

**Directions:** Choose the best answer for each of the following problems. Choice E is “NOT” for “None of these”.

1.  $36 \times 7 \div 4 - 5^2 =$

- A. 78                      B. 38                      C. 58                      D. 3364                      E. NOT

2.  $\frac{1}{12} + \frac{3}{12} + \frac{5}{12} + \frac{7}{12} + \dots + \frac{23}{12} =$

- A. 12                      B. 8                      C. 14                      D. 24                      E. NOT

3. Two teams scored a total of 61 points. One team won by 3 points. What was the higher score?

- A. 32                      B. 29                      C. 31                      D. 30                      E. NOT

4. A circle has a circumference of  $12\pi$  cm. What is its area?

- A.  $72\pi$  cm<sup>2</sup>                      B.  $18\pi$  cm<sup>2</sup>                      C.  $36\pi$  cm<sup>2</sup>                      D.  $144\pi$  cm<sup>2</sup>                      E. NOT

5. Billy bought two tacos for \$1.29 each and three nachos for \$2.29 each. How much in total did he spend?

- A. \$11.45                      B. \$10.45                      C. \$9.45                      D. \$8.45                      E. NOT

6. If  $N = -9$ , then  $N^2 - 6N + 9 =$

- A. 81                      B. 144                      C. 120                      D. 156                      E. NOT

7. What percent of 40 is 28?

- A. 80%                      B. 75%                      C.  $66\frac{2}{3}\%$                       D. 70%                      E. NOT

8.  $\frac{3}{5} + \frac{5}{3} =$

- A.  $2\frac{5}{9}$                       B.  $2\frac{2}{15}$                       C.  $2\frac{4}{15}$                       D.  $2\frac{3}{4}$                       E. NOT

9. Convert MMLXXIV to Arabic numerals.

- A. 274                      B. 276                      C. 2076                      D. 2074                      E. NOT

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10. Juanita left her house at 5:23pm. She averaged 50 mph on her 20-mile trip to her grandmother's house. What time did she get to her grandmother's house?
- A. 5:47pm      B. 5:43pm      C. 5:51pm      D. 5:49pm      E. NOT
11. On a map, 1 inch is equivalent to 22.5 miles. How many inches on the map represent a distance of 54 miles?
- A. 2.25 inches      B. 2.75 inches      C. 2.5 inches      D. 2.4 inches      E. NOT
12. Which property is represented by  $3 + 4 = 4 + 3$ ?
- A. additive inverse      B. additive identity      C. associativity      D. commutativity      E. NOT
13. There are 6 red and 4 blue coins in a hat. One coin is drawn out and it is blue. The coin is not replaced. What is the probability the next coin is also blue?
- A.  $\frac{1}{3}$       B.  $\frac{1}{2}$       C.  $\frac{2}{5}$       D.  $\frac{3}{5}$       E. NOT
14. The diagonal of a square is  $\sqrt{120}$  cm. What is the area of the square?
- A.  $90 \text{ cm}^2$       B.  $60 \text{ cm}^2$       C.  $30 \text{ cm}^2$       D.  $15 \text{ cm}^2$       E. NOT
15. The sum of the next three terms in the sequence 1, 1, 2, 3, 5, 8, ... is
- A. 60      B. 64      C. 68      D. 72      E. NOT
16.  $(51 \times 31 + 11) \div 8$  has a remainder of
- A. 3      B. 0      C. 4      D. 6      E. NOT
17.  $57$  (base 10) = \_\_\_\_\_ (base 7)
- A. 103      B. 110      C. 111      D. 101      E. NOT
18. Define  $A \otimes B$  to be  $\sqrt{A^2 + B^2}$ . Find  $8 \otimes 15$ .
- A. 22      B. 17      C. 19      D. 23      E. NOT

