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

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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 25th term is triple 11th term.

Answer:

$$a_4 = 0$$

$$\Rightarrow a + 3d = 0$$

$$\text{T. P } a_{25} = 3(a_{11})$$

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

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

$$\text{RHS sub } a = -3d$$

$$-3d + 24d = 21d$$

$$\text{LHS } 3a + 30d$$

$$-9d + 30d = 21d$$

$$LHS = RHS$$

Hence proved

Question 2:

Find the 20th term from the end of the AP 3, 8, 13 ... 253 .

Answer:

$$3, 8, 13 \dots 253 .$$

$$\text{Last term} = 253$$

$$a_{20} \text{ from end}$$

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

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

$$253 - 95$$

$$= 158$$

Question 3:

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

Answer:

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

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

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

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

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

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

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

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

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

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

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

Hence proved

Question 4:

Find the sum of first 40 positive integers divisible by 6 also find the sum of first 20 positive integers divisible by 5 or 6.

Answer:

No's which are divisible by 6 are 6, 12 ... 240

$$S_{40} = [240] 6 + 240$$

$$= 20 \times 246$$

$$= 4920$$

No's div by 5 or 6

$$30, 60 \dots 600$$

$$[220] 30 + 600$$

$$= 10 \times 630$$

$$= 10 \times 630$$

$$= 6300$$

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 x . $S_{40} = 3600$

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

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

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

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

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

Solve 1 & 2 to get

$$d = 2a = 51$$

I installment = ₹. 51