Holland Junior School
Mathematics Policy and Protocol

Written: May 2020
To be reviewed: May 2023

Principle Academy Vision

The Pioneer Academy promotes and achieves excellence by ensuring the very best care and guidance for every child within our family of schools. It recognises the importance of outstanding teaching and learning by actively encouraging creativity and innovation, whilst having consistent standards of behaviour and attendance. Treating everyone as equal, whilst celebrating diversity, is a non-negotiable; protecting all through safeguarding, health and safety and welfare is paramount.

Introduction

This document is a statement of the aims, principles and strategies for the teaching, learning and assessment of mathematics at The Pioneer Academy Schools. We believe every child can do maths. Our aim is to facilitate highly effective teaching and learning that is practical, challenging and engaging, whilst supporting children on their journey towards mastery. Every adult has the highest expectations of the children, and as such, expects all children to attain high standards. Children are expected to develop a deep understanding of a concept through mathematical reasoning before progressing to the next level.

Philosophy

The new National Curriculum states that:
"Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment.

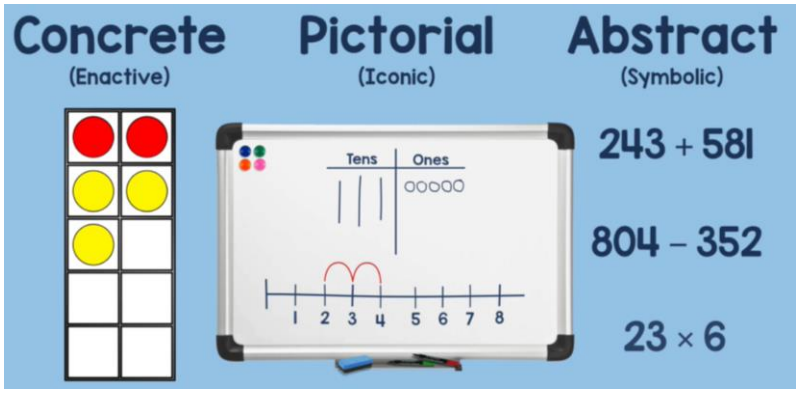
A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject."

At The Pioneer Academy we see Maths very much as a multi-discipline, cross curricular, interconnected subject which encourages creativity. We believe that talking and reasoning about Maths is as important as performing calculations. We want the children to see Mathematics as being relevant to their world and applicable to everyday life as well as being something that they will need as they move on through their school life and ultimately to the world of employment. Their learning experience should be one that develops the children's ability to think mathematically and one which allows them to apply the knowledge, understanding and skills they have learned in a variety of ways

The National Curriculum identifies three main aims in the primary phase:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

At The Pioneer Academy Schools we aim to ensure that conceptual, pictorial, and abstract (CPA) understanding is integrated into lessons alongside procedural and factual fluency. We believe that maths does not rely on rote learning of facts and procedures without the underlying understanding required to use them effectively. There is a focus on number and calculation from the beginning.



We aim to promote positive attitudes towards maths as we believe there is a link between success, confidence and enjoyment. We achieve this is by the use of maths across the curriculum and by making maths fun.

Scheme of Work

We follow White Rose Maths (WRM). This is a mastery approach to the teaching of Mathematics whereby topics are taught in depth over a longer period. This allows for the mastering of concepts before moving on to the next sequence. This we believe paves the way for children to be secure in what they have learnt. Click here to access the WRM progression document.

Calculation Policy

We follow the White Rose Calculation Policy which introduces key concepts using a concrete-pictorial-abstract approach. (See separate document)

Planning

Teachers in all year groups plan using the White Rose scheme as the basis for most of their work, supplemented with resources such as Premium WRM, Rising Stars, Classroom Secrets or Twinkl (Dive into Master). We aim, wherever possible, for children to access the work from their own year group. Occasionally, there may be a small number of children for whom this is not appropriate. They will look at earlier year groups if this is the case. Higher Ability children are extended using additional reasoning resources, maybe from NRich or NCETM etc.

Planning a Lesson

When planning a lesson, teachers need to plan for a balance of conceptual understanding, language and communication and mathematical thinking to support children's mathematical problem solving. If a pupil has meaningful understanding of the maths they are learning, they will be able to represent it in different ways, use mathematical language to communicate related ideas and think mathematically with the concept. This will enable them to apply their understanding to a new problem in an unfamiliar situation.

Engaging with WRM Schemes of Work

1. **Get an overview of the block**

- What should pupils be able to understand and apply by the end of this block?
- How does the block progress?
- What is the key learning which needs to be covered?
- Are there links to previous/future learning?

2. **Consider the key teaching points** - *these will need to be reinforced throughout the block.*

- What needs to be modelled and how to the children? How will you model this alongside the calculation?
- What are the key sentence structures and vocabulary*? (See Appendices 4 and 5)*
- What are the small steps for the learning?
- What concrete, pictorial and abstract representations would be most appropriate during the block?
- What misconceptions will need to be addressed or anticipated?
- What questions will promote a deeper understanding of the concepts taught? *(See Appendix 2)*

3. **Decide how the unit will need to be adapted for your class**

- How will you differentiate? How will you scaffold? Will you use constraints? *(See Appendix 3)*
- How will you promote learning for depth? What opportunities for reasoning will you include? How might you use conceptual/procedural understanding? (*See Appendix 1)*
- Will any pre-teaching be required? Would it be most useful to use consolidation lessons- at the beginning/end/middle of block?
- Will more/less time be needed on certain key learning?
- What are my expectations of how pupils will progress?
- What sharing strategies might pupils in use; Use manipulatives, create visual images, guesstimate (trial and error), work backwards, look for a pattern, create a systematic list, create a table…

Teaching

- Lessons can be structured in a variety of ways to suit the topic and the class.
  Example A: Do Now, New Learning, Talk Task, Develop Learning, Independent Task, Plenary
  Example B: Discover, Share, Think Together, Practise, Reflect
  Example C: Continuation from previous lesson
- Whole class teaching is used only when appropriate.
- The children get the opportunity for collaborative work and independent work.
- There are five maths lessons a week. In Key Stage 1 teachers ensure that every child undertakes mathematical activities for at least 40 minutes per day. In Key Stage 2 daily mathematics lessons are at least an hour long.
- Key vocabulary for the lesson is taught and displayed. Full sentence responses are modelled and expected.
- The use of worksheets for children's work is discouraged. However, learning prompts, scaffold or frames can be used to support learning.
- The following **core representations** or manipulatives are used across the school:

Place Value charts	Money	Number lines
Arrays	Base 10	Part-whole models
Numicon	Cuisenaire rods	Bar models
Place Value Counters	Bead strings	Tens frames

- A Working Wall and maths displays are used to support learning.
- Teachers plan for other opportunities for the preview and review of learning; Daily Ten, Maths Meetings, TT Rockstars, MyMaths, Maths with Parents, Big Maths, Flashback Four, True or False…..

Assessment

- Regular moderation staff meetings are planned throughout the year to ensure consistency in teacher assessments across the school.
- Gaps in learning will be identified on a regularly basis and children will be given targeted intervention time before the next lesson to enable them to move on with the rest of the class. WRM End of Block and End of Term Assessments are used for this purpose.
- Interventions are provided to boost children's progression in maths.

