Knowledge Organisers – Number - Addition and Subtraction

What are these?

The following knowledge organisers are developed based on the NCTEM progression documents for number and place value.

Every effort has been made to provide the learners with support for learning and understanding the essential skills in each aspect of number and place value.

Children should learn to and understand the key vocabulary and should be utilising this in varying contexts.

The teacher must use opportunities to link these facts to other areas of maths and other areas of the curriculum.

Simply providing the children with these organisers will not support them in their learning. Their use needs to be specifically taught and the children must see these as a learning aid.

The knowledge organisers are developed to be double sided with each child having their own copy (preferably printed on card) which they annotate to help support them further and or use to track their progress. The number on each knowledge organiser relates to the year group which the content relates to.

Why use them?

Working memory - This is where thinking actually happens. It has a very finite capacity; it can only hold and process about four different items at a time. If it receives too much it fails.

Long-term memory - Long-term memory has huge – almost infinite – capacity. It is here that we store our knowledge of facts and procedures. The goal is to stock our long-term memories with knowledge in a well organised, easily retrievable way and make recall of key aspects automatic. This frees up the working memory for new information.

Cognitive load - This is the term used in cognitive science to describe how much capacity something takes up in the working memory. Cognitive overload is what happens if too many demands are placed on working memory at once.

The aim of the knowledge organisers is to improve the speed with which information is stored in the long term memory, thus improving the learners ability to develop deep learning in more areas of the curriculum.

How can these be used?

There are several ways that you can use knowledge organisers with children.

1. Send the previous knowledge organiser home with the children before the start of a new topic to encourage discussion and recap of prior learning.

2. Display an enlarged copy of the knowledge organiser on the working wall, encourage children to add information (particularly different visual representations) around it during the topic.

3. All children to have a card copy of the knowledge organiser which is always available with their bank of other knowledge organisers. The footers and headers are purposely blank as children should annotate their individual knowledge organisers to support them further eg starring any aspects that they find tricky, adding any STEM sentences which they struggle with.

4. During lessons learners can be directed to question each other on a specific area (in a short time frame before swapping over).

5. Vocabulary prompts – use the vocabulary bank to insist the ALL children are supported in utilising the correct topic related vocabulary.

6. Teachers can challenge children to find the appropriate information at speed and put their finger on the relevant place on the organiser – children can also complete these task in pairs with a short time scale.

How are they not to be used?

These provide a brief overview of what the children should securely know by the end of that year group. They should NOT be utilised as an end point and links must be made to other areas of learning.

They are not the planning for the topic.

Currently, these knowledge organisers, are a starting point and will need to be adapted over time in response to the needs of the children.

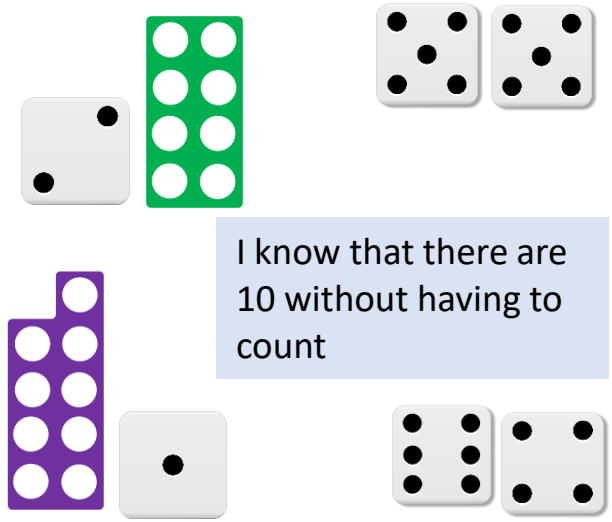
Top Tip: Number bonds, times tables, measurement conversions should all go into long-term memory.

