Helping your Child with Maths

Little Waltham CE Primary School

Calculation

The maths work your child is doing at school may look very different to the kind of 'sums' you remember. This is because children are encouraged to work mentally, where possible, using personal jottings to help support their thinking. Even when children are taught more formal written methods they are only encouraged to use these methods for calculations they cannot solve in their heads.

In this booklet we will show you the different methods your child will use as they progress through the school.

Discussing the efficiency and suitability of different strategies is an important part of maths lessons.

Talk to your child about how they work things out

Ask your child to explain their thinking

When faced with a calculation problem, encourage your child to ask...

- Can I do this in my head?
- Could I do this in my head using drawings or jottings to help me?
- Do I need to use a written method? Which one would be most helpful?
- Do I need a calculator to work this one out?

Also help your child to estimate and then check the answer. Encourage them to ask...

- Is the answer sensible?

Addition

Stage 1

Counting, knowing the order of numbers, lots of practical activities with no written recording.

Combine two groups of objects and begin to record pictorially.

Eg, Jane has 3 bears. She was given 2 more. How many does she have now?

3

2

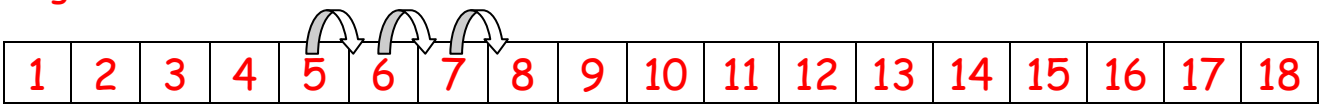
3 + 2 = 5

Children will use a mixture of words and symbols in order to explain to someone else the methods they have used.

Stage 2

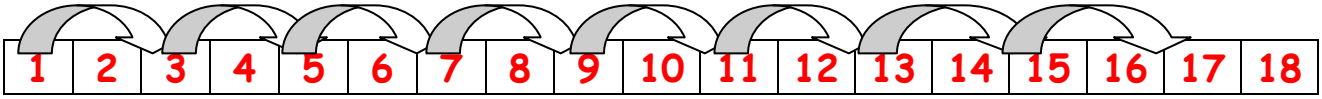
The use of numbered number tracks/lines and 100 squares are very helpful for teaching children the order of numbers and for images of addition and subtraction. It may begin with children physically jumping forwards and backwards along a numbered number track.

E.g. 5 + 3



Children can then use the track for finding patterns.

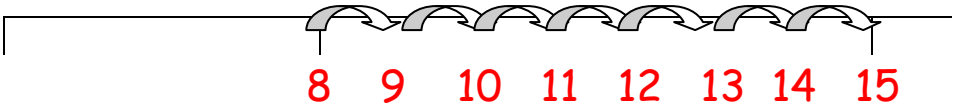
E.g., Mark the numbers you land on when you hop forward in twos from different starting numbers.



Stage 3

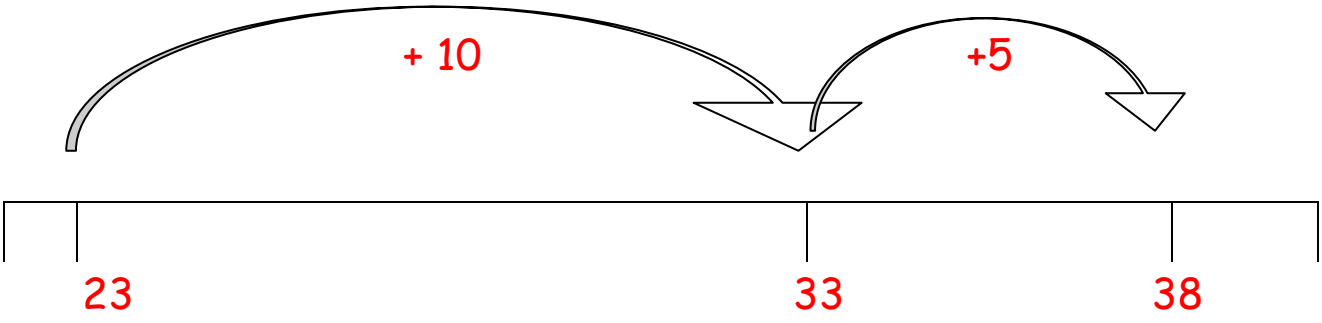
Building on mental methods using an empty number line.

