

Supporting Your Child with Maths



Grange Academy Maths Guide for Parents



Introduction

At Grange Academy, we follow a mastery approach to mathematics. Mastery maths allows for deep and sustained learning. There are three levels of learning; shallow surface learning which is temporary and often lost; Deep learning which sticks and can be recalled and used; Deepest learning which can be transferred and applied in different contexts. We aim to reach the deep and deepest levels by using the mastery approach. Learning in this approach is broken down into small steps and pupils have the opportunity to apply their new knowledge in different context to further deepen their learning. "A mathematical concept or skill has been mastered when a child can show it in multiple ways, using the mathematical language to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations."

What can parents and carers do to help?

Maths learning can take place anywhere! Maths is all around us, so look for opportunities for you to do some problem solving together, making connections between what your child is learning at school and the world around them. On each of the following pages you will find some suggested activities for you to complete with your child at home.

Term	Topic
Autumn 1	Place Value
Autumn 2	Shape, Space & Measure
Spring 1	Addition & Subtraction
Spring 2	Time & Statistics
Summer 1	Multiplication & Division
Summer 2	Money & Algebra * Algebra only for select pupils

Belong

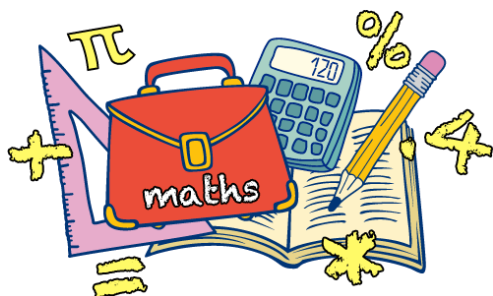
Believe

Achieve

How do pupils progress?

At the beginning of every topic, teachers will complete a baseline assessment with pupils. This will help the teacher to know where children need to start their learning and any misconceptions they may have. Teachers will then work through small steps, addressing misconceptions a long the way. Pupils will show they are ready to move onto the next step by being able to apply their knowledge to reasoning and problem solving

Supporting Your Child with Maths



Concrete—Pictorial—Abstract

A key feature of our mastery maths teaching method is the concrete pictorial abstract (CPA) approach, where children are initially introduced to new concepts through the use of concrete resources.



Concrete

You'll probably know them as place value counters, numicon, dienes etc. – these are all examples of concrete resources. Concrete resources (also referred to as manipulatives) are objects or physical resources that children can handle and manipulate to aid their understanding of different maths concepts. A mastery teaching approach encourages children of all ages to keep using these concrete resources. While the abstract nature of maths can be confusing for children, through the use of these concrete, practical resources, they are able to 'see' the maths

Abstract

Once children have a secure understanding of the concept through the use of concrete resources and visual images, they are then able to move on to the abstract. Examples of abstract representations are numerals and formal written methods using digits.

Why these teaching aids are a crucial part of mastery teaching

In the past, children were taught procedures, but not why or how the procedure worked. In other words, children learnt the methods to get to an answer, without any understanding of the maths behind each method or procedure.

Teaching methods without meaning leads to misconceptions, errors and difficulties in retaining the methods. Once children can actually 'see' the maths, they are much more likely to understand and accurately remember the methods... So, although they should not be exclusive to, concrete resources are particularly important for those children who find maths difficult, or lack confidence in maths.

While there are children who are able to access the maths through just learning a procedure by rote, many others have great difficulty coping with the abstract nature of it.

Pictorial

Once children are confident with a concept using concrete resources, they progress to drawing pictorial representations or quick sketches of the objects. By doing this, they are no longer manipulating the physical resources, but are still benefiting from the visual support the resources provide.

Supporting Your Child with Maths

Concrete resources at home

Why you should use concrete resources in your home?

If you haven't tried using concrete resources to support your child at home before, then give it a go!

This is by no means an exhaustive list of topics and resources.

Hopefully these suggestions have given you some ideas and a starting point, whilst providing an insight into how useful concrete resources can be in helping children to understand maths.

It doesn't matter what age your child is, concrete manipulatives are a fantastic way to help your child grow their confidence in maths.

Home alternatives for learning about place value



Straws, lollipop sticks or anything else that can be bundled together are a fantastic alternative to Dienes equipment. For example, individual straws can represent the ones and bundled together into tens to represent the tens.

Lego is another good alternative, using individual bricks for the ones and joining together to make tens. The children are able to visually see the link between the size of the individual

straws/bricks and the bundles of ten straws/bricks.

Downloading and printing **images of Numicon** onto card is a free alternative to buying a set of Numicon!

Place value counters can easily be made using plain counters and a marker pen.

Alternatively, you **use money**, with 1p representing the ones, 10p then tens and £1 the hundreds.



Home alternatives for learning the properties of shape

There are many opportunities both at home and when you're out and about to **investigate shapes** and their properties.

Children can look around the home and outside – going to the shops, on the way to school, eye-spy in the car, wherever – and identify any 2D / 3D shapes they can see. This can generate lots of discussion round their properties. Children can make 3D shapes using play-doh or lego. Alternatively, they could get creative using marshmallows and toothpicks – or bamboo skewers and masking tape – to construct a range of 3D shapes.

