

6. The opposite of integer number a is equal to: (1)
- A. $\checkmark -a$ B. a
C. $1/a$ D. a^2

Answer: A

The opposite (or additive inverse) of any real number a is the number that when added to a yields zero, which is $-a$.

7. Which of the following is the number of elements in the set $A = \{1, 2, 3, 4, 5\}$? (1)
- A. $\checkmark 5$ B. 4
C. 3 D. 2

Answer: A

The set $A = \{1, 2, 3, 4, 5\}$ contains five distinct elements, so the number of elements is 5.

8. Which of the following is the set of prime numbers less than 10? (1)
- A. $\checkmark \{2, 3, 5, 7\}$ B. $\{2, 3, 5, 7, 9\}$
C. $\{1, 2, 3, 5, 7\}$ D. $\{2, 4, 6, 8\}$

Answer: A

The prime numbers less than 10 are 2, 3, 5, and 7. Note that 1 is not a prime number, and 9 is a composite number divisible by 3.

9. Which of the following is the set of multiples of 3 less than 15? (1)
- A. $\checkmark \{3, 6, 9, 12\}$ B. $\{3, 6, 9, 12, 15\}$
C. $\{1, 2, 3, 4, 5\}$ D. $\{2, 4, 6, 8, 10\}$

Answer: A

The positive multiples of 3 strictly less than 15 are 3, 6, 9, and 12, so the correct set is $\{3, 6, 9, 12\}$.

10. Which of the following is the set of numbers divisible by 4 less than 20? (1)
- A. $\checkmark \{4, 8, 12, 16\}$ B. $\{4, 8, 12, 16, 20\}$
C. $\{1, 2, 3, 4, 5\}$ D. $\{2, 4, 6, 8, 10\}$

Answer: A

The positive numbers divisible by 4 strictly less than 20 are 4, 8, 12, and 16, which corresponds to option A.

11. Which of the following is the set of perfect squares less than 20? (1)
- A. $\checkmark \{1, 4, 9, 16\}$ B. $\{1, 4, 9, 16, 20\}$
C. $\{1, 2, 3, 4, 5\}$ D. $\{2, 4, 6, 8, 10\}$

Answer: A

The perfect squares strictly less than 20 are $1^2 = 1$, $2^2 = 4$, $3^2 = 9$, and $4^2 = 16$.

12. Which of the following is the set of prime numbers between 10 and 20? (1)
- A. $\checkmark \{11, 13, 17, 19\}$ B. $\{11, 13, 17, 19, 20\}$
C. $\{1, 2, 3, 4, 5\}$ D. $\{2, 4, 6, 8, 10\}$

Answer: A

The prime numbers between 10 and 20 are those integers in that range with no divisors other than 1 and themselves, which are 11, 13, 17, and 19.

13. Which of the following is the set of multiples of 5 less than 20? (1)

- A. ✓ {5, 10, 15} B. {5, 10, 15, 20}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The positive multiples of 5 strictly less than 20 are 5, 10, and 15, which matches option A.

14. Which of the following is the set of numbers divisible by 6 less than 20? (1)

- A. ✓ {6, 12, 18} B. {6, 12, 18, 20}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The positive integers divisible by 6 strictly less than 20 are 6, 12, and 18.

15. Which of the following is the set of prime numbers between 20 and 30? (1)

- A. ✓ {23, 29} B. {23, 29, 30}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The prime numbers between 20 and 30 are 23 and 29. Therefore, the correct set is {23, 29}.

16. Which of the following is the set of multiples of 7 less than 30? (1)

- A. ✓ {7, 14, 21, 28} B. {7, 14, 21, 28, 30}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The positive multiples of 7 strictly less than 30 are 7, 14, 21, and 28, which corresponds to option A.

17. Which of the following is the set of numbers divisible by 8 less than 30? (1)

- A. ✓ {8, 16, 24} B. {8, 16, 24, 30}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The positive numbers divisible by 8 strictly less than 30 are 8, 16, and 24, which is given in option A.

18. Which of the following is the set of perfect squares less than 30? (1)

- A. ✓ {1, 4, 9, 16, 25} B. {1, 4, 9, 16, 25, 30}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The perfect squares strictly less than 30 are $1^2 = 1$, $2^2 = 4$, $3^2 = 9$, $4^2 = 16$, and $5^2 = 25$.

19. Which of the following is the set of prime numbers between 30 and 40? (1)

- A. ✓ {31, 37} B. {31, 37, 40}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The prime numbers between 30 and 40 are 31 and 37, making the correct set {31, 37}.

