Y7 Equality and Equivalence

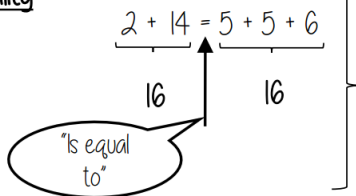## What do I need to be able to do?

By the end of this unit you should be able to:
- Form and solve linear equations
- Understand like and unlike terms
- Simplify algebraic expressions

Keywords

Equality: two expressions that have the same value
Equation: a mathematical statement that two things are equal
Equals: represented by '=' symbol — means the same
Solution: the set or value that satisfies the equation
Solve: to find the solution.
Inverse: the operation that undoes what was done by the previous operation. (The opposite operation)
Term: a single number or variable
Like: variables that are the same are 'like'
Coefficient: a multiplicative factor in front of a variable e.g. 5x (5 is the coefficient, x is the variable)
Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)
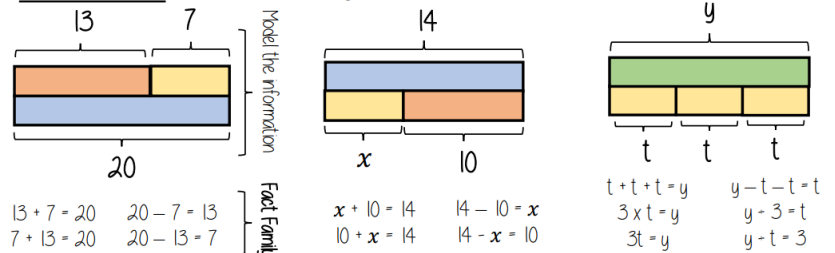
Equality

$$2 + 14 = 5 + 5 + 6$$

16   16

The sum on the left has the same result as the sum on the right

"Is equal to"

Saying it out loud sometimes helps you to understand equality

Fact Families

Use a bar model to display the relationships between terms and numbers.

Model the information

13   7
20

x 10
14

y
t t t

Fact Family

$13 + 7 = 20$ $20 - 7 = 13$
$7 + 13 = 20$ $20 - 13 = 7$

$x + 10 = 14$ $14 - 10 = x$
$10 + x = 14$ $14 - x = 10$

$t + t + t = y$ $y - t - t = t$
$3 \times t = y$ $y \div 3 = t$
$3t = y$ $y \div t = 3$

Solve one step equations (+/-)

There is more to this than just spotting the answer

$$x + 42 = 59$$

$x + 42 = 59$
$42 + x = 59$

$59 - x = 42$
$59 - 42 = x$

x   42
59

Don't forget you know how to use function machines

$x \rightarrow +42 \rightarrow 59$

-42

Solve one step equations ($\times/\div$)

$$\frac{f}{4} = 5$$

5 5 5 5

f

$f \div 4 = 5$
$f \div 5 = 4$

$5 \times 4 = f$
$4 \times 5 = f$

Don't forget you know how to use function machines

$5 \rightarrow \times 4 \rightarrow f$

$\div 4$
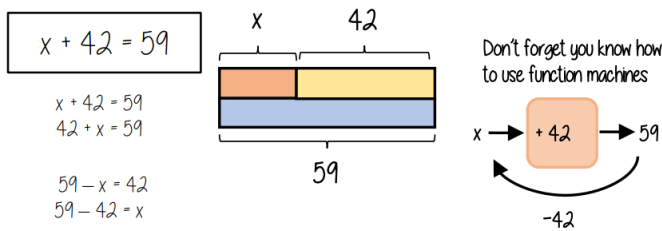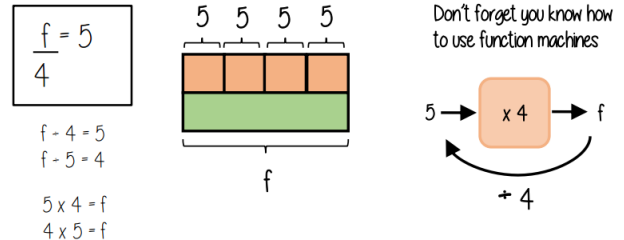
Like and unlike terms

Like terms are those whose variables are he same

♥ and 3♥ are **like** terms

the variable is the same

★ and 3♥ are **unlike** terms

the variables are NOT the same
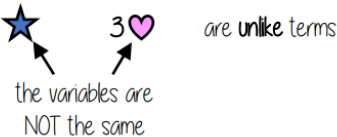
Examples and non-examples

Like terms	Un-like terms
$y, 7y$	$y, 7x$
$2x^2, x^2$	$2x^2, 2c^2$
$ab, 10ba$	$ab, 10a$
$5, -2$	$5, -2t$

Note here ab and ba are commutative operations, so are still like terms

Equivalence

Check equivalence by substitution
e.g. m = 10

$5m$	$2 \times 2m$	$7m - 3m$
5×10	$2 \times (2 \times 10)$	$(7 \times 10) - (3 \times 10)$
$= 50$	$= 2 \times 20$	$= 70 - 30$
	$= 40$	$= 40$

Equivalent expressions

Repeat this with various values for m to check

$5m$

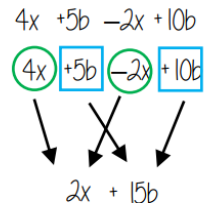$2 \times 2m$ 4m

$7m - 3m$ 4m
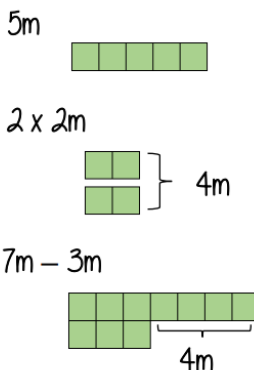
Collecting like terms $\equiv$ symbol

The $\equiv$ symbol means equivalent to.
It is used to identify equivalent expressions

Collecting like terms

Only **like** terms can be combined

$$4x + 5b - 2x + 10b$$

$4x$ $+5b$ $-2x$ $+10b$

$$2x + 15b$$

Common misconceptions

$$2x + 3x^2 + 4x \equiv 6x + 3x^2$$

Although they both have the x variable x2 and x terms are un-like terms so can not be collected