When making 3D shapes from nets, a whole range of nets can be downloaded for free from the internet, which is a great alternative to the plastic polydron geometry sets.



Home alternatives for learning about written calculation methods

As with place value, you can use anything else that can be bundled together as an alternative to Dienes equipment.

Place value counters are easy and cheap to make and coins are another great way for showing hundreds, tens and ones for written calculations.



Autumn 1—Place Value

Place value is simply the value of each digit in a number. It means understanding that 582 is made up of 500, 80 and 2, rather than 5, 8 and 2. Children progress from understanding numbers to 10 all the way to ten million and beyond.

Key Vocabulary

Millions

Thousands

Hundreds

Tens

Ones

Zero

Greater than

Less than

Order

Round

Negative number

Partition

Digit

Interval

Sequence

How can I help my child at home?

Play counting games

Board games often show ordered numbers on tracks or grids. Make sure to put out these numbers, and **count out loud** as you progress. This will help your child quickly get a sense of what the numbers mean.

Dice can also help your child recognise number patterns quickly. For example, a pair of dice is a great way of showing your child doubles, or what it means for a number to be 1 bigger than another number.

Break down numbers

Look for **numbers in the world** around you and encourage your child to break them into parts. Breaking numbers up like this is called partitioning.

Point out a number and ask your child how many ones/tens/hundreds/thousands it has. Lots of children find this easier with physical objects, like stones or sticks. For example, they could group sticks into groups of ten.

Have counting races

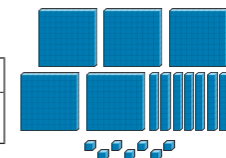
Choose a starting number and a multiple to **count up** by. For example, you could start at 12 and count in steps of 4.

Take turns to say the next **number in the sequence** (12, 16, 20, 24, 28, ...). Set a timer and see what number you can reach in one minute.

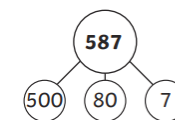
587

five hundred and eighty-seven

Hundreds	Tens	Ones



$$500 + 80 + 7$$

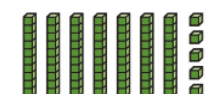


Hundreds	Tens	Ones
100 100 100 100 100	10 10 10 10 10 10 10 10 10 10	1 1 1 1 1 1 1 1 1

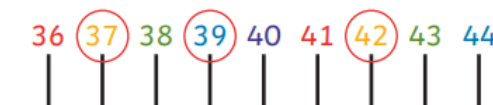
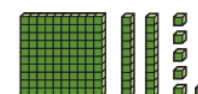
100s	10s	1s
● ●	● ●	● ● ● ●

324 > 243
greater than

100s	10s	1s
● ●	● ● ● ●	● ● ● ●



79 < 126
less than



$$37 < 39 < 42$$

45	48	52	53	61
smallest				greatest



Key Vocabulary

Angle
Right-angle
Acute
Obtuse
Horizontal
Vertical
Parallel
Perpendicular
Polygon
Two-dimensional
Three-dimensional
Flat face
Curved surface
Edge
Vertex
Vertices
Quarter turn
Half turn
Three-quarter turn

How can I help at home? Speak 'shape language'

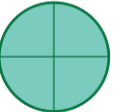
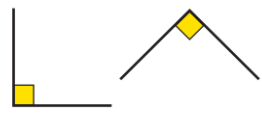
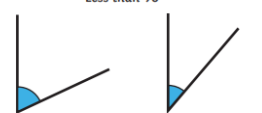
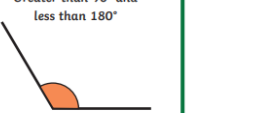
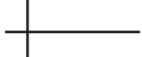
Look for shapes in the world around you and help your child to use accurate mathematical language to describe them in terms of their properties. For example:
It has six **faces**.
It has twelve **edges**.
It has eight **corners** (or vertices).
It has right **angles**.
It has two **lines of symmetry**.

Autumn 2—Shape

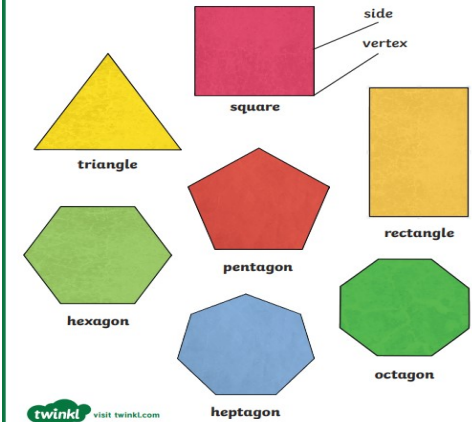
Geometry is a branch of mathematics that studies the sizes, shapes, positions angles and dimensions of things.

Flat shapes like squares, circles, and triangles are called 2D shapes. These shapes have only 2 dimensions, the length and the width. Solid objects are also known as 3D objects having the third dimension of height or depth.

