



Maths Mastery at Northleaze.

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A decorative graphic on the left side of the slide. It features a dark blue vertical bar on the far left. A black arrow points to the right from the top of this bar. Below the arrow, several thin, curved lines in shades of blue and grey sweep across the page towards the right.

Aims

- The National Curriculum – how is it different?
- A mastery approach – what does this actually mean?
- Maths at Northleaze – what does this look like?
- Maths at home – how can you help?
- Questions.

The National Curriculum – how it is different?

Children should:

- Become **fluent** in the fundamentals of mathematics, including through **varied and frequent practice with increasingly complex problems over time**, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **Reason mathematically** by following a line of **enquiry**, **conjecturing** relationships, making **generalisations** and **developing** an argument, **justification** or **proof** using mathematical language.
- **Solve problems** by **applying** their mathematics to a variety of problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The National Curriculum – how it is different?

- The new curriculum has considerably higher expectations for children in KS1 and KS2 than it did before.
- The expectation is that the majority of pupils will move through the programme of study at broadly the same pace.
- KPIs (key performance indicators) are followed for each year group.
- To be working at the expected standard children will have to be able to 'Master' objectives for their year group.
- KPIs were handed out at the last parents evening (please see your class teacher if you did not receive/have lost a copy).



A Mastery Approach – **why** was it developed?

- Teaching has been focused on procedures rather than deep understanding.
- There are increasingly large gaps in specific areas of learning.
- Fluency and quick recall of key facts was not secure.
- Negative attitudes towards maths ability and enjoyment from both children and parents.

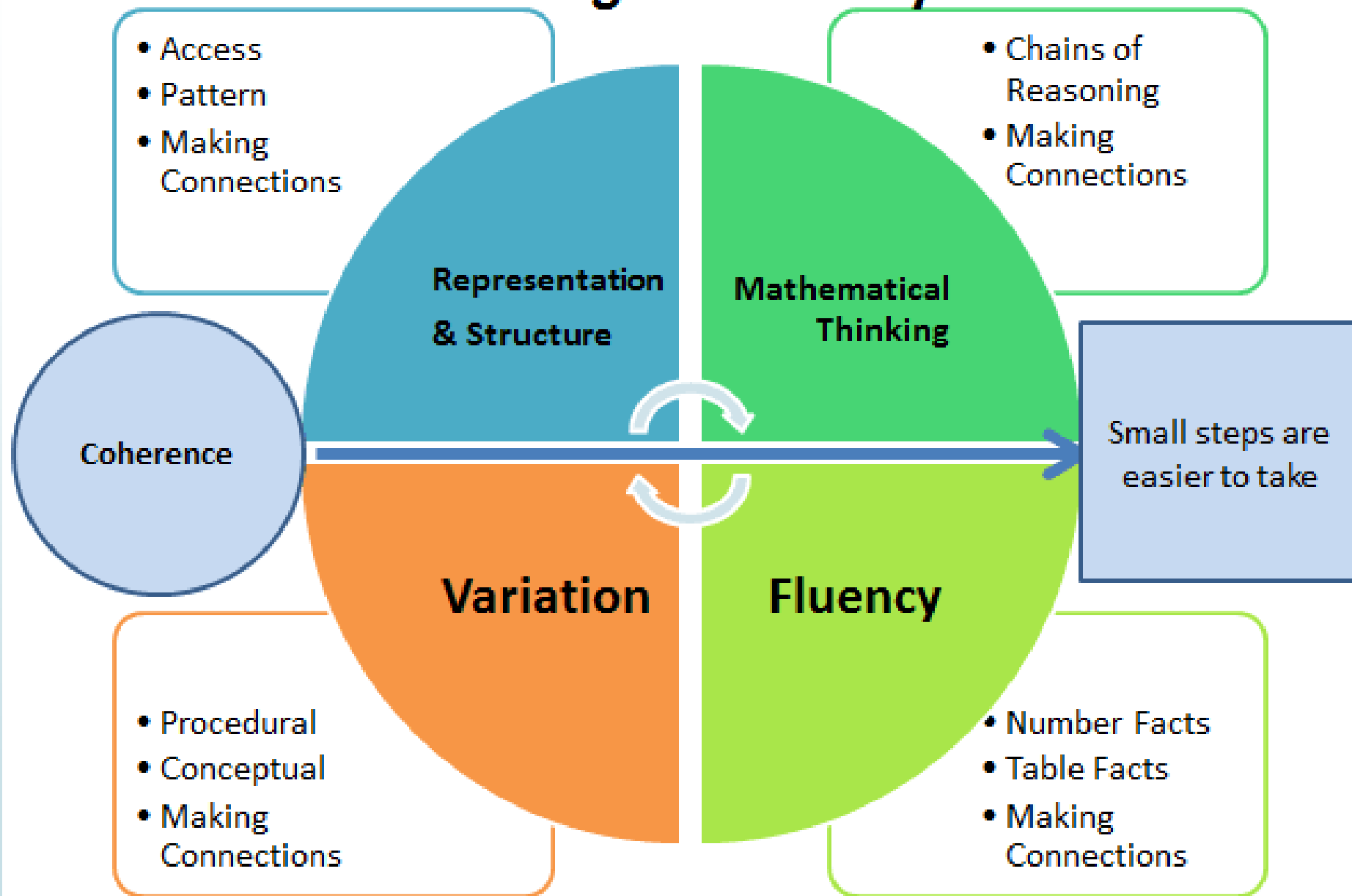
A Mastery Approach – **what** does this mean?

- **Rejects** the idea that some people *'just can't do maths'*. Instead encourages the belief that everyone can do maths!
- Whole class interactive teaching with all pupils working on the same lesson content for the same time.
- Longer time spent on key topics, e.g.: number, place value, four operations (+ - x ÷).
- Concrete and pictorial representations are used to help children grasp new ideas and to build knowledge of how and why maths procedures work.
- Developing fluency and variation to enable pupils to make links between learning.

A Mastery Approach – **what** does this mean?

- ▶ Pupils master concepts before moving to the next part of the curriculum sequence, allowing no pupil to be left behind.
- ▶ Early intervention to ensure pupils **keep up (not catch up)**.
- ▶ Lesson design focuses on small steps through a carefully sequenced learning journey.
- ▶ Hinge questions used during lesson time to inform type of intervention required.
- ▶ Rapid graspers are challenged through deepening their understanding rather than using bigger numbers as well as applying their knowledge to a variation of problems (see examples on the table).
- ▶ Those working significantly below are supported with KPIs from earlier year groups as well as same day and next day interventions.

