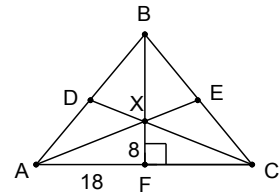


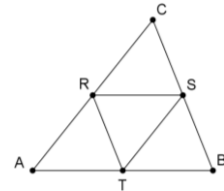
1. Given D, E and F are all midpoints, find the value of x.

- A. $x = 8$ B. $x = 16$ $2 \cdot 8 = 16$
 C. $x = 24$ D. $x = 18$



2. Given R, S, and T are midpoints, which of the following is false?

- A. ~~$\overline{RS} \parallel \overline{AT}$~~ B. If $ST = 9$, then $2 \cdot AC = 18$.
 C. $\frac{1}{2} \cdot AB = RS$ D. ~~$\triangle STR \cong \triangle ART$~~



3. For questions a-e, use the diagram at right.

a. Identify a median of $\triangle ABC$.

- A. ~~\overline{BF}~~ B. \overline{GH}
 C. \overline{AD} D. \overline{CE}
 E. None of the above

b. Identify an altitude of $\triangle ABC$.

- A. \overline{CE} B. \overline{GH}
 C. \overline{BF} D. \overline{CB}
 E. \overline{AD}

c. In $\triangle ABC$, if $m\angle ABF = 39^\circ$ and \overline{BF} is an angle bisector, then find $m\angle BCE$.

- A. 90° B. 45°
 C. 39° D. 51°
 E. 12°

d. If \overline{GH} is a perpendicular bisector of \overline{AB} with $BH = 14$, $GH = 17$, then AG is

- A. 9.64 B. 14
 C. 17 D. 22.02
 E. 31
- $x^2 = 14^2 + 17^2$
 $x^2 = 196 + 289$
 $x^2 = 485$
 $x = \sqrt{485} \approx 22.02$

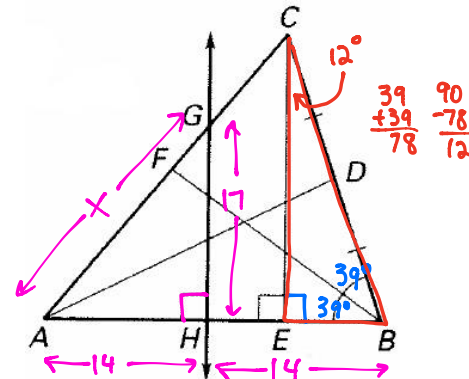
e. Which of the following statements is false?

- ~~I.~~ Medians intersect inside a triangle to form the centroid point of concurrency.
~~II.~~ Medians are divided into thirds, where two of the thirds are from the vertex to the centroid and one of the thirds is from the centroid to the side.
~~III.~~ The centroid is the point at which the triangle can be balanced
~~IV.~~ A triangle's median connects a vertex to the midpoint of the opposite side.
- A. I B. II
 C. III D. IV
 E. All true F. All false

4. A triangle with two side lengths of 9 and 17 is to be constructed. Which of the following is not a possible length of the third side of the triangle? Choose all that apply.

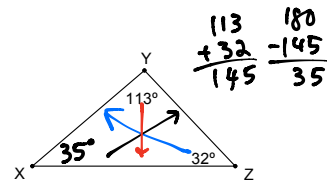
- A. 8 B. 9 C. 15
 D. 17 E. 26 F. All of the choices are possible lengths

$$\begin{array}{r} 17 \\ -9 \\ \hline 8 \end{array} \quad \begin{array}{r} 9 \\ +17 \\ \hline 26 \end{array}$$



5. Arrange the sides of $\triangle ABC$ in order of length from largest to smallest.

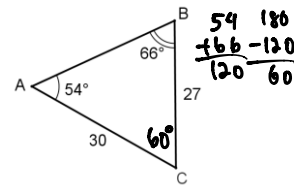
- A. $\overline{XY}, \overline{YZ}, \overline{XZ}$ B. $\overline{YZ}, \overline{XZ}, \overline{XY}$ C. $\overline{XZ}, \overline{YZ}, \overline{XY}$
 D. $\overline{XY}, \overline{XZ}, \overline{YZ}$ E. $\overline{YZ}, \overline{XY}, \overline{XZ}$ F. $\overline{XZ}, \overline{XY}, \overline{YZ}$