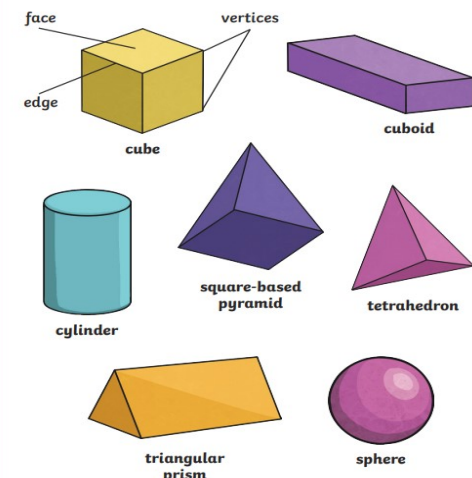
In this topic children are taught to recognise, name and describe 2d and 3d shapes. They are also taught to identify and describe different types of angles, lines and turns.

Turns and Angles					
Angles can be used as a description of a turn.					
					
$\frac{1}{4}$ turn	$\frac{1}{2}$ turn	$\frac{3}{4}$ turn	1 turn	clockwise	anticlockwise
An angle is created when two straight lines meet at a point or intersect.					
Right Angle 		Acute Angle Less than 90° 		Obtuse Angle Greater than 90° and less than 180° 	
Type of Lines					
horizontal 	vertical 	parallel 	perpendicular 		

Recognise and Describe 2D Shapes



Recognise and Describe 3D Shapes



Make a treasure map

Help your child to **draw a map** of your house or garden on a coordinate grid. Take turns to **hide 'treasure'** around the house and give each other coordinates from the map as clues for the position of hidden objects.

Play guessing games

Imagine a 2D or 3D shape. Can your child guess your shape by asking questions about its properties? Can they **draw or make** it from modelling dough just from your description? Can they identify shapes by touch alone?

Length Key Vocabulary

Metre (m)

Centimetre (cm)

Millimetre (mm)

Kilometre (km)

Height

Length

Width

Perimeter

Area

Further/furthest

Higher/highest

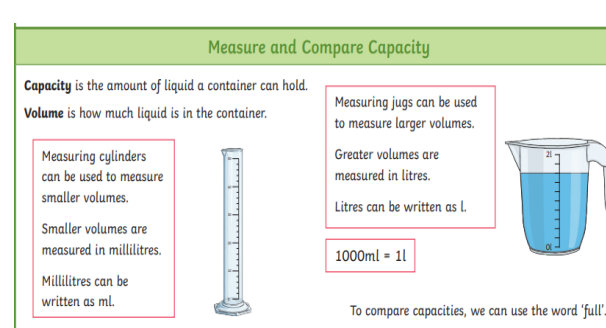
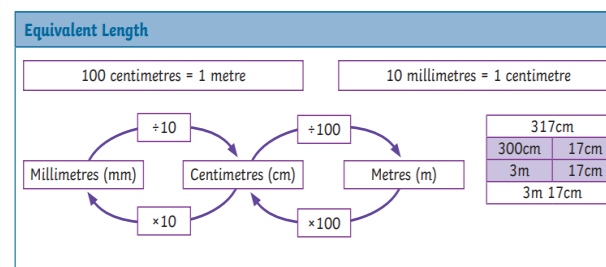
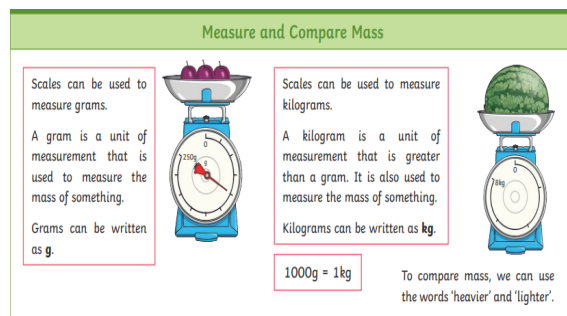
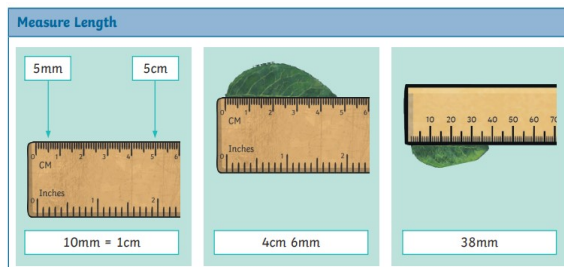
Longer/longest

Shorter/shortest

Taller/tallest

Autumn 2—Measure

Understanding measurement is essential to be able to quantify the world around us. In this topic children are taught both standard and non standard measures. Students then progress on to converting measures and using decimals.



Capacity & Mass Key

Mass

Gram (g)

Kilogram (kg)

Capacity

Volume

Millilitre (ml)

Litre (l)

Lighter

Heavier

Full

Almost full

Empty

How can I help at home?

Measure everything

There are lots of opportunities to practise measuring at home. Try to **measure practically wherever possible**. Discuss and identify standard units (like cm, m, kg, g, l, ml) on food packaging, toiletries, or clothes labels.

You could also try **using non-standard measures**. For example, how many paces long is the kitchen? How many paperclips wide is the book?

Bake together

Help your child to measure ingredients when you are cooking. Identify the capacity/volume or mass/weight of ingredients, either using scales or less formal methods such as cups. Another great idea is to look at recipes in both metric and imperial units. Older children may be able to convert between them.

