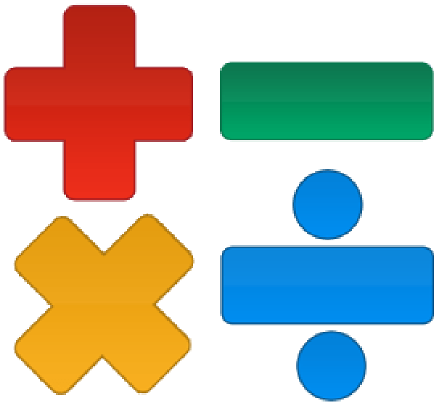
# St Luke's CE Primary School's Maths Calculation Policy



***We are a Christian school that serves a diverse community and works in partnership with parents to develop the whole child.***

# Vocabulary

- **Number sentence**

Examples

3 + 8 = $\square$ $\square$ + 9 = 15 16 - ? = 10

276 x 2 = 0.45 x 100 = 632 ÷ 12 = 2a = 3 + 5

- **Operations**

Addition +

Subtraction -
Multiplication x
Division ÷

- Vocabularies used to describe these operations

| + | - | × | ÷ |
|---|---|---|---|
| **addition** | **subtraction** | **multiplication** | **division** |
| sum | minus | times | divide |
| add | subtract | multiply | share between |
| more than | less than | product | split |
| altogether | decrease by | lots of | in equal groups |
| increase by | takeaway | groups of | |
| total | find the difference | | |

**Note:** real life words such as dropped, broken, sold, ripped, poured etc. can also be used to describe operations.

**Repeated addition** - used when multiplying multiples of the same number.
5 x 4 = 20
5 + 5 + 5 + 5 = 20

# Bar Modelling

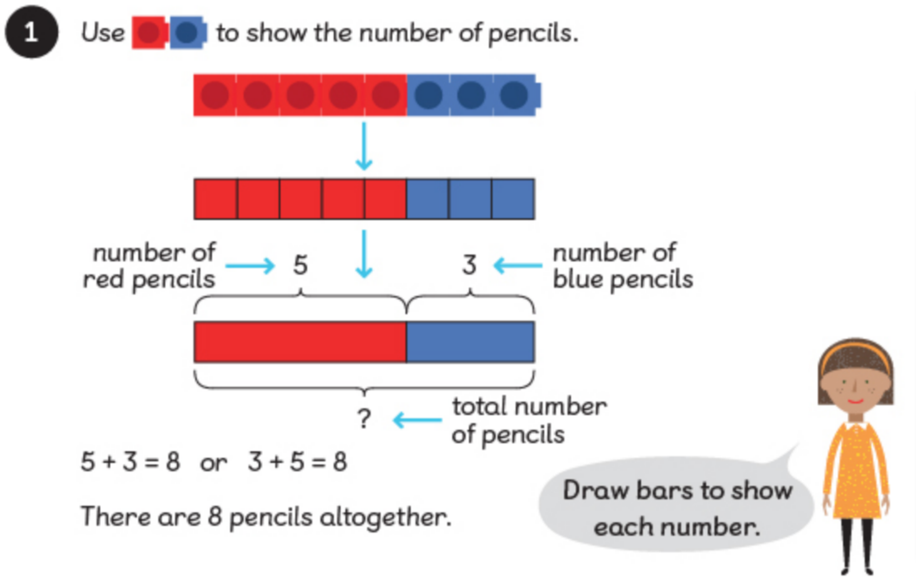
## What exactly is a bar model?

Essentially, the bar modelling technique is a form of visual algebra. It's a method for visualising a maths problem where bars or rectangles represent known numbers and unknown numbers. It acts as a bridge between the word problem and the abstract maths required to solve the problem.

When pupils are able  to visualise a word problem, they have a clearer understanding of what the question is about. They are also able to determine what operations are needed and can solve them in a more efficient manner. On the other hand, pupils will rely heavily on learning certain keywords in question and using them to determine operations needed which might not be the case. An example will be when most people see the word altogether, they automatically think of addition but it actually is referring to total amount.

