

# YEAR 7 — ALGEBRAIC THINKING

## 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)
- Index:** the power
- Expression:** a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)

### Equality

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

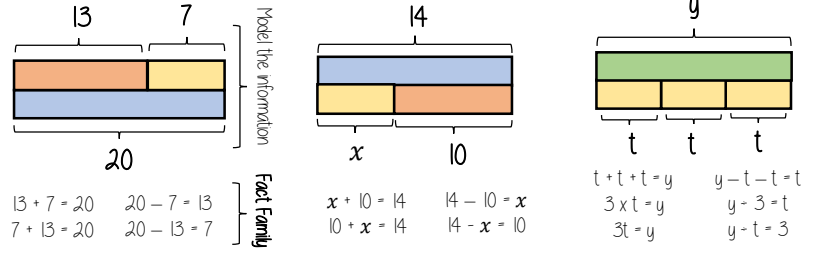


Saying it out loud sometimes helps you to understand equality

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

### Fact Families

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



### Solve one step equations (+/-)

There is more to this than just spotting the answer

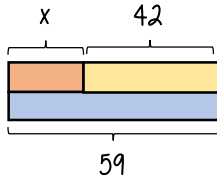
$$x + 42 = 59$$

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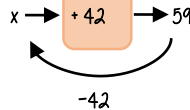
$$42 + x = 59$$

$$59 - x = 42$$

$$59 - 42 = x$$



Don't forget you know how to use function machines



### Solve one step equations (x/+)

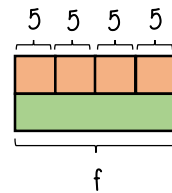
$$\frac{f}{4} = 5$$

$$f - 4 = 5$$

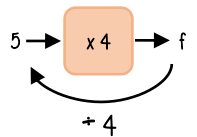
$$f - 5 = 4$$

$$5 \times 4 = f$$

$$4 \times 5 = f$$



Don't forget you know how to use function machines



### Like and unlike terms

Like terms are those whose variables are the 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

$y, 7y$   
 $2x^2, x^2$   
 $ab, 10ba$   
 $5, -2$

#### Un-like terms

$y, 7x$   
 $2x^2, 2c^2$   
 $ab, 10a$   
 $5, -2t$

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

### Equivalence

Check equivalence by substitution  
e.g.  $m = 10$

$$5m$$

$$5 \times 10$$

$$= 50$$

$$2 \times 2m$$

$$2 \times (2 \times 10)$$

$$= 2 \times 20$$

$$= 40$$

$$7m - 3m$$

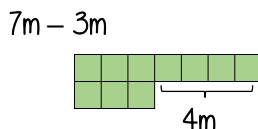
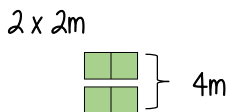
$$(7 \times 10) - (3 \times 10)$$

$$= 70 - 30$$

$$= 40$$

Equivalent expressions

Repeat this with various values for  $m$  to check



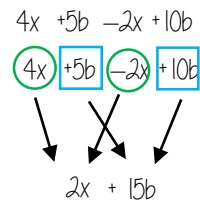
### Collecting like terms $\equiv$ symbol

The  $\equiv$  symbol means equivalent to

It is used to identify equivalent expressions

#### Collecting like terms

Only like terms can be combined



#### Common misconceptions

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

Although they both have the  $x$  variable  $x^2$  and  $x$  terms are unlike terms so cannot be collected