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SECTION 4

MATHEMATICS ACHIEVEMENT

Time: 40 minutes

45 Questions

Each question is followed by four suggested answers. Read each question and then decide which one of the four suggested answers is best.

Find the row of spaces on your answer sheet that has the same number as the question. In this row, mark the space having the same letter as the answer you have chosen.

Example:

$(5 + 3) - 2 =$

(A) 6
(B) 8
(C) 10
(D) 13

Sample Answer

● Ⓑ Ⓒ Ⓓ

The correct answer to this question is lettered A, so space A is marked.

1. Which of the following pairs of numbers are the two different prime factors of 36 ?

   (A) 2 and 3
   (B) 3 and 4
   (C) 3 and 12
   (D) 4 and 9

2. For what nonzero value of x will the expression $\frac{x - 3}{4x}$ be equal to 0 ?

   (A) –3
   (B) –2
   (C) 1
   (D) 3

3. Two positive whole numbers are in a ratio of 3 to 4. If the smaller of the two numbers is 9, what is the average of the two numbers?

   (A) 4
   (B) 10
   (C) 10.5
   (D) 12

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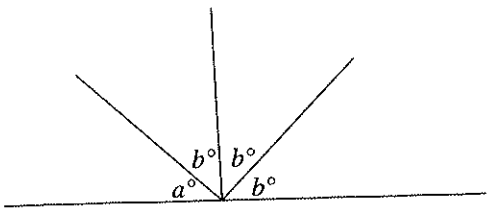


4. The four angles in the figure above share a common vertex on a straight line. What is the value of b when a equals 42 ?

(A) 38 degrees
(B) 40 degrees
(C) 42 degrees
(D) 46 degrees

5. What is 85% of 50 ?

(A) 150.75
(B) 135
(C) 42.5
(D) 39

6. A set of three positive integers has a sum of 11 and a product of 36. If the smallest of the three numbers is 2, what is the largest?

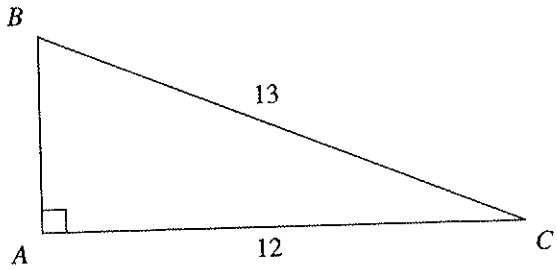
(A) 2
(B) 4
(C) 6
(D) 9

7. What is two-thirds of one-half?

(A) $\frac{1}{3}$
(B) $\frac{7}{6}$
(C) $\frac{1}{2}$
(D) $\frac{2}{3}$

8. If the distance around an oval-shaped track is 400 meters, how many laps does a runner have to run to cover a distance of 4 kilometers? (1 kilometer = 1,000 meters)

(A) 4
(B) 10
(C) 15
(D) 1,000



9. In triangle ABC shown above, the length of side AB is

(A) 5
(B) 7
(C) 11
(D) 14

10. If $f = 2$, and $f^j = 2f$, what is the value of j ?

(A) 0
(B) 1
(C) 2
(D) 3

11. If $\sqrt{a} + \sqrt{b} + \sqrt{c} = 15$, and $a = 36$ and $b = 25$, what is the value of c ?

(A) 4
(B) 16
(C) 49
(D) 81

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12. There are x students is Mrs. Sproul's class, 4 fewer than twice as many as are in Mrs. Puccio's class. If there are y students in Mrs. Puccio's class, then what is the value of y in terms of x ?

(A) $\frac{x}{2} + 2$

(B) $2x + 4$

(C) $2x - 4$

(D) $\frac{x}{2} - 4$

Questions 13-14 refer to the following definition.

