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# Mayville Primary School

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## A Parent Guide to Mathematics (Year 6)



*Working together in the pursuit of excellence for all*

Mathematics teaches children how to make sense of the world around them through developing their ability to use numbers, calculate, reason and solve problems. It helps children understand relationships and patterns, in both numbers and space in their everyday lives.

## Intent

The 2014 National Curriculum for mathematics aims to ensure that all children:

- become fluent in the fundamentals of mathematics;
- are able to reason mathematically;
- can solve problems by applying their mathematical knowledge.

At Mayville Primary School, these aims are embedded within maths lessons and the corresponding skills are developed over time. We want all children to enjoy mathematics and to experience success in the subject. We are committed to developing children's curiosity about the subject as well as an appreciation of the beauty and power of mathematics.

## Implementation

The content and principles underpinning the 2014 National Curriculum and the maths curriculum at Mayville reflect those found in high-performing education systems internationally, particularly those of east and south-east Asian countries such as Singapore, Shanghai and South Korea.

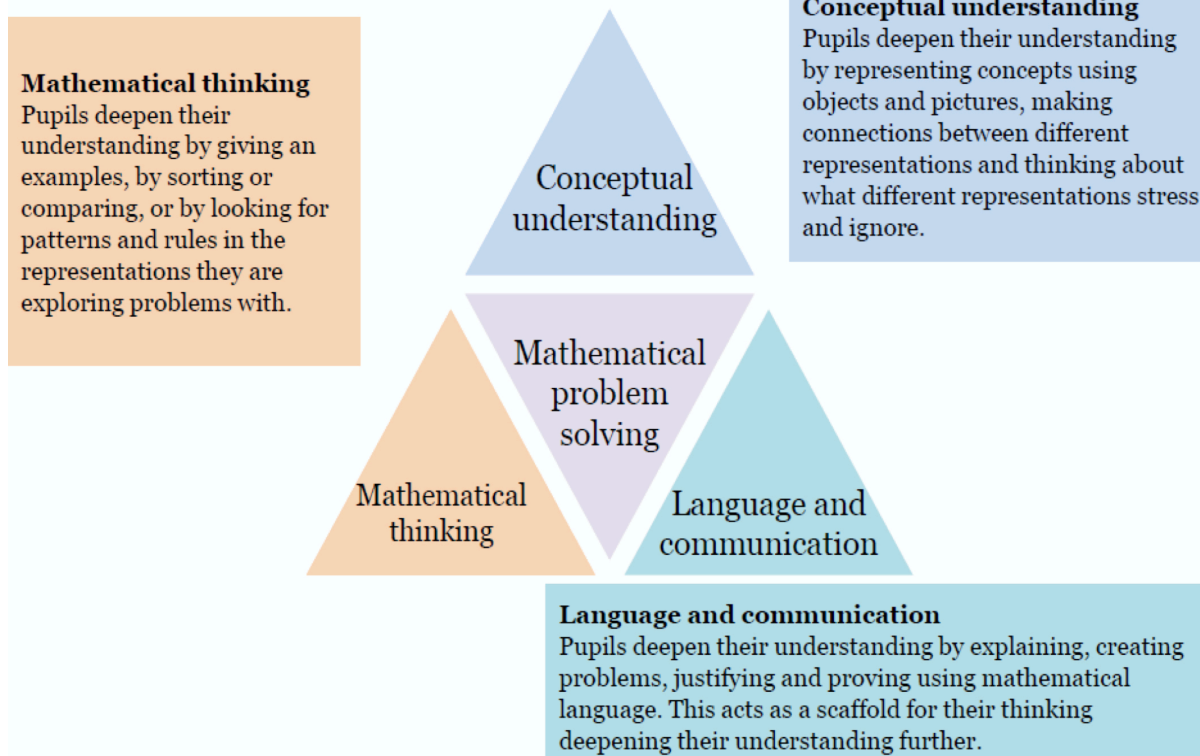
- Teachers reinforce an expectation that all children are capable of achieving high standards in mathematics.
- All lessons contain: fluency, reasoning and problem-solving activities.
- All activities, within a lesson, are differentiated at 3 levels: 'developing', 'expected' and 'greater depth'.
- Differentiation is also achieved by emphasising deep knowledge and through individual support and intervention.
- When suitable, teachers will use the CPA sequence of modelling (concrete > pictorial > abstract) to nurture a conceptual understanding of mathematics.
- When suitable, teachers will encourage pupils to use the Singapore bar-method to tackle problem-solving questions.
- To ensure whole-school consistency and progression, the school uses the White Rose Maths schemes of learning. These schemes of work are fully aligned with the National Curriculum and have an emphasis on fluency, problem-solving and reasoning. Mathematical topics are taught in blocks to enable the achievement of 'mastery' through depth: <https://whiterosemaths.com/resources/primary-resources/primary-sols/>
- The White Rose Maths schemes of learning are complemented with fully aligned resources from classroomsecrets.co.uk; CGP and Twinkl.
- Teaching is underpinned by carefully crafted lessons and resources to foster deep conceptual and procedural knowledge.
- Teachers will use precise questioning in class to test conceptual and procedural knowledge and will assess pupils regularly to identify those requiring intervention, so that all children keep up.
- Pupils will receive high quality feedback that will extend/consolidate their knowledge or clarify misconceptions. When giving feedback, teachers will draw a distinction