6. Write an inequality that best describes the possible lengths for \overline{AB} .

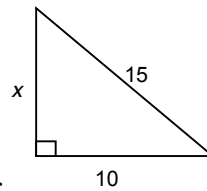
- A. $3 < AB < 57$ B. $3 < AB < 27$ C. $30 < AB < 57$ D. $27 < AB < 30$

medium side



7. Determine the value of x .

- A. 5 B. $5\sqrt{5}$
 C. 10 D. $10\sqrt{3}$

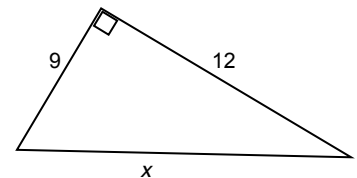


$x^2 + 10^2 = 15^2$
 $x^2 + 100 = 225$
 $x^2 = 125$
 $x = \sqrt{125} = 5\sqrt{5}$

8. Determine the value of x .

- A. 8 B. 15
 C. 18 D. 21

$9^2 + 12^2 = x^2$
 $81 + 144 = x^2$
 $225 = x^2$
 $15 = x$

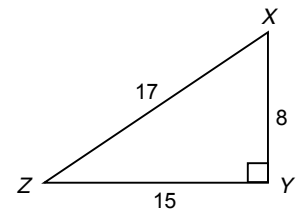


9. Find the tangent of angle X. Round your answer to four decimal places.

- A. 0.5333 B. 0.8823
 C. 1.1333 D. 1.8750

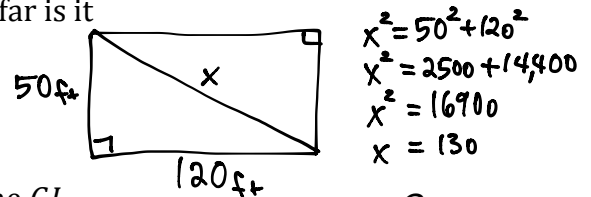
TOA
 $\tan(X) = \frac{15}{8} = 1.875$

missing decimal point



10. A rectangular yard is 50 feet wide by 120 feet long. How far is it diagonally from one corner to the opposite corner?

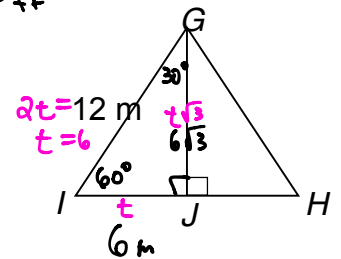
- A. 65 ft. B. 85 ft.
 C. 130 ft. D. 170 ft.



$x^2 = 50^2 + 120^2$
 $x^2 = 2500 + 14400$
 $x^2 = 16900$
 $x = 130$

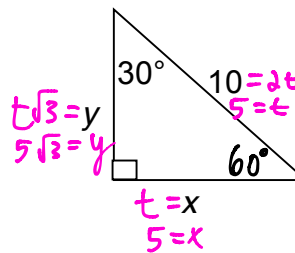
11. $\triangle GHI$ is equilateral with sides measuring 12 m. Determine GJ .

- A. 6 m B. $6\sqrt{3}$ m
 C. 12 m D. $12\sqrt{3}$ m



12. Find the value of x and y .

- A. $x = 5, y = 5\sqrt{3}$ B. $x = 5\sqrt{3}, y = 5$
 C. $x = 5, y = 5\sqrt{2}$ D. $x = 5\sqrt{2}, y = 5$

