Dick Schaff Math Superbowl XLVI
Level 3: Secondary Math I 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. Let $g(x) = 3x + 1$. Find the value of x for which $g(x) = -8$.

a) $x = -23$ b) $x = -3$ c) $x = 25$ d) $x = 7/3$ e) N.O.T.

2. Amaya works part-time to help pay for college. She has worked for the last fourteen days without a day off, and she has worked for a total of 48 hours. Depending on her schedule she either worked for three hours a day or four hours a day. During this fourteen-day period, how many days did Amaya work for four hours a day?

a) 2 days b) 4 days c) 6 days d) 8 days e) N.O.T.

3. A local kids' soccer team consists of seven 8-year-olds, six 9-year-olds, five 10-year-olds, and two 11-year-olds. If a child is picked from this team at random, what is the probability that the child's age is even?

a) 50% b) 55% c) 60% d) 65% e) N.O.T.

4. Solve the following equation for x: $|2x + 7| - 4 = 23$.

a) 10 or 17 b) 10 or – 17 c) – 10 or 17 d) – 10 or – 17 e) N.O.T.

5. A sequence is defined recursively with $g(1) = 100$ and $g(n) = g(n - 1) - 8n$. What is the value of $g(4)$?

a) 76 b) 60 c) 28 d) 22 e) N.O.T.

6. Which of the following correlation coefficients represents the weakest linear relationship?

a) 0.75 b) -0.42 c) -0.86 d) 0.23 e) N.O.T.

7. How many cubes with 5-cm sides will completely fill a cube that is 10 cm on a side?

a) 4 b) 8 c) 20 d) 50 e) N.O.T.

8. How many prime numbers are divisible by 4?

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

9. Modesto Irrigation District is dealing with power outages from a major storm. They start with 2500 customers without power. Every hour the number of customers without power decreases by 12% of the previous total. Which of the following expressions represents the number of customers still without power after four hours?

a) $2500(-0.12)^4$ b) $2500(0.12)^{-4}$ c) $2500(0.88)^4$ d) $2500(0.88)^{-4}$ e) N.O.T.

10. Solve the following equation for x: $16 - 2(x - 1) = 4(3 - x)$.

a) -3 b) 3 c) -15 d) 15 e) N.O.T.

11. Which ordered pair is not in the solution set of $y \geq 2x + 1$?

a) (1, 4) b) (1, 6) c) (0, 2) d) (2, 5) e) N.O.T.

12. Which equation represents a line that is parallel to the line $y = 0.5x + 7$?

a) $y = 2x + 9$ b) $y = -2x + 9$ c) $y = 0.5x + 9$ d) $y = -0.5x + 9$ e) N.O.T.

13. Which equation represents a line that is perpendicular to the line $y = 0.5x + 7$?

a) $y = 2x + 9$ b) $y = -2x + 9$ c) $y = 0.5x + 9$ d) $y = -0.5x + 9$ e) N.O.T.

14. Chris has grades of 84, 65, and 76 on three math tests. What grade must Chris obtain on the next math test to have an average of exactly 80 for all four tests?

a) 80 b) 85 c) 90 d) 95 e) N.O.T.

15. What is the average rate of change of the function $f(x) = x^2 - x - 6$ from $x = 1$ to $x = 5$?

a) 20 b) 4 c) -5 d) 5 e) N.O.T.

16. Alex hiked a trail. After hiking 60% of the length of the trail, Alex still had 12 km left to go. What is the length of the trail?

a) 4.8 km b) 7.2 km c) 20 km d) 30 km e) N.O.T.

17. For a data set, if the first quartile is 22, the second quartile is 38, and the third quartile is 45, which of the following statements must be true?

a) Approximately half of the data values must be larger than 45.

b) The median of the data is greater than 38, but less than 45.

c) The interquartile range is 16.

d) Approximately one quarter of the data values must be smaller than 22.

e) N.O.T.

