Years 5 & 6

Parent Maths Pack

"… pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems."

The national curriculum in England, DfE (2014)

We all use maths every day, often without realising it. We believe that every child can develop the numeracy skills they will need, both at school and throughout their lives.

where children love to learn

RIVER HILL FEDERATION

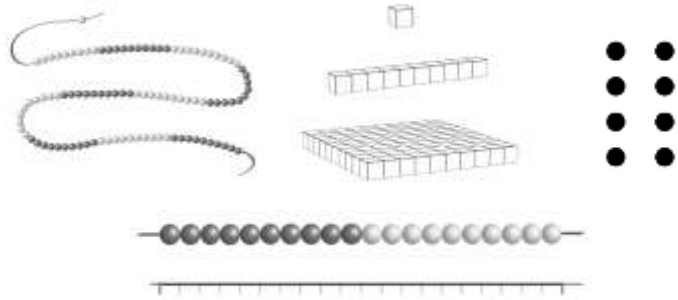
At Dog Kennel Hill School we follow the White Rose Maths Hub's new, more detailed schemes of learning, in years 5 and 6, which supports a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum. In addition to knowing and applying basic number skills, pupils are also required to reason mathematically, solve problems using different strategies and communicate their understanding effectively. Parents help at home is essential in helping children develop and strengthen these skills. Here are some suggestions for parents helping at home:

- ✓ Talk to your children about everyday maths
- ✓ Play maths games with them
- ✓ Value mistakes as learning opportunities
- ✓ Recognise that there is more than one way to work things out
- ✓ Praise children for effort over outcome
- ✓ Avoid saying things like "I'm useless at maths"
- ✓ Encourage your children to solve problems with you.
- ✓ Help them identify different methods or strategies to use in finding solutions and resist the temptation to provide the answer or method. There is usually more than one way to solve a problem, and simpler strategies are often effective.
- ✓ Provide opportunities for your children to explain and justify their thinking.
- ✓ Connect mathematics to real life experiences. Emphasising the mathematics around us helps to make mathematics education relevant.
- ✓ Ask good questions of your children about their homework and be good listeners when your children respond.
- ✓ Encourage children to estimate answers before working out the answer.

In school, children represent numbers in different ways. This supports your child in making deeper connections and applying their learning in different ways.

Conceptual understanding

Your child will use multiple concrete and pictorial representations and make connections between them. A key part of a 'deep understanding' in maths is being able to represent ideas in lots of different ways.



34 864 - 25 423 = 9441
This is an ***equation.***

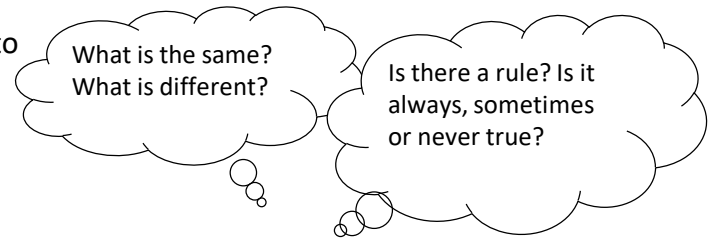
We don't round a number 'up' or 'down', we round it to the ***nearest multiple*** of 10, 100, 1000 etc.

Mathematical language

When asked to explain, justify and prove their ideas, your child is deepening their understanding of a concept. The correct mathematical vocabulary is taught from the outset and communication and discussions are encouraged.

Mathematical thinking

Lots of opportunities are planned for your child to investigate open questions that require them to sort and compare, seek patterns and look for rules. Good questioning, both for and from your child, build a deeper understanding of maths.



The way that pupils speak and write about mathematics has been shown to have an impact on their success in mathematics. Children are encouraged to discuss and reason about their work, using mathematical language.

You can support them at home by asking questions such as the ones below:

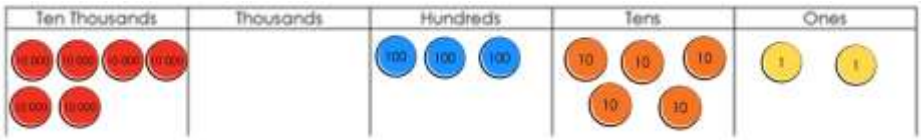
- Spot the mistake / Which is correct?
- True or false?
- What comes next?
- What do you notice?
- What else do you know?
- Can you convince me / Can you prove it?
- What's the same, what's different?

