2024 Geometry Exam
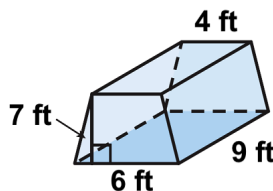
1. In triangle ABC, $AB = AC$ and $\angle ABC = 70°$. What is the angle measurement of $\angle BAC$?

   (a) 40°   (b) 110°   (c) 220°   (d) 80°
   (e) None of the above

2. Given one angle in a right triangle $\theta = \frac{\pi}{4}$ and the hypotenuse has a length of 4, what are the measures of the other two sides?

   (a) 4   (b) $3\sqrt{2}$ (c) $2\sqrt{2}$ (d) $4\sqrt{2}$
   (e) None of the above

3. The measure of an angle is four times the measure of its supplement. What is the degree measure of that angle?

   (a) 135   (b) 144   (c) 72   (d) 60   (e) 36

4. A sphere with radius 2 is placed into a cube with side length 4. What is the volume of the unoccupied space?

   (a) $64 + \frac{32}{3}\pi$ (b) $81 + \frac{32}{3}\pi$ (c) $64 - \frac{32\pi}{3}$ (d) $64 + 32\pi$
   (e) None of the above

5. In a right triangle XYZ where Y is the right angle, $\sin(X)$ is $\frac{12}{13}$ What is the value of $\tan(Z)$?

   (a) $\frac{12}{13}$ (b) $\frac{5}{12}$ (c) $\frac{12}{5}$ (d) $\frac{13}{12}$
   (e) None of the above

6. What is the equation for the volume of a cylinder whose height is one-third of its radius?

   (a) $V = \frac{\pi}{3}r^2$ (b) $V = \frac{\pi}{3}r^2h$ (c) $V = \pi r^3$ (d) $V = \frac{\pi}{3}r^3$
   (e) None of the above

7. In a 30-60-90 triangle, the length of the hypotenuse is 9. What is the length of the shortest side?

   (a) 4.5   (b) $\frac{9\sqrt{3}}{2}$ (c) $3\sqrt{3}$ (d) $9\sqrt{3}$ (e) $4\sqrt{2}$

8. What is the circumference of a circle if the area is 108π?

   (a) 9π (b) 12π (c) $4\sqrt{3}\pi$ (d) $12\sqrt{3}\pi$ (e) $9\sqrt{3}\pi$

9. Find the volume of the trapezoidal prism.

   (a) 234 ft^3 (b) 151 ft^3 (c) 315 ft^3 (d) 192 ft^3 (e) 182 ft^3

10. Find the area of a triangle with the side lengths of 10, 10, and 16.

   (a) 80   (b) 60   (c) 50   (d) 48   (e) 36

11. What is the area of a rhombus, given the diagonals are 5 meters and 6 meters?

   (a) 11 m^2 (b) 30 m^2 (c) 15 m^2 (d) 22 m^2
   (e) None of the above
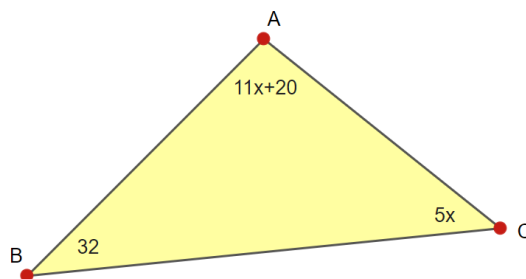
12. Determine the area of the trapezoid below:
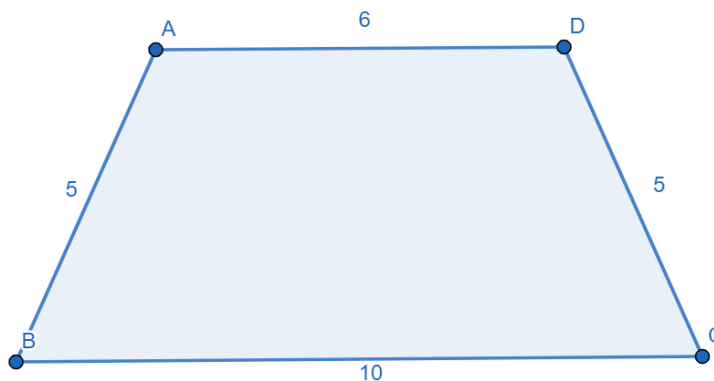
   (a) $5\sqrt{21}$ units^2 (b) $7\sqrt{21}$ units^2 (c) $6\sqrt{21}$ units^2 (d) $8\sqrt{21}$ units^2
   (e) None of the above