18. Which of these sets is not a function?

a) {(0, 1), (1, 1), (2, 1), (3, 1)}
b) {(0, 1), (1, 2), (2, 3), (3, 4)}
c) {(0, 1), (2, 3), (4, 5), (6, 7)}
d) {(0, 1), (0, 2), (0, 3), (0, 4)}
e) N.O.T.

19. Which of the following equations represents a line that passes through the point $(-2, 5)$ and is parallel to the x-axis?

a) $x = -2$
b) $y = -2x + 5$
c) $y = -2$
d) $y = 5x - 2$
e) N.O.T.

20. Consider the data set 4, 5, 6, 6, 7, 9, 12. Which of the following statements is true?

a) mean = mode
b) median = mode
c) mean < median
d) mean < mode
e) N.O.T.

21. Which value of x is in the solution set of the inequality $-2(x - 5) < 4$?

a) 0
b) 2
c) 3
d) 5
e) N.O.T.

22. An ice cream stand offers three flavors of ice cream: vanilla, chocolate, and strawberry. They also offer two types of cones (sugar and waffle) and three types of toppings (nuts, cookie crumbs, and sprinkles). If Josh does not order chocolate ice cream, how many different choices can he make that have one flavor of ice cream, one type of cone, and one topping?

a) 7
b) 8
c) 12
d) 18
e) N.O.T.

23. Evaluate the expression $-4x^2 - 4x - 4$ if $x = -4$.

a) 84
b) -84
c) -44
d) 44
e) N.O.T.

24. A triangle has vertices at points F(– 7, 3), G(2, 6), and H(3, 5). Where are the coordinates of each vertex if the triangle is reflected across the x-axis?

a) F'(7, – 3), G'(– 2, – 6), and H'(– 3, – 5)

b) F'(– 7, – 3), G'(2, – 6), and H'(3, – 5)

c) F'(7, 3), G'(– 2, 6), and H'(– 3, 5)

d) F'(– 7, – 3), G'(– 2, – 6), and H'(– 3, – 5)

e) N.O.T.

25. Jessica is going skiing. It costs $65 to rent skis, and $10/hour to ski. She does not want to spend more than $120, and the ski resort rules state you must pay for a full hour even if you do not ski for the whole hour. What is the maximum number of hours Jessica can ski?

a) 4 b) 5 c) 5.5 d) 6 e) N.O.T.

26. Erika has been at camp for three days. Every day she spends the same amount of money. At the end of the current day she has $227. At the end of five more days camp will be over, and Erika will have $87 left. How much money did Erika have at the start of camp?

a) $227 b) $255 c) $311 d) $367 e) N.O.T.

27. Which of the following expressions is equal to $(2x - 1)^2$?

a) $4x^2 - 1$ b) $4x^2 + 1$ c) $4x^2 + 4x + 1$ d) $4x^2 - 4x - 1$ e) N.O.T.

28. A circle has its center at (6, 7) and goes through the point (2, 4). A second circle is known to have one-fourth the area of the first circle. What is the radius of the second circle?

a) 1 unit b) 1.25 units c) 2 units d) 2.5 units e) N.O.T.

29. Julianna has two jobs. She earns \$10 per hour babysitting her neighbor's children, and she earns \$15 per hour tutoring a different neighbor's child. Let x represent the number of hours babysitting and y represent the number of hours tutoring. Which inequality accurately represents the situation in which Julianna works enough hours to earn at least \$200?

a) $10x + 15y \leq 200$ b) $10x + 15y \geq 200$ c) $15x + 10y \leq 200$ d) $15x + 10y \geq 200$ e) N.O.T.

30. The operation & is defined by $x\&y = x^2 + y^2$. If x is positive, and $x\&6 = 52$, then what is the value of x?

a) 46 b) 16 c) 256 d) 52 e) N.O.T.

31. Solve the following inequality: $|2x - 7| < 13$.

a) $-20 < x < 20$ b) $-10 < x < 10$ c) $-6 < x < 20$ d) $-3 < x < 10$ e) N.O.T.