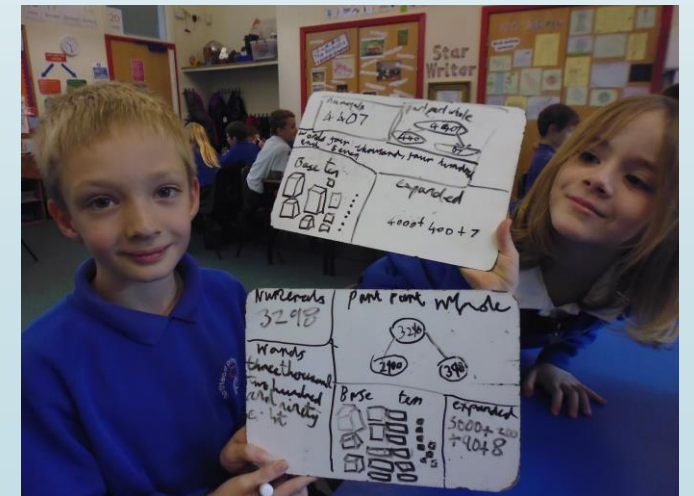
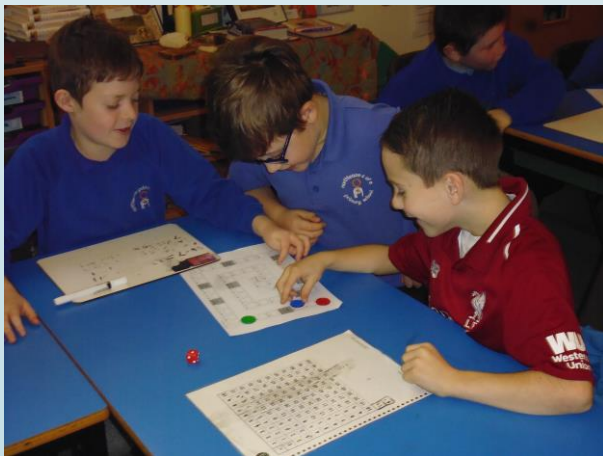
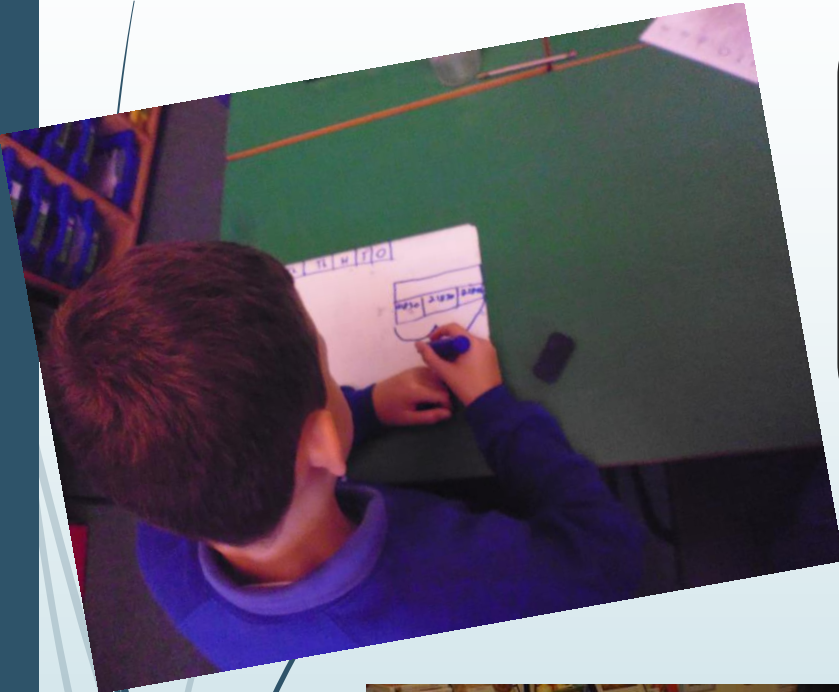
Teaching for Mastery



Maths at Northleaze

By using concrete materials we can explore why maths procedures work.

We work in partners to share our learning and our ideas. It is useful as it means we can use our initiative to solve mathematical problems.



Hinge questions...

Lesson 1

LF: simplifying fractions.

Hinge...

Simplify: $\frac{14}{35}$

A) $7/5$

B) $2/5$

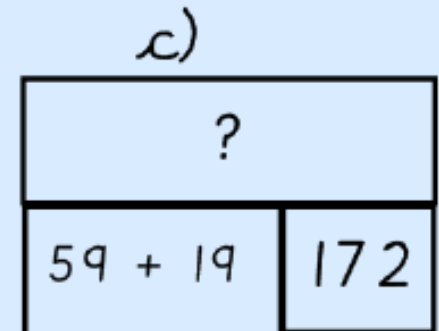
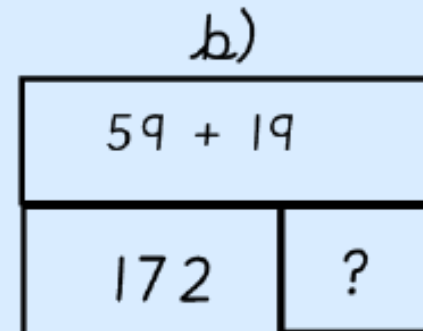
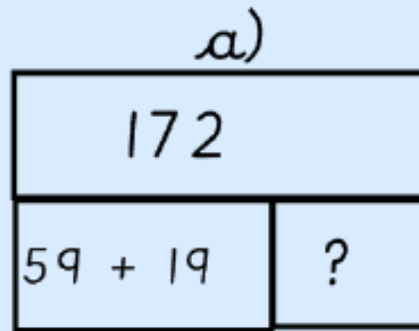
C) $7/7$

D) I don't know...yet!

