DICK SCHAFF SUPERBOWL XLI
Spring, 2014
Algebra Huddle

Directions: **Select the most correct answer for each question. Then consult with your partner and mark your final answer on the answer sheet. The questions are not arranged in order of difficulty. Note that N.O.T. means "none of these."**

1. What number is $\frac{3}{7}$ of the way from 28 to 91?

A. 40 B. 55 C. 63 D. 72 E. N.O.T.

2. $\dfrac{1}{2+\frac{3}{4+\frac{5}{6}}} =$

A. $\frac{29}{76}$ B. $\frac{3}{10}$ C. $\frac{3}{16}$ D. $\frac{59}{63}$ E. N.O.T.

3. What is the 40^{th} term in the sequence 1, 3, 7, 13, 21, 31,...?

A. 1298 B. 1437 C. 1561 D. 1600 E. N.O.T.

4. Which of the following quantities is the **largest**?

A. $\frac{1}{3}+\frac{1}{5}$ B. $\frac{1}{3+5}$ C. $\frac{1}{2\pi}$ D. $\frac{1}{5}+\frac{1}{5}$ E. N.O.T.

5. $\dfrac{12^{20}}{12^{10}} =$

A. 1 B. 12^2 C. 12^{10} D. 2 E. N.O.T.

6. Find the x-coordinate of the x-intercept of the graph of $y = 2x - 1$

A. -1 B. $-\dfrac{1}{2}$ C. $\dfrac{1}{2}$ D. 2 E. N.O.T.

7. How many diagonals does a *dodecagon* have?

A. 108 B. 54 C. 48 D. 12 E. N.O.T.

8. Which of the following represents the number of hours in x hours and y minutes?

A. $60x + y$ B. $y + \dfrac{x}{60}$ C. $x + 60y$ D. $x + \dfrac{y}{60}$ E. N.O.T.

9. What is the smallest value d for which the number $832,901,237,2d8$ is divisible by 9?

A. 0 B. 1 C. 3 D. 9 E. N.O.T.

10. The set of natural numbers is the set $\{1, 2, 3, 4, \dots\}$. What is the mean of the first four natural numbers that have exactly three divisors?

A. 13.5 B. 17 C. 21.75 D. 26.5 E. N.O.T.

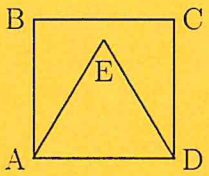
11. The slope of a line perpendicular to $2x + y = 3$ is

A. -2 B. $-\frac{1}{2}$ C. $\frac{1}{2}$ D. 2 E. N.O.T.

12. The ratio of an angle to it supplement is 1:4. What is the measure of the original angle?

A. 20^o B. 36^o C. 90^o D. 144^o E. N.O.T.

13. Equilateral triangle ADE is drawn inside square $ABCD$ as shown. What is the measure, in degrees, of $\angle BAE$?



A. 15^o B. 30^o C. 45^o D. 60^o E. N.O.T.

14. The area of a square is 25 square centimeters. What is the length of its diagonal in centimeters?

A. 5 B. $5\sqrt{2}$ C. 10 D. $10\sqrt{2}$ E. N.O.T.

15. For each pair of real numbers $x \neq y$, define the operation $\blacklozenge$ as $(x \blacklozenge y) = \frac{xy}{x-y}$. What is the value of $(1 \blacklozenge (2 \blacklozenge 3))$

A. $-\frac{6}{7}$ B. $-\frac{6}{5}$ C. $\frac{6}{5}$ D. $\frac{6}{7}$ E. N.O.T.

16. Find the quotient of the additive inverse of $-\frac{3}{4}$ and the multiplicative inverse of one-half.

A. $-\frac{3}{2}$ B. $-\frac{1}{3}$ C. $\frac{3}{8}$ D. $\frac{3}{2}$ E. N.O.T.

17. Find the value of $0.\overline{1} + 0.\overline{2} + 0.\overline{3}$.

A. $\frac{1}{6}$ B. $\frac{3}{5}$ C. $\frac{2}{3}$ D. 1 E. N.O.T.

18. If $1 + 2 + 3 + 4 + \cdots + n = 496$, what is the value of n?

A. 30 B. 31 C. 32 D. 33 E. N.O.T.

19. Which of the following triplets **cannot** represent the sides of a triangle?

A. $3, 4, 5$ B. $2, 6, 7$ C. $12, 12, 12$ D. $4, 8, 13$ E. N.O.T.

20. Given that $g(x) = 4x^2 - 3x + 4$ find $g\left(\frac{1}{2}\right)$?

A. $-1\frac{1}{2}$ B. $1\frac{1}{2}$ C. $3\frac{1}{2}$ D. $6\frac{1}{2}$ E. N.O.T.

21. $4^{10} \times 4^{10} =$

A. 8^{20} B. 8^{10} C. 16^{10} D. 16^{20} E. N.O.T.

22. What is the smallest counting number by which 450 can be multiplied so that the result is a perfect cube?

A. 2 B. 30 C. 60 D. 90 E. N.O.T.

23. How many zeros does the square of one trillion have?

A. 12 B. 18 C. 20 D. 24 E. N.O.T.

24. $\left[5^{-1} + \left(5^{-1}\right)^{-1}\right]^{-1} =$

A. $\frac{1}{5}$ B. $\frac{1}{25}$ C. $\frac{25}{26}$ D. $\frac{5}{26}$ E. N.O.T.

25. Suppose a store increases the price of a product by 10% and then increases the result by 10%. To the nearest whole number, by what percentage must the store discount the item in order to bring the price back down to what it originally was?

A. 17% B. 18% C. 20% D. 21% E. N.O.T.

26. Find the equation of a line going through the point (6,3) and parallel to the line going through points (-1,2) and (5,-3).

A. $y = -\frac{5}{6}x + 48$ B. $y = \frac{6}{5}x + 48$ C. $y = \frac{6}{5}x - \frac{21}{5}$ D. $y = \frac{5}{6}x + \frac{7}{6}$ E. N.O.T.

27. What number is the reciprocal of $2.\overline{13}$?

A. $\frac{71}{333}$ B. $\frac{99}{211}$ C. $\frac{73}{151}$ D. $\frac{89}{193}$ E. N.O.T.

28. $(x-2)^3=$

A. x^3-8 B. x^3-2x^2+4x-8

C. $x^3-6x^2+12x-8$ D. x^3-12x^2+6x-8 E. N.O.T.

29. $\frac{15x^2+2x}{2x}=$

A. $15x^2$ B. $7.5x$ C. $15x+1$ D. $7.5x+1$ E. N.O.T.

30. The equations $2x+7=3$ and $bx-10=-2$ have the same solution x. What is the value of b?

A. -4 B. 0 C. 2 D. -6 E. N.O.T.