How maths is taught at Holy Family - Key Stage 2

01

We aim for pupils to develop a mastery of maths by allowing them to develop a long, deep and secure understanding of mathematical concepts.

02

To develop a deep understanding of calculation, children need to understand the structure of calculation, not just the procedure.

03

A secure understanding of each calculation allows pupils to develop secure mental methods.

This means they move on once they've mastered a concept.

Place Value

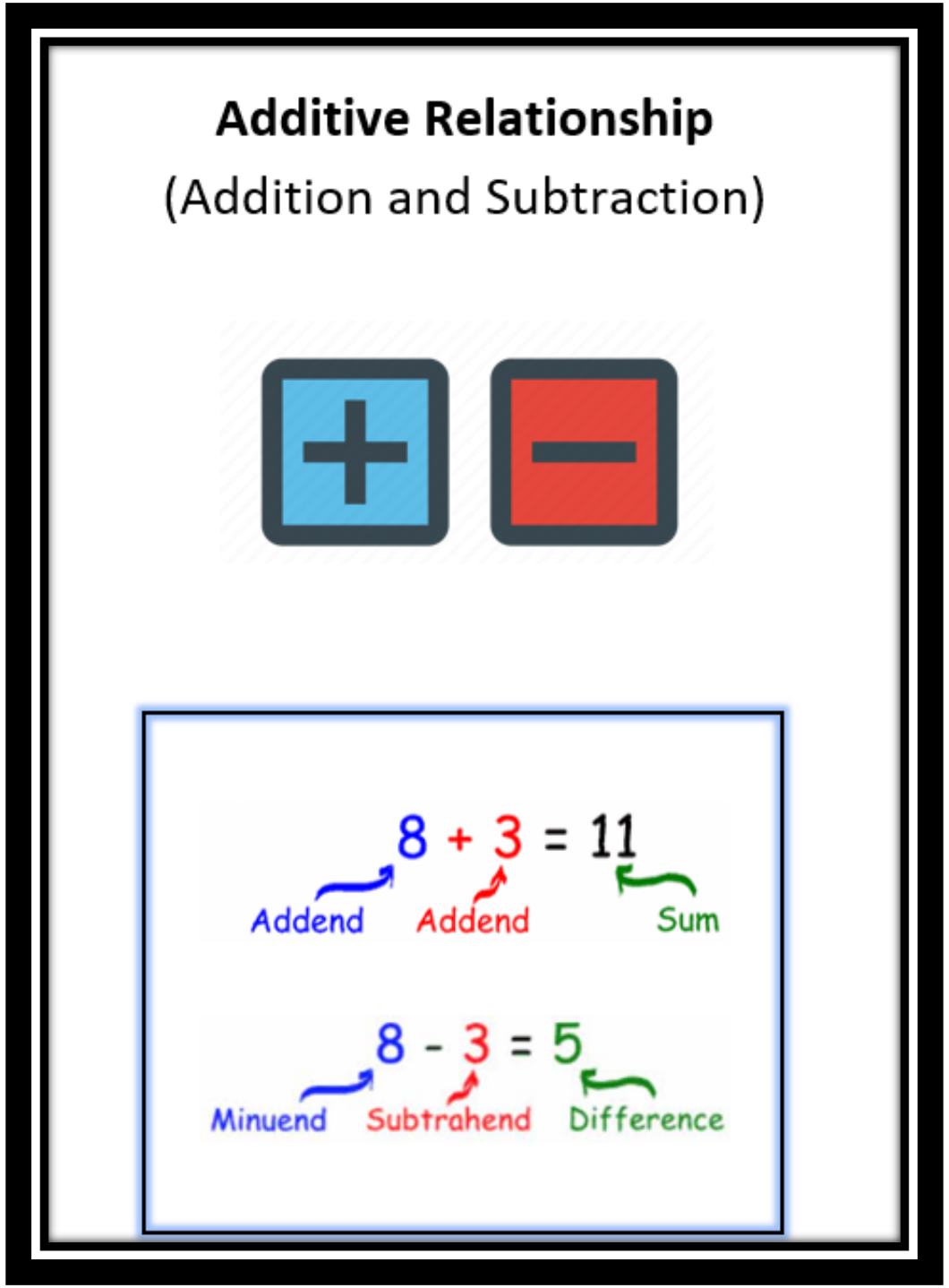
In order for pupils to be proficient in calculation, they need to have a secure understanding of place value - the position of each digit in a number.

Y1 - to 20
Y2 - to 100
Y3 - to 1000
Y4 - to 10,000
Y5 - tenths and hundredths
Y6 - to 10,000,000

Skills taught

- Recognising the value of each digit
- Composing and decomposing numbers
- Locating and placing numbers on a number line
- Comparing and ordering numbers
- Finding the next multiple
- Rounding (KS2)

All this supports a deep and conceptual understanding of number in order to aid calculation.



In KS1, and part of Year 3, pupils will be taught to understand the additive relationship.

This is the concept that addition and subtraction are inverses of each other and relate to each other.

It is important the pupils understand and apply the different structures of addition and subtraction.

Fluency of number facts within 20

All pupils in Reception and KS1 take part in the Mastering Number scheme. This helps pupils to 'master' all number facts within 20.

One factor of poor attainment in KS2 is counting with fingers.
All pupils in KS1 should leave knowing every number fact within 20, to help with calculation in KS2.

