Inspire Mathematics

123
Number

Unit 1
Numeracy and Calculations

$a^2+b^2=c^2$
Algebra

Unit 2
Algebra

Decimal and Measure

Unit 3 Decimals and Measure

Handling Data

Unit 4
Handling Data

$\frac{7}{10}$
Fractions, Decimals and Percentages

Unit 5
Fractions, Decimals and Percentages

Probability

Unit 6
Probability

4:3
Ratio and Proportion

Unit 7
Ratio and Proportion

Lines and Angles

Unit 8
Lines and Angles

Sequences, Graphs and Inequalities

Unit 9
Sequences, Graphs and Inequalities

Transformations

Unit 10
Transformations and Constructions

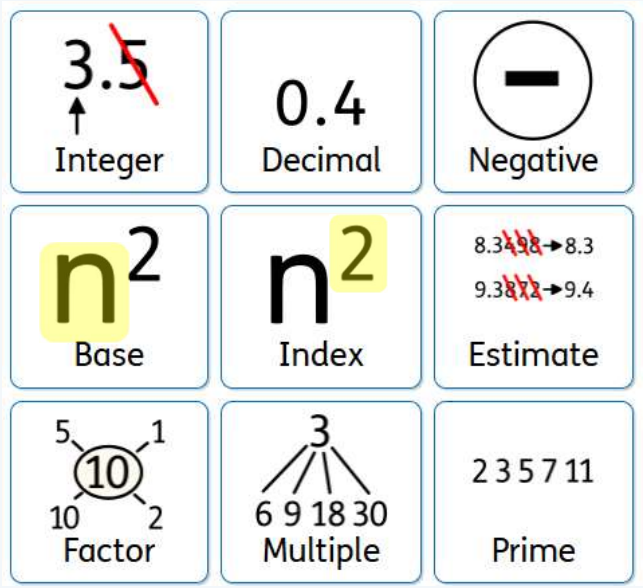
GCSE Mathematics

Inspire – Unit 1: Numeracy and Calculations

In this topic we will cover the core skills and knowledge needed to work with numbers. Many of these topics will recur throughout the year within different topics, and once we have finished this unit, we will practice our numeracy skills often.

In this topic, we will learn to…	☺	😐	☹
Use written methods of addition, subtraction multiplication and division			
Recall square numbers, cube numbers and their associated roots			
Write using index form			
How to use the order in which we apply mathematical operations (BIDMAS)			
Work with negative numbers			
Round numbers to an appropriate degree of accuracy			
When and how to estimate the answer to a calculation			
Recognise and use factors, multiples and prime numbers			
Use a scientific calculator			

Key Vocabulary



Multiplication Square

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Example Question

16	2	4	19
9	18	23	12

Which of the numbers in the box are

a factors of 36

b multiples of 8

c prime

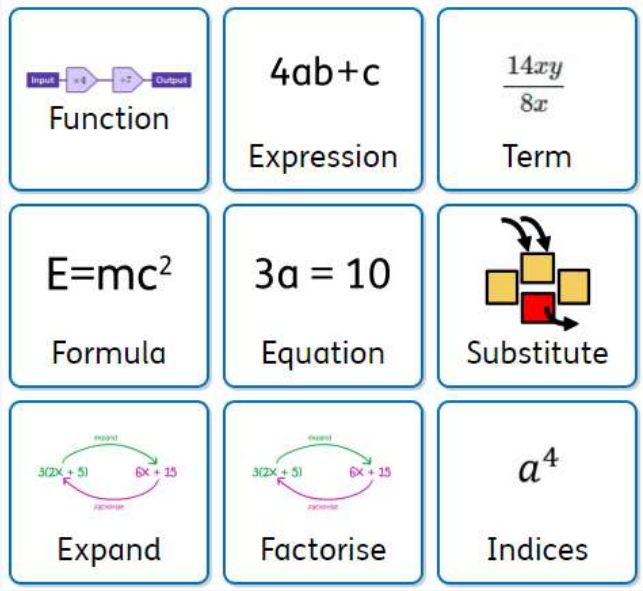
d square numbers?

Inspire – Unit 2: Algebra

Algebra is the branch of mathematics in which letters and symbols are used to represent rules, patterns and relationships. This is another topic that will often appear within other areas of mathematics.

