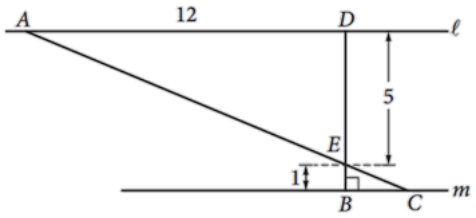
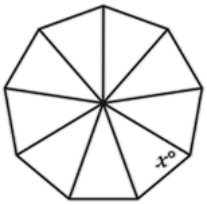
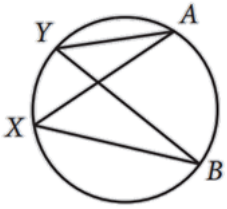
1. 

In the figure above, line l is parallel to line m, segment BD is perpendicular to line m, and segment AC and segment BD intersect at E. What is the length of segment AC?

2. 

In the figure above, a regular polygon with 9 sides has been divided into 9 congruent isosceles triangles by line segments drawn from the center of the polygon to its vertices. What is the value of x?

3. 

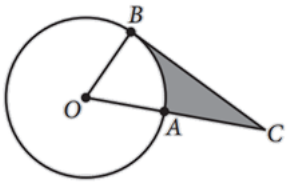
In the figure above, $\angle AXB$ and $\angle AYB$ are inscribed in the circle. Which of the following statements is true?

A) The measure of $\angle AXB$ is greater than the measure of $\angle AYB$.

B) The measure of $\angle AXB$ is less than the measure of $\angle AYB$.

C) The measure of $\angle AXB$ is equal to the measure of $\angle AYB$.

D) There is not enough information to determine the relationship between the measure of $\angle AXB$ and the measure of $\angle AYB$.

4. 

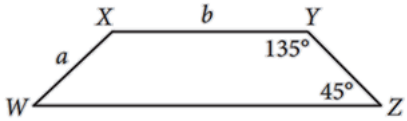
In the figure above, O is the center of the circle, segment BC is tangent to the circle at B, and A lies on the segment OC. If $OB = AC = 6$, what is the area of the shaded region?

A) $18\sqrt{3} - 3\pi$

B) $18\sqrt{3} - 6\pi$

C) $36\sqrt{3} - 3\pi$

D) $36\sqrt{3} - 6\pi$



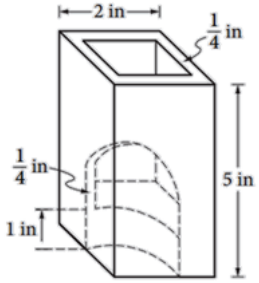
5. Trapezoid $WXYZ$ is shown above. How much greater is the area of this trapezoid than the area of a parallelogram with side lengths a and b and base angles measure $45°$ and $135°$?

A) $\frac{1}{2}a^2$

B) $\sqrt{2}a^2$

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

D) $\sqrt{2}ab$



Note: Figure not drawn to scale.

6. A glass vase is in the shape of a rectangular prism with a square base. The figure above shows the vase with a portion cut out. The external dimensions of the vase are height 5 inches, with a square base of side length 2 inches. The vase has a solid base of height 1 inch, and the sides are each $\frac{1}{4}$ inch thick. Which of the following is the volume, in cubic inches, of the glass used in the vase?

A) 6

B) 8

C) 9

D) 11

7. $x^2 + (y+1)^2 = 4$

The graph of the equation above in the xy-plane is a circle. If the center of this circle is translated 1 unit up and the radius of the circle increased by 1, which of the following is an equation of the resulting circle?

A) $x^2 + y^2 = 5$

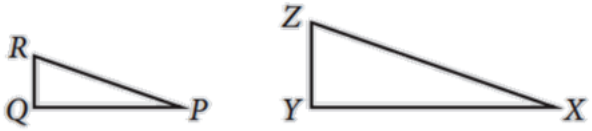
B) $x^2 + y^2 = 6$

C) $x^2 + (y+2)^2 = 5$

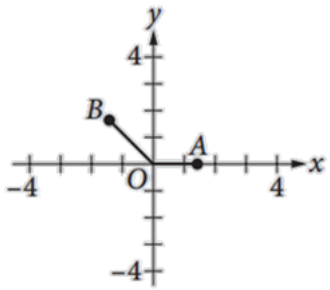
D) $x^2 + (y+2)^2 = 6$

8. $x^2 + 8x + y^2 - 6y = 24$

The graph of the equation above in the xy-plane is a circle. What is the radius of the circle

9. 

In the figure above, right triangle PQR is similar to right triangle XYZ, with vertices P, Q, and R corresponding to vertices X, Y, and Z, respectively. If $\cos R = 0.263$ what is the value of $\cos Z$?

10. 

In the figure above, the coordinates of point B are $(-\sqrt{2}, \sqrt{2})$. What is the measure, in radians, of angle AOB?

A) $\frac{\pi}{4}$
B) $\frac{\pi}{2}$
C) $\frac{3\pi}{4}$
D) $\frac{5\pi}{4}$

11. $\sin(x) = \cos(K - x)$
In the equation above, the angle measures are in radians and K is a constant. Which of the following could be the value of K?

A) 0
B) $\frac{\pi}{4}$
C) $\frac{\pi}{2}$
D) π

12. Which of the following is equal to $\frac{1+i}{1-i}$?

A) i
B) $2i$
C) $-1 + i$
D) $1 + i$

ANSWER KEY

1. $\frac{78}{5}$
2. 70
3. C
4. B
5. A
6. D
7. B
8. 7
9. 0.263
10. C
11. C
12. A