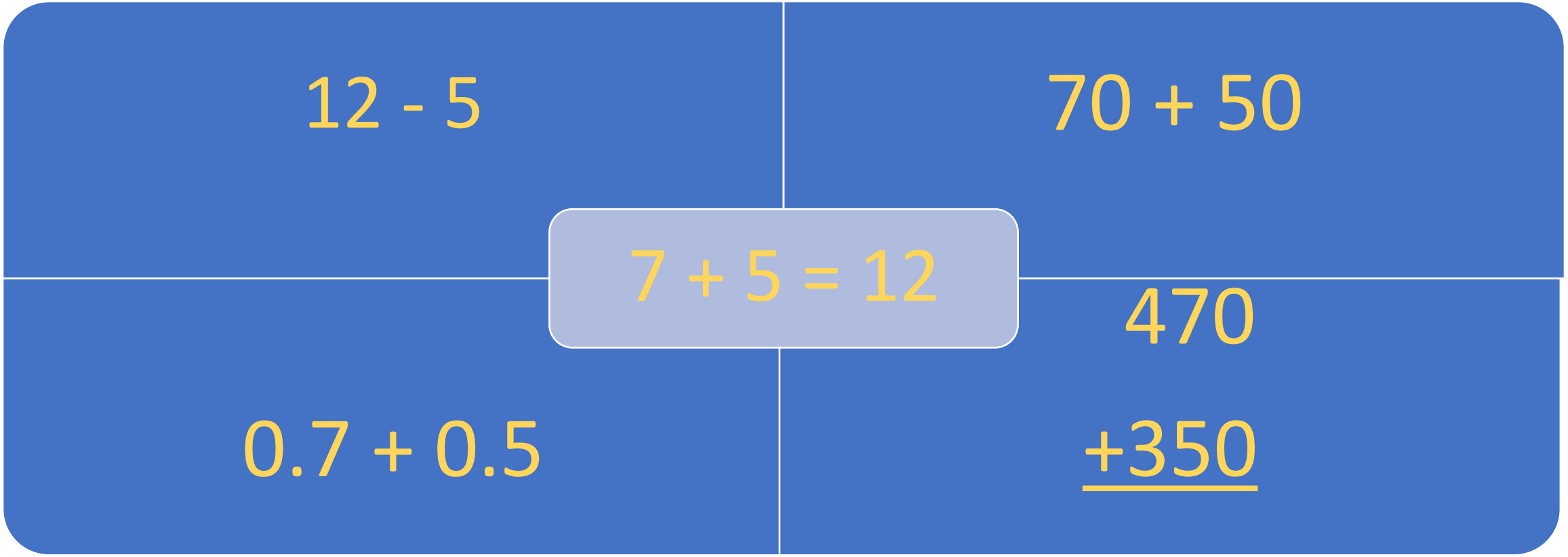
If pupils don't have this knowledge, many parts of KS2 maths become much more difficult.

+	0	1	2	3	4	5	6	7	8	9	10
0	0 + 0	0 + 1	0 + 2	0 + 3	0 + 4	0 + 5	0 + 6	0 + 7	0 + 8	0 + 9	0 + 10
1	1 + 0	1 + 1	1 + 2	1 + 3	1 + 4	1 + 5	1 + 6	1 + 7	1 + 8	1 + 9	1 + 10
2	2 + 0	2 + 1	2 + 2	2 + 3	2 + 4	2 + 5	2 + 6	2 + 7	2 + 8	2 + 9	2 + 10
3	3 + 0	3 + 1	3 + 2	3 + 3	3 + 4	3 + 5	3 + 6	3 + 7	3 + 8	3 + 9	3 + 10
4	4 + 0	4 + 1	4 + 2	4 + 3	4 + 4	4 + 5	4 + 6	4 + 7	4 + 8	4 + 9	4 + 10
5	5 + 0	5 + 1	5 + 2	5 + 3	5 + 4	5 + 5	5 + 6	5 + 7	5 + 8	5 + 9	5 + 10
6	6 + 0	6 + 1	6 + 2	6 + 3	6 + 4	6 + 5	6 + 6	6 + 7	6 + 8	6 + 9	6 + 10
7	7 + 0	7 + 1	7 + 2	7 + 3	7 + 4	7 + 5	7 + 6	7 + 7	7 + 8	7 + 9	7 + 10
8	8 + 0	8 + 1	8 + 2	8 + 3	8 + 4	8 + 5	8 + 6	8 + 7	8 + 8	8 + 9	8 + 10
9	9 + 0	9 + 1	9 + 2	9 + 3	9 + 4	9 + 5	9 + 6	9 + 7	9 + 8	9 + 9	9 + 10
10	10 + 0	10 + 1	10 + 2	10 + 3	10 + 4	10 + 5	10 + 6	10 + 7	10 + 8	10 + 9	10 + 10