Computing

Opportunities to use computing to support teaching and learning are planned for and used as appropriate.

Appendix 1 – Depth of Understanding

All pupils should be given opportunities to deepen their understanding. Pupils are less likely to consolidate understanding of a concept if they have only a simple, procedural understanding of it that relies heavily on limited representations with no connections to familiar ideas or contexts. Consider how you can support deeper understanding throughout the lesson…

'What's the question?' If this is the answer, what could the question have been? This could be an equation or a word problem.	**'Reason it'** Explain to your partner how you know. Remember to use the star words!	**'What's wrong with this?'** Can you explain what is wrong with this and correct the error?
'What's the same? What's different?' Can you find anything that is the same about these two numbers/shapes/calculations? Now can you find something that is different?	**'Find a pattern'** Can you see a pattern (in the numbers)? Can you see a pattern in the answers? Continuing this pattern, what would happen if...? What came before? What comes next? Explain how you know	**'Have you found all possibilities?'** Is there more than one way of completing this? Is there more than one answer? Have you found them all?
'Draw it' Draw a picture to explain or demonstrate what you have worked out	**Hedging** It *must* be… It *could* be… It *can't* be…	**'Maths story'** Make up a real-life story using your equation/numbers or shapes. Try to use the star words.
How do you know…? Why do you know…? Explain why…	**'Show me!'** Convince me that you are right.	**True/False/Always, Sometimes, Never True**

Reasoning Skills

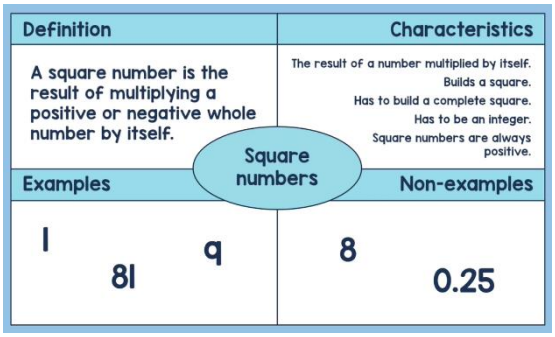
Describing	Simply tells what they did
Explaining	Offers some reasons for what they did (may or may not be correct)
Convincing	Confident that their chain for reasoning is right (inductive reasoning)
Justifying	A correct logical argument that has a complete chain of reasoning
Proving	A watertight argument that is mathematically sound (deductive reasoning)

Thinking Through Variation *(What do we want them to think about? Not what do we want them to do)*

Conceptual Variation	**Procedural Variation**
Examples and Non-Examples Standard and Non-Standard	Spotting patterns Making Connections Generalisations

This allows us to…

- Strengthen children's understanding
- Generalise a concept
- Ensure they are thinking carefully and deeply



Frayer Model

Appendix 2 – Questioning

The questions and prompts that we ask, both those that are planned, and those that we improvise in the moment, are crucial in supporting pupils' developing mathematical thinking.

Exemplifying	Give me one or more examples of ... .
Specialising	Describe (show, choose, draw, find, ...) an example of ... .
	Is ... an example of ...?
	What makes ... an example?
	Find a counter-example of ...?
Completing	What must be added/removed/altered in order to allow/ensure/contradict ...?
Deleting	What can be added/removed/altered without affecting ...?
Correcting	What needs to be changed so that?
	Tell me what is wrong with ... .
Comparing	What is the same and what is different about ...?
Sorting	Is it or is it not?
Organising	Sort or organise the following according to ... .
Changing	Change ... in response to imposed constraints.
Varying	What if ...?
Reversing	Do ... in two (or more) ways. What is quickest, easiest, ...?
Altering	If this is the answer to a similar question, what was the question?
	Alter an aspect of something to see the required effect.

Generalising	What happens in general?
Conjecturing	Of what is this a special case?
	Is it always, sometimes, never ...?
	Describe all possible ... as succinctly as you can.
	What can change and what has to stay the same so that ... is still true?
Explaining	Explain why ... .
Justifying	How is ... used in ...? Explain the role or use of ... .
Verifying	Give a reason ... (using or not using ...).
Convincing	How can you be sure that ...?
Refuting	Convince me that ... .
	Tell me what is wrong with ... .
	Is it ever false that ...? (Always true that ...?)

Appendix 3 – Adapt or vary

Ongoing adapt or vary - questioning		
Mathematical Thinking Compare… .What do you notice? What's the same? What's different? When might this be useful? What maths that we know is this similar to? Can you group these? How many ways can you find…? Have you found all possibilities? How do you know? What if (we change)…?	**Conceptual Understanding** Compare… What do you notice? What's the same? What's different? Can you represent this in a different way? Do you know another word for that? Which is the odd one out? Why? Can you give me another example of..? And another? Can you give me an obvious example of…? Can you give me an unusual example of…?	**Language and Communication** Why do you think that? How would you…? Explain your choices. Can you explain a different way that you know this? What have you discovered? Is this always true, sometimes true or never true?

Techniques to Extend

- Remove different information
- Remove 2 pieces of information and give constraints
- Interleave previously taught skills
- Use multiple representations to explain their answers (including concrete and pictorial)
- Spot patterns, make connections
- Create your own question

Techniques to Enable

- Pictures to match the problem
- Manipulatives to represent the problem
- Additional questions or hints as a way into the problem
- Pictorial representations, such as a bar model, to understand the operations needed
- Stem sentences

Appendix 4 – Sentence Stems for Mathematical Reasoning

I know that …… because ……

I think that …… because ……

I worked systematically by ……

If I know …… then I know ……

It is always true because ……

We know …. We do not know ….

My conjecture is… because ……

I am certain because ……

It cannot be true because ……

I estimate the answer to be …because…

I have noticed that ……

This happens because ……

This links to my work on ……

It is similar because ……

It is different because ……

The pattern continues like this because …

I used a different strategy. I ……

I used this strategy because ……

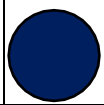
I found this work challenging because …

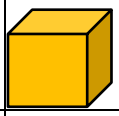
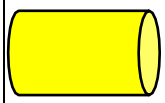
Appendix 5 – Key Vocabulary

These words should be shared meaningfully with the whole class at (or before) the start of the lesson. As well as all pupils repeating them, teachers should ensure that pupils develop understanding of each word, making use of appropriate representations (concrete or pictorial) and / or contexts that are familiar. The intention is for all pupils to use this key vocabulary accurately throughout the lesson.

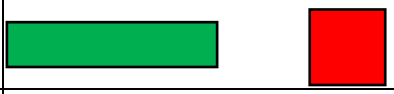
The vocabulary listed here is vocabulary that pupils are expected to use and understand on a daily basis within that year group, though the definitions are written for teacher reference and would not necessarily be shared with children as they stand. The vocabulary listed is cumulative and builds on the vocabulary previously introduced.

