Advanced Higher Maths
SQA 2021 Paper 2
Question 11

Three consecutive terms of an arithmetic sequence are given by

$$x-1, \quad x-7, \quad 2x-9.$$

(a) (i) Find the common difference. **1**

(ii) Hence find the value of x. **1**

(b) Given that $x-1$ is the 21st term, find

(i) the value of the first term **1**

(ii) a simplified expression for the n^{th} term of the sequence. **1**

Three consecutive terms of a geometric sequence are given by

$$y-1, \quad y-7, \quad 2y-9.$$

(c) Find the two possible values of y and the corresponding common ratios. **3**

One of the values of y gives an associated geometric series which has a sum to infinity.

(d) (i) Identify the value of y and justify your answer. **1**

(ii) Determine whether $\frac{64}{3}$ is a possible value for this sum to infinity. Give a reason for your answer. **2**

Answers:

(a) (i) –6

(ii) –4

(b) (i) 115

(ii) $121 - 6n$

(c) $5, \ -\frac{1}{2}$ and $-8, \ \frac{5}{3}$

(d) (i) 5 and $\left|-\frac{1}{2}\right| < 1$

(ii) No. This value would lead to –4, not 4, for the $y - 1$ term.