Mathematics	Algebraic Thinking	Year 7	Term 1

Sequences

Term - each number or object in a sequence.

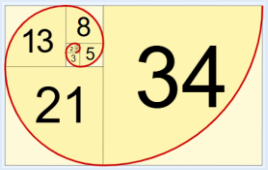
Difference – the result of a subtraction.

Consecutive – whole numbers that follow each other without gaps *e.g. 3, 4, 5 are consecutive.*

Linear sequence – a number pattern that increases or decreases by a **common difference** each time.
e.g. ***4, 7, 10, 13*** *is a linear sequence with a common difference of +3.*

Geometric sequence – a number pattern made by multiplying by the same value each time. They are non-linear.
e.g. **2, 4, 8, 16, 32**
x2 x2 x2 x2

Fibonacci – a non-linear sequence made by adding the 2 previous terms.
e.g. 1, 1, 2, 3, 5, 8, 13, 21, 34 …



Ascending – smallest to largest.

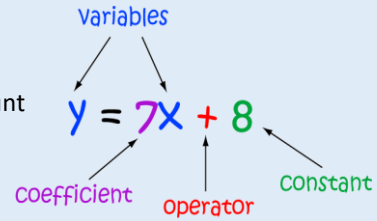
Descending – largest to smallest.

Algebraic Notation

Commutative – gives the same result regardless of the order *e.g.* 2 + 3 = 3 + 2

Variable – a symbol for a value we don't know. It can be a range of values.

Coefficient – the amount of a variable.

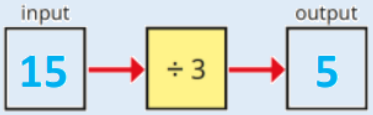


Inverse – the opposite operation.
e.g. the inverse of add is subtract
the inverse of multiply is divide

Squared – when a number is multiplied by itself.
e.g. 3^2 *"3 squared" means 3×3*

Substitute – to replace a variable with a value

Function – a process that happens to an input to give the output.



the function is ÷ 3

Important notation

$5y$ means $5 \times y$ $\quad\quad$ $\frac{y}{5}$ means $y \div 5$

Equality and Equivalence

Equality – having the same value.

Unknown – a symbol for a value we don't know yet that has a specific value that can be found.
e.g. $4 + x = 10$ *so* $x = 6$

Solve – to find the value of the unknown.

$\neq$ means **not** equal to

WORKED EXAMPLES

Sequences

Continue the linear sequence:

9, 13, 17, ___, ___

+4 +4 +4 +4

9, 13, 17, ***21***, ***25***

Linear means that the sequence increases by a common difference each time, so the term-to-term rule is to add 4

Continue the geometric sequence:

3, 6, 12, ___, ___

x2 x2 x2 x2

3, 6, 12, ***24***, ***48***

Geometric means that the sequence is made by multiplying by the same value each time, so the term-to-term rule is to multiply by 2

Continue the Fibonacci sequence:

1, 1, 2, 3, 5, ___, ___

1+1=2 1+2=3 2+3=5 3+5=8 5+8=13

1, 1, 2, 3, 5, ***8***, ***13***

Fibonacci means that the sequence is made by adding the two previous terms

Algebraic Notation

Substitute $x = 5$ into the expression $x + 7$

$x + 7$

$(5) + 7 = 12$

Substitute $x = 4$ into the expression $10 - x$

$10 - x$

$10 - (4) = 6$

Substitute $x = 8$ into the expression $5x$

$5x$

$5(8) = 5 \times 8 = 40$

Substitute $x = 14$ into the expression $\frac{x}{2}$

$\frac{x}{2} = \frac{(14)}{2} = 14 \div 2 = 7$

Substitute $x = 3$ into the expression $5x + 1$

$5x + 1$

$5(3) + 1$

$= 5 \times 3 + 1$

$= 15 + 1$

$= 16$

Equality and Equivalence

Solve $x + 3 = 18$

$-3 \quad -3$

$x = 15$

inverse of $+3$ is -3

Solve $x - 8 = 11$

$+8 \quad +8$

$x = 19$

inverse of -8 is $+8$

Solve $4x = 20$

$\div 4 \quad \div 4$

$x = 5$

$4x$ means $4 \times x$ so the inverse of $\times 4$ is $\div 4$

Solve $\frac{x}{4} = 20$

$\times 4 \quad \times 4$

$x = 80$

$\frac{x}{4}$ means $x \div 4$ so the inverse of $\div 4$ is $\times 4$

Solve $5x + 8 = 43$

$-8 \quad -8$

$5x = 35$

$\div 5 \quad \div 5$

$x = 7$

Solve $\frac{x}{5} + 8 = 43$

$-8 \quad -8$

$\frac{x}{5} = 35$

$\times 5 \quad \times 5$

$x = 175$