In this topic, we will learn to…	☺	😐	☹
Work with simple functions/function machines			
Write expressions using letters and powers			
Simplify algebraic expressions by collecting like terms			
Simplify algebraic expressions using multiplication, division and rules of indices			
Work with expressions that contain brackets			
Factorise expressions			
Substitute values into an expression or formulae			
Solve linear equations			
Identify terms, expressions, formulae, functions and equations			

Key Vocabulary



Add 14 to a	$a + 14$
Subtract 20 from b	$b - 20$
Multiply c by 4	$4c$
12 more than d	$d + 12$
Multiply e by 3 and subtract 5	$3e - 5$

The multiplication sign is not used in algebra. The number is always written in front of the variable.

$3y = 12$

The division sign is not used in algebra. A fraction line is used to show that you divide the top by the bottom.

$\frac{20}{g} = 5$

Example Question

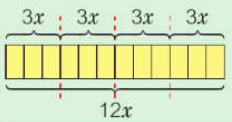
7 Simplify

a $4 \times 3x$ b $8 \times 2y$ c $6b \times 5$

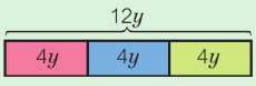
d $2c \times 2.5$ e $\frac{12y}{3}$ f $\frac{16f}{8}$

g $\frac{20z}{10}$ h $\frac{4g}{4}$

Q7a hint



Q7e hint

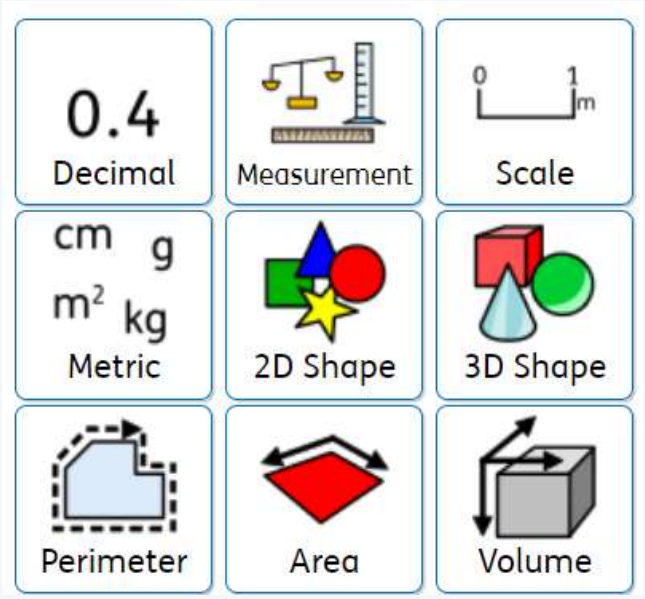


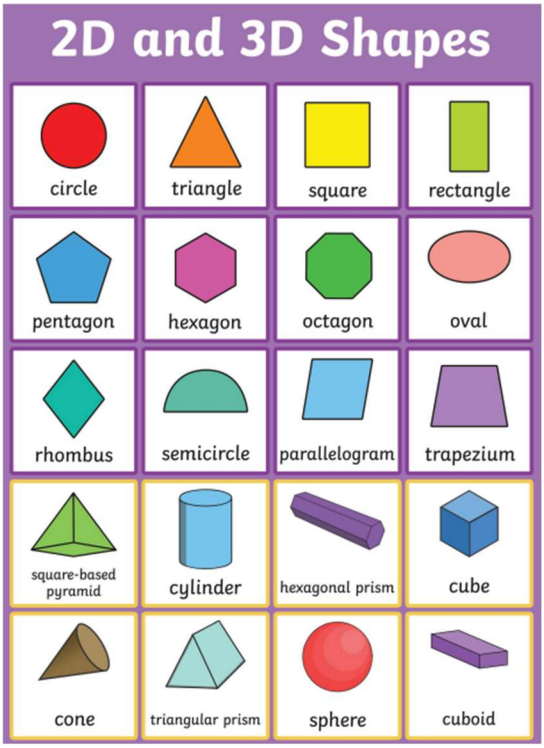
Inspire – Unit 3: Decimals and Measure

In this unit we will deepen your understanding of numeracy by exploring decimal numbers and apply our numeracy skills to geometry as we explore the properties of 2D and 3D shapes.