Example 1
Part-part-whole model

The part-part-whole model can be used for questions involving all four operations, fractions, measure, algebra, time, ratio, proportion and much more.

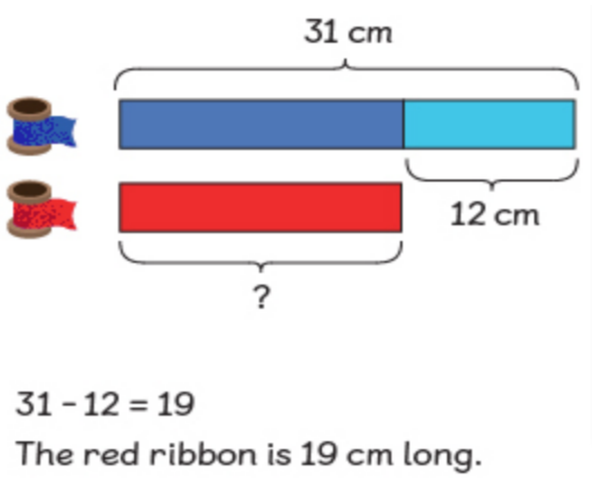



From the example above, we know two parts and need to find the whole. The unknown amount is always represented with a question mark and this tells us what calculation to do. For the part-part-whole model we know two pieces of information and have to find the other. So, we may know the whole and one part and have to find the other part.

Example 2

Comparison model

The comparison model is a bit different. Here we're comparing two bars:




When working with the bar model, we can draw the bars on paper or represent them with cut-out strips of paper, Cuisenaire rods, interlocking cubes or even counters.

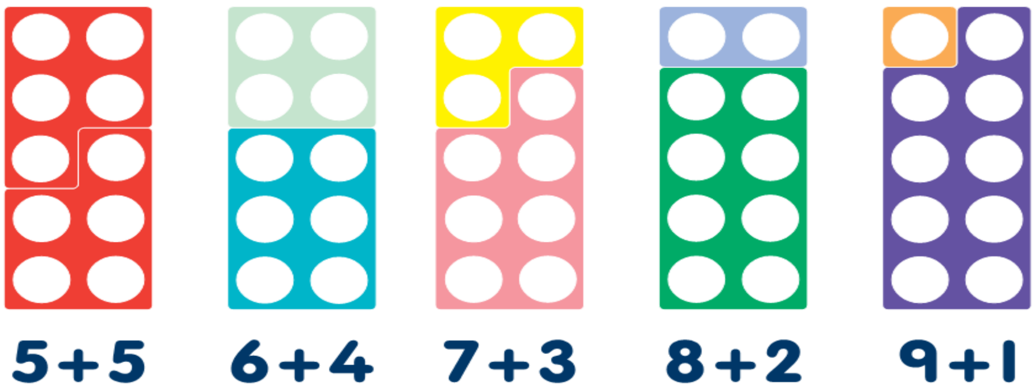
In this example we're looking at a before and after model. This means we need to represent the model at the start of the problem and at the end of the problem after there has been some sort of change.

**For more on Bar Modelling, see link below or contact Maths Lead.**

https://mathsnoproblem.com/blog/teaching-maths-mastery/making-the-most-of-bar-modelling/?utm_source=blog&utm_medium=blogintlink&utm_campaign=howtoteachcomparisonbarmodels

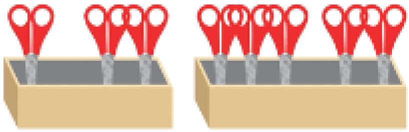
# Tens Frame

When playing and exploring pupils are provided with a range of equipments with which to explore making 6-9 as 'five and a bit'. For example, they could use a Numicon 'five' piece and join it with other pieces to make 6-9, or find 'five and a bit' pieces on dominoes.