What it looks like

Pupils will continue to work with large integers throughout Year 5 and to calculate with them in a variety of contexts. Their understanding of integer place value will provide a firm foundation to support their understanding of place value when decimal fractions are introduced. In Year 6, pupils will further extend the number system to include numbers up to 10 000 000.

Worked examples

1. Write statements about this number using knowledge of place value relationships.



Children are expected to write numbers in **digits** and **words** with the correct spelling.

This number is 60 352.

This number is sixty thousand, three hundred and fifty-two.

There are three hundreds in this number.

There is a place holder in the thousands place.

There are five tens.

The position of the digit in a number determines its **value.** Where the value is zero (as in the thousands place in this number), it does not mean there are none of that value (i.e. 'no' thousands). The thousands have been regrouped into ten thousands, in this example creating 60 thousands.

2. Write three different 5-digit numbers that can be made with these digits and where the digit '3' has a different value in each number. Compare the value of the digit '3' in two of your numbers.

3	0	1	8	6

18 603
68 301
31 680

Numbers beginning with 0 cannot be included as a 5-digit number. E.g. The number 01368 is a 4-digit number as the 0 has no purpose.

In the number 68 301, the '3' has a value of 300. In the number 31 680, the value of the '3' is one hundred times bigger as it is representing 30 000.

The value of a digit changes depending on the **place** it holds in a number. When talking about **place value** relationships, each digit becomes ten times greater/smaller when it is one place to the left/right.

What it looks like

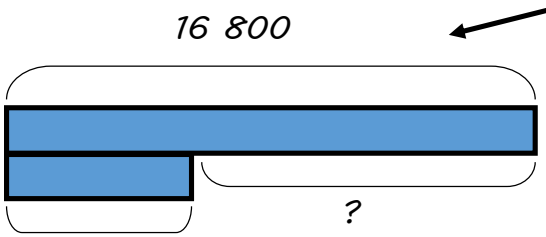
Pupils explore a variety of addition and subtraction calculation strategies, including the formal written layout. Pupils are taught to be flexible, in that they understand there are a range of strategies to solve the same calculation.

In Year 5, pupils will use larger (5-digit and 6-digit numbers) integers to add and subtract. Pupils will calculate with large integers in a variety of contexts throughout Year 5. Their understanding of integer problem solving will provide a firm foundation to support their understanding when calculating with decimal numbers and fractions later in the year. In Year 6, pupils will continue to extend the number system up to ten million.

Worked examples:

16 800 - 5200 =

A)Construct a bar model for this calculation



Bar models support pupils to solve calculations. They are not a method for calculating, but a pictorial representation of the relationship between numbers. They help pupils decide which kind of calculation they need to do to solve a problem.

B) Estimate the answer to this calculation

5200

16 800 ~ 17 000
5200 ~ 5000

17 000 - 5000 = **12 000**

"Rounding to estimate" is a useful strategy used to mentally calculate an estimate but still be relatively accurate. Choosing which multiple of 10, 100, 1000 etc. to round to determines the accuracy of the estimated calculation. Rounding before calculating also assists with checking an answer and reasoning if the answer generated is appropriate.

)Complete the calculation using the following partitioning strategies.

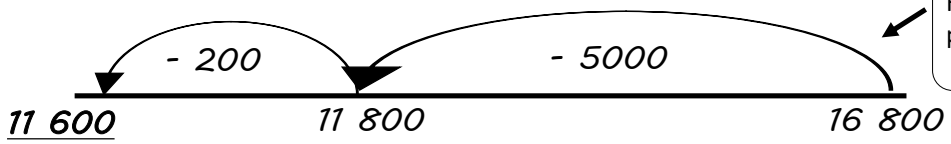
i) Partition both numbers into place value amounts
Ii) Partition one number and count back

i)

16 800	5200
10 000 - 0	= 10 000
6000 - 5000	= 1000
800 - 200	= 600
So, 16 800 - 5200	

Partitioning a number means splitting the number up into smaller parts so they are easier to work with. Partitioning a number helps a child work out large calculations in their head by combining similar numbers (e.g. all the hundreds). Children start by partitioning in place value amounts (ones, tens, hundreds etc.) before exploring the many other ways of partitioning to calculate e.g. 75 as 30 + 45.

ii)



Here, only 5200 has been partitioned (5000 + 200).