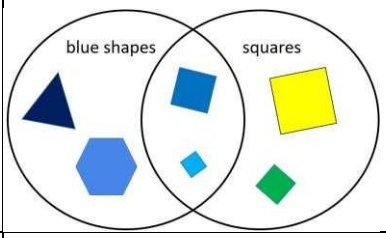
Mathematical vocabulary from Reception to Year 6

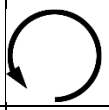
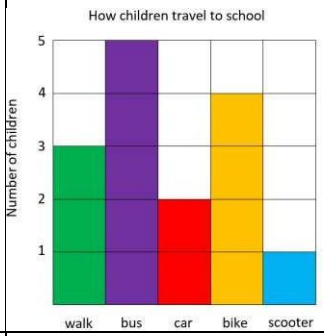
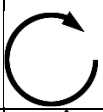
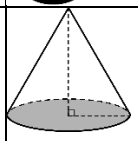
RECEPTION		
	Definition	**Example**
Above	Used to describe a higher position than another object.	The Maths Meetings board is **above** the sink.
Add	Carry out the process of addition.	I can **add** two numbers together to find a total.
Addition	The operation to combine at least two numbers or quantities to form a further number or quantity, the sum or total. Addition is the inverse operation to subtraction.	Three plus seven is equal to ten. This is an **addition** equation.
Altogether	In total.	That will be £2 **altogether** please.
Balance	A measuring tool used to weigh objects. It has two dishes hanging on a bar. Both dishes will be level when the contents weigh the same. Also, as a verb, indicates equivalence and equality.	The objects in the **balance** are unequal in weight because the dish on the right side is lower down that the dish on the left side. The two objects **balance** which means they have the same mass.
Before	In front of or prior to.	The number '3' comes **before** '5' on the number line.
Below	Used to describe a lower position than another object.	The sink is **below** the Maths Meetings board.
Between	Indicates a position in relation to two other places or objects on either side.	The teacher is standing **between** two tables.
Capacity	The amount of liquid a container can hold.	This cup is full to **capacity** because it cannot hold any more water.
Circle	The name of a 2-D shape. A circle has a curved side.	
Clock	A tool used to measure time.	The **clock** shows us that the time is now 2 o'clock.
Compare	Look for similarities and/or differences between at least two objects or sets.	I can **compare** these two sets – this set has more.
Corner	A point where two or more lines meet. The correct mathematical term is vertex (vertices).	The table has four **corners** (vertices).
Cost	A monetary value assigned to a good or service.	This apple **costs** 10p. What coin could I use to pay for it?

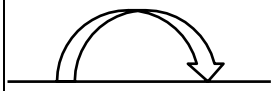
Count	Assigning one number name to each of a set of objects to determine how many there are.	I **counted** the children in the group – there are four so we will need four pencils.
Cube	A 3-D shape with six identical square faces.	
Cuboid	A 3-D shape with six rectangular faces.	
Curved surface	A non-plane surface of a 3-D shape. Both cones and cylinders have curved surfaces.	The cone has a **curved** surface.
Cylinder	A 3-D shape with two circular faces joined by a curved surface.	
2-D	Abbreviation for two-dimensional. A figure is two-dimensional if it lies on a plane.	A square is a **2-D** shape.
3-D	Abbreviation for three- dimensional. A solid is three- dimensional and occupies space.	A cylinder is a **3-D** shape.
Describe	To express mathematical features, qualities and details in words.	Can you **describe** the properties of a cube?
Difference	The numerical difference between two numbers or sets of objects. It is found by comparing the quantity of one set of objects with another.	The **difference** between ten and six is four.
Direction	The orientation of a line in space.	Which **direction** should we jump – forwards or backwards?
Distance	A measure between two points or things.	The **distance** between my house and the school is longer than that between the school and the train station.
Double	To multiply by two or add a value to itself.	Ten is **double** five.
Edge	A line segment joining two vertices of a plane figure (2-D shape) and the intersection of two plane faces (in a 3-D shape).	A triangle has three **edges** and a cube has 12 **edges**.
Empty	Containing nothing. Most commonly used in the context of measures.	There is no more water left in the jug – it is **empty**.
Equal	Indicates equivalence between two values and can be expressed with the symbol '='. The symbol is read as 'is equal to' which means the same as. Expressions on either side of the symbol have the same value.	My sets are **equal** because there are four bears in this set and there are four bears in this set.
Face	One of the plane surfaces of a solid shape.	A cube has six **faces**.

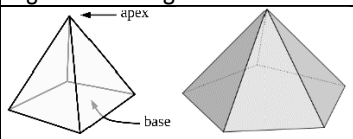
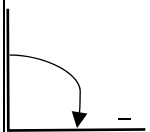
Fewer	A lesser amount – used when counting discrete objects, i.e. countable objects such as, pens, teddies, counters, etc.	There are **fewer** buttons on my coat than yours.
First	Comes before all others in time or position.	**First** I brush my teeth. Then I go to bed.
Flat	A level surface.	The table has a **flat** rectangular surface.
Full	Contains/holds as much or as many as possible; has no empty space.	The juice carton is not **full** because I drank some.
Group	To make equal size groups. This is one model for division.	I will **group** the crayons equally so that each person gets two.
Half	One of two equal parts of a shape, quantity or object.	I have shared the dolls into two equal groups – I have **half** and you have **half**.
Intersection of sets	Where the two subsets overlap in a Venn diagram. Objects or values which belong to both subsets are placed here.	The number 4 belongs in the **intersection** because it is even *and* less than 5.
Last	Comes after all others in time or order.	Rory is the **last** person in the line.
Length	A linear measurement.	The **length** of my snake is shorter than yours.
Less	A smaller amount or not as much.	I have 15p and you have 7p. you have **less** money than me.
Line	A set of adjacent points that has length but no width.	I have drawn a **line** matching the number four with the four ducks.
Long	An adjective used to describe length.	I have a **long** piece of string.
Mass	A measure relating to the amount of matter within a given object.	The **mass** of the school bag is greater than the **mass** of the book.
Measure	To find the size of something in a given unit.	How might we **measure** how much flour we need to bake a cake?
Minus	A name for the symbol '-', which denotes the operation of subtraction.	Three **minus** one is equal to two.
More	A greater amount.	I have six apples and you have two. I have **more**.
Next	Comes immediately after the present one in order.	The **next** shape in my pattern is a square.
Number bond	A pair of numbers with a given total.	Five and four make a **number bond** to nine.
Number line	A linear, continuous representation of number. Each number occupies a point on the line, and there is an equal interval between each number.	This **number line** starts at zero and ends at ten.
Number track	A linear, discrete representation of number. Each number is positioned in a square on the track.	I can count from one to ten, moving a counter along this **number track**.
Order	Describes the placement of items according to given criteria or in a pattern. As a verb, to place items according to given criteria or in a pattern.	I have **ordered** the bears from smallest to biggest.