During active Learning, tens frames are used as a label for areas in the setting that are restricted to certain numbers of pupils. Accompany the labels with the numerals.

When creating and thinking critically, pupils are encouraged to practise representing numbers 1-10 on fingers that have been shown on tens frames. Turn over a tens-frame card and show how many with fingers - start with 'grow it' so children can count out fingers if they need, then 'show it', putting up fingers without counting, then 'throw it', putting out their fingers without looking at them first.



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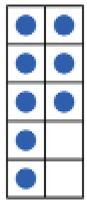


There are 8 scissors in the image above so if i want to make 10, how many more will i need? Looking at the ten frame, pupils are able to determine that they need 2 more. Helping them understand number bonds of 10 whilst also finding another way of making 10.

An equation(number sentence) can also be ritten using the tens frame model above. **8 + 2 = 10** **or** **10 - 8 = 2**

Count out some objects out and agree the quantity. Pupils amy be asked, to place a certain amount of blocks or objects on the ten frame. From this, they are able to work out how many more is needed to make 10 or 20 depending on the number bonds that is being taught.

https://www.ncetm.org.uk/media/lmhgcfky/series_03_episode_13_numberblocks-support-materials_five_and_friends_april_2021.pptx
Link to NCETM's slides on Tens Frame.

# Addition

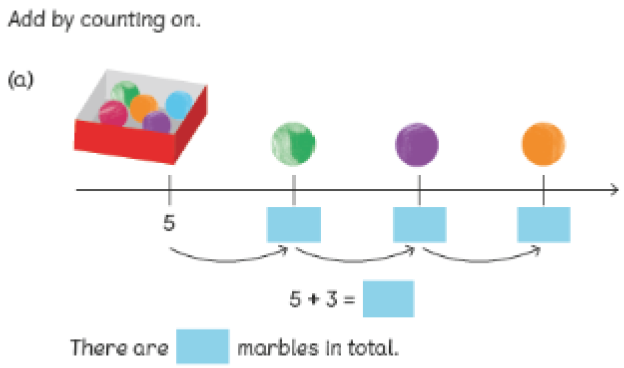
## Year 1

**<u>Adding within 10</u>**

Adding by counting on using number lines

- Draw a number line
- Start with your biggest number
- Use jumping to count on(forwards) to add on a specific amount

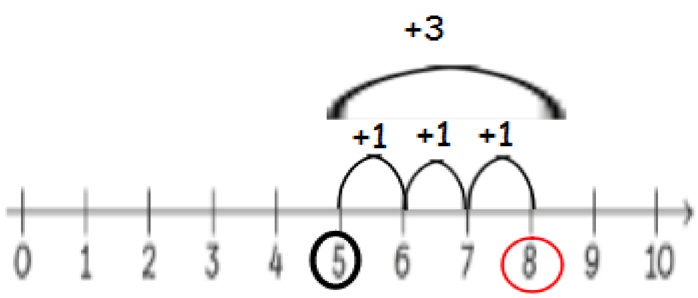
Example 1




So, I need to add 5 and 3.

5 + 3 =

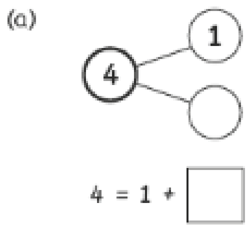
1. Draw my number line
2. Circle my biggest number
3. Jump three times to the right(adding on)
4. Circle the number you land on as your answer.
5. So 5 + 3 = 8



