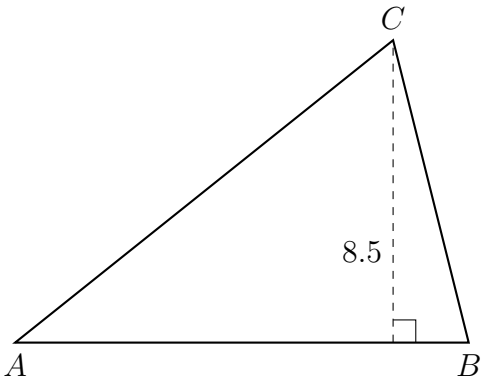
10.12 Unit Exam: Volume, density, trig, & review

1. Find the area of a semi-circle diameter of 10. Round your answer to the *nearest tenth*.

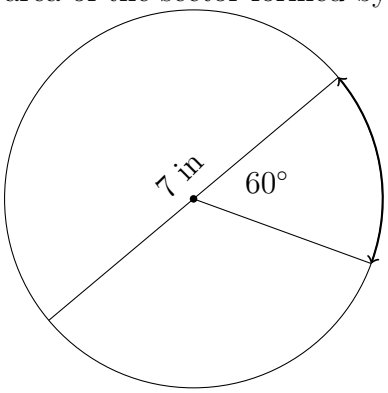
2. A cylindrical pipe with radius $r = 6$ inches has a volume of 15.7 cubic feet. Find the length of the pipe, to the *nearest foot*.

3. A box in the shape of a rectangular prism must have a volume of 30 cubic feet. It's length is 4 feet and width 3 feet. How tall must it be?

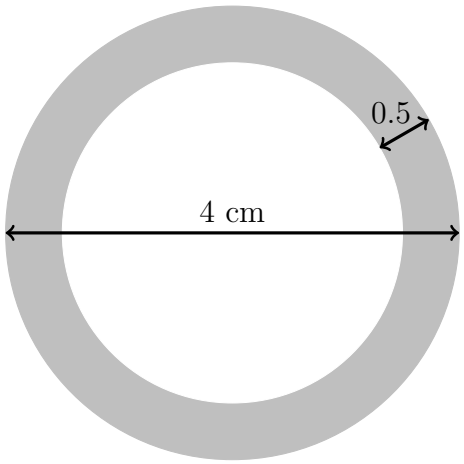
4. The area of $\triangle ABC$ is 120.7 square inches. The altitude h of the triangle is 8.5 inches. Find the length of the base AB.



5. A circle with a diameter of 7 in and a central angle of 60° is drawn below. What is the area of the sector formed by the 60° angle, to the *nearest hundredth of a square inch*?



6. A bakery sells hollow chocolate spheres. The larger diameter of each sphere is 4 cm. The thickness of the chocolate of each sphere is 0.5 cm. Determine and state, to the nearest tenth of a cubic centimeter, the amount of chocolate in each hollow sphere.



7. Which three-dimensional figure will result when a right triangle 8 inches tall and 3 inches wide is continuously rotated about the longer side?

   (a) a cone with a height of 6 inches and radius of 8 inches

   (b) a cone with a height of 8 inches and diameter of 6 inches

   (c) a cylinder with a radius of 8 inches and a height of 6 inches

   (d) a cylinder with a diameter of 6 inches and a height of 8 inches

8. A right cylinder is cut perpendicular to its base. The shape of the cross section is a

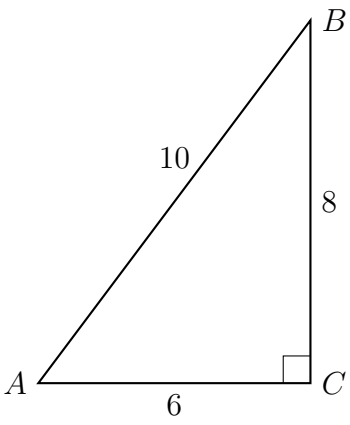
   (a) circle

   (b) cylinder

(c) rectangle

(d) triangular prism

9. $\triangle ABC$ is shown with $m\angle C = 90°$ and the lengths of the triangle's sides are $BC = 8$, $AC = 6$, and $AB = 10$.



(a) State, as a decimal, the value of $\sin A$.

(b) Find the measure of $\angle A$, to the *nearest degree*.

