OU Math Day 2007

Algebra 1 Test

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1. Three less than eight times a number is two more than six times the number. What is the number?

   (A) 13 (B) 5/2 (C) 18 (D) $-1/2$ (E) None of the above

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2. When multiplied out $(2a^2 + a - 3)(a^2 - 3a + 2)$ equals:

   (A) $2a^4 - 5a^3 - 2a^2 + 11a - 6$ (B) $2a^4 + 7a^3 + 4a^2 - 7a - 6$ (C) $2a^4 - 6$
   (D) $2a^4 - 5a^3 - 4a^2 - 11a - 6$ (E) None of the above

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3. The rule of arithmetic that asserts that $a(b + c) = ab + ac$ for all numbers a, b and c is called the

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

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4. What is the value of $1 - (2 - (3 - (4 - (5 - (6 - (7 - (8 - 9)))))))$?

   (A) -4 (B) -3 (C) 0 (D) 5 (E) None of the above

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5. Let $G(n) = \sqrt{n^2 + 1}$. What is the smallest integer larger than $G(2007)$?

   (A) 4028050 (B) 2008 (C) 46 (D) 45 (E) None of the above

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6. Which of the following is a prime number?

(A) 54 (B) 55 (C) 56 (D) 57 (E) None of the above

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7. If $3.1\,t - .2 = .6\,t + 1$ then t equals

(A) .48 (B) 1 (C) .32 (D) $-.32$ (E) None of the above

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8. A factorization of $2x^2 - 13x + 15$ is

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

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9. What are the solutions of the equation $2x^2 - 13x + 15 = 0$?

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

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10. How many integers n satisfy the inequality $|3n - 4| < 3$?

(A) 0 (B) 2 (C) 4 (D) 5 (E) None of the above

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11. Which of the following equals $\dfrac{5}{21}$?

(A) $\dfrac{1}{3}-\dfrac{1}{7}$ (B) $\dfrac{4}{7}+\dfrac{1}{14}$ (C) $\dfrac{1}{21}+\dfrac{1}{7}+\dfrac{1}{3}$ (D) $\dfrac{1}{7}+\dfrac{2}{21}$ (E) None of the above

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12. The expression $\left[\dfrac{-3x^2y^{-3}}{2x^{-1}y^4}\right]^{-2}$ simplifies to

(A) $\dfrac{4}{9x^2y^2}$ (B) $\dfrac{4y^{14}}{9x^6}$ (C) $\dfrac{4y^{14}}{9x^2}$ (D) $\dfrac{4y^2}{9x^6}$ (E) None of the above

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13. A mother is twelve times older than her daughter, but in 20 years she will be twice as old. How old is the mother now?

(A) 42 (B) 36 (C) 30 (D) 24 (E) None of the above

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14. How many different solutions does the equation $x^3 = 16x$ have?

(A) 0 (B) 1 (C) 2 (D) 3 (E) None of the above

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

$$r = \frac{m}{4}+\frac{n}{5}$$

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

(A) 10 (B) 12 (C) 13 (D) 20 (E) None of the above

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16. Which of the following five numbers is smallest?

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{12}{13}$ (C) $\frac{12}{17}$ (D) $\frac{3}{7}$ (E) $\frac{3}{5}$

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17. Which of the following five numbers is largest?

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{12}{13}$ (C) $\frac{12}{17}$ (D) $\frac{3}{7}$ (E) $\frac{3}{5}$

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18. What is the degree of the polynomial $P(x) = (2x+1)^3(x^2+x+1)^2(x^3+1)$?

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

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19. Express the number $(5^{-1/3} \cdot 25^3 \cdot \sqrt{5} \cdot 5^{-1})/125$ as a power of 5.

(A) 5^3 (B) $5^{1/3}$ (C) $5^{13/6}$ (D) $5^{49/6}$ (E) None of the above

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20. All of the solutions of the equation $|2x+5| = 13$ 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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21. 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
