Dick Schaff Math Superbowl XLII

May 9, 2015

8th Grade Huddle

Directions: Select the most correct answer for each question. Then, when so directed, consult with your partner, and mark your final answer on your answer sheet.

Note: No calculating devices are allowed, and N.O.T. stands for "None of These."

1. In how many zeros does $30!$ end?

(A) 6 (B) 1 (C) 7 (D) 3 (E) N.O.T.

2. How many positive factors does the number $2^9 3^4$ have?

(A) 50 (B) 13 (C) 36 (D) 40 (E) N.O.T.

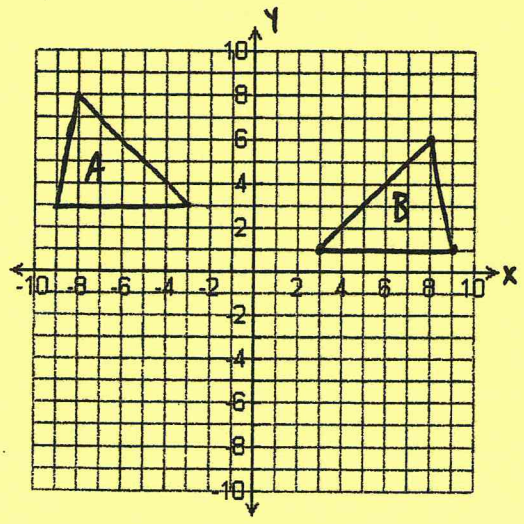
3. What is the sum of the numerator and the denominator when $.20\overline{15}$ is written as a reduced fraction?

(A) 793 (B) 671 (C) 839 (D) 2015 (E) N.O.T.

4. What is the diameter of a sphere whose volume is $\frac{32}{3}\pi$?

(A) 2 (B) 4 (C) 8 (D) 32 (E) N.O.T.

5. Which sequence of transformations takes triangle A to its image, triangle B?



(A) Reflection over the *x*-axis and translation 2 units down.
(B) Reflection over the *y*-axis and translation 2 units down.
(C) Translation 2 units down and 90° rotation about the origin.
(D) Translation 12 units to the right and 90° rotation about the origin.
(E) N.O.T.

6. If $f(x)=20x-15$, find a number a, where $f(a)=a$.

(A) $\frac{15}{19}$ (B) $\frac{15}{20}$ (C) $\frac{3}{4}$ (D) $\frac{4}{3}$ (E) N.O.T.

7. A company used about 7.4×10^5 sheets of paper in a month. Of the paper used during the month, the accounting department used about 8.9×10^3 of the sheets. Approximately many sheets of paper were used by other departments during the month?

(A) 1.5×10^2 (B) 1.5×10^3 (C) 7.3×10^4 (D) 7.3×10^5 (E) N.O.T.

8. Find the remainder of $7^{2015} \div 4$.

(A) 1 (B) 2 (C) 3 (D) 0 (E) N.O.T.

9. What is the slope of the line $0=\frac{2}{3}x-5$?

(A) -5 (B) $(0,-5)$ (C) $\frac{2}{3}$ (D) $\frac{3}{2}$ (E) N.O.T.

10. Find the remainder when $12345(2014!)$ is divided by $(2015!)$.

(A) 256(2015!) (B) 2014 (C) 255 (D) 2015! (E) N.O.T.

11. A pan filled with water to a depth of 50 millimeters is placed in the sun to measure the rate of evaporation. The pan loses one millimeter of water every four hours. Which of the following equations accurately represents the depth of the water, *d*, in the pan *h* hours after placing it in the sun?

(A) $d=-4h+50$ (B) $h=\frac{1}{4}d-50$ (C) $h=-\frac{1}{50}d+4$

(D) $d=-\frac{1}{4}h+50$ (E) N.O.T.

12. What is the product of two positive integers whose least common multiple is 240 and whose greatest common factor is 40?

(A) 6 (B) 9600 (C) 1440 (D) 280 (E) N.O.T.

13. Solve for x: $49^{x+3}=7^{x-2}$.

(A) -7 (B) -6 (C) -8 (D) -9 (E) N.O.T.

14. Solve the following system of equations: $\begin{cases}2x+7y=-3\\4x+y=-19\end{cases}$

(A) $(x,y)=(5,-1)$ (B) $(x,y)=(-1,5)$ (C) $(x,y)=(-5,-1)$

(D) $(x,y)=(1,-5)$ (E) N.O.T.