Spring 1—Addition and Subtraction

Addition and subtraction are core concepts in maths. They will form the basis of your child's maths education and, as they grow up they will need to use these skills when they are introduced to more complex ideas in mathematics. Addition and subtraction also have a number of practical applications in real life, such as budgeting, shopping and saving money. Students move from simple addition and subtraction of 1—digit numbers through counting to more formal written methods such as column addition and subtraction.

Addition and Subtraction Methods

3-digit and 1-digit numbers
Not crossing 10s
 $268 - 4 = 264$

Hundred	Ten	Ones
2	6	8

$343 + 6 = 349$

340 350

Crossing 10s (Exchanging)

Hundred	Ten	Ones
3	2	4

$316 + 8 = 324$

Hundred	Ten	Ones
3	1	6

$324 - 8 = 316$

3-digit and 2-digit numbers
Add and subtract tens

Hundred	Ten	Ones
4	5	1

$451 + 3 \text{ tens} = 481$ ($5 + 3 = 8$)
 $451 - 4 \text{ tens} = 411$ ($5 - 4 = 1$)

Crossing 10s (Exchanging)

$258 + 80 = 338$

- Column method
- Count in 10s mentally
- Add 100, subtract 20

Crossing 10 and 100

$368 + 73 = 441$

$368 + 73 = 441$

$368 + 73 = 441$

3-digit numbers
Not crossing
 $679 - 351 = 328$

Hundred	Ten	Ones
6	7	9

Crossing 10s (Exchanging)

$269 - 154 = 115$

$269 - 154 = 115$

Add and Subtract 100s
 $284 + 300 = 584$

Hundred	Ten	Ones
2	8	4

How can I help at home?

Use the language of addition and subtraction

Encourage your child to **use mathematical language** when talking about calculations, such as **add, altogether, more, plus, total, sum for addition and take away, subtract, minus, less, fewer, difference** for subtraction. For example, $7 - 3 = 4$ can be read as 'the difference between 7 and 3 is 4'.

Go shopping

Shopping provides great opportunities to practise skills. When buying items, ask your child to round prices to the nearest pound before adding mentally. Challenge your child to check shopping totals using subtraction. Encourage them to estimate, for example: I have £15. We need chicken for £4.50, vegetables costing £4.75, and the bus is £3.50. Will I have enough?

Explore different methods

When adding or subtracting, **ask your child to explain** each stage of their sum and why they chose that method. They might partition numbers into hundreds, tens, and ones, draw pictures to represent how they added or subtracted, use number lines, use objects, or try written column methods. Encourage them to check with a different strategy.

Key Vocabulary

Add

Total

Make

More

Plus

Sum

Minus

Fewer

Take away

Subtract

Regroup

Exchange

Equals

Inverse

Altogether

Count on

Count back

Difference

Decrease

Increase

Remaining

Addition and Subtraction Methods

Add 4-digit numbers

No exchange

$5162 + 3427 = 8589$

Starting with the ones, add each column in turn.

One exchange

$5162 + 3497 = 8659$

Starting with the ones, add each column in turn. When adding 6 tens + 9 tens = 15 tens = 1 hundred + 5 tens. Place 1 hundred under the hundreds answer and 5 tens in the answer.

Multiple exchanges

$5864 + 3497 = 9361$

Starting with the ones, add each column in turn. Exchange tens, hundreds and/or thousands as required.

Subtract 4-digit numbers

No exchange

$5789 - 3421 = 2368$

Starting with the ones, subtract each column in turn.

One exchange

$5749 - 3471 = 2278$

Starting with the ones, subtract each column in turn. When subtracting 4 tens - 7 tens, exchange 1 hundred to make: 14 tens - 7 tens = 7 tens

Multiple exchanges

$6131 - 3476 = 2655$

Starting with the ones, subtract each column in turn. Exchange tens, hundreds and/or thousands as required.

Spring 2—Time

Telling the time is an important skill in everyday life, but it can be tricky to learn.

Before your child will be able to tell the time on a clock they will need to grasp how time relates to their own experiences. You can start to increase their awareness of time with simple activities and games.

Key Vocabulary

12-hour time

24-hour time

Roman Numerals

Analogue

Digital

Hours

Minutes

Seconds

O'clock

Half past

Quarter past

Quarter to

Midday

Midnight

Noon

A.M.

P.M.

How can I help at home?

Draw attention to time. **Mention the time at different points in the day.** For example, you could say, 'it's 5 o'clock – time for tea,' or 'it's 7 o'clock – time for a bath.'