NUMBER BONDS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
represent and use number bonds and related subtraction facts within 20	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100				
MENTAL CALCULATION					
add and subtract one-digit and two-digit numbers to 20, including zero	add and subtract numbers using concrete objects, pictorial representations, and mentally, including: * a two-digit number and ones * a two-digit number and tens * two two-digit numbers * adding three one-digit numbers	add and subtract numbers mentally, including: * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds		add and subtract numbers mentally with increasingly large numbers	perform mental calculations, including with mixed operations and large numbers
read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot				use their knowledge of the order of operations to carry out calculations involving the four operations

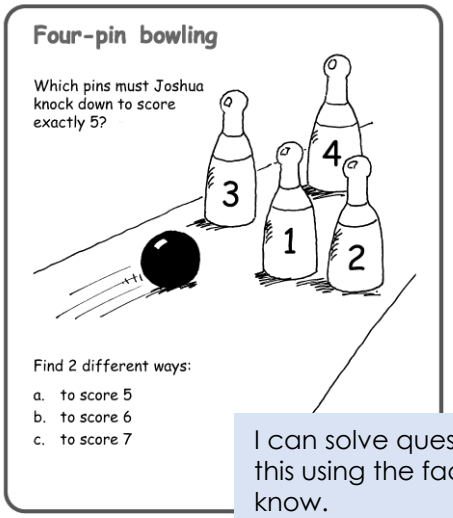
WRITTEN METHODS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs **(appears also in Mental Calculation)**		add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	
INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS					
	recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	estimate the answer to a calculation and use inverse operations to check answers	estimate and use inverse operations to check answers to a calculation	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

PROBLEM SOLVING					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ - 9	solve problems with addition and subtraction: * using concrete objects and pictorial representations, including those involving numbers, quantities and measures * applying their increasing knowledge of mental and written methods	solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
	solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (copied from Measurement)				Solve problems involving addition, subtraction, multiplication and division

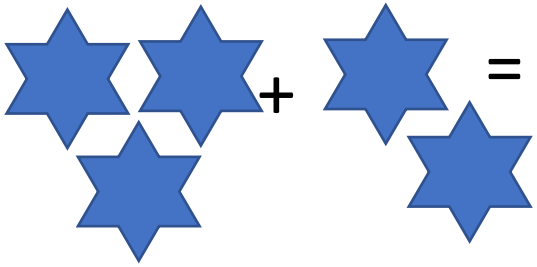
Year 1 – Autumn Block 2



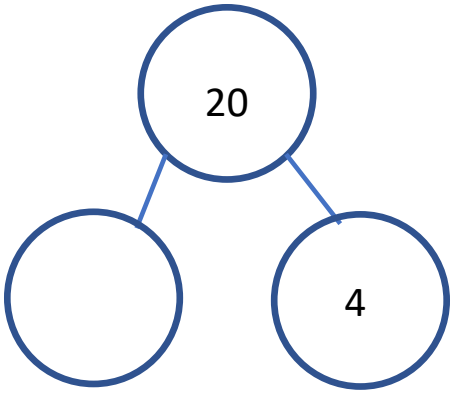
I know that there are 10 without having to count



I can solve questions like this using the facts that I know.



