CBSE Class 10- Mathematics: Chapter – 5 Arithmetic Progressions Part 1

One of the Endlessly Alluring Aspects of Mathematics is That Its Thorniest Paradoxes Have a Way of Blooming into Beautiful Theories

Question 1:

The fourth term of an AP is . Prove that its 25^{th} term is triple 11^{th} term.

Answer:

$a_4 = 0$

$\Rightarrow a + 3d = 0$

T. P $a25 = 3\,(a11)$

$\Rightarrow A + 24d = 3\,(a + 10d)$

$\Rightarrow a + 24d = 3a + 30d$

RHS sub $a = -3d$

$-3d + 24d = 21d$

LHS $3a + 30d$

$-9d + 30d = 21d$

$LHS = RHS$

Hence proved

Question 2:

Find the 20^{th} term from the end of the AP $3, 8, 13 \cdots 253$.

Answer:

$3, 8, 13 \cdots 253$.

Last term $= 253$

$a20$ from end

$= 1 - (n - 1)\,d$

$253 - (20 - 1)\,5$

$253 - 95$

$= 158$

Question 3:

If the $p^{th}, q^{th} \text{and} r^{th}$ term of an AP is x, y and respectively, show that $x(q-r) + y(r-p) + z(p-q) = 0$

Answer:

$p^{th} term \Rightarrow x = A + (p-1)D$

$Q^{th} term \Rightarrow y = A + (q-1)D$

$r^{th} term \Rightarrow z = A + (r-1)D$

$T.P\ x(q-r) + y(r-p) + z(p-q) = 0$

$= \{A + (p-1)D\} - (q-r) + \{A + (q-1)D\}(r-p)$

$+ \{A + (r-1)D\}(p-q)$

$A\{(q-r) + (r-p) + (p-q)\}$

$+D\{(p-1)(q-r) + (r-1)(r-p) + (r-1)(p-q)\}$

$\Rightarrow A.0 + Dp(q-r) + q(r-p) + r(p-q)$

$-(q-r) - (r-p) - (p-q)\}$

$= A.0 + D.0 = 0$

Hence proved

Question 4:

Find the sum of first 40 positive integers divisible by also find the sum of first 20 positive integers divisible by or $6.$

Answer:

No's which are divisible by are $6, 12 \cdots 240$

$S40 = [240]6 + 240$

$= 20 \times 246$

$= 4920$

No's div by 5 or 6

$30, 60 \cdots 600$

$[220]30 + 600$

$= 10 \times 630$

$= 10 \times 630$

$= 6300$

Question 5:

A man arranges to pay a debt of ₹ 3600 in 40 monthly installments which are in a AP. When 30 installments are paid, he dies leaving one third of the debt unpaid. Find the value of the first installment.

Answer:

Let the value of I installment be $xS_{40} = 3600$

$$\Rightarrow \frac{40}{2}[2a + 39d] = 3600$$

$$\Rightarrow 2a + 39d = 180 \ldots 1$$

$$S_{30} = \frac{30}{2}[2a + 29d] = 2400$$

$$\Rightarrow 30a + 435d = 2400$$

$$\Rightarrow 2a + 29d = 160 \cdots 2$$

Solve 1 & 2 to get

$$d = 2a = 51$$

$\therefore$ I installment $= ₹.51$