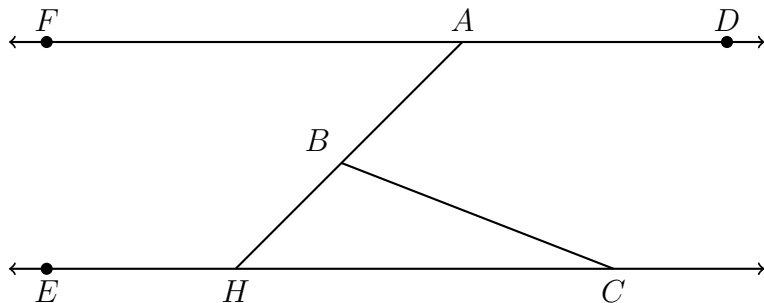


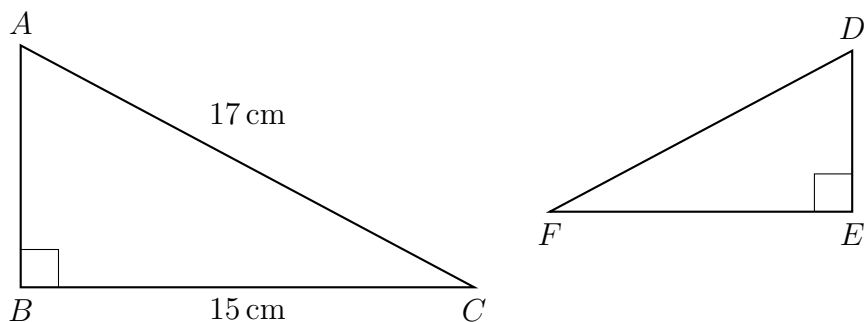
1. In the diagram below, $\overline{FAD} \parallel \overline{EHC}$, and \overline{ABH} and \overline{BC} are drawn.



If $m\angle FAB = 48^\circ$ and $m\angle ECB = 18^\circ$, what is $m\angle ABC$?

- (a) 18° (c) 66°
 (b) 48° (d) 114°
2. A cone has a volume of 108π and a base diameter of 12. What is the height of the cone?
3. The endpoints of directed line segment \overline{PQ} have coordinates of $P(-7, -5)$ and $Q(5, 3)$. What are the coordinates of point A , on \overline{PQ} , that divide \overline{PQ} into a ratio of 1:3?
4. Jaden is comparing two cones. The radius of the base of cone A is twice as large as the radius of the base of cone B. The height of cone B is twice the height of cone A. The volume of cone A is
- (a) twice the volume of cone B
 (b) four times the volume of cone B
 (c) equal to the volume of cone B
 (d) equal to half the volume of cone B

5. Kayla was cutting right triangles from wood to use for an art project. Two of the right triangles she cut are shown below.

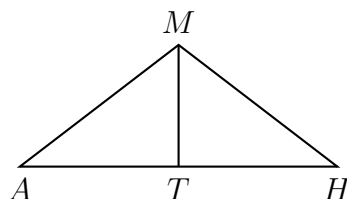


If $\triangle ABC \sim \triangle DEF$, with right angles B and E, $BC = 15$ cm, and $AC = 17$ cm, what is the measure of $\angle F$, to the *nearest degree*?

6. A regular hexagon is rotated about its center. Which degree measure will carry the regular hexagon onto itself?

- (a) 45° (c) 120°
(b) 90° (d) 135°

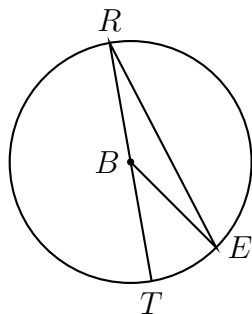
7. In triangle MAH below, \overline{MT} is the perpendicular bisector of \overline{AH} .



Which statement is *not* always true?

- (a) $\triangle MAH$ is isosceles.
(b) $\triangle MAT$ is isosceles.
(c) \overline{MT} bisects $\angle AMH$.
(d) $\angle A$ and $\angle TMH$ are complementary.

8. In circle B below, diameter \overline{RT} , radius \overline{BE} , and chord \overline{RE} are drawn.

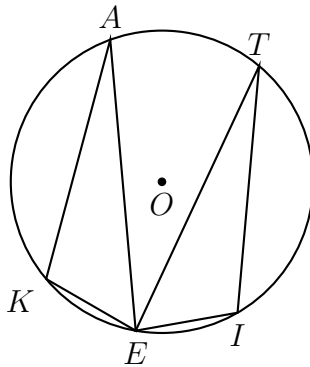


It $m\angle TRE = 15^\circ$ and $BE = 9$, then the area of sector EBR is what in terms of π ?