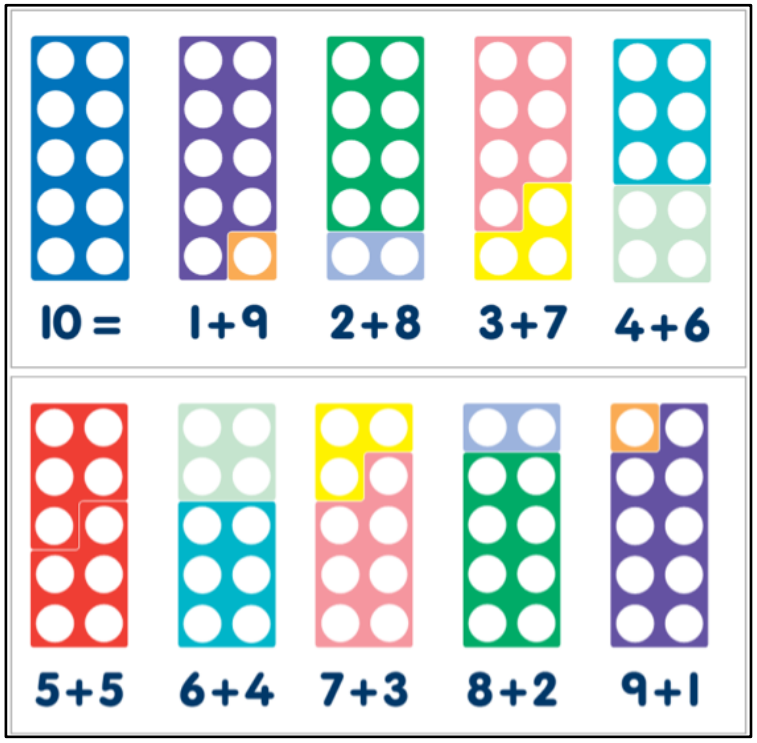
3 + 2 =
2 + 3 =
5 = □ + 3
5 = □ + 2

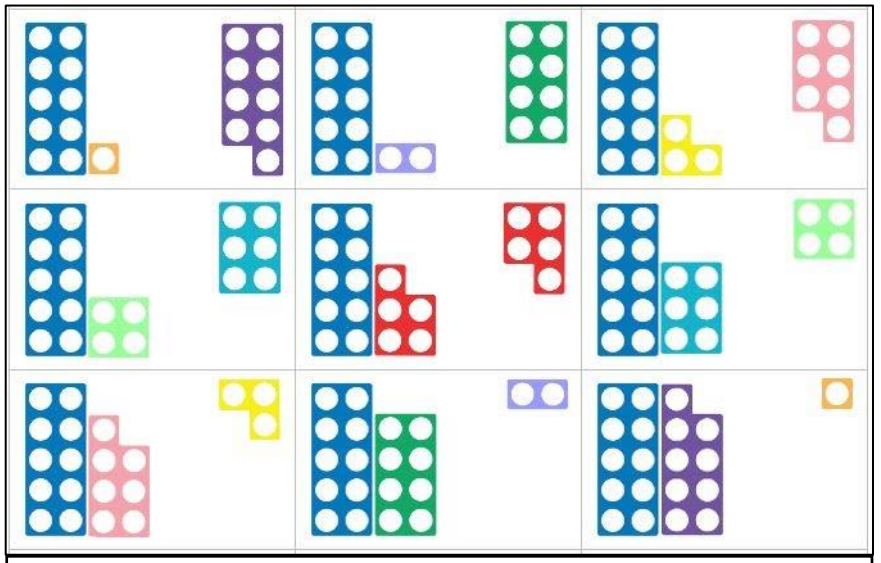


Part whole model

Vocabulary

add	addition
Plus	More
Make	Sum
total	take away,
subtract	minus
Less	difference
Equals	Makes
Total	balances





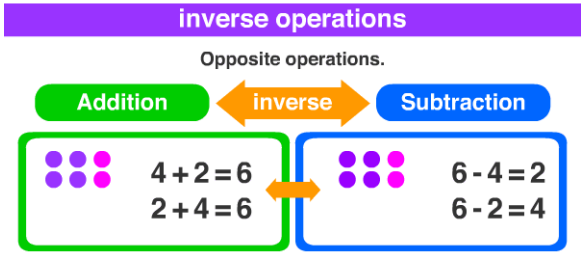
11 + 9 = 20 12 + 8 = 20 13 + 7 = 20
14 + 6 = 20 15 + 5 = 20 16 + 4 = 20
17 + 3 = 20 18 + 2 = 20 19 + 1 = 20

How do you know this?

I think this because …
The strategy I used was …
I agree with the answer because …
I disagree with the answer because …

I can prove it by …
I can model it by …
If the numbers were larger then …
I decided on this strategy because …

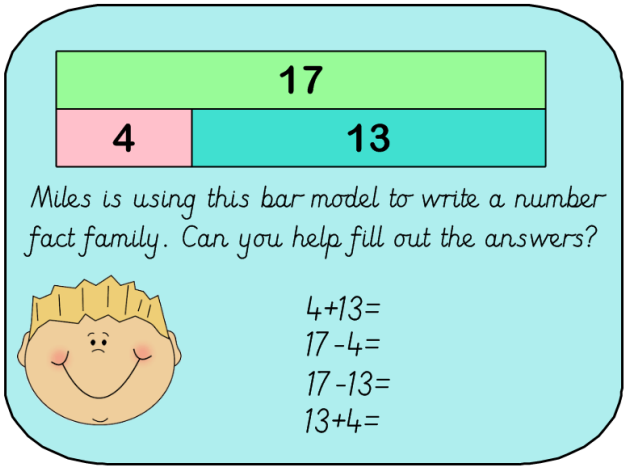
Year 2 – Autumn Block 2



Inverse - inverse operations

- opposite, reverse operations.
- addition and subtraction are inverse operations

Inverse operations are handy for checking your calculations.



