

Geometry Group Test

1. A twelve-sided polygon consists of vertices A – L. How many lines can be drawn between any two vertices, such that a line is neither repeated, nor redundant, with any sides of the polygon?

(A) 45

(B) 54

(C) 55

(D) 66

(E) 110

2. The triangular base of a prism is a right triangle of sides a and $b = 2a$. The height h of the prism is equal to 10 mm and its volume is equal to 40 mm^3 , find the lengths of the sides a and b of the triangle.

(A) $a = 4\text{mm}$, $b = 8\text{mm}$

(B) $a = 3\text{mm}$, $b = 6 \text{ mm}$

(C) $a = 2\text{mm}$, $b = 4\text{mm}$

(D) $a = 1\text{mm}$, $b = 2\text{mm}$

3. A line contains points $(4, -3)$ and $(7, -4)$. What is the slope of a line perpendicular to this line?

(A) $m = 1/3$

(B) $m = -1/3$

(C) $m = -3$

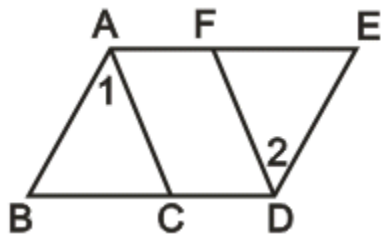
(D) $m = 3$

4. Two times the measure of the supplement of an angle is seven times the measure of the complement of the angle. Find the measure of the angle.

- (A) 45 degrees
- (B) 34 degrees
- (C) 43 degrees
- (D) 54 degrees

5.

In parallelogram ABCD, $\angle 1 \cong \angle 2$. The reason for $\triangle ABC$ and $\triangle DEF$ being congruent is _____.



- A) SSA
- B) AAS
- C) SAS
- D) ASA

6. When an angle is formed from two points on the circumference and two straight lines drawn from these two points meet at another point on the same circumference, it is said that the angle is _____ by the arc.

- A) Contracted
- B) Extended
- C) Subtended
- D) Distended

7. Two points are marked on the circumference of a circle. A straight line is drawn from each of these points which both meet at a certain point on the circumference. How much bigger is the angle formed at the center compared to the angle formed at the circumference?

- A) Triple
- B) Equal
- C) Quadruple
- D) Double

8. When a four-sided shape, where each corner touches the circumference is found inside a circle, it is called a cyclic quadrilateral. What is the rule about the size of the angles that are opposite to each other within this cyclic quadrilateral?

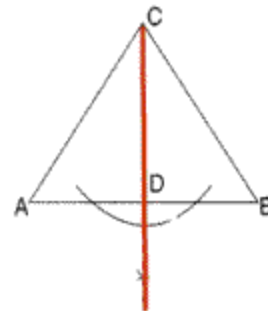
- A) They total 180 degrees
- B) They are equal
- C) They total 90 degrees
- D) They total 135 degrees

9. What is the equation for finding the area of a sector within a circle? Let θ be the angle of the sector in degrees.

- A) $\frac{\pi^2 r \theta}{180}$
- B) $\frac{\pi r \theta}{180}$
- C) $\frac{\pi r \theta}{360}$
- D) $\frac{\pi r^2 \theta}{360}$

10. According to the construction shown in the diagram below, what we do call segment \overline{CD} ?

- A) bisector of angle C
- B) median to side AB
- C) perpendicular bisector of segment of AB
- D) altitude to side AB

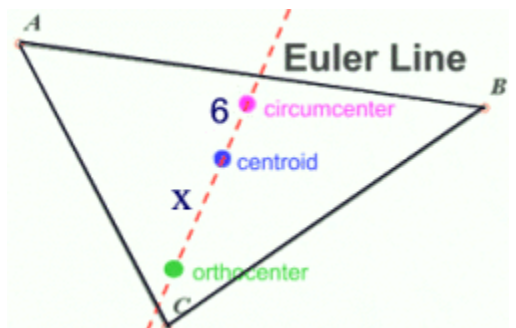


11. The point where the medians of a triangles are concurrent is called the:

- A) centroid
- B) orthocenter
- C) incenter
- D) circumcenter

12. Scalene triangle ABC is shown at the right. The distance from the centroid of the triangle to the circumcenter is 6 units. How far is the centroid from the orthocenter?

- A) 8
- B) 12
- C) 16
- D) 24



13. When constructing a line parallel to a given line, you will be

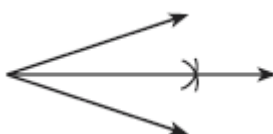
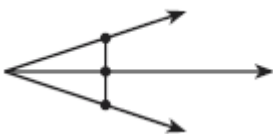
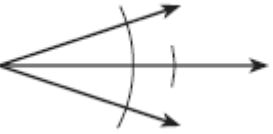
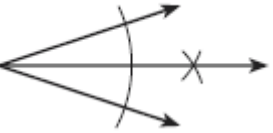
[A] copying a segment.

[B] bisecting a segment.

[C] copying an angle.

[D] constructing a perpendicular

14. Which diagram below shows a correct mathematical construction using only a compass and a straightedge to bisect an angle?

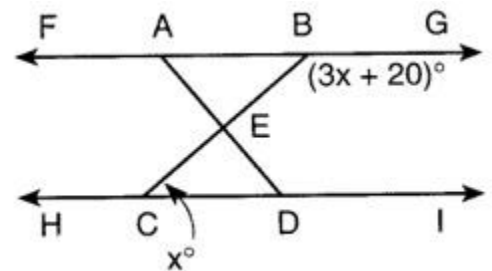
- [A] 
- [B] 
- [C] 
- [D] 

15.