20. Which of the following is the set of multiples of 9 less than 40? (1)

- A. ✓ {9, 18, 27, 36} B. {9, 18, 27, 36, 40}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The positive multiples of 9 strictly less than 40 are 9, 18, 27, and 36, which is option A.

21. Which of the following is the set of perfect cubes less than 40? (1)

- A. ✓ {1, 8, 27} B. {1, 8, 27, 64}
C. {1, 2, 3, 4, 5} D. {2, 4, 6, 8, 10}

Answer: A

The perfect cubes strictly less than 40 are $1^3 = 1$, $2^3 = 8$, and $3^3 = 27$, which matches option A.

22. What is the value of m if a point $(2, -6)$ lies on the line $y = mx + 2$? (1)

- A. -2 B. ✓ -4
C. 3 D. -8

Answer: B

Substituting the point $(2, -6)$ into the line equation $y = mx + 2$ gives $-6 = m(2) + 2$, which simplifies to $2m = -8$, and thus $m = -4$.

23. On a number line, when we add a negative integer, we: (1)

- A. Move to the right B. Do not move at all
C. ✓ **Move to the left** D. None

Answer: C

Adding a negative integer to a number is equivalent to subtracting its absolute value, which corresponds to moving to the left on a number line.

24. The solution set of $|x - 6| = 10$ is: (1)

- A. {4, -16} B. {-6, 10}
C. ✓ {-4, 16} D. {10, -6}

Answer: C

The equation $|x - 6| = 10$ splits into two cases: $x - 6 = 10 \implies x = 16$ and $x - 6 = -10 \implies x = -4$, giving the solution set $\{-4, 16\}$.

25. Which one of the following is the equivalent fraction of $\frac{12}{20}$? (1)

- A. ✓ $\frac{3}{5}$ B. $\frac{3}{4}$
C. $\frac{4}{5}$ D. $\frac{4}{3}$

Answer: A

Simplifying the fraction $\frac{12}{20}$ by dividing both the numerator and denominator by their greatest common divisor, 4, yields $\frac{3}{5}$.

26. Which one of the following numbers are in descending order? (1)

- A. $\frac{7}{12}, \frac{2}{3}, \frac{3}{2}$ B. $\frac{3}{2}, \frac{7}{12}, \frac{2}{3}$
C. ✓ $\frac{3}{2}, \frac{2}{3}, \frac{7}{12}$ D. $\frac{2}{3}, \frac{3}{2}, \frac{7}{12}$

Answer: C

Converting the fractions to decimals gives $\frac{3}{2} = 1.5$, $\frac{2}{3} \approx 0.67$, and $\frac{7}{12} \approx 0.58$. Since $1.5 > 0.67 > 0.58$, they are in descending order in option C.

27. The sum of $\frac{1}{3} + \frac{2}{3}$ is equal to: (1)
- A. $\frac{3}{6}$ B. 6
C. $\frac{1}{3}$ D. ✓ 1

Answer: D

Since the fractions have a common denominator, we add their numerators: $\frac{1}{3} + \frac{2}{3} = \frac{1+2}{3} = \frac{3}{3} = 1$.

28. $\frac{7}{9} - \frac{4}{3} =$ (1)
- A. $-\frac{9}{5}$ B. ✓ $-\frac{5}{9}$
C. $\frac{3}{6}$ D. $\frac{5}{9}$

Answer: B

To subtract the fractions, find a common denominator of 9: $\frac{7}{9} - \frac{4}{3} = \frac{7}{9} - \frac{12}{9} = \frac{7-12}{9} = \frac{-5}{9}$.

29. The product of $2\frac{5}{7} \times \left(-\frac{3}{2}\right) =$ \$ (1)
- A. ✓ $-\frac{57}{14}$ B. $-\frac{15}{7}$
C. $\frac{10}{9}$ D. $\frac{10}{3}$

Answer: A

First convert the mixed fraction to an improper fraction: $2\frac{5}{7} = \frac{19}{7}$. Then multiply: $\frac{19}{7} \times \left(-\frac{3}{2}\right) = -\frac{57}{14}$.

30. If Birr 1200 is invested at 10% simple interest per annum, then what is the simple interest after 5 years? (1)
- A. 800 Birr B. 500 Birr
C. 700 Birr D. ✓ 600 Birr

Answer: D

Simple interest is calculated as $I = P \times R \times T = 1200 \times 0.10 \times 5 = 600$ Birr.