I can solve these mentally

10 +  =

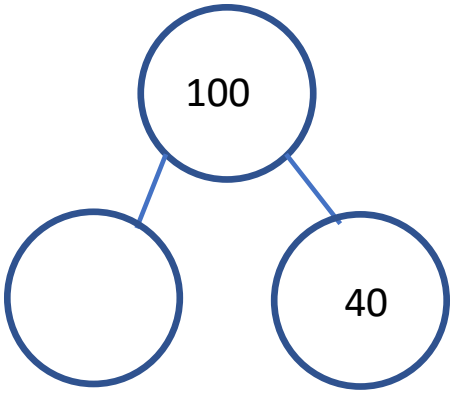
21 +  =

15 = □ - 3

15 = □ - 2

35 +  =

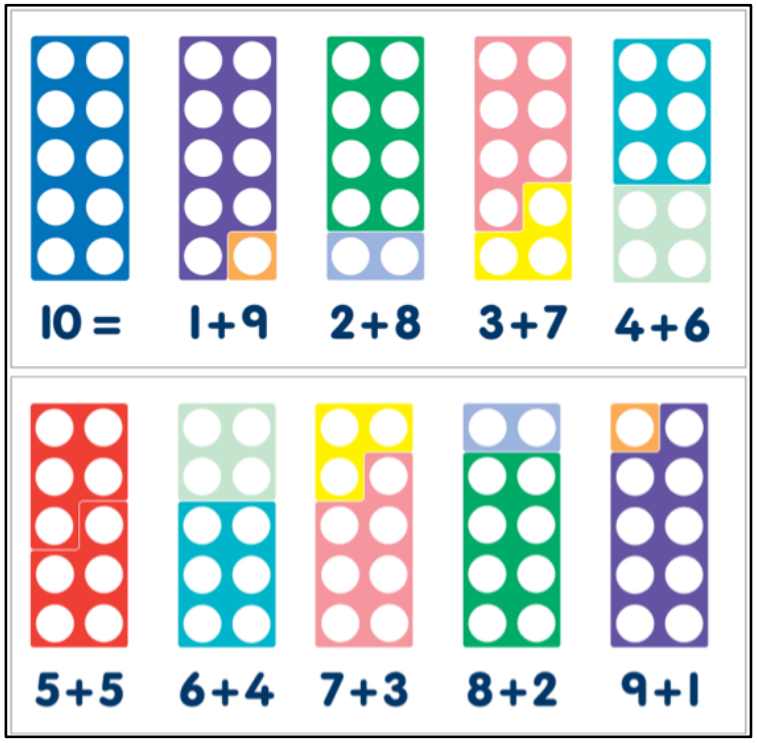
 + +

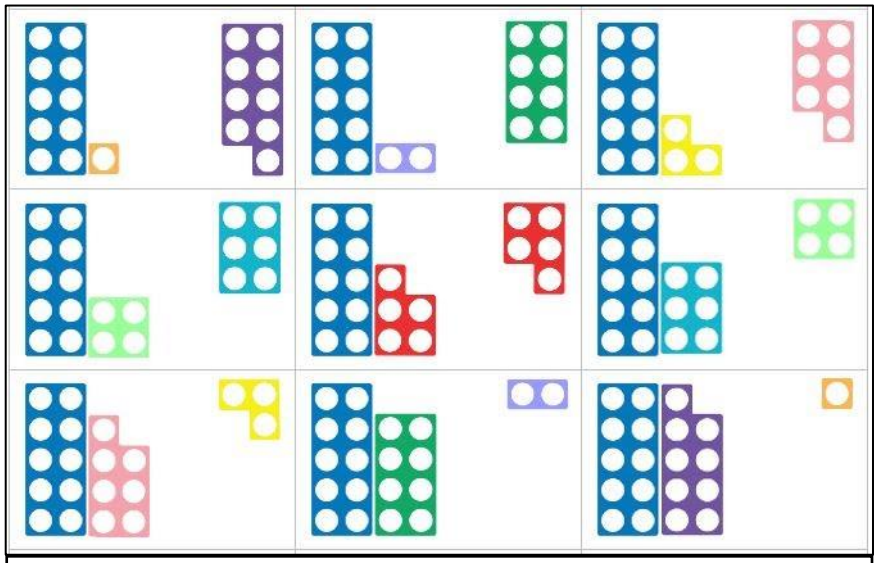


Part whole model

Vocabulary

add	addition
Plus	More
Make	Sum
total	take away,
subtract	minus
Less	difference
Equals	Makes
Total	balances





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17 + 3 = 20 18 + 2 = 20 19 + 1 = 20

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The strategy I used was …
I agree with the answer because …
I disagree with the answer because …

I can prove it by …
I can model it by …
If the numbers were larger then …
I decided on this strategy because …

Year 3 – Autumn Block 2

inverse operations

Opposite operations.

Addition ⟷ inverse ⟷ Subtraction

4 + 2 = 6
2 + 4 = 6

6 - 4 = 2
6 - 2 = 4

256 + 423 = 679

679 - 423 = 256

675

567

I can use a bar model to help solve missing number questions

I can solve these mentally

156 + ⚅ =

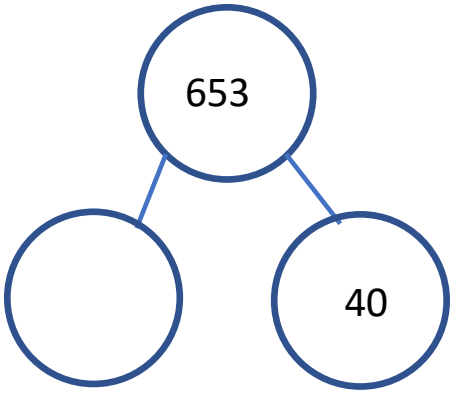
216 +  =

135 = □ - 3

165 = □ - 2

