

Sample 4  
Paper 1

Q.4 a

Find the sum to infinity of the geometric sequence  $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}$ 

$$S_{\infty} = \frac{a}{1-r}$$

$$a = 1$$

$$r = \frac{T_2}{T_1} = \frac{\frac{1}{3}}{1} = \frac{1}{3}$$

$$S_{\infty} = \frac{1}{1 - \frac{1}{3}} = \frac{1}{\frac{2}{3}} = \frac{3}{2}$$

Q4 b

The sum of 3 consecutive numbers in an arithmetic sequence is 27 and the sum of their squares is 293. Find them.

$$T_1 = a$$

$$d = d$$

Sum =

let the numbers be:  $a, a+d, a+2d$ 

$$a + (a+d) + (a+2d) = 27$$

$$3a + 3d = 27$$

÷3

$$a + d = 9 \Rightarrow a = 9 - d \quad (1)$$

Sum of squares =

$$a^2 + (a+d)^2 + (a+2d)^2 = 293$$

$$a^2 + (a^2 + 2ad + d^2) + (a^2 + 4ad + 4d^2) = 293$$

$$3a^2 + 6ad + 5d^2 = 293 \quad (2)$$

(1) → (2)

$$3(9-d)^2 + 6(9-d)d + 5d^2 = 293$$

$$3(81 - 18d + d^2) + 54d - 6d^2 + 5d^2 = 293$$

$$243 - 54d + 3d^2 + 54d - 6d^2 + 5d^2 = 293$$

$$2d^2 = 50$$

$$d^2 = 25 \Rightarrow d = \pm 5$$

$$a = 9 - d$$

$$d = 5$$

$$\Rightarrow a = 9 - (5) = 4, \text{ sequence} = 4, 9, 14$$

$$d = -5$$

$$\Rightarrow a = 9 - (-5) = 14, \text{ sequence} = 14, 9, 4$$