10.10.16

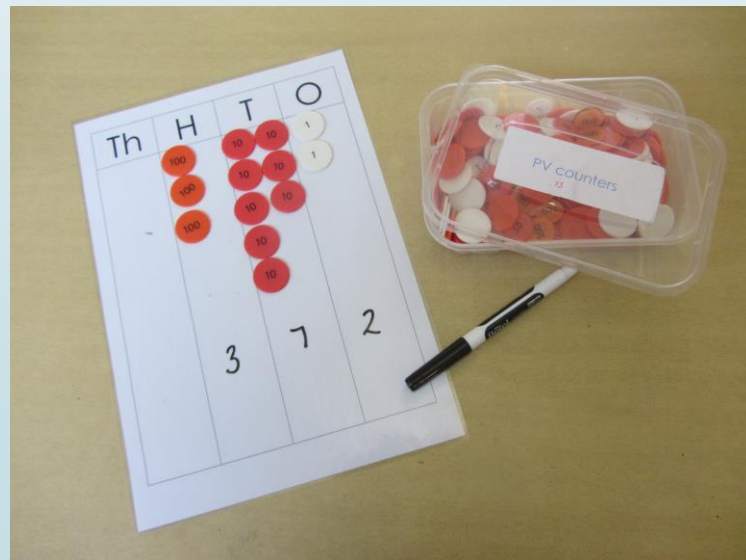
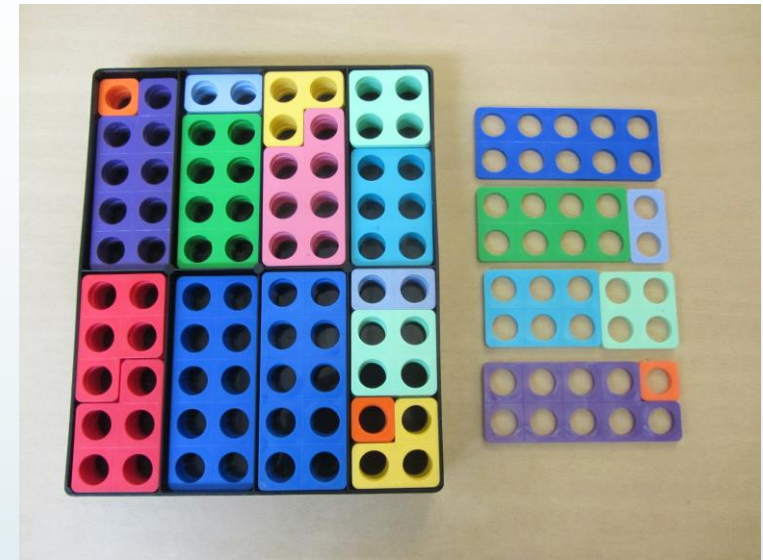
LF: balancing equations

Which PPW model would help you solve $172 - \underline{\quad} = 59 + 19$



d) Not sure...yet!


Grab boxes



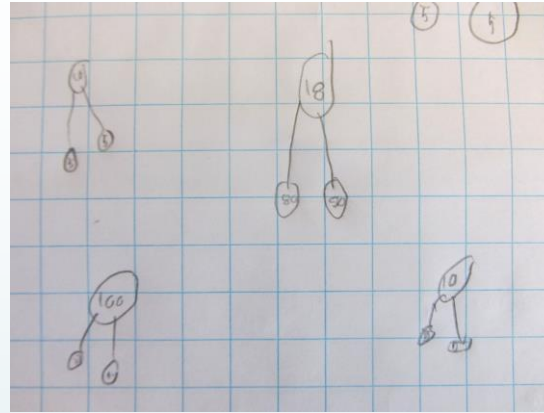
Maths at Northleaze

LF: To use counters to add a 1 digit number to a 3 digit number with regrouping.


21.10.19



We made alot of number sentis.



LF: subtracting 2 digit numbers.



$$\begin{array}{r} \overset{1}{4} \overset{0}{3} \\ - 20 \\ \hline 23 \end{array}$$

Draw the tens and ones.
Take away (cross out) any tens and ones.
Count what is left.

2. A farmer has 84 cows. He takes 46 to a new field. How many are left behind?

$$\begin{array}{r} 84 \\ -46 \\ \hline 38 \end{array}$$

3.8 cows ✓

4. A class has a target of raising £75 for a local charity. So far, they have raised £49. How much more do they need to raise to reach their target?

$$\begin{array}{r} 75 \\ -49 \\ \hline 26 \end{array}$$

£26 ✓

M	HT	T	H	T	O
2	5	1	3	4	2
4	1	3	9	6	4

four million, one hundred and thirty nine thousand, four hundred and twenty five.

2,513,425

5,751,000

12,500

79,042

1000

100

10

1

1000

100

10

1

1000

100

10

1

LF: To compare numbers using place value materials.

1. Fill in the circle with < or >.

2. Draw objects to make the statement true.

3. Which image is the odd one out?

4. Circle the greater amount in each case.

5. True or false? Explain.

6. What could you do to make the image correct?

7. How many sweets could be in B?

LF: Numbers to 5

1

2

3

4

5

Reasoning and talking mathematically.

Which is the odd one out? *Why?*



Captain Conjecture says 'The number in the place value grid is the largest 3-digit number you can make using all 10 counters.'

100s	10s	1s

Do you agree?

Explain your reasoning.



Sometimes always, never

If two denominators are different multiples of the same number then you can simplify the bigger number to make them the same

e.g. $\frac{3}{4}$ and $\frac{9}{12}$

$\frac{9}{12}$ can be simplified to $\frac{3}{4}$

because it depends on if the numerator is divisible by the number you are dividing by. Give an example

$$\begin{array}{r} 7 \overline{) 205} \\ \underline{14} \\ 65 \\ \underline{63} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

$12 \div 2 = 6$ ✗

Cold and hot tasks.

Year 6 Cold Task – Place Value

SKILL

1) Circle the greater number.
Seventy six thousand, eight hundred and twenty six or 76026 ✓

2) Write the following number in words: 2359118
Twenty three million six hundred and one thousand and one hundred and eighteen.

3) Round 0.286 to the nearest tenth: 0.29 ✓

4) Round 345902 to the nearest hundred: 345900 ✓

5) Round 345067 to the nearest ten thousand: 35000 ✓

6) Fill in the missing numbers.
 $352, 302, 52, 2, -52, 0$
 $3, 2, 5$
 $-2, -6, -1$

7) In a Science experiment, a class videoed a thermometer overnight. At 02:30 it read -12°C and it was 15°C at 13:00. What was the difference in temperatures? 17°C

APPLY

3) Match the representation to the numbers in digits.
One million, four hundred and one thousand, three hundred and twelve
1041312
1401312
1401312
1401312

6) Mr Langfield gives out the following four cards:
 $59, 86$
 $60, 26$ $62, 32$
Four children each take a card and give a clue to what their number is:
Alice says "My number is 60 when rounded to the nearest 10."
Beth says "My number has exactly 6 tens in it."
Charlie says "My number is 59.9 to the nearest tenth."
Daniel says "My number is 60 to the nearest tenth."
Which child has which colour card?
Alice = 60 ✓
Beth = 60 ✓
Charlie = 59.9 ✓
Daniel = 60 ✓

10) Here are some number cards.
 $3, 2, 5$
 $-2, -6, -1$
Use the cards to complete the sums below.
 $3 + 2 = 5$
 $-2 - 6 = -8$

ENQUIRE

4) Put a number in the missing space below to make the sentence correct.
 $4 \underline{6} 236460 > 46236460$
Explain why you have chosen this number.
Because they are the same and one as the missing number in it so its 6.

