OU Math Day 2006

Algebra 1 Test

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

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

2. A 200 yard piece of rope is cut into four pieces. The second piece is 12 yards shorter than the first piece. The third piece is twice as long as the second piece, and the fourth piece is 8 yards more than half the size of the second. How many yards long is the longest of the four pieces of rope?

   (A) 80 (B) $200/3$ (C) 52 (D) 40 (E) None of the above

3. The cube of an integer n equals one billion. What is n?

   (A) 100 (B) 1000 (C) 10^5 (D) one million   (E) None of the above

4. 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

5. What is the largest integer smaller than $\sqrt{2006}$?

(A) 42   (B) 43   (C) 44   (D) 45   (E) None of the above

6. All of the solutions to the equation $b^2 = 98$ are:

(A) $b = 2\sqrt{7}$ (B) $b = 7\sqrt{2}$ (C) $b = 2\sqrt{7}$ and $b = -2\sqrt{7}$
(D) $b = 7\sqrt{2}$ and $b = -7\sqrt{2}$ (E) None of the above

7. What is the largest prime factor of 520?

(A) 7   (B) 11   (C) 13   (D) 17   (E) None of the above

8. When multiplied out $(3a + 4b)(2a - 11b)$ equals:

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

9. Tim's age is twice of Brian's while Sally's age is half of Brian,s. In 14 years the sum of their ages will be 63 which will be the age of their uncle John's age at that time. What is the sum of Tim, Brian, Sally and uncle John's current ages?

(A) 21   (B) 42   (C) 70   (D) 84   (E) None of the above

10. The fraction $\dfrac{\frac{2}{3} - \frac{5}{14}}{1 - \frac{7}{9}}$ simplifies to:

   (A) 39/28   (B) 351/448   (C) 13/189   (D) $-20/9$ (E) None of the above

11. In a one hour run, a jogger runs 2 miles in the first 30 minutes and 3 miles in the second half hour. What is the jogger's average rate of speed in miles per hour for the entire run?

   (A) 2.5   (B) 5   (C) 3   (D) 5.5   (E) None of the above

12. 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

13. Determine the fractional form of the repeating decimal $1.2\overline{6}$:

   (A) 19/15   (B) 125/99   (C) 63/50   (D) 38/33   (E) None of the above

14. 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

15. Which of these numbers is largest?

(A) 2^{3^5} (B) 2^{5^3} (C) 3^{2^5} (D) 3^{5^2} (E) 5^{3^2}

16. How many solutions for x does the equation $|3 - x| = |2x - 1|$ have?

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

17. 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

18. The smallest whole number k for which 7^k is bigger than $100,000$ is:

(A) 5   (B) 6   (C) 7   (D) 8   (E) None of the above

19. Solve for x given that $\dfrac{9}{8} + \dfrac{5}{2}x = 0$.

(A) $-5/16$ (B) $-1/3$ (C) $-9/20$ (D) $-2/5$
(E) None of the above

20. Which of the listed integers is prime?

(A) 36   (B) 113   (C) 405   (D) 119   (E) 99