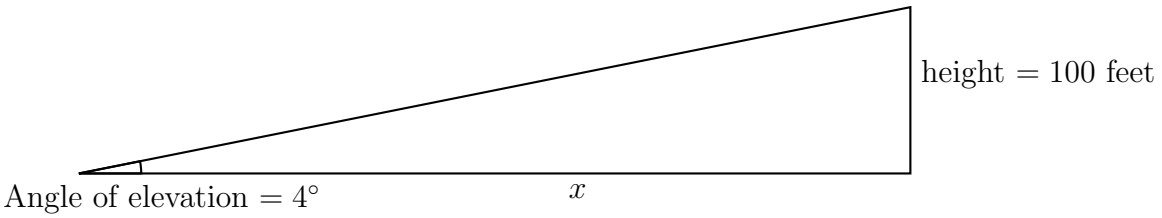
(c) Find the degree measure of $\angle B$. Justify your answer.

10. Express each trigonometric ratio to the *nearest thousandth* and each angle measure to the nearest degree.

(a) $\sin 55° =$

(b) $\cos^{-1} 0.766 =$

11. A sailor observes the top of a lighthouse with an angle of elevation of 4°. She knows the lighthouse is 100 feet tall. Determine and state the distance x between the sailor and the lighthouse, to the *nearest foot*.



12. Solve for the value of x.

    $\frac{1}{5}(2x + 3) = 1$

13. Given $f(x) = \frac{1}{4}x + 4$. Solve for x such that for $f(x) = 6$.

14. Given $g(x) = 3x^2 - 7x + 5$. Simplify $g(0)$.

15. Given $f(x) = 5x - 22$. Solve for x such that for $f(x) = 3$.

16. Given $h(x) = x^2 + 6x + 5$. Solve $h(x) = 0$.

17. A translation maps $A(3,5) \to A'(-2,7)$. What is the image of $B(-4,1)$ under the same translation?

18. The line l has the equation $y = -\frac{3}{5}x+4$. To each line below, circle whether l is parallel, perpendicular, or neither.

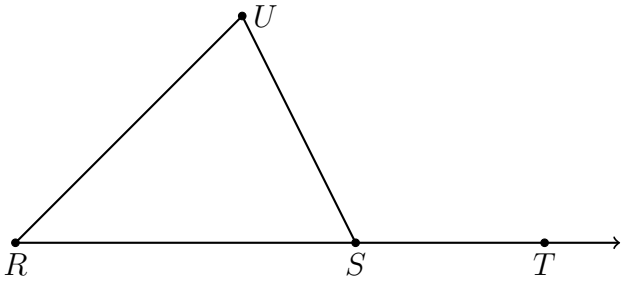
    (a) parallel perpendicular neither $y = \frac{3}{5}x - 2$

    (b) parallel perpendicular neither $3x - 5y = -15$

19. Simplify each expression. (Leave it in radical form if necessary, not a decimal.)

    (a) $\sqrt{20}$ (b) $\sqrt{\frac{16}{49}}$

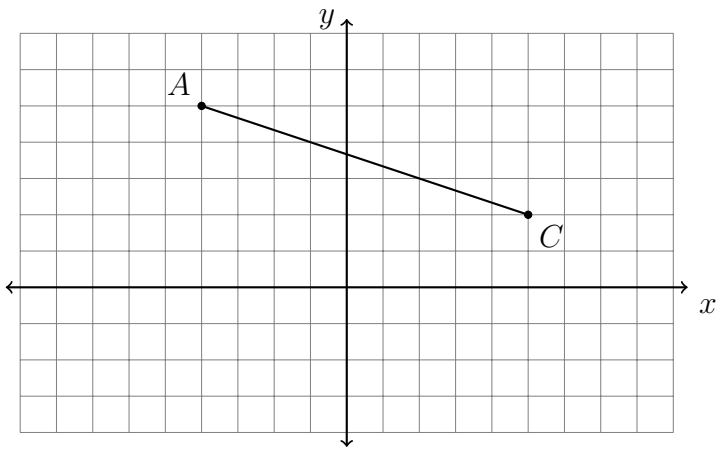
20. Given $m\angle R = 40$ and $m\angle U = 80$. Find $m\angle UST$.