7) Spot the mistake! Calvin rounded 23598 to the nearest ten thousand and wrote 23598 .
Can you explain to Calvin what mistake he has made and why he has done it?
There is nothing.

Cold tasks are used to assess prior knowledge and understanding and inform our planning. These are done at the beginning of the unit and completed independently.

Year 6 Cold Task – Place Value

SKILL

1) Circle the greater number.
Seventy six thousand, eight hundred and twenty six or 76026 ✓

2) Write the following number in words: 2359118
Two million, three hundred and sixty five thousand, one hundred and eighteen.

3) Round 0.286 to the nearest tenth: 0.290 ✓

4) Round 345902 to the nearest hundred: 345900 ✓

5) Round 345067 to the nearest ten thousand: 35000 ✓

6) Fill in the missing numbers.
 $32, 24, 16, 8, 0, -8, -16$ ✓

7) In a Science experiment, a class videoed a thermometer overnight. At 02:30 it read -12°C and it was 15°C at 13:00. What was the difference in temperatures? 17°C

APPLY

3) Match the representation to the numbers in digits.
One million, four hundred and one thousand, three hundred and twelve
 1041312
 1401312
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6) Mr Langfield gives out the following four cards:
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Four children each take a card and give a clue to what their number is:
Alice says "My number is 60 when rounded to the nearest 10."
Beth says "My number has exactly 6 tens in it."
Charlie says "My number is 59.9 to the nearest tenth."
Daniel says "My number is 60 to the nearest tenth."
Which child has which colour card?
Alice = 59.96 ✓
Beth = 60.34 ✓
Charlie = 60.34 ✓
Daniel = 60.26 ✓

10) Here are some number cards.
 $3, 2, 5$
 $-2, -6, -1$
Use the cards to complete the sums below.
 $-8 + 6 = 2$
 $-7 - 2 = -9$

ENQUIRE

4) Put a number in the missing space below to make the sentence correct.
 $4 \neq 236460 > 46236460$
Explain why you have chosen this number.
Because if it's six they would be the same number so it could be 789.

7) Spot the mistake! Calvin rounded 23598 to the nearest ten thousand and wrote 23598 .
Can you explain to Calvin what mistake he has made and why he has done it?
He did not turn all the other numbers into zeros.

Hot tasks are used to assess understanding at the end of a unit. This informs the KPIs and what interventions are necessary.

Maths at home – how can you help?

- Support your child with their maths homework where you can.
- Use every opportunity to **ask your child questions** and to encourage them to explain their reasoning to you.
- Continue to work on number facts at home (**number bonds, times tables, making relationships between numbers**) so that your child is fluent in them (*able to recall them out of order.*)
- **Look for maths around you**; telling the time, discussing the days of the week, talking about money, measuring out ingredients, talking about the length of cooking times etc.
- **Play** board/dice/card games with your child at home – encourage counting, mental calculations and talk about strategies and tactics for solving problems.
- **GROWTH MINDSET** – every one of us can master mathematics given the opportunity. Foster an attitude of ‘I can’, ‘I will’ and ‘I don’t know it yet, but I’ll keep trying!’.



Your turn!



Using manipulatives.

- ▶ How could you use the manipulatives on your table to make this number?
- ▶ Can you find more than one method?

6753



Using manipulatives.

- Now solve this calculation using the manipulatives...

$$6753 + 215$$

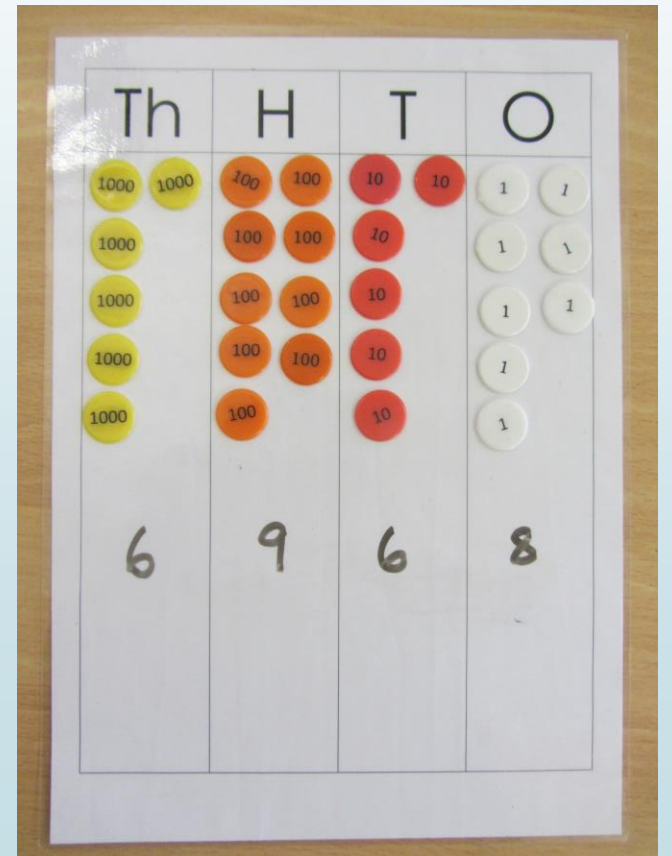
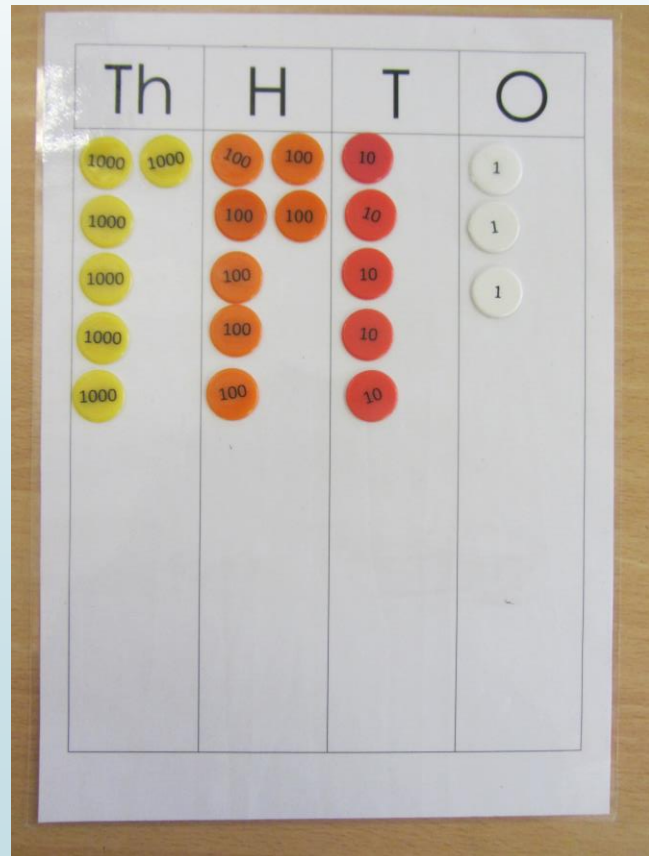
- What would happen if you had to bridge 10? How would the manipulatives help you?

$$6753 + 515$$

Using manipulatives.

