



Calculation Strategies Year R – Year 6

**This document should be read in conjunction
with the Caldecote Maths Curriculum**

September 2024

Contents

IMPORTANT:

This document sets out the new calculation strategies taught in each year group.

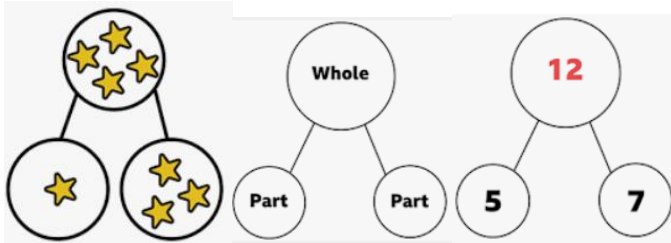
Children will continue to use and consolidate methods taught in previous year groups.

Addition and Subtraction YR – Year 6	Page 3
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Addition & Subtraction

EYFS: addition & subtraction

Pupils will experience practical calculation opportunities using a wide variety of practical equipment including small world play, role play, counters, cubes and Numicon.



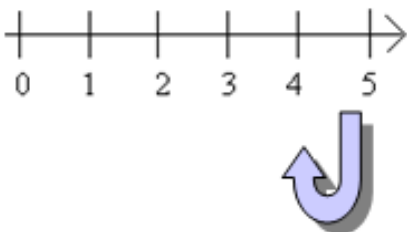
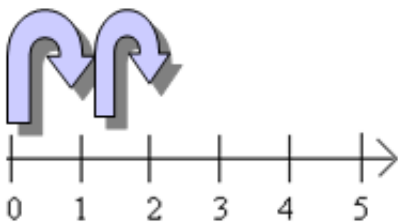
Part-part whole model

Five is a part, seven is a part and twelve is the whole.

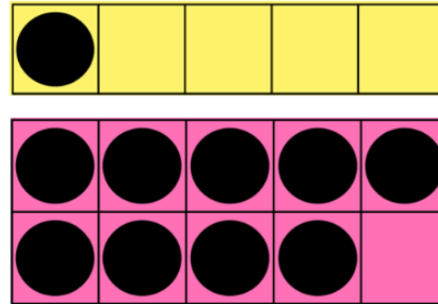
Manipulatives such as cubes, Numicon and other objects



Number lines – count on and back, using Numicon or cubes to support.

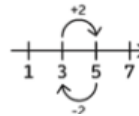


Ten and Five Frames



Those who are ready may record their own calculations by beginning to use mathematical symbols =, +

Two More, Two Less: Think Odds and Evens



If we add two to a number, we go from odd to the next odd or even to the next even. The same if we subtract.

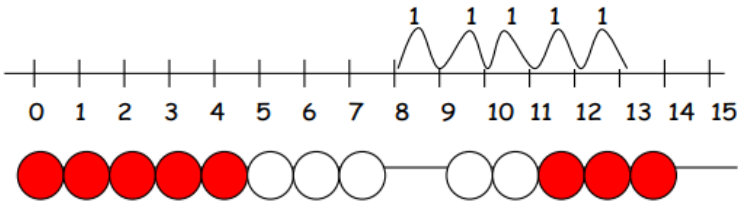
Five and A Bit



Numbers 6, 7, 8, 9 are made up of 'five and a bit'. This can be shown on hands and supports decomposition of these numbers.

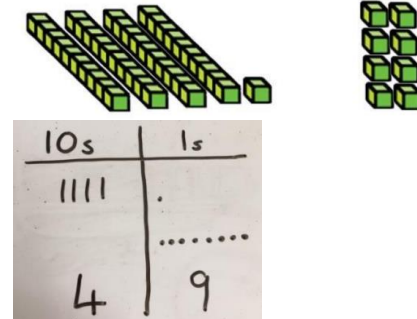
Year 1: Addition & Subtraction

Number lines

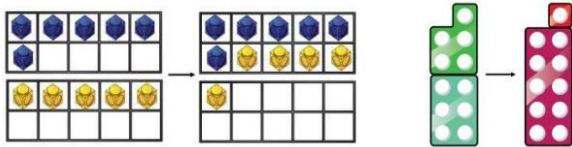


Pupils use number lines along with bead strings or a Rekenrek to illustrate addition and subtraction, including bridging through ten e.g. by counting on 2 then counting on three or counting back 3 then 2.