235 -  =

⚀ + ⚂ + ⚄



Part whole model

Vocabulary

add	addition
Plus	More
Make	Sum
total	take away,
subtract	minus
Less	difference
Equals	Makes
Total	balances

Addition and subtraction

789 + 642 becomes

$$\begin{array}{r} 7\ 8\ 9 \\ +\ 6\ 4\ 2 \\ \hline 1\ 4\ 3\ 1 \\ \hline 1\ \ 1 \end{array}$$

Answer: 1431

874 – 523 becomes

$$\begin{array}{r} 8\ 7\ 4 \\ -\ 5\ 2\ 3 \\ \hline 3\ 5\ 1 \end{array}$$

Answer: 351

932 – 457 becomes

$$\begin{array}{r} {\scriptstyle 8\ \ 12\ \ 1} \\ 9\ \not{3}\ \not{2} \\ -\ 4\ 5\ 7 \\ \hline 4\ 7\ 5 \end{array}$$

Answer: 475

932 – 457 becomes

$$\begin{array}{r} {\scriptstyle 1\ \ \ 1} \\ 9\ 3\ 2 \\ -\ \not{4}\ \not{5}\ 7 \\ {\scriptstyle 5\ \ 6} \\ \hline 4\ 7\ 5 \end{array}$$

Answer: 475

How do you know this?

I think this because …
The strategy I used was …
I agree with the answer because …
I disagree with the answer because …

I can prove it by …
I can model it by …
If the numbers were larger then …
I decided on this strategy because …

Year 4 – Autumn Block 2

inverse operations

Opposite operations.

