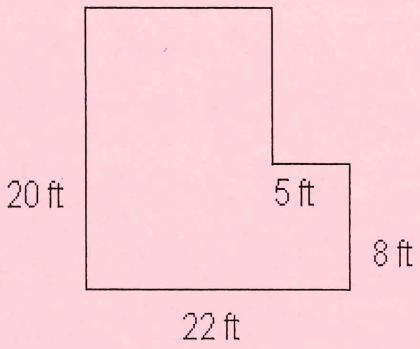
48th Annual Dick Schaff Math Superbowl

2023 Level 1 Exam – 7th Grade Blitz

Directions:
1. Select the most correct answer for each question and mark it on your Scantron.
2. Use $\pi = 3.14$ if needed.
3. NO CALCULATORS OR ELECTRONIC DEVICES MAY BE USED.
4. Note that N.O.T. means "none of these."

1. Find the perimeter of a room with the following dimensions:



(A) 84 ft. (B) 55 ft. (C) 380 ft. (D) 440 ft. (E) N.O.T.

2. A star-pattern is made by placing 9 points on a circle and drawing exactly 1 line segment from every point to every other point. How many line segments are in the pattern?
(A) 81 (B) 64 (C) 45 (D) 36 (E) N.O.T.

3. Solve the formula $P = \frac{A}{1+rt}$ for A, if $r = 0.2$, $t = 5$ and $P = 240$.
(A) 480 (B) 240 (C) 120 (D) 60 (E) N.O.T.

4. A coin has 2 sides: head and tail. If 4 coins are flipped, what is the probability that exactly 2 of the coins will land with head facing up?
(A) $\frac{1}{2}$ (B) $\frac{3}{8}$ (C) $\frac{1}{4}$ (D) $\frac{3}{16}$ (E) N.O.T

5. Which of the following is a prime number?
(A) 21 (B) 51 (C) 91 (D) 121 (E) N.O.T.

6. The numbers 9 and 10 are composite, but they are *coprime* with respect to each other, i.e., they share no common factors other than 1. Find the smallest composite number which is coprime with respect to 70.
(A) 6 (B) 9 (C) 15 (D) 33 (E) N.O.T

7. Two pizzas are ordered. Ed eats $\frac{3}{8}$ of a pizza, and Ted eats $\frac{3}{4}$ of a pizza. How much pizza is left for their brother, Ned?
A) $\frac{7}{8}$ (B) $\frac{3}{8}$ (C) $1\frac{1}{8}$ (D) $\frac{1}{2}$ (E) N.O.T

8. On a map, 4 inches represents 50 miles. How many miles does 21 inches represent, to the nearest whole mile?

(A) 213 (B) 240 (C) 263 (D) 270 (E) N.O.T.

9. A store offers a 30% discount on all items, and 8% sales tax is added to the discounted price. The final price of a pair of shoes, with tax is $45.36. What was the original price, before tax or discount?

(A) $60.00 (B) $54.24 (C) $55.34 (D) $62.60 (E) N.O.T.

10. Jae has the following test scores so far: 83, 56, 92, 87. To have an average of 80, what score is needed for the 5th test?

(A) 75 (B) 78 (C) 80 (D) 82 (E) N.O.T.

11. A garden has an area of 60 square feet and a perimeter of 38 feet. What is the value of one of the dimensions (length or width) in feet?

(A) 5 (B) 10 (C) 15 (D) 20 (E) N.O.T.

12. Simplify: $\frac{2}{3}(0.6) + \frac{11}{12}(2.4)$

(A) 2 (B) 2.4 (C) 2.6 (D) 3 (E) N.O.T.

13. Subtract: $8\frac{1}{5} - 5\frac{2}{3}$

(A) $2\frac{8}{15}$ (B) $3\frac{1}{2}$ (C) $3\frac{7}{15}$ (D) $11\frac{13}{15}$ (E) N.O.T.

14. How many miles/hour is 44 feet/second? 1 mile = 5280 feet.

(A) 90 (B) 60 (C) 30 (D) 20 (E) N.O.T.

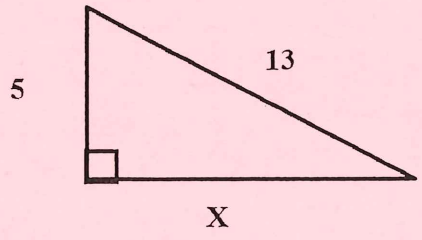
15. There are 1500 students at a school, and $\frac{2}{5}$ take a music class. If $\frac{1}{3}$ of music students are in marching band, how many students are in marching band?

(A) 100 (B) 200 (C) 300 (D) 500 (E) N.O.T.

16. A round spa is advertised using its circumference, to the nearest foot. If the diameter of the spa is 6.4 feet, what should be the label on the spa (in feet)?

(A) 15 (B) 20 (C) 22 (D) 40 (E) N.O.T.

17. Find the length of the unknown side of the right triangle below:



(A) 8 (B) 10 (C) 12 (D) 14 (E) N.O.T.

18. Evaluate the expression $\frac{1}{2}mv^2$ for $m = \frac{1}{3}$, $v = 12$

(A) 6 (B) 12 (C) 15 (D) 24 (E) N.O.T.

19. Find the next number in the sequence: 2, 5, 10, 17, ...

(A) 18 (B) 19 (C) 20 (D) 21 (E) N.O.T.

20. Find the sum of all the even integers between 2 and 100

(A) 550 (B) 1010 (C) 2550 (D) 5050 (E) N.O.T.