E.g. 8 + 7 = 15

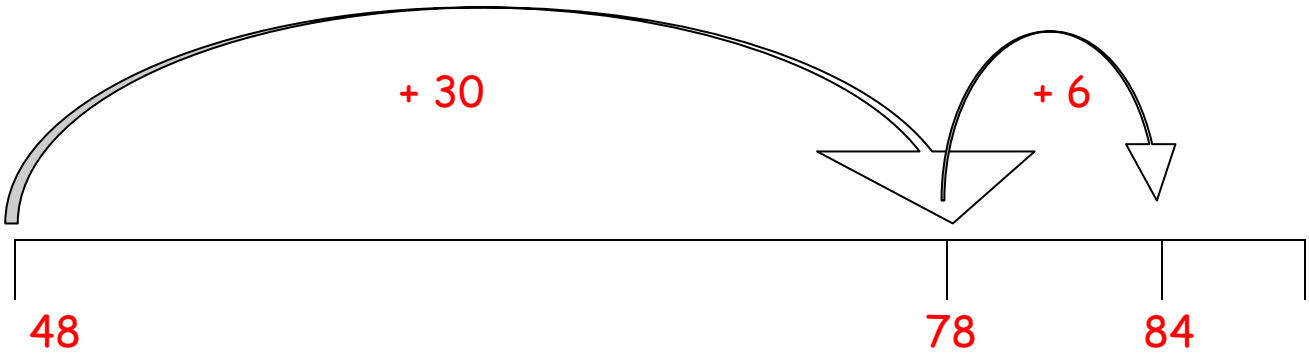


The mental methods that lead to column addition may involve partitioning, e.g. adding the tens and units separately, often starting with the tens.

E.g. 23 + 15 = 38



E.g. 48 + 36 = 84



The empty number line helps to record the steps on the way to calculating the total.

Stage 4

Once children are secure with mentally partitioning numbers, record mental methods using partitioning. Add the tens and then the units to form partial sums and then add these partial sums.

E.g. 43 + 76 = 40 + 70 + 3 + 6
= 40 + 70 + 9
= 110 + 9
= 119

Partitioning both numbers into tens and units mirrors the column method where units are placed under units and tens are placed under tens.

E.g. 43 + 76 = 43 = 40 + 3
+76 = 70 + 6
110 + 9 = 119

Stage 5

Move on to a layout showing the addition of the tens to the tens and the units to the units separately. To find the partial sum children should be taught to add the units digits first.

E.g. 87 + 45 =

```
  87
+ 45
  12   (7 + 5)
 120   (80 + 40)
 132
```

Of course this method can be used for adding three digit numbers.

E.g. 438 + 275 =

```
  438
+ 275
   13
  100
  600
  713
```

This expanded method will lead to the more compact method so that they can understand its structure and efficiency.

Stage 6

In this compact, column method, recording is reduced further. Carry digits are recorded below the line, using the phrases 'carry ten' or 'carry one hundred' not carry one. This method can be applied to numbers with varying numbers of digits.

Eg,

47	258	366
+76	+ 87	+458
123	345	824
11	1 1	1 1

Stage 7 – Using and applying addition methods in a problem solving context and to decimal numbers. (EXTENSION)

E.g. Find the total weight of 5 adults weighing 72kg, 57.4kg, 89.75kg, 72.9kg and 89.4kg to determine if they can all get in a lift with a total weight restriction of 400kg.

```
   72.00
   57.40
   89.75
   72.90
+  89.40
  381.45
   32
```

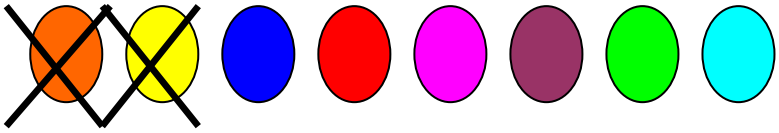
Subtraction

Stage 1

Counting backwards, knowing the order of numbers, lots of practical activities with no written recording.

Children need practical activities of taking away, that is finding how many are left from a collection of objects when some are removed.