19. A 1-gallon bottle is 12.5% full of water. What percent of a quart is in the bottle?
- A. 50%      B. 25%      C. 75%      D. 100%      E. NOT
20. The bases of a trapezoid are 6 cm and 26 cm. What is the height if the area is  $160 \text{ cm}^2$ ?
- A. 10 cm      B. 20 cm      C. 5 cm      D. 15 cm      E. NOT
21.  $(3 \times 4 + 5^0) \times (4 \times 5 - 3^1) =$
- A. 221      B. 244      C. 272      D. 253      E. NOT
22. How many zeros are at the end of the number  $44!$ ?
- A. 6      B. 7      C. 8      D. 9      E. NOT
23. Solve for  $v$ :  $3v - 5[2v + 7(6 - 3v)] = 90 - 2v$
- A. 4      B. 3      C. 8      D. 7      E. NOT
24. If  $f(x) = \frac{x^4 - x^2}{x - 1}$ , find  $f(19)$ .
- A. 7160      B. 7220      C. 7280      D. 7340      E. NOT
25. If set  $A$  has 46 elements,  $B$  has 29 elements, and  $A \cap B$  has 12 elements, how many elements are in  $A \cup B$ ?
- A. 47      B. 63      C. 72      D. 58      E. NOT
26. 72% of 55 is 88% of what number?
- A. 40      B. 36      C. 45      D. 42      E. NOT
27. How many distinct diagonals does a regular octagon have?
- A. 12      B. 16      C. 20      D. 24      E. NOT
28.  $0.6363... - 0.3636... =$  \_\_\_\_\_ (fraction)
- A.  $\frac{4}{9}$       B.  $\frac{1}{3}$       C.  $\frac{4}{11}$       D.  $\frac{3}{11}$       E. NOT

29. What single digit M goes in the equation to make it true?

$$\begin{array}{r} 8 \ M \ 7 \\ + \ 3 \ M \ M \\ \hline 1 \ 1 \ 9 \ 1 \end{array}$$

- A. 3                      B. 4                      C. 5                      D. 6                      E. NOT

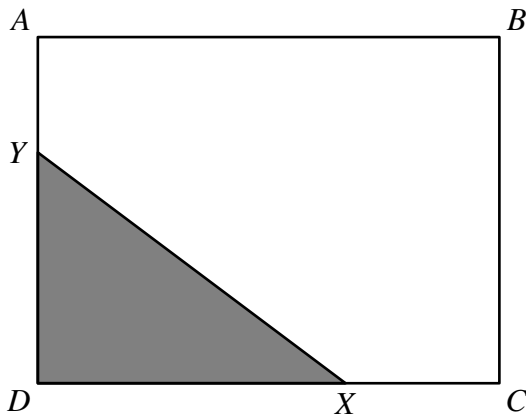
30. Find the sum of all solutions to the equation  $2x^2 - 3x + 1 = 0$ .

- A. -3                      B. 3                      C. -1.5                      D. 1.5                      E. NOT

31. The area of a rectangle is  $48 \text{ cm}^2$ . If the length is three times the width, what is its perimeter?

- A. 32 cm                      B. 12 cm                      C. 24 cm                      D. 44 cm                      E. NOT

32. In rectangle  $ABCD$ ,  $AB = 12$ ,  $BC = 9$ ,  $CX = 4$ , and  $XY = 10$ . Find the shaded area.



- A. 24  
B. 32  
C. 16  
D. Cannot be determined  
E. NOT

33. Solve  $V = \frac{1}{3}\pi r^2 h$  for  $h$ .

- A.  $h = \frac{3V}{\pi r^2}$                       B.  $h = \frac{V}{3\pi r^2}$                       C.  $h = \sqrt{\frac{3V}{\pi r}}$                       D.  $h = \frac{\pi r^2}{3V}$                       E. NOT

34. A pump can fill an empty tank in 3 hours. How long will it take to fill a tank that is half-full if two identical pumps are used?

- A. 6 hours                      B.  $1\frac{1}{2}$  hours                      C. 3 hours                      D. 45 minutes                      E. NOT

35. At a sandwich shop, there are 6 meats, 4 cheeses, and 2 breads to choose from. How many different sandwiches can be made with the different meat, cheese, and bread choices?