21. A natural number is divisible by 4, 6, 45, and 63. What is the smallest natural number that satisfies these conditions?

(A) 63 (B) 180 (C) 1260 (D) 2835 (E) N.O.T.

22. What number, multiplied by itself is equal to the product of 24 and 150?

(A) 40 (B) 52 (C) 60 (D) 72 (E) N.O.T.

23. A phone is originally priced at \$600, but it is discounted by 35%. Sales tax of 8% is added to the sale price. What is the final price?

(A) \$421.20 (B) \$432.00 (C) \$448.60 (D) \$500 (E) N.O.T.

24. In a survey of 100 students, 82 like English class, 63 like Science class, and 7 students don't like either class. How many students like both Science and English?

(A) 41 (B) 52 (C) 93 (D) 144 (E) N.O.T.

25. Mr. Morales has a box containing bags of different types of cookies. The box has:

- 3 bags of oatmeal cookies
- 8 bags of chocolate chip cookies
- 5 bags of lemon cookies
- 4 bags of snickerdoodles

Mr. Morales randomly gives one bag of cookies to each of his 20 students. Jonathan is a student in Mr. Morales's class. What statement about the likelihood of Jonathan receiving different types of cookies is true?

(A) Jonathan is less likely to receive either oatmeal or lemon cookies than snickerdoodles.
(B) Jonathan is equally likely to receive chocolate chip cookies as he is to receive either oatmeal or lemon cookies.
(C) Jonathan is twice as likely to receive snickerdoodles as he is to receive chocolate chip cookies.
(D) Jonathan is more likely to receive lemon cookies than oatmeal cookies and less likely to receive lemon cookies than snickerdoodles.
(E) N.O.T.

26. What is the 4-digit number in which the 2nd digit is $\frac{1}{3}$ of the 1st digit, the 3rd digit is the sum of the 1st and 2nd, and the last digit is 3 times the 1st digit?

(A) 6289 (B) 1346 (C) 9369 (D) 3149 (E) N.O.T.

27. How many different 3-digit numbers can be made using the digits 2, 4, 5, 6, and 7 if each of these digits can only be used once?

(A) 24 (B) 55 (C) 125 (D) 1680 (E) N.O.T.

28. A math machine takes in three numbers as the input, performs a specific computation with these numbers, and provides an output. Suppose the following inputs produce the given output:

- Inputs: 2, 0, and 1. Output: 1.
- Inputs: 0, 7, and 8. Output: 5.
- Inputs: 4, 3, and 5. Output: 4.
- Inputs: 8, 4, and 9. Output: 7.

What would be the machine's output if the inputs were 3, 5, and 1?

(A) 2 (B) 3 (C) 4 (D) 5 (E) N.O.T.

29. Simplify: $\frac{1}{4} \cdot 2^{10}$

(A) $\left(\frac{1}{2}\right)^{10}$ (B) $\left(\frac{1}{2}\right)^{8}$ (C) 2^8 (D) 2^{12} (E) N.O.T.

30. If x is a positive number, when is $\sqrt{x}$ greater than x?

(A) When x is less than 1 (B) When x is greater than 1
(C) Always (D) Never (E) N.O.T.

31. Solve for x: $|x - 4| = -2$

(A) 2 (B) 6 (C) –2 (D) A and B (E) N.O.T.

32. There are 53 socks in a drawer: 21 identical blue, 15 identical black, and 17 identical red. The room is completely dark, so socks must be taken out by chance. How many socks must be taken out to be 100% sure that there is 1 pair of black socks?

(A) 16 (B) 21 (C) 22 (D) 40 (E) N.O.T.

33. The repeating decimal 0.7272... is converted to a fraction in lowest terms. What number is in the denominator?

(A) 9 (B) 72 (C) 99 (D) 100 (E) N.O.T.

34. Find the next number in the sequence 2, 5, 10, 17, 26, ...

(A) 35 (B) 37 (C) 40 (D) 46 (E) N.O.T.

35. How many different ways can 1st, 2nd, and 3rd place winners be selected from 8 runners?

(A) 56 (B) 216 (C) 336 (D) 512 (E) N.O.T.

36. How many different ways can 3 finalists (equal rank) be selected from 8 runners?
(A) 56 (B) 216 (C) 336 (D) 512 (E) N.O.T.

37. Two dice (6-sided, labeled 1 to 6) are rolled. What is the probability that the sum of the 2 numbers is 9?
(A) $\frac{1}{6}$ (B) $\frac{5}{36}$ (C) $\frac{1}{9}$ (D) $\frac{1}{12}$ (E) N.O.T.

38. A bag contains 4 red candies and 6 blue candies. Three candies are randomly drawn with replacement (each candy is returned to the bag after one is drawn). What is the probability (to the nearest thousandth) that all 3 will be blue?
(A) 0.167 (B) 0.216 (C) 0.064 (D) 0.125 (E) N.O.T.

39. A bag contains 4 red candies and 6 blue candies. Three candies are randomly drawn WITHOUT replacement (after a candy is drawn, it is not replaced). What is the probability (to the nearest thousandth) that all 3 will be blue?
(A) 0.167 (B) 0.216 (C) 0.064 (D) 0.125 (E) N.O.T.

40. A bag contains 4 red candies and 6 blue candies. Three candies are randomly drawn WITHOUT replacement. What is the probability that 2 will be red and 1 will be blue, in any order?
(A) 0.096 (B) 0.08 (C) 0.24 (D) 0.125 (E) N.O.T.