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Mathematics

9709/12

Paper 1 Pure Mathematics 1

October/November 2022

Question No (2)

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- 2 The first, second and third terms of an arithmetic progression are  $a$ ,  $2a$  and  $a^2$  respectively, where  $a$  is a positive constant.

Find the sum of the first 50 terms of the progression.

Solution:

$n$ th term of arithmetic progression

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

Sum of  $n$  terms of an A.P

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

Given that  $a, 2a, a^2$  are first three terms of an A.P.

Common difference of two consecutive terms are equal

$$\Rightarrow \text{second term} - \text{first term} = \text{third term} - \text{second term}$$

$$2a - a = a^2 - 2a$$

$$a^2 - 2a - 2a + a = 0$$

$$a^2 - 4a + a = 0$$

$$a^2 - 3a = 0$$

$$a(a-3) = 0$$

$$a = 0, a - 3 = 0$$

$$a = 0, a = 3$$

$a = 0$  ignore as  $a$  is +ve constant.  
Therefore first three terms of AP are,

$$a, 2a, a^2$$

$$3, 2(3), (3)^2 \quad \therefore a=3$$

$$3, 6, 9$$

$$\Rightarrow a=3, \quad d = \text{second term} - \text{First term}$$

$$= 6 - 3$$

$$n=50 \quad d=3$$

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

$$= \frac{50}{2} [2 \times 3 + (50-1)3]$$

$$= 25 [6 + (49)(3)]$$

$$= 25 [6 + 147]$$

$$= 25(153)$$

$$s_{50} = 2825$$

