

## NUMBER PATTERNS 7: QUIZ SOLUTIONS

### Question 1

If the arithmetic series  $3 - 1 - 5 - \dots$  has  $S_n = -150$ , what is the value of  $n$ ?

- A. -10      B. 10      C.  $\frac{15}{2}$       D.  $-\frac{15}{2}$

### Solution

$$a = 3, d = -4, S_n = -150$$

$$\therefore \frac{1}{2}n[2(3) + (n-1)(-4)] = -150$$

$$\therefore n(6 - 4n + 4) = -300$$

$$\therefore 10n - 4n^2 = -300$$

$$\therefore 4n^2 - 10n - 300 = 0$$

$$\therefore 2n^2 - 5n - 150 = 0$$

$$\therefore (2n + 15)(n - 10) = 0$$

$$\therefore n = -\frac{15}{2} \text{ or } 10$$

$$\text{Number of terms, } n = 10$$

So, correct answer is B.

### Question 2

Evaluate the arithmetic series  $11x + 9x + 7x + \dots$  to 14 terms.

- A.  $-28x$       B.  $-28$       C.  $28$       D.  $28x$

### Solution

$$a = 11x, d = -2x, n = 14$$

$$\therefore S_{14} = \frac{1}{2} \times 14[2(11x) + 13(-2x)]$$

$$= 7(22x - 26x)$$

$$= -28x$$

So, the correct answer is A.

### Question 3

What is the sum of the series  $4 + 9 + 14 + \dots + 54$ ?

- A. 58      B. 79      C. 319      D. 638

### Solution

$$a = 4, d = 5, T_n = 54$$

$$\therefore 4 + (n-1)(5) = 54$$

$$\therefore n = 11$$

$$\therefore S_{11} = \frac{1}{2} \times 11(4 + 54)$$

$$= \frac{1}{2} \times 11 \times 58$$

$$= 319$$

So, the correct answer is C.

**Question 4**

If the first three terms of an arithmetic series are  $t - 2$ ,  $2t - 6$  and  $4t - 8$ , what is the value of  $t$ ?

- A. -8      B. -6      C. -4      D. -2

**Solution**

$$a = t - 2, \quad a + d = 2t - 6, \quad a + 2d = 4t - 8$$

$$\therefore (2t - 6) - (t - 2) = (4t - 8) - (2t - 6)$$

$$\therefore t - 4 = 2t - 2$$

$$\therefore t = -2$$

So, the correct answer is D.

**Question 5**

What is the greatest number of terms for which the series  $\sum_{r=1}^n (2r - 10)$  has a value less than 22?

- A. 9      B. 10      C. 11      D. 12

**Solution**

$$\sum_{r=1}^n (2r - 10) = -8 - 6 - 4 - \dots < 22$$

$$\text{i.e., } a = -8, \quad d = 2$$

$$\therefore \frac{1}{2}n[2(-8) + (n - 10)(2)] < 22$$

$$\therefore n(-16 + 2n - 2) < 44$$

$$\therefore 2n^2 - 18n - 44 < 0$$

$$\therefore n^2 - 9n - 22 < 0$$

$$\therefore (n - 11)(n + 2) < 0$$

$$\therefore n < 11 \text{ or } n > -2$$

$$\therefore n = 10$$

So, the correct answer is B.