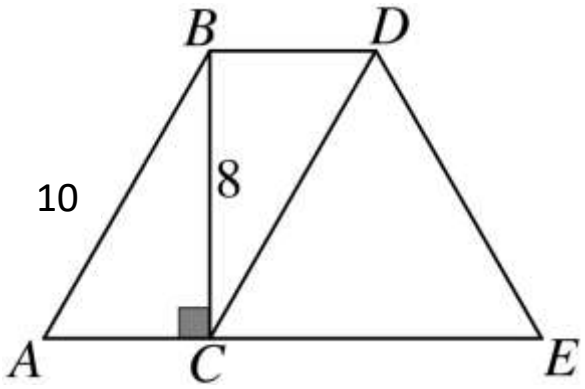
Date Completed: _____
Mentor Initials: _____

Geometry (Intermediate)

Use the information below to answer questions 1 – 3.

In the diagram below, $\overline{BD} \parallel \overline{AE}$ and $\overline{AB} \parallel \overline{CD}$ and ΔCDE is equilateral.



1. What is the perimeter of $CBDE$?

A. 24
B. 28
C. 34
D. $8 + \frac{40\sqrt{3}}{3}$
E. $8 + 40\sqrt{3}$

2. What is the area of $ABDC$?

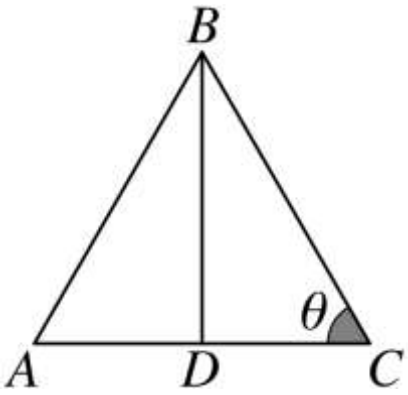
A. 16
B. 24
C. 32
D. 48
E. 60

3. What is the sum of $m\angle EDC$ and $m\angle BCE$ in degrees?

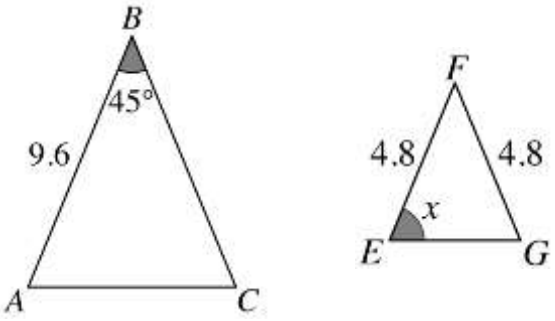
A. 120°
B. 145°
C. 150°
D. 160°
E. 170°

4. The equilateral triangle ΔABC is shown to the right. $\overline{BD}$ is the perpendicular bisector of $\overline{AC}$, and $\overline{BD}$ measures $8\sqrt{3}$ inches. What is the perimeter of ΔABC in inches?

A. 16
B. 24
C. $24\sqrt{3}$
D. 48
E. $64\sqrt{3}$



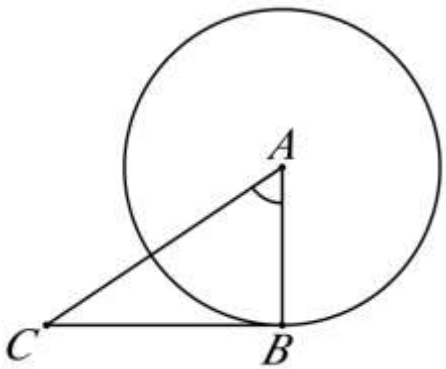
5. In the figure below, $\Delta ABC \sim \Delta EFG$, sides $\overline{EF}$ and $\overline{FG}$ are both 4.8 cm long, side $\overline{AB}$ is 9.6 cm long, and the measure of $\angle ABC$ is 45°. What is the measure of x?



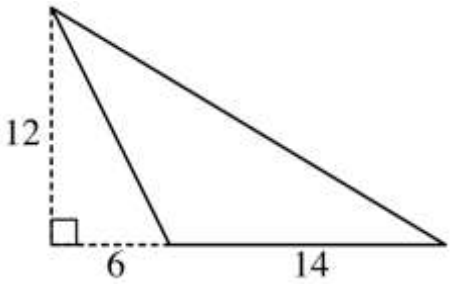
A. 60°
B. 65°
C. 67.5°
D. 72.5°
E. 75°

6. In the diagram to the right, $\overline{CB}$ is tangent to circle A at point B, and $\angle CAB = 56.49°$. What is the measure of ∠ACB to the nearest degree?