Example 2

**This question is worded differently but is still an addition question which allows children the chance to think.**

Adding by completing number bonds- missing numbers

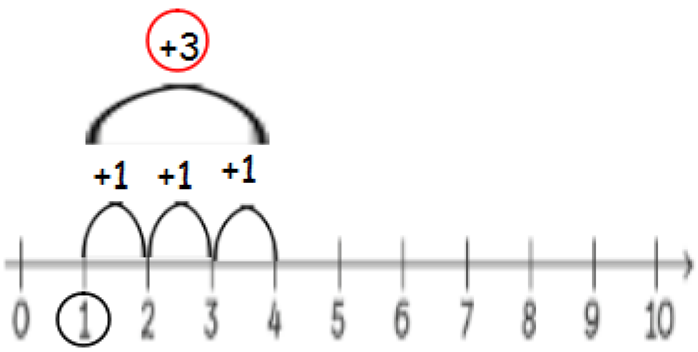



**Understanding the question:**

- ❖ Your answer is 4(total)
- ❖ How do I get to 4 from 1?
- ❖ What number do I add to 1 to get to 4?

Answering Question:

1. Child can rewrite question as 1 + $\boxed{\phantom{0}}$ = 4
2. Can they use their number lines now?
3. Draw a number line
4. Circle my 1
5. Jump till I get to 4
6. How many jumps did I complete?
7. Therefore, 1 + 3 jumps will take me to 4
8. So my missing number is 3



# Subtraction

## Year 1

- **Subtracting by crossing out**

Example 1

7 - 2 = ☐

7 − 2 = 5

5 ladybirds are left.

Example 2

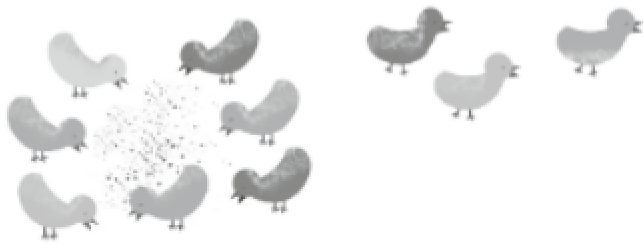
I have 8 bananas. I peel 5 of them. How many bananas are not peeled?

8 − 5 = ☐

- Children can draw their 8 bananas.
- Cross out the 5 that has been peeled.
- How many are left over?
- Count what is left
- That is your answer

8 - 5 = 3

Example 3



3 chicks have eaten. How many chicks are still eating?

10 - 3 = 7

7 chicks are still eating.

- **Crossing out to subtract within 20**

Subtract 2 from 17 or 17 - 2 =

17 – 2 = 15

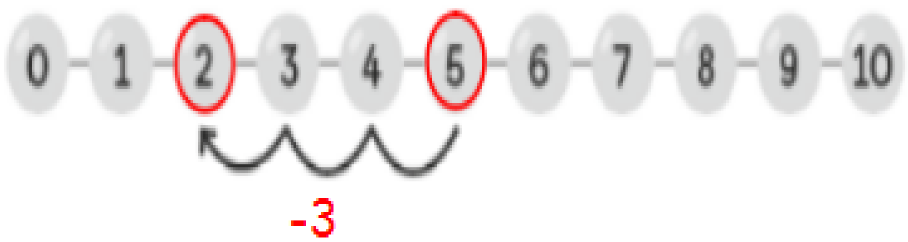
10 7

7 - 2 = 5

10 + 5 = 15

- **Subtracting on a numberline by counting back**

5 - 3 =




5 - 3 = 2

❖ Just like adding using a numberline, draw the number line.
❖ Write numbers down
❖ Circle the bigger number
❖ Jump backwards 3 times(subtracting or taking away 3)
❖ Circle the number you land on(2)
❖ Answer is 2

- **Subtracting by counting backwards**

5 - 3 =

- Put your bigger number in your head
- Count backwards from the next number(4)
- Count back 3 times(use fingers to help you)
- This method is not the most efficient but works for 1 and 2 digit numbers.