between a 'response question' and a 'next-step question' (please refer to the section of marking and feedback).

- Pupils in Yr 6 will be taught the laws of mathematics so that they have a clear understanding of why and how operations are carried out. These laws include: the commutative law, associative law, distributive law and the laws of identity. Learning these laws and their applications will empower pupils to achieve higher in mathematics.

## **Maths Mastery**

### **Key Principles**



## Mathematics in Year 6

By the end of Year 6, children are expected to be confident with the use of all four standard methods for written calculations, and to have secured their knowledge of the key number facts for the four operations. Their work will focus more on fractions, ratio, proportion and the introduction of algebra.

### Number and Place Value

- Work with numbers up to ten million (10,000,000) including negative numbers
- Round any number to any required number of digits or magnitude

### Calculations

- Use the standard method of long multiplication for calculations of four-digit numbers by two-digit numbers
- Use the standard method of long division for calculations of four-digit numbers by two-digit numbers
- Identify common factors, common multiples and prime numbers
- Carry out complex calculations according to the mathematical order of operations
- Solve complex problems using all four operations

The mathematical order of operations requires that where calculations are written out in long statements, first calculations in brackets are completed, then any multiplication or division calculations, and finally any addition or subtraction. So, for example, the calculation  $4 + 3 \times (6 + 1)$  has a solution of 25, not 43 or 49.

### Fractions and Decimals

- Use common factors to simplify fractions, or to add fractions with different denominators
- Place any group of fractions into size order
- Multiply pairs of fractions together
- Divide fractions by whole numbers, for example  $\frac{1}{3} \div 2 = \frac{1}{6}$
- Use division to calculate the decimal equivalent of a fraction
- Know and use common equivalences between fractions, decimals and percentages, such as  $\frac{1}{2} = 0.5 = 50\%$

### Ratio and Proportion

- Find percentages of quantities, such as 15% of £360
- Use ratio to explain relationships and solve problems
- Use simple scale factors for drawings, shapes or diagrams

Ratio is represented using the colon symbol. For example, if £100 is shared in a ratio of 1:3 between two people, then the first person receives £25 (one part), with the other receiving £75 (three parts).



