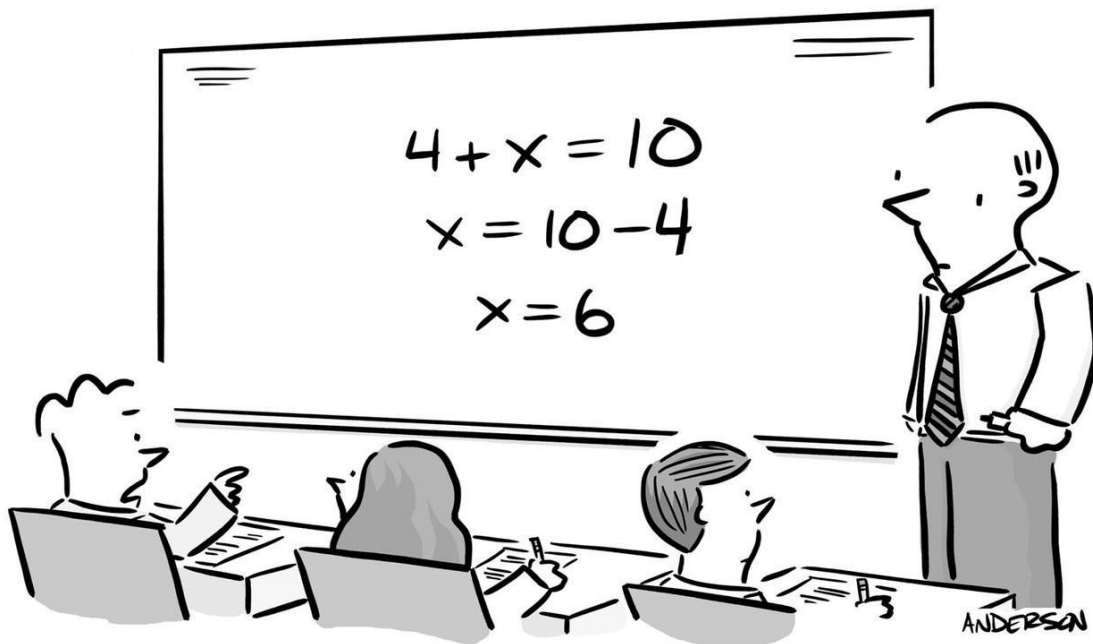


Fourteenth Annual PI Competition

Geometry Individual Test

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"Hold on. When we learned Roman numerals, X was 10. Now it's 6. What's going on around here?!"

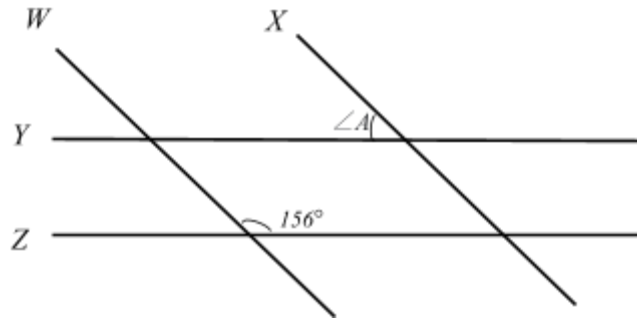
YOU WILL HAVE 60 MINUTES TO COMPLETE THIS TEST. THERE ARE 30 MULTIPLE CHOICE QUESTIONS. MARK YOUR ANSWER ON THE ANSWER SHEET. NO AIDS SUCH AS CALCULATORS, NOTES, BOOKS, ETC., MAY BE USED IN COMPLETING THIS TEST. ALL FRACTIONS MUST BE IN SIMPLEST FORM. THE CHOICE E. NOTA, DENOTES “NONE OF THE ABOVE.” IF NONE OF THE ANSWERS ARE CORRECT, CHOOSE E.

WATCH OUT FOR SILLY MISTAKES. REMEMBER THAT THESE QUESTIONS ARE MEANT TO BE CHALLENGING FOR EVEN THE TOP STUDENTS.

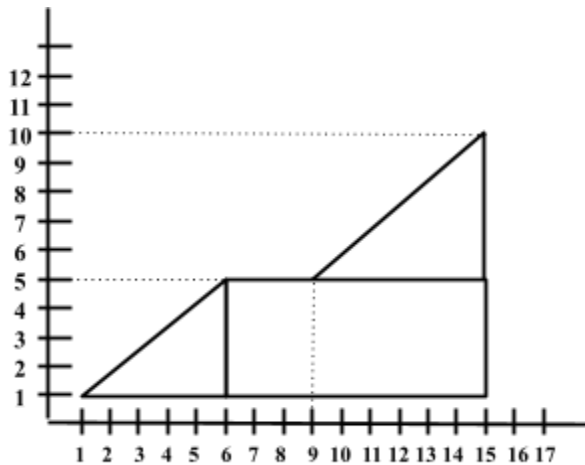
GOOD LUCK AND HAVE FUN!

