

20



GAITHER/LETO INVITATIONAL GEOMETRY INDIVIDUAL

January 27, 1996

1. $\frac{x+1}{x-2} = 3$. Solve for x.

- a. $\frac{7}{2}$ b. $\frac{3}{2}$ c. $-\frac{5}{2}$ d. $-\frac{7}{2}$ e. NOTA

2. The intersection of the medians of a triangle is a point called the

- a. centroid b. orthocenter c. incenter d. circumcenter e. NOTA

3. The number of diagonals of a regular heptagon is

- a. 9 b. 14 c. 20 d. 28 e. NOTA

4. Factor completely: $2x+xy-y-2$

- a. $(x+1)(y+2)$ b. $(x+1)(y-2)$ c. $(x-1)(y+2)$ d. $(x-1)(y-2)$ e. NOTA

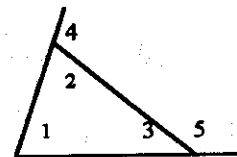
5. Given that 1 and 5 are the first two pentagonal numbers, what is the 5th pentagonal number?

- a. 17 b. 20 c. 22 d. 35 e. NOTA

6. A tessellation is an arrangement of polygons that covers a plane without overlapping or leaving holes. Which of the following regular polygons, if used exclusively, can NOT form a tessellation?

- a. triangle b. square c. hexagon d. octagon e. NOTA

7. Given the diagram, which of the following expressions is equal to $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 + m\angle 5$?



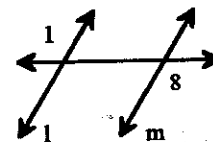
- a. $3(m\angle 1) + 2(m\angle 2) + m\angle 3$ b. $m\angle 1 + 2(m\angle 2) + 2(m\angle 3)$ c. $360^\circ + m\angle 1$
d. cannot be determined e. NOTA

8. Tickets to a local play cost \$15.00 for good seats and \$8.50 for other seats. If 24 more \$8.50 tickets than \$15.00 tickets were purchased, and the total spent on tickets was \$1050.00, how many total tickets were purchased?

- a. 60 b. 96 c. 104 d. 112 e. NOTA

9. If $m\angle 1 = 10x^2 - 5x + 1$ and $m\angle 8 = 2x^2 + x + 10$, what values of x will make $l \parallel m$?

- a. $\{\frac{3}{2}, \frac{3}{4}\}$ b. $\{-\frac{3}{2}, \frac{3}{4}\}$ c. $\{-\frac{3}{2}, -\frac{3}{4}\}$ d. $\{\frac{3}{2}, -\frac{3}{4}\}$ e. NOTA



10. Which of the following is the best description of the triangle with vertices (1,5); (3,8); and (0,10)?

- a. obtuse b. scalene c. isosceles d. right e. right isosceles

11. Dave has taken five tests, earning scores of 83, 91, 79, 89, and 94. What score does he need on the next test to have an 80 average, assuming all tests carry equal weight?

- a. 44 b. 54 c. 64 d. 74 e. NOTA

12. Solve $(x-3)^2 = 24$.

- a. 7.9 b. $3 + 2\sqrt{6}$ c. $2\sqrt{6}$ d. 8 e. NOTA

13. The area of an equilateral triangle with side of length s has _____ the area of an equilateral triangle with side $3s$.

- a. one third b. one sixth c. one ninth d. one twenty-seventh e. NOTA

14. "If $AB > AC$ and $AC > BC$, then $AB > BC$ " is an example of which of the following?

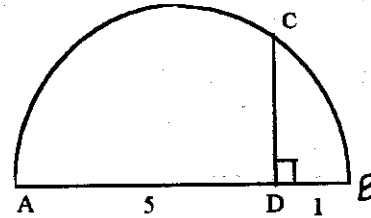
- a. reflexive property b. symmetric property c. transitive property
d. equivalence relation e. NOTA

15. What is the perimeter of a triangle with vertices at (2,4); (-1,0); and (1,5)?

- a. $5 + \sqrt{29} + \sqrt{2}$ b. $6 + \sqrt{29}$ c. $5 + \sqrt{31}$ d. 11 e. NOTA

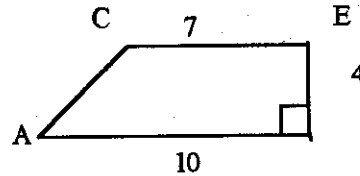
16. Given ACB is a semicircle. What is the length of \overline{CD} ?

