Arithematic Progressions Ex 19.4 Q1

(i) $50, 46, 42, \ldots, 10$ terms

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$S_{10} = \frac{10}{2}\left[2 \times 50 + (10-1)(-4)\right]$$

$$= 320$$

(ii) $13, 5, \ldots, 12$ terms

$$S_{12} = \frac{12}{2}\left[2 \times 1 + (12-1)2\right]$$

$$= 6 \times 24 = 144$$

(iii) $3, \frac{9}{2}, 6, \frac{15}{2}, \ldots, 25$ terms

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$S_{25} = \frac{25}{2}\left(2 \times 3 + 24 \times \frac{3}{2}\right)$$

$$= 525$$

(iv) $41, 36, 31, \ldots, 12$ terms

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$S_{25} = \frac{25}{2}\left[2 \times 41 + (11)(-5)\right]$$

$$= 162$$

(v) $a+b, a-b, a-3b, \ldots$ to 22 terms

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$S_{22} = \frac{22}{2}\left[2a + 2b + 21(-2b)\right]$$

$$= 22a - 440b$$

(vi) $(x-y)^2, \left(x^2+y^2\right), (x+y)^2, \ldots, x$ terms

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$= \frac{n}{2}\left[2\left(x^2 + y^2 - 2xy\right) + (x-1)(-2xy)\right]$$

$$= n\left[(x-y)^2 + (n-1)xy\right]$$

$$\frac{x-y}{x+y}, \frac{3x-2y}{x+y}, \frac{5x-3y}{x+y}, \text{.....to n terms}$$

nth term in above sequence is $\frac{(2n-1)x-ny}{x+y}$

Sum of n terms is given by

$$\frac{1}{\text{x+y}}\left[x+3x+5x+.....+(2n-1)x-(y+2y+3y...+ny)\right]$$

$$=\frac{1}{\text{x+y}}\left[\frac{n}{2}(2x+(n-1)2x)-\frac{n(n+1)y}{2}\right]$$

$$=\frac{1}{2(\text{x+y})}\left[2n^2x-2n^2y-ny\right]$$

Arithematic Progressions Ex 19.4 Q2

(i) $2+5+8+\ldots+182.$

a_n term of given A.P is 182

$a_n = a+(n-1)d = 182$

$\Rightarrow$ $182 = 2+(n-1)3$

or $n = 61$

Then,

$$S_n = \frac{n}{2}[a+l]$$
$$= \frac{61}{2}[2+182]$$
$$= 61\times 92$$
$$= 5612$$

(ii) $101+99+97+\ldots+47$

a_n term of A.P of n terms is 47.

$\therefore$ $47 = a+(n-1)d$

$47 = 101+(n-1)(-2)$

or $n = 28$

Then,

$$S_n = \frac{n}{2}[a+l]$$
$$= \frac{28}{2}[101+47]$$
$$= 14\times 148$$
$$= 2072$$

(iii) $(a-b)^2+(a^2+b^2)+(a+b)^2+\ldots+\left[(a+b)^2+6ab\right]$

Let number of terms be n

Then,

$a_n = (a+b)^2+6ab$

$\Rightarrow$ $(a-b)^2+(n-1)(2ab) = (a+b)^2+6ab$

$\Rightarrow$ $a^2+b^2-2ab+2abn-2ab = a^2+b^2+2ab+6ab$

$\Rightarrow$ $n = 6$

Then,

$$S_n = \frac{n}{2}[a+l]$$
$$S_6 = \frac{6}{2}\left[a^2+b^2-2ab+a^2+b^2+2ab+6ab\right]$$
$$= 6\left[a^2+b^2+3ab\right]$$

A.P formed is $1, 2, 3, 4, \ldots, n$.

Here,

$a = 1$

$d = 1$

$l = n$

So sum of n terms $= S_n = \frac{n}{2}\left[2a + (n-1)d\right]$

$= \frac{n}{2}\left[2 + (n-1)1\right]$

$= \frac{n(n+1)}{2}$ is the sum of first n natural numbers.

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