Making Connections

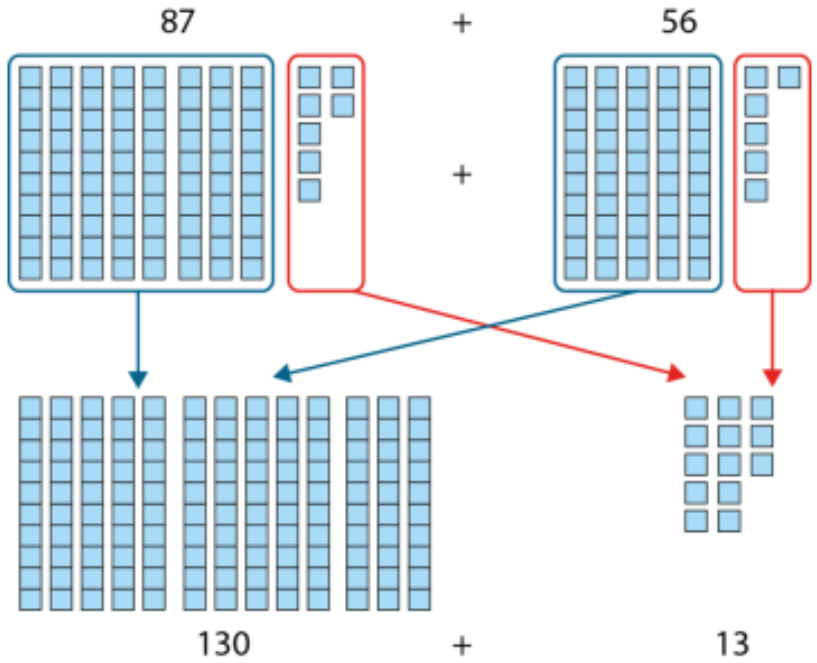
Knowing this KS1 fact to automaticity means calculations in KS2 become much easier to understand.

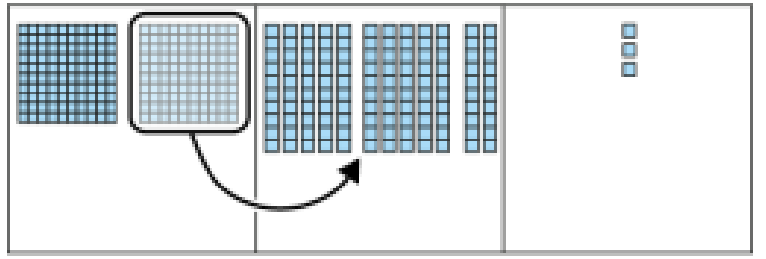
If I know 7 + 5, then I also know…



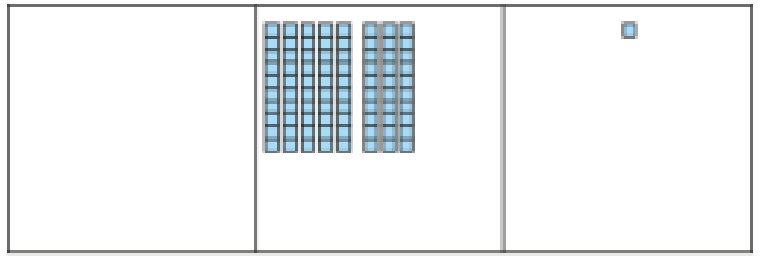
Building up to columnar method

Dienes are a resource which help pupils to make the connection between place value and addition/subtraction. Pupils will be taught to use the rods alongside columnar method to 'unpick' what is happening to allow them to understand this written method.





100s	10s	1s
~~2~~ 1	1 2	3
− 1	4	2



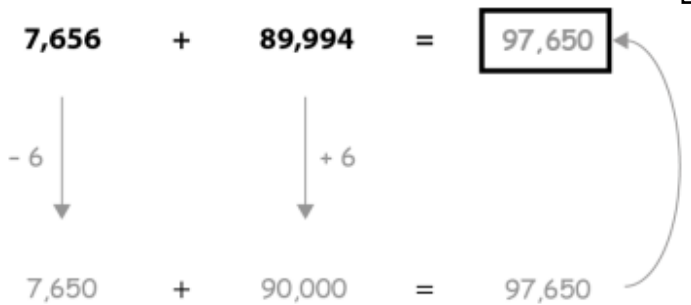
100s	10s	1s
~~2~~ 1	1 2	3
− 1	4	2
0	8	1

The importance of mental strategies

Mental strategies hold as much weight as written strategies (columnar method). Mastery of these shows a real understanding of the additive relationship.

Redistribution

Redistribution is where we adjust the calculations to make it easier to solve.

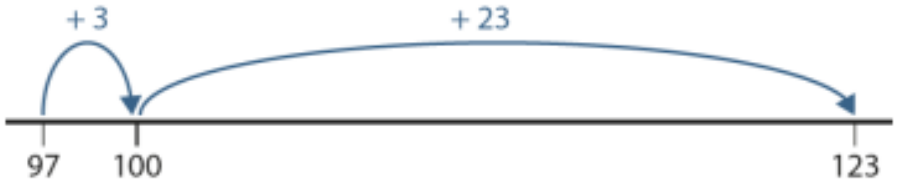


Using place value

$$370 + 260 = 37 \text{ tens} + 26 \text{ tens}$$
$$= 63 \text{ tens}$$
$$= 630$$

Number line (adding on to find difference)

125 - 97



Adam wants to use a mental method to calculate 182 – 97

He starts from 182

Here are some methods that Adam could use.