Addition and subtraction using tens and ones with manipulatives e.g. $41 + 8$

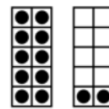


Ten Frames and Numicon



$6 + 5$

Ten and A Bit



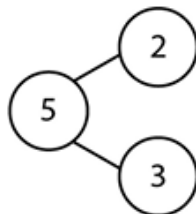
Recognise the structure of numbers 11 – 20 which enables addition and subtraction facts involving their constituent parts (e.g. $3 + 10 = 13$, $17 - 7 = 10$).

Regrouping to make 10 using ten frames and counters/cubes or Numicon.

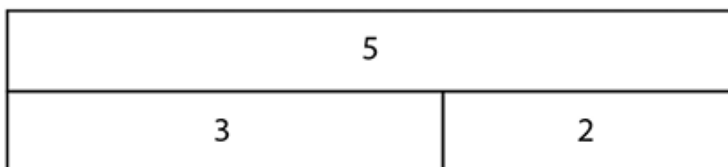
Part-Part-Whole Diagrams

$2 + 3 = 5$

Cherry representation:



Bar model:



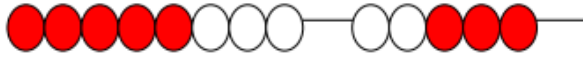
Year 2: Addition & Subtraction

Number lines

Bread strings are used to illustrate addition and subtraction.

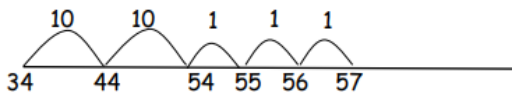
$8 + 5 = 13$ (Count on 2 and then 3)

$13 - 5 = 8$ (Count back 3 and then 2)

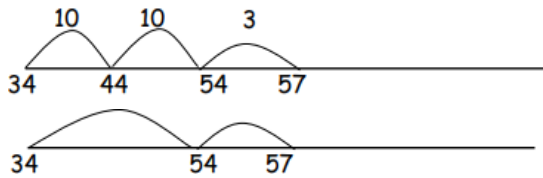


Count on in tens and ones

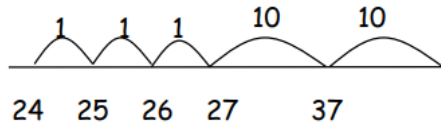
$34 + 23 = 57$



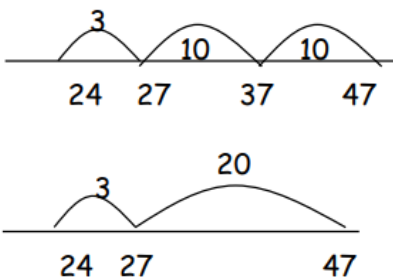
Pupils to become more efficient by adding the units in one jump (using the known fact $4 + 3 = 7$)



Count back in tens and ones



Pupils become more efficient by subtracting the units in one jump (by using the known fact $7 - 3 = 4$)



Partitioning

In preparation for efficient/formal written methods, pupils will use jottings of partitioning alongside part-part whole models and bar models.

$23 + 45 =$

$20 + 40 = 60$

$3 + 5 = 8$

$60 + 8 = 68$

$92 - 47 =$

$80 - 40 = 40$

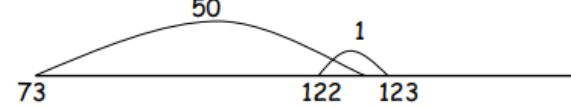
$12 - 7 = 5$

$92 - 40 - 7 = 45$

Compensation – ‘adjust it’

Pupils will use empty number lines to support compensation understanding.

$49 + 73 = 122$



Redistribution

$32 + 59 =$

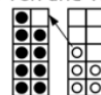
$31 + 60 = 91$

Doubles and Near Doubles



Memorise doubles of numbers to 10, using a visual approach. Once we know $6 + 6 = 12$ then $6 + 7$ is easy.

Make Ten and Then...



Additions which cross the tens boundary. First, make 10 and then add on the remaining amount (e.g. $8 + 6$ can be calculated by $8 + 2 = 10$ and 4 more makes 14). This can be applied to subtractions through 10 (e.g. $14 - 6$ can be calculated by $14 - 4 = 10$ and 2 less makes 8).