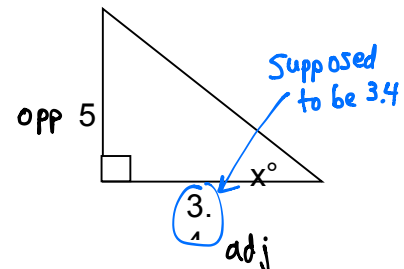


13. Find the value of x .

- A. 34° B. 48°
 C. 56° D. 90°

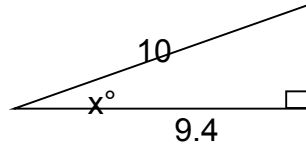
SOH
 CAH
 TOA

$\tan(x) = \frac{5}{3.4}$
 $x = \tan^{-1}\left(\frac{5}{3.4}\right)$
 $x \approx 55.7^\circ$



14. Find the value of x

- A. 19.95°
 B. 43.23°
 C. 70.05°
 D. 46.77°



$$\cos(x^\circ) = \frac{9.4}{10}$$

$$x^\circ = \cos^{-1}\left(\frac{9.4}{10}\right)$$

$$x^\circ \approx 19.95^\circ$$

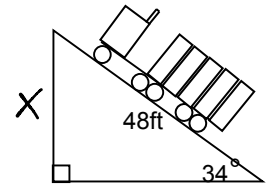
15. How high is the end of a 48-foot ramp when it is positioned at an angle of 34° to unload a truck?

- A. 24.0 ft.
 B. 26.8 ft.
 C. 32.0 ft.
 D. 39.8 ft.

$$\sin(34^\circ) = \frac{x}{48}$$

$$48 \cdot \sin(34^\circ) = x$$

$$26.84 \text{ ft} \approx x$$



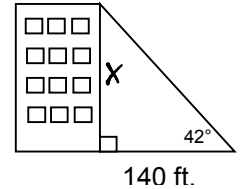
16. To measure the height of a building you stand 140 feet from its base and measure the angle of elevation to be 42° . What is the building's height?

- A. 93 ft.
 B. 104 ft.
 C. 126 ft.
 D. 155 ft.

$$\tan(42^\circ) = \frac{x}{140}$$

$$140 \cdot \tan(42^\circ) = x$$

$$126.06 \text{ ft} \approx x$$



17. Which statement is true when using segments of length 5, 8, and 10 to form a triangle?

- A. The segments form an acute triangle.
 B. The segments form an obtuse triangle.
 C. The segments form a right triangle.
 D. The segments do not form a triangle.