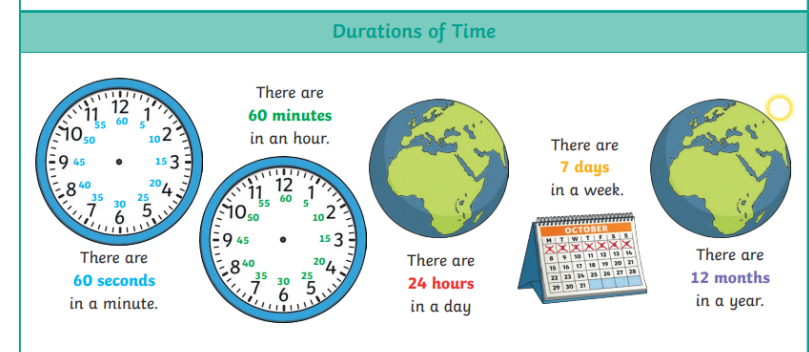
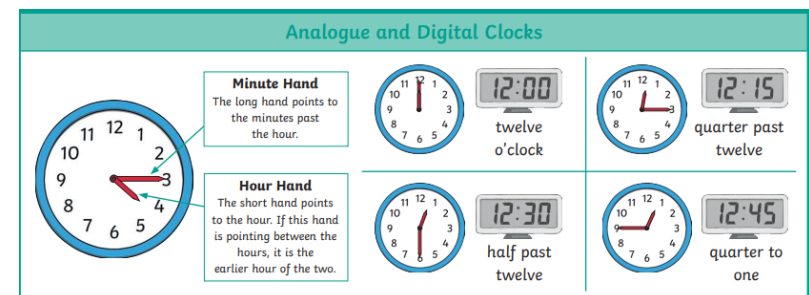
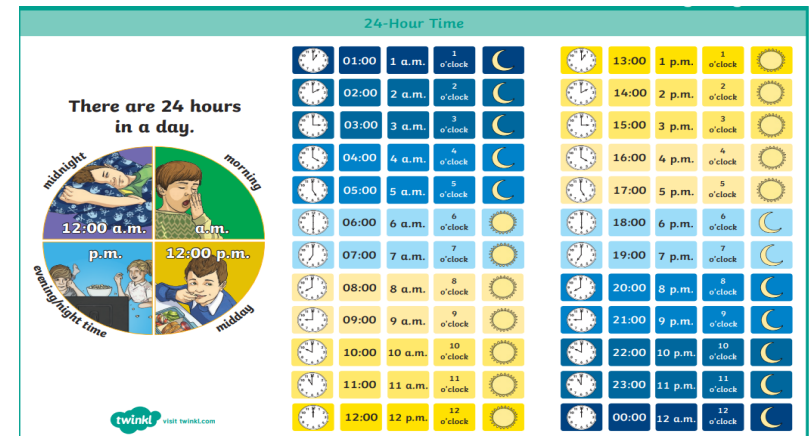
- Do fun activities that include measuring time:
- use a **timer** for baking
- play a board game with a sand timer
- use a **stop watch** to time a race or challenge

Make sure your child is confident with numbers and counting from 1–60 as this will make telling the time easier. Practising the five **times table** will also be a big help.

Start with analogue clocks rather than digital clocks. Focus on telling time to the hour and half hour.

Put a **clock** in your child's bedroom. Ideally it should have a clear hour hand and half hour hand as this will help them to understand that the short hand shows the hour and the long hand shows the minutes.

Talk about what you regularly do at different times in the day. Compare and contrast **weekdays and weekends**, if there are differences. **Use time vocabulary such as to-day, yesterday, now, afterwards.**



Spring 2 -Statistics

Statistics and data are essential for understanding the world. The data handling skills your child learns at school will help them understand numerical information throughout life. Children begin by looking at tally charts and move onto pictograms, bar charts and more complex graphs. They will create and interpret data from these charts, graphs and tables.

Key Vocabulary

Data

Pictogram

Symbol

Bar chart

Horizontal axis

Vertical axis

Axes

Scale

Intervals

Table

Interpret

Tables

In order to understand the data presented in a table, you must read the table's title and the headings. Remember to always look at the heading above each piece of information.

Table to Show Ticket Prices at a Local Cinema

Ticket Type	Weekday Price	Weekend Price
Adult	£6	£7.50
Child	£4	£4.50
Student	£5.50	£6

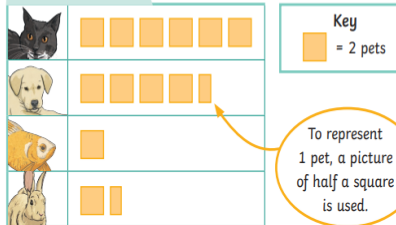
Using the table, we can see the cost of an adult and a child visiting the cinema on a Monday would be £10.



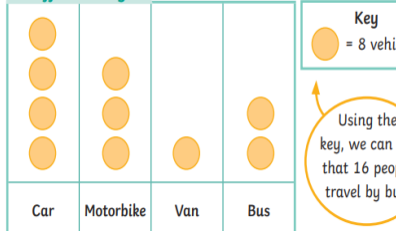
Pictograms

Pictograms use pictures or symbols to represent data. The key shows what each symbol represents. This pictogram uses 1 symbol to represent 2 pets.