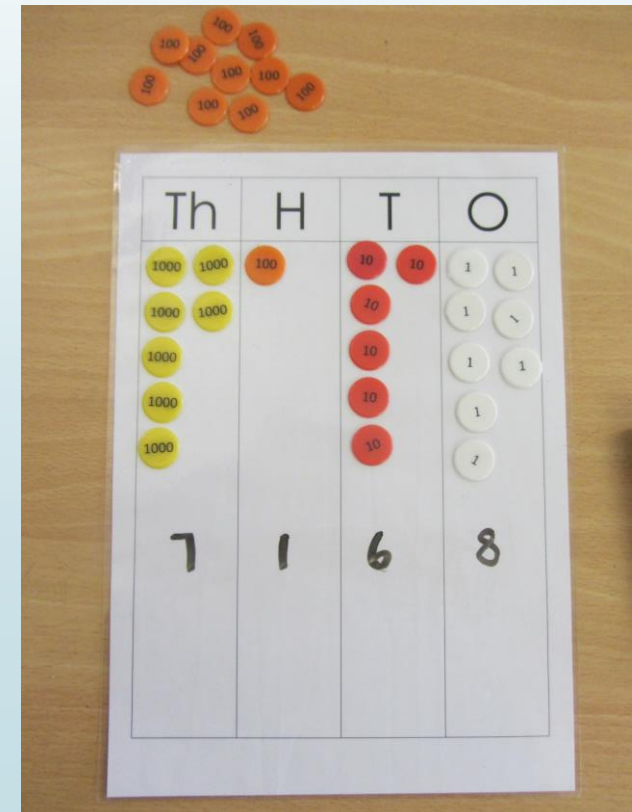
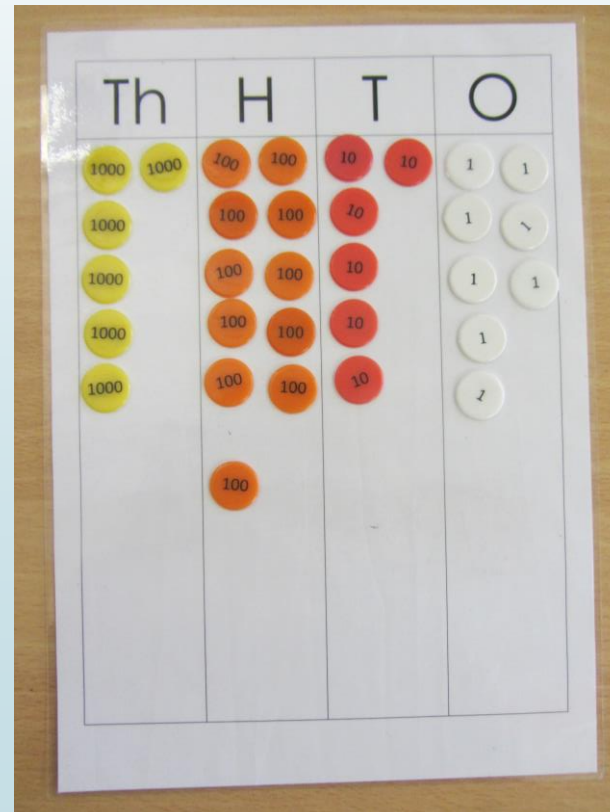
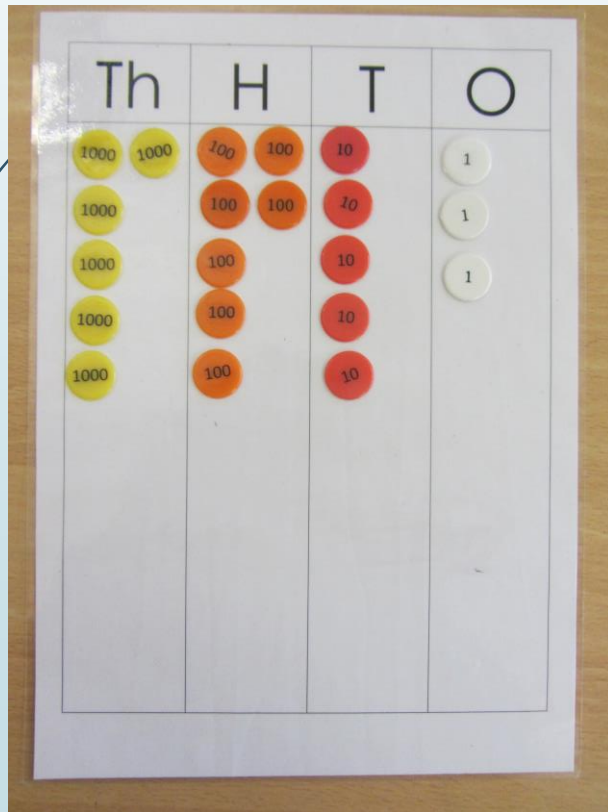
- ▶ What should it look like?

$$6753 + 215$$



Using manipulatives.

- Bridging 10 – what happens then?





Using manipulatives.

- Now solve this calculation using the manipulatives...

