EXERCISE 5·3

Q1) (i) Here, $a = 2$, $t_2 = 7$, $t_3 = 12$ and $n = 10$.

$\therefore d = t_3 - t_2 = 12 - 7 = 5$.

$\therefore$ The required sum,

$$S_{10} = \frac{10}{2}[2 \times 2 + (10-1)5]$$

$$= 5 \times 49 = 245.$$

(ii) Here, $a = -37$, $t_2 = -33$, $t_3 = -29$ and

$n = 12$

$\therefore d = t_2 - t_2 = -29 + 33 = 4.$

$$S_{12} = \frac{12}{2}[2 \times (-37) + (12-1)4].$$

$$= 6 \times (-30) = -180.$$

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(i) $7 \times 10\frac{1}{2} + 14 + \dots + 84.$

Here,

$a = 7, d = \frac{21}{2} - \frac{7}{1} = \frac{7}{2}, a_n = 84.$

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

$84 = 7 + (n-1)\frac{7}{2} \Rightarrow 84 - 7 = (n-1)\frac{7}{2}$

$\Rightarrow 77 \times \frac{2}{7} = n-1 \Rightarrow 22 + 1 = n \Rightarrow n = 23.$

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

$S_{23} = \frac{23}{2}[7 + 84] = \frac{23}{2} \times 91 = \frac{2093}{2} = 1046.5.$

Q3) (i) Given: $a = 5$, and $d = 3$ and $a_n = 50$

Applying the formula,

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

$\Rightarrow 5 + (n-1)3 = 50$

$\Rightarrow 3n = 48 \Rightarrow n = 16.$

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

$\Rightarrow S_{16} = \frac{16}{2}[2 \times 5 + (16-1)3]$

$= 8(10+45) = 8 \times 55 = 440.$

(ii) $a_{13} = a + (13-1)d.$

$35 = 7 + 12d.$

$d = \frac{28}{12} = \frac{7}{3}$

$\therefore S_{13} = \frac{13}{2}[2a + 12d] \Rightarrow \frac{13}{2}\left[2 \times 7 + 12 \times \frac{7}{3}\right] = \frac{13}{2} \times 42 = 273.$

Q4) $S_n = \frac{n}{2}[2a+(n-1)d]$

$\Rightarrow 636 = \frac{n}{2}[2\times 9 + (n-1)8]$

$\Rightarrow 636 \times 2 = 2n(5+4n) \Rightarrow \frac{636 \times 2}{2} = 5n + 4n^2.$

$\Rightarrow 4n^2 + 5n - 636 = 0 \Rightarrow 4n^2 + 53n - 48n - 636 = 0.$

$\Rightarrow n(4n+53) - 12(4n+53) = 0 \Rightarrow (4n+53)(n-12) = 0.$

$\Rightarrow 4n + 53 = 0$ or $n - 12 = 0.$

$\Rightarrow n = \frac{-53}{4}$ or $n = 12$

Hence, $n = 12.$