

Below are the formulas you may find useful as you work the problems. However, some of the formulas may not be used. You may refer to this page as you take the test.

Geometry Formulas

Perimeter

The perimeter of a polygon is equal to the sum of the length of its sides.

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Coordinates of point which partitions a directed line segment AB at the ratio of $a:b$ from $A(x_1, y_1)$ to $B(x_2, y_2)$

$$(x, y) = \left(\frac{bx_1 + ax_2}{b + a}, \frac{by_1 + ay_2}{b + a} \right)$$

OR

$$(x, y) = \left(x_1 + \frac{a}{a+b}(x_2 - x_1), y_1 + \frac{a}{a+b}(y_2 - y_1) \right)$$

Circumference of a Circle

$$C = \pi d \text{ or } C = 2\pi r$$

$$\pi \approx 3.14$$

Arc Length of a Circle

$$\text{Arc Length} = \frac{2\pi r\theta}{360}$$

Area

Triangle $A = \frac{1}{2}bh$

Rectangle $A = bh$

Circle $A = \pi r^2$

Area of a Sector of a Circle

$$\text{Area of Sector} = \frac{\pi r^2 \theta}{360}$$

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

Trigonometric Relationships

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}; \quad \cos \theta = \frac{\text{adj}}{\text{hyp}}; \quad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

Equation of a Circle

$$(x - h)^2 + (y - k)^2 = r^2$$

Volume

Cylinder $V = \pi r^2 h$

Pyramid $V = \frac{1}{3}Bh$

Cone $V = \frac{1}{3}\pi r^2 h$

Sphere $V = \frac{4}{3}\pi r^3$

Statistics Formulas

Conditional Probability

$$P(A/B) = \frac{P(A \text{ and } B)}{P(B)}$$

Multiplication Rule for Independent Events

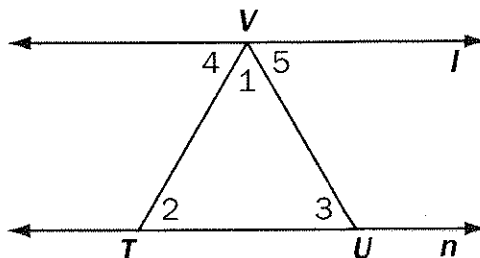
$$P(A \text{ and } B) = P(A) \cdot P(B)$$

Addition Rule

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Item 1

In this figure, $l \parallel n$. Jessie listed the first two steps in a proof that shows $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$.



	Step	Justification
1	$\angle 2 \cong \angle 4$?
2	$\angle 3 \cong \angle 5$?

Which justification can Jessie give for Steps 1 and 2?

- A. Alternate interior angles are congruent.
- B. Corresponding angles are congruent.
- C. Vertical angles are congruent.
- D. Alternate exterior angles are congruent.

Item 2

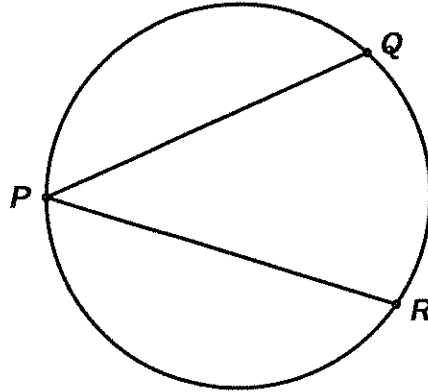
The points $O(-4, 3)$, $A(x, y)$, and $B(x, 3)$ create a right triangle inside of Circle O . Point A lies on the circle. $OA = 6$ centimeters.

What is the equation of Circle O ?

- A. $(x + 4)^2 + (y - 3)^2 = 6$
- B. $(x - 3)^2 + (y - 3)^2 = 6$
- C. $(x - 3)^2 + (y + 4)^2 = 36$
- D. $(x + 4)^2 + (y - 3)^2 = 36$

Item 3

In this circle, $m\widehat{QR} = 72^\circ$.

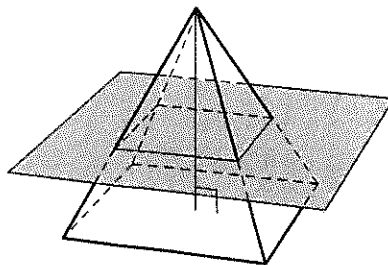


What is $m\angle QPR$?

- A. 18°
- B. 24°
- C. 36°
- D. 72°

Item 4

Look at the square pyramid.