Key Stage 2: addition and subtraction

Making Connections

$$92 - 47 = 45$$

$$47 + 3 = 50$$

$$92 - 50 = 42$$

$$42 + 3 = 45$$

$$\begin{array}{r} 92 - 47 \\ \downarrow \downarrow \\ \cancel{50} \quad 42 \\ \quad \quad 3 \end{array}$$

Re-distribution with the same difference

$$92 - 47$$

$$+3 \quad +3$$

$$95 - 50 = 45$$

Column Method

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

$$\begin{array}{r} 3 \quad . \quad 5 \quad 6 \\ + \quad 2 \quad . \quad 4 \quad 7 \\ \hline 6 \quad . \quad 0 \quad 3 \\ \hline \quad \quad | \end{array}$$

Step 1: Line the up the digits using their place value knowledge.

Step 2: Begin with adding the ones. $4 + 7 = 11$. The 1 stays in the ones column and the 1 (ten) is **re-grouped** and is placed in the tens column.

Step 3: Add the tens digits. 6 tens + 4 tens = 10 tens. Add the 1 ten from the bottom. This totals 11 tens.

Step 4: The 1 ten stays in the tens column and the 10 tens (100) is re-grouped and is placed under the hundreds column.

Step 5: 3 hundreds + 2 hundreds = 5 hundreds. Add the 1 hundred from below which makes 6 hundreds.

Step 6: Add the thousands

$$\begin{array}{r} \overset{6}{\cancel{7}} \overset{6}{\cancel{10}} \quad \overset{6}{\cancel{7}} \overset{12}{\cancel{12}} \\ - \quad 3 \quad 2 \quad 2 \quad 6 \\ \hline 3 \quad 8 \quad 4 \quad 6 \end{array}$$

$$\begin{array}{r} \overset{2}{\cancel{3}} \quad \overset{13}{\cancel{4}} \overset{12}{\cancel{12}} \\ - \quad 1 \quad . \quad 7 \quad 6 \\ \hline 1 \quad . \quad 6 \quad 6 \end{array}$$

Step 1: Line up the digits using their place value knowledge.

Step 2: Begin with subtracting the digits in the ones column. There aren't enough ones to subtract 6 therefore 1 ten is **exchanged** from the tens column into the ones column. There are now 6 tens and 12 ones.

Step 3: $12 - 6 = 6$

Step 4: 6 tens - 2 tens = 4 tens

Step 5: There aren't enough hundreds so 1 thousand is exchanged for 10 hundred. 6 thousand is left.

Step 6: 10 hundreds - 2 hundreds = 8 hundreds

Step 7: 6 thousands - 3 thousands = 3 thousands

Multiplication

EYFS: Multiplication

Children will experience equal groups of objects and will count in 2s. They will work on practical problem solving activities involving equal sets or groups. They will explore this through learning opportunities such as through role play and play dough.



They may record simple drawings.

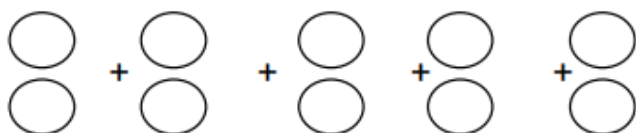


Year 1: Multiplication

Pupils will continue to see multiplication in real life situations such as egg boxes and ice cube trays.

Pupils understand that multiplication is repeated addition and that it can be done by counting **equal** steps/groups.

$$2 + 2 + 2 + 2 + 2 = 10$$



How many legs do three teddies have?



How many shoes are there? Count in groups of two.



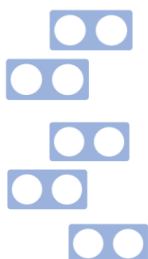
Arrays

Pupils are introduced to an array. They understand that 2×4 is the same as 5×2 .



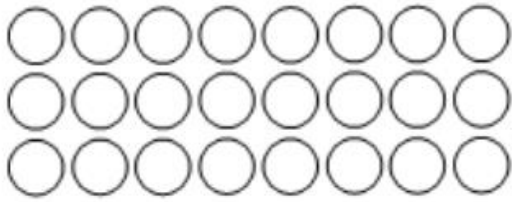
Numicon

5 lots of 2 make 10



Year 2: Multiplication

Pupils will continue to use repeated addition and arrays.

