

February Geometry Regional

Choice E is NOTA, which is None of the Above.

1. Which of the following do not necessarily determine a plane?

- A) two parallel lines B) a pair of intersecting lines C) a line and a point not on the line
D) three distinct points E) NOTA

2. What is the total number of diagonals in a convex dodecagon?

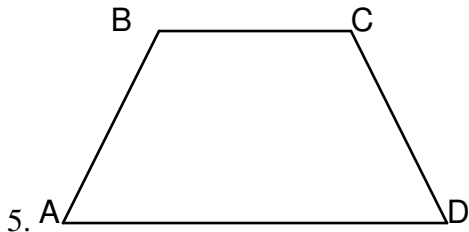
- A) 12 B) 36 C) 54 D) 108 E) NOTA

3. In triangle ABC, $BC = AC$, $\angle B = 6x + 7$ and $\angle C = 4x + 6$.
Find the measure of $\angle A$.

- A) 52 B) 60 C) 64 D) 67 E) NOTA

4. Two vertical angles have measures of $(2x - 3)^2$ and $3x(x - 2)$. Find the measure of each angle.

- A) 9 B) 45 C) 90 D) No solution E) NOTA



5. Given the trapezoid ABCD and the following:
Segment BC is parallel to segment AD, BE is perpendicular to Segment AD at point E,
 $BC = 32$, $BE = 15$, $\angle A = \angle D = 60^\circ$, find the area of the trapezoid.

- A) 480 B) $32 + 5\sqrt{3}$ C) $480 + 75\sqrt{3}$ D) $960 + 150\sqrt{3}$ E) NOTA

6. The sides of a triangle are in a ratio of 4:5:6. If the perimeter of the triangle is 90, what is the area of the triangle?

- A) $\frac{15\sqrt{7}}{4}$ B) 180 C) 360 D) $135\sqrt{7}$ E) NOTA

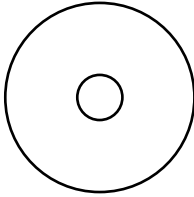
7. Two supplementary angles have measures $x^2 - 7x$ and $x^2 + 3x + 150$. Find the complement of the smaller angle.

- A) 30 B) 60 C) 90 D) no solution E) NOTA

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8. Each interior angle of a regular polygon has a measure of 135 degrees. What is the name of the polygon?

- A) Octagon B) Pentagon C) Decagon D) Hexagon E) NOTA



9. Two concentric circles form the given annulus. If the area of the annulus is 825π and the diameter of the smaller circle is 8, find the diameter of the larger circle.

- A) 54 B) 56 C) 58 D) 60 E) NOTA

10. Two sides of a triangle have lengths 4 and 7. Which of the following is a possible length of the third side?

- A) 3 B) 8 C) 11 D) 12 E) NOTA

11. An architect is drawing a sketch in which $2\frac{1}{3}$ inches represents 7 feet. What distance in inches should be used to represent 17 feet 3 inches?

- A) $5\frac{1}{4}$ B) $5\frac{1}{2}$ C) $5\frac{3}{4}$ D) 6 E) *NOTA*

12. Triangle XYZ has coordinates X(8,2), Y(-3,6) and Z(7, 12). Segment XM is a median of triangle XYZ. Find the length of segment XM.

- A) $\sqrt{58}$ B) $\sqrt{85}$ C) $\sqrt{101}$ D) $\sqrt{137}$ E) *NOTA*

13. The arithmetic mean between two positive numbers is 17, and their positive geometric mean is 8. Find the larger of the two numbers.

- A) 24 B) 28 C) 32 D) 36 E) *NOTA*

14. Which line segments of a triangle are concurrent at a point which is equidistant from the three vertices of the triangle?

- A) the perpendicular bisectors B) the medians C) the angle bisectors
D) the altitudes E) *NOTA*

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15. The diagonals of a rhombus are 18 inches and 24 inches. Find the perimeter of the rhombus in inches.

- A) 108 B) 60 C) 54 D) 42 E) NOTA

16. Bill is standing on top of a 100 foot tall building. He looks down and sees Ted at an angle of depression of 60 degrees. How far is Ted from the base of the building, assuming that Bill's height is ignored?