In this topic, we will learn to…	☺	😐	☹
Understand, order and round decimal numbers			
Add, subtract, multiply and divide with decimal numbers			
Convert between metric units of length, mass and capacity			
Use metric and imperial units of measurement			
Use scale diagrams and solve everyday problems involving measures			
Calculate the perimeter and area of 2D shapes			
Calculate the volume and surface area of 3D shapes			
Represent 3D shapes in 2D images, including plans and elevations and nets			
Use Pythagoras' Theorem			

Key Vocabulary



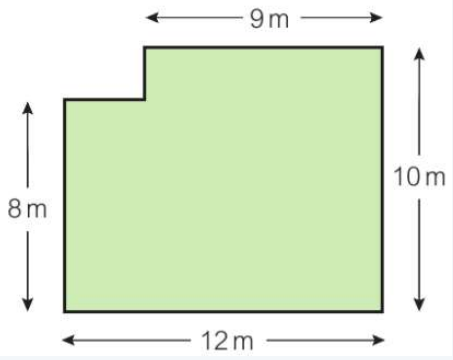


Example Question

The diagram shows the dimensions of an office.

a Work out the perimeter.

b Work out the floor area.

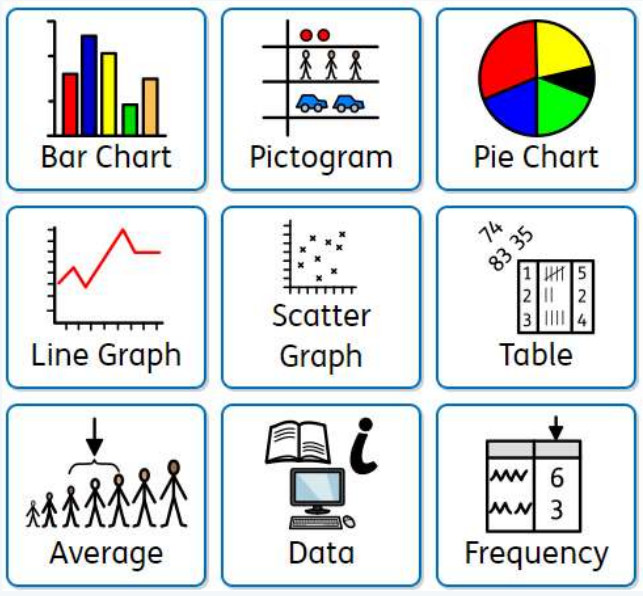


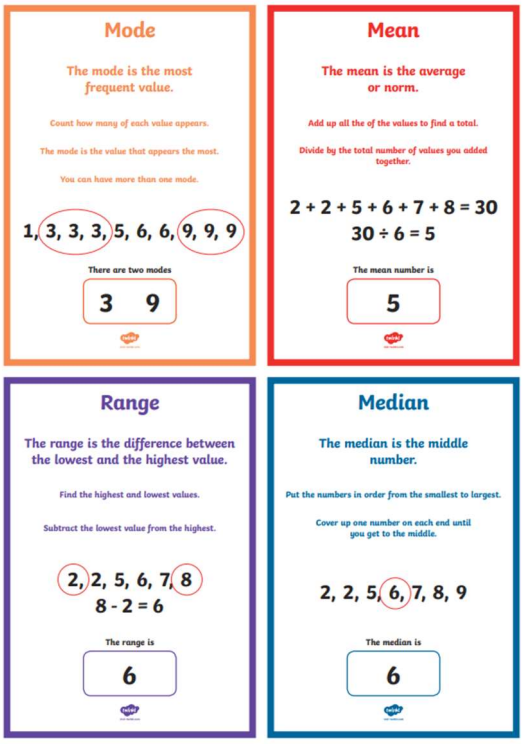
Inspire – Unit 4: Handling Data

Handling data is a very useful topic as we will be presented with information throughout our lifetime – during this topic we will study how to create and interpret a range of graphs and charts, and how to find, understand and compare averages and the range of sets of data.

In this topic, we will learn to…	☺	😐	☹
Use tally charts, frequency tables and two-way tables			
Draw and interpret bar charts, pictograms and bar-line graphs for discrete data			
Draw and interpret grouped bar charts and line graphs for continuous data			
Construct and understand pie charts			
Draw scatter graphs, draw lines of best fit and describe correlations			
Calculate the average value (mean, mode and median) of a set of data			
Calculate the range of a set of data			
Construct and interpret stem and leaf diagrams			
Identify sources of data and best practices for collecting data			

Key Vocabulary





Example Question

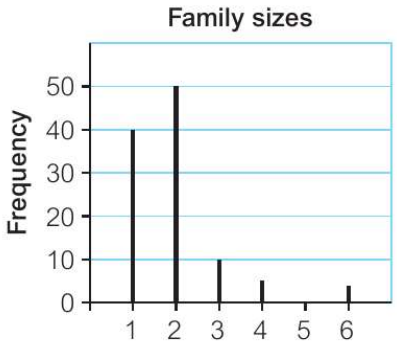
The bar-line chart shows the numbers of children in the families of some Year 7 students.

a How many families have 3 children?

b What is the mode?

c Why is there no bar for 5 children?

d How many families have fewer than 3 children?