$$8546 - 1320$$

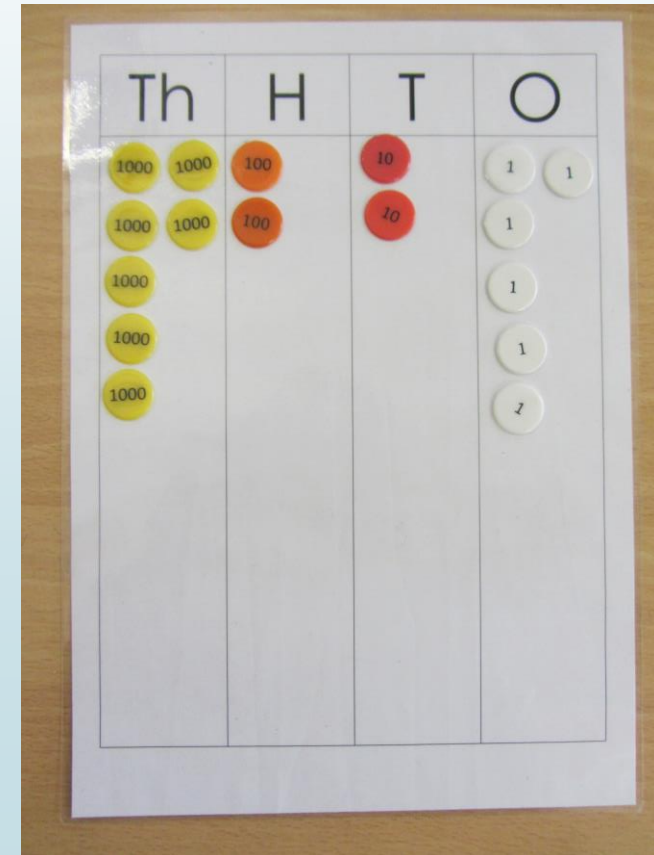
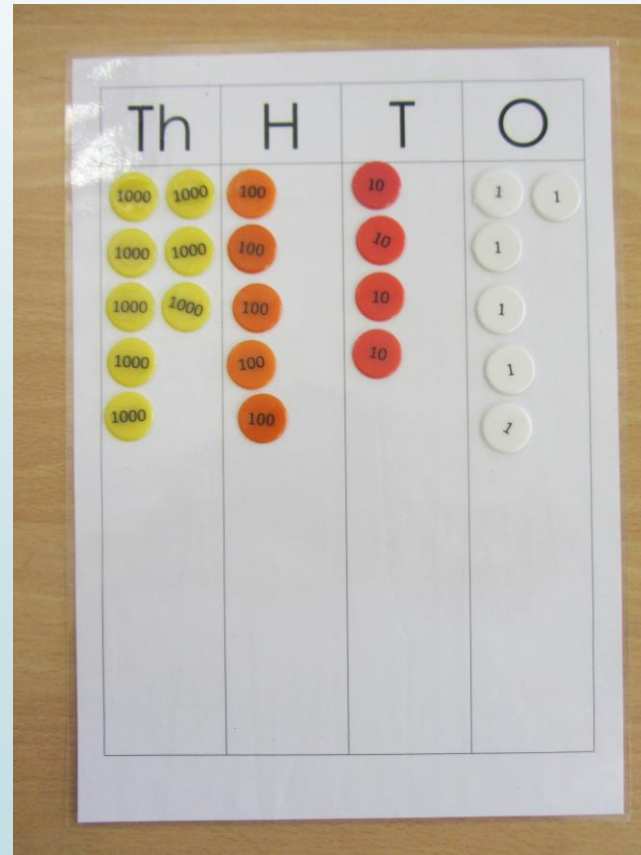
- What would happen if you had to bridge 10? How would the manipulatives help you?

$$8546 - 1360$$

Using manipulatives.

- ▶ What should this look like?

$$8546 - 1320$$



Bar modelling.

1

Eva has 20 counters.

6 of them are red.

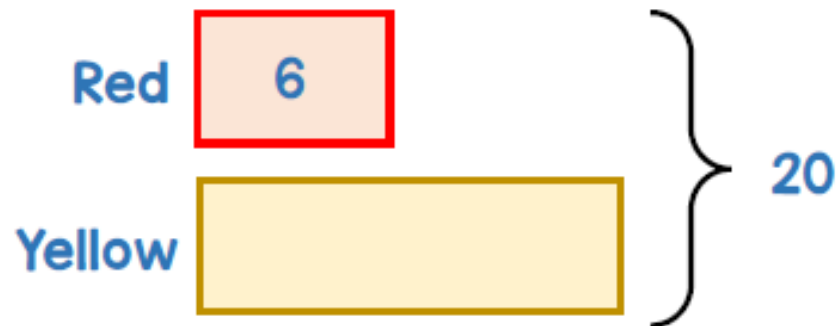
The rest are yellow.

How many more yellow than red counters are there?



Bar modelling.

- I** Eva has 20 counters.
6 of them are red.
The rest are yellow.
How many more yellow than red counters are there?



Bar modelling.

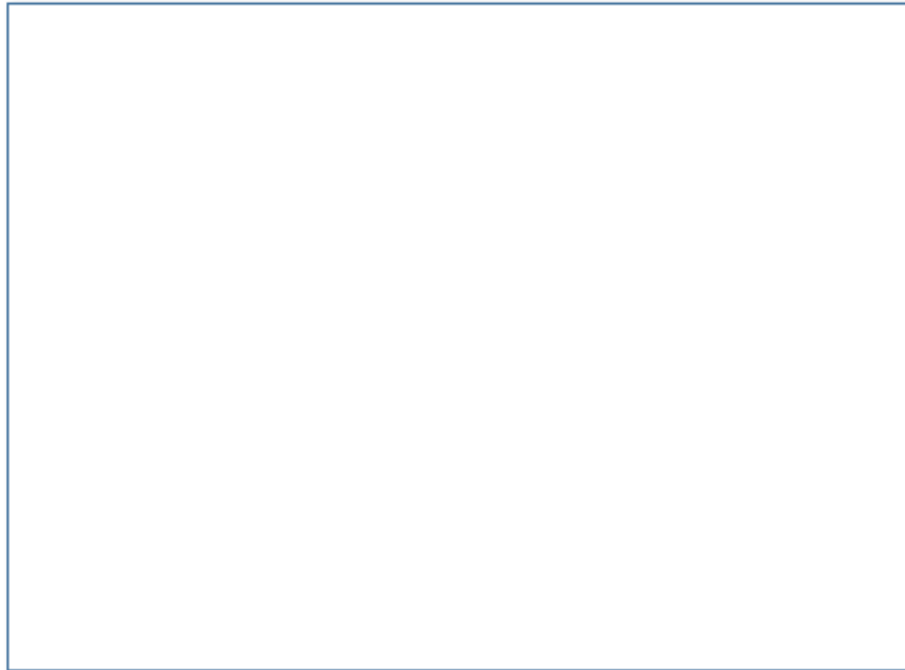
3

A baker sold 93 more pies on Tuesday than Monday.

She sold 55 fewer pies on Tuesday than on Wednesday.

She sold 236 pies on Tuesday.

How many pies did she sell in total?



Bar modelling.