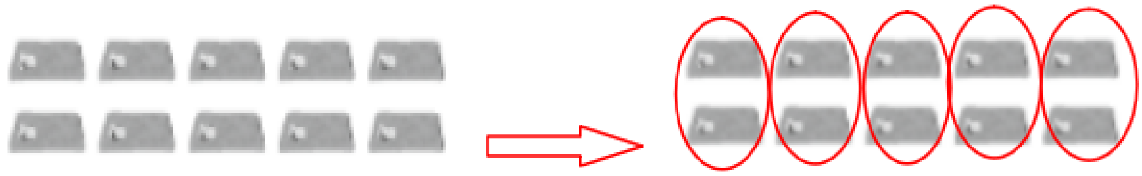
# Multiplication

## Year 1

- ***Counting in/making groups of...***

Example 1

5 groups of 2



2 + 2 + 2 +2 +2 = 10

Example 2

5 groups of 3

3 + 3 +3 +3 +3 = 15

# Division

## Year 1

**For Year 1, multiplication links right into division so the idea of grouping or sharing to divide is used instead of having other methods.**

## Grouping to Divide

20 ÷ 2 is equal to 10.

There are 20 chocolates.

Put 2 chocolates
in each bag.

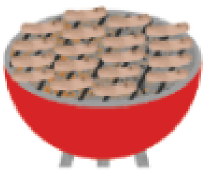
Emma gets 10 bags of chocolate.

20 ÷ 2 = 10 is a division equation.
20 ÷ 2 = 10 is read as twenty **divided by** two equals ten.

## Sharing

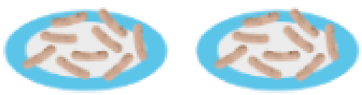
How can the sausages be put equally on 2 plates?
What is the number of sausages on each plate?

There are 18 sausages.



Put 18 sausages
equally on 2 plates.

2 × 9 = 18



There are 9 sausages on each plate.

18 ÷ 2 = 9

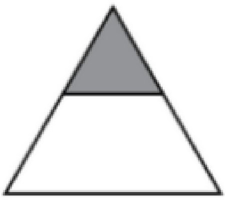
# Fractions

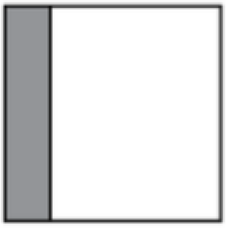
## Year 1

**Making Halves**

When making halves pupils must understand that :

- making halves is the same as putting a whole into 2 equal parts.
- Or putting a whole into 2 equal halves.
- That 2 halves makes a whole or 1 whole.
- It can also be sharing into 2 equal groups.

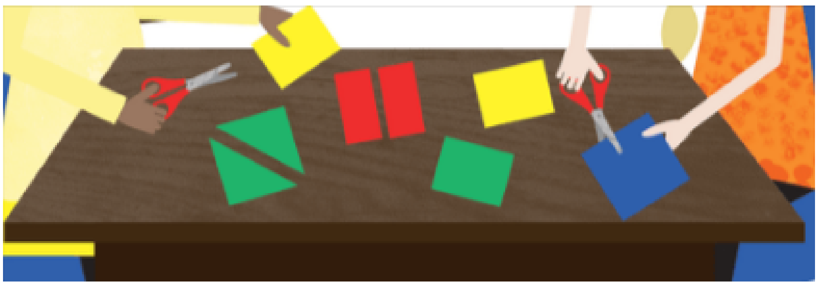




*Although these 2 shapes have been put in2 parts, they are not in 2 EQUAL parts so they are not halves.

- Halves mighty not look the same as shown below.
- The language one out of 2 can be used.

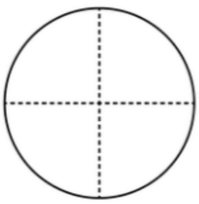
* Pupils might only be required to shade halves and not to work out a half of a number. They are only required to have an understanding of what a half is.



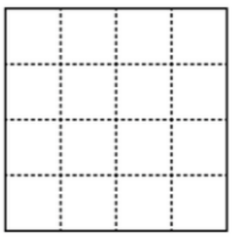
Example 1

Shade to show half of each shape.