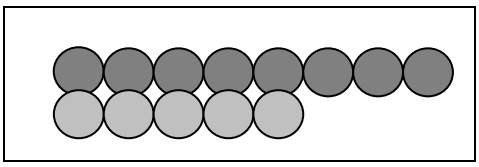
E.g. There were 8 balloons. Two popped. How many balloons are left?



8 – 2 = 6

Children also need practical activities around 'finding the difference', which involves making a comparison between the numbers in two groups of objects. They need to recognise that this is another example of subtraction.

E.g. How many more biscuits does Sally have than you? (The biscuits are represented by counters).



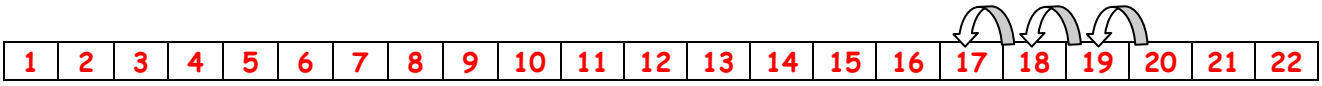
'Sally has 3 more than me'.

A mixture of words and symbols will be used by children in order to explain to someone else the methods that they have used. Children will use a variety of ways of recording subtraction, reflecting the mental methods used.

Stage 2

The use of numbered number tracks and lines is very helpful for teaching children the order of numbers and for images of addition and subtraction. It may begin with children physically jumping forwards and backwards along a numbered number track.

Eg, There are 20 children in our class. Three are away today. How many are here?

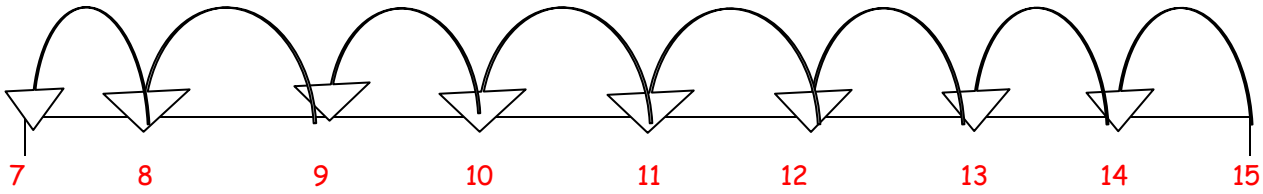


20 – 3 = 17

Stage 3

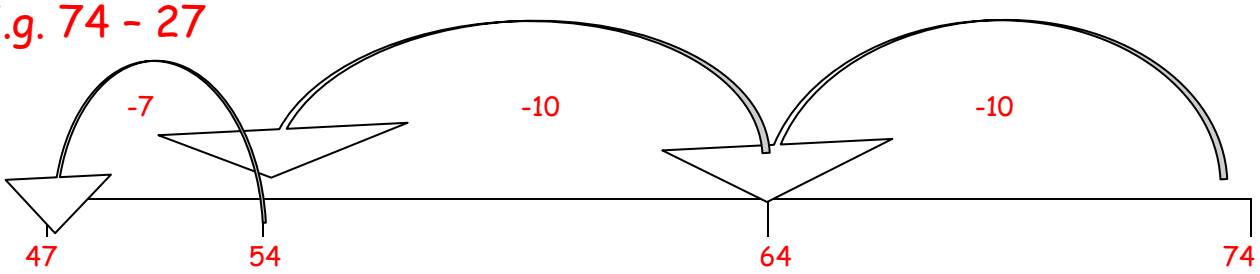
The empty number line helps to record or explain the steps in mental subtraction.
Steps in subtraction can be recorded on a number line. The steps often bridge through a multiple of 10

(i) Counting back in units E.g. 15 – 8



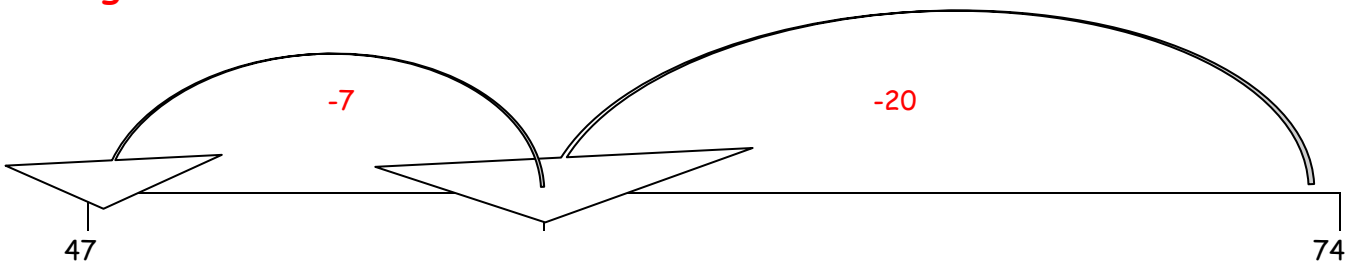
(ii) Counting back by partitioning the number into tens and units

