

YEAR 7 — ALGEBRAIC THINKING

Equality and Equivalence

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

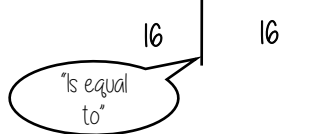
- Form and solve linear equations
- Understand like and unlike terms
- Simplify algebraic expressions

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

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

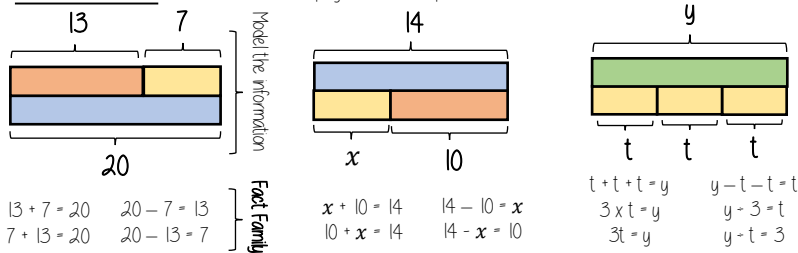


Saying it out loud sometimes helps you to understand equality

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

Fact Families

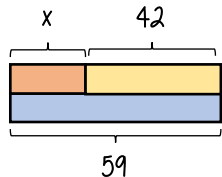
Use a bar model to display the relationships between terms and numbers



Solve one step equations (+/-)

There is more to this than just spotting the answer

$$x + 42 = 59$$

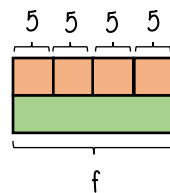


Don't forget you know how to use function machines

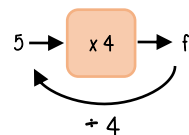


Solve one step equations (x/+)

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

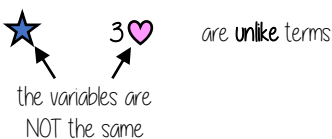
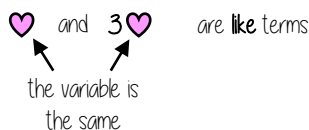


Don't forget you know how to use function machines



Like and unlike terms

Like terms are those whose variables are 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. $m = 10$

$$5m \quad 2 \times 2m \quad 7m - 3m$$

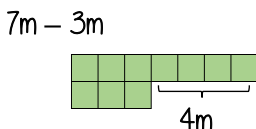
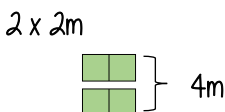
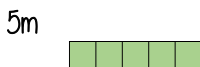
$$5 \times 10 \quad 2 \times (2 \times 10) \quad (7 \times 10) - (3 \times 10)$$

$$= 50 \quad = 2 \times 20 \quad = 70 - 30$$

$$= 50 \quad = 40 \quad = 40$$

Equivalent expressions

Repeat this with various values for m to check

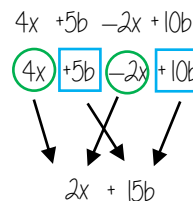


Collecting like terms \equiv symbol

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

YEAR 7 — PLACE VALUE AND PROPORTION

Ordering integers and decimals

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Understand place value and the number system including decimals
- Understand and use place value for decimals, integers and measures of any size
- Order number and use a number line for positive and negative integers, fractions and decimals;
- use the symbols $=$, \neq , \leq , \geq
- Work with terminating decimals and their corresponding fractions
- Round numbers to an appropriate accuracy
- Describe, interpret and compare data distributions using the median and range

Keywords

- Approximate:** To estimate a number, amount or total often using rounding of numbers to make them easier to calculate with
- Integer:** a whole number that is positive or negative
- Interval:** between two points or values
- Median:** A measure of central tendency (middle, average) found by putting all the data values in order and finding the middle value of the list
- Negative:** Any number less than zero, written with a minus sign
- Place holder:** We use 0 as a place holder to show that there are none of a particular place in a number
- Place value:** The value of a digit depending on its place in a number. In our decimal number system, each place is 10 times bigger than the place to its right
- Range:** The difference between the largest and smallest numbers in a set
- Significant figure:** A digit that gives meaning to a number. The most significant digit (figure) in an integer is the number on the left. The most significant digit in a decimal fraction is the first non-zero number after the decimal point