13. Solve for the area of the equilateral triangle shown below:
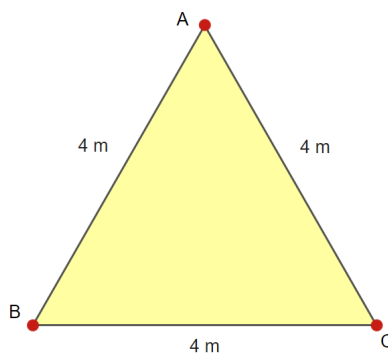
   (a) $2\sqrt{3}$ (b) $3\sqrt{3}$ (c) $4\sqrt{3}$ (d) $5\sqrt{3}$
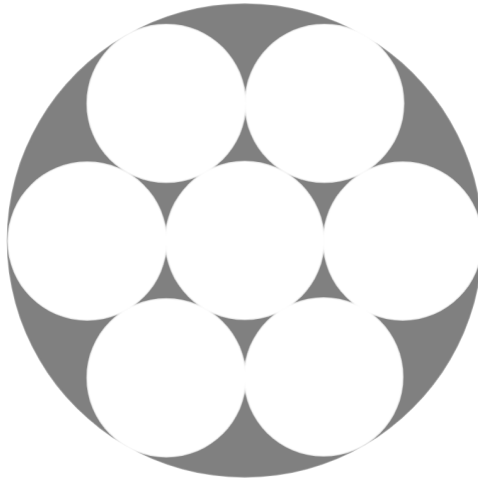   (e) None of the above

14. Find the measure of $\angle BAC$.

   (a) $72°$ (b) $96°$ (c) $108°$ (d) $139°$
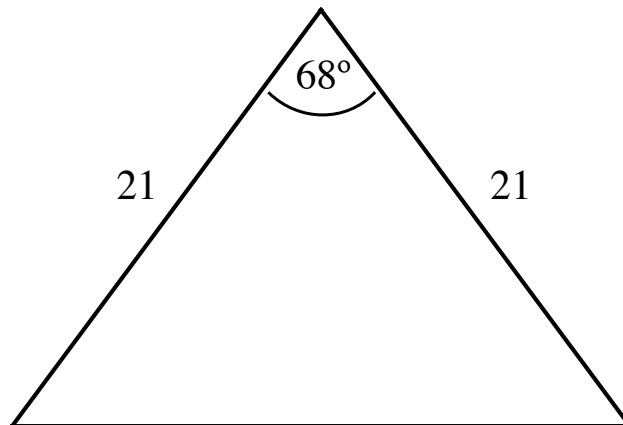   (e) None of the above

15. What is the number of sides in a regular polygon with interior angles of $144°$?

   (a) 10   (b) 8   (c) 6   (d) 4
   (e) None of the above

16. Consider the figure below. If each of the small circles has a radius of 3, what is the area of the shaded section?


(a) 36π (b) 3π (c) 18π (d) 12π
(e) None of the above

17. Consider the figure below. Find the measure of each base angles (in degrees).


(a) 50   (b) 52   (c) 54   (d) 56
(e) None of the above

18. What is the surface area of a right cone with a height of 6 and a radius of 8?

(a) 92π (b) 108π (c) 144π (d) 196π
(e) None of the above

19. What is the area of a regular octagon with side lengths of 4?

(a) $32 + 32\sqrt{2}$ (b) $16 + 16\sqrt{2}$ (c) $32 + 32\sqrt{8}$ (d) $16 + 16\sqrt{8}$
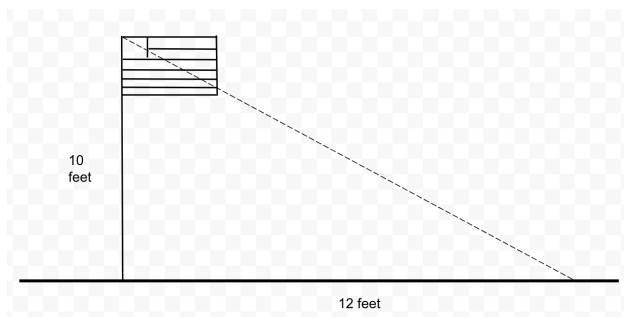(e) None of the above

20. What is the measure of $\angle\theta$ so that $a \parallel b$?
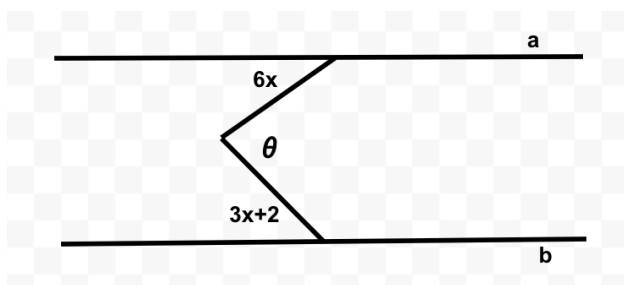
   (a) $9x$ (b) $3x + 2$ (c) $3x$ (d) $9x + 2$
   (e) None of the above