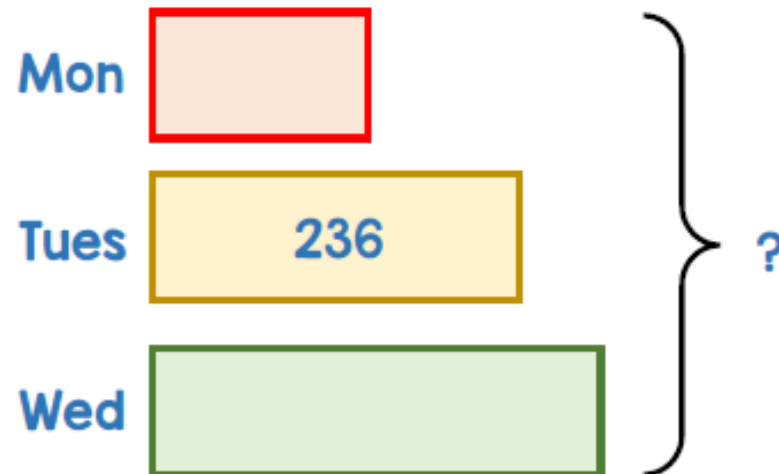
3

A baker sold 93 more pies on Tuesday than Monday.

She sold 55 fewer pies on Tuesday than on Wednesday.

She sold 236 pies on Tuesday.

How many pies did she sell in total?



Bar modelling.

3

A box of 8 chocolates weighs 450 g.

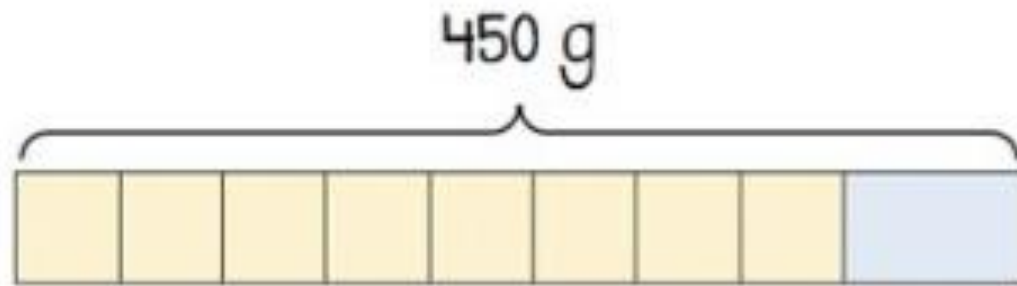
Peter eats 3 of the chocolates.

The box of chocolates now weighs 336 g.

How much does the empty box weigh?

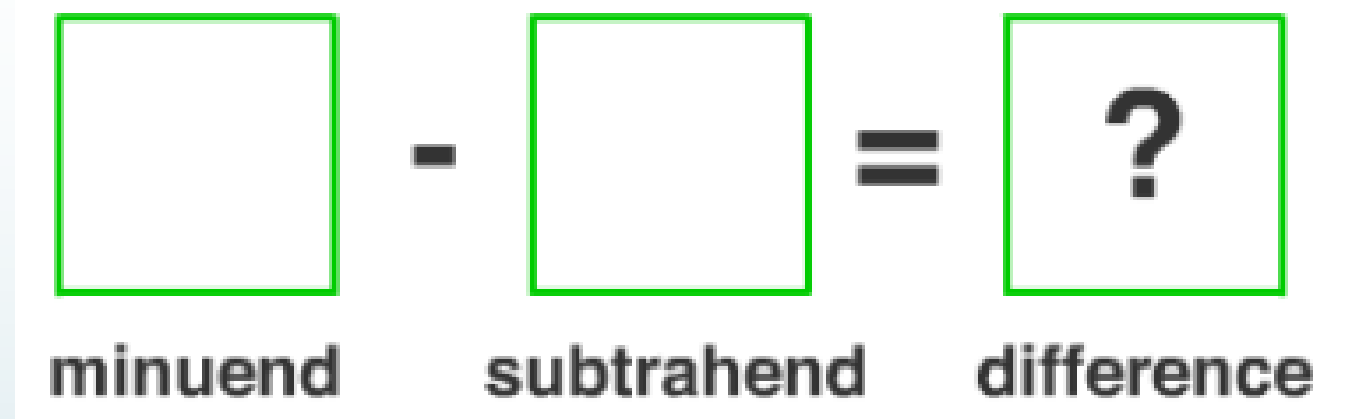
Bar modelling.

- 3** A box of 8 chocolates weighs 450 g.
Peter eats 3 of the chocolates.
The box of chocolates now weighs 336 g.
How much does the empty box weigh?



Vocabulary

- Subtraction language:



A diagram illustrating subtraction language. It shows a subtraction equation: a green-outlined square followed by a minus sign, another green-outlined square, an equals sign, and a third green-outlined square containing a question mark. Below each square is a label: 'minuend' under the first, 'subtrahend' under the second, and 'difference' under the third.

$$\square - \square = \square ?$$

minuend **subtrahend** **difference**

- Addition language:



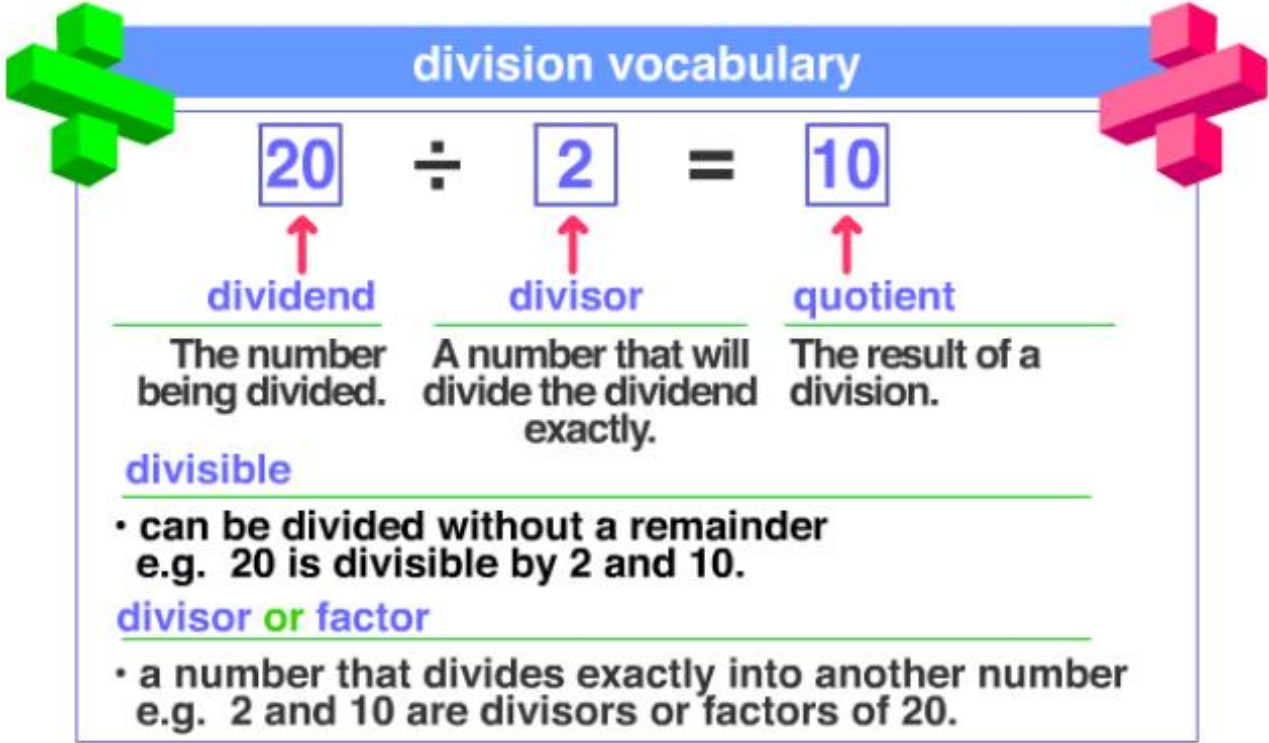
A diagram illustrating addition language. It shows an addition equation: a black-outlined square followed by a plus sign, another black-outlined square, an equals sign, and a third black-outlined square containing a question mark. Below each square is a label: 'addend' under the first, 'addend' under the second, and 'sum or total' under the third. The word 'or' is highlighted in green.