What it looks like

Pupils explore a variety of addition and subtraction calculation strategies, including the formal written layout. Pupils are taught to be flexible, in that they understand there are a range of strategies to solve the same calculation.

The 'formal methods' for addition and subtraction are **column addition** and **column subtraction**. Children will be using more efficient formal methods and abstract representations of number.

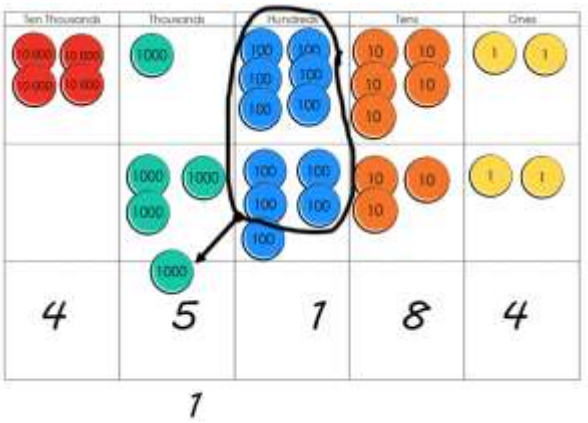
A quick guide to re-grouping in addition

Re-grouping is what some people may refer to as 'carrying' and 'borrowing'. Mathematics Mastery always uses the term re-grouping as it supports the conceptual understanding of the formal methods for addition and subtraction, as modelled below.

Formal Column Method

```
  41652
+  3532
 45184
     1
```

Pictorial representation



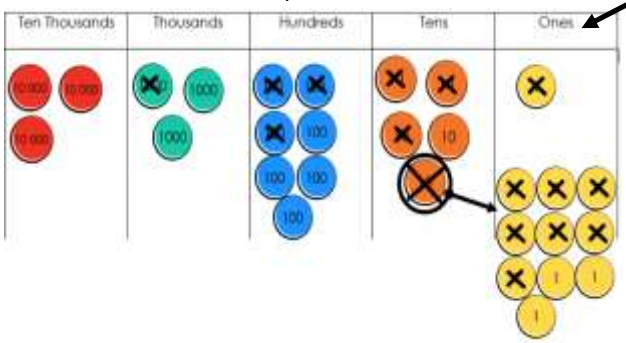
Look at the Hundreds column. Adding six and five hundreds results in 11 hundreds and so re-grouping is necessary. Ten 100s make 1000 and this is added to the Thousands column, leaving one 100. The re-grouped 1000 is added to the four thousands already there.

A quick guide to re-grouping in subtraction

Formal Column Method

```
  3 3 7⁴5¹1
–   1 3 3 8
  3 2 4 1 3
```

Pictorial representation



Look at the Ones column. Re-grouping is needed in order to subtract eight from one. One of the tens can be 're-grouped' back into ten ones to make the calculation 11 - 8. Doing this reduces the number of tens to four (40). Nothing has been removed from the calculation, it has just been reorganised.

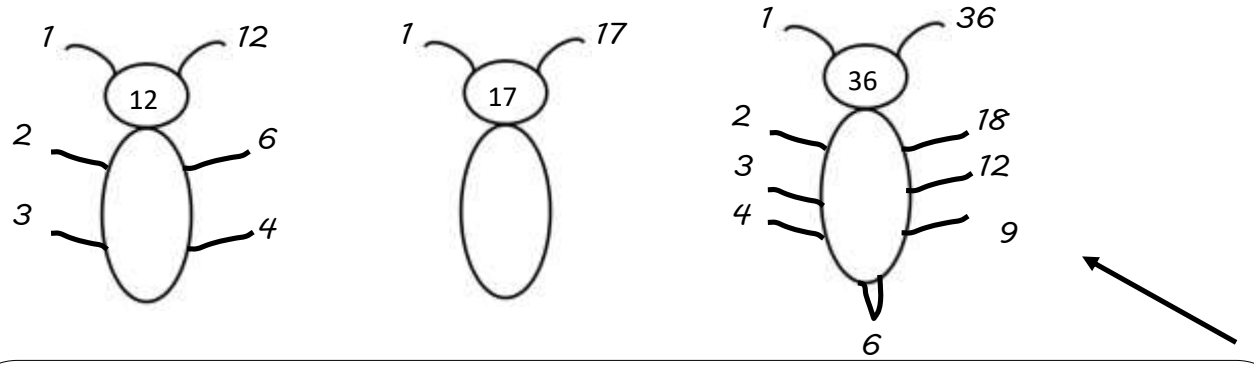
What it looks like

Pupils consolidate their understanding of factors and multiples by finding factor pairs and common factors of two numbers. They are introduced to the terms 'prime number' and 'square number'. The expectation is that pupils are secure with multiplication facts up to 12 × 12.