Pair	A set of two things used together.	Socks come in a **pair**—one for each foot.
Pattern	A systematic arrangement of numbers, shapes or other elements according to a rule.	The **pattern** is red, blue, red, blue, red blue.
Plus	The word representing the operation of addition. It is also the name for the symbol '+'.	Five apples **plus** two apples are equal to seven apples.
Rectangle	A quadrilateral with four right angles.	
Second	A unit of time. An ordinal number.	Mohsin is **second** in the line today.
Sequence	A series of numbers or other elements which follow a rule.	The number 3 is next in the **sequence** because each number is one less than the one before.
Set	A defined group of objects, numbers or other elements.	I have placed all the purple counters in this **set** because they are all the same colour.
Share	To distribute fairly between a given number of recipients. This is one model for division.	I will **share** the crayons equally between the people at the table.
Short	An adjective used to describe length.	This string will not reach to the door. It is too **short**.
Side	A straight line that forms part of the boundary of a shape.	This shape has four straight **sides**.
Size	An element's overall dimensions or magnitude.	The **size** of my shoe is smaller than my teacher's.
Sort	To organise a set of elements into specified categories.	I will **sort** these objects based on their size.
Square	A quadrilateral with four equal length sides and four right angles.	
Straight	A line or movement uniform in direction, without bends or curves.	The walls of the school are **straight**.
Subtract	Carry out the process of subtraction.	Nine **subtract** three is equal to six.
Subtraction	The inverse operation to addition.	We are taking some away so it is a **subtraction** question.
Sum	The result of one or more additions.	The **sum** of five and three is eight.
Surface	An outer boundary of a 3-D object.	This cone has a curved **surface**.
Take away	Used in the reduction structure of subtraction. To remove a number of items from a set.	He ate three of the sweets so we need to **take away** three counters.
Tall	Measuring a specific distance from top to bottom.	Our class teacher is not as **tall** as our head teacher.
Time	Related to duration. Measured in seconds, minutes, hours, days, weeks, months, years etc.	After lunch it will be **time** for P.E.
Total	The sum found by adding.	There are a **total** of five people at this table.

Triangle	A polygon with three sides.	
Venn diagram	Two or more circles which represent given sets and intersect according these.	
Vertex (pl. vertices)	The point at which two or more lines intersect.	This shape has five **vertices**.
Weight	The force exerted on an object by gravity. Weight therefore changes with a change in gravitational force. Used interchangeably with mass until KS2.	The **weight** of this book is heavier than the pencil.
Zero	The number before one. It is neither positive nor negative.	**Zero** comes before one on the number track.

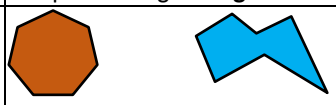
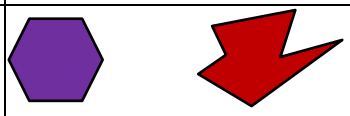
YEAR 1		
Year 1	**Definition**	**Example**
Analogue clock	A clock with a face and hands.	
Anticlockwise	Movement in the opposite direction to the motion of the hands of a clock.	
Approximate	The number is not exact but is close.	Our PSHE lesson lasts **approximately** half an hour.
Array	An arrangement of counters or numbers, in columns and rows, used to represent multiplication and division	This **array** shows 3 × 4, 4 × 3, 12 ÷ 4 and 12 ÷ 3
Block graph	The pre-cursor to the bar graph, this representation of data has an x- and y-axis and one block represents one item. Each block is adjoined to the adjacent block.	
Chart	A table or graph.	I will mark one day for the sun on our weather **chart**.
Chronological	In time order.	I ordered the events in my day **chronologically**. I woke up, ate my breakfast, went to school then came home.
Clockwise	Movement in the direction of the hands of a clock.	
Cone	A 3-D shape with one circular plane face, which tapers to a apex.	
Continuous surface	An outer boundary of a 3-D object which is uninterrupted by any plane surfaces.	A sphere has a **continuous surface**.
Data	Quantitative information which has been counted or measured.	This block graph shows us **data** for the colour of the cars in the car park.
Decreasing	Becoming smaller in value. Used in relation to number sequences.	15, 14, 13, 12. This number pattern is **decreasing** by one each time.
Diagram	An illustration, drawing or representation.	I will draw a **diagram** to show how I programed my floor toy to move.

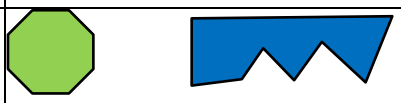
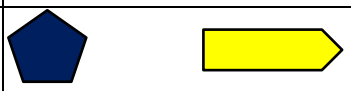
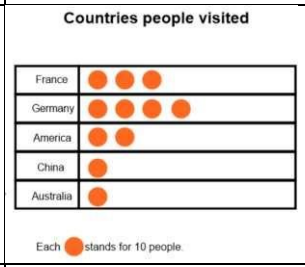
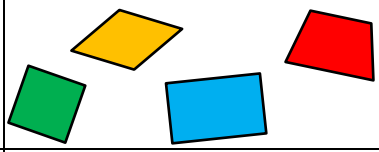
Digit	One of the ten Arabic numerals 0 to 9, from which we compose numbers.	The number 54 has the **digit** five in the tens column and the **digit** four in the ones. The **digit** five has a value of fifty.
Divide	To share or group into equal parts.	**I** can **divide** 12 by three using grouping or sharing.
Estimate	An appropriately accurate guess, depending on the context and numbers involved.	I **estimate** there are eight cubes in the cup because it looks about double four but fewer than ten.
Even number	A number with a 0, 2, 4, 6 or 8 in the ones and therefore exactly divisible by two.	32 is an **even number**.
Facts	Related to the four operations (+, -, ×, ÷). Pupils should be supported in achieving fluency, i.e. very fast recall, in these facts. These then become **known facts**.	Number bonds to and within 10 and 20 are **facts**, e.g. 3 +7 = 10.
Fraction	A part of a whole number, quantity or shape. Expressing a division relationship between two integers in the form .	I have shared my sweets into four equal parts. Everyone will get a **fraction** of the whole quantity of sweets. One group is a quarter of the whole.
Half turn	A 180 degree rotation, i.e. $\frac{1}{2}$ of a 360 degree or 'full' turn.	
Hour	A unit of time.	There are 24 hours in one day.
Increasing	Becoming greater in value. Used in relation to number sequences.	2, 4, 6, 8. This number pattern is **increasing** by two each time.
Kilogram	A standard unit of mass, equal to 1000 grams.	The book has a mass of two **kilograms**.
Known fact	A number fact which has been committed to memory (or very fast recall) and can be applied fluently to various calculation strategies.	When I use the 'Make ten' strategy to add, I use **known facts** to partition the number I'm adding.
Left	Indicating the position or direction.	Make a quarter turn **left** and walk forward three steps.
Litre	A standard unit of volume, equal to 1000 millilitres.	The capacity of the jug is about half a **litre**.
Mental calculation	A calculation performed without using a formal written strategy. Simple jottings may aid a mental calculation.	14 plus 5 is equal to 19. **I** completed this using a **mental calculation** and deriving facts because **I** know that four plus five is equal to nine.
Metre	A standard unit of measure, equal to 100 centimetres.	I estimate that the table is about a **metre** tall.
Minute	A unit of time.	We will have lunch in five **minutes.**