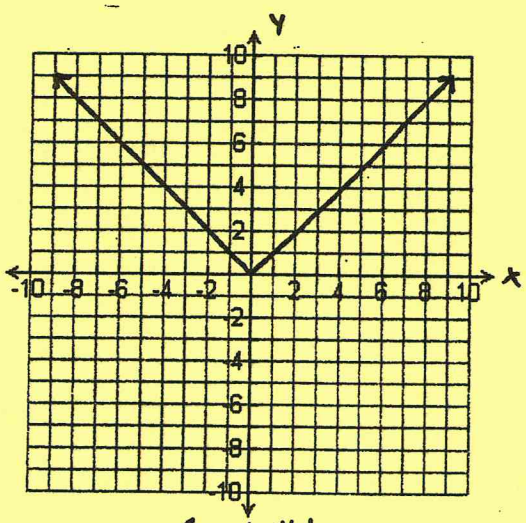
15. Find the last digit of the following sum: $1!+2!+3!+4!+\ldots+2014!+2015!$

(A) 1 (B) 2 (C) 3 (D) 4 (E) N.O.T.

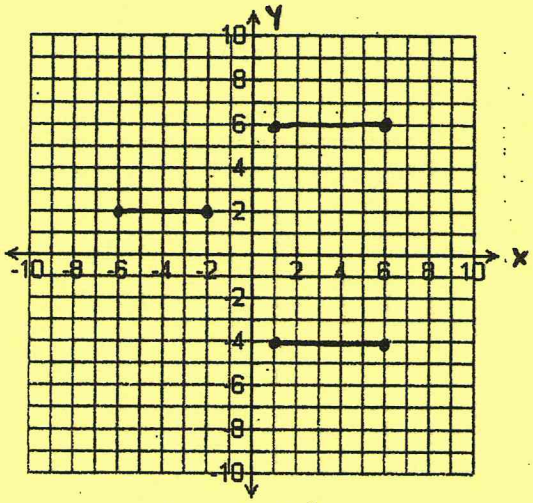
16. If $g(x)=20x+15$, evaluate $g\left(g\left(g\left(\frac{-7}{10}\right)\right)\right)$.

(A) 720 (B) 1 (C) 715 (D) 35 (E) N.O.T.

17. Which of the following graphs represent a function?



Graph #1



Graph #2

(A) Graph #1 only (B) Graph #2 only (C) Both graphs

(D) Neither (E) Cannot determine

18. If $\left(\left(\left(\left((x)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}=2015$, then x equals which of the following:

(A) $2015^{\frac{1}{32}}$ (B) $\frac{2015}{32}$ (C) $2015(32)$ (D) 2015^{32} (E) N.O.T.

19. A rectangle has a length of 20 inches and a width of 15 inches. If each dimension is reduced by 5%, by what percent is the area of the original rectangle reduced?

(A) .25% (B) 10% (C) 25% (D) 9.75% (E) N.O.T.

20. 3 flips = 2 flaps and 3 flaps = 2 flops, so 3 flops = x flips. Solve for x.

(A) 2 (B) 3 (C) 6 (D) 6.75 (E) N.O.T.

21. The average of 20 numbers is 15. Fifteen of the 20 numbers have an average of 20. What is the average of the remaining 5 numbers?

(A) 1 (B) 0 (C) 15 (D) 20 (E) N.O.T.

22. If $5^4+5^4+5^4+5^4+5^4=5^x$ and $4^5+4^5+4^5+4^5=4^y$, evaluate xy.

(A) $4^5 5^4$ (B) $(5+4)^{5(4)}$ (C) 30 (D) 20 (E) N.O.T.

23. The ratio of the area of a circle to its circumference is 3 inches. What is the circle's radius?

(A) 4 in. (B) 5 in. (C) 6 in. (D) 7 in. (E) N.O.T.

24. Evaluate $(-1^1)+(-1^2)+(-1^3)+\cdots+(-1^{2013})+(-1^{2014})+(-1^{2015})$.

(A) 1 (B) -1 (C) 2015 (D) -2015 (E) N.O.T.

25. Find the sum of the primes in the prime factorization of 2015.

(A) 48 (B) 49 (C) 50 (D) 51 (E) N.O.T.

26. Evaluate $\left(\left(-2^0\right)^1\right)^5$.

(A) 1 (B) -1 (C) 32 (D) -32 (E) N.O.T.

27. A survey was given to 890 students, and most of the results are shown in the table. Some results are missing. How many students exercise regularly and get eight or more hours of sleep?

		Daily Exercise		
		Yes	No	Total
Average Hours of Sleep Per Night	Less than 8 hours	294		611
	More than 8 hours		122	279
	Total	451	439	890

(A) 157 students (B) 279 students (C) 596 students

(D) Cannot be determined (E) N.O.T.

28. Which of the following equations is nonlinear?

(A) $x(x+4)=15$ (B) $2x+9=100$ (C) $10(x-3)=22$

(D) $4=7x-19\pi$ (E) N.O.T.

29. What is the mean of 4^3 and 4^4 ?

(A) $4^{3.5}$ (B) 4^7 (C) 164 (D) 160 (E) N.O.T.

30. If $f(x)=x+1$, then evaluate $f\left(f\left(f(2)+0\right)+1\right)+5$.

(A) 9 (B) 8 (C) 7 (D) 6 (E) N.O.T.