Dick Schaff Math Superbowl XLVI
Level 2: 8th Grade Blitz

Directions: (1) Select the most correct answer for each question and bubble it on your Scantron™.
(2) No calculating devices of any sort are allowed.
(3) N.O.T. stands for "None of These."

1. What number is in the units place of 3^{2019}?

a) 1 b) 3 c) 7 d) 9 e) N.O.T.

2. Solve $343^{x+2} = 49^{x-5}$ for x.

a) 7 b) -16 c) -17 d) -18 e) N.O.T.

3. Let $5 + 4(3x + 2) = 1$. What is the value of $3x + 2$?

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

4. A photocopy machine costs \$3,000, plus an additional \$0.03 per copy. A fancy copy machine costs \$5000, but copies only cost an additional \$0.02 each. How many copies would you have to make before the costs are the same?

a) 2,000 b) 20,000 c) 200,000 d) 2,000,000 e) N.O.T.

5. Alex was driving along the highway at a speed of 65 mph at 1:00 p.m. Alex's speed slowly increased; at 1:20 p.m. Alex was driving 68 mph. If Alex's acceleration stayed constant, how fast was Alex driving at 3:00 p.m.?

a) 71 mph b) 74 mph c) 83 mph d) 95 mph e) N.O.T.

6. A rectangular garden has a perimeter of twenty feet. The length of the garden is two feet less than three times the width. Which of the following equations could be used to determine the width of the garden?

a) $20 = 2(3w + 2) + 2w$ b) $20 = 2(2w + 3) + 2w$

c) $20 = 2(3w - 2) + 2w$ d) $20 = 2(2w - 3) + 2w$ e) N.O.T.

7. Which of the following is a factor of 2019?

a) 11 b) 13 c) 17 d) 19 e) N.O.T.

8. Which of the following numbers is largest?

a) $2\frac{2}{3}$ b) $\frac{8}{3}$ c) 2.67 d) $2.\overline{66}$ e) N.O.T.

9. Which of the following is an irrational number?

a) -2 b) 0.2 c) ½ d) $\sqrt{2}$ e) N.O.T.

10. A backyard swimming pool holds 34,000 liters of water. What is that in scientific notation?

a) 3.4×10^4 b) 3.4×10^5 c) 34×10^4 d) 34×10^5 e) N.O.T.

11. Which of the following functions is not linear?

a) $f(x) = 2x + 3$ b) $f(x) = 2x + \sqrt{3}$ c) $f(x) = 2x + \pi$ d) $f(x) = 2x^2 + 3$ e) N.O.T.

12. How many zeroes are at the end of $1 \times 2 \times 3 \times \ldots \times 50$?

a) 5 b) 10 c) 12 d) 50 e) N.O.T.

13. Simplify $(-1)^1 + (-1)^2 + (-1)^3 + \ldots + (-1)^{2019}$.

a) -1 b) 0 c) 1 d) 2019 e) N.O.T.

14. Which of the following is equivalent to $\frac{2}{11}$?

a) 0.18 a) 0.22 a) $0.1\overline{8}$ a) $0.\overline{2}$ e) N.O.T.

15. Set is four years older than Miles. In a year Set will be three times as old as Miles. How old is Set?

a) 5 b) 8 c) 11 d) 14 e) N.O.T.

16. A triangle is plotted on the coordinate system so its vertices are at (2, 3), (2, 7), and (11, 7). This triangle is then reflected about the y-axis. Which of the following would be coordinates for one of the vertices of the reflected triangle?

a) $(-2, 3)$ b) $(2, -7)$ c) $(-11, -7)$ d) $(11, 3)$ e) N.O.T.

17. Alex has to sort through a comic book collection, deciding what to keep and what to sell. On the first day Alex was enthusiastic about the project, so Alex sorted through 56 comic books. Alex's enthusiasm waned after that, so for Alex only sorted through 28 comic books per day after that. Which of the following formulas models the total number of comic books sorted (N), as a function of days (d)?

a) $N = 28d + 56$ b) $N = 28d - 56$ c) $N = 28(d + 2)$ d) $N = 28(d + 1)$ e) N.O.T.

18. Robin's car can travel 35 miles on one gallon of gasoline. How far can Robin's car go on 8.8 gallons of gasoline?

a) 208 miles b) 218 miles c) 308 miles d) 318 miles e) N.O.T.

19. If $x > y$, and $y = z + 1$, then which of the following must be true?

a) $x = z$ b) $x < z$ c) $x \leq z$ d) $x > z$ e) N.O.T.

20. An island has two types of inhabitants: *knights who always tell the truth*, and their opposites, *knaves who always lie*. You encounter two people on the island, Alex and Bobby. Alex says, "Bobby is a knight," and Bobby says, "Alex and I are opposite types." What must be true?

a) Alex is a knight and Bobby is a knave b) Alex is a knave and Bobby is a knight

c) Alex and Bobby are the same type d) There is not enough information to tell e) N.O.T.

21. What is the smallest positive integer that is divisible by the first nine positive integers?

a) 1,260 b) 2,520 c) 36,288 d) 362,880 e) N.O.T.