Oblong	A quadrilateral with two pairs of parallel sides of equal length.	
Odd number	An integer which is not divisible by two without a remainder.	All numbers which end in 1, 3, 5, 7 and 9 are **odd numbers**.
Partition	To split a number into two or more parts.	The number 23 can be **canonically partitioned** (by place value) into 20 and 3, or **non-canonically partitioned** in many different ways, including 18 and 5, 17 and 6, etc.
Place value	A system for writing numbers, in which the value of a digit is defined by its position within the number.	In the number 452 written in base ten, the digit four has a value of 400, the five has a value of 50 and the two has a value of two.
Position	Location, expressed either descriptively using positional prepositions, or specified by coordinates.	The book is **on** the table. The clock is hanging **above** the board.
Pound (sterling)	The official currency of the United Kingdom.	**Pounds sterling** are written using the £ symbol. There are 100 pence in one **pound** sterling.
Property	Any attribute.	A **property** of a triangle is that it has three straight sides and three vertices, the sum of whose angles is 180 degrees.
Pyramid	A 3-D shape with a polygonal base and otherwise triangular faces, which form edges with the base, and which meet at an apex.	
Quantity	An amount, in some cases given a numerical value.	A **quantity** of apples is placed on the left-hand side of the balance. How many kilogram masses will we need to place on the right to balance the apples?
Quarter	One of four equal parts of a whole, quantity or object.	I have shared the eight conkers into four equal groups – I have two conkers, which is one **quarter** of the whole.
Quarter turn	A 90-degree rotation, i.e. $\frac{1}{4}$ of a 360 degree 'full' turn.	
Repeated addition	A structure of multiplication where equal parts are added to make a whole.	I can show 4×5 as **repeated addition**: $4+4+4+4+4$.

Repeated subtraction	A structure of division, where equal parts are subtracted and the number of equal parts summed to calculate a quotient.	I can use **repeated subtraction** to calculate 20 divided by four: 20 – 4 – 4 – 4 – 4 – 4.
Represent	To express or show a mathematical concept using words, numerals and symbols, pictures, diagrams, or concrete manipulatives.	I have used three blue cubes to **represent** the three oranges in the question. I used a part-whole model to **represent** the addition question.
Right	Indicating the position or direction.	The picture is on the **right**- hand side of the board.
Rule	A consistent pattern which allows generalisation. Awareness of a rule allows a pupil to continue a sequence or generate a related sequence.	2, 5, 8, 11, 14... The **rule** is that each number is three greater than the previous number. Therefore, the next number in this sequence will be 17.
Scales	An object used to measure mass.	The **scales** showed that the banana had a greater mass than the apple.
Sign	Synonymous with symbol in its mathematical context, e.g. +, -, ×, ÷, =.	20 5 = 4. What is the missing **sign**?
Standard unit	A uniform measure, agreed upon as standard.	**Standard units** of mass include grams and kilograms. **Standard units** of length include centimetres, metres and kilometres. **Standard units** of volume and capacity include millilitres and litres.
Sphere	A 3-D shape with a continuous surface, which is at all points equidistant from its centre. It has an infinite number of flat faces and straight edges.	A bowling ball is a **sphere**.
Symbol	Synonymous with sign in its mathematical context, e.g. +, -, ×, ÷, =.	20 5 = 4. What is the missing **symbol**?
Table	A structure organised into columns and rows, in which data can be recorded.	The information for Thursday is not yet complete on the **table** because it is only Wednesday.
Turn	Rotation (see half and quarter turn).	A whole turn is 360 degrees. A half turn is 180 degrees. A quarter turn is 90 degrees.
Unit	An element considered as a single entity. Ten single cubes can be grouped together to make a unit of ten. A unit of measure, which can be standard or non-standard.	I regrouped ten ones for one **unit** of ten. Unifix cubes can be used as **units** of measure, but these are not **standard units**.

Volume	A quantity or amount of any substance and the 3-D space it fills.	The bottle contains a **volume** of one litre but its capacity is two litres. The bottle is half full.

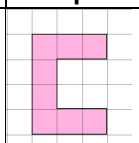
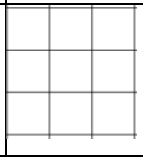
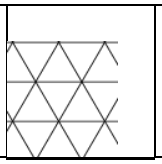
YEAR 2		
Year 2	**Definition**	**Example**
Angle	The amount of turn, measured in degrees.	The **angle** is 60 degrees.
Calculate	To compute or work out mathematically.	Can you **calculate** the answer to 13 + 4?
Centimetre	A metric unit of length.	The book is 15 **centimetres** long.
Column	A vertical arrangement of numbers or objects.	23 has two tens — I will place them into the tens **column**.
Commutative	A property of addition and multiplication. It does not matter in which order the addends or factors are added or multiplied; the result will be the same.	4 + 6 = 10 6 + 4 = 10 This demonstrates that addition is **commutative**. Arrays demonstrate the **commutativity** of multiplication, i.e. 3 × 4 = 4 **x** 3
Consecutive	Following in order.	2, 3, 4, 5, 6 are **consecutive** numbers. 3, 6 and 9 are **consecutive** multiples of 3.
Denominator	The number written below the vinculum in a fraction. In a measure context, it indicates the number of equal parts into which the whole is divided. In a division context, it is the divisor.	In the fraction one quarter, four is the **denominator**.
Division	The process of partitioning a whole into equal parts.	12 **divided** by 3 is equal to 4.
Efficient	Well-organised. Choosing an efficient computation strategy requires consideration of the numbers involved and will normally utilise 'known facts'.	I will use my number bonds knowledge to calculate 22 + 7 **efficiently**. I know that 2 + 7 is equal to 9, so the answer is 29. That's more efficient that counting on seven.
Frequency	The number of times something occurs within a data set.	4 pupils have brown hair. The **frequency** of brown hair is 4.
Gram	A metric unit of mass.	The pencil weighs 20 **grams**.
Heptagon	A polygon with seven sides and seven angles.	
Hexagon	A polygon with six sides and six angles.	
Inverse operations	Opposite operations that 'undo' each other.	Addition and subtraction are **inverse** operations.
Millilitre	A metric unit of capacity/volume.	The can of fizzy drink has a capacity of 330 **millilitres**.
Multiple	The result of multiplying a number by an integer, for example, 12 is a multiple of 3 and 4 because 3 × 4 = 12.	36 is a **multiple** of three because three multiplied by 12 is equal to 36. It is also a **multiple** of 12 for the same reason (and 1, 2, 4, 6, 9, 18 and 36)