Class A's Pets

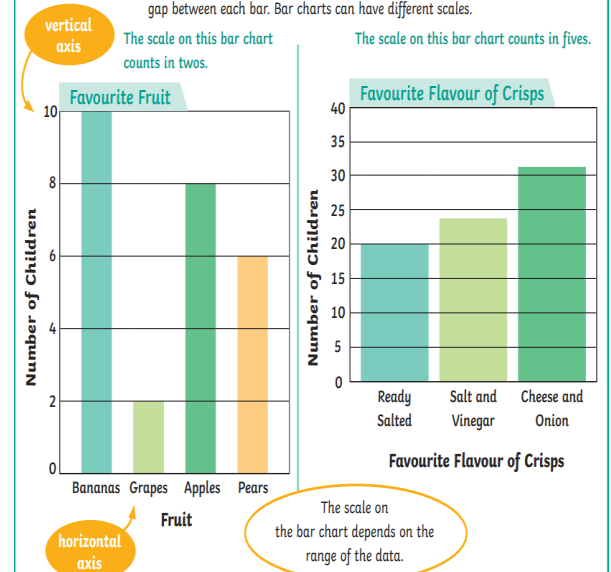


Traffic Survey



Bar Charts

Bars are used to show the data in each category. There must be a gap between each bar. Bar charts can have different scales.



How can I help at home?

Discuss data

Look for real-life **tables, charts, and graphs** in newspaper articles or non-fiction books. Discuss what the data shows and ask your child about it. Why do they think the data has been presented in that way? Is it easy to understand? Could it be shown in a clearer way?

Conduct a survey

Help your child to survey friends or family about topics such as favourite films, foods, or sports.

How many people took part? What does the data show? How could it be presented? Encourage your child to analyse the data and ask questions about it.

Use timetables

Look at timetables together. For example, take a look at public transport, cinema showings, or holiday activity schedules. When is the next bus? How long will journeys take? When will films finish?

You could also encourage your child to make their own timetables for daily routines or excursions.

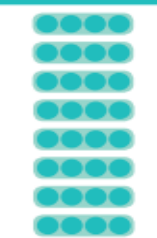
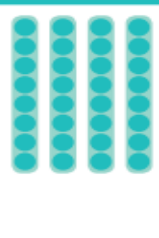
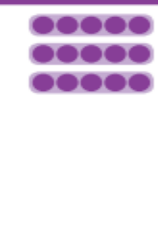
Summer 1—Multiplication & Division

Understanding how to multiply and divide numbers is essential to be able to solve maths problems quickly. Students begin with repeated addition and sharing, through to arrays and then onto formal written methods such as column method and bus stop method.

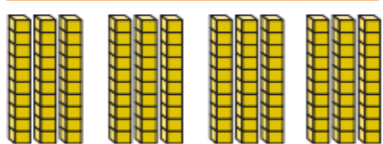
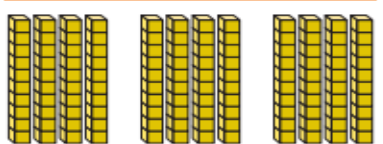
Key Vocabulary

Multiply
Groups of
Lots of
Times
Divide
Share
Remainder
Factor
Multiple
Product
Equal groups
Share
Inverse
Quotient
Divisor
Distribute

Write and Calculate Mathematical Statements

$4 \times 8 = 32$ $32 \div 8 = 4$ 	$8 \times 4 = 32$ $32 \div 4 = 8$ 	$5 \times 3 = 15$ $15 \div 3 = 5$ 	$3 \times 5 = 15$ $15 \div 5 = 3$ 
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Related Calculations

$3 \times 4 = 12$ 	$4 \times 3 = 12$ 
$30 \times 4 = 120$ 	$40 \times 3 = 120$ 

How can I help at home?

Explore practically

Use real objects to develop early understanding of multiplication and division. For example, use socks, gloves or ice-cube trays to count in twos, fives, or tens. Use egg boxes or muffin trays to explore arrays. Practise division by sharing beads between toys or arranging blocks into groups.

Practise times tables

Sing, chant or play games to help your child to memorise times tables. Give points for each fact they know. Use real-life opportunities to practise. For example, when you're in the supermarket ask your child: 'How many packets will we have if we buy 3 multipacks with 6 packets in each?'

Explain different methods

Ask your child to explain each stage of a multiplication or division and why they chose that method. They might use doubling or halving, apply times tables facts, pictures to represent their calculation, or written methods. Encourage them to estimate first and then check with a different strategy.

Multiplication and Division Facts

x	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

Multiply Using Formal Written Methods

Th	H	T	O
5	4	3	
x			4
		1	2
	1	6	0
2	0	0	0
2	1	7	2

Th	H	T	O
5	4	3	
x			4
2	1	7	2
1	1		

Remember to move any regrouped numbers into the next column. After the next multiplication, add the regrouped number to the answer.

Division

$$136 \div 4 = 34$$

		3	4
4	1	3	6
-	1	2	0
		1	6
-		1	6
			0



Short Division

		3	4
4	1	3	6
-	1	2	0
		1	6
-		1	6
			0

15 ÷ 4 = 3 remainder 3
Remember to regroup any remainders and move them into the next column.

		4	5	5	3
5	2	2	7	8	
-	2	0	0	0	
		2	7	8	
-		2	7	8	

28 ÷ 5 = 5 remainder 3
If your calculation has a remainder, remember to record it in the answer using the letter r.

Summer 2—Money

Money is not only an important skill in maths, it is also an important life skill that students will need to use on a daily basis in their adult life. Students will begin by learning to recognise coins and notes and then move onto calculating using the four operations with money.