$$5 + 8 = 13$$

$$13 > 10 \checkmark$$

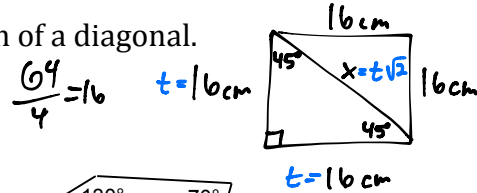
$$10^2 \square 5^2 + 8^2$$

$$100 \square 25 + 64$$

$$100 \square > 89$$

18. The perimeter of a square is 64 cm. Find the length of a diagonal.

- A. 8 cm
 B. $8\sqrt{2}$ cm
 C. 16 cm
 D. $16\sqrt{2}$ cm

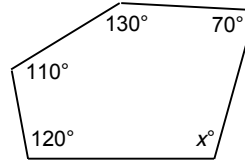


$$\frac{64}{4} = 16$$

$$t = 16 \text{ cm}$$

19. Find the value of x .

- A. 100
 B. 110
 C. 120
 D. 130



$$\text{pentagon: } (5-2) \cdot 180^\circ = 3 \cdot 180^\circ = 540^\circ$$

$$x + 70 + 130 + 110 + 120 = 540$$

$$x + 430 = 540$$

$$x = 110$$

20. The sum of the interior angles of a convex hexagon is

- A. 180°
 B. 360°
 C. 720°
 D. 1080°

$$(6-2) \cdot 180^\circ$$

$$= 4 \cdot 180^\circ$$

$$= 720^\circ$$

21. The sum of the exterior angles of a regular octagon is

- A. 180°
 B. 360°
 C. 1080°
 D. 1440°

22. Determine the measure of the interior angle at vertex R.

- A. 89°
 B. 91°
 C. 109°
 D. 111°

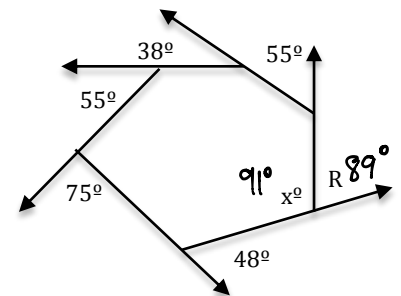
$$R + 55 + 38 + 55 + 75 + 48 = 360$$

$$R + 271 = 360$$

$$R = 89$$

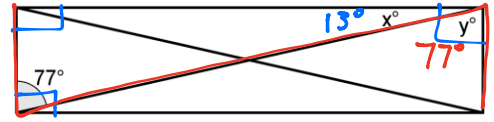
$$180 - 89 = x$$

$$91 = x$$



23. Solve for x and y in the rectangle.

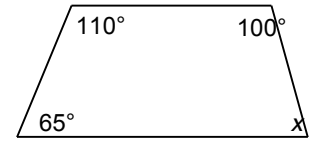
- A. $x = 77^\circ, y = 77^\circ$ **B. $x = 13^\circ, y = 77^\circ$**
 C. $x = 77^\circ, y = 13^\circ$ D. $x = 13^\circ, y = 13^\circ$



24. Solve for x.

- A. 65° **B. 85°**
 C. 110° D. 115°

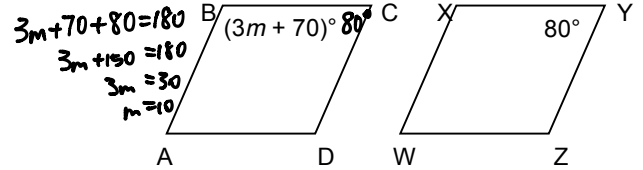
$$\begin{aligned} x + 100 + 110 + 65 &= 360 \\ x + 275 &= 360 \\ x &= 85 \end{aligned}$$



25. $\triangle ABCD \cong \triangle WXYZ$. Solve for m.

- A. $m = 3.3$ B. $m = 8$
C. $m = 8.5$ **D. $m = 10$**

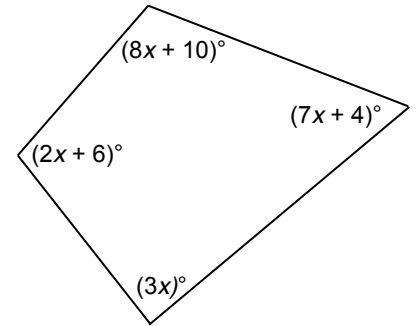
Parallelograms



26. Find the value of x.

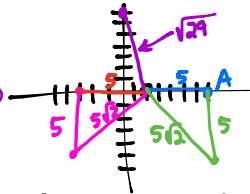
- A. 8 B. 9
C. 17 D. 19

$$\begin{aligned} 8x + 10 + 7x + 4 + 3x + 2x + 6 &= 360 \\ 20x + 20 &= 360 \\ 20x &= 340 \\ x &= 17 \end{aligned}$$



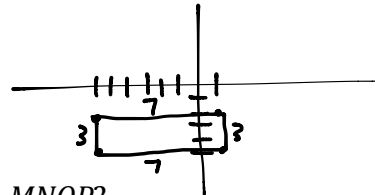
27. A square with a side length of 5 has one vertex at (2, 0). Which of the following points **cannot** be a vertex of the square?

- ~~A. (7, 0)~~ ~~B. (-3, 0)~~
~~C. (-3, -5)~~ **D. (0, 7)**
 E. (7, -5)



28. What special type of quadrilateral has the vertices $F(-6, -2)$, $G(1, -2)$, $H(-6, -5)$, and $I(1, -5)$?

- A. Rectangle** B. Parallelogram
 C. Rhombus D. Kite
 E. Square



29. What are the values of the variables in quadrilateral $MNOP$?

- ~~A. $x = 4, y = 19$~~ ~~B. $x = 3, y = 32$~~
~~C. $x = 5, y = 27$~~ **D. $x = 7, y = 26$**

$$\begin{aligned} 6x - 8 &= 4x + 6 \\ 2x - 8 &= 6 \\ 2x &= 14 \\ x &= 7 \end{aligned}$$