Pupils will apply this knowledge to develop efficient calculation strategies for multiplication and division. They will solve problems using their knowledge of factors, multiples, squares and cubes. This knowledge will be used when working with equivalent fractions. In Year 6 pupils will find common factors and multiples, use common factors to simplify fractions and use common multiples to express fractions in the same denomination.

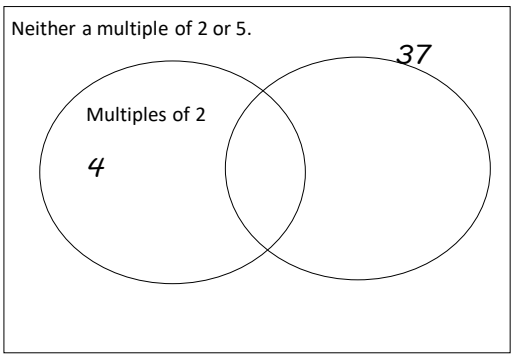
1. Create a factor bug for the following numbers:

12 36 17



Children explore different properties of numbers through their factors. Factor bugs are used as a systematic way to find all factors for a given number. Every number will have the factors one and itself and these are represented by the 'antennae' on the factor bug. Other factors make up the 'legs' of the factor bug which are recorded in pairs. If there are no more factors, the factor bug has no legs and becomes a slug. Slugs are **prime numbers**. Some numbers have a 'stinger'. These numbers are **square numbers** because they have a pair of equal factors, only one of which is represented on the factor bug. Children are asked to compare numbers based on their factors to further explore properties of number. Responses could include comparing the total number of factors ('12 has six factors, 17 has two factors'), the number of even/odd factors ('12 has four factors which are even, 36 has six factors which are even'), numbers that have the same factors ('12 and 16 both have a factor of four') etc.

2. Sort these numbers into the Venn diagram.



4	10	25	37

In this example, a Venn diagram is used to sort numbers into **sets**. There are two sets in this example: 'multiples of 2' and 'multiples of 5'. Where a number is part of both sets they are written in the intersection. A number that does not belong to either set is written outside the diagram. By sorting numbers this way, children are deepening their understanding of properties of numbers.