1. If a right triangle has an angle of 34° , what is the combined angle measurement of its two other angles?
A. 120° B. 146° C. 131° D. 166° E. NOTA
2. Which polygon has an interior angle sum of 720° ?
A. Octagon B. Nonagon C. Hexagon D. Heptagon E. NOTA
3. A regular pentagon ABCDE has the coordinates of A at (2, 15). If the polygon is rotated 90° counterclockwise about the origin, what is the transformed coordinate of point A?
A. (15, -2) B. (-15, 2) C. (-15, -2) D. (2, -15) E. NOTA

4. Assume lines Y and Z are parallel and lines W and X are parallel. What is the measure of $\angle A$?

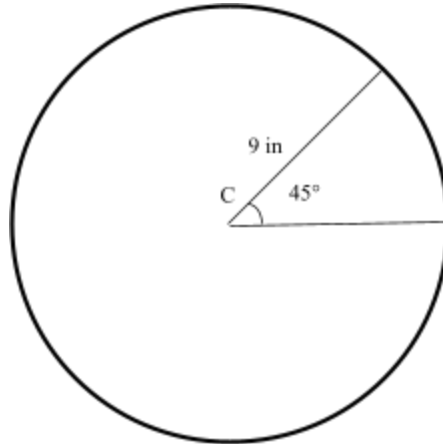


- A. 32° B. 24° C. 22° D. 36° E. NOTA
5. Megan decides to have a day at the beach with her friends. Kaylee decides to fly a kite with the diagonal lengths 4 ft and 7 ft. What is the area of Kaylee's kite?
- A. 12 ft B. 28 ft C. 18 ft D. 21 ft E. NOTA
6. Below is a diagram of farmer Dat's field. What is the area of Dat's field?



- A. 53.5 B. 57.0 C. 58.5 D. 61.0 E. NOTA
7. The exterior angle of a regular polygon is 22.5° . How many sides does this polygon have?
- A. 18 B. 20 C. 16 D. 22 E. NOTA

8. Assuming point C is at the center, what is the exact length of this circle's major arc?



- A. 13.5π in. B. 12 in. C. 9.0π in. D. 4.5π in. E. NOTA
9. What is the radius of the circle: $x^2 + 4x + y^2 - 8y = 5$?
- A. 25 B. 10 C. 2 D. 5 E. NOTA
10. What are the center coordinates of the circle: $x^2 + 4x + y^2 - 8y = 5$?
- A. (2, 4) B. (4, 2) C. (-4, 2) D. (-2, 4) E. NOTA
11. The area of a rectangle is 136 meters, while the perimeter is 50 meters. What is the difference between the longest side and the shortest side?
- A. 6 meters B. 8 meters C. 10 meters D. 12 meters E. NOTA
12. What is the midpoint of segment BC if B(6, 2) and C(-5, -1)?
- A. (3, 1) B. (1, 0.5) C. (0.5, 0.5) D. (0.5, 1) E. NOTA
13. A regular hexagon with side lengths of 4.5 is drawn inside of a circle such that all of the vertices of the hexagon touch the circle. What is the area of the circle?
- A. 20.25π B. 21.5π C. 28.75π D. 32.5π E. NOTA