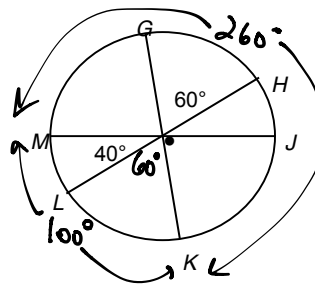


$$\begin{aligned} 6(7) - 8 + 5y + 16 &= 180 \\ 42 - 8 + 5y + 16 &= 180 \\ 34 + 5y + 16 &= 180 \\ 5y + 50 &= 180 \\ 5y &= 130 \\ y &= 26 \end{aligned}$$

30. Find the measure of arc MHK .

- A. 100° B. 180°
 C. 220° **D. 260°**

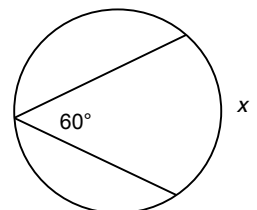
$$\begin{aligned} 360 \\ -100 \\ \hline 260 \end{aligned}$$



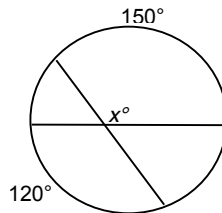
31. Find the value of x.

- A. 30° B. 60°
 C. 90° **D. 120°**

$$\begin{aligned} \text{inscribed} &= \frac{\text{angle}}{2} \\ 60^\circ &= \frac{x}{2} \end{aligned}$$

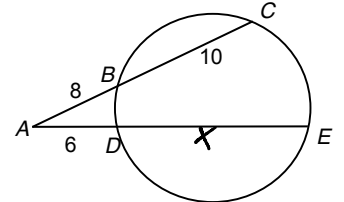


32. Find the value of x .
 A. 120 B. 135
 C. 150 D. 270



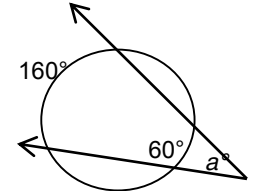
inside angle = $\frac{\text{arc} + \text{arc}}{2}$
 $x^\circ = \frac{150^\circ + 120^\circ}{2}$
 $x^\circ = \frac{270^\circ}{2}$
 $x^\circ = 135^\circ$

33. Find the value of DE.
 A. 18 B. 13.3
 C. 8 D. 7.5



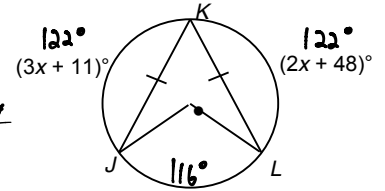
Outside (whole) = outside (whole)
 $8(8+10) = 6(6+x)$
 $8(18) = 36 + 6x$
 $144 = 36 + 6x$
 $108 = 6x$
 $18 = x$

34. Find the value of a .
 A. 30 B. 50
 C. 80 D. 100



Outside angle = $\frac{\text{big arc} - \text{small arc}}{2}$
 $a^\circ = \frac{160^\circ - 60^\circ}{2} = \frac{100^\circ}{2} = 50^\circ$

35. Find the measure of arc JL.
 A. 37° B. 116°
 C. 122° D. 244°

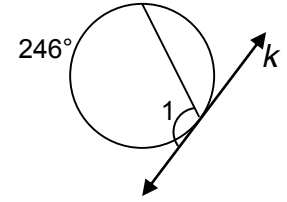


$3x + 11 = 2x + 48$
 $x + 11 = 48$
 $x = 37$

$3(37) + 11 = 122$

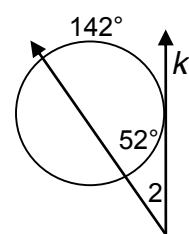
$\frac{122}{2} = 61$
 $\frac{360}{2} = 180$
 $180 - 116 = 64$
 $64 + 61 = 125$

36. Line k is tangent to the circle. Find $m\angle 1$.
 A. 246° B. 123°
 C. 114° D. 67°



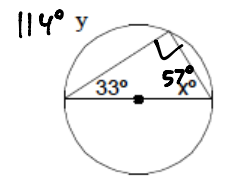
inscribed angle = $\frac{\text{arc}}{2} = \frac{246^\circ}{2} = 123^\circ$

