fluidmaths.co.uk

Year 2 (A-Level)

Sequences and Series – Set 1

The marks shown are for guidance purposes only

When not specified, round all decimals to 3 significant figures

Arithmetic Series

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

Geometric Series

$$S_n = \frac{a(1 - r^n)}{1 - r}$$

$$S_\infty = \frac{a}{1 - r} \text{ for } |r| < 1$$

©fluidmaths.co.uk

1	The first and last terms of an A.P. are -10 and 55 respectively a) Given that, the sum of the terms of the progression is 225, find the number of terms in the sequence. **[2marks]** b) Find the common difference **[2marks]** c) Hence write down the Nth term of the sequence **[1mark]**

©fluidmaths.co.uk

2	The first 4 terms of an A.P. are given as $$x, \quad 2x - y, \quad 3x - 2y, \quad 4x - 3y \ldots$$ a) Find an expression for the 25th term **[2marks]** b) Given that $a_3 = 12$ and $a_5 = 27$, find the values of x and y **[4marks]** c) Find the Nth term of the A.P. and hence find $S_{20} - S_{21}$ **[4marks]**

©fluidmaths.co.uk

3	A patient uses 8% of insulin every 15 minutes after its initial administration. a) An initial dose of 250mg is given to a patient. How much insulin is left in the patient after 2 hours? **[3marks]** For the treatment of a certain medical condition, a patient must have at least 150mg but no more than 320mg of insulin in their body at any time t. A doctor prescribes 80mg of insulin per hour for the patient after the initial dose. b) Will the treatment be effective? **[2marks]**

©fluidmaths.co.uk

4	A hotel manager has 120kg of food supplies for his guest. The guest consumes 12% of the food each day but the manager restocks 10kg of supplies. a) How long will it take before the supplies run below 85kg? **[4marks]** b) Will the hotel ever run out of food? Show how you decide **[2marks]**

©fluidmaths.co.uk

5 The first three terms of a geometric sequence are given as

$$(1+\sqrt{2}), \qquad (3+2\sqrt{2}), \qquad (7+5\sqrt{2}), \ldots$$

a) Find the Nth term of the sequence **[3marks]**

b) Calculate the exact value of the 5th term **[3marks]**

c) Find the value of S_{30} **[2marks]**

d) Will the series converge to a limit or diverge?
Fully justify your answer **[1marks]**

©fluidmaths.co.uk

©fluidmaths.co.uk

6	The sum to infinity of a G.P. is 25 If the second term of the sequence is 2. Find: a) The possible Nth term of the sequence. **[7marks]** b) $S_{20} - S_{\infty}$ **[4marks]**

©fluidmaths.co.uk

©fluidmaths.co.uk