For all real numbers x,

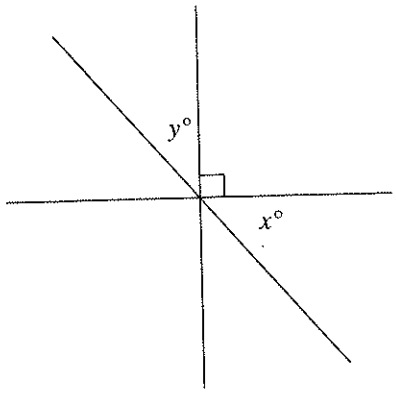
$\#x = x^2$ if x is negative;
$\#x = 2x$ if x is positive.

13. $\#(-6) - \#(6) =$

(A) –24
(B) 16
(C) 24
(D) 30

14. What is the value of $\#[\#x - \#y]$ when $x = 3$ and $y = -4$?

(A) –10
(B) 12
(C) 32
(D) 100



15. In the figure above, what is the value of x in terms of y ?

(A) y
(B) $90 - y$
(C) $90 + y$
(D) $180 - y$

16. $\frac{4a^4b^6c^3}{2a^3b^5c^2} =$

(A) $\frac{2ac}{b}$

(B) $\frac{ac}{b}$

(C) $\frac{2b}{c}$

(D) $2abc$

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17. In Mr. Johanessen's class, $\frac{1}{4}$ of the students failed the final exam. Of the remaining class, $\frac{1}{3}$ scored an A. What fraction of the whole class passed the test but scored below an A?

(A) $\frac{5}{12}$
(B) $\frac{1}{4}$
(C) $\frac{7}{12}$
(D) $\frac{1}{2}$

18. When buying new clothes for school, Rena spends \$20 more than Karen and \$50 more than Lynn does. If Rena spends r dollars, then what is the cost of all three of their purchases in terms of r?

(A) $r + 70$
(B) $\frac{r + 70}{3}$
(C) $3r - 70$
(D) $r + 210$

19. In a group of 100 children, there are 34 more girls than there are boys. How many boys are in the group?

(A) 33
(B) 37
(C) 67
(D) 68

20. If $6x - 7 = 17$, then $x + 6 =$

(A) 6
(B) 10
(C) 14
(D) 24

21. At Nicholas's Computer World, computers usually sold for \$1,500 are now being sold for \$1,200. What fraction of the original price is the new price?

(A) $\frac{1}{10}$
(B) $\frac{1}{5}$
(C) $\frac{3}{4}$
(D) $\frac{4}{5}$

22. If $\frac{3}{x} = \frac{y}{4}$, then

(A) $xy = 12$
(B) $3y = 4x$
(C) $\frac{x}{y} = \frac{4}{3}$
(D) $3x = 4y$

23. The ratio of boys to girls at Delaware Township School is 3 to 2. If there is a total of 600 students at the school, how many are girls?

(A) 120
(B) 240
(C) 360
(D) 400

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24. 150% of 40 is

(A) 30
(B) 40
(C) 50
(D) 60

25. Jane studied for her math exam for 4 hours last night. If she studied $\frac{3}{4}$ as long for her English exam, how many hours did she study all together?

(A) 3
(B) $4\frac{3}{4}$
(C) 6
(D) 7

26. $\frac{0.966}{0.42} =$

(A) 0.23
(B) 2.3
(C) 23
(D) 230

27. Nicole was able to type 35 words per minute. If she increased her speed by 20%, her new typing speed would be

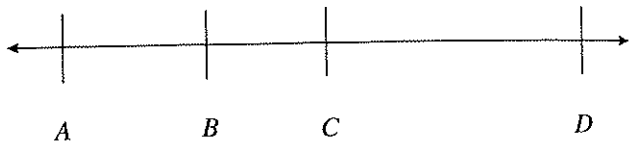
(A) 38 words per minute
(B) 42 words per minute
(C) 55 words per minute
(D) 70 words per minute

28. The first term in a series of numbers is 50. Each subsequent term is one-half the term before it if the term is even, or one-half rounded up to the next whole number if the term is odd. What is the third term in this sequence?

