OU Math Day 2015

Geometry Test

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1. How many diagonals does a regular hexagon have?

   (A) 6 (B) 8 (C) 9 (D) 10 (E) None of the above.

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2. A circle of radius R has twice the area of the circle of radius 10. What is R?

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

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3. If a right triangle has legs of length 4 and 8 centimeters then its hypotenuse has length

   (A) $4\sqrt{3}$ cm (B) 12 cm (C) $4\sqrt{5}$ cm (D) 4 cm (E) None of the above.

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4. P is the midpoint of the segment AB where $A = (3, -1)$ and $B = (7, 3)$. What are the coordinates of the midpoint of the segment AP?

   (A) $(5, 1)$ (B) $(2.5, .5)$ (C) $(4, 0)$ (D) $(6, 2)$ (E) None of the above.

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5. A square is inscribed in a circle of radius $\sqrt{2}/2$. What is the area of the square?

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

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6. A rectangle has an area of 360 square meters and one side is ten times longer than another. What is the perimeter of the rectangle?

   (A) 132 m (B) 36π m (C) 66 m (D) 64 m (E) None of the above.

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7. How many square faces does a cube have?

(A) 6 (B) 4 (C) 12 (D) 8 (E) None of the above.

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8. How many edges does a cube have?

(A) 6 (B) 4 (C) 12 (D) 8 (E) None of the above.

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9. The side lengths of a triangle T are 6, 8 and 13. Which of the following is true?

(A) T is a right triangle.

(B) T is an acute triangle.

(C) T is an isoceles triangle.

(D) T is an equilateral triangle.

(E) None of the above.

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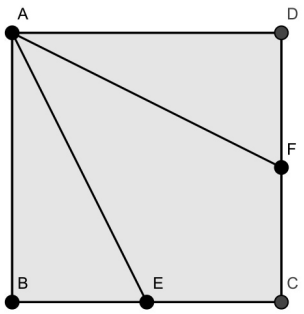
10. In the figure below $ABCD$ is a square of side length 4, E is the midpoint of BC, and F is the midpoint of CD. What is the area of the quadrilateral $AECF$?

(A) 16 (B) 8 (C) 4 (D) 2 (E) None of the above.



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11. In the figure above what is the length of the segment AE?

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

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12. What is the maximum number of points of intersection that a triangle and a square can have if no side of the triangle is parallel to a side of the square?

(A) 4 (B) 6 (C) 8 (D) 10 (E) None of the above

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13. A triangle has a side of length 12 centimeters, and a side of length 9 centimeters. How many integral values are possible for the length, measured in centimeters, of the third side?

(A) 16 (B) 17 (C) 18 (D) 19 (E) None of the above.

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14. Three points P, Q and R lie on a line. Suppose that PQ has length 7, QR has length 4, and PR has length d. There is more than one possible value for d. What is the product of all these possible values?

(A) 33 (B) 28 (C) 7 (D) 4 (E) None of the above.

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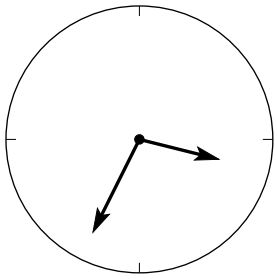
15. What is the degree measure of the smaller angle between the two hands of a clock when the time is 3:36 PM? (Note: the picture is not drawn to scale.)

(A) 90° (B) 108° (C) 116° (D) 126° (E) None of the above.



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16. An isoceles triangle Δ has a base with length 20 and area 240. What are the side lengths of Δ?

(A) 20, 26, and 26 (B) 20, 24, and $4\sqrt{61}$ (C) 20, 20 and 28
(D) 20, $4\sqrt{61}$, and $4\sqrt{61}$ (E) None of the above.

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17. Which of the following statements are true?

I. *For any two lines in space there is a plane containing both lines.*

II. *For any two parallel lines in space there is a plane containing both lines.*

III. *For any two intersecting lines in space there is a plane containing both lines.*

(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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18. A triangle has vertices at $(-1, 0)$, $(7, 0)$, and $(2, 5)$. What is its area?

(A) 20 (B) 8 (C) 15 (D) 40 (E) None of the above

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19. What is the distance between two diametrically opposite vertices in a cube whose side length is 5?

(A) $5\sqrt{3}/2$ (B) $5\sqrt{2}$ (C) $5\sqrt{3}$ (D) $5\sqrt{2}/2$ (E) None of the above.

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20. An automobile has wheels with a radius 13 inches. If it moves a distance down a street so that the wheels go through 60 complete rotations then how far has the automobile travelled?

(A) 780π feet (B) 60 feet (C) 130π feet (D) 720 feet (E) None of the above.

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21. Which of the following is not true?

(A) a parallelogram is a quadrilateral
(B) at least two interior angles of a triangle are acute
(C) a trapezoid has two parallel sides
(D) the sum of the interior angles of a triangle is 180°
(E) the two diagonals of a rhombus have the same length

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22. Two rectangles $\mathcal{R}_1$ and $\mathcal{R}_2$ are similar. The larger rectangle $\mathcal{R}_1$ has sides of length 6 and 12, 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