Inspire – Unit 5: Fractions, Decimals and Percentages

Fractions, decimals and percentages are different ways of expressing a proportion of a value and they arise in many areas of maths and in many areas of real life, particularly when dealing with finance.

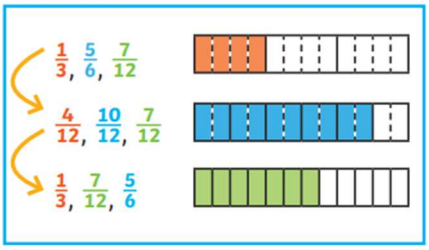
In this topic, we will learn to…	☺	😐	☹
Write, order and compare fractions			
Change a mixed number to an improper fraction and vice versa			
Add, subtract, multiply and divide with fractions			
Find the reciprocal of a number			
Recall equivalent fractions, decimals and percentages			
Work out fractions and percentages of amounts			
Write one quantity as a fraction or a percentage of another			
Work with percentage change			
Work with decimals, including recurring decimals			
Change time to decimal hours			

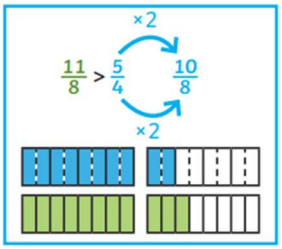
Key Vocabulary

$\frac{7}{10}$ Fraction	$\frac{7}{10}$ ← Numerator	$\frac{7}{10}$ ← Denominator
$5\frac{2}{7}$ Mixed number	$\frac{9}{4}\ \frac{7}{2}\ \frac{10}{7}$ Improper fraction	% Percentage
0.4 Decimal	$0.\dot{7}\dot{1}$ Recurring	$n\ \ \frac{1}{n}$ Reciprocal

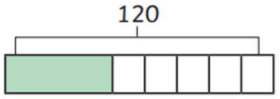
Compare and Order Fractions

We can compare and order fractions by using common denominators.





Fractions of Amounts



Find $\frac{3}{8}$ of 120:

$\frac{1}{8}$ of 120 = 120 ÷ 8 = 15

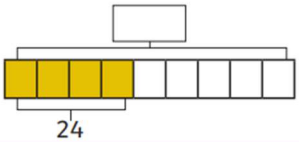
$\frac{3}{8}$ of 120 = 3 ×15 = 45

Find the whole:

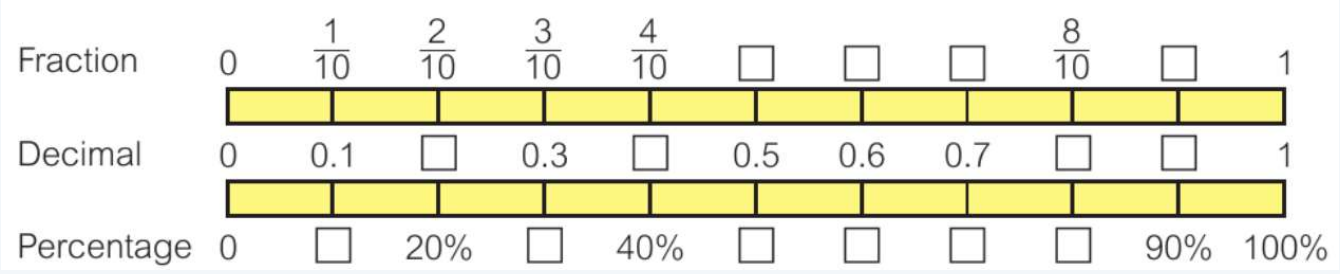
4/9 of the whole = 24

1/9 of the whole = 24 ÷ 4 = 6

The whole is 9 × 6 = 54



Example Question

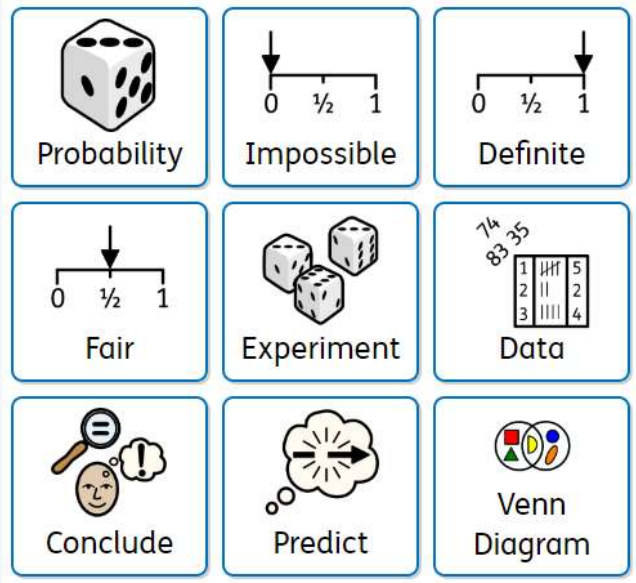


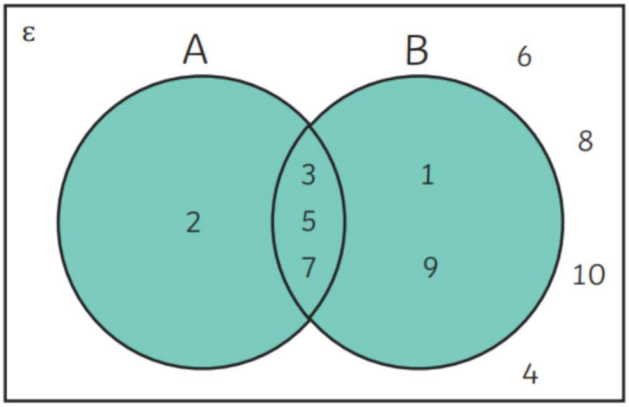
Inspire – Unit 6: Probability

Probability is the mathematical way of measuring the chance of an event or series of events happening. It will draw upon a lot of the knowledge and skills we have gained from working with fractions, decimals and percentages.

In this topic, we will learn to…	☺	😐	☹
Describe probabilities in words			
Understand and use the probability scale			
Identify outcomes and calculate theoretical probabilities			
Estimate probabilities based on experimental data			
Use experimental data to make conclusions and prediction			
Construct and use Venn diagrams			

Key Vocabulary





ε = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} ← The universal set

A = {prime numbers} ← These funny looking brackets are just a way of showing us what is in a set.

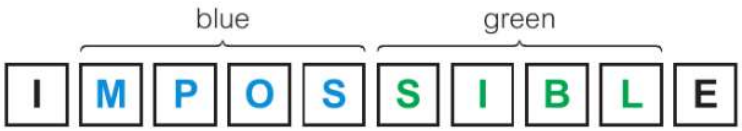
B = {odd numbers}

A ∪ B = {1, 2, 3, 5, 7, 9}

A ∩ B = {3, 5, 7}

Example Question

These letter cards are shuffled. Jim chooses one of the cards at random.



Work out the percentage probability that he picks

a the letter S
b a vowel
c not the letter P
d a green letter or the letter M
e not the letter S
f the letter J

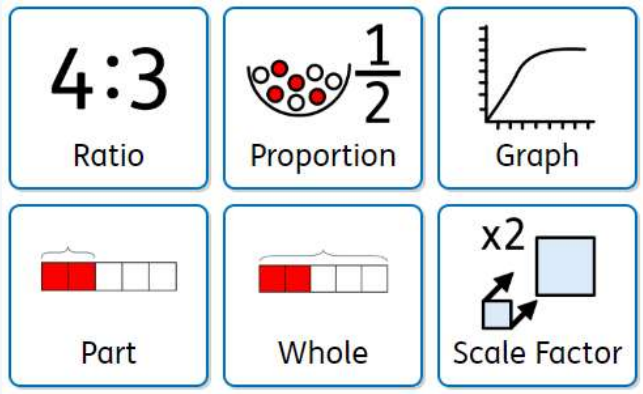
Inspire – Unit 7: Ratio and Proportion

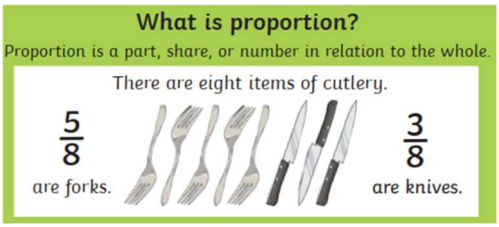
Ratio is how much of one quantity there is in relation to another; for example, the amount of flour and the amount of sugar needed to make biscuits.

