

Leaving Certificate Maths Ordinary Level Grinds - **Week 7**

Topic:

Sequences and Series – Part 1



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Leaving
Certificate
Maths
Ordinary Level

Week 7:

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Series – Part 1

Sound & Visual Check

“I am now talking....”

“If you cannot hear me or see my screen please say “Cannot hear/see you” on the chat.

“If some of you can’t hear me, please restart your computer and join the class again.”

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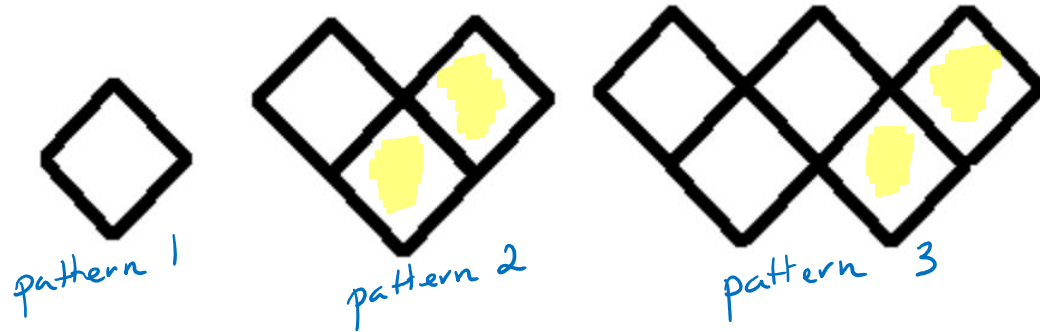
Lesson Overview:

By the end of this lesson you should be able to:

- Continue a given sequence of patterns
- Find the **n th** term of an arithmetic sequence, using the formula $T_n = a + (n - 1)d$, (where a = the first term, and d = the common difference)
- Find T_1, T_2, T_3 etc. of an arithmetic sequence, when given the **n th** term
- Find a value for n when given the value of the term e.g., for what value of n is $T_n = 46$

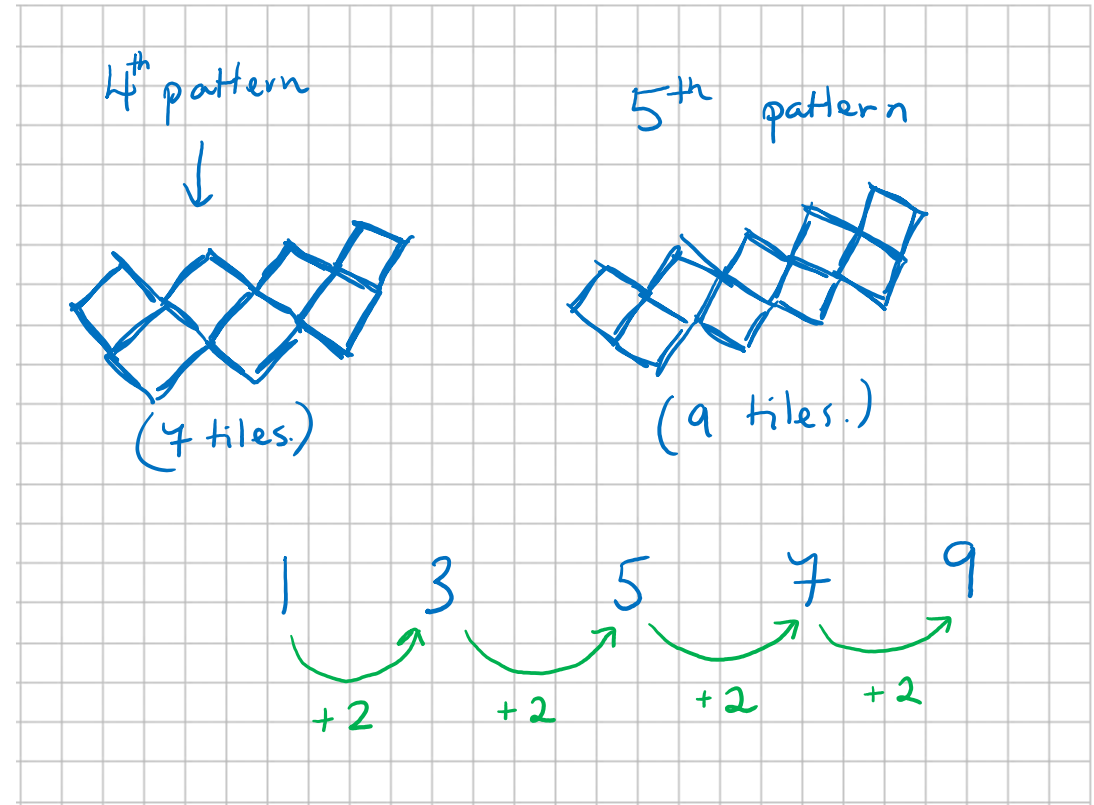
Continue a given sequence of patterns

Michelle is designing patterns with tiles from her scrabble board. The first three patterns are shown below.