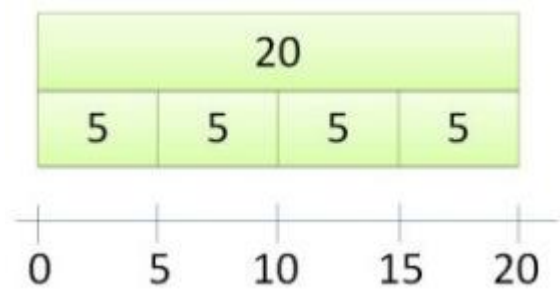


$$3 \times 8 = 8 + 8 + 8 = 24$$

Number lines

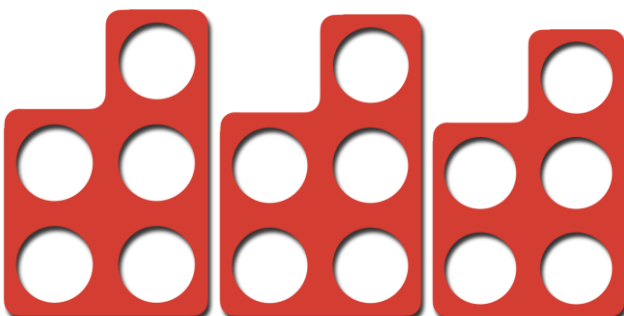


Bar Model representations



Numicon

$$5 \times 3$$



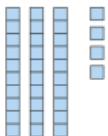
Year 3: Multiplication

Partitioning

Pupils use their partitioning knowledge to multiply a single digit by a two digit number. In doing this, they are introduced to the grid method. Visual imagery is used at this stage before moving onto abstract models.

Partitioning

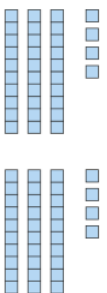
Step 1 – partition thirty-four:



$34 = 30 + 4$

- 'Thirty-four is equal to three tens and four ones.'
- $34 = 3 \text{ tens} + 4 \text{ ones}$

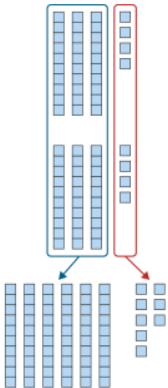
Step 2 – make a copy of the representation (multiply by two):



34×2

- 'Three-tens-and-four-ones multiplied by two.'

Step 3 – multiply the tens and ones and recombine:




$34 \times 2 = 30 \times 2 + 4 \times 2$

$= 60 + 8$

$= 68$

- 'Three-tens-and-four-ones multiplied by two is equal to three tens multiplied by two and four ones multiplied by two.'
- $3 \text{ tens} \times 2 = 6 \text{ tens}$
- $4 \text{ ones} \times 2 = 8 \text{ ones}$

Grid Method



x	30	4	
5	150	20	= 170

Year 4: Multiplication

Pupils will learn expanded multiplication leading onto short multiplication.

Expanded Method

Step 1 – write the factors:

$$\begin{array}{r|l} 10\text{s} & 1\text{s} \\ \hline 3 & 4 \\ \times & 2 \\ \hline \end{array}$$

Step 3 – multiply the single-digit number by the tens:

$$\begin{array}{r|l} 10\text{s} & 1\text{s} \\ \hline 3 & 4 \\ \times & 2 \\ \hline & 8 \\ 6 & 0 \\ \hline \end{array} \quad \begin{array}{l} 2 \times 4 \text{ ones} = 8 \text{ ones} \\ 2 \times 3 \text{ tens} = 6 \text{ tens} \end{array}$$

Step 2 – multiply the single-digit number by the ones:

$$\begin{array}{r|l} 10\text{s} & 1\text{s} \\ \hline 3 & 4 \\ \times & 2 \\ \hline & 8 \\ \hline \end{array} \quad 2 \times 4 \text{ ones} = 8 \text{ ones}$$

Step 4 – add the partial products:

$$\begin{array}{r|l} 10\text{s} & 1\text{s} \\ \hline 3 & 4 \\ \times & 2 \\ \hline & 8 \\ 6 & 0 \\ \hline 6 & 8 \\ \hline \end{array} \quad \begin{array}{l} 2 \times 4 \text{ ones} = 8 \text{ ones} \\ 2 \times 3 \text{ tens} = 6 \text{ tens} \end{array}$$