32. Solve $A = \frac{1}{4}(x + y + z + w)$ for w.

a) $w = A - 4x - 4y - 4z$ b) $w = 4A + x + y + z$

c) $w = 4A - 4x - 4y - 4z$ d) $w = 4A - x - y - z$ e) N.O.T.

33. A triangle on the coordinate plane is rotated 90° clockwise, translated 4 units to the right, and then reflected about the y-axis. Which of the following must be true about the triangle obtained after this sequence of transformations?

a) The new triangle must be a right triangle.

b) The new triangle must have a side length of 4.

c) The new triangle is similar to, but not congruent to, the original triangle.

d) The new triangle is congruent to the old triangle.

e) N.O.T.

34. Which of the following triples of numbers could represent the lengths of the sides of a triangle?

a) 2, 2, 5 b) 1, 4, 6 c) 3, 3, 6 d) 3, 7, 11 e) N.O.T.

35. Consider the graph of a function $y = f(x)$. How is the graph of $y = f(x - 7)$ related to the graph of $y = f(x)$?

a) The graph of $y = f(x - 7)$ is found by shifting the graph of $f(x)$ right 7 units.

b) The graph of $y = f(x - 7)$ is found by shifting the graph of $f(x)$ left 7 units.

c) The graph of $y = f(x - 7)$ is found by shifting the graph of $f(x)$ up 7 units.

d) The graph of $y = f(x - 7)$ is found by shifting the graph of $f(x)$ down 7 units.

e) N.O.T.

36. Solve the following equation for x: $| x - 3 | = | 3 - x |$.

a) 3 b) 7 c) No Solution d) All Real Numbers e) N.O.T.

37. The set $S = \{1, 2, 3, \ldots, 50\}$ contains the first 50 positive integers. After the multiples of 2 and the multiples of 3 are removed, how many integers remain in S?

a) 8 b) 9 c) 17 d) 18 e) N.O.T.

38. When is $-x$ greater than x?

a) When x is negative b) When x is positive

c) When x is zero d) Never e) N.O.T.

39. What is the average rate of change of the function $f(x) = 2^x$ from $x = -1$ to $x = 4$?

a) 14/3 b) 14/5 c) 31/10 d) 33/10 e) N.O.T.

40. Rose and Colin paint houses. Rose can paint a particular house in eight hours, while Colin can pain the same house in ten hours. If Rose and Colin work together, which of the following must be true about the time needed to pain the house together?

a) It will take them less than four hours to paint the house together.

b) It will take them between four and eight hours to paint the house together.

c) It will take them between eight and ten hours to paint the house together.

d) It will take then between ten and eighteen hours to paint the house together.

e) N.O.T.

41. If the line passing through the two points (2, 7) and (k, 3k) has a slope of 2, then what is the value of k?

a) 2 b) 2.4 c) 3 d) 10 e) N.O.T.

42. A student spent 15 minutes painting a 2-foot by 3-foot bulletin board. How long did it take the student to paint 1 square foot?

a) 2.5 minutes b) 3 minutes c) 1.5 minutes d) 90 minutes e) N.O.T.

43. Which of the following must be true about the product of the first six primes?

a) The product must be odd b) The product's last digit is 0

c) The product is prime d) The product's first digit is 1 e) N.O.T.

44. Let $y = f(x)$ be a function with domain $0 \leq x \leq 8$ and range $0 \leq y \leq 16$. Which is true about the graphs of $y = f(x)$ and $y = f(2x)$?

a) The graph of $y = f(2x)$ is half as wide as the graph of $y = f(x)$

b) The graph of $y = f(2x)$ is twice as wide as the graph of $y = f(x)$

c) The graph of $y = f(2x)$ is half as tall as the graph of $y = f(x)$

d) The graph of $y = f(2x)$ is twice as tall as the graph of $y = f(x)$

e) N.O.T.

45. The cost of printing n pages from a color printer may be modeled by the function $C(n) = 0.25n$. What is an appropriate domain for $C(n)$?

a) All Real Numbers

b) All Rational Numbers

c) All Integers

d) All Whole Numbers

e) N.O.T.