- A. 12                      B. 48                      C. 24                      D. 36                      E. NOT

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36. If  $2^{5x-1} = 8$ , then  $x =$
- A. 1.4            B. 1.2            C. 0.6            D. 0.8            E. NOT
37. If  $\frac{3x-12}{15} = 0.8$ , then  $\frac{3x+12}{15} =$
- A. 1.8            B. 1.2            C. 2.4            D. 3.6            E. NOT
38. A parallelogram has coordinates of  $(4, 7)$ ,  $(12, 3)$ ,  $(3, 1)$ , and  $(13, 9)$ . Find the point of intersection of its diagonals.
- A.  $(7, 6)$             B.  $(8, 5)$             C.  $(7, 5)$             D.  $(8, 6)$             E. NOT
39. What is the largest 4-digit number that can be formed from the digits 1, 4, 2, and 6 that is evenly divisible by 8?
- A. 6214            B. 6412            C. 4612            D. 4216            E. NOT
40. The odds of winning a game are 8:11. What is the probability of winning?
- A.  $\frac{11}{19}$             B.  $\frac{11}{8}$             C.  $\frac{3}{8}$             D.  $\frac{8}{19}$             E. NOT
41. How many positive integral divisors does 49 have?
- A. 2            B. 6            C. 3            D. 4            E. NOT
42. Inés made cookies to take to school. She gave  $\frac{2}{3}$  of the cookies to her classmates and the rest to the teachers. The teachers shared them equally, each teacher getting 2 cookies. If there are 15 teachers, how many cookies did the classmates get?
- A. 30            B. 120            C. 60            D. 90            E. NOT
43. What is the distance between the points  $(-7, 8)$  and  $(1, -7)$ ?
- A. 15            B. 17            C. 19            D. 21            E. NOT
44. Which of the following is a solution to the equation  $5x - 3y = -14$ ?
- A.  $(-1, 3)$             B.  $(2, 7)$             C.  $(-3, 9)$             D.  $(0, 5)$             E. NOT

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45. Find the total surface area of a right circular cylinder with diameter 10 cm and height 4 cm.
- A.  $90\pi \text{ cm}^2$       B.  $120\pi \text{ cm}^2$       C.  $84\pi \text{ cm}^2$       D.  $112\pi \text{ cm}^2$       E. NOT
46. What is the unit's digit of the product of  $5^{17}$  and  $17^5$ ?
- A. 3      B. 0      C. 5      D. 7      E. NOT
47. Each exterior angle of a regular pentagon measures how many degrees?
- A.  $60^\circ$       B.  $120^\circ$       C.  $72^\circ$       D.  $108^\circ$       E. NOT
48. The following pattern continues. What is the sum of the numbers in Row 9?
- |        |    |    |    |    |  |  |  |  |        |
|--------|----|----|----|----|--|--|--|--|--------|
| Row 1: | 1  |    |    |    |  |  |  |  | A. 636 |
| Row 2: | 3  | 5  |    |    |  |  |  |  | B. 792 |
| Row 3: | 7  | 9  | 11 |    |  |  |  |  | C. 693 |
| Row 4: | 13 | 15 | 17 | 19 |  |  |  |  | D. 729 |
|        | ⋮  |    |    |    |  |  |  |  | E. NOT |
49. Jerry and Ralph are in the middle of running a lap around a track. The circumference of the track is 400 feet. Jerry is 60 feet behind Ralph. Ralph is running at 6 feet per second. How fast should Jerry run so that they both complete the lap in 30 seconds?
- A. 9 ft/s      B. 8 ft/s      C. 12 ft/s      D. 4 ft/s      E. NOT
50. For  $x$  and  $y$  positive integers, if  $xy \geq 9$ , what is the smallest possible sum of  $x + y$ ?
- A. 6      B. 4      C. 12      D. 3      E. NOT