- A) 100 B) 200 C) $\frac{100\sqrt{3}}{3}$ D) $\frac{200\sqrt{3}}{3}$ E) *NOTA*

17. Given the statement "If John likes to cook, then Jack will go to the party.", what is the inverse of that statement?

- A) If John does not like to cook, then Jack will not go to the party.
B) If John does not like to cook, then Jack will go to the party.
C) If Jack will not go to the party, then John does not like to cook.
D) If Jack will go to the party, then John likes to cook.
E) *NOTA*

18. Find the number of degrees in the acute angle formed between the minute and the hour hand of the clock when it reads 11:08.

- A) 68 B) 70 C) 72 D) 74 E) *NOTA*

19. Two buildings of height 50 and 75 form a right angle with the ground. If two wires are stretched from the top of each building to the bottom of the other building, find the height above the ground where the wires cross.

- A) 20 B) 25 C) 30 D) 35 E) *NOTA*

20. Point E lies in the interior of rectangle ABCD. If $AE = 8$, $BE = 5$, and $CE = 3$, find the length of DE.

- A) 5 B) $4\sqrt{3}$ C) 6 D) $\sqrt{73}$ E) *NOTA*

21. Find the ratio of the area of an equilateral triangle with side length X to the area of an equilateral triangle with side length $(3\sqrt{2})X$.

- A) $\frac{1}{18}$ B) $\frac{\sqrt{2}}{6}$ C) $3\sqrt{2}$ D) 18 E) *NOTA*

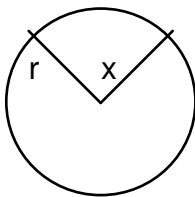
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22. Find the equation of the line perpendicular to the line $5x + 2y = 3$ through the point $(-3, 4)$ in slope intercept form.

- A) $y = \frac{-2}{5}x + \frac{14}{5}$ B) $y = \frac{2}{5}x - \frac{26}{5}$ C) $y = \frac{2}{5}x + \frac{14}{5}$ D) $y = \frac{2}{5}x + \frac{26}{5}$ E) *NOTA*

23. A sidewalk 6 feet wide surrounds a rectangular garden that measures 20 feet by 30 feet. Find the area of the sidewalk, in square feet.

- A) 336 B) 492 C) 552 D) 744 E) *NOTA*



24. Given the following sector with a radius of r and a central angle of x degrees. The area of the sector is $\frac{25\pi}{12}$ and the ratio of the arc length of the sector to the arc length of arc y is 1:11. Find the perimeter of the sector.

- A) $\frac{5\pi}{6}$ B) 10 C) $10 + \frac{5\pi}{6}$ D) $\frac{25\pi}{12}$ E) *NOTA*

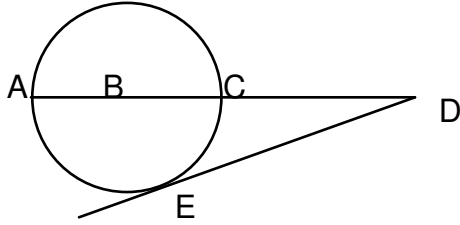
25. A square has a diagonal of length $14\sqrt{2}$. Find the ratio between the perimeter of the square and the area of the square.

- A) $\frac{2}{7}$ B) $\frac{7}{2}$ C) $\frac{2\sqrt{2}}{7}$ D) $\frac{7\sqrt{2}}{4}$ E) *NOTA*

26. In rectangle ABCD, diagonals AC and BD intersect at point E. If $\angle BAE = 42^\circ$, then $\angle BEC = ?$

- A) 42 B) 48 C) 84 D) 96 E) *NOTA*

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27.

The segment of the line DE is tangent to circle B at point E. AC is a diameter of circle B, $DE = 8$, $CD = 6$. Find the radius of circle B.

- A) 2 B) 3 C) $\frac{9}{2}$ D) $\frac{14}{3}$ E) *NOTA*

28. If two circles have exactly two points in common, the number of their common tangents is

- A) one B) two C) three D) four E) *NOTA*

29. Find the distance between the point $(4, -7)$ and the line $2x - 3y = 5$.

- A) $\frac{24\sqrt{65}}{65}$ B) $\frac{34\sqrt{13}}{13}$ C) $\frac{24\sqrt{13}}{13}$ D) $\frac{34\sqrt{65}}{65}$ E) *NOTA*

30. In a circle with radius 10 inches, a chord is 4 inches from the center. What is the length of the chord?

- A) $2\sqrt{29}$ B) $2\sqrt{21}$ C) $4\sqrt{29}$ D) $4\sqrt{21}$ E) *NOTA*