

Method

- 1) Make TWO equations in terms of a and d.
- 2) Use simultaneous equations to find a value of a and d.

Eg 1 $T_4=11$ and $T_9=21$ in an arithmetic sequence.
Find the values of a and d.

$$T_n = a + (n-1)d$$

$$T_4 = 11$$

$$a + (4-1)d = 11$$

$$a + (3)d = 11$$

$$\textcircled{1} a + 3d = 11$$

$$T_9 = 21$$

$$a + (9-1)d = 21$$

$$a + (8)d = 21$$

$$\textcircled{2} a + 8d = 21$$

$$d=2 \Rightarrow \textcircled{1}$$

$$a + 3d = 11$$

$$a + 3(2) = 11$$

$$a + 6 = 11$$

$$-6 \mid a = 5 \quad \mid -6$$

Simultaneous Equations
Elimination method

$$\textcircled{1} a + 3d = 11 \quad (-1)$$

$$\textcircled{2} a + 8d = 21 \quad \left. \begin{array}{l} \text{Multiply} \\ \swarrow \end{array} \right\}$$

$$\hline -a - 3d = -11$$

$$a + 8d = 21$$

$$\hline 5d = 10$$

$$\div 5 \mid d = 2 \quad \mid \div 5$$

Q2 Pg 289

Q2 Pg 289

$T_4 = 14$ and $T_9 = 34$ Find a and d

$$T_n = a + (n-1)d$$

$$T_4 = 14$$

$$a + (4-1)d = 14$$

$$\textcircled{1} a + 3d = 14$$

$$T_9 = 34$$

$$a + (9-1)d = 34$$

$$\textcircled{2} a + 8d = 34$$

Simultaneous Equations

$$\textcircled{1} a + 3d = 14 \quad \times (-1)$$

$$\textcircled{2} a + 8d = 34$$

$$\Rightarrow$$

$$\hline -a - 3d = -14$$

$$a + 8d = 34$$

$$\hline +5d = 20$$

$$\div 5 \mid d = 4 \quad \mid \div 5$$

$$d=4 \Rightarrow \textcircled{1} a + 3d = 14$$

$$a + 3(4) = 14$$

$$a + 12 = 14$$

$$T_n = a + (n-1)d$$

$$a = 2$$

$$d = 4$$

$$T_n = 2 + (n-1)4$$

$$2 + 4n - 4$$

$$T_n = 4n - 2$$

$$4 + 504 / -14$$
$$a + 12 = 14$$
$$-12 \mid a = 2 \quad \mid -12$$

$$T_n = 4n - 2$$

Homework Pg 289 Q3+4



T&T3 10.5



T&T3
10.5.pptx

PROJECT MATHS

Text & Tests

Leaving 3 Certificate

Section 10.5 Finding the values of a and d

Example 1

T_4 of an arithmetic sequence is 11 and $T_9 = 21$.
Find the values of a and d and hence find T_{50} .

Example 2

If $x + 1$, $2x - 2$, and $2x + 1$ are three consecutive terms of an arithmetic sequence, find the value of x .

Hence write down T_n and T_{100} of the sequence.

288

Exercise 10.5

1. The first term of an arithmetic sequence is 5.
If the fifth term is 33, find d , the common difference.
Hence find T_n and T_{20} .

289

Exercise 10.5

2. In an arithmetic sequence, $T_4 = 14$ and $T_9 = 34$.
Find the values of a and d and hence write down the value of T_{13} .

Exercise 10.5

3. In an arithmetic sequence, $T_5 = 21$ and $T_{10} = 41$.
Find the values of a and d .
Hence find T_n and T_{60} .

Exercise 10.5

4. In an arithmetic sequence, the eighth term is -18 and the third term is 12 .
Find the values of a and d .
Hence find T_{100} .

289

Exercise 10.5

5. In an arithmetic sequence, $T_3 = 4$ and $T_{10} = -17$.
Find the values of a and d .
Write down T_n of the sequence and find the value of n for which $T_n = -47$.

