

YEAR 9 — REASONING WITH NUMBER...

Numbers

What do I need to be able to do?

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

- Identify integers, real and rational numbers
- Work with directed number
- Solve problems with number
- Find HCF/ LCM
- Add/ Subtract fractions
- Multiply/ Divide fractions
- Write numbers in standard form

Keywords

Integer: a whole number that is positive or negative

Rational: a number that can be made by dividing two integers

Irrational: a number that cannot be made by dividing two integers

Inverse operation: the operation that reverses the action

Quotient: the result of a division

Product: the result of a multiplication

Multiples: found by multiplying any number by positive integers

Factor: integers that multiply together to get another number

Integers, real and rational numbers

Rational – root word: ratio

Real numbers: $\frac{2}{3}$ stems from 2:1 ($\frac{2}{3}$ of the whole)

Irrational numbers: $\sqrt{2}$ the solution is a decimal that never ends and does not repeat

The square root of a negative is not a real number and cannot be found

HCF/LCM

1 is a common factor of all numbers

Common factors are factors two or more numbers share

HCF – Highest common factor

HCF of 18 and 30

18: 1, 2, 3, 6, 9, 18

30: 1, 2, 3, 5, 6, 10, 15, 30

HCF = 6

LCM – Lowest common multiple

LCM of 9 and 12

9: 9, 18, 27, 36, 45, 54

12: 12, 24, 36, 48, 60

LCM = 36

The first time their multiples match

Standard form

Any number between 1 and less than 10 $\rightarrow A \times 10^n$ Any integer

$6 \times 10^5 + 8 \times 10^5$

= 600000 + 800000

= 1400000

= 1.4×10^6

$(1.5 \times 10^5) \div (0.3 \times 10^3)$

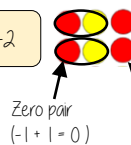
$15 \div 0.3 \times 10^5 \div 10^3$

= 5×10^2

Directed number

Addition

$$2 + -4 = -2$$



Generalisation

$$+ - = -$$

Subtraction

$$2 - 4 = -2$$

Representation for calculation

$$2 - -1 = 3$$

Start with the representation of 2

"Subtract" – means take away or remove



Generalisation

$$- - = +$$

Multiplication

$$-2 \times -3 = 6$$

Divisions are the inverse operations

Red dot = -1
Yellow dot = 1

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



$a = 5$

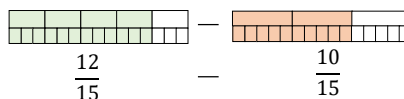
$b = -4$

Brackets around negative substitutions helps remove calculation errors

$$2a - b = 2 \times 5 - (-4) = 10 + 4 = 14$$

Addition/ Subtraction of fractions

$$\frac{4}{5} - \frac{2}{3}$$



$$= \frac{2}{15}$$

Use equivalent fractions to find a common multiple for both denominators

Multiplication/ Division of fractions

$$\frac{3}{4} \times \frac{2}{3}$$

Shade in 3 parts

Repeat it on this many rows

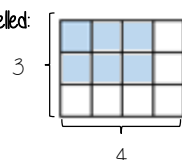
This many columns

This many rows

$$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$$

Parts shaded

Modelled:



Total number of parts in the diagram

Remember to use reciprocals

$$2 \div \frac{3}{4}$$

$$2 \times \frac{4}{3}$$

Multiplying by a reciprocal gives the same outcome

Represented



$$= \frac{8}{3}$$