Tick the methods that are **correct**.

add 3 then subtract 90 ☐

subtract 100 then add 3 ☐

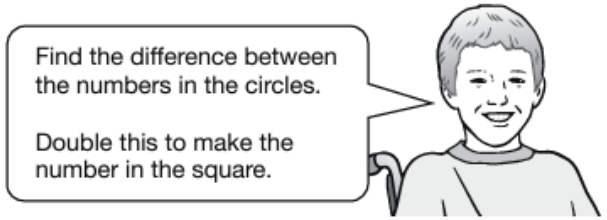
subtract 7 then subtract 90 ☐

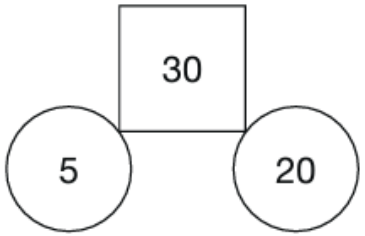
subtract 3 then subtract 100 ☐

2 marks

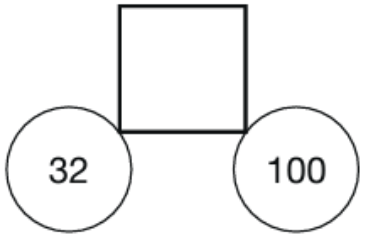
This is an example KS2 SATs question. It requires children to have a good understanding of mental strategies in the additive relationship.

William says the rule for this diagram.

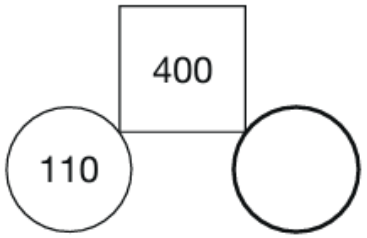




Use the same rule to write the missing numbers below.



1 mark

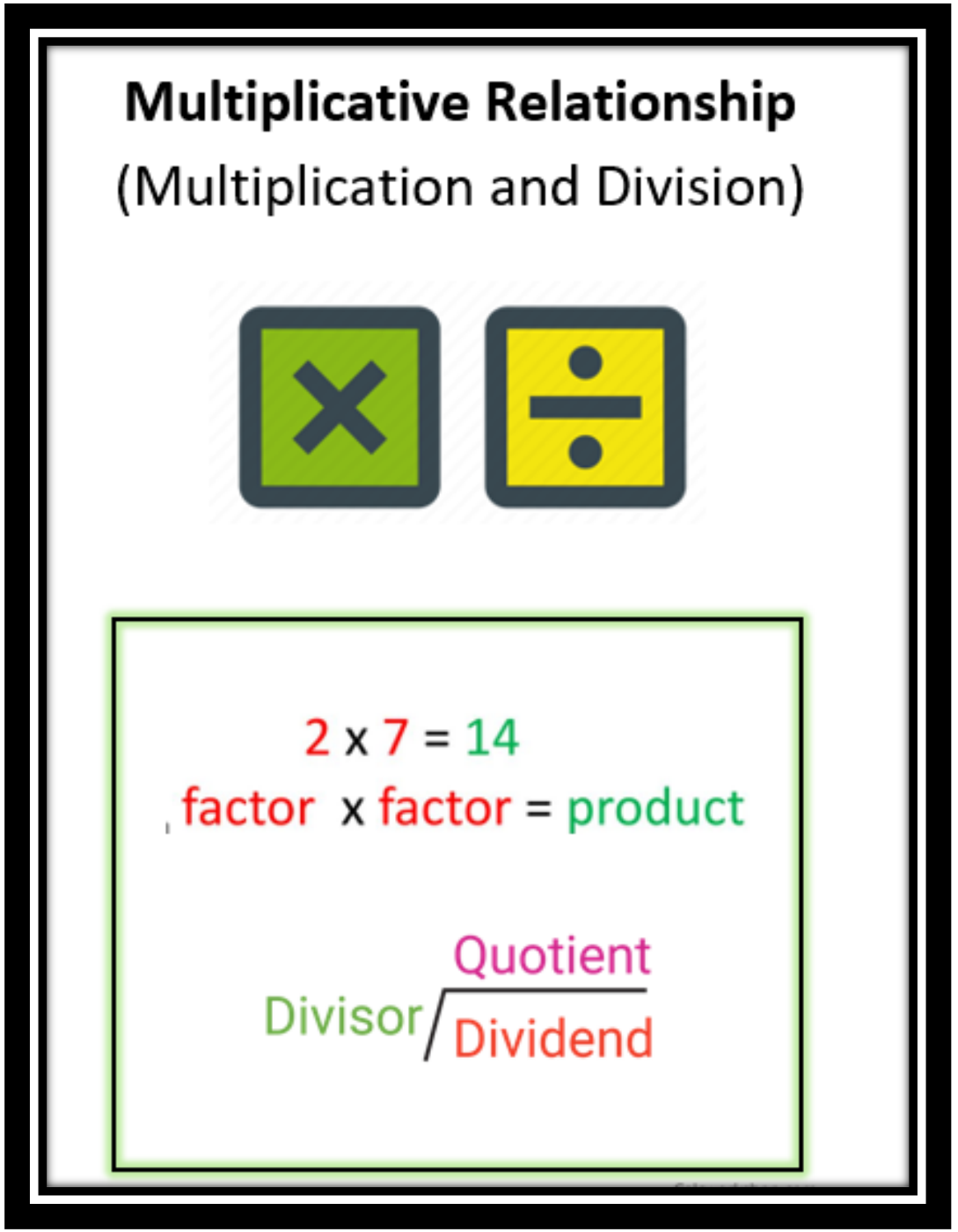


1 mark

Another example KS2 SATs question. It requires children to have a good understanding of the additive relationship.

The multiplicative relationship works the same as the additive. Multiplication is the inverse of diversion and vice versa.