(a)



(b)



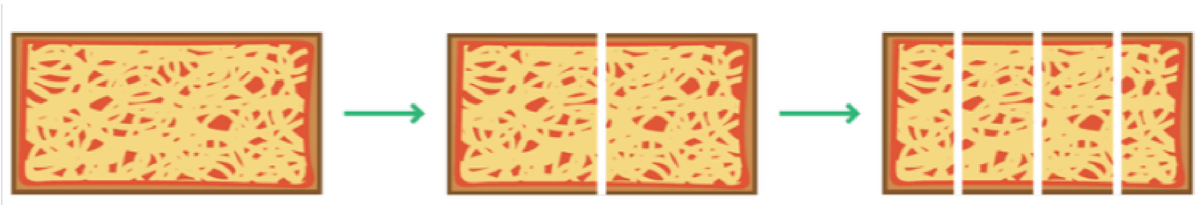
When halving, each person should get equal amount so will mean having to shade one for one person, let's say Mia and leave one

unshaded for another(Lesley). So for the circle, you will end up with 2 shaded parts for Mia and 2 unshaded parts for Lesley. Emphasise that these should be equal amounts.
Mia's shaded in red and
Lesley's unshaded in white.

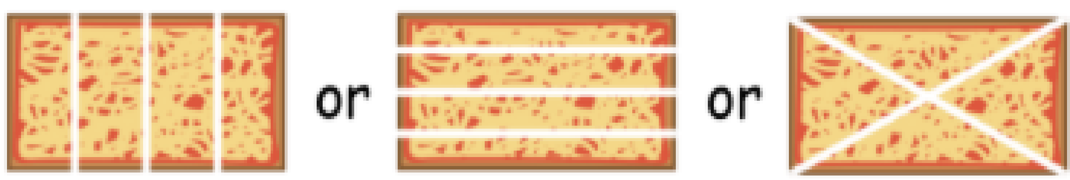

**Making Quarters**

Following on from making halves pupils should have a solid foundation that making fractions requires them to have equal parts so making quarters will also mean making 4 equal parts. This can be introduced as making a half of a half.

A great example of this will be to take a square paper (1 whole). Emphasise on the fact that you are starting with 1 whole (1). Fold paper into 2 halves and fold again into 2 halves. Pupils can undo the folds to reveal 2 equal halves or 4 quarters. Those 2 comparisons can be made as they are the same fraction (equivalent fractions).



A rectangular paper can be used to show this and a squared paper can be folded diagonally to show that quarters can be made in so many different ways as shown below.

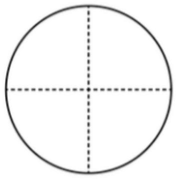



The sentence one out of four should be introduced at this point.
I have four pieces, if i were to shade one, I will have shaded 1 out of the four pieces making $\frac{1}{4}$.

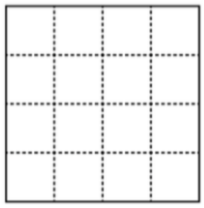
Example 2

Shade to show a quarter of each shape.

(a)

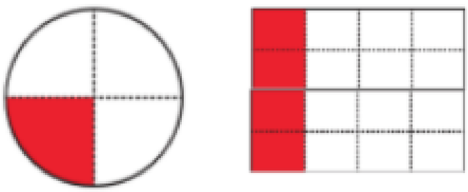


(b)



To complete a shade a quarter question, it is important for your pupils to be able to identify the four pieces needed and shade 1 out of those identified 4 pieces.

So for question (b), said pupil should be able to identify the first row (or column) as having 4 pieces hence 1 out of the 4 pieces can be shaded and move onto the next row(column) until all the rows or columns are completed. They would have shaded 4 out of 16 pieces which is the same as a quarter of this square.



Pupils should also start to draw their own rectangles and put them in equal parts to find halves and subsequently quarter as 2 halves make 1 quarter.