Arithematic Progressions Ex 19.4 Q1

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

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

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

$$= 320$$

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

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

$$= 6 \times 24 = 144$$

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

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

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

$$= 525$$

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

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

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

$$= 162$$

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

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

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

$$= 22a - 440b$$

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

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

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

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

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

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

Sum of n terms is given by

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

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

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

Arithematic Progressions Ex 19.4 Q2

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

$\quad$ a_n term of given A.P is 182

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

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

or $\quad$ $n = 61$

Then,

$$S_n = \frac{n}{2}[a + l]$$

$$= \frac{61}{2}[2 + 182]$$

$$= 61 \times 92$$

$$= 5612$$

(ii) $101 + 99 + 97 + ... + 47$

$\quad$ a_n term of A.P of n terms is 47.

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

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

or $\quad$ $n = 28$

Then,

$$S_n = \frac{n}{2}[a + l]$$

$$= \frac{28}{2}[101 + 47]$$

$$= 14 \times 148$$

$$= 2072$$

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

Let number of terms be n

Then,

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

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

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

$\Rightarrow$ $\quad$ $n = 6$

Then,

$$S_n = \frac{n}{2}[a + l]$$

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

$$= 6\left[a^2 + b^2 + 3ab\right]$$

Arithematic Progressions Ex 19.4 Q3

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

Here,

$a = 1$

$d = 1$

$l = n$

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

$$= \dfrac{n}{2}\big[2 + (n-1)1\big]$$

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

********** END **********