Key Vocabulary

Amount

Change

Combinations

Estimate

Decimal

Pence

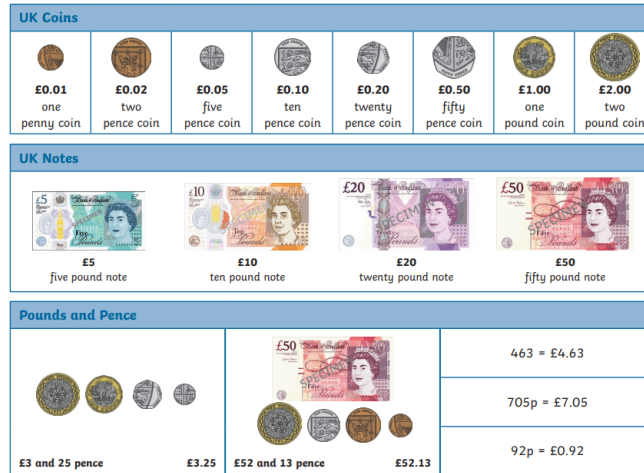
Penny

Pounds

Round

Value

Convert



How can I help at home? Set up shop

Playing shops at home is a wonderful way of introducing children to the idea of using money through creative play. Together, decide what to sell – raid kitchen cupboards, toy boxes, or wardrobes to create different types of shop – and price up all the items with sticky notes. For younger children, set prices with penny amounts or whole pounds using numbers they can cope with. Use real or toy coins (or make coin rubbings with paper and crayons to create your own) and take turns to be shopper and shopkeeper.

Have younger children start by just buying one item and counting out the right coins to pay for it. Encourage older children to choose several items and work out totals and change. Top Tip 1: More online shopping and contactless card or phone payments mean children often don't see cash being used. Playing with real money can help them recognise different coins and their values.

Be super shoppers

How do you turn a supermarket shop with kids from frazzling to fun-filled? Playing money games that challenge them to be super shoppers might help! Start by asking younger children to spot and read different prices. (Printing labels when weighing out fruit and veg is a great of providing non-round-number amounts.) As they learn to add amounts, ask your child to find, say, three items that total £5.

Encourage older children to calculate with money by finding the total of your shopping as you add new items to your basket/trolley. In larger supermarkets, handheld scanners offer a fun way to check, but a calculator on your phone works just as well for keeping track on the go. Or you could just challenge your child to see if their total matches the final amount at the checkout!

Top Tip 2: Decimal points in money amounts can be confusing, especially for younger children. Explain that the decimal point separates the pounds and pence, so £2.99 can be read as 'Two pounds and ninety-nine pence'.

Manage a budget

Even after children have learnt to **calculate using money**, they often have little sense of affordability! Involving your child in planning family celebrations, days out, or holidays (real or imaginary) can help them to understand the cost of items and activities. It might even encourage them to save for something they want!

Set a budget and research prices together. How much will it cost to get there? Is there a choice of ticket prices? What will lunch/drinks/snacks cost? How shall we divide the budget between party food, decorations, and presents? Don't forget to talk about the difference between what they need and what they want!

Top Tip 3: When calculating with money, it can be helpful to convert amounts into pence first, before changing back to pounds and pence after the calculation. This helps your child keep track of where the decimal point should go. For example, to add £4.50 + £2.73, you could change the sum to 450p + 273p = 723p, which can then be turned into £7.23.

Money Continued

With many purchases now being online and through contactless payments it is also important for children to learn about money in a digital sense. At school we learn about this through financial capability lessons in Maths and RSHE.

How can I help at home?
Use a marble jar

With young children, a good way to lay the foundation for understanding the value of money and the principle of saving is to introduce a marble jar (or a reward chart). When a child is rewarded for something, a marble is added to the jar. When the jar is full, the marbles are exchanged for a treat or reward.

Challenge: What can you buy with a pound?

Log into an online retailer with your child, and look for items that they are interested in. Could you buy any with £1? What does £1 buy? How many pounds will they need to buy something that they want? Are things more expensive than they thought?

Manage pocket money

Giving your child pocket money allows them to start making decisions about their own money. There are a number of pocket money apps on the market, complete with contactless cards, designed to support children in developing an understanding of the four key pillars of money management: spend, save, earn and give. All of them help children to develop an awareness of the value of money whilst giving parents control over spending.

Go shopping online

Online shopping is a globally increasing trend. Whilst we cannot physically collect and weigh items online, we can replicate many of the tasks we would do in the supermarket digitally.

Ask your child to put a given number of apples in the virtual basket. If they are older, ask them to look at how much are the apples cost.

Look at offers and compare – which one is better value? Check by adding to the basket.

Write a list together and estimate the cost. Draw your child's attention to the cost going up as items are added to the basket. See who was closest when the shopping is complete.

Set a budget for the shopping. Can everything be bought? What do we take out if we exceed the budget? What treats can be added if there is any money spare? Explain to your child that the money is taken from your bank account when you check out.

Learn 'when it is gone, it is gone'

This is an important principle for children to understand and it becomes relevant when children gain some independence and a mobile phone, for example. Pay as you go and top up accounts provide an important lesson about budgeting and making things last. Discussing data, text and call usage and mobile phone tariffs with children makes the idea of budgeting real.