289

Exercise 10.5

6. In an arithmetic sequence, the first term is 3 and $T_6 = 2T_3$.
- Find the value of the common difference, d .
 - Find T_n , the n th term.

289

Exercise 10.5

7. In an arithmetic sequence, $T_1 + T_5 = 0$ and $T_{13} = 20$.
- Find the value of a and the value of d .
 - Show that the seventh term is twice the fifth term.

289

Exercise 10.5

8. In an arithmetic sequence, $T_4 = -9$ and $T_{15} = -31$.

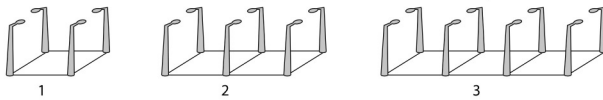
Find the values of a and d .

Write down T_n of the sequence and hence find which term is equal to -81 .

290

Exercise 10.5

9. Lamp-posts are put at the end of every 100 m stretch of a motorway, as shown,



- How many lamp-posts are needed for 500 m of motorway?
- Write down, as a number sequence, the number of lamp-posts required for 100 m, 200 m, 300 m, 400 m, ...
- Find an expression in n for the n th term of this sequence.
- Use the expression found in (iii) to write down the number of lamp-posts needed for 8 km of motorway.
- The M51 is a motorway being built. The contractor has ordered 2402 lamp-posts. How long is this motorway?

290

Exercise 10.5

10. In an arithmetic sequence, $T_1 + T_3 = 12$ and $T_4 + T_6 = 24$.
Find the values of a and d .

Exercise 10.5

11. In an arithmetic sequence, the sixth term is 20 and the tenth term is four times the second term.
Find the values of a and d . Hence calculate T_{100} .

Exercise 10.5

12. If x , $2x + 3$ and $4x + 5$ form three consecutive terms of an arithmetic sequence, find the value of x .

290

Exercise 10.5

13. Find the value of x in each of the following arithmetic sequences:
- (i) $x - 1, x + 1, 3x - 3$
 - (ii) $x + 4, 3 - x, x + 10$.

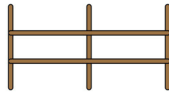
290

Exercise 10.5

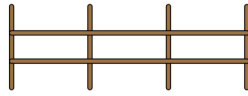
14. Tommy builds fences in different lengths using pieces of wood.



Fence length 1



Fence length 2



Fence length 3

(i) Sketch fence length 5.

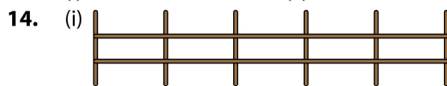
Tommy counted how many pieces he needed to make each fence length. He then drew up the table below.

Fence length	1	2	3	4	5	6
Number of pieces	4	7	10			

- (ii) Complete the table to show how many pieces of wood he would use for fence lengths 4, 5 and 6.
- (iii) Write down, in terms of n , an expression for the number of pieces of wood needed for fence length n .
- (iv) How many pieces of wood are needed for fence length 40?
- (v) If 91 pieces of wood are needed, what is the number of the fence length?

Answers 10.5

- $d = 7; T_n = 7n - 2; T_{20} = 138$
- $a = 2, d = 4; T_{13} = 50$
- $a = 5, d = 4; T_n = 4n + 1; T_{60} = 241$
- $a = 24, d = -6; T_{100} = -570$
- $a = 10, d = -3; T_n = -3n + 13; n = 20$
- (i) $d = 3$ (ii) $T_n = 3n$
- (i) $a = -4, d = 2$ (ii) Both = 8
- $a = -3, d = -2; T_n = -2n - 1; T_{40} = 81$
- (i) 12 (ii) 4, 6, 8, 10, ...
(iii) $2n + 2$ (iv) 162 (v) 120 km
- $a = 4, d = 2$
- $a = 5, d = 3; T_{100} = 302$
- $x = 1$
- (i) $x = 3$ (ii) $x = -2$



(ii)

Fence length	1	2	3	4	5	6
No. of pieces	4	7	10	13	16	19

- (iii) $3n + 1$ (iv) 121
(v) Fence length 30