Short Multiplication

Step 1 – write the factors:

$$\begin{array}{r|l} 10\text{s} & 1\text{s} \\ \hline 2 & 4 \\ \times & 3 \\ \hline \end{array}$$

Step 2 – multiply the single-digit number by the ones and regroup:

$$\begin{array}{r|l} 10\text{s} & 1\text{s} \\ \hline 2 & 4 \\ \times & 3 \\ \hline & 2 \\ 1 & \\ \hline \end{array} \quad \begin{array}{l} 3 \times 4 \text{ ones} = 12 \text{ ones} \\ = 1 \text{ ten} + 2 \text{ ones} \\ \textit{Write "1" below the tens column} \\ \textit{and "2" in the ones column.} \end{array}$$

Step 3 – multiply the single-digit number by the tens and add the tens from regrouping:

$$\begin{array}{r|l} 10\text{s} & 1\text{s} \\ \hline 2 & 4 \\ \times & 3 \\ \hline 7 & 2 \\ 1 & \\ \hline \end{array} \quad \begin{array}{l} 3 \times 2 \text{ tens} = 6 \text{ tens} \\ 6 \text{ tens} + 1 \text{ ten} = 7 \text{ tens} \\ \textit{Write "7" in the tens column.} \end{array}$$

Year 5 and 6: Long Multiplication for Larger Numbers

Pupils to decide on then chosen method based on numbers in the calculation and which method would be most efficient e.g. short method for multiplying 3-digit by 1-digit and long multiplication for 3-digit by 2-digits.

		✂				
		1,000s	100s	10s	1s	
			3	1	2	
×				2	8	
		2	4	9	6	312 × 8
		6	2	4	0	312 × 20
		8	7	3	6	
		1				

Step 1: Write the factors

Step 2: Multiply the ones digit by the ones digit and regroup

Step 3: Multiply the tens digit by the ones digit and add the regrouped tens

Step 4: Multiply the hundreds digit by the ones digit and regroup

Step 5: Place a zero to show that it's ten times the size

Step 6: Multiply the ones digit by the tens digit

Step 7: Multiply the tens digit by the tens digit

Step 8: Multiply the hundreds digit by the tens digit

Step 9: Add the partial products

Division

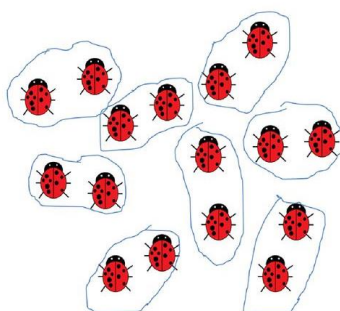
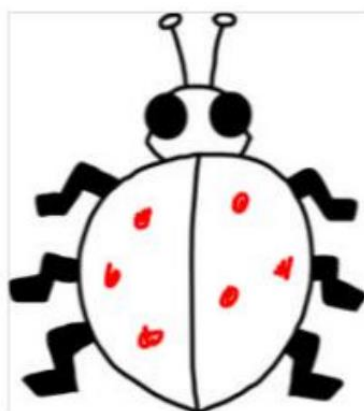
EYFS and Year 1: Division

Pupils investigate sharing and putting items into equal groups. They will experience practical calculation opportunities using a wide variety of equipment such as through role play by acting out sharing.

Sharing into equal groups

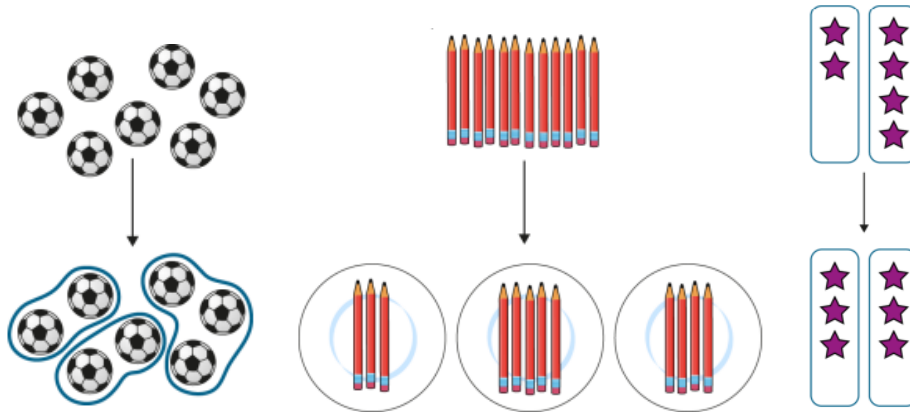


They will develop ways of recording calculations using pictures. The concept of remainders should be discussed as it arises. 'There is one left. Each bowl has four apples and there is one leftover.'