21. Write down the center and radius of each circle.

    (a) $(x-1)^2 + (y+3)^2 = 81$ (b) $x^2 + y^2 = 49$

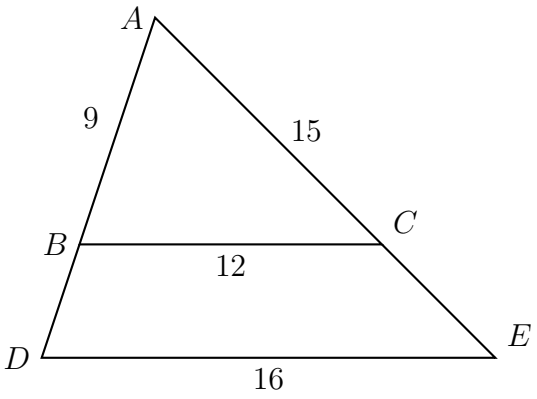
22. In the diagram below, $\overline{AC}$ has endpoints with coordinates $A(-4, 5)$ and $C(5, 2)$.



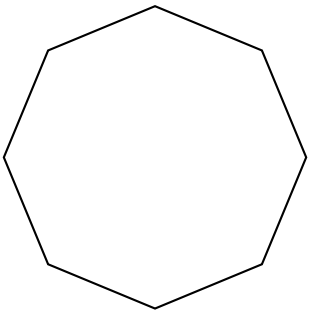
If B is a point on $\overline{AC}$ and $AB{:}BC = 1{:}2$, what are the coordinates of B?

23. Triangle ABC is dilated with a scale factor of k centered at A, yielding $\triangle ADE$, as shown. Given $AB = 9$, $BC = 12$, $AC = 15$, and $DE = 16$.

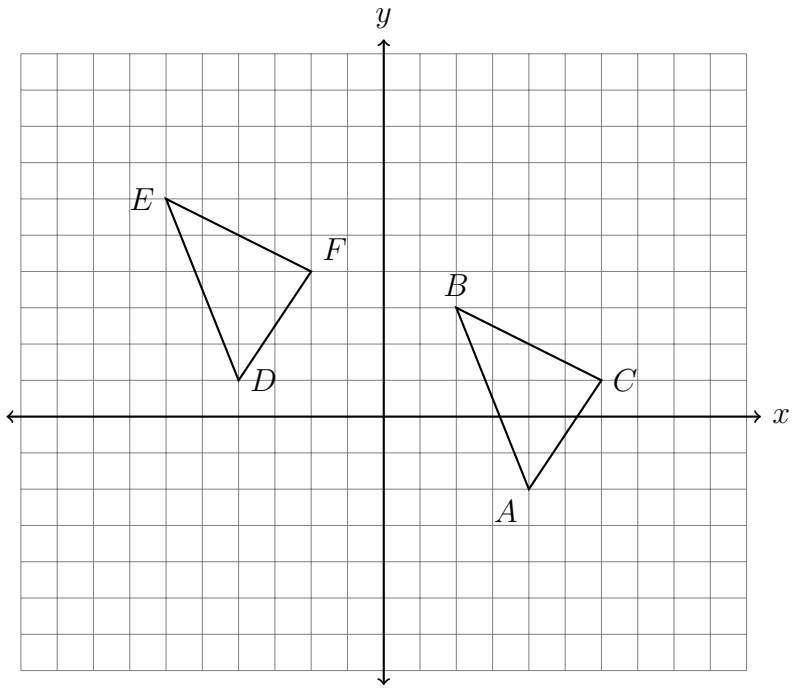
Find BD, AE, and k (the scale factor).