Integer Place Value

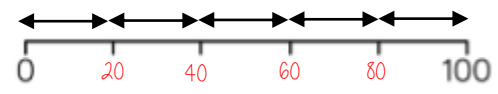
Billions			Millions			Thousands			Ones		
H	T	O	H	T	O	H	T	O	H	T	O
		3	1	4	8	0	3	3	0	2	9

Placeholder

Three billion, one hundred and forty eight million, thirty three thousand and twenty nine

1 billion 1,000,000,000
1 million 1,000,000

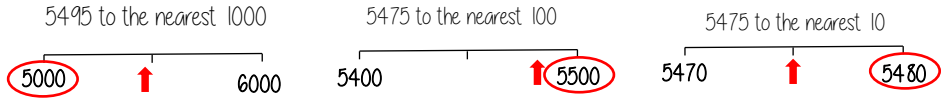
Intervals on a number line



Divide the difference by the number of intervals (gaps).
Eg $100 \div 5 = 20$

Rounding to the nearest power of ten

If the number is halfway between we "round up"



Compare integers using $<$, $>$, $=$, \neq

- $<$ less than Two and a half million = 2 500 000
- $>$ greater than 300 000 000 = Three billion
- $=$ equal to Six thousand and eighty = 68 000
- \neq not equal to

Range Spread of the values

Difference between the biggest and smallest

3 9 8 12

Range: Biggest value - Smallest value
 $12 - 3 = 9$

Range = 9

Median The middle value

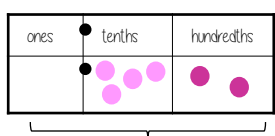
Example 1 Median: put the in order 3 4 8 9 12
4 3 9 8 12 find the middle number 3 4 **8** 9 12

Example 2 Median: put the in order 137 148 **150** 154 158 160
150 154 148 There are 2 middle numbers 152
137 160 158 Find the midpoint

Decimals

We say "nought point five two"

Five tenths and two hundredths



0 ones, 5 tenth and 2 hundredths

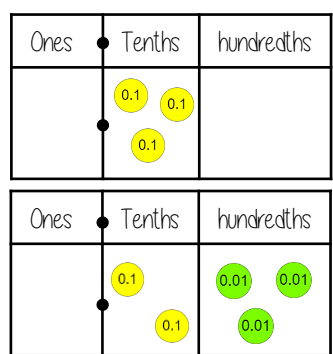
$$0 + 0.1 + 0.1 + 0.1 + 0.1 + 0.1 + 0.01 + 0.01$$

$$= 0 + 0.5 + 0.02$$

$$= 0.52$$

Comparing decimals

Which the largest of 0.3 and 0.23?



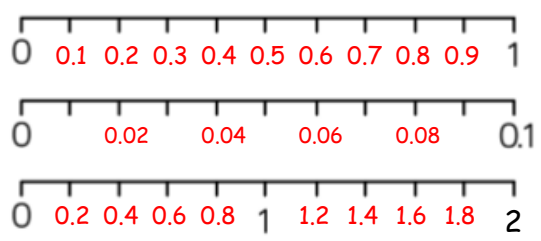
$0.3 > 0.23$

"There are more counters in the furthest column to the left"

0.30 }
0.23 } Comparing the values both with the same number of decimal places is another way to compare the number of tenths and hundredths

Decimal intervals on a number line

One whole split into 10 parts makes tenths = 0.1
One tenth split into 10 parts makes hundredths = 0.01



Round to 1 significant figure

- 370 to 1 significant figure is 400
- 37 to 1 significant figure is 40
- 37 to 1 significant figure is 4
- 0.37 to 1 significant figure is 0.4
- 0.00000037 to 1 significant figure is 0.0000004

Round to the first non zero number