37. Line k is tangent to the circle. Find $m\angle 2$.
 A. 45° B. 26°
 C. 166° D. 38°



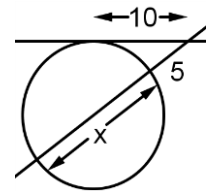
Outside angle = $\frac{\text{big arc} - \text{small arc}}{2}$
 $m\angle 2 = \frac{142^\circ - 52^\circ}{2}$
 $m\angle 2 = \frac{90^\circ}{2} = 45^\circ$

38. Find x and y given the diameter of the circle.
 A. $x = 33, y = 66^\circ$ B. $x = 33, y = 33^\circ$
 C. $x = 57, y = 114^\circ$ D. $x = 57, y = 57^\circ$



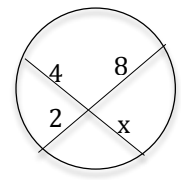
$\frac{90}{2} = 45$
 $\frac{33}{2} = 16.5$
 $45 + 16.5 = 61.5$

39. Find the value of segment x if a tangent and a secant intersect the circle as shown.
 A. 2 B. 15
 C. 20 D. 12



Outside (whole) = outside (whole)
 $10(10) = 5(5+x)$
 $100 = 25 + 5x$
 $75 = 5x$
 $15 = x$

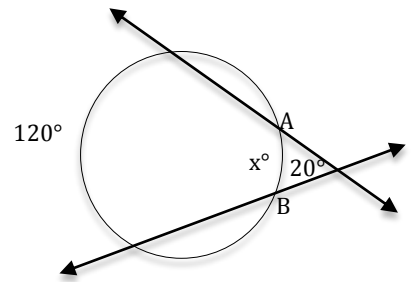
40. Find the value of x .
 A. 4 B. 5
 C. 6 D. 10



$4 \cdot x = 2 \cdot 8$
 $4x = 16$
 $x = 4$

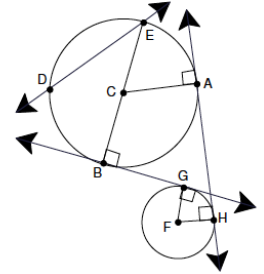
41. Find the measure of arc AB.
 A. 20° B. 40°
 C. 80° D. 160°

Outside angle = $\frac{\text{big arc} - \text{small arc}}{2}$
 $20^\circ = \frac{120^\circ - x^\circ}{2}$
 $40^\circ = 120^\circ - x^\circ$
 $-80^\circ = -x^\circ$
 $80^\circ = x^\circ$



42. Using the image at the right, determine which of the following is **true**.

- ~~A. $\angle BCA$ is an inscribed angle.~~
~~B. \overline{AB} is an arc.~~
~~C. \overline{DE} is a chord.~~
 D. \overline{AH} is a tangent.



43. The radius of a circle is 23 mm. Find the circumference of the circle.

- A. 46 mm B. 72.2 mm C. 144.4 mm D. 1661.1 mm
 $C = 2\pi r$
 $C = 2\pi \cdot 23 \text{ mm}$
 144.5 mm

44. Find the radius of a circle with circumference 20π cm.

- A. 10 cm B. 5π cm
 C. 20 cm D. 10π cm

$C = 2\pi r$
 $20\pi = 2\pi r$
 $\frac{20\pi}{2\pi} = \frac{2\pi r}{2\pi}$
 $10 = r$

45. If an arc measures 45° with a diameter of 20 m, then what is its arc length?

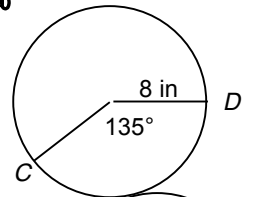
- A. $2.5\pi \text{ m}$ B. $5\pi \text{ m}$
 C. $15\pi \text{ m}$ D. $17.5\pi \text{ m}$

$AL = \pi \cdot d \cdot \frac{\theta}{360^\circ} = \pi \cdot 20 \text{ m} \cdot \frac{45^\circ}{360^\circ}$