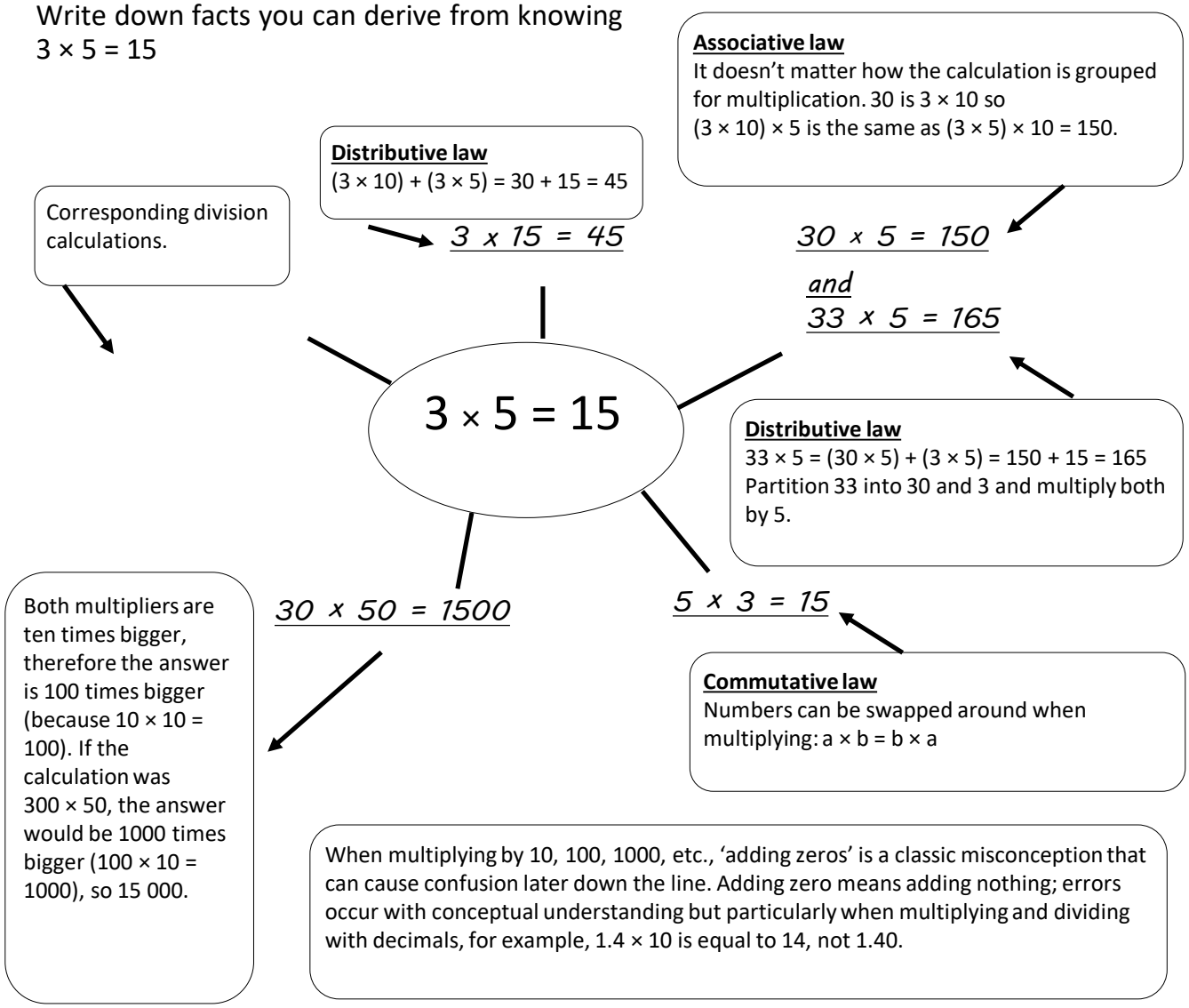
What it looks like

Pupils will multiply and divide whole numbers by 10, 100 and 1000. They will gain a secure understanding of the relationship between this concept and place value. It is assumed that pupils know their multiplication facts up to 12 × 12 and they will learn how to use these facts in a variety of ways to calculate with larger numbers.
Pupils are working towards formal long multiplication and long division by the end of Year 6 and they will use this knowledge to calculate with decimals and fractions.

Children learn to be flexible with calculation strategies and understand that there are multiple ways of solving problems.
To calculate '**mentally**' means deriving an answer without using the formal written method. To begin with, jottings can be used to support visualisation. When children become more fluent they will be able to calculate mentally in their heads. Using **known facts** is a key skill in calculating mentally.

Worked example

Write down facts you can derive from knowing 3 × 5 = 15



When multiplying by 10, 100, 1000, etc., 'adding zeros' is a classic misconception that can cause confusion later down the line. Adding zero means adding nothing; errors occur with conceptual understanding but particularly when multiplying and dividing with decimals, for example, 1.4 × 10 is equal to 14, not 1.40.

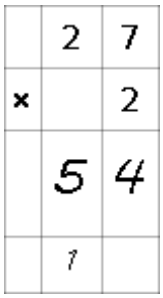
What it looks like

Pupils will multiply and divide whole numbers by 10, 100 and 1000. They will gain a secure understanding of the relationship between this concept and place value. It is assumed that pupils know their multiplication facts up to 12 × 12 and they will learn how to use these facts in a variety of ways to calculate with larger numbers.

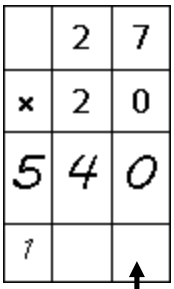
Children are expected to know and use the formal methods of multiplication and division. A mastery approach to learning teaches with conceptual understanding at the core - when working with your child ask them to explain what they are doing and why, instead of just following a procedure.