Addition ⟷ inverse ⟷ Subtraction

4 + 2 = 6
2 + 4 = 6

6 - 4 = 2
6 - 2 = 4

256
+ 423
679

679
- 423
256

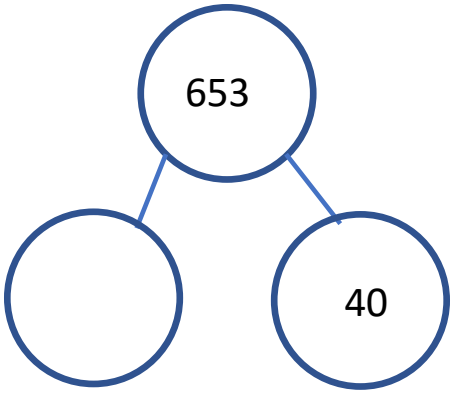
675

567

I can use a bar model to help solve missing number questions

I can solve these using my number fact knowledge and understanding of place value.

$$\begin{array}{r} 3\ 4\square\ 1\square \\ -\ \square\ 4\ 8\ 2 \\ \hline 2\ 9\ 2\ \square\ 4 \end{array} \quad =$$



Part whole model

Vocabulary

add	addition
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total	take away,
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Addition and subtraction

789 + 642 becomes

$$\begin{array}{r} 7\ 8\ 9 \\ +\ 6\ 4\ 2 \\ \hline 1\ 4\ 3\ 1 \\ \hline 1\ \ 1 \end{array}$$

Answer: 1431

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Answer: 351

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932 – 457 becomes

$$\begin{array}{r} 1\ \ 1 \\ 9\ 3\ 2 \\ -\ \cancel{4}\ \ \cancel{5}\ 7 \\ \hline 5\ \ 6 \\ 4\ 7\ 5 \\ \hline \end{array}$$

Answer: 475

How do you know this?

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The strategy I used was …
I agree with the answer because …
I disagree with the answer because …

I can prove it by …
I can model it by …
If the numbers were larger then …
I decided on this strategy because …

Year 5 – Autumn Block 2

inverse operations

Opposite operations.

Addition ⟷ inverse ⟷ Subtraction

4 + 2 = 6
2 + 4 = 6

6 - 4 = 2
6 - 2 = 4

256
+ 423
679

679
- 423
256

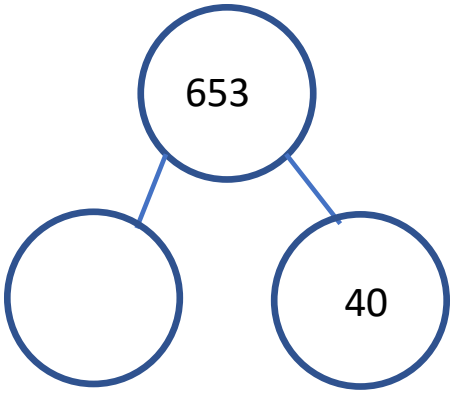
675

567

I can use a bar model to help solve missing number questions

I can solve these using my number fact knowledge and understanding of place value.

$$\begin{array}{r} 3\ 4\square\ 1\square \\ -\ \square\ 4\ 8\ 2 \\ \hline 2\ 9\ 2\ \square\ 4 \end{array} \quad =$$



Part whole model

Vocabulary

add	addition
Plus	More
Make	Sum
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Addition and subtraction

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I decided on this strategy because …

Year 6 – Autumn Block 2

A packet contains 1.5 kg of oats.

Every day Maria uses 50 g of oats to make porridge.

How many days does the packet of oats last?

I use my knowledge of different areas of maths to solve questions like this mentally.

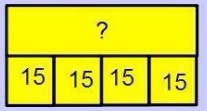
I can decide on the best method of calculating – mental, jottings or full written method. Eg

6,757 – 4,199 =

	3	4		1
-			4	8	2
	2	9	2		4

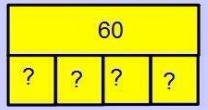
I can solve the missing digit calculation using my number fact knowledge and understanding of place value.

Whole unknown...



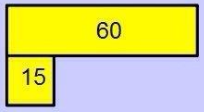
4 children go to the cinema. They each pay £15. How much do they spend altogether?

Size of groups unknown...



4 children go to the cinema. They pay £60 altogether. How much do they spend each?

Number of groups unknown...



Tickets to the cinema are £15. Some children buy tickets that cost £60. How many children bought tickets?

Vocabulary

add	**addition**
Plus	**More**
Make	**Sum**
total	**take away,**
subtract	**minus**
Less	**difference**
Equals	**Makes**
Total	**balances**

Addition and subtraction

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