## Algebra

- Use simple formulae
- Describe sequences of numbers where the increase between values is the same each time
- Solve missing number problems using algebra
- Find possible solutions to problems with two variables, such as  $a + b = 10$

## Measurements

- Convert between any metric units and smaller or larger units of the same measure
- Convert between miles and kilometres
- Use a given formula to find the area of a triangle or parallelogram

## Shape and Position

- Draw 2-d shapes using given sizes and angles
- Use knowledge of 2-d shapes to find missing angles in triangles, quadrilaterals and other regular shapes
- Name and label the radius, diameter and circumference of a circle
- Find missing angles in problems where lines meet at a point or on a straight line
- Use a standard grid of coordinates including negative values

## Graphs and Data

- Construct and understand pie charts and line graphs
- Calculate the mean average of a set of data

Mean average is calculated by adding up all the values and dividing by the number of items. For example, the mean average of 3, 5, 8, 9 and 10 is 7 ( $3 + 5 + 8 + 9 + 10 = 35$ , then  $35 \div 5 = 7$ )

### Parent Tip

Playing traditional games, such as battleships or even draughts and chess, is great for exploring coordinates and movements across the coordinate grid.

## **In what sequence will my child learn mathematics?**

Our school follows the White Rose Maths scheme of learning which can be found here: <https://whiterosemaths.com/resources/primary-resources/primary-sols/>

## **KS2 SATs exams**

Towards the end of Year 6, children are expected to sit a statutory test in maths, reading, and grammar.

The mathematics assessment comprises of three papers: Arithmetic, Reasoning 1, Reasoning 2.

KS2				
Paper 1	Arithmetic	30 minutes	36	40 marks
Paper 2	Reasoning	40 minutes	20	35 marks
Paper 3	Reasoning	40 minutes	20	35 marks

## **How can I help my child prepare for SATs?**

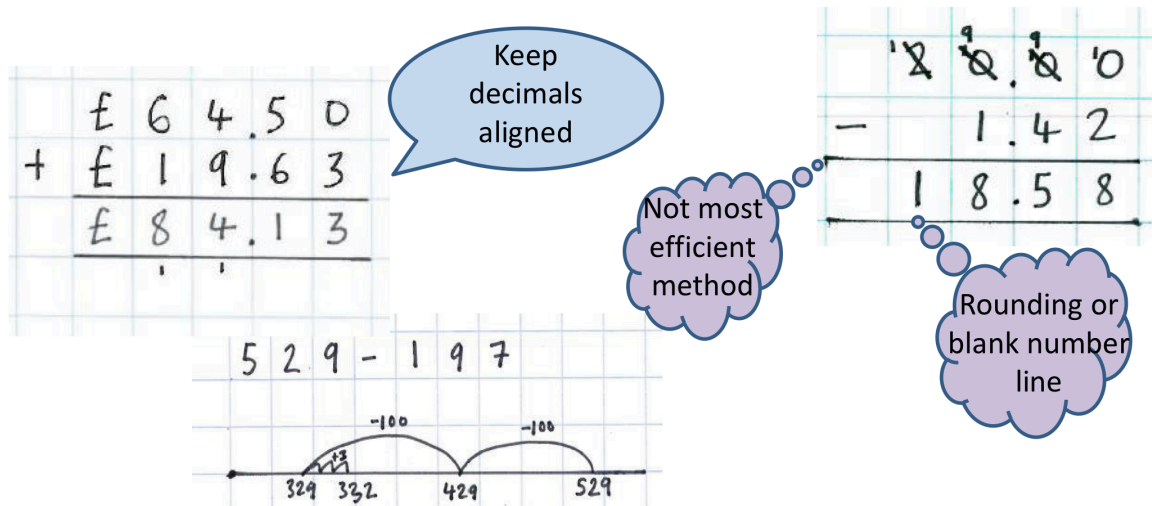
<https://thirdspacelearning.com/blog/sats-tips-and-help/>

## **Where can I access practice tests?**

<http://www.satspapers.org/ks2maths2016onwards.htm>

# Addition & subtraction in Year 6

Column method with up to four digits



**Year 5 and 6:** Add whole numbers with more than 4 digits, including using formal written methods (columnar addition). Consolidate previous learning and apply it in multi-step problems. Mentally add numbers using known facts.

