

For all operations children should be encouraged to:

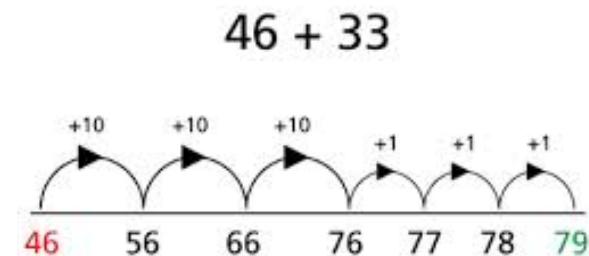
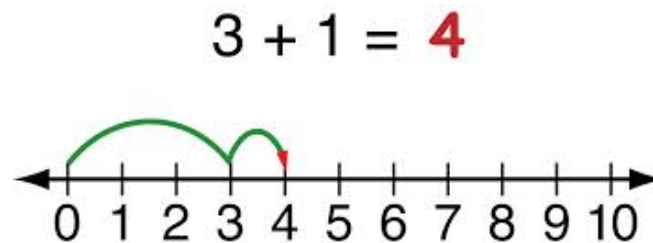
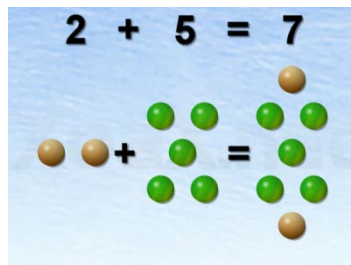
- approximate their answers before calculating.
- check their answers after calculation using an appropriate strategy.
- consider if a mental calculation would be appropriate before using written methods.

Addition +

Stage 1

Develop understanding of addition:

- As combining sets to make a total
- Can be done in any order e.g. $5+2=2+5$
- Is the inverse of subtraction
- Record calculations in a number sentence (e.g. $5+2=7$)
- Using symbols to stand for unknown numbers to complete equations using inverse operations
 $\square + 2 = 4$ $20 + \triangle = 24$ $\square \div \triangle = 4$
- Practical activities for counting objects and combining sets using concrete objects and practical apparatus
- Mostly mental calculations with jottings. Teacher recording.
- Use of pictorial representations e.g.



Stage 2 - Formal Methods

Columnar Addition

(now identified first in year 3 but can be introduced as soon as children are ready in KS1)

Continue to develop mental additions

TU+TU

$$\begin{array}{r} 23 \\ + 45 \\ \hline 68 \end{array} \qquad \begin{array}{r} 36 \\ + 45 \\ \hline 81 \\ 1 \end{array}$$

(Initially not crossing tens boundary)

HTU + TU

$$\begin{array}{r} 636 \\ + 45 \\ \hline 681 \\ 1 \end{array} \qquad \begin{array}{r} 432 \\ + 89 \\ \hline 521 \\ 11 \end{array}$$

HTU + HTU

$$\begin{array}{r} 456 \\ + 765 \\ \hline 1221 \\ 111 \end{array}$$

ThHTU + HTU

$$\begin{array}{r} 1456 \\ + 765 \\ \hline 2221 \\ 111 \end{array}$$

ThHTU + ThHTU

$$\begin{array}{r} 4478 \\ + 3762 \\ \hline 8240 \\ 111 \end{array}$$

Including work on decimals to 1dp and 2dp making links to measures and money

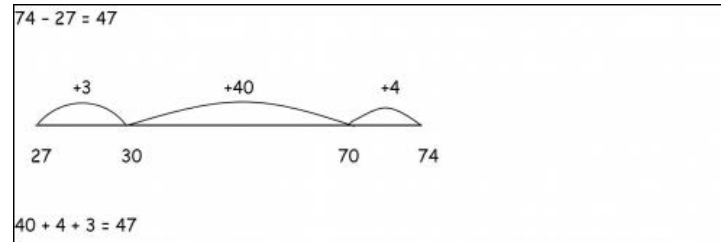
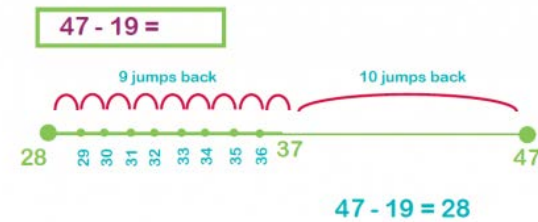
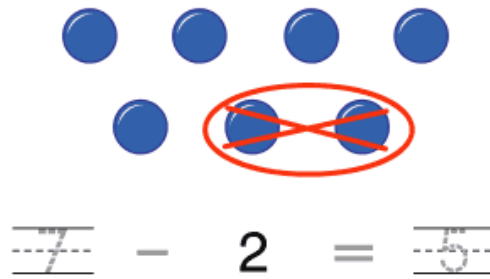
$$\begin{array}{r} 4.3 \text{ cm} \\ + 1.8 \text{ cm} \\ \hline 6.1 \text{ cm} \\ 1 \end{array} \qquad \begin{array}{r} \pounds 4.32 \\ + \pounds 0.89 \\ \hline \pounds 5.21 \\ 11 \end{array}$$

