YEAR 7 – DIRECTED NUMBER

Operations with equations and directed numbers

@whisto_maths

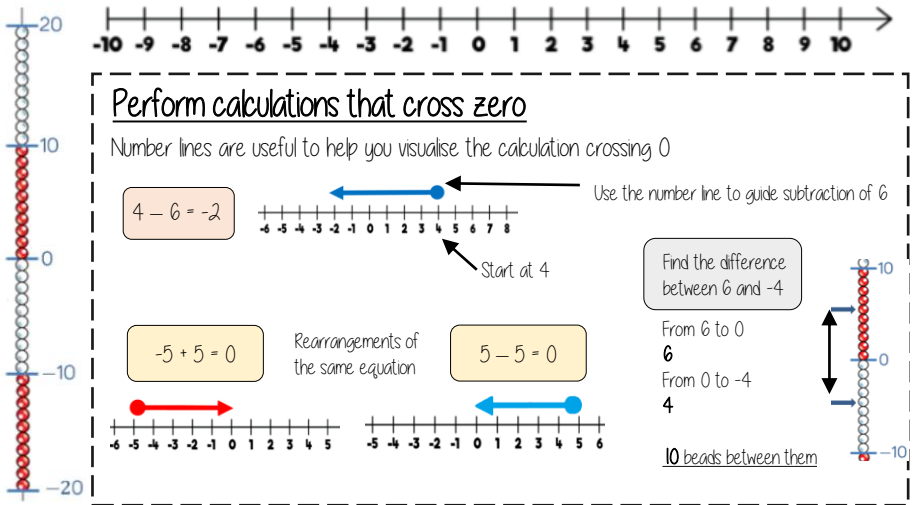
What do I need to be able to do?

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

- Perform calculations that cross zero
- Add/ Subtract directed numbers
- Multiply/ Divide directed numbers
- Evaluate algebraic expressions
- Solve two-step equations
- Use order of operations with directed number

Keywords

Subtract: taking away one number from another.
Negative: a value less than zero.
Commutative: changing the order of the operations does not change the result
Product: multiply terms
Inverse: the opposite function
Square root: a square root of a number is a number when multiplied by itself gives the value (symbol $\sqrt{}$)
Square: a term multiplied by itself.
Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)



Perform calculations that cross zero

Number lines are useful to help you visualise the calculation crossing 0

4 – 6 = -2

Use the number line to guide subtraction of 6

Start at 4

Find the difference between 6 and -4

From 6 to 0
6
From 0 to -4
4

10 beads between them

-5 + 5 = 0

Rearrangements of the same equation

5 – 5 = 0

Add directed numbers

= −1
= 1
Representations

2 + - 4 = -2

Zero pair
(-1 + 1 = 0)

Two " – 1 " left
= -2

8 + -3 = 5

Partitioning

8 + -3 = 5

5 + 3 + - 3 = 5

Partition the value to create a zero pair calculation

Generalisation
+ – = –

Subtract directed numbers

= −1
= 1
Representations

Representation for calculation

2 "Subtract" – means take away or remove

2 - - 1 = 3

Take away one

Start with the representation of 2

= 3

2 - - 3 = 5

= 5

Generalisation
– – = +

Multiply/ Divide directed numbers

-3 -3

Two representations of the same calculation

2 x -3 = -6

Negative, Negative calculation

-2 x -3

This is the negative of 2 x -3

The act of making counters into their negative is turning them over

-2 x -3 = 6

Divisions are the inverse operations

Evaluate algebraic expressions

a = 5

b = -4

$a^2 = 5^2$
$a^2 = 25$

$b^2 = (-4)^2$
$b^2 = 16$

With negative numbers the brackets are important so that it performs -4 x -4.

Brackets around negative substitutions helps remove calculation errors

2a – b = 2 x 5 – (-4) = 10 + 4 = 14

3b – 2a = 3(-4) – 2(5) = - 12 – 10 = -22

Two-step equations

Bar Model

10

x x x x 2

10

4x + 2 = 10

10 – 4x = 2

Representing the same question (use fact families)

Function machine

x → x4 → +2 → 10

Inverse operations to find x

x x x x

8

x

2

Use order or operations

( )
² & √
× & ÷
+ & –

Brackets
Indices or roots
Multiplication or division
Addition or subtraction

Brackets around negative substitutions helps remove calculation errors

Remember square roots have a positive and negative value

×	-3	-2	-1	0	1	2	3
-3	9	6	3	0	-3	-6	-9
-2	6	4	2	0	-2	-4	-6
-1	3	2	1	0	-1	-2	-3
0	0	0	0	0	0	0	0
1	-3	-2	-1	0	1	2	3
2	-6	-4	-2	0	2	4	6
3	-9	-6	-3	0	3	6	9

YEAR 7 – PLACE VALUE AND PROPORTION...

FDP equivalence

@whisto_maths

What do I need to be able to do?

