OU Math Day 2012

Geometry Test

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1. The side lengths of a triangle are 28, 35 and 43. 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

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2. What is the distance between a pair of diametrically opposite vertices in a cube whose side length is 4?

   (A) $2\sqrt{3}$ (B) $4\sqrt{2}$ (C) $4\sqrt{3}$ (D) $2\sqrt{2}$ (E) None of the above.

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3. A rectangle has an area of 196 square inches and one side is four times longer than another. What is the perimeter of the rectangle?

   (A) 14 *in* (B) 8π *in* (C) 70 *in* (D) 35 *in* (E) None of the above.

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4. What is the area of an equilateral triangle whose perimeter is 12?

   (A) $4\sqrt{3}$ (B) $36\sqrt{3}$ (C) $6\sqrt{3}$ (D) $12\sqrt{3}$ (E) None of the above.

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5. Four of the interior angles of a pentagon have measures 110°, 120°, 130° and 140°. What is the measure of the fifth angle?

   (A) 5° (B) 10° (C) 20° (D) 40° (E) None of the above.

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6. Which of the following can be the intersection of two planes in space?

   I. *A Point* II. *A Line* III. *A Plane*

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

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7. A piece of cardboard is shaped like a right triangle with legs of length a and b inches. A square is cut out of the cardboard such that one right angle coincides with the right angle of the triangle and the opposite vertex lies on the hypotenuse. Find the side length of the square.

(A) $\frac{a+b}{2}$ (B) $\frac{ab}{a+b}$ (C) ab (D) $|a-b|$ (E) None of the above

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8. The number of edges in an heptagon is

(A) 5 (B) 6 (C) 8 (D) 9 (E) None of the above.

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9. 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

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10. Let ABCD be a square as pictured below. Let E, F and G be the midpoints of edges AD, AB and CD respectively. Determine the area of the triangle EFG if the length of AB is 8.

(A) 16 (B) 8 (C) 36 (D) 32 (E) None of the above.

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11. What is area of the largest rectangle which fits inside a circle whose diameter is 10 cm given that the length of the rectangle is five times its width ?

(A) 50 cm^2 (B) 25/3 cm^2 (C) 10 cm^2 (D) 250/13 cm^2 (E) None of the above.

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12. If a triangle is acute, which of the following conditions are satisfied?

I. *All internal angles are less than* $90°$.

II. *Exactly one internal angle is larger than* $90°$.

III. *The sum of all three internal angles is* $180°$.

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

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13. A can is made out of a right circular cylinder with height h and radius 5, and circular top and bottom pieces with radius 5. If the surface area of the can is 120π then what must h equal?

(A) 12 (B) 8 (C) 7 (D) 9.5 (E) None of the above.

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14. 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

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15. 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

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16. Two rectangles $\mathcal{R}_1$ and $\mathcal{R}_2$ are similar. The larger rectangle $\mathcal{R}_1$ has area 72 and one side of length 6, and the smaller rectangle $\mathcal{R}_2$ has one side of length 10. What is the area of $\mathcal{R}_2$?

(A) 12 (B) 50 (C) 60 (D) 200 (E) None of the above

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17. The hypotenuse of an isoceles right triangle has length 20 inches. What is the length in inches of one of the other sides of the triangle?

(A) 10 (B) $10\sqrt{2}$ (C) $20\sqrt{\pi}$ (D) $5\sqrt{2}$ (E) None of the above.

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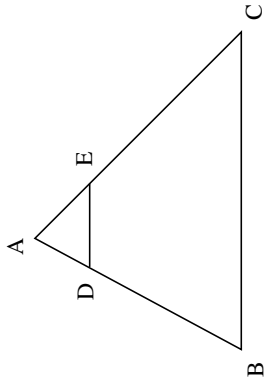
18. In the figure below, the length of EC is 12 cm and the length of AE is 2 cm. If AB has length 11 cm what is the length of AD?

(A) 1.9 cm (B) 11/6 cm (C) 11/7 cm (D) 12/7 cm (E) None of the above.



19. Let $\mathcal{C}$ be a circle and let P and Q be distinct points on $\mathcal{C}$. How many points on $\mathcal{C}$ are equidistant from P and Q?

(A) 0 (B) 1 (C) 2 (D) 4 (E) None of the above.

20. Which of the following conditions on a quadrilateral Q guarantee that Q is a parallelogram?

I. *Both pairs of opposite sides have the same length.*

II. *There is a pair of opposite sides of the same length, and also a pair of opposite sides that are parallel.*

III. *Both pairs of opposite angles are congruent.*

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

21. A circle has an area of 144 square inches. What is its circumference?

(A) $12\sqrt{\pi}$ in (B) 12π in (C) $24\sqrt{\pi}$ in (D) 48π in (E) None of the above.

22. 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

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