(A) 13
(B) 24
(C) 30
(D) 40

29. If the average of 7 and x is equal to the average of 5, 9, and x, what is the value of x ?

(A) 2
(B) 5
(C) 7
(D) 9



30. On the number line shown above, if segment BD has a length of 18, segment AB has a length of 5, and segment CD has a length of 12, then segment AC has a length of

(A) 6
(B) 11
(C) 17
(D) 23

31. The decimal representation of $2 + 40 + \frac{1}{100}$ is

(A) 24.1
(B) 24.01
(C) 42.1
(D) 42.01

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32. What is the least possible integer divisible by 2, 3, 4, and 5 ?

(A) 30
(B) 40
(C) 60
(D) 90

33. If a car travels at x miles per hour, in terms of x and y, how long does it take it to travel y miles?

(A) $\frac{2x}{y}$

(B) xy

(C) $\frac{y}{x}$

(D) $\frac{x}{y}$

34. $\frac{4}{15} + \frac{3}{11} =$

(A) $\frac{12}{17}$

(B) $\frac{89}{165}$

(C) $\frac{44}{45}$

(D) $\frac{4}{55}$

35. James buys one halibut steak and two salmon steaks for \$30.00. Dave buys two halibut steaks and four salmon steaks for \$60.00. If halibut steaks cost x dollars each and salmon steaks cost y dollars each, what is the value of x ?

(A) \$5.00
(B) \$8.00
(C) \$10.00
(D) It cannot be determined from the information given.

Question 36 refers to the following definition.

For all positive integer values of x,

$(x) = \frac{1}{2}x$ if x is even;

$(x) = 2x$ if x is odd.

36. $(1 + 5) =$

(A) 2
(B) 3
(C) 4
(D) 6

37. Which of the following equals $(4z + 1)$?

(A) $2z + \frac{1}{2}$

(B) $2z + 1$

(C) $4z + 2$

(D) $8z + 2$

38. There are eight buildings in Celeste's apartment complex. Each building is directly connected to each of the others with a tunnel. How many tunnels are there?

(A) 8
(B) 28
(C) 36
(D) 56

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39. Zoo A has 3 monkeys. Zoo B has 8 monkeys. Zoo C has 16 monkeys. What is the average number of monkeys at the three zoos?

(A) 3
(B) 7
(C) 9
(D) 27

40. A steak costs $4 more than a hamburger, and a hamburger costs $4 more than a grilled cheese sandwich. If six grilled cheese sandwiches cost $2x$ dollars, how much will 4 steaks and 2 hamburgers cost?

(A) $2x + 40$
(B) $2x + 48$
(C) $6x + 34$
(D) $12x + 40$

41. If the base of an isosceles triangle is decreased by 40% and its height is increased by 10%, then what is the percent change in the area of the triangle?

(A) 17
(B) 30
(C) 34
(D) 40

42. $100xy$ is what percent of xy ?

(A) 10
(B) 100
(C) 1,000
(D) 10,000

43. If Matt's home is four miles from school and Laura's home is eight miles from school, then the distance from Matt's home to Laura's home is

(A) 4 miles
(B) 8 miles
(C) 12 miles
(D) It cannot be determined from the information given.

44. Two partners divide a profit of $2,000 so that the difference between the two amounts is half of their average. What is the ratio of the larger to the smaller amount?

(A) 6:1
(B) 5:3
(C) 4:1
(D) 2:1

45. What is the total value, in cents, of j coins worth 10 cents each and $j + 5$ coins worth 25 cents each?

(A) $35j + 125$
(B) $35j + 5$
(C) $10j + 130$
(D) $2j + 5$

STOP

IF YOU FINISH BEFORE TIME IS CALLED,
YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY.
DO NOT TURN TO ANY OTHER SECTION IN THE TEST.