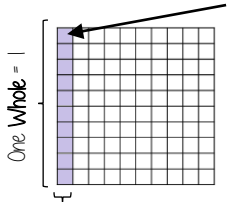
By the end of this unit you should be able to:

- Convert fluently between fractions, decimals & percentages

Keywords

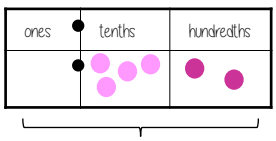
Fraction: how many parts of a whole we have
Decimal: a number with a decimal point used to separate ones, tenths, hundredths etc.
Percentage: a proportion of a whole represented as a number between 0 and 100
Place value: the numerical value that a digit has decided by its position in the number
Placeholder: a number that occupies a position to give value
Interval: a range between two numbers
Tenth: one whole split into 10 equal parts
Hundredth: one whole split into 100 equal parts
Sector: a part of a circle between two radius (often referred to as looking like a piece of pie)
Recurring: a decimal that repeats in a given pattern

Tenths and hundredths



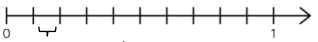
One **hundredth** (one whole split into 100 equal parts) = $\frac{1}{100}$ = 0.01

One **tenth** (one whole split into 10 equal parts) = $\frac{1}{10}$ = 0.1



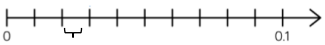
0 ones, 5 tenth and 2 hundredths
0 + 0.1 + 0.1 + 0.1 + 0.1 + 0.1 + 0.01 + 0.01
= 0 + 0.5 + 0.02
= **0.52**

On a number line



One whole – split into 10 equal parts

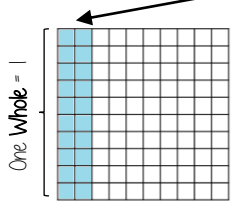
One tenth = $\frac{1}{10}$ = 0.1

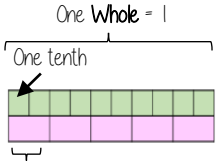


One tenth – split into 10 equal parts

One hundredth = $\frac{1}{100}$ = 0.01

Fifths

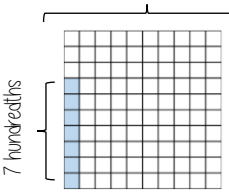




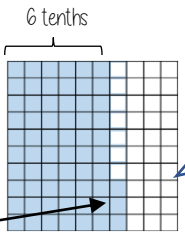
One **fifth** (one whole split into 5 equal parts) = $\frac{1}{5}$ = 0.2

Percentages on a hundred grid

100% = a whole = 100 hundredths



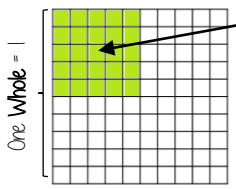
7 hundredths
7 out of 100
7%

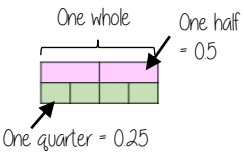


6 tenths and 3 hundredths
63 hundredths
63%

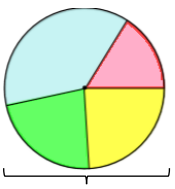
Quarters

One **quarter** (one whole split into 4 equal parts) = $\frac{1}{4}$ = 0.25





Simple pie charts



A pie chart has 360° so all FDP calculations are out of 360

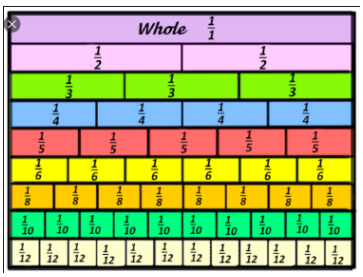
Split into 10 parts = 10% = 36°

Split into 2 parts = 50% = 180°

Split into 5 parts = 20% = 72°

Equivalent fractions

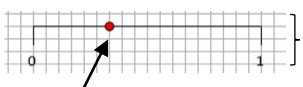
Represent equivalence with fraction walls



Fractions – on a diagram

The denominator is represented by EQUALLY sized parts – this is split into quarters

Fractions – on a number line



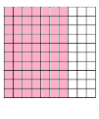
This point is at the 6th part
6 is the **numerator**

One whole split into 18 equal parts
18 is the **denominator**

$\frac{6}{18} \leftarrow \frac{3}{9} \leftarrow \frac{1}{3}$

Convert FDP

$\frac{70}{100}$ → This also means 70 ÷ 100 → 70 out of 100 squares → 70 "hundredths" = 7 "tenths" = 0.7



→ 70 hundredths = 70%

Using a **calculator**

→ S⇔D → Convert to a decimal

This will give you the answer in the simplest form

× 100 converts to a percentage

Be careful of recurring decimals
e.g $\frac{1}{3}$ = 0.3333333 = $0.\dot{3}$
The dot above the 3