

PRACTICE 5.3 – Arithmetic Sequences

* Full, worked solutions can be found in the folder linked on the Course Website ☺

Exercise 5J

- 1 The first term of an arithmetic sequence is -10 and the seventh term is -1 .
 - a Find the value of the common difference.
 - b Find the 15th term of this sequence.
- 2 The n th term of a sequence is defined by $b_n = n(2n + 1)$.
 - a Find the values of b_1 , b_2 and b_3 .
 - b Show that this sequence is not arithmetic.
- 3 The first terms of an arithmetic sequence are $5, 9, 13, 17, \dots$
 - a Write down the general term for this sequence.
 - b Determine whether or not 116 is a term in this sequence.
- 4 In an arithmetic sequence, $u_3 = 12$ and $u_{10} = 40$. The common difference is d .
 - a Write down two equations in u_1 and d to show this information.
 - b Find the values of u_1 and d .
 - c Find the 100th term.
- 5 When a company first started it had 85 employees. It was decided to increase the number of employees by 10 at the beginning of each year.
 - a Find the number of employees during the second year and during the third year.
 - b How many employees will this company have during the 10th year?
 - c After how many years will the company have 285 employees?

Keep going... more on back □

6 In Investigation 9, Pablo made monthly payments to his bank for a loan. The payments for the first five months were \$55, \$52, \$49, \$46, \$43.

- Write down an expression for the n th term of this sequence.
- Find the amount of Pablo's 12th payment.
- Determine when Pablo will make his last payment.
- Find the amount of the last payment.

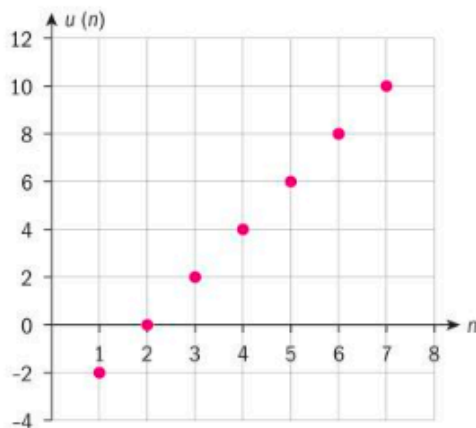
7 A sequoia tree that was 2.6 m tall when it was planted in 1998 grows at a rate of 1.22 m per year.

- Write down a formula to represent the height of the tree each year, with a_1 representing the height in 1998.
- Find the height of the tree in 2025.
- The tallest living sequoia tree, the General Sherman tree in the US Sequoia National Park, has a height of 84 m. In what year would the tree planted in 1998 reach this height if it continues to grow at the same rate?

8 Consider the finite arithmetic sequence 1000, 975, 950, ..., -225.

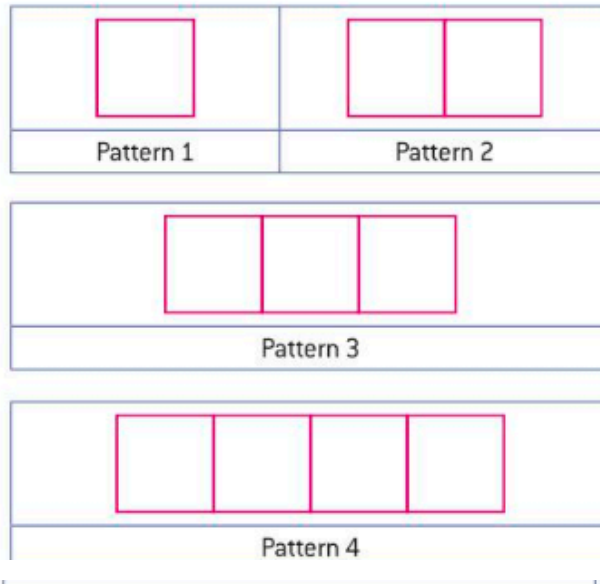
- Write down the common difference.
- Find the 10th term.
- Find the number of terms in the sequence.

9 The diagram shows part of the graph of a sequence u_n .



- Explain why this sequence is arithmetic.
- Write down the common difference of this sequence.
- Write down the first term of the sequence.
- Write down the general term of the sequence.
- Determine whether or not the point (20, 36) lies on the graph of this sequence.

10 Pedro is bored and is making patterns with sticks. Pattern 1 was made with four sticks, pattern 2 with seven sticks and so on.



- Write down the number of sticks needed to make pattern 5 and pattern 6.
- Find the number of sticks needed to make pattern 20.
- Find the pattern number for the pattern made with 127 sticks.

11 Consider the arithmetic series $S = 1 + 3 + 5 + 7 + \dots + 61$.

Find the number of terms in this series.