46. Find the length of arc CD.

- A. $3\pi \text{ in}$ B. $6\pi \text{ in}$
 C. $12\pi \text{ in}$ D. $16\pi \text{ in}$

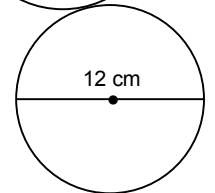
$AL = 2\pi \cdot 8 \text{ in} \cdot \frac{135^\circ}{360^\circ}$



47. Find the area of the circle.

- A. $6\pi \text{ cm}^2$ B. $12\pi \text{ cm}^2$
 C. $36\pi \text{ cm}^2$ D. $144\pi \text{ cm}^2$

$A = \pi r^2$
 $A = \pi \cdot 6^2$



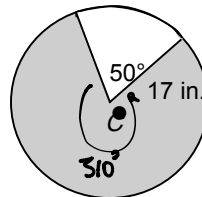
48. Find the radius of a circle with area 81π square feet.

- A. $9\pi \text{ ft.}$ B. 18 ft.
 C. $3\pi \text{ ft.}$ D. 9 ft.

$A = \pi r^2$
 $81\pi = \pi r^2$
 $81 = r^2$
 $9 = r$

49. Find the area of the shaded region.

- A. 92 in^2 B. 126 in^2
 C. 782 in^2 D. 908 in^2

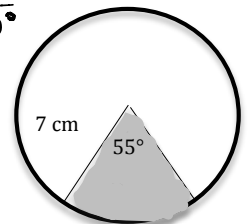


$A = \pi r^2 \cdot \frac{\theta}{360^\circ}$
 $= \pi (17 \text{ in})^2 \cdot \frac{30^\circ}{360^\circ}$

50. Find the area of the shaded region.

- A. 7 cm^2 B. 24 cm^2
 C. 288 cm^2 D. 1008 cm^2

$A = \pi r^2 \cdot \frac{\theta}{360^\circ}$
 $A = \pi (7 \text{ cm})^2 \cdot \frac{55^\circ}{360^\circ}$

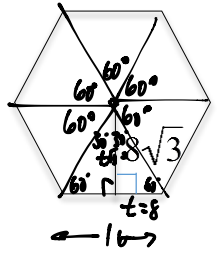


51. Find the area of the regular polygon.
 A. 83 square units B. 333 square units
 C. 665 square units D. 1330 square units

$$A = 6 \cdot \Delta$$

$$A = 6 \cdot \frac{1}{2} bh$$

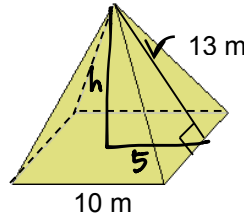
$$= 6 \cdot \frac{1}{2} (16) \cdot 8\sqrt{3}$$



52. Find the volume of the square pyramid.
 A. 280 m³ B. 340 m³
 C. 400 m³ D. 580 m³

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

$$V = \frac{1}{3} \cdot 10^2 \cdot 12$$



$$h^2 + 5^2 = 13^2$$

$$h^2 + 25 = 169$$

$$h^2 = 144$$

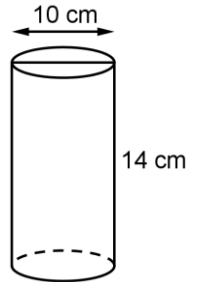
$$h = 12$$

53. Find the volume of the right cylinder.
 A. 70 cm³ B. 440 cm³
 C. 550 cm³ D. 1099 cm³

$$1099.557$$

$$V = \pi r^2 h$$

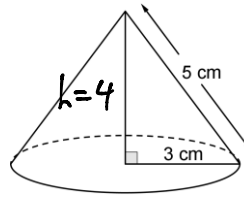
$$= \pi (5)^2 \cdot 14$$



54. Find the volume of the cone.
 A. 5π cm³ B. 12π cm³
 C. 15π cm³ D. 36π cm³

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

$$= \frac{1}{3} \pi (3)^2 \cdot 4$$



$$3^2 + h^2 = 5^2$$

$$h = 4$$

55. Find the volume of a square pyramid with a base area of 40 square inches and a height of 9 inches.
 A. 120 cubic inches B. 180 cubic inches
 C. 360 cubic inches D. 4800 cubic inches

