QUESTION POOL & ORUKKAM QUESTIONS & ANSWERS

Qn. 1 **(Question Pool - 2017)**

Write the sequence obtained by adding two adjacent consecutive terms in counting numbers starting from 1. Write the algebraic expression of this sequence.

Sequence obtained by adding two adjacent consecutive terms = 3, 5, 7, 9, ...

Algebraic expression of this sequence

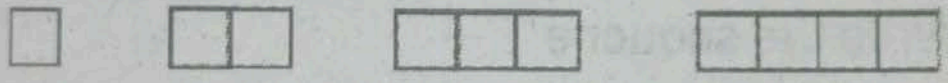
$= 3 + (n - 1)2$

$= 3 + 2n - 2$

$= 2n + 1$

Qn. 2 **(Question Pool - 2017)**

A pattern is formed using sticks of equal length as shown below:



a) Write the sequence of number of sticks used in each figure.

b) Write the sequence of number of squares and rectangles in each figure.

c) Write the algebraic expression in the above two sequences

d) Find the number of sticks and squares in the 10^{th} figure.

a) Sequence of number of sticks

$= 4, 7, 10, 13, ..$

b) Sequence of squares and rectangles

$= 1, 3, 6, 10, ..$

c) Algebraic Expression of the first sequence

$= 4 + (n-1)3$

$= 4 + 3n - 3$

$= 3n + 1$

Algebraic expression of the 2nd sequence

$= \frac{n(n+1)}{2}$

d) Number of sticks in the 10th figure

$= 3 \times 10 + 1$

$= 31$

No. of squares and rectangle in the 10th figure

$= \frac{10(10+1)}{2}$

$= \frac{10 \times 11}{2}$

$= 55$

Qn. 3 **(Question Pool - 2017)**

Consider an arithmetic sequence with common difference 6 and 7th term 52. Find the 15th term of the arithmetic sequence. Is it possible, to get a difference of 100 between any two terms of this sequence?

Ans $d = 6, x_7 = 52$

15th term $x_{15} = x_7 + 8 \times d$

$= 52 + 48 = 100$

100 is not a multiple of common difference 6.

Qn. 4 **(Question Pool - 2017)**

Consider an arithmetic sequence whose 7th term is 34 and 15th term is 66.

a) Find the common difference.

b) Find the 20th term.

Ans a) 15th term can be obtained by adding 7th term and 8 times the common difference.

$x_{15} = x_7 + 8d \; ; x_7 = 34, x_{15} = 66$

$8d = x_{15} - x_7$

$8d = 66 - 34 = 32$

$d = \frac{32}{8} = 4$

Common difference = 4

b) 20th term $= x_{15} + 5d$

$= 66 + 5 \times 4$

$= 66 + 20 = 86$

Qn. 5 **(Question Pool - 2017)**

Consider an arithmetic sequence $\frac{17}{7}, \frac{20}{7}, \frac{23}{7}, \ldots\ldots$

a) Write the algebraic expression of the sequence

b) Write the sequence of counting numbers in the above given sequence. Is the newly obtained sequence an arithmetic sequence.

Ans a) Sequence = $\frac{17}{7}, \frac{20}{7}, \frac{23}{7}, \ldots$

Common difference $d = \frac{20}{7} - \frac{17}{7} = \frac{3}{7}$

Algebraic expression $x_n = \frac{17}{7} + (n-1) \times \frac{3}{7}$

$= \frac{17}{7} + \frac{3n}{7} - \frac{3}{7}$

$= \frac{3}{7}n + 2$

b) $x_n = \frac{3}{7}n + 2$

$x_7 = \frac{3}{7} \times 7 + 2 = 5$

$x_{14} = \frac{3}{7} \times 14 + 2 = 8$

$x_{21} = \frac{3}{7} \times 21 + 2 = 11$

The newly obtained sequence is 5, 8, 11, ... is an arithmetic sequence with common difference 3.

Qn. 6 **(Question Pool - 2017)**

Find the 20^{th} term of an arithmetic sequence if its 6^{th} term is 14 and 14^{th} term is 6.

Ans $x_6 = 14$

$x_{14} = 6$

$x_1 + 5d = 14$ ..... (1)

$x_1 + 13d = 6$ ..... (2)

(2) -(1) $\rightarrow$ $8d = -8$ $d = -1$

20^{th} term $x_{20} = x_{14} + 6d$

$= 6 + 6 \times -1$

$= 6 - 6 = 0$

Qn. 7 **(Question Pool - 2017)**

Find the 13^{th} term of an arithmetic sequence if 5 times the 5^{th} term is equal to 8 times the 8^{th} term.

Ans 5^{th} term $= x_5$

8^{th} term $x_8 = x_5 + 3d$

$5x_5 = 8(x_5 + 3d)$

$5 \times x_5 - 8x_5 = 24d$

$-3x_5 = 24d$

$x_5 = -8d$

$x_{13} = x_5 + 8d$

$= -8d + 8d = 0$

13^{th} term $= 0$

Qn. 8 **(Question Pool - 2017)**

Prove that the square of any term of the arithmetic sequence 7, 11, 15..... will not be a term of the sequence.

Ans Sequence = 7, 11, 15, ...

Algebraic expression $x_n = 4n + 3$

Each term when divided by 4

Leave remainder 3.

But the square of each term divided by 4 we get remainder 1. Therefore square of any term will not be a term of the given sequence.

Qn. 9 **(Question Pool - 2017)**

Consider two arithmetic sequences given below: 11, 19, 27, ... and 50, 55, 60, ...

Is there a common number to these sequences at same term position? If yes, find the term positions. Find the term?

Ans Consider the sequence 11, 19, 27, ...

$$x_n = 11 + (n - 1)\,8$$
$$= 8n - 8 + 11$$
$$= 8n + 3$$

Consider the sequence 50, 55, 60, ...

$$x_n = 50 + (n - 1)\,5$$
$$= 50 + 5n - 5$$
$$= 5n + 45$$

If n^{th} terms are equal for both sequences

$$8n + 3 = 5n + 45$$
$$3n = 42$$
$$n = 14$$

The 14^{th} term of both sequences are equal.

$$14^{th} \text{ term} = 8 \times 14 + 3 = 115$$

Qn. 10 **(Question Pool - 2017)**

Find the sum of first 25 terms of the arithmetic sequence 5, 8, 11, ...

Ans The sequence = 5, 8, 11, ...

Sum of first 25^{th} term $= \frac{n}{2}[x_1 + x_{25}]$

$$x_1 = 5$$
$$x_n = 3n + 2$$
$$x_{25} = 77$$

$$\text{Sum of } 25^{th} \text{ term} = \frac{25}{2}[5 + 77)$$

$$= \frac{25}{2} \times 82 = 1025$$