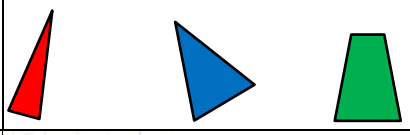
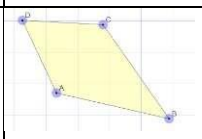
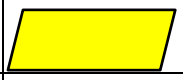
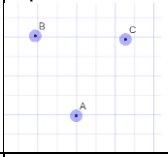
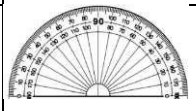
Multiplication	One of the four mathematical operations. Multiplication can be understood as repeated addition orscaling (introduced in Year 3).	The **multiplication** symbol is ×.
Multiply	To increase a quantity by agiven scale factor.	**I** can **multiply** 3 by 4 which is equal to 12.
Near double	When two numbers involved in an addition are close in value, such as 23 + 22. The numbers can be treated as exact doubles, followed by compensating.	To calculate 23 + 22, **I** can use the **near double** strategy. **I** can double 22 and then add one more.
Non-unit fraction	A fraction with a numerator greater than one.	Two thirds is a **non-unit fraction.**
Numerator	The number written above the vinculum in a fraction. In a measure context, it indicates the specified number of parts out of the whole. In a division context, it is the dividend.	In the fraction one quarter, one is the **numerator**.
Octagon	A polygon with eight sides and eight angles.	
Operation	A mathematical process. The four mathematical operations are addition, subtraction, multiplication and division.	4 + 2 = 6. The **operation** is addition.
Pentagon	A polygon with five sides and five angles.	
Pictogram	A representation of data using pictures or symbols.	
Quadrilateral	A 2D shape with four sides and four angles. which add up to 360 degrees.	
Relationship	The way in which two or more things are connected.	The **relationship** between addition and subtraction is that they are the inverse of each other.
Right angle	An angle of 90 degrees.	A square has four **right angles**.
Rotation	The act of rotating about an axis/centre.	I will **rotate** the square 90 degrees clockwise.

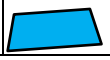
Scale	Equally spaced markings on a measuring device which can be read to quantify a measurement.	Using the **scale** on the ruler, the book measures 15cm.
Symmetry	A shape is symmetrical when it fits exactly onto itself when folded in half.	This triangle has one line of **symmetry**.
Tally	A form of counting. Each tally is a vertical mark. After the fourth vertical mark, a fifth horizontal/diagonal mark is drawn to create a group of five.	Four children have black hair; I will record this as four **tallies**.
Temperature	The measure of heat.	Outside has a **temperature** of 15 degrees Celsius.
Unit fraction	A fraction with a numerator of one.	One-third is a **unit fraction**.
Vinculum	A horizontal line that separates the numerator and the denominator in a fraction.	$\frac{1}{4}$ vinculum

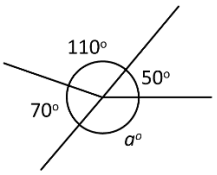
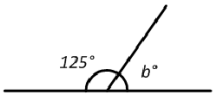
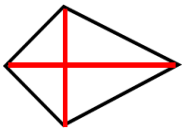
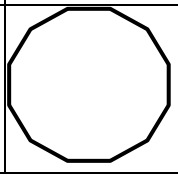
YEAR 3		
Year 3	**Definition**	**Example**
Acute angle	An angle that is smaller than a right angle.	It is smaller than my right angle checker so this must be an **acute angle**.
Axis (plural: axes)	A real or imaginary reference line. The y-axis (vertical) and x-axis (horizontal) on charts and graphs are used to show the measuring scale or labels for the variables.	The y-**axis** on this bar graph shows you how many pupils preferred each colour.
Bar graph	A representation of data in which the frequencies are represented by the height or length of the bars.	This **bar graph** shows us the preferred colours of the pupils in our Year 3 class.
Columnar addition/subtraction	The formal written algorithms for addition and subtraction that are exemplified in *Mathematics Appendix 1* of the 2014 national curriculum.	Solve the following calculations by using the appropriate method of **columnar addition** or **subtraction**.
Factor	A number, that when multiplied with one or more other factors, makes a given number.	The number six has four **factors**: 1, 2, 3 and 6.
Formal written methods	Exemplified in *Mathematics Appendix 1 (see above)*. As well as including columnar addition and subtraction, these also consist of written algorithms for multiplication and division.	Pupils should only use **formal written methods** for calculations that cannot be efficiently calculated using mental strategies (with or without jottings).
Horizontal	Horizontal refers to planes and line segments that are parallel to the horizon.	The x-axis on a graph should be **horizontal**.
Irregular	In geometry, irregular is a term used to describe shapes that are not regular (see below).	The sides and the angles of this pentagon are not all equal so the pentagon is **irregular**.
Kilometre	A metric unit measure of length that is equal to one thousand metres.	The distance from the school to Arun's house was exactly one **kilometre**.
Millimetre	A metric unit measure of length that is equal to one thousandth of one metre.	The length of Philippa's ruler is 300 **millimetre**s.
Numeral	A numeral is a symbol (or group of symbols) used to represent a number.	Whole numbers can all be represented as **numerals** consisting of the digits 0 to 9.
Obtuse angle	An angle that is greater than a right angle but less than 180 degrees.	It is greater than my right angle checker so this angle must be **obtuse**.
Parallel	Line segments that can be described as parallel must be on the same plane and will never meet, regardless of how far either or both line segments are extended.	The opposite sides of a square are **parallel**.

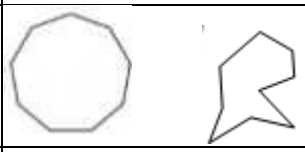
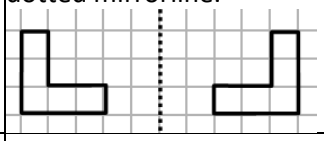
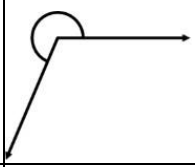
Perimeter	The perimeter of a 2-D shape is the total distance around its exterior.	I know that one side of this square is 2cm so it must have a **perimeter** of 8cm.
Perpendicular	A pair of line segments (or surfaces) can be described as perpendicular if they intersect at (or form) a right angle.	The adjacent sides of a rectangle are **perpendicular**.
Place holder	A place holder is a zero used in any place value column (that contains a value of zero) to clarify the relative positions of the digits in other places.	I need to use a **place holder** in the ones column to make it clear that my number is 320 and not 32.
Prism	A prism is a 3-D solid with two identical, parallel bases and otherwise rectangular faces.	A triangular **prism** has five faces, consisting of three rectangles and two triangles which are parallel.
Product	The result you get when you multiply two numbers.	24 is the **product** of 3 and 8.
Regular	Regular 2-D shapes (regular polygons) have angles that are all equal and side lengths that are all equal. Regular 3-D shapes (the Platonic Solids) are those that have congruent (exactly the same) faces of a single regular polygon.	A square is a **regular** 2-D shape because all four angles are right angles and all four sides are the same length. A cube is a **regular** 3-D shape with six identical square faces.
Roman numeral	Roman numerals are a system of symbols used to represent numbers that were developed and used by the Romans. They do not use a place value system.	The number twelve on this clock is represented by the **Roman numerals** XII, which is 10 + 1 + 1.
Round	Approximate a number, normally to the nearest multiple of ten, to make it easier with which to calculate.	I would **round** the number 17 to 20 because it is three away from 20 but seven away from 10.
Square-based pyramid	A pyramid is a 3-D shape with a 2-D shape (which gives the pyramid its name) as a base and triangular faces that taper to a point called a vertex or apex.	This **square-based pyramid** has five faces; one square face and four triangular faces.
Triangle-based pyramid		This **triangle-based pyramid** has four triangular faces.