9. Lou has a solid clay brick in the shape of a rectangular prism with a length of 8 inches, a width of 3.5 inches, and a height of 2.25 inches. If the clay weighs 1.055 oz/in^3 , how much does Lou's brick weigh, to the nearest ounce?
10. For the acute angles in a right triangle, $\sin(4x)^\circ = \cos(3x + 13)^\circ$.
What is the number of degrees in the measure of the smaller angle?
11. A rectangular tabletop will be made of maple wood that weighs 43 pounds per cubic foot. The tabletop will have a length of eight feet, a width of three feet, and a thickness of one inch. Determine and state the weight of the tabletop, in pounds.
12. Determine and state an equation of the line perpendicular to the line $5x - 4y = 10$ and passing through the point $(5, 12)$.

13. After a dilation with center $(0,0)$, the image of \overline{DB} is $\overline{D'B'}$. If $DB = 4.5$ and $D'B' = 18$, then what is the scale factor of this dilation?

14. In the diagram below of circle O , points K , A , T , I , and E are on the circle, $\triangle KAE$ and $\triangle ITE$ are drawn, $\widehat{KE} \cong \widehat{EI}$, and $\angle EKA \cong \angle EIT$.

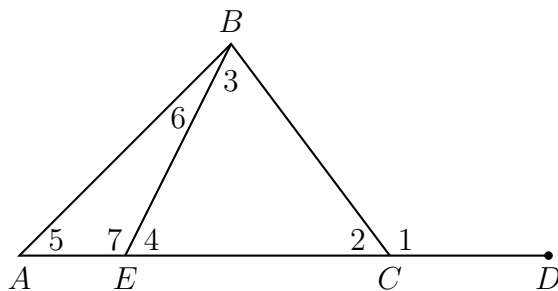


Which statement about $\triangle KAE$ and $\triangle ITE$ is always true?

- (a) They are neither congruent nor similar.
 - (b) They are similar but not congruent.
 - (c) They are right triangles.
 - (d) They are congruent.
15. 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? (1 mile = 5280 feet)
16. The area of a sector of a circle with a radius measuring 15 cm is $75\pi \text{ cm}^2$. What is the measure of the central angle that forms the sector?

17. Point M divides \overline{AB} so that $AM : MB = 1 : 2$. If A has coordinates $(-1, -3)$ and B has coordinates $(8, 9)$, what are the coordinates of M ?
18. What is an equation of the image of the line $y = \frac{3}{2}x - 4$ after a dilation of a scale factor of $\frac{3}{4}$ centered at the origin?
19. Which three-dimensional figure will result when a rectangle 6 inches long and 5 inches wide is continuously rotated about the longer side?
- (a) a rectangular prism with a length of 6 inches, width of 6 inches, and height of 5 inches
 - (b) a rectangular prism with a length of 6 inches, width of 5 inches, and height of 5 inches
 - (c) a cylinder with a radius of 5 inches and a height of 6 inches
 - (d) a cylinder with a radius of 6 inches and a height of 5 inches

20. In the diagram below of triangle ABC , \overline{AC} is extended through point C to point D , and \overline{BE} is drawn to \overline{AC} .



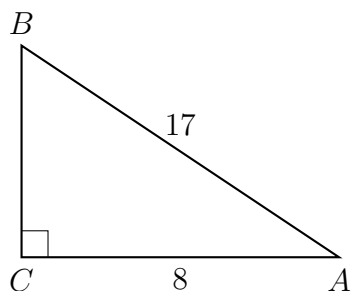
Which equation is always true?

- (a) $\angle 1 = m\angle 3 + m\angle 2$
- (b) $\angle 5 = m\angle 3 - m\angle 2$
- (c) $\angle 6 = m\angle 3 - m\angle 2$
- (d) $\angle 7 = m\angle 3 + m\angle 2$

21. In right triangle ABC , $m\angle C = 90^\circ$ and $AC \neq BC$. Which trigonometric ratio is equivalent to $\sin B$?

- (a) $\cos A$ (c) $\tan A$
(b) $\cos B$ (d) $\tan B$

22. In the diagram below of right triangle ABC , $AC = 8$, and $AB = 17$.



Which equation would determine the value of angle A ?

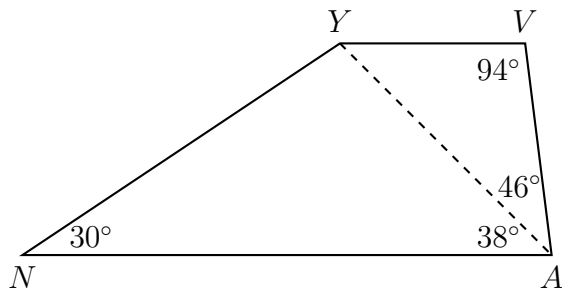
- (a) $\sin A = \frac{8}{17}$ (c) $\cos A = \frac{15}{17}$
(b) $\tan A = \frac{8}{15}$ (d) $\tan A = \frac{15}{8}$

23. Which equation represents a line that is perpendicular to the line represented by

$$y = \frac{2}{3}x + 1?$$

- (a) $3x + 2y = 12$ (c) $y = \frac{3}{2}x + 2$
(b) $3x - 2y = 12$ (d) $y = -\frac{2}{3}x + 4$

24. In diagram of quadrilateral $NAVY$, $m\angle YNA = 30^\circ$, $m\angle YAN = 38^\circ$, $m\angle AVY = 94^\circ$, and $m\angle VAY = 46^\circ$.