22. Solve for x: $16^{x+1} = 8^{x+2}$.

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

23. A line passes through the points $(2, -4)$ and $(6, -6)$. What is the equation of this line?

a) $y = -\frac{1}{2}x - 4$ b) $y = -\frac{1}{2}x - 5$ c) $y = -\frac{1}{2}x - 6$ d) $y = -\frac{1}{2}x - 7$ e) N.O.T.

24. What is the product of two numbers whose GCF is 20 and whose LCM is 200?

a) 10 b) 2000 c) 4000 d) 8000 e) N.O.T.

25. What is the slope of the line passing through $(2, -3)$ and $(-2, 3)$?

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

The following information is needed for problems 26 – 28:

A number of Jr. High students were surveyed about their daily "screen time" (the time they spend watching television, working on a computer, or playing video games). The results are shown in the table below.

	Less than 1 hour	Between 1 and 3 hours	More than 3 hours
7^{th} Graders	2	10	8
8^{th} Graders	3	12	15

26. What is the relative frequency that a 7^{th} grader was surveyed?

a) 20% b) 30% c) 40% d) 60% e) N.O.T.

27. What is the relative frequency that a student spent three hours or less in front of a screen?

a) 23% b) 27% c) 46% d) 54% e) N.O.T.

28. What is the relative frequency that a student spent an hour or more in front of a screen?

a) 23% b) 45% c) 46% d) 90% e) N.O.T.

29. What is the volume of a right circular cylinder with height and diameter of 8 cm?

a) 128π cm^3 b) 256π cm^3 c) 512π cm^3 d) 1024π cm^3 e) N.O.T.

30. Let $f(x) = 20x - 17$. Find a number p such that $f(p) = p$.

a) 20 b) 17 c) $\frac{17}{19}$ d) $\frac{19}{17}$ e) N.O.T.

31. What is the last digit of the sum $1! + 2! + 3! + \ldots + 2019!$

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

32. Let $f(x) = x^2 + 1$. Find $f\left(f(f(3))\right)$.

a) 10,102 b) 10,202 c) 10,302 d) 10,402 e) N.O.T.

33. What is the mean of 6^2 and 6^3 ?

a) $3^{2.5}$ b) $6^{2.5}$ c) 6^5 d) 252 e) N.O.T.

34. Erin makes a smoothie for breakfast. Erin uses eight ounces of orange juice, six ounces of frozen strawberries, two ounces of frozen peaches, and two ounces of apple juice. To the nearest full percent, what percent of this smoothie is frozen fruit?

a) 11% b) 33% c) 44% d) 45% e) N.O.T.

35. A line parallel to the y-axis crosses the x-axis at 3.14. What is the equation of this line?

a) $y = 3.14$ b) $y = 3.14x$ c) $y = x + 3.14$ d) $x = 3.14$ e) N.O.T.

36. A farm has seventeen horses. Each horse needs four shoes. Each shoe needs seven nails. Horseshoe nails come in packages of 50. How many packages of nails would you buy to shoe all of these horses?

a) 196 b) 476 c) 9 d) 10 e) N.O.T.

37. What is the equation of the line passing through $\left(\frac{1}{4}, \frac{2}{7}\right)$ and $\left(\frac{1}{2}, \frac{4}{7}\right)$

a) $y = \frac{8}{7}x - \frac{1}{7}$ b) $y = \frac{7}{8}x - \frac{1}{7}$ c) $y = \frac{8}{7}x$ d) $y = \frac{7}{8}x$ e) N.O.T.

38. The average of 20 numbers is 17. The average of 17 of those numbers is 20. What is the average of the remaining three numbers?

a) 0 b) 17 c) 20 d) 340 e) N.O.T.

39. Simplify $((-2^0)^3)^5$.

a) -1 b) 0 c) 1 d) 2^{15} e) N.O.T.

40. Which of these numbers is the largest?

a) $3\sqrt{5}$ b) $5\sqrt{3}$ c) $2\sqrt{7}$ d) $7\sqrt{2}$ e) N.O.T.

41. A circular fountain has a radius of twelve feet. Bobby runs around the fountain twelve times. How far did Bobby run?

a) 24π feet b) 144π feet c) 288π feet d) 576π feet e) N.O.T.

42. Two adults take five children to a small zoo. They pay \$27.50 for tickets. Adult tickets cost \$5 each. How much does a child's ticket cost?

a) \$3.00 b) \$3.50 c) \$4.50 d) \$5.50 e) N.O.T.

43. If $3 + 2(3x + 2) = 25$, then $3x + 2 =$

a) 1 b) 3 c) 5 d) 11 e) N.O.T.

44. Suppose the time was 4 p.m. three hours ago. What will the time be 52 hours from now?

a) 8 p.m. b) 11 p.m. c) 12 a.m. d) 3 a.m. e) N.O.T.

45. On the coordinate plane, what is the distance between the origin and (8, 15)?

a) 7 units b) 17 units c) 19 units d) 23 units e) N.O.T.