21. Caleb has a cup of water. Find the volume if the cup is three times the size of each dimension from the figure below and round to the nearest whole number.
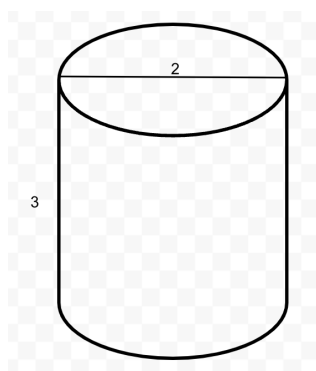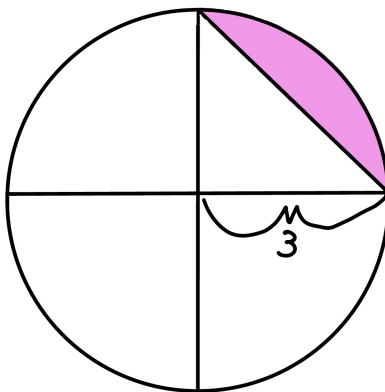

   (a) 3π cubic inches   (b) 12π cubic inches
   (c) 27π cubic inches   (d) 81π cubic inches
   (e) None of the above

22. The flag pole is 10 feet in the air and casts a shadow 12 feet away from the base of the pole. Based on the information given. Find the distance from the top of the flag to the ground, where the shadow is being cast.


   (a) $\sqrt{212}$ ft   (b) $\sqrt{244}$ ft   (c) $\sqrt{290}$ ft   (d) $\sqrt{302}$ ft
   (e) None of the above

23. Fred walked 17 miles north, turned around and walked 35 miles south. He then turned and walked 9 miles west before he collapsed from exhaustion. How many miles will he have to crawl in a straight line to return to his original location?

    (a) 16 miles   (b) 19 miles   (c) 8 miles   (d) 23 miles
    (e) None of the above

24. A point of the circumference of the unit circle has coordinates $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$. What angle does this represent in degrees?

    (a) $360°$ (b) $270°$ (c) $60°$ (d) $90°$
    (e) None of the above

25. If the volume of a sphere is equal to 36π cubic centimeters, what is the diameter of the sphere?

    (a) 3 cm   (b) 6 cm   (c) 9 cm   (d) 27 cm
    (e) None of the above

26. A science class conducts an experiment with a plastic bottle rocket that launches 50 ft in the air but then ends up hitting the ground 26 ft away from the class depicting a right triangle. What is the distance from the rocket's highest point to when it hits the ground?

    (a) $\sqrt{676}$ ft   (b) $\sqrt{2500}$ ft   (c) $\sqrt{3176}$ ft   (d) $\sqrt{5000}$ ft
    (e) None of the above

27. A triangle has a perimeter of 30. If 2 of its sides are equal length and the third side length is 3 more than the length of one of the equal sides, what is the length of the third side?

    (a) 4   (b) 8   (c) 12   (d) 15
    (e) None of the above

28. In a 30-60-90 triangle, the length of the hypotenuse is 6. What is the length of the shortest side?

    (a) 2   (b) $2\sqrt{3}$ (c) 3   (d) $6\sqrt{3}$
    (e) None of the above

29. Which of the following could be the side lengths of a right triangle?

    (a) 3,6,9   (b) 3,5,7   (c) 4,8,6   (d) 5,12,13
    (e) None of the above

30. The perimeter of a regular hexagon is 123. What is the length of one of its diagonals?

    (a) 61.5   (b) 21   (c) 14   (d) 41
    (e) None of the above

31. What is the measure of each interior angle in a 12 sided regular polygon?

    (a) $150°$ (b) $180°$ (c) $170°$ (d) $140°$
    (e) None of the above

32. The measure of the interior angles of a hexagon are $2x, 3x, 4x, 5x, 6x$, and $5x + 20$. What is the degree measure of the largest angle?

    (a) $120°$ (b) $160°$ (c) $168°$ (d) $182°$
    (e) None of the above

33. Find the area of the shaded region below.

(a) $2\pi - 3\sqrt{2}$ (b) $6\pi - \frac{9}{2}$ (c) $\frac{9\pi}{4} - \frac{9}{2}$ (d) $\frac{12\pi}{4} - \frac{7}{2}$
(e) None of the above

34. What is the volume of a pyramid with the base's area being 16 square inches, and has a height of 9 inches?

(a) 144 cubic inches   (b) 48 cubic inches
(c) 96 cubic inches   (d) 72 cubic inches
(e) None of the above

35. In the figure below (not necessarily to scale) $m\angle BAC = 6x + 10$ degrees, $m\angle ABD = 3x$ degrees, and $m\angle BDC = 6x + 20$ degrees. Find the measure of angle AOC.
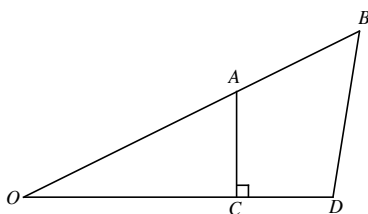
(a) $12°$ (b) $16°$ (c) $20°$ (d) $24°$
(e) None of the above