Subtraction -

Stage 1

Develop understanding of subtraction:

- 'Taking away'
- Finding the difference
- Using blank/numbered hundred squares to count back in multiples of 10 or 1
- Cannot be done in any order e.g. $5-2$ does not = $2-5$
- Is the inverse of addition
- Record calculations in a number sentence (e.g. $5-2=3$)
- Using symbols to stand for unknown numbers to complete equations using inverse operations
 $\square - 2 = 4$ $10 - \triangle = 4$ $\square - \triangle = 4$
- Practical activities for counting back and taking away objects using concrete objects and practical apparatus
- Mostly mental calculations with jottings. Teacher recording.
- Use of pictorial representations e.g.



Stage 2 - Formal Methods

Columnar Subtraction

(now identified first in year 3 but can be introduced as soon as children are ready in KS1)

Continue to develop mental subtractions.

TU – TU

$$\begin{array}{r} 56 \\ - 34 \\ \hline 22 \end{array} \qquad \begin{array}{r} {}^4 5^1 6 \\ - 3 \ 8 \\ \hline 1 \ 8 \end{array}$$

(Initially not crossing tens boundary)

HTU – TU

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

HTU – HTU

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

ThHTU – HTU

$$\begin{array}{r} 1^1 4^1 3 \\ 2 \ \cancel{5}^1 4^1 3 \\ - 8 \ 7 \ 6 \\ \hline 1 \ 6 \ 6 \ 7 \end{array}$$

ThHTU – ThHTU

$$\begin{array}{r} 5 \ ^1 3 \\ \cancel{6}^1 4^1 6 \ 7 \\ - 2 \ 6 \ 8 \ 4 \\ \hline 3 \ 7 \ 8 \ 3 \end{array}$$

Including work on decimals to 1dp and 2dp making links to measures and money

$$^4 5.3 \text{ cm}$$

$$- \underline{3.7 \text{ cm}}$$

$$\underline{1.6 \text{ cm}}$$

$$^4 \overset{2}{5}.3^3$$

$$- \underline{^3 3.57}$$

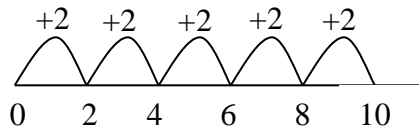
$$\underline{^2 1.76}$$

Multiplication x

Stage 1

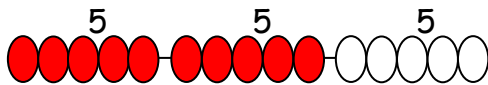
Develop understanding of multiplication:

- Count repeated groups of the same size
- Teacher to introduce x sign as meaning 'lots of' and model recording calculations (e.g. $2 \times 5 = 10$ or 2 lots of 5 = 10)
- Understand multiplication can be done in any order e.g. $2 \times 5 = 10$ and $5 \times 2 = 10$
- Using symbols to stand for unknown numbers to complete equations using inverse operations
 $\square \times 2 = 4$ $2 \times \triangle = 12$ $\square \times \triangle = 8$
- Practical activities to relate multiplication to 'repeated addition' in varying groups of numbers using concrete objects and practical apparatus
- Mostly mental calculations with jottings. Teacher recording.
- Use of pictorial representations e.g.

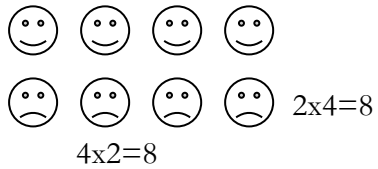


May use a bead bar:

$$3 \times 5 = 5 + 5 + 5$$



Describe an array:



Record calculations in a number sentence (e.g. $5 \times 4 = 20$)

Stage 2 - Formal Methods

Short Multiplication and Long Multiplication

(now identified first in year 3 but can be introduced as soon as children are ready in KS1)

Continue to develop mental multiplications by recalling times table facts.

