OU Math Day 2002

GEOMETRY TEST

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1. If the diagonal of a square has length 1, what is the area of the square?

   (A) $\sqrt{2}$ (B) 1 (C) 1/2 (D) 3/4 (E) None of the above.

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2. Two sides of a non-degenerate triangle have lengths 5 and 7. Which one of the following could be the length of the third side?

   (A) 1 (B) 2 (C) 3 (D) 100 (E) None of the above.

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3. A restaurant prices their pizzas proportionally to the area of the pizza. If a pizza 60 centimeters in diameter costs \$20.00, how much would a pizza 45 centimeters in diameter cost?

   (A) \$8.75 (B) \$11.25 (C) \$15.00 (D) \$10.00 (E) None of the above.

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4. If the vertex angle of an isoceles triangle is $40°$, then what is the degree measure of the two base angles?

   (A) $30°$ (B) $45°$ (C) $70°$ (D) $80°$ (E) None of the above.

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

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

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

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

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7. The area of a circle whose circumference is 6 is:

   (A) $9/\pi$ (B) 36 (C) 3π (D) 12 (E) None of the above.

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8. If the area of an equilateral triangle is $\sqrt{3}$, then what is the length of its side?

   (A) 3 (B) $\sqrt{2}$ (C) 1 (D) 2 (E) None of the above.

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9. 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.

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10. A rectangle has width x and length $x + 4$. What is its perimeter?

    (A) $4(x + 2)$ (B) $2(x + 2)$ (C) $4x$ (D) $\pi(x + 2)^2$ (E) None of the above.

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11. A right triangle has a leg of length 10 cm and another of length 24 cm. What is the length of the hypotenuse?

    (A) 18 cm (B) 25 cm (C) 26 cm (D) 30 cm (E) None of the above.

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12. If a triangle is obtuse, 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) II & III (D) III only (E) None of the above.

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13. A circle has area 8. What is its diameter?

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

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14. What is the voume of a rectangular box with length 6, width 5 and height 3?

    (A) 120 (B) 90 (C) 120 (D) 126 (E) None of the above.

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15. What is the surface area of a rectangular box with length 6, width 5 and height 3?

    (A) 120 (B) 90 (C) 120 (D) 126 (E) None of the above.

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16. 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.

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

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

II. *Given a line A and a point B not on line A, there is exactly one line through B perpendicular to A.*

III. *Given a line A and a point B not on line A, there is exactly one line through B parallel to A.*

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

18. A non-degenerate triangle has a side of length 12 meters and a side of length 9 meters. How many integral values are possible for the length, measured in meters, of the third side?

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

19. How many values of k exist such that $(-1, 2)$, $(-10, 5)$ and $(-4, k)$ are the vertices of a right triangle?

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

20. A pioneer is headed home from town, but must stop at the river along the way to get water. If the river runs east-west 24 miles north of the town, and the pioneer's home is 12 miles west and 8 miles north of the town, what is the shortest distance, in miles, the pioneer can travel?

(A) $4\sqrt{109}$ mi (B) $15\sqrt{7}$ mi (C) $5\sqrt{95}$ mi (D) $4\sqrt{13}$ mi (E) None of the above.