E.g. 74 – 27



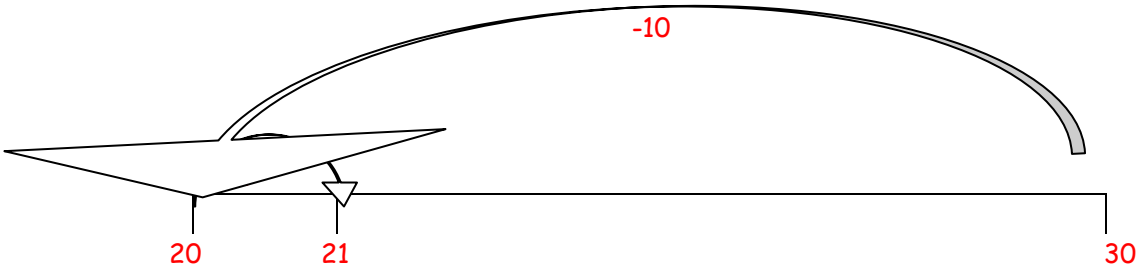
(iii) With practice children will need to record less information

E.g. 74 – 27 = 74 – 20 – 7 = 54 – 7 =47



(iv) Children may use efficient mental methods to inform their written methods, e.g. adjusting

E.g. 30 – 9

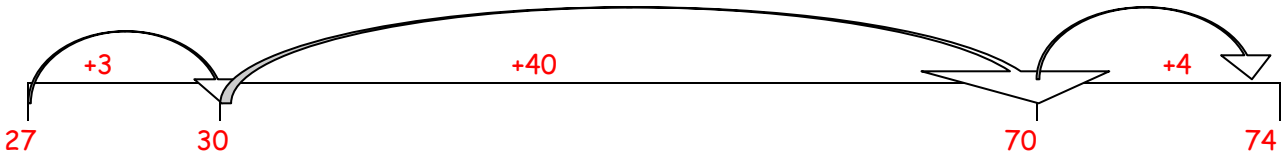


Some children prefer to count on from the smaller to the larger number to find the difference. Particularly mentally this may be a more efficient method. For example consider whether you would count up or back when solving these calculations.

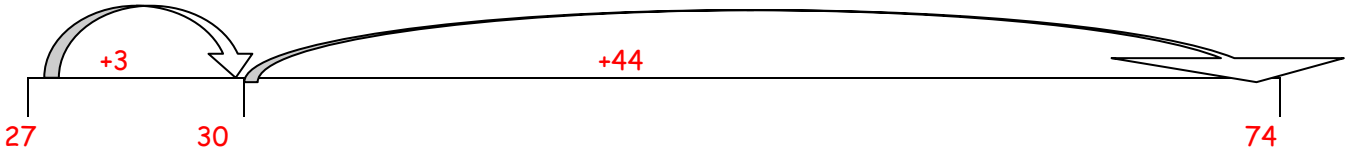
57 – 12 86 – 77 43 – 28

Each of the methods explained in points (i) – (iv) can be applied to this counting on method as explained in these examples:

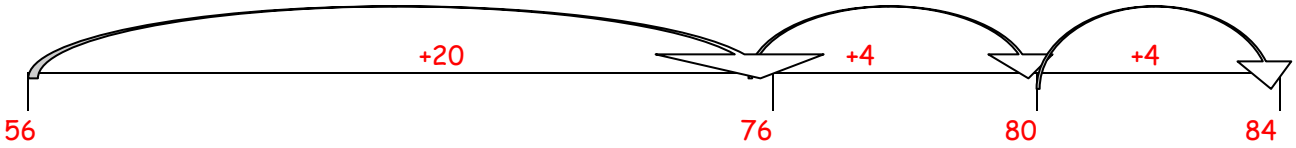
E.g. 74 – 27



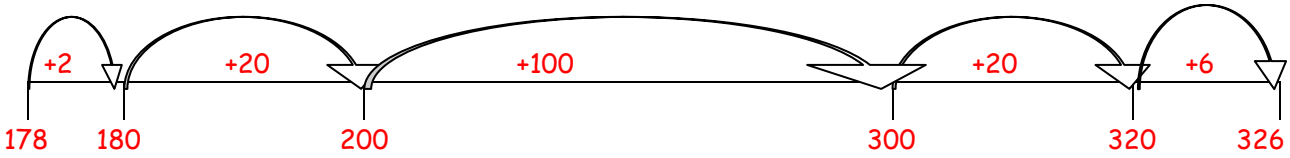
E.g. 74 – 27



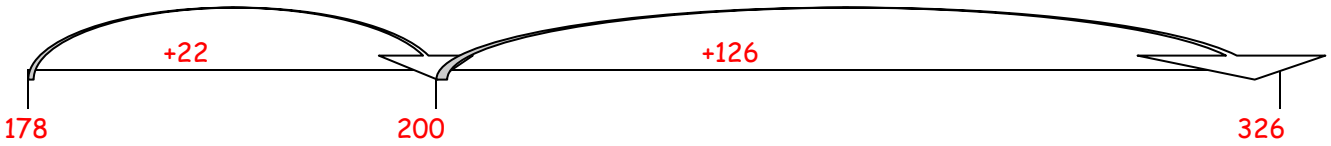
E.g. 84 – 56



E.g. 326 – 178



E.g. 326 –178



Stage 4

Building on the number line, children partition and subtract mentally.
First children should be given sums where no decomposition is required.

E.g., 47 – 36 = 47 – (30 + 6) = 47 – 30 – 6 = 17 - 6 = 11

Then children can cross the tens boundary

E.g., 75 – 47 = 75 – (40 + 7) = 75 – 40 – 7 = 35 – 7 = 28

Stage 5

Stage 5 is the expanded layout, which leads to the column method. Partitioning the numbers into tens and units and writing one under the other, mirrors the column method where tens are placed under tens and units under units. This method parallels the column addition method.

E.g. 74 – 23 = 70 + 4 = 70 + 4
-20 + 3 -20 + 3
50 + 1

This method can be applied to decomposition

E.g. 74 - 27 = 70 + 4 = 60 14
-20 + 7 70 + 4
- 20 + 7
40 + 7

This can be applied to 3 or 4 digit numbers.

E.g. $563 - 271 = 500 + 60 + 3 = \overset{400}{500} + \overset{160}{60} + 3$

$-200 + 70 + 1 \quad \underline{-\ 200 + 70 + 1}$

$200 + 90 + 2$

This method is written in the initial stages, but children should be encouraged to tackle this mentally.

Stage 6

This method leads to a more compact method.

E.g. $74 - 27 =$

$$\begin{array}{r} {\scriptstyle 6\ 14} \\ \cancel{7}\cancel{4} \\ \underline{-27} \\ 47 \end{array}$$

This can be applied to 3 or 4 digit numbers.

E.g. $563 - 271 =$

$$\begin{array}{r} {\scriptstyle 4\ 16} \\ \cancel{5}\cancel{6}3 \\ \underline{-271} \\ 292 \end{array}$$

Stage 7 – Using and applying subtraction methods in a problem solving context and to decimal numbers. (EXTENSION)

E.g. Find the difference in weight of 2 adults weighing 57.8kg, and 89.75kg.

$$\begin{array}{r} {\scriptstyle 8\ 17} \\ 8\not{9}.75 \\ -57.80 \\ \hline 31.95 \end{array}$$

Multiplication

Stage 1

It is expected that there will be lots of practical activities to support children's growing awareness and understanding of multiplication.
Children can complete practical activities involving grouping objects. Rhymes and stories can be used that involve counting in different intervals.

Use apparatus to sort objects into groups.

E.g. Sort six compare bears into 2 groups. How many in each group?

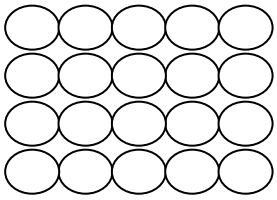
2 lots of 3
2 groups of 3
2 x 3

A mixture of pictures, words and symbols will be used by children in order to explain to someone else the methods that they have used.