At KS2, this relationship is explored in much more detail. In order to make understanding this relationship easier, times tables are a key factor…



Ashley Down Times Tables - KS2

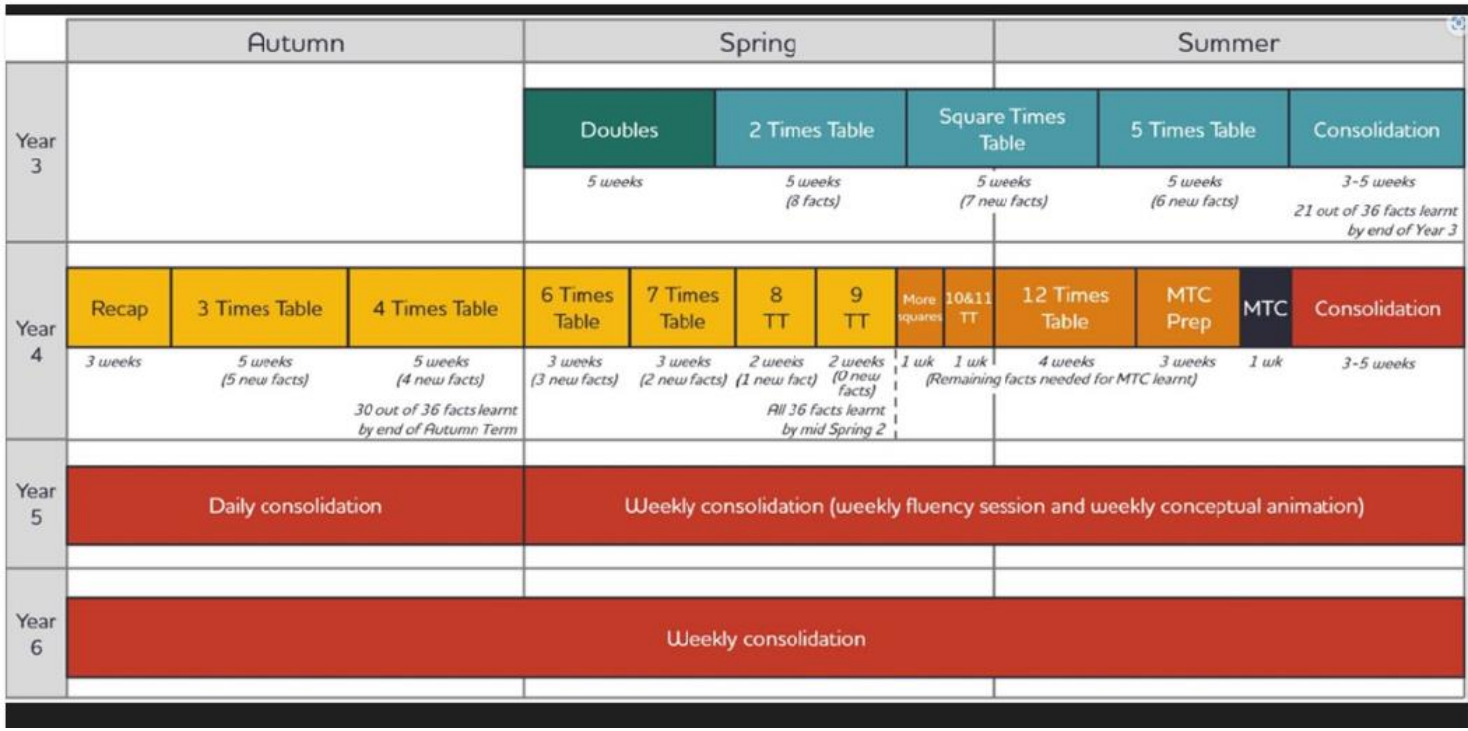
- We want our children to LOVE maths and SUCCEED within the maths curriculum.
- Time and time again, our children who can recall facts enjoy and are able to secure the maths curriculum easier than the children who can't recall these facts.
- The reality is the children who can't recall these facts inevitably fall behind because these facts are the building blocks of so many other aspects of maths.
- There are not many facts: 36 'building block' facts (up to 9 x 9). There are roughly 39 weeks in a school year, equating to essentially 1 fact a week, every year. It is achievable for the vast majority of children to learn these facts.

The importance of times tables!

X2	X3	X4	X5	X6	X7	X8	x9
2 x 2							
3 x 2	3 x 3						
4 x 2	4 x 3	4 x 4					
5 x 2	5 x 3	5 x 4	5 x 5				
6 x 2	6 x 3	6 x 4	6 x 5	6 x 6			
7 x 2	7 x 3	7 x 4	7 x 5	7 x 6	7 x 7		
8 x 2	8 x 3	8 x 4	8 x 5	8 x 6	8 x 7	8 x 8	
9 x 2	9 x 3	9 x 4	9 x 5	9 x 6	9 x 7	9 x 8	9 x 9

Y3 – 21 facts learnt
Y4 – 15 facts learnt
36 facts in total

This shows the 36 facts children need to learn, if we always start with the largest factor.



A rough timetable of when pupils will learn each times table.

Key principles in how we learn times tables

1) Learn each number sentence as a memorised phrase by repeating the sound pattern out loud.
2) Learn each fact one way round only. 4 x 6 = becomes six fours are twenty-four. We always state the larger number first. The children very quickly become attuned to this and it just helps in the learning process.
3) Division states the fact they learn. e.g. 24 ÷ 4 = ? becomes ‘mmm’ fours are twenty-four… six fours are twenty-four.
4) Learn one new fact at a time. We will look at 6 x 6 = 36 one day. Then 7 x 6 = the following day.
5) Don’t think. We want them to become known facts. This means we don’t count in our times tables!