- (a) Draw the next two patterns.
 (b) Complete the following table.

Pattern	1	2	3	4	5
Tiles	1	3	5	7	9



- (c) Michelle states that her pattern is linear. Do you agree with Michelle? Explain your answer fully.

Yes, the pattern is linear. Why? Because the difference between each term is constant



Find the n th term of an arithmetic sequence, using the formula $T_n = a + (n - 1)d$, (where a = the first term, and d = the common difference)

Finding T_1, T_2, T_3 etc. of an arithmetic sequence, when given the n th term

(d) Find T_n , the n th term of the pattern.

T_1 T_2 T_3 T_4 T_5
 1 , 3 , 5 , 7 , 9

$$T_n = a + (n - 1)d \quad a = 1 \quad d = 2$$

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

$$T_n = 1 + 2n - 2 \quad \therefore T_n = 2n - 1$$

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

a = first term

d = common difference

(e) Hence or otherwise find T_{21} .

T_{21} = the value of the 21st term or how many tiles in the 21st pattern

$$T_n = 2n - 1$$

$$T_{21} = 2(21) - 1 \quad T_{21} = 42 - 1 \quad T_{21} = 41$$



Find a value for n when given the value of the term e.g., for what value of n is $T_n = 46$

(f) Which pattern would contain 87 tiles?

$$\begin{aligned} T_{44} \text{ should equal } 87 \\ T_n = 2n - 1 \\ T_{44} = 2(44) - 1 \end{aligned}$$

$$\begin{aligned} 2n - 1 &= 87 \\ 2n &= 87 + 1 \\ 2n &= 88 \\ n &= \frac{88}{2} \\ n &= 44 \end{aligned}$$

$$2n = 88$$

$$n = \frac{88}{2}$$

$$n = 44$$

\therefore pattern number 44 contains 87 tiles.

Which pattern or "term"
contains 87 tiles -

$$\text{let } T_n = 87$$

$$T_n = 2n - 1$$



- (iii) Jill states that the sequence can be represented by the rule $T_n = 5n - 1$. Is Jill correct? Explain your answer.

$$T_n = a + (n-1)d$$
$$a = 4 \text{ (1st term)}$$
$$d = 5 \text{ (common difference)}$$
$$T_n = 4 + (n-1)5$$
$$T_n = 4 + 5n - 5$$
$$T_n = 5n - 1$$

Yes, Jill is correct

Find the **n th** term of an arithmetic sequence, using the formula $T_n = a + (n-1)d$, (where a = the first term, and d = the common difference)

$$4, 9, 14, 19, 24$$

- (iv) Jack asks Jill to find the value of T_{57} for his sequence. What value did she calculate?

$$T_n = 5n - 1$$
$$T_{57} = 5(57) - 1$$
$$T_{57} = 285 - 1$$
$$T_{57} = 284$$

What is the value of T_{57} (57^{th} term) in the sequence

Find T_1, T_2, T_3 etc. of an arithmetic sequence, when given the **n th** term



The general term of an arithmetic sequence is $T_n = 2n + 1$.

Write down the first term, a , and the common difference, d , of the sequence.

$$\begin{aligned} a &= \text{first term} = T_1 & \therefore a &= T_1 \\ T_n &= 2n + 1 & T_2 &= 2(2) + 1 \\ T_1 &= 2(1) + 1 & T_2 &= 4 + 1 \\ T_1 &= 3 & T_2 &= 5 \\ & \therefore a &= 3 & \therefore d = T_2 - T_1 \\ & & & = 5 - 3 \\ & & & = 2 \end{aligned}$$

For what value of n is $T_n = 243$?

$$\begin{aligned} \text{Let } T_n &= 243 \\ 2n + 1 &= 243 \\ 2n &= 243 - 1 \\ 2n &= 242 \\ n &= \frac{242}{2} = 121 \quad \text{i.e. the } 121^{\text{st}} \text{ term has a value of } 243 \end{aligned}$$

Find T_1, T_2, T_3 etc. of an arithmetic sequence, when given the n th term

$$T_1, T_2, T_3, T_4, T_5, \dots$$

$$d = T_2 - T_1 \quad \text{or} \quad T_3 - T_2$$

$$\begin{aligned} T_3 &= 2(3) + 1 \\ &= 6 + 1 \\ &= 7 \end{aligned}$$

Find a value for n when given the value of the term e.g., for what value of n is $T_n = 46$

There is a certain term in the sequence with a value of 243. What no. term is it?



Next Weeks Lesson:
Leaving Certificate
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Grinds - **Week 8**

Topic: Sequences and
Series – Part 2



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