Linear Sequences

A linear sequence increases or decreases by a fixed amount from term to term.

Examples

Ex1 $\overset{3}{2}, \overset{6}{5}, \overset{9}{8}, \overset{12}{11}, \ldots$

Rule : add 3

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

10^{th} term $= 3 \times 10 - 1 = 29$

25^{th} term $= 3 \times 25 - 1 = 74$

Ex 2 $\overset{4}{14}, \overset{8}{18}, \overset{12}{22}, \overset{16}{26}, \ldots$

Rule = add 4

n^{th} term $= 4n + 10$

10^{th} term $= 4 \times 10 + 10 = 50$

25^{th} term $= 4 \times 25 + 10 = 110$

Ex 3 $27, 24, 21, 18, \ldots$

Rule = subtract 3

n^{th} term $= 30 - 3n$

10^{th} term $= 30 - 3 \times 10 = 0$

25^{th} term $= 30 - 3 \times 25 = -45$

Exercise Find n^{th} term, 10^{th} term, 25^{th} term

1) 1, 5, 9, 13, ...

2) 88, 77, 66, 55, ...

3) 2, 4, 6, 8, ...

1) Rule add 4

n^{th} term $= 4n - 3$

10^{th} term $= 4 \times 10 - 3 = 37$

25^{th} term $= 4 \times 25 - 3 = 97$

2) Rule subtract 11

n^{th} term $= 99 - 11n$

10^{th} term $= 99 - 11 \times 10 = -11$

25^{th} term $= 99 - 11 \times 25 = -176$

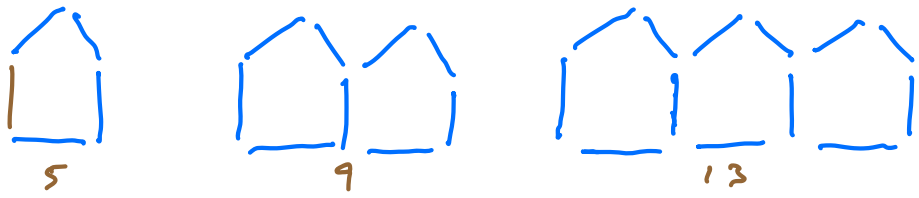
3) Rule add 2

n^{th} term $= 2n$

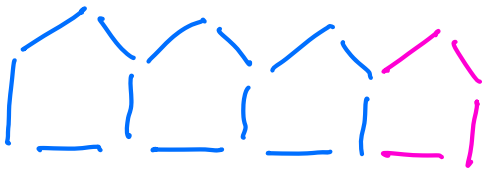
10^{th} term $= 2 \times 10 = 20$

25^{th} term $= 2 \times 25 = 50$

Ex4

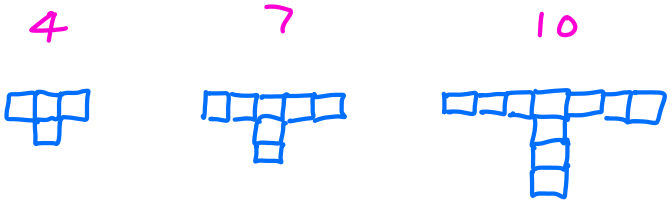


Draw next pattern and determine how many matchsticks are required for the n^{th} pattern



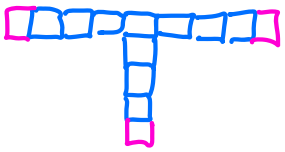
n^{th} term $= 4n + 1$

Exercise



Draw next pattern

Find how many squares in n^{th} pattern



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

Quadratic Sequences

n	1	2	3	4	5	6	7	8	9
n^2	1	4	9	16	25	36	49	64	81
1st difference	3	5	7	9	11	13	15	17	
2nd difference	2	2	2	2	2	2	2		

Ex 1

2nd diff	2	2	2	2	
1st diff	6	8	10	12	14

Find n^{th} term

8, 14, 22, 32, 44, 58

n^2	1	4	9	16	25	36
	7	10	13	16	19	22
$+3n$	3	6	9	12	15	18
$+4$	4	4	4	4	4	4

n^{th} term $= n^2 + 3n + 4$

Ex 2

2nd diff	2	2	2	2	
1st diff	1	3	5	7	9

7, 8, 11, 16, 23, 32

n^2	1	4	9	16	25	36
	6	4	2	0	-2	-4

$-2n$	-2	-4	-6	-8	-10	-12
$+8$	8	8	8	8	8	8

n^{th} term $= n^2 - 2n + 8$

Ex 3

2nd d.f. 2 2 2 2

1st d.f. 8 10 12 14 16

2, 10, 20, 32, 46, 62

n^2	1	4	9	16	25	36
	1	6	11	16	21	26
$+5n$	5	10	15	20	25	30
	-4	-4	-4	-4	-4	-4
-4						

n^{th} term $= n^2 + 5n - 4$