Week	Date	Number of facts I know (/36)	Number of facts still to learn (/36)	Facts I will learn this week
1				
2				
3				
4				
5				
6				

For the majority of pupils, this approach will allow them to learn their tables to automaticity.

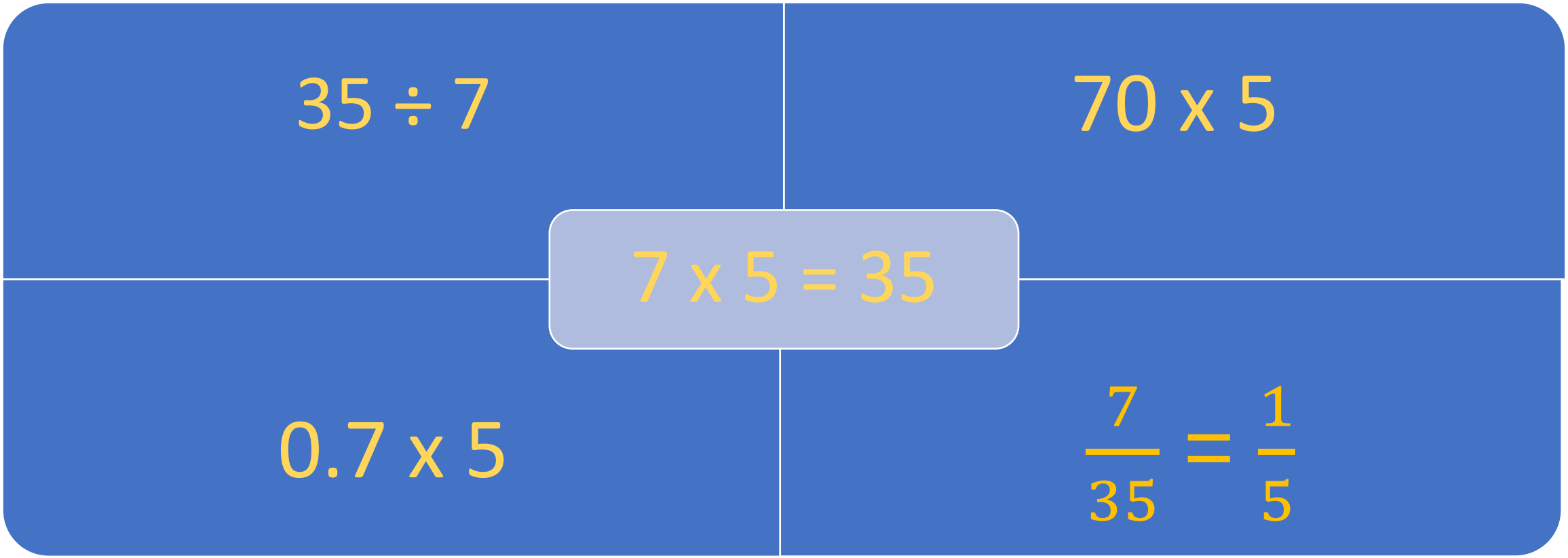
For those, who for whatever reason, fall behind, intervention will allow them to practise the facts they have not learnt.

This sheet may be sent home to show them what tables they need to focus on. They can be practised at home by simply repeating it again and again!

Making Connections

If I know 7 x 5 = 35, then I also know…

Just like with additive facts, knowing times tables to automaticity makes other areas of maths less demanding.



Write the missing number to make this **division** correct.

$$15{,}000 \div \square = 75$$

1 mark

Examples from KS2 SATs which show how pupils need to have a good understanding of the multiplicative relationship.

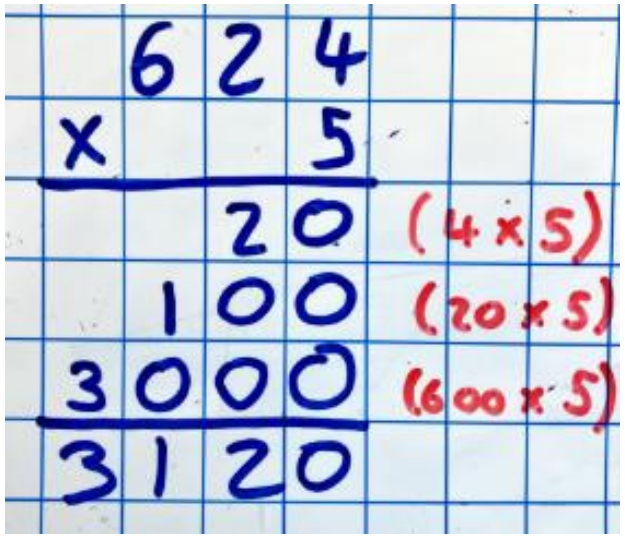
Write the missing number to make this calculation correct.