Short Multiplication

<u>TU x U</u>	<u>HTU x U</u>	<u>ThHTU x U</u>
23	346	2741
x <u>7</u>	x <u>9</u>	x <u>6</u>
<u>161</u>	<u>3114</u>	<u>16446</u>
2	45	42

Long Multiplication

<u>TUxTU</u>	<u>HTUx TU</u>
2	1 2
2 4	1 2 4
<u>X 1 6</u>	<u>x 2 6</u>
1 4 4	7 4 4
<u>2 4 0</u>	<u>2 4 8 0</u>
<u>3 8 4</u>	<u>3 2 2 4</u>
	1 1

Extend to multiplication of decimal numbers to 1dp and 2dp using methods

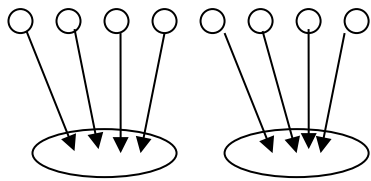
Division ÷

Stage 1

Develop understanding of division:

- Share objects into equal groups and count how many in each group
- Practical activities to relate division to 'sharing equally', 'grouping' and repeated subtraction.
- Understand equal groups and share items out in play and problem solving.
- Teacher model recording simple divisions in a number sentence using the ÷ and = signs, moving to children recording for themselves.
- Include calculations with remainders e.g. $13 \div 2 = 6 \text{ r}1$
- Understand division as the inverse to multiplication.
- Using symbols to stand for unknown numbers to complete equations using inverse operations
 $\square \div 2 = 4$ $20 \div \triangle = 4$ $\square \div \triangle = 4$
- Practical activities to relate division to 'sharing' and 'grouping' using concrete objects and practical apparatus
- Mostly mental calculations with jottings. Teacher recording.
- Use of pictorial representations e.g.

Sharing in problem solving: 8 apples are shared equally between 2 children. How many apples does each child get?



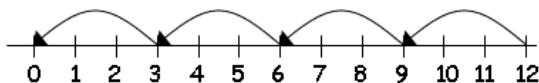
Grouping in problem solving: 8 apples are shared equally between 2 children. How many apples does each child get?
8 grouped into 2's:



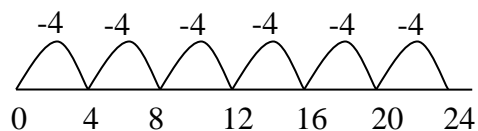
Grouping or repeated subtraction: e.g. There are 6 sweets, how many people can have 2 sweets each?



$$12 \div 3 = 4$$



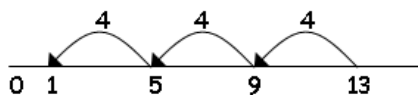
Developing the use of a blank number line for division.



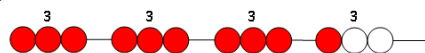
$$24 \div 4 = 6$$

Extend using larger numbers

Continue to complete calculations involving remainders.



May use a bead bar:



Stage 2 - Formal Methods

Short Division and Long Division

(now identified first in year 3 but can be introduced as soon as children are ready in KS1)

Continue to develop mental divisions using related multiplication facts.

Short Division

TU \div U, HTU \div U, ThHTU \div U

Encourage children when ready to write answers in different ways e.g. remainder as a whole number or fraction

Introduce without remainders, then with remainders

	2	1	
4	8	4	

Answer = 21

	1	2	2
8	9	¹ 7	¹ 6

Answer = 122

	1	2	r	4
6	7	¹ 6		

Answer = 12r4 or $\frac{124}{6}$ ($\frac{122}{3}$)

	1	2	1	r	5
7	8	¹ 5	¹ 2		

Answer = $121\frac{5}{7}$

Extend to decimals with one decimal place and writing answer as a decimal: e.g. $174.3 \div 7 =$

		2	4	•	9
7	1	7	³ 4	•	⁶ 3

Answer = 24.9

Move towards decimals with two decimal places.

		2	3	•	2	9
8	1	8	² 6	•	² 3	⁷ 2

Answer = 23.29

Long Division

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

Answer as a remainder

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

Writing the answer as a decimal

This could also be converted to writing the remainder as a fraction e.g. $28 \text{ r } 12 = 28 \frac{12}{15}$ or $28 \frac{3}{5}$