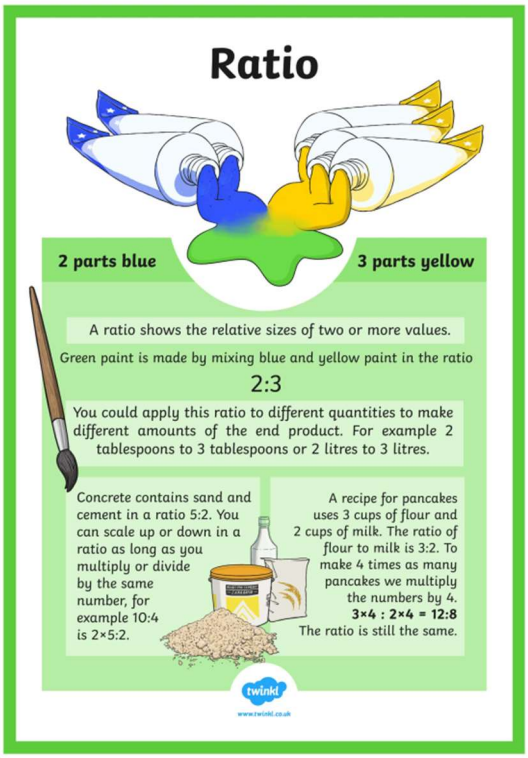
Proportion is how much there is of one thing compared to the whole amount, for example, the amount of orange squash in an entire drink.

In this topic, we will learn to…	☺	😐	☹
Solve problems with direct proportion in context, e.g. recipes			
Write and simplify ratios			
Divide a quantity into a given ratio			
Use ratios that involve decimals and measurements			
Understand the relationship between fractions, percentages, ratio and proportion			
Solve best-buy problems			
Plot and interpret graphs that represent proportion, e.g. distance-time graphs			
Use compound measures			
Write formulae to model proportional relationships			

Key Vocabulary





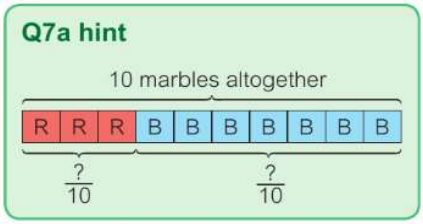


Example Question

a There are 3 red and 7 blue marbles in box A. What fraction of the marbles are red?

b There are 3 red and 2 blue marbles in box B. What fraction of the marbles are red?

c Which box has the greater proportion of red marbles?



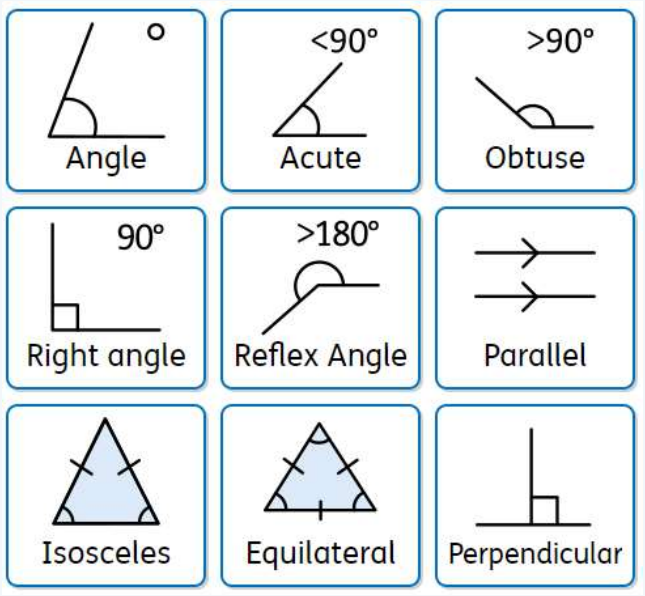
Q7c hint Compare the fractions in parts **a** and **b**. Which is greater?