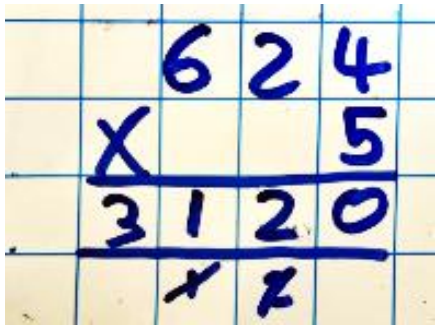
$$754 \times 6 + 754 \times 3 = 754 \times \square$$

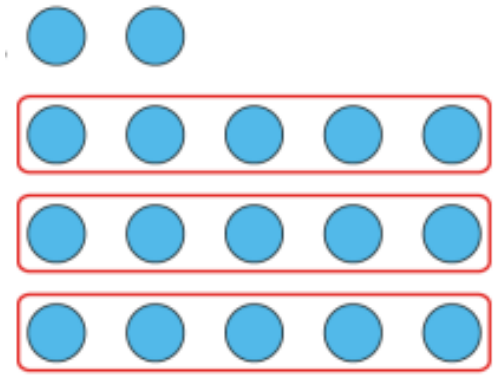
1 mark

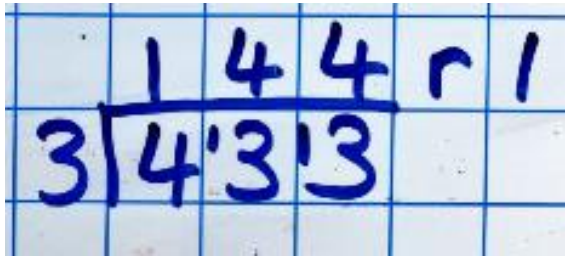
Written methods – Y5

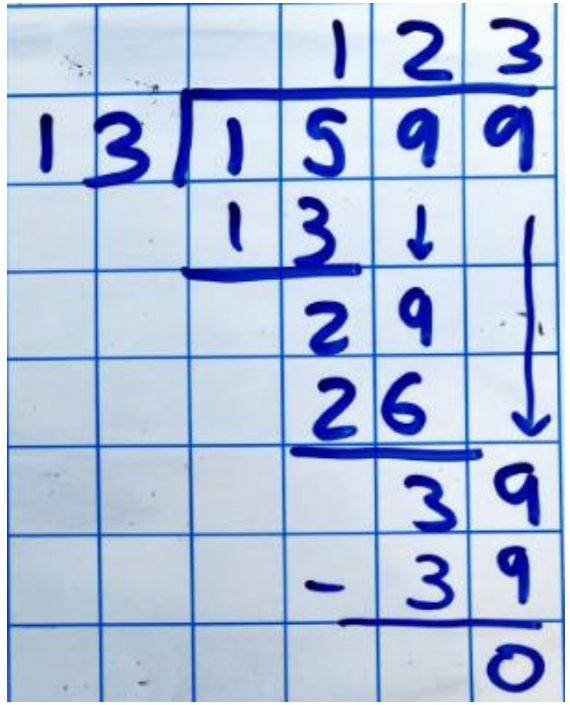
Pupils will eventually learn written methods for multiplication and division for more complicated questions.











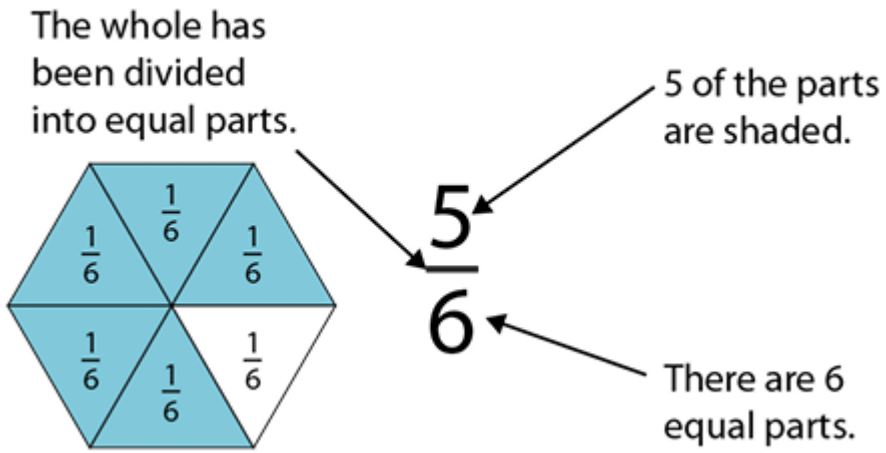
Fractions

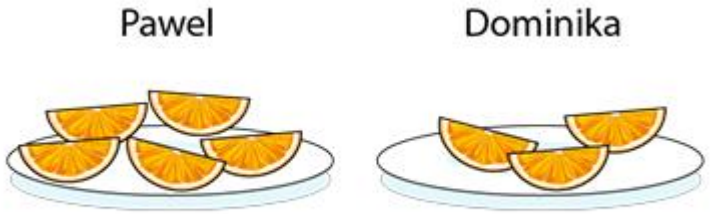
A critical part of KS2 is building a strong understanding of fractions as parts of wholes. This table shows when key learning points are introduced across the 4 years – each building on each other.

	Learning Point	Introduced
Within one whole	Use and understand fraction notation (as parts of a whole)	Y3
	Find fractions of amounts	Y3
	Locate fractions on a number line	Y3
	Add and subtract fractions with same denominator	Y3
Above a whole	Convert between mixed numbers and improper fractions	Y4
	Add, subtract and locate mixed numbers and improper fractions	Y4
	Find fractions of amounts	Y5
	Find equivalent fractions	Y5
	Simplify fractions	Y6
	Compare fractions	Y6
	Calculate with fractions (+, -, x and ÷)	Y6