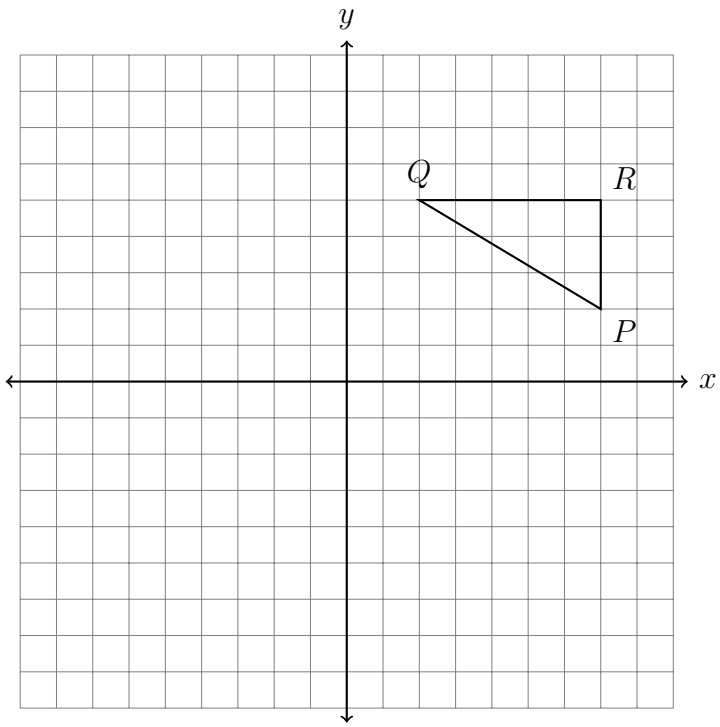
24. What is the smallest non-zero angle of rotation about its center that would map the octagon onto itself?



25. What transformation maps $\triangle ABC$ onto $\triangle DEF$, shown below? Fully specify the transformation.



26. Reflect $\triangle PQR$ across the x-axis, drawing its image $\triangle P'Q'R'$ and labeling its vertices.



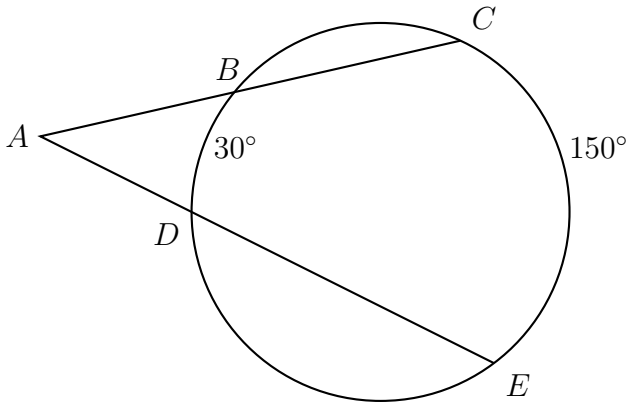
27. In a right triangle, the acute angles have the relationship $\sin x = \cos 30$. Find x.

28. If $\sin(8x - 8)^\circ = \cos(7x + 8)^\circ$, what is the value of x?

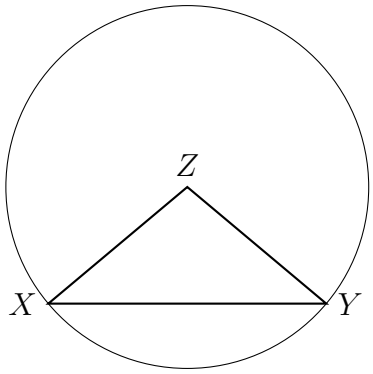
29. Write an equation of the line that is parallel to the line whose equation is $y = \frac{1}{2}x - 4$ and passes through the point $(-2, 5)$.

30. Find the distance between $(1, 9)$ and $(6, -3)$.

31. The secants $\overline{ABC}$ and $\overline{ADE}$ intersect the circle O, as shown in the diagram. Given $m\widehat{BD} = 30°$ and $m\widehat{CE} = 150°$. Find the $m\angle A$.



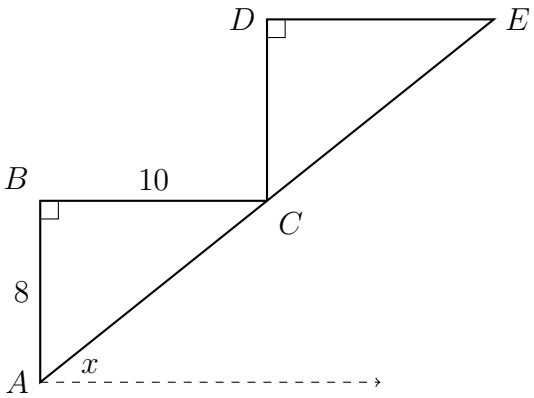
32. Given circle Z with inscribed $\triangle XYZ$. $m\angle Z = 100$. Find $m\angle Y$.