Year 2: Division

Pupils will continue to use practical equipment to represent equal groups and sharing to divide. Pupils will also identify unequal and equal groups and recognise that there can sometimes be a remainder.



Bar model representations

Pupils will use multiplication facts to help divide.

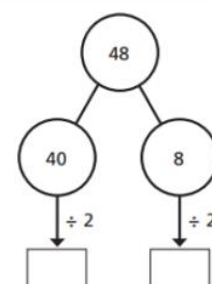
	<i>'There are six counters.'</i>						
	<ul style="list-style-type: none"> • <i>'There are three groups of two; there are six altogether.'</i> • <i>'Six is divided into groups of two. There are three groups.'</i> • <i>'Six is divided into three groups of two.'</i> 						
<table border="1" style="margin: auto;"> <tr><td colspan="3" style="text-align: center;">6</td></tr> <tr><td style="text-align: center;">2</td><td style="text-align: center;">2</td><td style="text-align: center;">2</td></tr> </table>	6			2	2	2	
6							
2	2	2					
$6 = 2 + 2 + 2$ $6 = 3 \times 2$ $6 = 2 \times 3$							

Year 3: Division

Use of base ten or place value counters.

Tens	Ones

$48 \div 2 = 24$

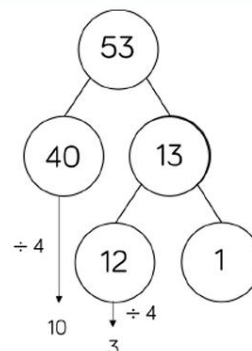


Year 4: Division

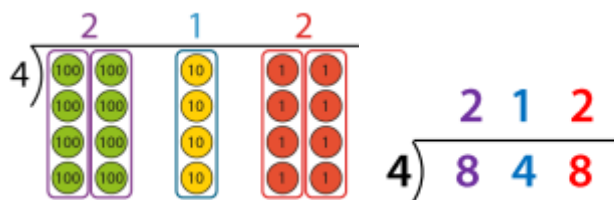
Use of base ten or place value counters with remainders.



$$53 \div 4 = 13 \text{ r}1$$



Partitioning leading to short division



- Step 1: Write the divisor and dividend
 Step 2: Share/group the hundreds
 Step 3: Share/group the tens
 Step 4: Share/group the ones

Year 5: Short Division

98 ÷ 7 becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 86 \text{ r}2 \\ 5 \overline{) 432} \\ \underline{4} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Answer: 86 remainder 2

- Step 1: Set up your question as follows.
 Step 2: How many 7's go into 9? The answer is 1 with 2 remaining. The 2 moves along to the next digit to make 28.
 Step 3: How many 7's go into 28? The answer is 4 with no remainder.
 Step 4: The final answer is 14.

Year 6: Long Division

Pupils to recognise when to use short and long division based on the calculation given.

$$\begin{array}{r}
 29 \text{ r}5 \\
 25 \overline{)730} \\
 \underline{50} \quad \downarrow \\
 230 \\
 \underline{225} \\
 005
 \end{array}$$

	× 25
1	25
2	50
4	100
5	125
8	200
10	250

Step 1: Write the divisor, frame and dividend

Step 2: How many 25's are in 7? 0.

Step 3: How many 25's in 73? $2 \times 25 = 50$. Write 2 above the bus stop.

Step 4: Now subtract 50 from 73. You are left with 23.

Step 5: Bring the 0 ones down to make 230.

Step 6: How many 25's are in 230? $9 \times 25 = 225$.

Step 7: Write 9 above the bus stop.

Step 8: Subtract 225 from 230 which is equal to 5.

Step 9: You are left with 5 remaining.