$$\square + \square = \square ?$$

addend **addend** **sum or total**

Vocabulary

► Division language:



The diagram features a blue header bar with the text "division vocabulary" in white. On either side of the bar are 3D block letters: a green plus sign on the left and a red plus sign on the right. Below the bar is a mathematical equation: $20 \div 2 = 10$. Each number is enclosed in a blue square box. A red arrow points from the word "dividend" below to the box containing "20". Another red arrow points from the word "divisor" below to the box containing "2". A third red arrow points from the word "quotient" below to the box containing "10".

dividend
The number being divided.

divisor
A number that will divide the dividend exactly.

quotient
The result of a division.

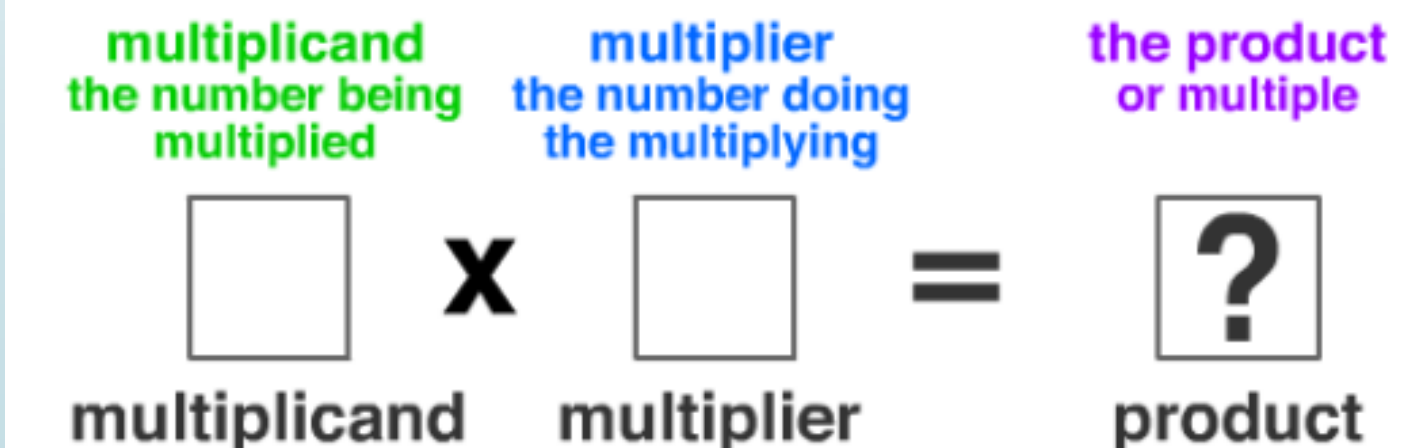
divisible

- can be divided without a remainder
e.g. 20 is divisible by 2 and 10.

divisor or factor

- a number that divides exactly into another number
e.g. 2 and 10 are divisors or factors of 20.

► Multiplication language:



The diagram shows a multiplication equation: $\square \times \square = \square$. The first square is labeled "multiplicand" in green text above it and "multiplicand" in black text below it. The second square is labeled "multiplier" in blue text above it and "multiplier" in black text below it. The third square contains a question mark and is labeled "the product or multiple" in purple text above it and "product" in black text below it.

multiplicand
the number being multiplied

multiplier
the number doing the multiplying

the product or multiple
product

Vocabulary

- ▶ Place value – refers the value of the individual digit (HTO)
- ▶ Sum – refers only to addition calculations.
- ▶ Product – the answer when two integers are multiplied together.
- ▶ Integer – a number that can be either positive, negative or zero, but **not** a fraction or decimal.
- ▶ Commutative – when a calculation can be written in any order and still result in the same answer (addition and multiplication)
 - ▶ e.g.: $2 + 4 = 6$ and $4 + 2 = 6$
 - ▶ $6 \times 5 = 30$ and $5 \times 6 = 30$
- ▶ Carroll diagram:

Carroll diagram	an even number	not an even number
a multiple of 3	6 18 24	9 21 27
not a multiple of 3	10 20 40	25 35 55

Vocabulary

► Fraction: $\frac{\text{numerator}}{\text{denominator}}$

► LCM – lowest common multiple

► HCF – highest common factor

► Number bond:

number bond

A number bond is a mental or pictorial representation of a part-part-whole relationship, that is, a number and the parts that combine to make it, e.g. $8 + 2$ and $6 + 4$ are both number bonds that make 10.

May also be described as a 'number fact' and is related to the concept of a 'fact family'.

examples

The examples section shows three diagrams. The first shows a number 7 with a line connecting it to two circles containing 1 and 6; 'part' is written above 1 and 'whole' below 7, with 'part' below 6. The second shows a number 6 with a line connecting it to two circles containing 4 and 2; 'whole' is written above 6, and 'part' is written below 4 and 2. The third shows two circles containing 3 and 5 with a line connecting them; 'part' is written above 3 and 'whole' below 5. Below these are two pictorial examples: a jar with 6 candies (3 purple, 3 blue) with a line connecting it to a circle with 2 and a circle with a question mark; and two blocks of cheese (one green, one yellow) with a line connecting them to a circle with 8 and a circle with 5.

► Please refer to this website for other words that may need explaining:

► <http://www.amathsdictionaryforkids.com/qr/qr.html>



Any questions?





DoodleMaths

What is it and how
does it work?