In the accompanying diagram,
 $\overline{FABG} \parallel \overline{HCDI}$, \overline{BC} and \overline{AD} intersect at E ,
 $m\angle GBE = 3x + 20$, and $m\angle ECD = x$.

What is the value of x .

- [A] 10 [B] 17.5
- [C] 40 [D] 50



16.

The perimeter of a rhombus is 60. If the length of its longer diagonal measures 24, the length of the shorter diagonal is

- [A] 20 [B] 18 [C] 15 [D] 9

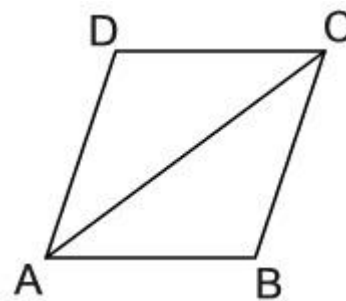
17. Which property is true for all trapezoids?

- [A] Only two opposite sides are parallel.
 [B] Consecutive angles are supplementary.
 [C] The base angles are congruent.
 [D] All angles are equal.

18.

In the accompanying diagram of rhombus $ABCD$, $m\angle CAB = 35$. Find $m\angle CDA$.

- [A] 35
 [B] 70
 [C] 110
 [D] 140



19. Find the center of the circle $x^2 + y^2 + 16x + 20y + 155 = 0$.

- A) (-8, -10)
 B) (8, 10)
 C) (8, -10)
 D) (-8, 10)

20. Change $x^2 + y^2 - 4x - 12y = 0$ into an equation in polar form.

- A) $r^2 = 4 \cos \theta + 12 \sin \theta$
- B) $r = 4 \cos \theta + 12 \sin \theta$
- C) $r = 48 \cos \theta \sin \theta$
- D) $r = 4 \cos \theta - 12 \sin \theta$

21. Write the equation of the ellipse with center at $(-2, 6)$, vertices at $(-2, 14)$ and $(-2, -2)$, and foci at $(2, 1)$.

- A) $\frac{(x+2)^2}{39} + \frac{(y-6)^2}{64} = 1$
- B) $\frac{(x-2)^2}{39} + \frac{(y+6)^2}{64} = 1$
- C) $\frac{(x+2)^2}{64} + \frac{(y-6)^2}{39} = 1$
- D) $\frac{(x+2)^2}{25} + \frac{(y-6)^2}{64} = 1$

22. A rectangular solid and a circular cylinder have the same volume and the same height. The base of the rectangular solid is a square. Which (if any) of the following statements are true?

(i) The rectangular solid and the cylinder have the same base area.

(ii) The rectangular solid has a greater base area than the cylinder.

(iii) The side length of the square base of the rectangular solid is equal to the diameter of the cylinder.

(iv) The side length of the square base of the rectangular solid is less than the diameter of the cylinder.

A) (i) and (iii)

B) (ii)

C) (i) and (iv)

D) (ii) and (iii)

23. Find the length of the third side of the right triangle. Assume that c represents the length of the hypotenuse. Give an exact answer and, if appropriate, an approximation to three decimal places when $a = 1$, $b = 7$.

- A) $c = \text{square root of } 8$, $c = 2.828$
- B) $c = \text{square root of } 48$; $c \approx 6.928$
- C) $c = 8$
- D) $c = \text{square root of } 50$; $c \approx 7.071$

24. The outfield wall in a baseball park is in the shape of a quarter circle. If the radius of the circle is 8 ft, how long is the wall?

- A) 12.56 ft
- B) 25.12 ft
- C) 10.56 ft
- D) 6.28 ft

25. Complement of 37°

- A) 53°
- B) 323°
- C) 74°
- D) 143°

26. Triangle ABC has vertices $A(1,3)$, $B(0,1)$, and $C(4,0)$. Under a translation, A' , the image point of A , is located at $(4,4)$. Under this same translation, point C' is located at

- [A] $(7,1)$
- [B] $(5,3)$
- [C] $(3,2)$
- [D] $(1,-1)$

27. Line segment \overline{AB} has endpoints $A(2,-3)$ and $B(-4,6)$.

What are the coordinates of the midpoint of \overline{AB} ?

- [A] $(-2,3)$
- [B] $\left(-1, 1\frac{1}{2}\right)$
- [C] $(-1,3)$
- [D] $\left(3, 4\frac{1}{2}\right)$

28. A rectangular prism has a volume of $3x^2 + 18x + 24$. Its base has a length of $x + 2$ and a width of 3. Which expression represents the height of the prism?

- [A] $x + 4$
- [B] $x + 2$
- [C] 3
- [D] $x^2 + 6x + 8$

29. Which of the following statements about it is NOT true about a rhombus?

- A. Its diagonals bisect each other.
- B. Its diagonals are congruent.
- C. Its diagonals are perpendicular.
- D. Each pair of opposite angles are congruent.
- E. Each pair of consecutive angles are supplementary.

30. The process of making a conjecture based on a series of observed patterns is known as

- A. deductive reasoning
- B. obfuscation
- C. proof
- D. inductive reasoning
- E. brawling

31. Towns A, B and C are located along a straight highway. Town B is between A and C, and the distance from B to C is 17 miles more than the distance from A to B. If A and C are 95 miles apart, how far is it from town B to town C?

- A. 42 miles
- B. 29 miles
- C. 56 miles
- D. 45 miles
- E. 39 miles

32. TV has endpoints at (2, 10) and (18, -18). What is the approximate length of the segment?

- A. 29.00
- B. 32.25
- C. 47.92
- D. 49.07