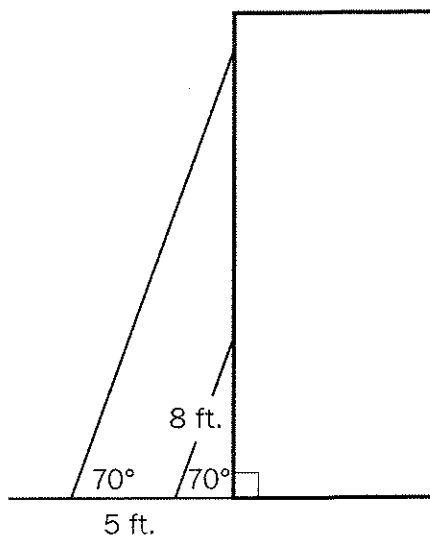
If the plane in the figure is parallel to the base of the pyramid, which BEST describes the shape of the intersection?

- A. a rectangle
- B. a trapezoid
- C. a triangle
- D. a circle

Item 5

This diagram shows two ladders leaning against a building. Each ladder is leaning at an angle of 70 degrees.

- The length of the short ladder is 8 feet.
- The base of the long ladder is 5 feet farther from the base of the building than the base of the short ladder is.



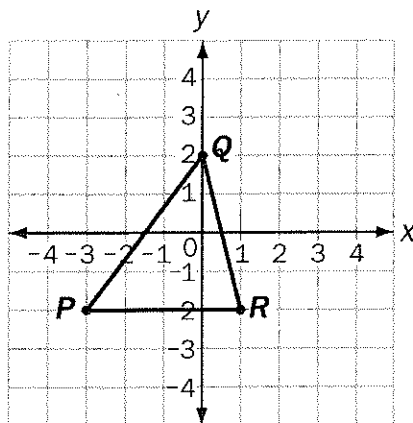
What is the length, to the nearest foot, of the long ladder?

$$\begin{bmatrix} \sin 70^\circ = 0.9397 \\ \cos 70^\circ = 0.3420 \\ \tan 70^\circ = 2.7475 \end{bmatrix}$$

- A. 10 ft.
- B. 13 ft.
- C. 23 ft.
- D. 26 ft.

Item 6

Look at the coordinate grid below.



What is the perimeter of $\triangle PQR$?

- A. $4 + \sqrt{42}$
- B. 14
- C. $9 + \sqrt{17}$
- D. 17

Item 7

Look at the coordinates of square $ABCD$.

- $A(-3, 0)$
- $B(2, 4)$
- $C(6, -1)$
- $D(1, -5)$

What is the perimeter of square $ABCD$?

- A. 20 units
- B. $4\sqrt{41}$ units
- C. $2\sqrt{82}$ units
- D. 41 units

Item 8

Paul has a spinner with the colors red, green, blue, orange, and purple on it. He also has a six-sided number cube.

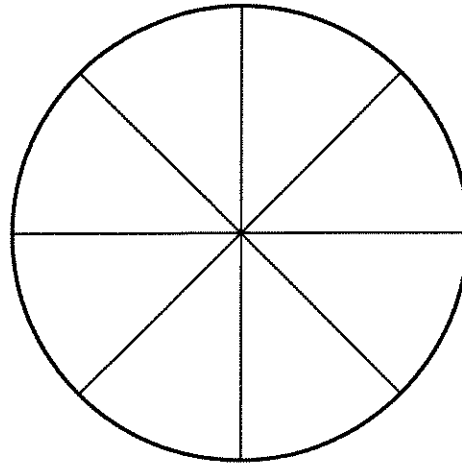
The probability of the arrow of the spinner stopping on green is $\frac{1}{5}$ and the probability of getting a number greater than 2 when tossing the number cube is $\frac{4}{6}$.

What is the probability of landing on green and tossing a number greater than 2?

- A. $\frac{2}{15}$
- B. $\frac{3}{10}$
- C. $\frac{7}{10}$
- D. $\frac{13}{15}$

Item 9

Billy is creating a circular garden divided into 8 equal sections. The diameter of the garden is 12 feet.



What is the area, in square feet, of one section of the garden? Use $\pi = 3.14$. Explain how you determined your answer. Write your answer on the lines provided.

Part B: Which car is launched from the highest point? Explain your reasoning. Write your answer on the lines provided.

A large rectangular box containing 15 horizontal lines for writing an answer.