Sequences.

1. $u_n = \dfrac{1}{2}n(n+2)$ find u_2, u_7. Find n if $u_n = 24$.

2. $u_1 = -1$, $u_2 = 3$, $u_3 = 7$.
Write down a recurrence relation for the sequence and find a formula for u_n.

3. $u_1 = 2$, $u_2 = 6$, $u_3 = 18$.
Find a recurrence relation for the sequence and find a formula for u_n.

4. $S_n = \dfrac{n(n+1)}{4}$ Find u_1, u_2, u_3. Find a recurrence relation for the sequence and a formula for u_n.

5. $u_n = 3 \times 4^n$ Evaluate $\dfrac{u_{n+1}}{u_n}$

6. $u_n = \dfrac{n}{2}\left\{1 - (-1)^n\right\}$ Find u_{15} and u_{16}.

7. Evaluate   (i) $\lim\limits_{n\to\infty}\left(1 + \frac{1}{n}\right)$ (ii) $\lim\limits_{n\to 0}\left(\frac{1}{n^2}\right)$ (iii) $\lim\limits_{n\to 0}\left(\frac{n+1}{n}\right)$ (iv) $\lim\limits_{n\to\infty}\left(\frac{n-1}{n}\right)$

8. $u_{n+1} = 20 + \frac{3}{4}u_n$ Evaluate $\lim\limits_{n\to\infty} u_n$.

9. $u_{n+1} = 4 - 0.1u_n$.   Evaluate $\lim\limits_{n\to\infty} u_n$

10. S_n is the sum of n terms of the sequence $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots\ldots$ Evaluate $S_1, S_2, S_3,$ and S_4.
Evaluate $\lim\limits_{n\to\infty} S_n$.

11. $u_n = 1 + \frac{2}{n^2}$ defines a sequence. Write down u_1, u_2, u_3. Evaluate $\lim\limits_{n\to\infty} u_n$

12 A sequence is defined by $u_n = 4n + 7$ Write down $u_1, u_2, u_3, u_{n+1},$ and hence evaluate $u_{n+1} - u_n$.

13   A sequence is defined by $u_{n+1} = 10u_n - 9,$ when $u_1 = 2$.   Write down the first 5 terms.

14   A sequence is defined by the recurrence relation $u_{n+1} = 0.2u_n + 4$ where $u_1 = 3$.
(a) Find the first five terms of the sequence.
(b) Will there be any terms greater than 5?
(c) what happens to u_n as $n \to \infty$?

15   For a certain sequence $S_n = n^2 + 4n$.

  Evaluate S_1, S_2, S_3 and hence find the first three terms of the sequence.

16. Find the first three terms of the sequence which has $S_n = 3n^2 + 9n$.

17 Find the fourth term of the sequence with $S_n = n^3 - 2n$.

18 Calculate the tenth term of the sequence given by $S_n = 2^n + 1$

19 A sequence is given by $u_{n+1} = 2u_n + 1$
(a) Find epressions for u_1, u_2, and u_3 showing that $u_3 = 2^3 u_0 + 2^2 + 2 + 1$.
Deduce a similar expansion for u_n.

20 A sequence is given by $u_{n+1} = 5u_n + 1$.
Find expressions for the terms u_1, u_2, u_3, Showing that $u_3 = 5^3 u_0 + 5^2 + 5 + 1$.
Find a similar expression for u_n.

21. A sequence is given by $u_{n+1} = 3u_n + 2$.
Find epressions for u_1, u_2, u_3, showing that $u_3 = 3^3 u_0 + 2 \times 3^2 + 2 \times 3 + 2$

22 A sequence is defind by $u_{n+1} = au_n + b$ If $u_1 = 5, u_2 = 7, u_3 = 13$, find the constants a and b.

23 A sequence is defined by $u_{n+1} = 5u_n + b$, where b is constant .
If $u_1 = 8$ and $u_3 = 224$, find b.

24 If $u_{n+1} = 4u_n + 1$ and $u_3 - u_2 = 10$, calculate the value of u_1.

25. Show that the sequence defined by $u_{n+1} = \frac{3}{4} u_n + 5$, with $u_1 = 12$, has a limit L
Calculate L and find the least value of n for which $L - u_n \langle 0.5$

26. Show that the sequence defined by $u_{n+1} = 0.8u_n + 14$ has a limit L. Calculate L.