OU Math Day 2012

Algebra 1 Test

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1. Simplify the expression $\dfrac{4-(7-(-9))}{3(-2+4)}$

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

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2. What is the value of $x^3 - 2x^2 - 3x$ when $x = -1$?

   (A) -3 (B) -1 (C) 0 (D) 1 (E) None of the above

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3. Of the integers listed below which is closest in value to the cube of 2012?

   (A) 8000000 (B) 80000000 (C) 800000000 (D) 8000000000 (E) 8000000000000

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4. Of the integers listed below which is closest in value to the cube root of 2012?

   (A) 24 (B) 20 (C) 17 (D) 13 (E) 10

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5. In a 45 minute run, a jogger runs for 30 minutes at a rate of 5 miles per hour and for the remaining 15 minutes she averages 6 miles per hour. What is the average rate of speed in miles per hour for the entire run?

   (A) 5.5 mph (B) 5.4 mph (C) $5.\overline{3}$ mph (D) 5.25 mph (E) None of the above

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6. When multiplied out $(3a + 22b)(3a - 2b)$ equals:

   (A) $9a^2 + 60ab - 44b^2$ (B) $6a^2 - 41ab + 44b^2$ (C) $6a^2 + 41ab - 44b^2$
   (D) $6a^2 + 25ab - 44b^2$ (E) None of the above

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7. The equation $x^5(x+3)(x^2-12)^5(x^2-9)^2(x-9)^2 = 0$ 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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8. Which of the following is **NOT** equal to $\frac{5}{20} + \frac{6}{15}$?

(A) $\frac{1}{3} + \frac{19}{60}$ (B) $\frac{1}{2} + \frac{3}{20}$ (C) $\frac{5}{4} - \frac{3}{5}$ (D) $\frac{11}{20} - \frac{1}{10}$ (E) None of the above

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9. On a certain math test the scores of 9 of the 10 students who took the test were

$$85, 84, 69, 91, 80, 77, 92, 96, \text{ and } 76 .$$

If the mean score for all ten students was 83, what grade did the tenth student make?

(A) 80 (B) 83 (C) 90 (D) 84 (E) None of the above

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10. If $A = 8,000,000$ which of the following equals $A^{-2/3}$?

(A) .000025 (B) .005 (C) 200 (D) 250000 (E) None of the above

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11. Which of the following equations expresses the *associative law for multiplication*?

(A) $a + b = b + a$ (B) $(a + b) + c = a + (b + c)$ (C) $a(b + c) = ab + ac$
(D) $a(bc) = (ab)c$ (E) None of the above

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12. If $4 + 17p = -30$ then what does p equal?

(A) $-26/17$ (B) -2 (C) 2 (D) $30/17$ (E) None of the above

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13. The average of two positive numbers is 7 and their product is 48. What are the values of the two numbers?

(A) 6 and 8 (B) 6 and 10 (C) 3 and 16 (D) 4 and 12 (E) None of the above

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14. Of the integers between 1 and 35,000 how many are divisible by at least six distinct primes?

(A) 0 (B) 1 (C) 21 (D) 32 (E) None of the above

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15. Express the number $(3^{-1/3} \cdot 9^{-2} \cdot \sqrt{3} \cdot 3^8)/81$ as a power of 3.

(A) $3^{-1/2}$ (B) $3^{5/6}$ (C) $3^{1/6}$ (D) $3^{-2/3}$ (E) None of the above

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16. Of the five numbers $\frac{13}{18}$, $\frac{13}{17}$, $\frac{12}{17}$, $\frac{12}{18}$ and $\frac{11}{15}$, which is largest?

(A) $\frac{13}{18}$ (B) $\frac{13}{17}$ (C) $\frac{12}{17}$ (D) $\frac{12}{18}$ (E) $\frac{11}{15}$

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17. In planning for a wilderness trip, a guide estimates that 9 pounds of food and water will be needed each day for every 4 people. If 30 people are to go on a 10 day excursion, how many pounds of food and water should the guide plan on carrying?

(A) 145 (B) 1005 (C) 675 (D) 100.5 (E) None of the above

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18. Today a father is five times older than his daughter, but after 21 years he will be twice as old. How old is the father now?

(A) 42 (B) 35 (C) 30 (D) 24 (E) None of the above

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19. The reciprocal of $\frac{1}{3} - \frac{1}{7}$ equals

(A) 4/21 (B) 10/21 (C) -4 (D) 21/4 (E) None of the above

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20. What is the degree of the polynomial $P(x) = (5x-3)^3(2x^2+x-1)^2(x^3-9)$?

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

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21. All of the solutions of the equation $|4x+10| = 26$ are:

(A) $x = -4$ (B) $x = 4$ and $x = -9$ (C) $x = \pm 4$
(D) $x = 11/5$ and $x = -3$ (E) None of the above

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22. If $x - y = -2$ then x^3 equals

(A) $y^3 - 6y^2 + 12y - 8$ (B) $2 - y^3$ (C) $y^3 + 6y^2 + 12y + 8$ (D) $8 - y^3$
(E) None of the above

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23. Which of the following is the prime decompostion of the integer $628,425$?

(A) $3^3 \cdot 5^2 \cdot 7^2 \cdot 19$ (B) $3 \cdot 75 \cdot 7^2 \cdot 19$ (C) $3^5 \cdot 5^2 \cdot 7 \cdot 17$
(D) $5 \cdot 37 \cdot 43 \cdot 79$ (E) None of the above

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24. How many different numbers r with $0 < r < 1$ can be written in the form

$$r = \frac{m}{3} + \frac{n}{7}$$

where $m \geq 0$ and $n \geq 0$ are integers?

(A) 10 (B) 13 (C) 14 (D) 20 (E) None of the above
