. A sequence is defined by the recurrence relation $u_{n+1} = 3u_n + 4$, with $u_0 = 1$.

Find the value of u_2.

A 7

B 10

C 25

D 35

(*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**

A sequence is defined by the recurrence relation $u_{n+1} = 2u_n + 3$ and $u_0 = 1$.

What is the value of u_2?

A 7

B 10

C 13

D 16

A sequence is generated by the recurrence relation $u_{n+1} = \frac{1}{4}u_n + 7$, with $u_0 = -2$.

What is the limit of this sequence as $n \to \infty$?

A $\frac{1}{28}$

B $\frac{28}{5}$

C $\frac{28}{3}$

D 28

A sequence of numbers is defined by the recurrence relation $U_{n+1} = pU_n + q$, where p and q are constants.

(a) Given that $U_0 = 3$, $U_1 = 2$ and $U_2 = -2$, find **algebraically**, the values of p and q. **(3)**

(b) Hence find U_3. **(1)**

A sequence is generated by the recurrence relation $u_{n+1} = 0{\cdot}7u_n + 10$.

What is the limit of this sequence as $n \to \infty$?

A $\frac{100}{3}$

B $\frac{100}{7}$

C $\frac{17}{100}$

D $\frac{3}{10}$

A sequence is defined by the recurrence relation

$$u_{n+1} = 0{\cdot}3u_n + 6 \text{ with } u_{10} = 10.$$

What is the value of u_{12}?

A 6·6

B 7·8

C 8·7

D 9·6

A sequence is generated by the recurrence relation $u_{n+1} = 0{\cdot}4u_n - 240$.

What is the limit of this sequence as $n \to \infty$?

A −800

B −400

C 200

D 400

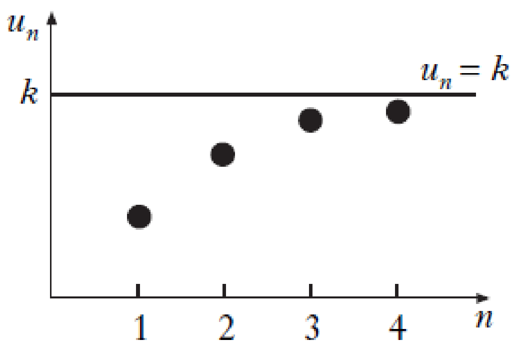
A sequence is defined by the recurrence relation

$$u_{n+1} = \frac{1}{4}u_n + 16,\ u_0 = 0.$$

(*a*) Calculate the values of u_1, u_2 and u_3. **3**

Four terms of this sequence, u_1, u_2, u_3 and u_4 are plotted as shown in the graph.

As $n \to \infty$, the points on the graph approach the line $u_n = k$, where k is the limit of this sequence.



(*b*) (i) Give a reason why this sequence has a limit.

(ii) Find the exact value of k. **3**

A sequence of numbers is defined by the recurrence relation $U_{n+1} = kU_n + c$, where k and c are constants.

Given that $U_0 = 10$, $U_1 = 14$ and $U_2 = 17 \cdot 2$, find **algebraically** , the values of k and c . **(3)**

A sequence is defined by the recurrence relation $U_{n+1} = 0 \cdot 8\, U_n + 3$.

(a) Explain why this sequence has a limit as $n \to \infty$. **(1)**

(b) Find the limit of this sequence. **(2)**

(c) Taking $U_0 = 10$ and L as the limit of the sequence, find n such that

$$L - U_n = 2 \cdot 56$$ **(3)**

A sequence is defined by the recurrence relation $U_{n+1} = aU_n + b$, where a and b are constants.

(a) Given that $U_0 = 4$ and $b = -8$, express U_2 in terms of a . **(2)**

(b) Hence find the value of a when $U_2 = 88$ and $a > 0$. **(3)**

(c) Given that $S_3 = U_1 + U_2 + U_3$, calculate the value of S_3 . **(2)**

A recurrence relationship is defined as $U_{n+1} = 0 \cdot 5\, U_n + 16$ with $U_0 = 128$

(a) Find the limit (L) of this sequence. **(1)**

(b) Given that $U_n - L = 6$, find n . **(3)**