- a. $\frac{5}{2}$ b. $\sqrt{5}$ c. $\sqrt{6}$ d. 4 e. NOTA



17. What is the area of the following trapezoid?

- a. 30 b. 34 c. 36 d. 42 e. NOTA

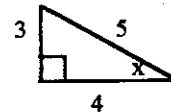


18. What is the sum of all values of x which satisfy $x + 2 = \sqrt{28 + 2x}$?

- a. -2 b. 4 c. 10 d. 24 e. NOTA

19. Find the value of $\sin x + \cos x + \tan x$.

- a. $\frac{11}{3}$ b. $\frac{51}{12}$ c. $\frac{41}{15}$ d. $\frac{43}{20}$ e. NOTA



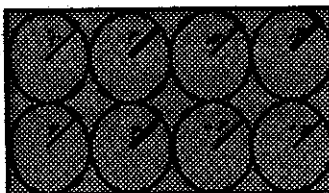
20. If x varies directly as y and z and inversely as the square root of w . If $x = 10$ when $y = 2$, $z = 3$, and $w = 9$, what is x when $y = 5$, $z = 4$, and $w = 25$?

- a. 5 b. 12 c. 20 d. 24 e. NOTA

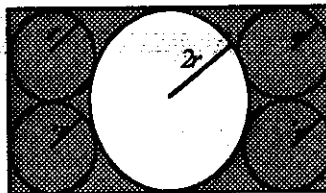
21. Dorothy is standing on top of a building 300 feet tall that rises vertically from the ground. She sees Bill on the ground, and then angle of depression to Bill is 45° . How many feet is Bill from the building?

- a. 100 b. 150 c. 200 d. 300 e. NOTA

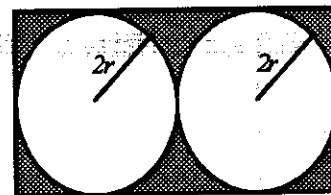
22. Which of the following has shaded area equal to $8r^2(4 - \pi)$? All of the smaller circles have radius r and the larger circles have radius $2r$. All circles are tangent to each other and bordered by a rectangle.



i



ii



iii

- a. i only b. ii and iii only c. i, ii, and iii d. iii only e. NOTA

23. The statement $\sim p \rightarrow \sim q$ is the _____ of the statement $p \rightarrow q$.

- a. inverse b. converse c. contrapositive d. negation e. NOTA

24. Given 100 points in a plane, no three of which are collinear. How many distinct lines can be drawn connecting any two points?

- a. 99 b. 100 c. 200 d. 4950 e. NOTA

25. Evaluate the following for $b = -2$: $(-6b)(-b^3)(-b^2)$

- a. -384 b. -288 c. 288 d. 384 e. NOTA

26. $\frac{\frac{2}{5}}{\frac{1}{3}} + \frac{\frac{3}{4}}{\frac{2}{7}} = \frac{m}{n}$, a fraction in lowest terms. What is $m + n$?

- a. 163 b. 193 c. 243 d. 283 e. NOTA

27. Hose 1 can fill an empty pool in 6 hours, hose 2 can fill an empty pool in 5 hours, and a drain can empty a full pool in 8 hours. If all are working simultaneously, how long (to the nearest minute) would it take to fill an empty pool?

- a. 4 hours 4 minutes b. 4 hours 8 minutes c. 4 hours 13 minutes
d. The pool would never fill e. NOTA

28. A goat is tied to the corner of a square barn of side length 10 m by a rope of length 12 m. What is the total grazing area of the goat?

- a. $108 \pi \text{ m}^2$ b. $110 \pi \text{ m}^2$ c. $112 \pi \text{ m}^2$ d. $114 \pi \text{ m}^2$ e. NOTA

29. Which of the following is NOT a true statement?

- a. A rhombus may be a rectangle. b. A parallelogram may be a rhombus.
c. A square is a rectangle. d. A square is a rhombus. e. NOTA

30. Consider the Cartesian plane and the area bounded by the lines $y = 2$, $y = -2$, $x = 3$, $x = 1$. The area bounded by $|x| + |y| = 1$ is what fraction of the area bounded by the four lines?

- a. $\frac{1}{8}$ b. $\frac{\sqrt{2}}{8}$ c. $\frac{1}{4}$ d. $\frac{\sqrt{2}}{4}$ e. NOTA