Worked example

1. Use the formal method of multiplication to solve the following calculations.



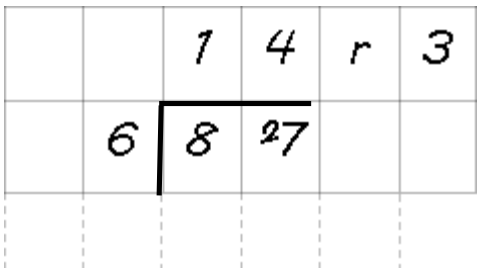
Just like in addition, re-grouping ones, tens and hundreds etc. is sometimes necessary in multiplication (see Unit 2, week 2 for guidance). Here, 2 × 7 = 14, so ten ones have been re-grouped into one ten.



Place holder which makes 27 × 2 ten times bigger.

Multiplying by 20 is the same as multiplying by ten and then by two. When you multiply a number by ten, the digits have to be in a place which is ten times larger. For whole numbers this is achieved by putting a place holder (i.e. '0') in the ones place. Then you can carry out the steps of multiplying by two as before. If you are multiplying by 100, you will need two place holders (00), and thousands would require three (000).

2. *There are 87 children in Year 5.*
How many full teams of six can be made?



14 teams of six can be made.
There will be three children left.

Here, 87 is the **dividend** (the number being divided) and six is the **divisor** (the number you are dividing by). Children will first be taught how to divide using this short method using place value counters in order to eventually articulate it as follows:

- I can divide eight tens into six equal groups of one ten. Two tens are left and cannot be divided equally into six groups.
- Two tens are regrouped into 20 ones. There are now 27 ones.
- I can divide 27 ones into six equal groups of four ones, with three left over. Three ones becomes the remainder.

The context of the question will determine how the remainder is articulated (i.e. if it is left as a remainder or the answer is rounded to the previous or next whole number).

What it looks like

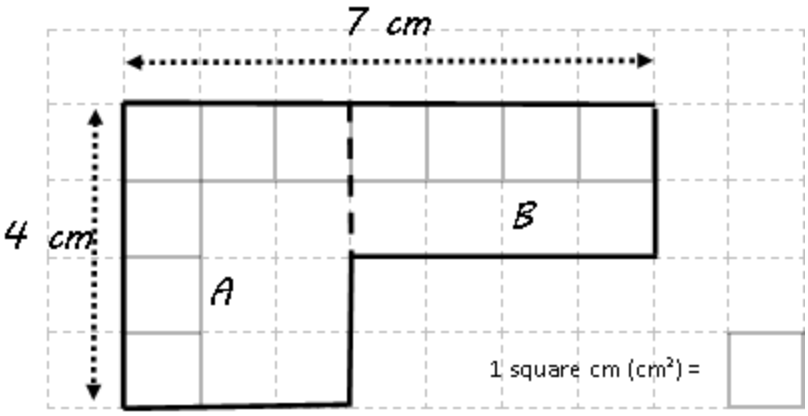
Pupils will calculate and compare the area of rectangles in square centimetres and square metres and link to their understanding of multiplication arrays. They will estimate the area of non-rectilinear shapes that are presented on a grid by counting squares and parts of squares. Pupils are introduced to volume using 1 cm^3 blocks to build cuboids and will develop an ability to estimate volume and capacity.

Pupils will use their understanding of calculating measures to work with simple formulae where appropriate. They will find the area of more complex shapes such as parallelograms and triangles. They will be introduced to using mm^3, m^3, and km^3 in calculating, estimating and comparing volume.

Perimeter is a measure of length, for example the distance around a field or the total length of all the sides of a pentagon. Length is measured in **one dimension**, e.g. cm, m, km.

Area is measured in square units, for example cm^2, articulated as 'square centimetres', or 'centimetres squared'. 'Squared' represents the **two dimensions** of a shape to calculate its area. Area is the amount of surface something covers. For example, the area of a field is calculated by multiplying the two dimensions of length and width.

Area = length × width

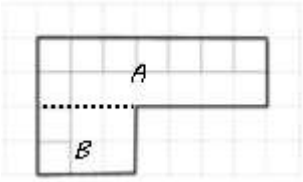


Area of rectangle A = 3 x 4 = 12 cm^2
Area of rectangle B = 4 x 2 = 8 cm^2
Area of shape = 12 cm^2 + 8 cm^2 = 20 cm^2

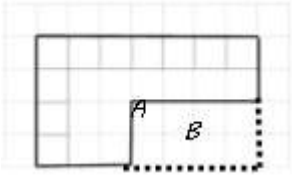
Perimeter = 7 + 2 + 4 + 2 + 3 + 4 = 22 cm

To find the area of this shape, two rectangles have been created. The area of each rectangle is calculated and then the two are combined to find the total area. There are other ways that this shape could be split.