## Multiplication in Year 4, 5 & 6

### Short multiplication

(Any number multiplied by a one digit number)

**Year 5:** Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

**Year 6:** Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

Handwritten short multiplication on grid paper:

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \end{array}$$

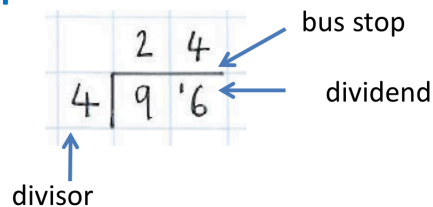
1. Multiply the ones
2. Regroup the tens (if needed)
3. Multiply the tens
4. Add the re-grouped tens

## Multiplication in Year 4, 5 & 6

### Short division

(With a one digit divisor)

$$96 \div 4 = 24$$



As above, when there is a remainder once the ones within the dividend has been divided by the divisor:

4. Insert a decimal point after the ones with the bus stop and above the bus stop (within the answer)
5. Write the remainder, small, after the decimal point and insert a zero as a place holder i.e. 40
6. Divide the tenths by the divisor and record the answer after the decimal above the bus stop.

If there is a remainder write in small with the bus stop and write a zero as a place holder.

1. Divide the first number inside the bus stop by the divisor.
2. Write the answer on top and write the remainder, small, before the ones within the dividend.
3. Divide the second number (two digit number i.e. 16) by the divisor and record the answer at the top of the bus stop.

$$79 \div 5 = 15.8$$

$$\begin{array}{r} 15.8 \\ 5 \overline{) 79.40} \end{array}$$

$$\begin{array}{r} 15 \text{ r}4 \\ 5 \overline{) 79} \end{array} \quad \begin{array}{r} 15 \frac{4}{5} \\ 5 \end{array}$$

## Multiplication in Year 5 & 6

### Formal written method

(Any number multiplied by two or more digits)

$$24 \times 16 =$$

Same as short multiplication, and then:

5. Place a zero in the ones column
6. Multiply the tens by the ones
7. Regroup the tens (if needed)
8. Multiply the tens by the tens
9. Add the re-grouped tens
10. Draw an equals
11. Add each column, starting with the ones to the tens to the hundreds

$$\begin{array}{r} \phantom{00}24 \\ \times \phantom{00}16 \\ \hline 144 \\ + 240 \\ \hline 384 \end{array}$$

Zero as the place holder for the ones column

$$\begin{array}{r} 502 \\ \times 336 \\ \hline 3012 \\ 15060 \\ + 150600 \\ \hline 168672 \end{array}$$

Zero as the place holder for the ones column

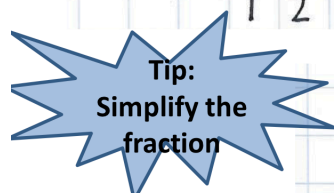
Two zeroes as the place holder for the ones and ten column

## Division in Year 5 & 6

### Formal written method (With a two digit divisor)

### Chunking by repeated subtraction

$$\begin{array}{r}
 432 \div 15 \\
 \hline
 28 \frac{4}{5} \text{ or } 28.8 \\
 15 \overline{) 432} \\
 \underline{300} \quad (20 \times 15) \\
 75 \quad (5 \times 15) \\
 \underline{57} \\
 45 \quad (3 \times 15) \\
 \underline{12}
 \end{array}$$



$$\frac{12}{15} = \frac{4}{5} = 0.8$$

1. Use known multiplication facts to chunk i.e.  $15 \times 2 = 30$  so  $15 \times 20 = 300$ .
2. Record the answer below the number inside the bus stop and write the multiplication in brackets on the right hand side)
3. Subtract the two numbers and write the answer below.
4. Repeat the above steps until you can no longer divide the dividend by the divisor.
5. Total the numbers in the brackets which were multiplied by the divisor and write the answer above the bus stop.

## Division in Year 5 & 6

### Formal written method (With a two digit divisor)

$$\begin{array}{r}
 28 \text{ r } 12 \\
 15 \overline{) 432} \\
 \underline{30} \downarrow \\
 132 \\
 \underline{120} \\
 12
 \end{array}$$



How to Divide!



