OU Math Day 2008

Geometry Test

---

1. The ratio of two adjacent sides of a rectangle equals 2. If one of the sides has length 5 what is the area of the rectangle?

   (A) 25 or 25/4 (B) 100 (C) 25π (D) 50 or 25/2 (E) None of the above

---

2. A circle has a diameter of 6. What is its area?

   (A) 6π (B) 9π (C) 12π (D) 36π (E) None of the above

---

3. 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) All of the above (E) None of the above

---

4. What is the radian measure of the interior angle of a regular hexagon?

   (A) $\pi/3$ (B) $2\pi/3$ (C) $\pi/6$ (D) $5\pi/6$ (E) None of the above

---

5. 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) 2/7 (B) 7/4 (C) $2\sqrt{2}/7$ (D) $7\sqrt{2}/4$ (E) None of the above

---

6. Which of the following is not true?

(A) a rhombus is a quadrilateral (B) at least two interior angles of a triangle are acute
(C) a pentagon has five sides (D) an isoceles triangle has two sides with the same length
(E) None of the above

---

7. The surface area of a cube is 24. What is the side length of the cube?

(A) $\sqrt{2}$ (B) 8 (C) 1 (D) 2 (E) None of the above

---

8. The surface area of a cube is 24. What is the volume of the cube?

(A) $\sqrt{2}$ (B) 8 (C) 1 (D) 2 (E) None of the above

---

9. A triangle has vertices at $(1, 1)$, $(3, 1)$, and $(3, 7)$. What is its area?

(A) 6 (B) 8 (C) 10 (D) 12 (E) None of the above

---

10. The area of the annular region between two concentric circles is 825π and the radius of the smaller circle is 4. Find the diameter of the larger circle.

(A) 56 (B) 58 (C) 62 (D) 72 (E) None of the above

---

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

(A) $15\sqrt{7}/4$ (B) 180 (C) 360 (D) $135\sqrt{7}$ (E) None of the above

---

12. The length of two sides in a right triangle are 5 and 12. Which of the following is a possible length for the third side?

(A) 11 (B) 169 (C) 10 (D) $\sqrt{119}$ (E) None of the above

---

13. In a circle with radius 10, the distance from the center to a chord is 4. What is the length of the cord?

(A) $2\sqrt{29}$ (B) $2\sqrt{21}$ (C) $4\sqrt{29}$ (D) $4\sqrt{21}$ (E) None of the above

---

14. A parallelogram has two sides with length 3 and two sides with length 7. What is the sum of all four interior angles of the parallelogram?

(A) 180° (B) 360° (C) 540° (D) 720° (E) None of the above

---

15. Among all parallelograms having two sides with length 3 and two sides with length 7, what is the largest possible area?

(A) 21 (B) 30 (C) $21\sqrt{2}$ (D) $7\sqrt{3}$ (E) None of the above

---

16. In Euclidean planar geometry, which of the following statements are true?

I. *Given two distinct points there is exactly one line which contains both points.*

II. *Given two distinct points there is exactly one circle which contains both points.*

III. *Given a circle $\mathcal{C}$ and a point P not on $\mathcal{C}$, there is a line through P tangent to $\mathcal{C}$.*

(A) I only (B) I & II only (C) I & III only (D) I, II & III (E) None of the above

---

17. How many different values of y are there for which $(1, -2)$, $(4, 1)$ and $(10, y)$ are the vertices of a right triangle?

(A) 1 (B) 2 (C) 3 (D) 4 (E) None of the above

---

18. Find the length of an altitude in an equilateral triangle with a perimeter of 60 inches.

(A) $10\sqrt{3}$ (B) 10 (C) 20 (D) $10\sqrt{5}$ (E) None of the above

---

19. Find the area of an equilateral triangle with a perimeter of 60 inches.

(A) $100\sqrt{5}$ (B) 200 (C) 100 (D) $100\sqrt{3}$ (E) None of the above

---

20. The six faces of a solid rectangular box have areas equal to 12, 18 and 24 inches (each repeated twice). What is the volume of the box?

(A) 108 (B) 144 (C) 72 (D) 5184 (E) None of the above

---

21. Which of the following do not necessarily determine a unique plane in space?

(A) two distinct parallel lines
(B) three distinct points
(C) a line and a point not on the line
(D) two lines which intersect in one point
(E) None of the above
