0
- D. 19.2
- E. Cannot be determined

29. What is the perimeter of the figure shown below?



- A. 19
- B. 28
- C. 38
- D. 90
- E. Cannot be determined

30. A chord 16 inches long is 6 inches from the center of a circle, as shown below. What is the radius of the circle, to the nearest tenth of an inch?



- A. 10
- B. 11
- C. 14
- D. 24
- E. 48

ACT MATH PREP - GEOMETRY**Solutions.**

1. The correct answer is **A**.
The formula for the volume of a cube is $V = s^3$ where s is the length of each edge or side. Since $V = 27$, we have $27 = s^3$ and the only value for s that satisfies this is $s = 3$.
2. The correct answer is **C**.
The formula for the area of a triangle is $A = \frac{1}{2}bh$, where b is the base, and h is the height. We have $24 = \left(\frac{1}{2}\right)(b)(8)$. Solving, we find that $b = 6$.
3. The correct answer is **D**.
The formula for the volume of a cylinder is $V = \pi r^2 h$. Since the diameter of cylinder B is 12, its volume is $V = \pi \cdot 36 \cdot 3 = 108\pi$. The volume of cylinder A is $V = \pi \cdot 16 \cdot 3 = 48\pi$. Subtracting, $108\pi - 48\pi = 60\pi$.
4. The correct answer is **D**.
By the Pythagorean Theorem, the hypotenuse has a length of $\sqrt{10^2 + 8^2} = \sqrt{100 + 64} = \sqrt{164} = \sqrt{4 \cdot 41} = \sqrt{4} \sqrt{41} = 2\sqrt{41}$.
5. The correct answer is **C**.
Solution #1: The formula for the area of a circular sector is $A = \frac{1}{2}r^2\theta$, where θ is the angle measure in radians. Since 60° is equivalent to $\frac{\pi}{3}$ radians, we have
$$A = \left(\frac{1}{2}\right)(36)\left(\frac{\pi}{3}\right) = 6\pi.$$

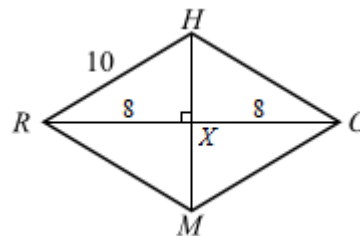
Solution #2: The formula for the area of a circle is $A = \pi r^2$, so the area of the entire circle is 36π . But 60° is $\frac{1}{6}$ of the degree measure of the entire circle, so the area of the sector is $\frac{1}{6} \cdot 36\pi = 6\pi$.
6. The correct answer is **B**.
By the Pythagorean Theorem, the diagonal (hypotenuse), is $\sqrt{6^2 + 6^2} = \sqrt{72} = \sqrt{36 \cdot 2} = \sqrt{36} \sqrt{2} = 6\sqrt{2}$.
7. The correct answer is **A**.
If a linear equation is in standard form $Ax + By = C$, the slope is given by $-\frac{A}{B}$. In the given equation, $A = 3$ and $B = -2$, so the slope is $-\frac{3}{-2} = \frac{3}{2}$.
8. The correct answer is **A**.
The distance formula is $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. Using the given coordinates, we have $x_1 = -2$, $y_1 = 3$, $x_2 = 4$, and $y_2 = -5$. Plugging these values in the distance formula gives:
$$d = \sqrt{(4 - (-2))^2 + (-5 - 3)^2} = \sqrt{(6)^2 + (-8)^2} = \sqrt{36 + 64} = \sqrt{100} = 10.$$
9. The correct answer is **A**.
The area of a trapezoid is given by the formula $A = \frac{1}{2}h(b_1 + b_2)$. If $A = 36$, $h = 4$, and $b_1 = 8$, then $36 = \frac{1}{2} \cdot 4(8 + b_2) \Rightarrow 36 = 2(8 + b_2) \Rightarrow 18 = 8 + b_2 \Rightarrow 10 = b_2$.
10. The correct answer is **C**.
For the viewable portion of the picture, the width is $20 - 1.5 = 18.5$, and the length is $32 - 1.5 = 30.5$. So the area is $18.5 \cdot 30.5 = 564.25$.
11. The correct answer is **A**.
Note that $6 - 5 = 1$ and $6 + 5 = 11$. By the Triangle Inequality Theorem, the third side must satisfy the inequality $1 < s < 11$.
12. The correct answer is **D**.
The equation of a circle with center (h, k) is $(x - h)^2 + (y - k)^2 = r^2$. Clearly the center is at $(5, 5)$ and the radius is 5, so the equation is $(x - 5)^2 + (y - 5)^2 = 25$.
13. The correct answer is **A**.
Since each side is of length 2, the distance from the center to the base is half that value.

