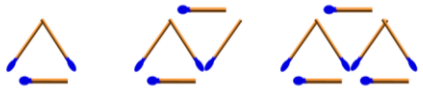
SEQUENCES

Key Concept

Types of Sequence

Sequence as pictures:



Linear sequence:

4, 7, 10, 13, 16, …

+3 +3 +3 +3

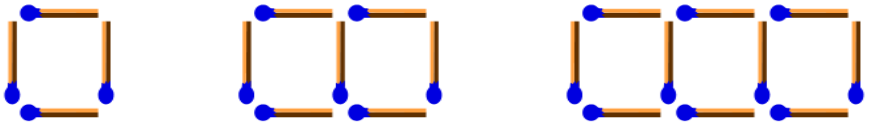
Fibonacci sequence:
(add the previous two terms)

1, 1, 2, 3, 5, 8, …

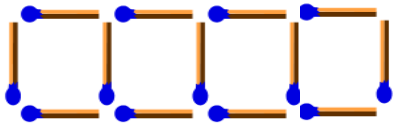
Key Words

Sequence: A list which is in a particular order following a pattern.
Term: Each particular part of a sequence.
Linear sequence: A sequence which is formed by adding or subtracting the same amount each time.

Examples



Next pattern is:



Sequence = 4, 7, 10, 13, ….
Term to term rule = + 3
Nth term 4, 7, 10, 13, 16, … **= 3n + 1**

+1 +3 +3 +3 +3

sparx

M241, M381, M991

Tip

If a sequence is decreasing, the 'n' term will be negative.
Eg, 15, 11, 7, 3, …
Nth term = -4n + 19

Questions

1) Find the next two terms and the term to term rule
a) 9, 13, 17, 21, … b) 7, 12, 17, 22, … c) 9, 7, 5, 3, … d) 3, 4, 7, 11, 18
2) Find the nth term a) 7, 9, 11, 13, … b) 8, 13, 18, 23, …
c) 15, 12, 9, 6, … d) 1, -3, -7, -11, …

ANSWERS: 1) a) 25, 29 Rule = +4 b) 27, 32, Rule = +5 c) 1, -1 , Rule = -2 d) 29, 47, Rule = add previous 2 numbers 2) a) 2n + 5 b) 5n + 3 c) -3n + 18 d) -4n + 5

Algebraic Notation

Key Concept

Formula

$$v = u + at$$

Expression

$$f^2 + f^2 + f^2$$

Equation

$$34 = 12 + 6t$$

Identity

$$c \times c = c^2$$

sparx

U330,U534, M635,M690

Key Words

Formula: A rule written using symbols that describe a relationship between different quantities.
Expression: Shows a mathematical relationship whereby there is no solution.
Equation: A mathematical statement that shows that two expressions are equal.
Identity: A relation which is true. No matter what values are chosen.

Tip
When expanding brackets be careful with negatives.

Examples

Simplify:

4a + 3b – a + 2b

= 3a + 5b

Expand and simplify:

$9a - 2(3a - 4)$

$9a - 6a + 8$

$3a + 8$

Factorise:

$9x^2 + 6x$

Factorising is the opposite of expanding brackets

$3x$ is common to both terms

$3x(3x + 2)$

Expand and simplify:

$2(4a + 2b) - 2(a + 3b)$

$8a + 4b - 2a - 6b$

$6a - 2b$

Questions

1) $5x + 3y - 2x + 4y$ 2) $2p - 6q + 2q + 4p$ 3) $12b - 3(2b + 5)$
4) Factorise a) $4x + 10$ b) $8a^2 - 10a$

ANSWERS: 1) $3x + 7y$ 2) $6p - 4q$ 3) $6b - 15$ 4) a) $2(2x + 5)$ b) $2a(4a - 5)$

Equality and Equivalence

Key Concept

Inverse Operations

Operation	Inverse
+	—
—	+
×	÷
÷	×
x^2	$\sqrt{x}$

Key Words

Unknown: A letter which represents a number we do not know the value of.
Terms: The numbers and letters in the expression or equation.
Inverse: The operation which will do the opposite.

Examples

x + 9 = 16 -9 -9 **x = 7**	x − 12 = 20 +12 +12 **x = 32**	$\frac{x}{3} = 5$ ×3 ×3 **x = 15**	2x + 5 = 14 -5 -5 2x = 9 ÷2 ÷2 **x = 4.5**

$\frac{x}{4} - 2 = 4$ +2 +2 $\frac{x}{4} = 6$ ×4 ×4 **x = 24**	2(3x + 5) = -14 expand 6x + 10 = -14 -10 -10 6x = - 24 ÷6 ÷6 **x = - 4**	2x + 7 = 5x + 1 -2x (smallest x term) +7 = 3x + 1 -1 -1 6 = 3x ÷3 ÷3 **2 = x**

sparx

M707, M509, M554

Tip

Answers can be:

- Integers
- Decimals
- Fractions
- negatives

Questions

1) x + 8 = 19
2) y − 25 = 15
3) 2y = 82
4) $\frac{t}{4} = 7$
5) $\frac{p}{2} - 6 = 2$
6) 3(2x − 3) = 15
7) 4x − 8 = 2x + 1

ANSWERS: 1) x = 11, 2) y = 40, 3) y = 41, 4) t = 28, 5) p = 16, 6) x = 4, 7) x = 4.5