OU Math Day 2013

Algebra 1 Test

(with answers on the last page)

---

1. The expression $1 - \dfrac{2-(3-11)}{1+2(-2+4)}$ simplifies to

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

---

2. If the sum of two numbers is 4 and their difference is 2 what is their product?

   (A) 3 (B) 8 (C) 4 (D) 0 (E) None of the above

---

3. Two numbers x and y satisfy the equation $\dfrac{2x-5}{7} + \dfrac{5x+2}{7} = y$. What is the value of $x - y$?

   (A) $3/7$ (B) $1/7$ (C) $-3/7$ (D) $4/7$ (E) None of the above

---

4. Which of the following is the prime decomposition of the integer 2013?

   (A) $3 \cdot 671$ (B) $3 \cdot 11 \cdot 61$ (C) $29 \cdot 67$ (D) $7 \cdot 17^2$ (E) None of the above

---

5. If B is 30% larger than A and A is 60% smaller than 1000 what is the value of $B - A$?

   (A) 780 (B) 180 (C) 100 (D) 120 (E) None of the above

---

6. In a collection of coins, 2/5 are pennies, 3/10 are nickels, and 1/10 are dimes. If the remaining 10 coins are quarters then how many coins are in the collection?

   (A) 10 (B) 5 (C) 50 (D) 20 (E) None of the above

---

7. How many distinct real solutions for x does the equation $x^6 = 125$ have?

(A) 0 (B) 2 (C) 4 (D) 6 (E) None of the above

---

8. Which of the five listed numbers is smallest?

(A) $\frac{3}{8}$ (B) $\frac{1/3}{8}$ (C) $\frac{3}{1/8}$ (D) $\frac{1/3}{1/8}$ (E) $\frac{3}{13}$

---

9. In the final four basketball games of the season Maria averaged 20.5 points per game. She had scored a total of 108 points in the previous games. If her season average was 19 points per game, how many games did she play?

(A) 10 (B) 5 (C) 50 (D) 20 (E) None of the above

---

10. Which of the following equations expresses the *distributive law for arithmetic*?

(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

---

11. Ann and Liz live at opposite ends of a straight road. One day they plan to leave home at 10:00 AM and ride their bikes to meet somewhere between the two houses. At 10:30 AM they are 1 mile apart and Ann has traveled half of the distance between the houses while Liz, who is slower, has only covered 3/8 of the distance between the houses. How far apart are the houses in miles?

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

---

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

(A) -3 (B) -2 (C) 0 (D) 10 (E) None of the above

---

13. When multiplied out $(7a + b)(2a - 5b)$ equals:

(A) $14a^2 - 33ab - 5b^2$ (B) $14a^2 - 35ab - 5b^2$ (C) $14a^2 - 5b^2$
(D) $14a^2 + 37ab + 5b^2$ (E) None of the above

---

14. What is the degree of the polynomial $P(x) = x(x+2)(x^2+12)^5(x^2-4)^2(x-4)^2$?

(A) 7 (B) 14 (C) 5 (D) 18 (E) None of the above

---

15. The equation $x(x+2)(x^2+12)^5(x^2-4)^2(x-4)^2 = 0$ has four distinct real solutions. What is the sum of all four of these solutions?

(A) 0 (B) $4\sqrt{2}$ (C) $6\sqrt{2}$ (D) -8 (E) None of the above

---

16. Which of the following is **NOT** equal to $\frac{5}{14} + \frac{7}{21}$?

(A) $\frac{1}{3} + \frac{5}{14}$ (B) $\frac{4}{21} + \frac{1}{2}$ (C) $\frac{43}{42} - \frac{1}{3}$ (D) $\frac{2}{5} + \frac{61}{210}$ (E) None of the above

---

17. If $A = 64,000,000$ then $A^{-1/3}$ equals

(A) .0025 (B) 4 (C) .4 (D) -400 (E) None of the above

---

18. Express the number $(5^{-1/3} \cdot 25^{-2} \cdot \sqrt{5} \cdot 5^8)/125$ as a power of 5.

(A) $5^{-1/2}$ (B) $5^{5/6}$ (C) $5^{7/6}$ (D) $5^{-2/3}$ (E) None of the above

---

19. A quarter is flipped repeatedly until it has landed heads either two times or tails two times, not necessarily in order. If the first flip lands heads, what is the probability that two tails appear before a second head?

(A) 2/5 (B) 1/4 (C) 2/3 (D) 1/3 (E) None of the above

---

20. All of the solutions of the equation $|3x + 15| = 9$ are:

(A) $x = -2$ (B) $x = -2$ and $x = -8$ (C) $x = \pm 2$
(D) $x = 3/5$ and $x = -2$ (E) None of the above

---

21. If $a - b = -2$ then a^3 equals

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

---

22. How many different ordered arrangements of letters can be formed using all seven letters of the word BANANAS if each consonant must be followed by a vowel?

(A) 0 (B) 6 (C) 12 (D) 24 (E) None of the above

---

23. What is the average value of the first sixteen positive integers $\{1, 2, \ldots, 16\}$?

(A) 7 (B) 8.5 (C) 8 (D) 7.5 (E) None of the above

---

24. The reciprocal of $\dfrac{1}{2} - \dfrac{1}{14}$ equals

(A) 7/4 (B) 2/7 (C) 7/3 (D) 7/2 (E) None of the above

---

25. Of the integers listed below which is closest in value to the square root of 2013?

(A) 40 (B) 44 (C) 45 (D) 50 (E) 4×10^6

ANSWERS:

1. D
2. A
3. A
4. B
5. D
6. C
7. B
8. B
9. A
10. C
11. A
12. E
13. A
14. D
15. E
16. E
17. A
18. C
19. B
20. B
21. E
22. A
23. B
24. C
25. C