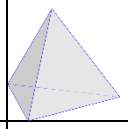
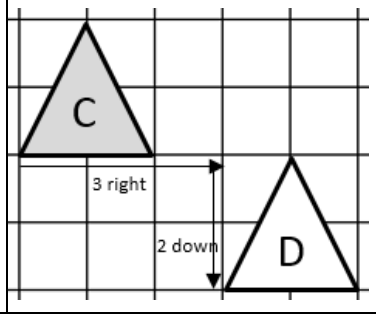
YEAR 4		
Year 4	**Definition**	**Example**
Area	The space a surface takes up inside its perimeter. Area is always measured in square units.	 The **area** is 8 square units.
Associative law	No matter how the parts in an addition or multiplication equation are grouped, the answer will be the same.	(6 + 3) + 2 = 11 6 + (3 + 2) = 11 Addition and multiplication are **associative**. Subtraction and division are not.
Convert	To change from one unit of measurement to another.	2 km can be **converted** to metres — it is equal to 2000 m.
Coordinate	The position of a point, usually described using pairs of numbers. Sometimes called Cartesian coordinates, after the mathematician Rene Descartes.	The **coordinate** (3,4) describes a point that is 3 on the x axis and 4 on the y axis.
Decimal fraction	A fraction expressed in its decimal form.	Half written as a decimal fraction is 0.5.
Distributive law	The process whereby adding some numbers and then multiplying the sum gives the same answer as multiplying the numbers separately and then adding the products.	3 × (2 + 4) = (3 × 2) + (3 × 4) 3 × 12 = (3 × 10) + (3 × 2)
Dividend	The amount that you want to divide.	In '12 ÷ 3 = 4', 12 is the **dividend**.
Divisor	The number you divide by.	In '12 ÷ 3 = 4', 3 is the **divisor**.
Equilateral	Having all sides the same length.	An **equilateral** triangle has three equal sides.
Equivalent	Equivalent means having the same value. Equivalent fractions have the same value.	$\frac{2}{4} = \frac{1}{2}$
Expression	One or a group of numbers, symbols or operators. An expression does not use equality or inequality signs. *Using an equality or inequality sign will give an equation.*	2×3 4^2
Grid	A series of evenly divided and equally spaced shapes, usually squares.	 

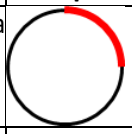
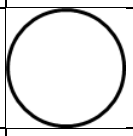
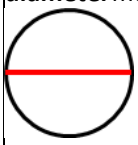
Improper fraction	A fraction where the numerator is bigger than the denominator. These fractions are therefore greater than one whole.	$\frac{12}{11}$
Integer	A whole number that can be positive or negative.	6 is an integer, 0.6 is not.
Interval	An interval on a graph's axis lies between two values.	If one point on an axis is 50 and the next 60, the **interval** is 10.
Isosceles	Having two sides of equal length. Isosceles triangles have two equal sides; isosceles trapezia have two equal, non-parallel sides.	
Kite	A 2-D shape with two pairs of equal length adjacent sides. The diagonals intersect at right angles.	
Line graph	A graph that uses lines to connect the points on a data chart. Used to present continuous data, such as change over time.	Temperature graph
Mixed numbers	Numbers consisting of an integer and fractional part.	$1\frac{1}{2}; 3\frac{3}{4}$
Negative number	A number that is less than zero. (It is helpful to refer to these numbers as 'negative numbers' rather than 'minus' to avoid confusion with the operation 'minus'.)	-1, -24, -o.5 etc.
Parallelogram	A 2-D shape that has two pairs of parallel sides and equal opposite angles.	
Plot	To mark out a point on a graph or grid.	'**Plot** the point (3,6)' means to draw the precise location of that point, usually shown as a dot or a small cross.
Point	The precise location of a position on a 2-D plane.	An exact place on a graph or on squared paper. A **point** is often represented by a capital letter. 
Positive number	A number that is greater than zero. Zero is neither positive or negative.	3, 32, 0.5
Proper fraction	A fraction with a value less than one.	$\frac{1}{2}$ ' $\frac{3}{4}$ ' $\frac{5}{8}$
Protractor	A measuring device for measuring the size of an angle. Angles are measured in degrees (°).	

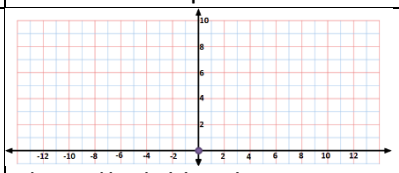
Quotient	The result when the dividend is divided by the divisor.	15 ÷ 3 = **5** **5** is the **quotient**.
Rectilinear	A rectilinear shape has straight line edges which are perpendicular (all meet at right angles).	A rectangle. A straight-sided shape that can be divided up into other rectangles.
Rhombus	An equilateral parallelogram with four equal length sides.	
Scalene	A scalene triangle has three unequal sides and three unequal angles.	
Short division	A formal written layout where the quotient is calculated showing only one written step.	77 5 3 85
Short multiplication	A formal written layout where the multiplier is usually 9 or less.	782 × 9 7038
Simplify	To write a number or equation in its simplest form.	I can **simplify** $\frac{8}{10}$ to $\frac{4}{5}$.
Square centimetre	A unit of measure for area equal to a square with the dimensions 1 cm by 1cm.	Sometimes referred to as centimetre squared, abbreviated to **cm²**.
Trapezium	A quadrilateral with exactly one pair of parallel sides.	

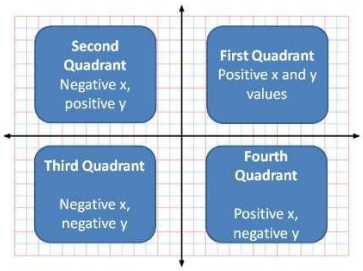
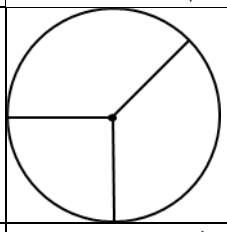
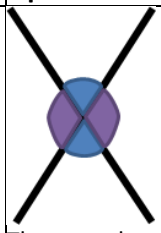
YEAR 5		
Year 5	**Definition**	**Example**
Angle at a point	Angles that meet at a point that sum to 360°.	
Angle on a line	Angles formed on a straight line that sum to 180°.	
Average (mean)	A measure of central tendency. The mean average of a set of data is the sum of the quantities divided by the number of quantities.	The **mean average** of the set 4, 5, 5, 6 is 5 because (4+5+5+6) ÷ 4 = 5.
Common factor	A factor of two (or more) given numbers.	A **common factor** of 12 and 9 is 3 because 3 × 4 = 12 and 3 × 3 = 12.
Common multiple	A multiple of two (or more) given numbers.	A **common multiple** of 3 and 6 is 12 because 3 × 4 = 12 and 6 × 2 = 12.
Congruent	Used to describe two shapes or figures which are exactly the same size.	The two triangles are **congruent**. If I place one on top of the other, there is no overlap.
Cube number	The product of three equal factors.	Eight is a **cube number** because 8 = 2 × 2 × 2 = 2^3.
Cubic centimetre	A unit used to measure volume. The space taken up by a cube with edges of length 1 cm or which measures 1 cm × 1 cm × 1cm.	The volume of this multilink cube is eight **cubic centimetres.**
Cubic metre	A unit used to measure volume. The space taken up by a cube with edges of length 1 metre.	The volume of this fridge is two **cubic metres.**
Decagon	A polygon with ten sides and ten angles.	
Degree	The unit of measure for angles.	A right angle is 90 **degree**s.
Diagonal	A straight line segment that joins one vertex to another.	The **diagonals** of a kite are Perpendicular 
Divisible	A number is said to be divisible by another if it can be divided by that number without a remainder.	24 is **divisible** by 8. When divided by 8 it gives a quotient of 3, with no remainder.
Dodecagon	A polygon with twelve sides and twelve angles.	