Early finishers

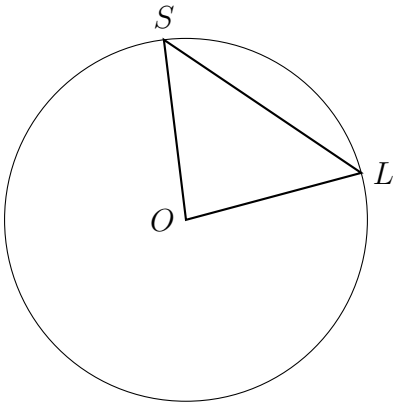
33. A monument in the shape of a pyramid with a square base has a volume of 24 cubic feet. If its height measures 20 feet what is the length of the side of the base, to the *nearest cubic foot*?

34. A staircase riser is cut as a series of congruent triangles with each step's "rise" equal to 8 inches, and the "run" of each step is 10 inches, as shown below. ($AB = 8$ and $BC = 10$) Find the diagonal length of the two-step riser, the distance AE, to the *nearest inch*.

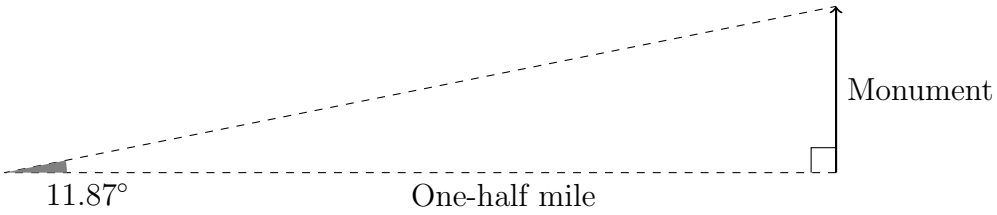


What is the angle of inclination of the staircase, x?

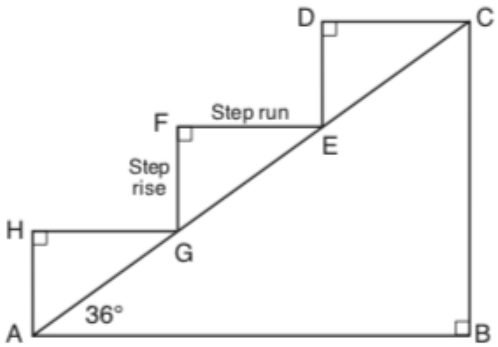
35. Given circle O with inscribed $\triangle SLO$. $m\angle S = x + 7$. Find $m\angle O = 2x - 2$. Find x. For full credit, check your answer.



36. From a point on the ground one-half mile from the base of a historic monument, the angle of elevation to its top is 11.87°. To the nearest foot, what is the height of the monument?



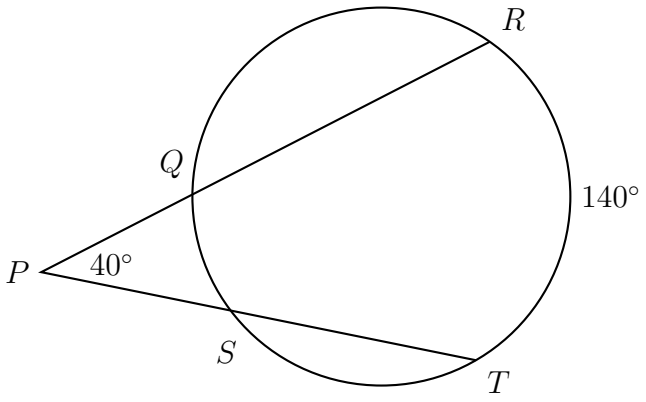
37. A homeowner is building three steps leading to a deck, as modeled by the diagram below. All three step rises, $\overline{HA}$, $\overline{FG}$, and $\overline{DE}$, are congruent, and all three step runs, $\overline{HG}$, $\overline{FE}$, and $\overline{DC}$, are congruent. Each step rise is perpendicular to the step run it joins. The measure of $\angle CAB = 36°$ and $\angle CBA = 90°$.



If each step run is parallel to $\overline{AB}$ and has a length of 10 inches, determine and state the length of each step rise, to the *nearest tenth of an inch*.

Determine and state the length of $\overline{AC}$, to the *nearest inch*.

38. The secants $\overline{PQR}$ and $\overline{PST}$ intersect the circle O, as shown in the diagram. Given $m\angle P = 40°$ and $m\widehat{RT} = 140°$. Find the $m\widehat{QS}$.


R
Q
140°
P
40°
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