Area = A + B



Area = A - B
(where A = the whole shape).



This is a non-rectilinear shape. Whole squares are counted and part squares are combined to form approximate whole squares.

= 1 square cm (cm^2)

There are 10 whole squares and parts of squares that create approximately 3 whole squares.
The area is approximately 13 cm^2.

What it looks like

Pupils will complete, read and interpret data presented in charts, including timetables. They will solve a range of problems using data presented in this way, including calculating time intervals using both the 12-hour and 24-hour clock.

Data charts can take many forms but their purpose is to allow information to be easily understood. Their layout is designed to display data in an organised way.
There is often confusion between rows and columns which can lead to difficulties when describing charts. Making connections to other meanings of the words can help pupils recall that rows are horizontal (rows of houses, rows of flowers) and columns are vertical (like the pillars that hold up buildings).

A timetable is a table of information showing when things will happen. Reading and interpreting timetables is a useful life skill that can be put to use in a range of practical situations.

Calculating time intervals

To complete the information on this timetable, the information available needs to be read and interpreted and then intervals of time need to be calculated. Representing these calculations on empty number lines can help keep track of the steps.

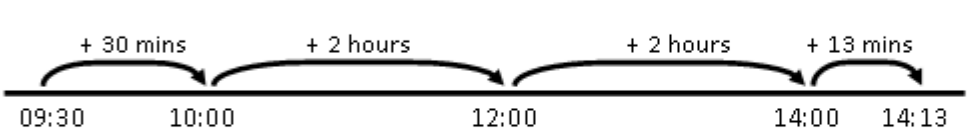
? ***For the train leaving at 09:30, what is the duration of the journey?***

London St Pancras	06:18	07:01	08:31	09:22	10:01
Ashford International	06:55	-	-	09:55	-
Paris Gare du Nord	09:47	10:17	11:47	12:47	13:17

? ***At what time did the last train on the chart leave London?***

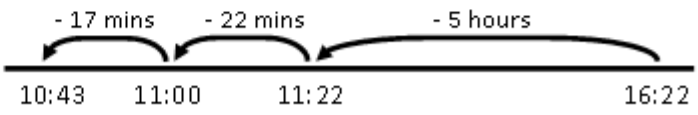
Make use of the many opportunities to use table, charts and timetables. Create timetables for your daily or weekly routines. Look at timetables and bus stops and train stations. Use online websites together to book real or imaginary journeys, exploring the different route options and times available.

Train times from London to Edinburgh		
Depart	Arrive	Duration
09:30	14:13	
10:00		4h 20m
	16:22	5h 39m



I need to find the difference between 09:30 and 2:13 p.m. I could count forwards or backwards.

I need to work out what time it was 5 hours and 39 minutes before 4:22 p.m. I will jump back to work it out.



Try this at home – more ideas

Shape
You could take your child on a 'shape walk' around an area such as Cardiff Bay to see what 2D and 3D shapes they can spot. They should be able to spot different sorts of angles, lines of symmetry and parallel and perpendicular lines.

Time
Make sure that there are both traditional and digital clocks around the house for your child to practise reading the time to the nearest minute.
Use timetables and TV guides that use 24 hour clock times.
Give your child lots of time problems to solve. E.g. "Tea will be 45 minutes. What time will it be ready?"

Money
Get your child to work out holiday spending money by using conversion charts in newspapers to convert pounds to foreign currency.
Go shopping in the sales (fun for all!) – what is the sale price if there is 10% off?
Give your child an Argos catalogue. Let them go on a 'fantasy spending spree'. What would they buy with £20 and how much change (if any!) would they have?

Measures
Cooking is a great way for your child to practise weighing and measuring in grams and kilograms. It's a terrific way to learn to accurately read scales and measure out capacities in litres and centilitres. Following recipes will also make them familiar with imperial measurements such as pints, pounds and ounces

Multiplication tables
By the time your child reaches Years 5 and 6 it is hoped that they will be familiar with all of their times tables. They should learn to recite them in order as well as give 'quickfire' answers when they are jumbled up (e.g. "What are seven eights?", "How many nine's make 81?"). This can be done on car journeys or whenever there is a spare 5 minutes.
Playing **Time Tables Rock Stars** is a great way for them to learn.