

LINEAR SEQUENCES

A linear sequence is a sequence that increases or decreases by a fixed amount between consecutive terms.

Example 1.

5, 8, 11, 14, 17, ..., ...

Find rule: Add 3

Find next two terms: 20, 23

Find the n^{th} term

Since the sequence goes up in 3s, the formula for the n^{th} term will have $3n$ in it which generates the 3 times table.

3,	6,	9,	12,	15
↓	↓	↓	↓	↓
5,	8,	11,	14,	17

This gives the correct spacing of numbers but

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TRANSCRIPT

an adjustment of +2 is required to match the numbers in the given sequence.

$$\text{So } n^{\text{th}} \text{ term} = 3n + 2$$

$$\text{Find } 10^{\text{th}} \text{ term} = 3 \times 10 + 2 = 32$$

$$\text{Find } 25^{\text{th}} \text{ term} = 3 \times 25 + 2 = 77$$

Example 2

2, 7, 12, 17, 22, ..., ...

Rule: Add 5

Next two terms: 27, 32

Find n^{th} term

going up in 5s so $5n$ in formula

5,	10,	15,	20,	25
↓	↓	↓	↓	↓
2,	7,	12,	17,	22

$$\text{Adjustment required} = -3$$

$$\text{So } n^{\text{th}} \text{ term} = 5n - 3$$

$$\text{Find } 10^{\text{th}} \text{ term} = 5 \times 10 - 3 = 47$$

$$\text{Find } 25^{\text{th}} \text{ term} = 5 \times 25 - 3 = 122$$

LINEAR SEQUENCES

TRANSCRIPT

Example 3

11, 13, 15, 17, 19, ..., ...

Rule: Add 2

Next two terms: 21, 23

Find n^{th} term

goes up in 2s so $2n$ in formula

2	4	6	8	10
11	13	15	17	19

Adjustment = +9

So n^{th} term = $2n + 9$

Find 10^{th} term = $2 \times 10 + 9 = 29$

Find 25^{th} term = $2 \times 25 + 9 = 59$

Example 4

1, 7, 13, 19, 25

Rule: Add 6

Next two terms: 31, 37

Find n^{th} term

Going up by 6 so $6n$ in formula

6	12	18	24	30
↓	↓	↓	↓	↓
1	7	13	19	25

Adjustment = -5

so n^{th} term = $6n - 5$

Find 10^{th} term = $6 \times 10 - 5 = 55$

Find 25^{th} term = $6 \times 25 - 5 = 145$

Example 5

11, 20, 29, 38, 47

Rule: Add 9

Next two terms: 56, 65

Find n^{th} term

Going up by 9 so $9n$ in formula

9	18	27	36	45
↓	↓	↓	↓	↓
11	20	29	38	47

Adjustment = +2

So n^{th} term = $9n + 2$

Find 10^{th} term = $9 \times 10 + 2 = 92$

Find 25^{th} term = $9 \times 25 + 2 = 227$

LINEAR SEQUENCES

TRANSCRIPT

Example 6



Draw 4th pattern



Complete table

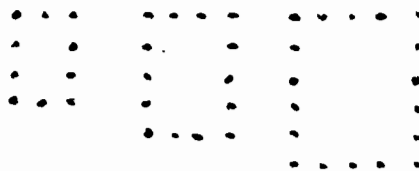
Pattern number	1	2	3	4	5
Matchsticks	4	7	10	13	16

How many matchsticks in pattern 15?

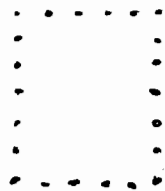
n^{th} term = $3n + 1$

So 15th term = $3 \times 15 + 1 = 46$ matchsticks

Example 7



Draw 4th pattern



Complete table

Pattern number	1	2	3	4	5
Dots	10	14	18	22	26

How many dots in pattern 10?

n^{th} term = $4n + 6$ so $4 \times 10 + 6 = 46$

LINEAR SEQUENCES

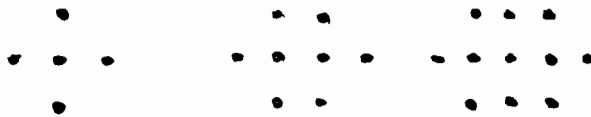
TRANSCRIPT

or keep adding on 4 until pattern 10

6	7	8	9	10
30	34	38	42	46

Answer 46 dots

Example 8



Draw pattern 4



Complete table

Pattern Number	1	2	3	4	5
Dots	5	8	11	14	17

How many dots in pattern 10?

$n^{th} \text{ term} = 3n + 2$ so $3 \times 10 + 2 = 32$

or keep adding on 3 until pattern 10

6	7	8	9	10
20	23	26	29	32

Answer 32 dots