14. Right triangle XYZ has side lengths $XY = 7$, $YZ = 25$, and $XZ = 24$. What is the cosecant $\angle XYZ$?
- A. $25/7$ B. $24/7$ C. $25/24$ D. $24/25$ E. NOTA
15. Ethan has a square pool with an area of 64 ft and he swims from the top left corner to the bottom right corner. How far does he swim? (*In simplest radical form*)
- A. $4\sqrt{3}$ B. $5\sqrt{2}$ C. $8\sqrt{2}$ D. $9\sqrt{5}$ E. NOTA
16. If ABCD is a parallelogram and $AB = CD$, what is the first step in the proof that $\angle ABC = \angle CDA$?
- A. Find BC via “What are supplementary angles”?
- B. Find AD via “What are supplementary angles”?
- C. Find $\angle ABC$ via “What is a parallelogram”?
- D. Find $\angle BCD$ via “What is a parallelogram”?
- E. NOTA
17. Julia has a plate with a circumference of 36π inches while Abdullah has a plate with an area of 81π inches. Who has the larger plate and what is the radius of the plate?
- A. Abdullah; 15 in. B. Julia; 12 in. C. Abdullah, 9 in.
- D. Julia; 18 in. E. NOTA
18. What is the volume of a cone with a base radius of 4 in. and height of 3 in.?
- A. $16\pi \text{ in.}^3$ B. $18\pi \text{ in.}^3$ C. $22\pi \text{ in.}^3$ D. $24\pi \text{ in.}^3$ E. NOTA
19. Pythagorean Triples satisfy the Pythagorean Theorem. Which of the following is not a Pythagorean Triple?
- A. 3, 4, 5 B. 6, 7, 9 C. 5, 12, 13 D. 6, 8, 10 E. NOTA

20. Which of the following is NOT a property of congruent triangles?
- A. The perimeters of both triangles are always equal.
 - B. Congruent triangles are never obtuse.
 - C. The interior angles of both triangles are congruent.
 - D. The triangles will coincide if they are repositioned.
 - E. NOTA
21. Emi is looking for her magic paintbrush that is located at $(5, 3, 8)$. Thanks to her magic shoes, she begins with a head start at $(3, 1, 7)$. How far will she need to travel?
- A. 4 units
 - B. 2 units
 - C. 5 units
 - D. 3 units
 - E. NOTA
22. At a party hosted by Skylar, a large tank of soda has a height of 6 feet and a diameter of 4 feet. The party-goers drank $\frac{1}{3}$ of the soda. How much soda was left once the party was over?
- A. $4\pi \text{ ft}^3$
 - B. $8\pi \text{ ft}^3$
 - C. $12\pi \text{ ft}^3$
 - D. $16\pi \text{ ft}^3$
 - E. NOTA
23. How many sides are on a dodecagon?
- A. 12
 - B. 10
 - C. 8
 - D. 6
 - E. NOTA
24. Which statement is the contrapositive of: “If I am happy, I am doing math”?
- A. If I am doing math, then I am happy.
 - B. If I am not doing math, then I am not happy.
 - C. If I am not happy, then I am not doing math.
 - D. If I am not happy, then I am doing math.
 - E. NOTA

25. The shape of Tiara's room is a trapezoid with parallel walls of 4 ft and 8 ft. The distance between these walls is 48 inches. If she were to expand her room by adding a square closet with walls four feet long, what would be the size of her room?

- A. 20 ft^2 B. 30 ft^2 C. 40 ft^2 D. 50 ft^2 E. NOTA

26. If an isosceles triangle has a unique angle of 35° , what is the difference between its two other angles?

- A. 15° B. 20° C. 5° D. 0° E. NOTA

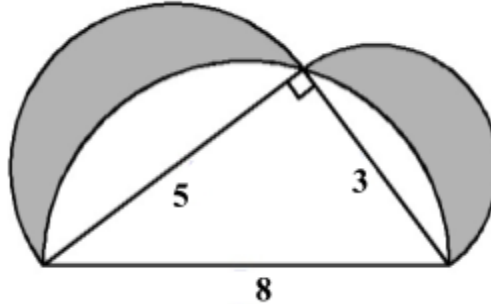
27. Which statement is the inverse of: "If I watch anime, I eat fries"?

- A. If I do not watch anime, I eat fries.
B. If I eat fries, I watch anime.
C. If I do not eat fries, I do not watch anime.
D. If I eat fries, I do not watch anime.
E. NOTA

28. The face of Timmy's spaceship is a triangle that has a side length of 7 cm with angles that have cosines that are all $\frac{1}{2}$. What is the perimeter of the face of Timmy's spaceship?

- A. 15 cm B. 24 cm C. 21 cm D. 27 cm E. NOTA

29. Consider the figure below. What is the approximate area of the largest semi-circle without the inclusion of the triangle rounded to the nearest whole number?



- A. 16 B. 6 C. 10 D. 9 E. NOTA
30. Congratulations! You have reached the last question. What is the equation of a circle with the center (2, 5) and radius 5?

- A. $(x - 2)^2 + (y - 5)^2 = 25$
- B. $(x - 2)^2 + (y - 5)^2 = 5$
- C. $(x + 2)^2 - (y + 5)^2 = 25$
- D. $(x + 2)^2 - (y + 5)^2 = 5$
- E. NOTA