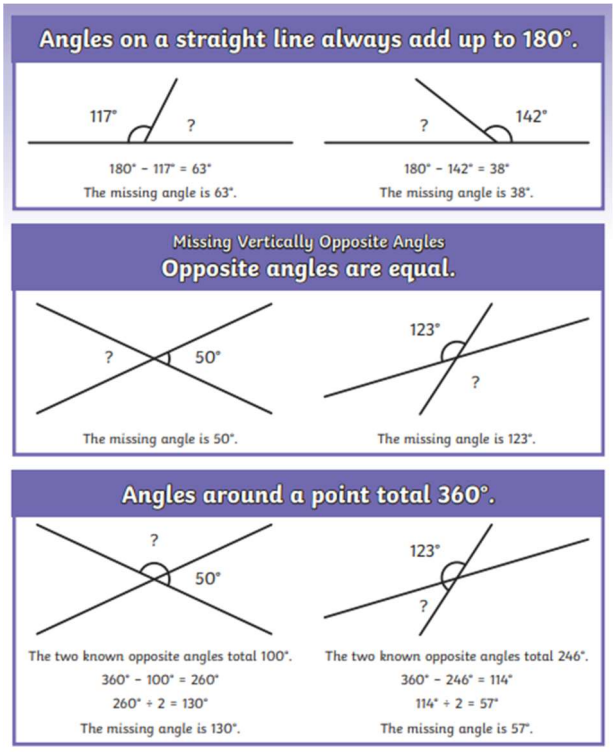
Inspire – Unit 8: Lines and Angles

In this unit of work, we will build upon the skills we have developed with measurement to understand and work with angles. There will be the practical element of drawing and measuring angles and the theoretical element of calculating with key angle facts.

In this topic, we will learn to…	☺	😐	☹
Measure, draw and estimate the size of angles			
Use common angle rules to calculate missing angles			
Solve problems using properties of angles in parallel and intersecting lines			
Use common mathematical descriptors and labels for lines, angles and triangles			
Identify the different triangles and quadrilaterals and recall their properties			
Use the rule for the sum of angles in triangles and quadrilaterals			
Recognise congruent and similar shapes			
Calculate using interior and exterior angles of polygons			
Use trigonometric ratios to find unknown angles and sides of right-angled triangles			

Key Vocabulary

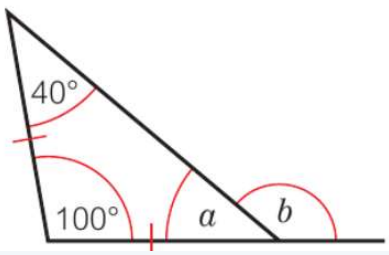




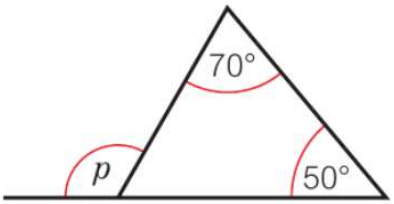
Example Question

Work out the size of each angle labelled with a letter.
Write down a reason for each angle you find.

a



b

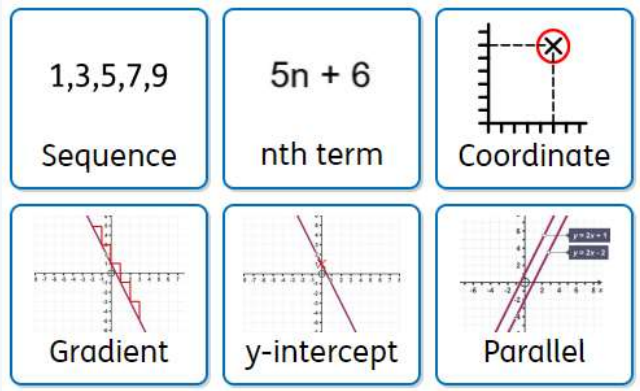


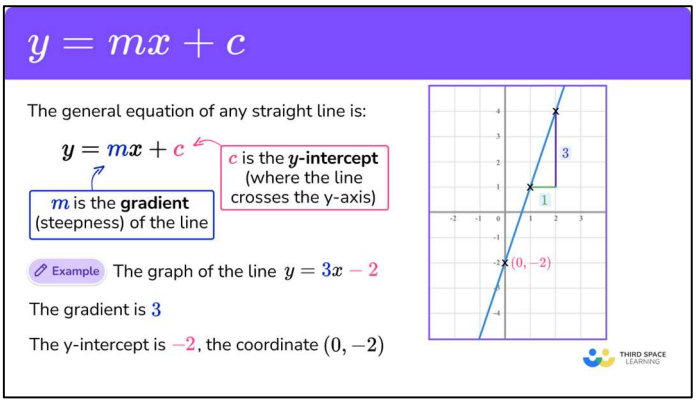
Inspire – Unit 9: Sequences, Graphs and Inequalities

This topic continues our exploration of algebra, with a focus on sequences and graphs. These two topics overlap hugely – a graph can be a pictorial representation of a sequence and many of the processes we use for each topic will be similar.

