OU Math Day 2008

Algebra 1 Test

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1. On a long drive, a motorist averages a speed of 55 miles per hour for the first 2 hours and 60 miles per hour for the last 4 hours. How far does the motorist travel?

   (A) 320 miles (B) 330 miles (C) 340 miles (D) 350 miles (E) None of the above

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2. If $21 - 4y = 3$ then what does y equal?

   (A) $19/4$ (B) $-19/4$ (C) $-9/2$ (D) $9/2$ (E) None of the above

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3. Factor $18x^2 - 9x - 20$ into the form $(Ax + B)(Cx + D)$. What is the value of $A + B + C + D$?

   (A) 0 (B) 4 (C) 6 (D) 10 (E) None of the above

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4. How many odd integers are there between 101 and 1001 inclusive?

   (A) 200 (B) 449 (C) 450 (D) 451 (E) None of the above

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5. There are 32 different combinations of how five voters can vote either YES or NO on an issue. In how many of these combinations are there 3 YES and 2 NO votes?

   (A) 6 (B) 10 (C) 15 (D) 16 (E) None of the above

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6. If the cube root of $A - 5$ equals -2 then what is A?

   (A) 9 (B) -2 (C) -3 (D) -13 (E) None of the above

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7. The rule of arithmetic that asserts that $a+b = b+a$ for all numbers a and b is called the

(A) law of the additive inverse (B) associative law for multiplication
(C) commutative law for addition (D) distributive law (E) None of the above

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8. If $x = 5$, $y = 2$ and $z = 3$ then $\dfrac{(2y-z)^3+y^3}{(2x-z+y)^3}$ equals

(A) 1/729 (B) 7/729 (C) 1/81 (D) 9/125 (E) None of the above

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9. On a math test all but 5 students in a class made an A, all but 6 students made a B, all but 7 students made a C, and no student had a grade lower than C. How many students are in the class?

(A) 7 (B) 9 (C) 11 (D) 15 (E) None of the above

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10. Determine the value of $3x-4y$ given that

$$x-2(1-3x) = 6+3(4-x) \quad \text{and} \quad \frac{3y+1}{3y-1} = \frac{2y+1}{2y-3}.$$

(A) 7 (B) 2 (C) 1/2 (D) 4 (E) None of the above

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11. The equation $x^5(x+5)(x^2-12)(x^2-9)^3(x-7)^2 = 0$ has seven distinct real solutions. What is the sum of all seven of these solutions?

(A) 0 (B) $2\sqrt{2}$ (C) $-2\sqrt{2}$ (D) 2 (E) None of the above

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12. Which of these numbers is smallest?

(A) .000001 (B) 2/3 (C) $(2/3)^{100}$ (D) $(2/3)^{-100}$ (E) 1/33

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13. Two years ago Sarah invested \$1000 in a company's stock. The company had a difficult year and its stock decreased by 10%, however the following year it rebounded and the stock grew by 20%. At the end of the two years how much was Susan's investment worth?

(A) \$1040 (B) \$1080 (C) \$1100 (D) \$1200 (E) None of the above

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14. If $x = 2.999$ what whole number is nearest to the value of $\dfrac{2x^2 - 9x + 9}{x - 3}$?

(A) 0 (B) 3 (C) 6 (D) 9 (E) None of the above

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15. Find the greatest common factor of 180 and $1,386$

(A) $5,220$ (B) 36 (C) 18 (D) 9 (E) None of the above

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16. Solve for x: $\dfrac{3}{x-5} + \dfrac{1}{x+5} = \dfrac{2}{x^2-25}$

(A) $x = -2$ (B) $x = 5$ (C) $x = 1$ (D) $x = 3$ (E) None of the above

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17. What is the remainder when

$$1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2 + 7^2 + 8^2 + 9^2 + 10^2$$

is divided by 5?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

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18. Let $f(x) = 9x^7 + 3x^5 - 6$. Which of the following is a solution of $f(x) = 0$?

(A) -1 (B) $1/3$ (C) $2/3$ (D) 9 (E) None of the above

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19. Find the sum of all of the integer solutions of the inequality $|5 - 3x| < 10$.

(A) 0 (B) 7 (C) 9 (D) 13 (E) None of the above

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20. The sum of two numbers is 21. One number is four more than the other. What are the numbers?

(A) 6 and 15 (B) 8 and 13 (C) 25/3 and 37/3
(D) 17/2 and 25/2 (E) None of the above

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21. The sum of the first N positive integers $1 + 2 + \cdots + N$ equals 66. What is N?

(A) 8 (B) 11 (C) 14 (D) 20 (E) None of the above

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22. What are the solutions of the equation $2x^2 + 20x + 42 = 0$?

(A) $x = 3$ and $x = 7$ (B) $x = -1$ and $x = -2$ (C) $x = -3$ and $x = -7$
(D) $x = -4$ and $x = 6$ (E) None of the above

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23. How many of the first 1000 positive integers are divisible by all of the numbers 3, 4, 5, and 10?

(A) 14 (B) 15 (C) 16 (D) 17 (E) None of the above