A. 23°
B. 29°
C. 34°
D. 37°
E. 45°



7. The height of the triangle to the right is 12 units. What is its area in square units?

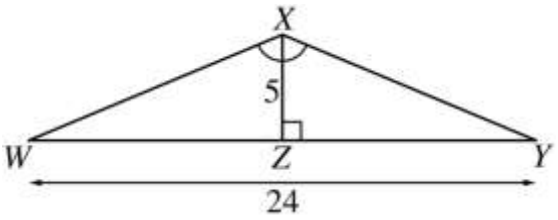


A. 72
B. 84
C. 168
D. 240
E. Cannot be determined from the given information

8. An angle is bisected, and each of the resulting angles is trisected. The final angle measure of each resulting angle is $12.5°$. What was the measure of the original angle?

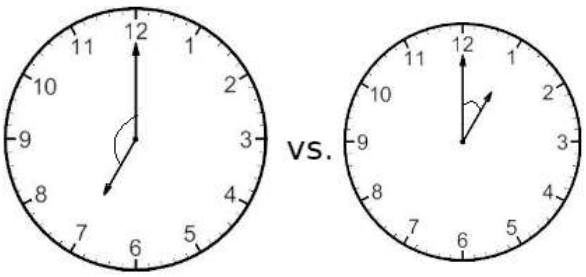
A. $58°$
B. $65°$
C. $72°$
D. $75°$
E. $82°$

9. In the figure to the right, $\overline{XZ}$ is the perpendicular bisector of ΔWXY, and $\overline{WY} = 24$. What is the ratio of the area to the perimeter of ΔWXY?



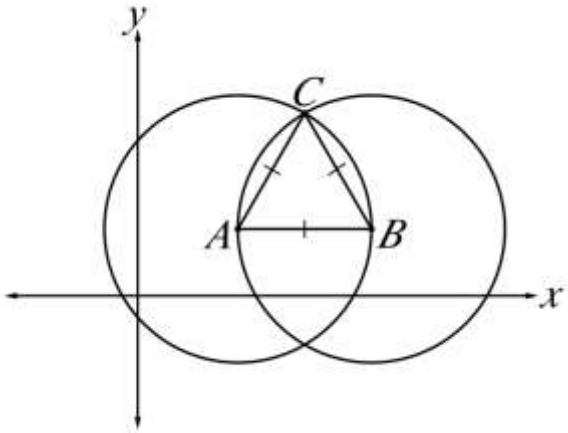
A. $6:5$
B. $4:3$
C. $3:5$
D. $2:3$
E. $1:2$

10. How much larger is the smallest angle created by the hour and minute hand at $7:00$ than the smallest angle created by the hour and minute hand at $1:00$?



A. $100°$
B. $120°$
C. $130°$
D. $140°$
E. $150°$

Use the information below to answer questions 11 – 12



In the diagram, ΔABC is inscribed between two overlapping circles with center points $A\ (3, 2)$ and $B\ (7, 2)$. ΔABC is an equilateral triangle.

11. What is the circumference of the circle with center point A?

A. 4π
B. 8π
C. 12π
D. 14π
E. 16π

12. What is the length of the arc between points B and C on circle A?

A. $\frac{1}{2}\pi$

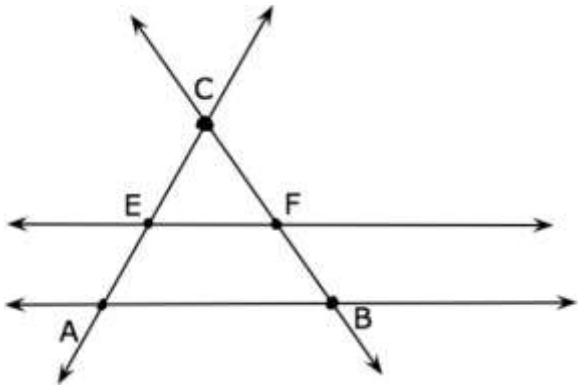
B. π

C. $\frac{4}{3}\pi$

D. 2π

E. 4π

13. In the figure to the right, ΔABC is an equilateral triangle. $\overleftrightarrow{AB} \parallel \overleftrightarrow{EF}$, E bisects $\overleftrightarrow{AC}$ and F bisects $\overleftrightarrow{BC}$. What is the ratio of the area of ΔEFC to that of ΔABC?