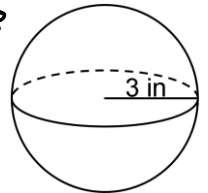
$$V = \frac{1}{3} Bh = \frac{1}{3} \cdot 40 \cdot 9 = 120$$

56. Find the volume of a pyramid that has a square base with 5 cm sides and a height of 9 cm.
 A. 15 cm³ B. 30 cm³
 C. 50 cm³ D. 75 cm³

$$V = \frac{1}{3} Bh = \frac{1}{3} \cdot 5^2 \cdot 9 = 75$$

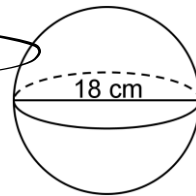
57. Find the volume of the sphere.
 A. 28 in³ B. 113 in³
 C. 175 in³ D. 452 in³

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



58. Find the volume of the sphere.
 A. 324π cm³ B. 972π cm³
 C. 1296π cm³ D. 7776π cm³

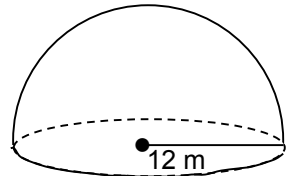
$$V = \frac{4}{3} \pi (9)^3$$



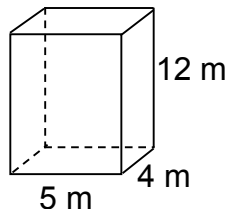
59. Find the volume of the hemisphere.
 A. 2304 cubic meters B. 3618 cubic meters
 C. 5426 cubic meters D. 7235 cubic meters

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

$$V = \frac{2}{3} \pi (12)^3$$



60. Find the volume.
 A. 240 m³
 B. 120 m³
 C. 20 m³
 D. 48 m³



$$V = Bh$$

$$= 5 \cdot 4 \cdot 12$$

$$= 240$$

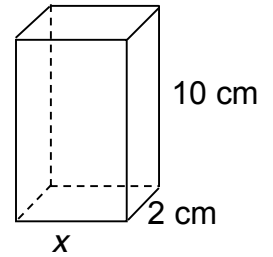
61. The volume of the right prism is 160 cm^3 . Find the value of x .

- A. 8 cm B. 16 cm
C. 5 cm D. 4 cm

$$V = Bh$$

$$\frac{160}{20} = \frac{2 \cdot x \cdot 10}{20}$$

$$8 = x$$



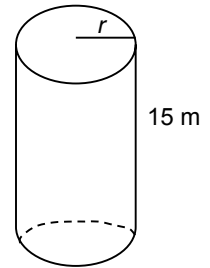
62. The volume of the cylinder is 3817 m^3 . Find the radius r .

- A. 254 m B. 81 m
C. 9 m D. 28 m

$$V = Bh$$

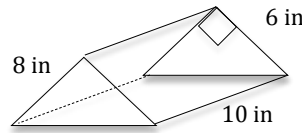
$$\frac{3817}{15\pi} = \frac{\pi r^2 \cdot 15}{15\pi}$$

$$\sqrt{\frac{3817}{15\pi}} = r$$



63. Find the volume of the solid.

- A. 240 in^3 B. 280 in^3
C. 340 in^3 D. 480 in^3



$$V = Bh$$

$$= \frac{1}{2}bh \cdot h_2$$

$$= \frac{1}{2} \cdot 6 \cdot 8 \cdot 10$$

64. The volume of a sphere is 500 cubic yards. What is the radius of the sphere?

- A. 7.21 yd. B. 8.74 yd.
C. 19.36 yd. D. 7.94 yd.

$$\frac{3}{4\pi} \cdot 500 = \frac{4}{3}\pi r^3 \cdot \frac{3}{4\pi}$$

Correct answer not listed

$$\sqrt[3]{\frac{1500}{4\pi}} = r$$

$$4.92 \text{ yd} \approx r$$