31. If $X = \frac{-2}{3}$, then $X^2 =$ (1)
- A. $-\frac{4}{6}$ B. $\frac{4}{6}$
C. ✓ $\frac{4}{9}$ D. $-\frac{4}{9}$

Answer: C

Squaring a negative fraction results in a positive fraction: $X^2 = \left(\frac{-2}{3}\right)^2 = \frac{(-2)^2}{3^2} = \frac{4}{9}$.

32. $\sqrt{\frac{25}{9}} =$ (1)
- A. ✓ $\frac{5}{3}$ B. $\frac{14}{9}$
C. $\frac{3}{5}$ D. $\frac{7}{10}$

Answer: A

The square root of a fraction is the square root of the numerator divided by the square root of the denominator: $\sqrt{\frac{25}{9}} = \frac{\sqrt{25}}{\sqrt{9}} = \frac{5}{3}$.

33. Which one of the following numbers is both a perfect square and a perfect cube? (1)
- A. 81 B. ✓ 64
C. 100 D. 36

Answer: B

The number 64 is both a perfect square ($8^2 = 64$) and a perfect cube ($4^3 = 64$).

34. $\sqrt[3]{0.001}$ is equal to: (1)
- A. 0.01
B. ✓ 0.1
C. 0.001
D. 0.0001

Answer: B

The number 0.001 can be written as 10^{-3} , and its cube root is $(10^{-3})^{1/3} = 10^{-1} = 0.1$.

35. The area of a square park is $81m^2$. Its length of side is equal to: (1)
- A. 27 m
B. 6 m
C. ✓ 9 m
D. 3 m

Answer: C

The area of a square is given by $A = s^2$. Thus, the side length $s = \sqrt{81} = 9$ m.

36. The cube of 0.4 is equal to: (1)
- A. 0.16
B. ✓ 0.064
C. $\frac{64}{100}$
D. $\frac{16}{100}$

Answer: B

The cube of 0.4 is $(0.4)^3 = 0.4 \times 0.4 \times 0.4 = 0.064$.

37. Which of the following points does not satisfy the equation $y = 4x$? (1)
- A. (0, 0)
B. (2, 8)
C. ✓ (-1, 4)
D. (3, 12)

Answer: C

For the point $(-1, 4)$, substituting $x = -1$ gives $y = 4(-1) = -4$, which does not equal the given y -value of 4.

38. If the point $P(a, 3)$ lies on the line given by the equation $12x - 2y = 0$, then what is the value of a ? (1)
- A. ✓ $\frac{1}{2}$
B. $\frac{4}{3}$
C. $\frac{3}{4}$
D. -3

Answer: A

Substituting $P(a, 3)$ into the line equation $12x - 2y = 0$ gives $12a - 2(3) = 0 \implies 12a = 6 \implies a = \frac{1}{2}$.

39. What is the solution set of the inequality $\frac{x+1}{3} > \frac{2x}{5}$ in the set of natural numbers? (1)
- A. $\{1, 2\}$
B. $\{1, 2, 3\}$
C. $\{1, 2, 3, 4, 5\}$
D. ✓ $\{1, 2, 3, 4\}$

Answer: D

Multiplying both sides of the inequality $\frac{x+1}{3} > \frac{2x}{5}$ by 15 gives $5x + 5 > 6x \implies x < 5$. In the set of natural numbers $\{1, 2, 3, \dots\}$, the solutions are $\{1, 2, 3, 4\}$.

40. The solution set of $2x - 5 < x + 1, x \in \mathbb{Q}$ is: (1)
- A. $\{x : x < -4\}$
B. $\{x : x > 6\}$
C. $\{x : x > -4\}$
D. ✓ $\{x : x < 6\}$

Answer: D

By simplifying the inequality $2x - 5 < x + 1$, we subtract x and add 5 to both sides to obtain $x < 6$. Since $x \in \mathbb{Q}$, the solution set is $\{x : x < 6\}$.

41. The sum of the age of the mother and her daughter is 68 years. The mother is 22 years older than her daughter. (1)
How old is her mother?
- A. ✓ 45 years B. 46 years
C. 23 years D. 50 years

Answer: A

Let the mother's age be m and the daughter's age be d . We have $m + d = 68$ and $m - d = 22$. Adding these two equations gives $2m = 90 \implies m = 45$ years.

— END OF MARKING KEY —

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