Does

$\div$  (divide)

McDonald's

$\times$  (multiply)

Serve

$-$  (subtract)

Burgers?

$\downarrow$  (bring down)

Repeat

1. Divide the divisor into the first digit of the dividend. If it can't divide then look at the next digit as a two digit number and divide.
2. Record the answer at the top of the bus stop i.e.  $15$  goes into  $43$  two times,  $15 \times 2 = 30$
3. Take the answer away from the two digit number at the start of the bus stop i.e.  $43 - 30 = 13$
4. Carry down the ones from under the bus stop i.e.  $132$
5. Repeat the above steps until the divisor can no longer go into the dividend

- Fractions, decimals, percentages

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
$\frac{1}{2}$ and $\frac{1}{4}$	$\frac{1}{4}$ , $\frac{2}{4}$ , $\frac{3}{4}$ , $\frac{1}{3}$	Add and subtract fractions with the same denominator up to one whole  $\frac{1}{4} + \frac{1}{4} = \frac{1+1}{4} = \frac{2}{4}$	Add and subtract fractions with the same denominator where the answer may be an improper fraction  $\frac{4}{8} + \frac{5}{8} = \frac{9}{8}$	Add and subtract fractions where one denominator is a multiple of another  $\frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{2+1}{6} = \frac{3}{6}$ $\frac{1}{3} = \frac{2}{6}$	Add and subtract fractions with different denominators  Multiply simple pairs of proper fractions  Divide proper fractions by whole numbers  $\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{4+3}{12} = \frac{7}{12}$
				Find 10% of a number  Find a multiple of 10% of a number  Find 5% of a number  Find 10% of £90 $90 = 100\%$ $9 = 10\%$ $18 = 20\%$	Find a multiple of 5% of a number  Find 1% of a number  Find 5% of £90 $90 = 100\%$ $9 = 10\%$ $4.5 = 5\%$

## Language & Reasoning

The 2014 National Curriculum is explicit in articulating the importance of children using the correct mathematical language as a central part of their learning.

The Talk Task is a crucial opportunity for children to perform tasks where recording is at a minimum with the focus instead being on the correct use of mathematical language.



Megan has made a 3-digit number with these cards.



What is the largest number you can make with these cards?  
Explain your answer.





# Problem solving & Arithmetic

Word problems:

A shop sells magazines and comics.

Freya buys a magazine and a comic.

She pays £2.50.

Evie buys a magazine and two comics.

She pays £3.90.

How much does a comic cost?

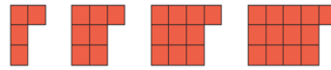
How much does a magazine cost?



## Finding patterns:

Ali has made three sequences of shapes by sticking coloured squares together.

The sequence of red shapes starts



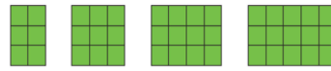
and so on.

The sequence of blue shapes starts



and so on.

The sequence of green shapes starts



and so on.

Ali says, 'If I put a red and a blue shape together, they will make a shape that is the same as one of the green shapes.'

Do you agree with Ali?

Explain your reasoning.

*Mental arithmetic is an important life skill and regular practice is critical. Without fluency in mental maths to underpin their work in number, children will struggle with many other areas of mathematics. Children who are fluent with number will be able to use their mental arithmetic skills to find efficient strategies for completing calculations, recalling and applying number knowledge rapidly and accurately.*

*By the end of year 4 pupils should be able to recall their times tables to 12 x 12.*

# How you can support at home



## Measuring

- Cooking- weighing and following instructions
- Measure yourself! - make a height strip. Keep a graph to show your growth! How much have you grown?
- Measure stuff! - use a tape measure
- Telling the time- how long until...? Analogue /digital time, Days of the week, dates, keep a calendar/

## Picnic or Party maths:

- Preparing food for a group of people is a real problem solving opportunity; how many cups can we fill with one jug, how many pieces of pizza can we cut from each one? A great opportunity to use terms like 'half' 'quarter' 'double' and put those tables into practice.