Long division	The formal written algorithm that can be used to divide by a number with two or more digits.	34 12 | 408 36 48 48 0
Long multiplication	The formal written algorithm that can be used to multiply a number by a number with two or more digits.	34 × 12 68 340 408
Negative integer	A whole number with a value less than zero. Zero is neither positive nor negative.	When the temperature falls below 0° a **negative integer** is used to record it.
Nonagon	A polygon with nine sides and nine angles.	
Percentage	The number of parts per hundred which is written using the % symbol.	30% means for every 100 there are 30.
Polygon	A 2-D shape with three or more straight sides.	Triangles and rectangles are examples of **polygons**.
Polyhedron (pl. polyhedra)	A 3-D shape with flat surfaces that are polygons.	A cuboid is a **polyhedron**. A cylinder is not a **polyhedron** because it has a curved surface.
Prime factor	A factor that is a prime number.	3 and 2 are **prime factors** of 6.
Prime number	A whole number with only two factors, one and the number itself.	2, 3, 5, 7, 11, 13, 17 and 19 are the **prime numbers** less than 20.
Remainder	The amount remaining after division when a whole number answer is needed.	21 divided by four is equal to five with a **remainder** of 1.
Reflection	A mirror image that is equidistant from a mirror line.	The shape has been **reflected** in the dotted mirror line. 
Reflex angle	An angle that is greater than 180°.	
Scale (not to scale)	The ratio of lengths, in a drawing, are in proportion to the measurements of the real object. The lengths are not in proportion when not to scale.	The diagram was not drawn **to scale**. That means I can't use a ruler to measure the sides, because they are not in proportion to the real object.

Square metre	A unit of measure for area. The surface covered by a square with sides of length one metre.	The area of the floor in a room might be measured in **square metres**.
Square number	The product of two equal factors.	9 is a **square number** because $9 = 3 \times 3 = 3^2$.
Tetrahedron	A 3-D shape with four triangular faces.	
Transformation	A collective term for the ways that shapes can be changed, resulting in congruent or similar shapes, i.e. translation, reflection, rotation or enlargement.	Translations and reflections are types of **transformations**.
Translation	When a shape moves so that it is in a different position but retains the same size, area, angles and side length and so is congruent.	Triangle C has been translated three right and two down resulting in triangle D. 

YEAR 6		
Year 6	**Definition**	**Example**
Arc	A portion of the circumference of a circle	
Brackets	The symbols ( ) used to separate parts of a multi-step calculation.	**(**10 − 2**)** × 3 = 21
Centre	In a circle, the centre refers to one point that is equidistant to all points around the circumference of the circle.	To draw a circle, I place the point of my pair of compasses at the **centre**.
Circumference	The perimeter/boundary of a circle.	
Compasses	A tool for creating curved lines, arcs and circles.	I can use a pair of **compasses** to draw a circle with a radius of 4 cm.
Common fraction	A fraction written with a numerator and denominator separated by a vinculum.	One quarter can be written as a common fraction, .
Degree of accuracy	A description of how accurately a value is communicated.	The **degree of accuracy** needed for the answer is one decimal place.
Diameter	A line from one point of the circumference of a circle to another on the opposite side, which must pass through the centre of the circle.	The circumference of a circle is the **diameter** multiplied by pi. 
Equivalent expression	An expression, which can be algebraic, which is equal in value to another expression.	Find an **equivalent expression** to 17 + 10. 18 + 9 is an **equivalent expression** to 17 + 10.
Factorise	To identify factors of a given number. To express a number as factors.	I can **factorise** 12 by looking at its factor pairs. 1 × 12 = 12, 2 × 6 = 12, 3 × 4 = 12. So the factors of 12 are 1, 2, 3, 4, 6 and 12.
Foot/feet	An imperial unit of measure of length.	I am approximately five **feet** tall.
Formula	An algebraic expression of a rule.	The area of a rectangle can be found by multiplying the width and height. **a = w × h**
Gallon	An imperial unit of measure of volume/capacity.	A **gallon** is approximately 4.5 litres
Imperial unit	A unit of measure once officially used in the UK but is now used less often, except in the context of length. Includes miles, pounds and pints.	Miles are an **imperial unit** to measure length.

Inch	An imperial unit of measure.	An **inch** is approximately 2.2 cm.
Intersect	The point at which two (or more) lines meet is where they intersect.	The x and y axes **intersect** at (0,0)
Metric unit	A standard unit of measure used in the UK and Europe. Includes centimetres, litres and kilograms.	Litres are a **metric unit** used to measure volume.
Mile	An imperial unit of measure of length.	Five **miles** is equivalent to eight kilometres.
Net	A group of 2-D shapes which, when folded and connected, forms a 3-D polyhedron.	The **net** of a cube is comprised of six connected squares.
Order of operations	The internationally agreed order to complete operations in a multi-step equation with multiple operations.	$(3 + 4) \times 2 =$ □ The **order of operations** dictates that the operation within the brackets is completed first.
Origin	The point at which axes in a coordinates grid cross; the point (0,0).	 ndicated by the blue dot.
Ounce	An imperial unit of measure of mass.	The newborn baby had a mass of 6 pounds and 3 **ounces**.
Pie chart	A representation of a set of data where each segment represents one group in proportion to the whole.	
Pint	An imperial unit of measure.	I found a **pint** of milk on my doorstep.
Pound (mass)	An imperial unit of measure of mass.	The new-born baby had a mass of 6 **pounds** and 3 ounces.
Proportion	A comparison between two or more parts of a whole or group. Proportion expresses a part-whole relationship. This may be represented as a fraction, a percentage or a decimal.	Two thirds of a class were boys. The **proportion** of the class that is girls is one third.

Quadrant	One of four regions into which a coordinates grid is divided.	
Radius	A line from one point of the circumference of a circle to the centre of the circle.	
Ratio	A comparison between two or more parts of a whole or group. Ratio expresses a part- part relationship. This is usually represented in the form a:b.	For every 4 tulips there are 7 daffodils. The **ratio** of tulips to daffodils is 4:7.
Similar	Similar shapes are those which have the same internal angles and where the side lengths are in the same ratio or proportion. Enlarging a shape by a scale factor (for example by doubling all side lengths) creates a similar shape.	All squares are **similar** to one another.
Square millimetre	The area of a square with sides 1 mm.	The smallest squares on graph paper have an area of one **square millimetre.**
Square kilometre	The area of a square with sides 1 km.	The area of England is 130 279 **square kilometres.**
Vertically opposite angles	Angles which are positioned opposite to one another when two lines intersect.	 The purple angles indicated are **vertically opposite angles.**