Arithematic Progressions Ex 19.2 Q19

Given,

$$n = 60$$
$$a = 7$$
$$l = 125$$
$$\therefore \quad a + (n-1)d = 125$$
$$7 + (59)d = 125$$
$$d = 2$$

$$\therefore \quad a_{32} = a + (32-1)d$$
$$= 7 + (31)2$$
$$= 69$$

32nd term is 69.

Arithematic Progressions Ex 19.2 Q20

$$a_4 + a_8 = 24 \qquad [\text{Given}]$$
$$\Rightarrow \quad (a+3d) + (a+7d) = 24$$
$$\Rightarrow \quad a + 5d = 12 \qquad \text{---(i)}$$

$$a_6 + a_{10} = 34$$
$$\Rightarrow \quad (a+5d) + (a+9d) = 34$$
$$\Rightarrow \quad a + 7d = 17 \qquad \text{---(ii)}$$

From (i) and (ii)

$$a = \frac{-1}{2} \text{ and } d = \frac{5}{2}$$

$\therefore$ 1st term is $\frac{-1}{2}$ and common difference is $\frac{5}{2}$.

Arithematic Progressions Ex 19.2 Q21

The nth term from starting

$$= a_n = aa + (n-1)d \qquad \text{---(i)}$$

The nth term from end

$$= l - (n-1)d \qquad \text{---(ii)}$$

Adding (i) and (ii), we get

Sum of nth term from begining and nth term from the end

$$= a + (n-1)d + l - (n-1)d$$

$= a + l$ Hence proved.

Arithematic Progressions Ex 19.2 Q22

$$\frac{a_4}{a_7} = \frac{2}{3} \qquad [\text{Given}]$$

$$\Rightarrow \quad \frac{a+3d}{a+6d} = \frac{2}{3} \qquad =$$

$$\Rightarrow \quad 3a + 9d = 2a + 12d$$

$$\Rightarrow \quad a = 3d \qquad \text{---(i)}$$

$$\frac{a_6}{a_8} = \frac{a+5d}{a+7d}$$

$$\Rightarrow \quad = \frac{3d+5d}{3d+7d} \qquad [\because 3d \text{ from (i)}]$$

$$\Rightarrow \quad = \frac{8d}{10d}$$

$$\Rightarrow \quad = \frac{4}{5}$$

$$\frac{a_6}{a_8} = \frac{4}{5}$$

Arithematic Progressions Ex 19.2 Q23

$$\sec\theta_1\sec\theta_2+\sec\theta_2\sec\theta_3+....+\sec\theta_{n-1}\sec\theta_n=\frac{\tan\theta_n-\tan\theta_1}{\sin d}$$

$$\theta_2-\theta_1=\theta_3-\theta_2=.........=d$$

$$\sec\theta_1\sec\theta_2=\frac{1}{\cos\theta_1\cos\theta_2}=\frac{\sin d}{\sin d\left(\cos\theta_1\cos\theta_2\right)}$$

$$=\frac{\sin(\theta_2-\theta_1)}{\sin d\left(\cos\theta_1\cos\theta_2\right)}$$

$$=\frac{\sin\theta_2\cos\theta_1-\cos\theta_2\sin\theta_1}{\sin d\left(\cos\theta_1\cos\theta_2\right)}$$

$$=\frac{1}{\sin d}\left[\frac{\sin\theta_2\cos\theta_1}{\left(\cos\theta_1\cos\theta_2\right)}-\frac{\cos\theta_2\sin\theta_1}{\left(\cos\theta_1\cos\theta_2\right)}\right]$$

$$=\frac{1}{\sin d}\left[Tan\theta_2-Tan\theta_1\right]$$

Similarly, $\sec\theta_2\sec\theta_3=\frac{1}{\sin d}\left[Tan\theta_3-Tan\theta_2\right]$

If we add up all terms, we get

$$=\frac{1}{\sin d}\left[Tan\theta_2-Tan\theta_1+Tan\theta_3-Tan\theta_2+...........+Tan\theta_n-Tan\theta_{n-1}\right]$$

$$=\frac{1}{\sin d}\left[Tan\theta_n-Tan\theta_1\right]$$

Hence Proved

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