Important concepts to grasp

Fractions as parts of a whole





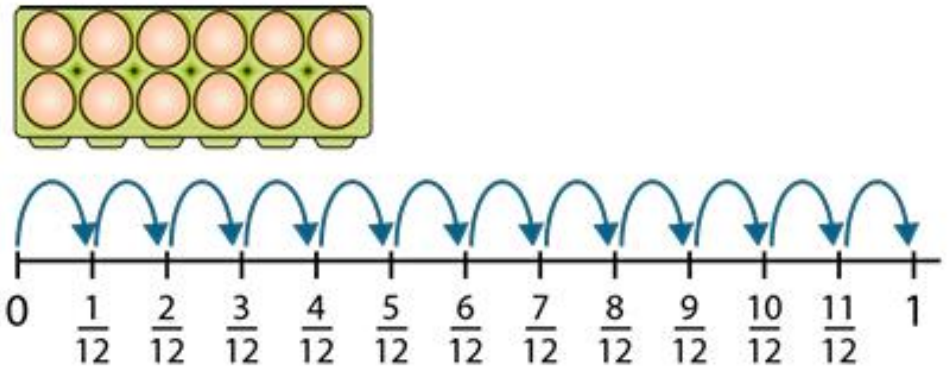
- *'The orange is divided into eight equal parts.'*

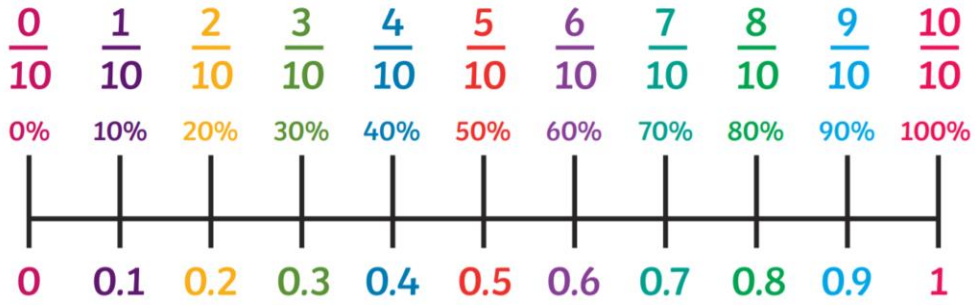
Every learning point comes backs to two key concepts:

(1) Fractions are part of wholes that we can see in the real world.

(2) Fractions are part of the number system and can be placed in it.

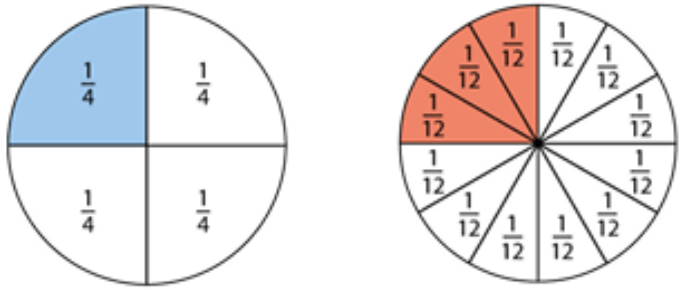
Fractions as numbers





Referring to these basic concepts consistently means later calculations make more sense.

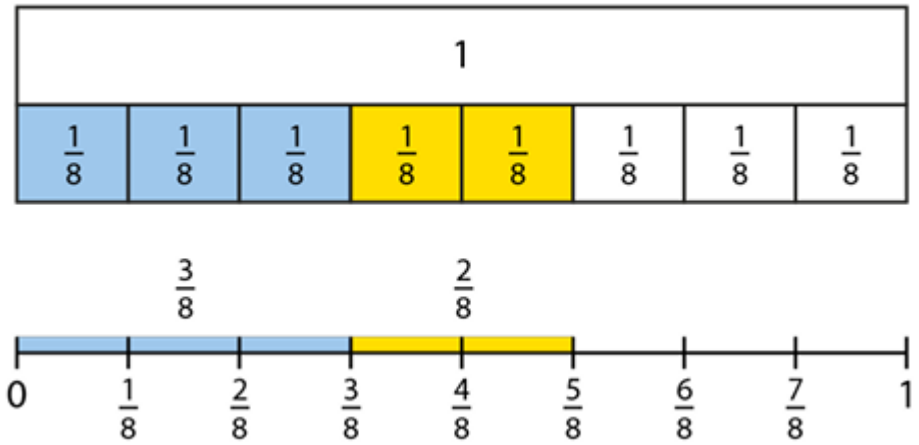
Equivalent fractions



$$\frac{1}{4} = \frac{3}{12}$$

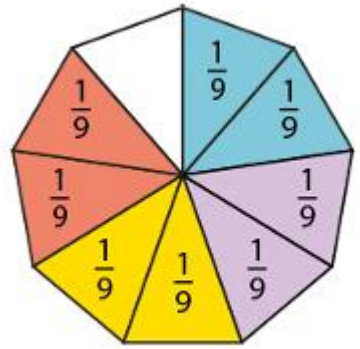
These are equivalent because they take up the same **part of the whole.**

Adding/subtracting



When we add fractions of the same denominator, we are getting closer to the whole (one)

Multiplying by a whole



$$\frac{2}{9} + \frac{2}{9} + \frac{2}{9} + \frac{2}{9}$$

$$4 \times \frac{2}{9}$$

Multiplying fractions by a whole number is the same as repeated addition.

How can I help at home?

<u>Prioritising number facts if they are not secure</u>

- Number bonds to 10 and 20,
- Doubles and halves
- Times tables

Avoid jumping ahead and teaching 'quick tricks' or methods – this makes flexible thinking difficult for them, and less likely to make connections.**– particularly with fractions**

Ask your child to show you what they have done in school throughout their learning journey.