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14. The correct answer is **D**.
The base of the parallelogram is 25 and the vertical height is 12. Therefore the area is $A = bh = 25 \cdot 12 = 300$.
15. The correct answer is **E**.
By the Pythagorean Theorem, the hypotenuse is $\sqrt{(2x)^2 + x^2} = \sqrt{4x^2 + x^2} = \sqrt{5x^2} = x\sqrt{5}$.
16. The correct answer is **D**.
Since the length, l , is $w + 12$, and the area is given by $A = lw$, then we have $160 = w(w + 12) \Rightarrow w^2 + 12w - 160 = 0$ and the solutions to this quadratic equation are 8 and -20 . The width is then 8, and the length is $8 + 12 = 20$.
17. The correct answer is **C**.
The circumference of a circle is given by $C = 2\pi r$. Therefore, the ratio of the circumferences is $2 \cdot \pi \cdot 4 : 2 \cdot \pi \cdot 9$. But the 2π on each side of the ratio cancels out, so the resulting ratio is $4 : 9$.
18. The correct answer is **B**.
If $\overline{AB} \cong \overline{BC}$, then the triangle is isosceles, and the base angles are congruent. Therefore, the measure of $\angle C = 42^\circ$.
19. The correct answer is **A**.
By the Exterior Angle Theorem, the measure of angle LMO is $135 - 40 = 95$. By the Triangle Sum Theorem, the measure of angle LOM is $180 - 40 - 95 = 45$. The measure of angle MON is then 40° .
20. The correct answer is **D**.
To ensure that the two equations have an infinite number of solutions, we must make the first equation look exactly like the second equation. To do this, we multiply every term of the first equation by 5. Then we have $16 \cdot 5 = 2n$, so $n = 40$.
21. The correct answer is **B**.
Since the circumference of a circle is given by $C = 2\pi r$, we can make the equation $6\pi = \frac{1}{9} \cdot 2\pi r$, so $r = 27$.

22. The correct answer is **D**.
If the hypotenuse is given in an isosceles right triangle, it can be shown that a side length is given by $\frac{\text{hypotenuse}}{\sqrt{2}}$. Therefore one of the side lengths is $\frac{10}{\sqrt{2}} = \frac{10\sqrt{2}}{\sqrt{2}\sqrt{2}} = \frac{10\sqrt{2}}{2} = 5\sqrt{2}$.
23. The correct answer is **E**.
Given two points, the midpoint formula is $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$. Since we know the coordinates of the midpoint, we can make the two mini-equations, $1 = \frac{-3 + x_2}{2}$ and $1 = \frac{-2 + y_2}{2}$ where (x_2, y_2) are the coordinates of point B . Solving each equation, we have the coordinates for B as $(5, 4)$.

24. The correct answer is **B**.
Because $RHOM$ is a rhombus, its diagonals bisect each other at right angles. Consider the diagram below:



Because triangle HXR is a 6-8-10 triangle, the measure of $HM = 6 \cdot 2 = 12$.

25. The correct answer is **C**.
The formula for the sum of the interior angles of a convex polygon is given by the formula $S = 180(n - 2)$ where n is the number of sides of the polygon. For a pentagon, $S = 540$. Then the sum of the other 4 interior angles is $540 - 50 = 490$.
26. The correct answer is **E**.
The slope of the line $5x - y = -20$ is 5, which is greater than the other 4 equations.

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27. The correct answer is **C**.

The slope formula is given by $\frac{y_2 - y_1}{x_2 - x_1}$. Using the given coordinates, we have $x_1 = -3$, $y_1 = 1$, $x_2 = 6$, and $y_2 = -2$. Plugging these values into the slope formula, we have

$$\frac{-2 - 1}{6 - (-3)} = \frac{-3}{9} = -\frac{1}{3}.$$

28. The correct answer is **D**.

We make the proportion, $\frac{5}{8} = \frac{12}{x}$ and solve for x , so $x = 19.2$.

29. The correct answer is **C**.

The total horizontal distance is 10 and the total vertical distance is 9. Doubling these and adding them together gives $9 \cdot 2 + 10 \cdot 2 = 38$.

30. The correct answer is **A**.

Since the longer leg of the right triangle is half the length of the chord, its length is 8. That makes the right triangle a 6-8-10 right triangle, so $r = 10$.