In this topic, we will learn to…	☺	😐	☹
Recognise, describe and continue a range of sequences			
Use term-to-term and position-to-term rules of a sequence			
Model situations using numerical sequences			
Find and use an nth term of arithmetic (linear) sequences			
Find the midpoint of a line segment			
Generate and plot coordinates from a rule, including in the format $y = mx + c$			
Recognise and name horizontal and vertical line graphs, and the graphs of $y = \pm x$			
Rearrange equations and use the formats $y = mx + c$ and $ax + by = c$			
Solve linear simultaneous equations graphically			
Draw and interpret non-linear graphs, including quadratic functions			
Plot, use and interpret conversion graphs			
Recognise, plot and use graphs showing direct and indirect proportion			
Represent and use inequalities using number lines and mathematical symbols			

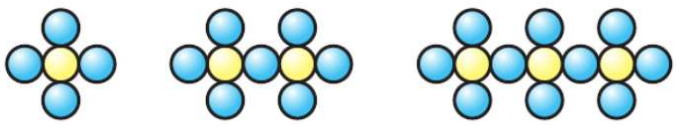
Key Vocabulary





Example Question

Sushma makes a bracelet from beads.
It grows like this.



a Copy and complete this table.

Number of flowers	1	2	3	4	5
Number of beads	5	9			

b What is the term-to-term rule for the sequence?

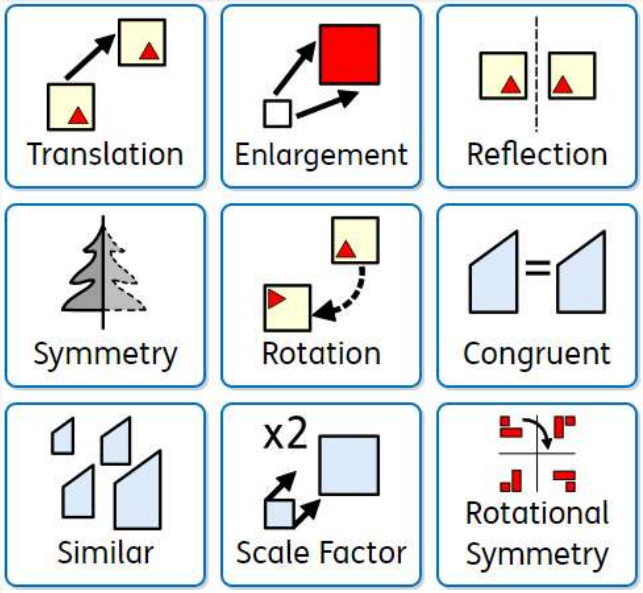
Inspire – Unit 10: Transformations and Constructions

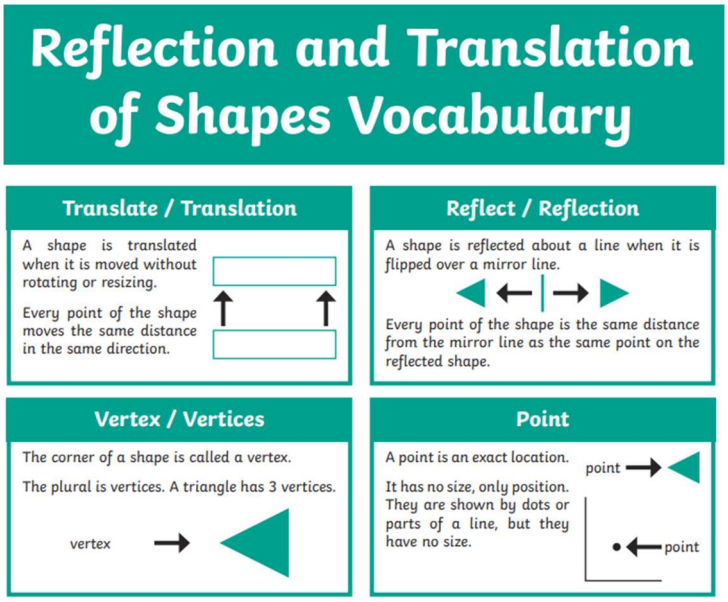
In maths, a **transformation** is a change we make to a shape. There are four main transformations: reflection, rotation, translation and enlargement.

In our **constructions** work we will use equipment to accurately draw shapes, lines and angles.

In this topic, we will learn to…	☺	😐	☹
Recognise and use line and rotational symmetry in 2D shapes			
Complete transformation of 2D shapes: reflection, rotation and translation			
Enlarge 2D shapes using a centre of enlargement			
Complete transformations of shapes on a coordinate grid			
Perform combinations of transformations			
Describe transformations using mathematical vocabulary and notation			
Perform mathematical constructions using drawing equipment			
Identify congruent and similar shapes			
Use scales on maps and diagrams			

Key Vocabulary





Example Question

Which reflections have the mirror line in the correct place?