Dick Schaff Math Superbowl XLV

Level 1: 7th Grade Huddle – 2018

Directions: (1) Select the most correct answer for each question and mark it on your answer form.

(2) No calculators of any sort are allowed.

(3) Note that N.O.T. means "None of these."

1. What is the hundreds digit in 5^{2018}?

   a) 5 b) 2 c) 1 d) 6 e) N.O.T.

2. Write $2.0\overline{18}$ as a reduced mixed number.

   a) $2\frac{18}{99}$ b) $2\frac{2}{11}$ c) $2\frac{18}{990}$ d) $2\frac{2}{110}$ e) N.O.T.

3. Simplify $\frac{20!}{18!}$ completely.

   a) $\frac{10}{9}$ b) 380 c) 20 d) $\frac{20}{18}$ e) N.O.T.

4. As a circle's diameter decreases from 20 inches to 18 inches, what is the percent decrease in its area?

   a) 17% b) 18% c) 19% d) 20% e) N.O.T.

5. In the year 2018 the first two digits and the last two digits, written as the ordinary whole numbers 20 and 18, each have the same number of factors. Find the two most recent previous years that this has happened. Write the sum of those two years.

   a) 4009 b) 4008 c) 4007 d) 4006 e) N.O.T.

6. What is the exact value of $(.\overline{2}+.\overline{0}+.\overline{1}+.\overline{8}) \div (.\overline{20}+.\overline{18})$?

a) $3\frac{5}{34}$ b) $3\frac{6}{35}$ c) $3\frac{7}{38}$ d) $3\frac{8}{39}$ e) N.O.T.

7. Simplify $((2^0)^1)^8$ completely.

a) 3 b) 2 c) 1 d) 0 e) N.O.T.

8. Which of the following is equal to 4^{2018}?

a) 8^{1009} b) 8^{2017} c) 16^{1009} d) 16^{2016} e) N.O.T.

9. If $a * b$ is defined as $(a+1) \cdot (b+1)$, simplify $\big((2 * 0) * 1\big) * 8$ completely.

a) 54 b) 63 c) 72 d) 81 e) N.O.T.

10. Find the sum of all values of x which satisfy the equation $|x + 20| + 18 = 2019$.

a) 40 b) -40 c) 20 d) -20 e) N.O.T.

11. Two lights are flashing, one every 20 seconds and one every 18 seconds. Every so often, they flash at the same time. How many minutes apart are two consecutive simultaneous flashings?

a) 3 b) 120 c) 180 d) 40 e) N.O.T.

12. What is the measure of each of the interior angles of a regular nonagon?

a) $90°$ b) $110°$ c) $120°$ d) $130°$ e) N.O.T.

13. What is the smallest counting number by which 1820 can be multiplied so that the product is a perfect square?

a) 1820 b) 455 c) 91 d) 35 e) N.O.T.

14. Exactly three of the years from 2000 to 2018 are prime numbers. Find their sum.

a) 6019 b) 6027 c) 6029 d) 6031 e) N.O.T.

15. A chessboard is an eight by eight grid of 64 small squares. There are many other larger squares contained in the board. How many squares are there altogether?

a) 98 b) 200 c) 202 d) 204 e) N.O.T.

16. Evaluate the quotient obtained when the number that is 24% of 24 is divided by the number that is 8% of 8.

a) 9 b) 3 c) .09 d) .03 e) N.O.T.

17. There are 5280 feet in a mile. How many more yards are there in $\frac{7}{8}$ of a mile than in $\frac{3}{4}$ of a mile?

a) 210 b) 220 c) 230 d) 240 e) N.O.T.

18. In the following equation, what is the product of all possible values for x? $\frac{3}{5x} = \frac{x}{15}$

a) -9 b) 3 c) 9 d) -3 e) N.O.T.

19. What is the positive difference between the mean of set $A = \{12, 13, 23, 34, 144\}$ and the mean of set $B = \{12, 13, 23, 34, 44\}$?

a) 16 b) 17 c) 18 d) 19 e) N.O.T.

20. What is the positive difference between the range and the median of the set $\{1, 3, 3, 5, 5, 5, 5, 7, 7, 7, 7, 11, 13\}$?

a) 6 b) 7 c) 8 d) 9 e) N.O.T.

21. A set of four numbers has an average of 7. What number should be added to the set to make the average of all five numbers 8?

a) 8 b) 9 c) 10 d) 11 e) N.O.T.

22. How many positive two-digit integers are multiples of both 2 and 3?

a) 12 b) 13 c) 14 d) 15 e) N.O.T.

23. Find n such that $3^5 \cdot 4^4 \cdot 5^3 \cdot 7^1 \cdot 11^1 \cdot n = 15!$

a) 728 b) 1092 c) 2184 d)4368 e) N.O.T.

24. Determine the number of zeroes in which $12!$ ends.

a) 3 b) 4 c) 5 d) 6 e) N.O.T.

25. Find the value of the expression: $2018 - 2017 + 2016 - 2015 + \cdots + 2 - 1.$

a) 1009 b) 2018 c) 1008 d) 2017 e) N.O.T.

26. Find the sum: $\frac{1}{3}+\frac{2}{3}+\frac{3}{3}+\cdots+\frac{25}{3}+\frac{26}{3}$.

a) 115 b) 116 c) 117 d) 118 e) N.O.T.

27. When an integer is divided by 15, the remainder is 11. Find the sum of the remainders when the same integer is divided by 3 and by 5.

a) 1 b) 2 c) 3 d) 4 e) N.O.T.

28. How many different combinations of coins could a person have if she has exactly 21 cents?

a) 5 b) 6 c) 7 d) 8 e) N.O.T.

29. What does the ratio of the number of even factors to odd factors of 60 equal?

a) $\frac{7}{3}$ b) $\frac{3}{2}$ c) $\frac{1}{2}$ d) 2 e) N.O.T.

30. What is the sum of the digits of the decimal form of the product $2^{2018} \cdot 5^{2020}$?

a) 5 b) 7 c) 8 d) 13 e) N.O.T.