Remember that children learn about money from what they see you doing. So draw their attention to and explain hidden transactions like ATM use and chip and pin transactions too.

Algebra (For pupils step 25+)

If students reach step 25+ in our Grange steps, they will start learning about algebra. They will use simple formulae, will describe number sequences using letters as symbols, and will find unknowns in an equation.

Key Vocabulary

Term to term rule

Variable

Unknown

Expression

Equation

Formula

One-step equation

Two-step equation

Substitution

Pairs of unknowns

Enumerate

Linear Number Sequences

A linear number sequence is a sequence where each value increases or decreases by the same amount each time. Each number in a linear number sequence is called a **term**. The constant change between each number is called the term to term rule. To identify the term to term rule, find the difference between two adjacent terms.

When you know the term to term rule, you can use it to find the next term in the sequence. It can also be used to find a missing number within a sequence.

Sequence 1: 33, 28, 23, 18, 13, 8

Term to term rule: -5

Sequence 2: 0.5, 0.9, 1.3, 1.7, ?, ?

Term to term rule: $+0.4$

Sequence 3: $\frac{1}{2}$, ?, $1\frac{1}{2}$, $1\frac{1}{2}$, ?, $2\frac{1}{2}$

Term to term rule: $+\frac{1}{2}$

Sequence 4: 127, ?, ?, 181, ?, 217

Term to term rule: $+18$

Example calculation: $54 + 3 = 18$

Forming Expressions

An expression is a group of numbers, letters and operation symbols.

Examples:

- 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: $3e - 5$
- Add 12 to f and then multiply by 2: $2(f + 12)$

Forming Equations

An equation is a number statement with an equal sign (=). Expressions on either side of the equal sign are of equal value.

Examples:

- $a + 14 = 20$
- $b - 20 = 15$
- $4c = 28$
- $d + 12 = 30$
- $3e - 5 = 10$
- $2(f + 12) = 44$

Formulas / Formulae

(The word formula has two possible plural forms, formulae and formulas.)

A formula is a special type of equation that shows the relationship between different substituted variables. Formulae are often used in geometry to find area and volume.

- Area of rectangle = length $\times$ width
- Area of triangle = (base $\times$ height) $\div$ 2
- (12.5 $\times$ hours worked) $\div$ 25 = cost of job

Equations with Pairs of Unknowns

In an equation with two unknown numbers, there may be **several** possible values for the unknowns that will balance the equation.

Example: $ab = 18$

a	b
1	18
2	9
3	6
6	3
9	2
18	1

Example: $2a + b = 10$

a	b
2	6
3	4
4	2
5	0

Enumerating Possibilities

Enumerating means making a complete list of answers to a problem.

- Use a system for finding the possibilities.
- Organise your findings in an ordered list or table.
- Have a way of deciding when all possibilities have been found.

Example: Two scoops of two different flavours give six possible combinations.

- chocolate and strawberry
- chocolate and vanilla
- chocolate and mint
- strawberry and vanilla
- strawberry and mint
- vanilla and mint

Solving One-Step and Two-Step Equations

In algebra, missing numbers in equations are represented by letters. Any letter can be used but often the letter x is used. An algebraic x is written to look different to a normal letter 'x' to avoid confusion.

The multiplication sign is not used in algebra to avoid confusing it with the algebraic x used to show a missing number. Inverse operations are used to isolate the letter on one side of the equation.

Example 1: $3x = 15$

Example 2: $2x + 4 = 10$

How can I help at home?

Practise basic algebra

Your child will have solved lots of problems involving **missing numbers at school**. Before, the unknown number in a calculation will have been represented using a blank box or a question mark. This will now be replaced by a letter, like a or b. This letter represents the unknown number, also known as the variable.

Play with sequences

Below are a few steps you can take to help your child get to know linear sequences:

Choose a sequence of five numbers. Try to begin with sequences of numbers in the times tables. For example, start with 3 and write down the next four next terms in the sequence: 3, 6, 9, 12, 15.

Can your child describe the number sequence? What is happening to the numbers in the sequence? In our example, the numbers are increasing by 3 each time, so there is a difference of 3 between each of the terms.

Ask your child to predict the next few numbers. They should see that they just need to add three to get the next term. Therefore, the next two numbers in the sequence would be 18 (15 + 3) and then 21 (18 + 3).

Can your child predict what the tenth number in the sequence would be? They could do this by adding on 3 ten times to reach 30.

Encourage your child to look at the relationship between the position of each term (for example, the 3rd number in the sequence) and the value of that term (for example, 9). They could make a table to help them identify patterns and find a general rule:

Because the number in the sequence is always the term multiplied by 3, this sequence can be written as the algebraic rule $3n$.

Here are some ideas for an extra challenge once your child has followed those steps:

Ask your child to work out the hundredth number in the sequence. Your child should be able to see that if we multiply the term number by 3, we will get the sequence number. For example, the 100th term would be 300 because $3 \times 100 = 300$. Ask your child if they could find any number in the sequence, like the 736th term.

Choose a number that you know is not in the sequence (for example, 37) and ask your child to figure out if this number would appear in the sequence. How do they know?

You could ask your child to explore number sequences where the numbers decrease by a constant quantity (for example, 40, 36, 32, 28, and so on).