## How you can do Maths at Home



## Number games

- Board games
- Snakes and ladders
- Dominoes
- Playing card games eg snap, doubles
- Dice games eg exchange game
- Have fun playing with a calculator and try out those signs!



## Shopping games:

- Set up a mini supermarket in the kitchen and give the children some real money to go shopping with.
- Change can be the trickiest concept and needs to be taught in 'real' shopping activities which can be done really well at home.

## Shapes everywhere

- Shopping Shape Sort; let your child loose on the packages and sort them into cuboids, cylinders, cubes
- 2-D shape pictures and patterns
- Which shapes can you draw? you will need a ruler for some of them!





# Props around the house

Ideas taken from **Maths for Mums and Dads** Eastaway, R. and Askew, M. (2010)

- **A prominent clock**- digital and analogue is even better. Place it somewhere where you can talk about the time each day.
- **A traditional wall calendar**-Calendars help with counting days, spotting number patterns and
- **Board games that involve dice or spinners**-helps with counting and the idea of chance
- **A pack of playing cards**- Card games can be adapted in many ways to learn about number bonds, chance, adding and subtracting
- **A calculator**- A basic calculator will help with maths homework when required, there are also many calculator games you can play, too.
- **Measuring Jug**-Your child will use them in school, but seeing them used in real life is invaluable. Also useful for discussing converting from metric to imperial
- **Dried beans, Macaroni or Smarties**- for counting and estimating
- **A tape measure and a ruler**- Let your child help when measuring up for furniture, curtains etc
- **A large bar of chocolate** (one divided into chunks)- a great motivator for fractions work
- **Fridge magnets with numbers on**- can be used for a little practice of written methods
- **Indoor/outdoor Thermometer**- especially useful in winter for teaching negative numbers when the temperature drops below freezing
- **Unusual dice**- not all dice have faces 1-6, hexagonal dice, coloured dice, dice from board games all make talking about chance a little more interesting
- **A dartboard with velcro darts**- Helps with doubling, trebling, adding and subtracting.

## Glossary

**Abacus** – A tool used to assist the teaching and learning in Year 5 and 6

**Abstract** – Written down calculation

**Bridging** – Moving through the 10, 100, 1000 boundary

**Bus stop** – Visual representation used for to lay out short division

**Concrete** – Hands on, practical resources

**Denominator** – The bottom number in a fraction

**Digit** – A symbol used to make numerals 0-9

**Dividend** – The amount you want to divide up

**Divisor** – The number you divide by

**Improper fraction** – Where a fraction is top heavy; the numerator is larger than the denominator

**Mathematics Mastery** - A tool to used to assist the teaching and learning from Reception to Year 4, on a rolling programme

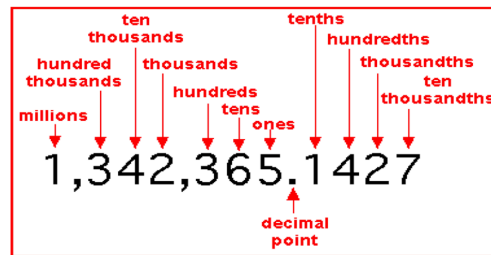
**Mixed number fraction** - A whole number and a fraction combined

**Numerator** – The bottom number in a fraction

**Partitioning** – Splitting a number into parts

**Place holder** - A significant zero in the decimal representation of a number

**Place value** - The value of where the digit is in the number (see diagram)



**Proper fraction** - A fraction where the numerator is less than the denominator

**Re-grouping** - Making groups of tens when adding or subtracting two digit numbers (or more) and is another name for 'carrying' and 'borrowing'.

**Remainder** - The amount left over after division

**Rounding** - Making a number simpler but keeping its value close to what it was.

**Simplify** - Divide the top and bottom by the highest number that can divide into both numbers in the fraction exactly

**Skip counting** - Counting forwards or backwards by a number other than 1

**Vinculum** - The horizontal line used to separate the numerator and denominator in a fraction

**Visual** – Mathematical concepts represented by pictures