A. 1: 4
B. 1: 3
C. 1: 1
D. 2: 1
E. 2: 3

14. A circle is inscribed in a square, which has a perimeter of 40 cm. What is the area of the circle?

A. 10π
B. 25π
C. 40π
D. 50π
E. 100π

15. Point R exists at some distance from a circle. Lines are drawn from point R and run tangent to the circle at points P and Q. If $\angle PRQ$ is 50°, what is the measure of ∠RPQ?

A. 50°
B. 60°
C. 65°
D. 70°
E. 75°

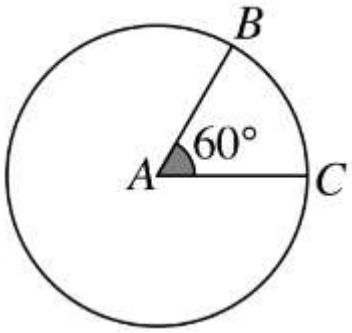
16. Two cylinders both have a height of 4, but the first cylinder has a radius of 3, and the second has a radius of 5. What is the ratio of the volume of these cylinders?

A. 3: 5
B. 7: 9
C. 9: 25
D. 4: 5
E. 27: 125

17. In ΔABC, $\overline{AB}$ = 5 cm, $\overline{AC}$ = 10 cm, $m\angle A = 60$, and $\overline{AC}$ is the longest side. Which of the following statements about the measures of the angles in ΔABC must be true?

A. $m\angle A = m\angle B = m\angle C$
B. $m\angle B > m\angle A > m\angle C$
C. $m\angle B = m\angle C > m\angle A$
D. $m\angle B > m\angle C = m\angle A$
E. $m\angle C > m\angle A > m\angle B$

18. Given the circle below with $AB = 6$, and $\angle BAC = 60°$ find the length of arc BC.



A. $\frac{\pi}{6}$

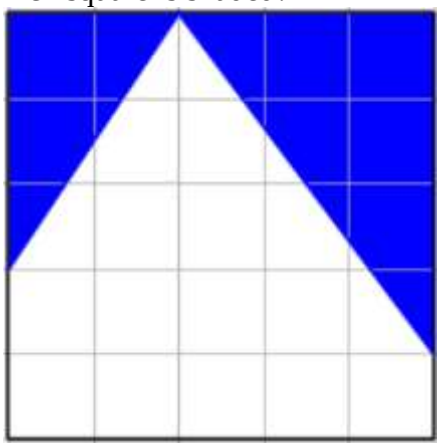
B. $\frac{\pi}{2}$

C. π

D. 2π

E. 6π

19. A 5-inch-by-5-inch square grid shown below is divided into 25 squares, each with a side length of 1 inch. Each vertex of the two shaded triangles lies at an intersection of 2 grid lines. What fractional part of the 5-inch-by-5-inch square is shaded?



A. $\frac{1}{3}$

B. $\frac{9}{25}$

C. $\frac{1}{2}$

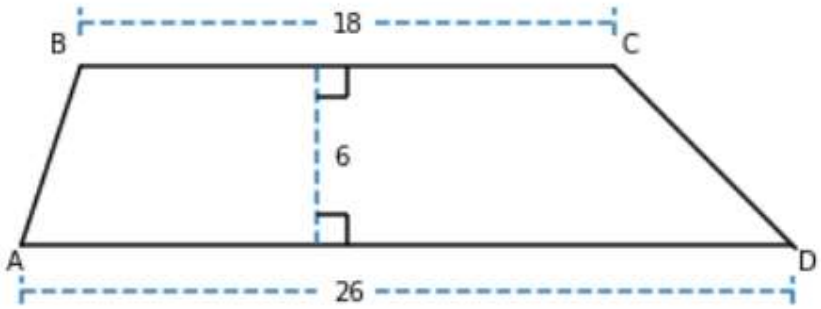
D. $\frac{3}{5}$

E. $\frac{3}{4}$

20. What is the perimeter of an isosceles right triangle with hypotenuse $5\sqrt{2}$ feet long?

A. 10
B. 15
C. $5 + 5\sqrt{2}$
D. $10 + 5\sqrt{2}$
E. $15 + 5\sqrt{2}$

21. In quadrilateral $ABCD$ shown below, $\overline{AD} \parallel \overline{BC}$, $BC = 18$ centimeters, $AD = 26$ centimeters, and the distance between $\overline{AC}$ and $\overline{AC}$ is 6 centimeters. What is the area, in square centimeters, of quadrilateral $ABCD$?



A. 108
B. 132
C. 156
D. 264
E. 468