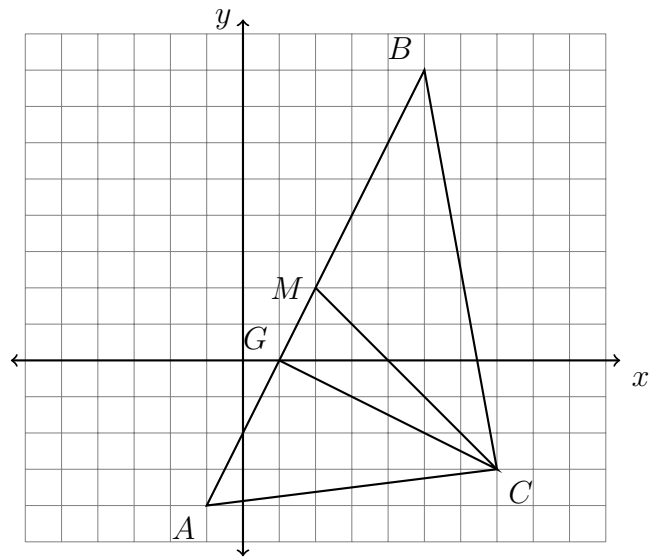


Which segment has the shortest length?

- (a) \overline{AY}

(b) \overline{NY}
- (c) \overline{VA}

(d) \overline{VY}
25. In the diagram below, $\triangle ABC$, altitude \overline{CG} , and median \overline{CM} are drawn.



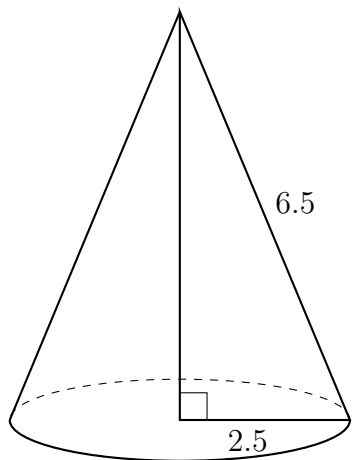
Which expression represents the area of $\triangle ABC$?

- (a) $\frac{(BC)(AC)}{2}$

(b) $\frac{(GC)(BC)}{2}$
- (c) $\frac{(CM)(AB)}{2}$

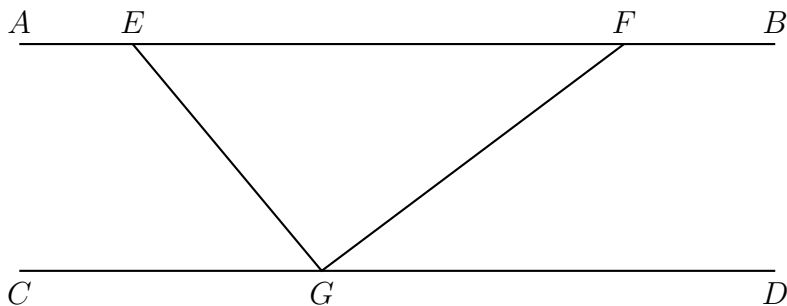
(d) $\frac{(GC)(AB)}{2}$

26. As shown in the diagram below, the radius of a cone is 2.5 cm and its slant height is 6.5 cm.



How many cubic centimeters are in the volume of the cone? Express your answer in terms of π .

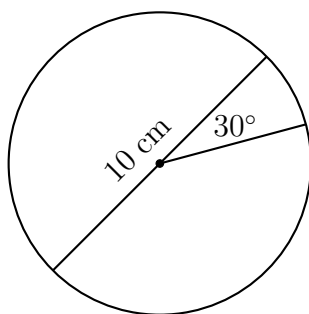
27. In the diagram below, $\overline{AEFB} \parallel \overline{CGD}$, and \overline{GE} and \overline{GF} are drawn.



If $m\angle EFG = 32^\circ$ and $m\angle AEG = 137^\circ$, what is $m\angle EGF$?

- | | |
|----------------|-----------------|
| (a) 11° | (c) 75° |
| (b) 43° | (d) 105° |

28. An isosceles right triangle whose legs measure 6 is continuously rotated about one of its legs to form a three-dimensional object. The three-dimensional object is a
- (a) cylinder with a diameter of 6
 - (b) cylinder with a diameter of 12
 - (c) cone with a diameter of 6
 - (d) cone with a diameter of 12
29. The coordinates of the endpoints of directed line segment ABC are $A(-8, 7)$ and $C(7, -13)$. If $AB : BC = 3 : 2$, what are the coordinates of B ?
30. A circle with a diameter of 10 cm and a central angle of 30° is drawn below.



- What is the area, to the *nearest tenth of a square centimeter*, of the sector formed by the 30° angle?
31. A child's tent can be modeled as a pyramid with a square base whose sides measure 60 inches and whose height measures 84 inches. What is the volume of the tent, to the *nearest cubic foot*?