SQA Past paper questions

2019 – Paper 1 – Question 4

A sequence is generated by the recurrence relation

$$u_{n+1} = mu_n + c,$$

where the first three terms of the sequence are 6, 9 and 11.

(a) Find the values of m and c. 3

(b) Hence, calculate the fourth term of the sequence. 1

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Specimen – Paper 2 – Question 2

A wildlife reserve has introduced conservation measures to build up the population of an endangered mammal. Initially the reserve population of the mammal was 2000. By the end of the first year there were 2500 and by the end of the second year there were 2980.

It is believed that the population can be modelled by the recurrence relation:

$$u_{n+1} = au_n + b,$$

where a and b are constants and n is the number of years since the reserve was set up.

(a) Use the information above to find the values of a and b. 4

(b) Conservation measures will end if the population stabilises at over 13 000. Will this happen? Justify your answer. 3

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Exemplar – Paper 2 – Question 1

A sequence is defined by $u_{n+1} = -\frac{1}{2}u_n$ with $u_0 = -16$.

(a) Determine the values of u_1 and u_2. 1

(b) A second sequence is given by 4, 5, 7, 11, ...

It is generated by the recurrence relation $v_{n+1} = pv_n + q$ with $v_1 = 4$.

Find the values of p and q. 3

(c) Either the sequence in (a) or the sequence in (b) has a limit.

(i) Calculate this limit.

(ii) Why does this other sequence not have a limit? 3

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2013 – Paper 2 – Question 1

The first three terms of a sequence are 4, 7 and 16.

The sequence is generated by the recurrence relation

$$u_{n+1} = mu_n + c, \text{ with } u_1 = 4.$$

Find the values of m and c. **4**

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2012 – Paper 2 – Question 3

(a) A sequence is defined by $u_{n+1} = -\frac{1}{2}u_n$ with $u_0 = -16$.
Write down the values of u_1 and u_2. **1**

(b) A second sequence is given by 4, 5, 7, 11, ...
It is generated by the recurrence relation $v_{n+1} = pv_n + q$ with $v_1 = 4$.
Find the values of p and q. **3**

(c) Either the sequence in (a) or the sequence in (b) has a limit.

(i) Calculate this limit.

(ii) Why does the other sequence not have a limit? **3**

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2003 – Paper 1 – Question 4

A recurrence relation is defined by $u_{n+1} = pu_n + q$, where $-1 < p < 1$ and $u_0 = 12$.

(a) If $u_1 = 15$ and $u_2 = 16$, find the values of p and q. **2**

(b) Find the limit of this recurrence relation as $n \to \infty$. **2**

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