Stage 2

Children will begin to recognise multiplication as repeated addition. This can also be expressed as an array.

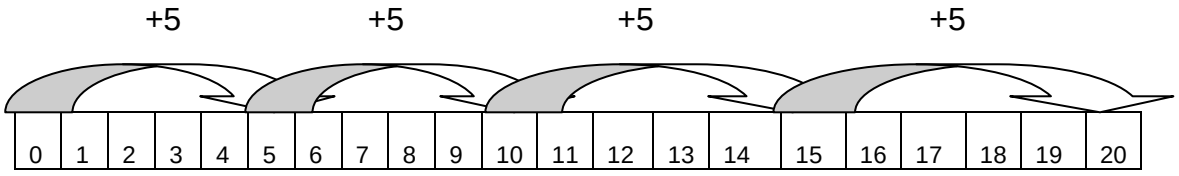
E.g. What is the value of 4 five-pence coins?



5 + 5 + 5 + 5

4 groups of 5

4 X 5



Stage 3

This method of mental multiplication using partitioning allows the tens and units to be multiplied separately to form partial products and these are then added to find the total product.

E.g. 13 x 6 = 10 + 3

↓ ↓

60 18 = 78

43 x 4 = 40 + 3

↓ ↓

160 12 = 172

E.g. 43 x 4 = (40 x 4) + (3 x4)

160 + 12 = 172

To be able to use written methods of multiplication successfully it is important children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for multiplication. For example;

* recalling multiplication facts.
* multiplying by 10 and 100.
* partitioning numbers into multiples of hundreds, tens and one.
* add two or more single digit numbers mentally.
* add multiplies of 10 or 100.
* add combinations of whole numbers using the column method.

Stage 4

The grid method is the main method taught and found to be the method staff feel produces the least amount of errors.

E.g. 38 x 7 =

X	**30**	**8**
7	210	56

210 + 56 = 266

E.g. 56 x 27 =

X	**50**	**6**
20	1000	120
7	350	42

```
  1 0 0 0
    3 5 0
    1 2 0
+     4 2
-------
  1 5 1 2
-------
    1
```

Stage 5

Extend the grid method to HTU x TU

E.g. 286 x 29

X	**200**	**80**	**6**
20	4000	1600	120
9	1800	720	54

```
  4 0 0 0
   1 6 0 0
   1 8 0 0
     7 2 0
     1 2 0
+      5 4
  ---------
   8 2 9 4
  ---------
   2
```

Stage 6

The grid method can be extended to bigger numbers and decimals. This can be presented vertically however the grid method is the most straightforward and efficient way of multiplying and would allow children to tackle any multiplication problem.

```
  56
x 27
  42      (6 x 7    =   42)
 350      (50 x 7   =  350)
 120      (6 x 20   =  120)
1000      (50 x 20  = 1000)
1512
  1
```

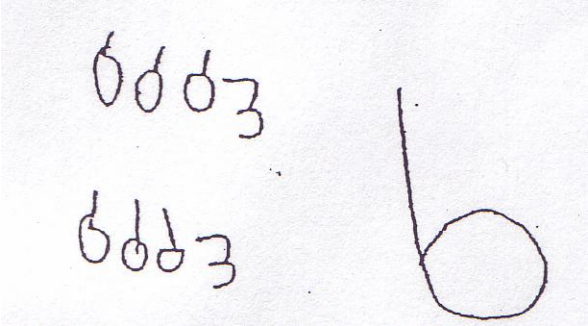
This moves on to …

```
  56
x 27
 392
1120
1512
  1
```

Division

Stage 1

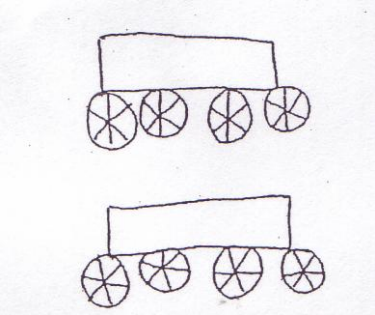
Young children will be familiar with the language of sharing and understand that six shared equally among three people means everyone has two each and that if they were shared between two people, both would have three.



Stage 2

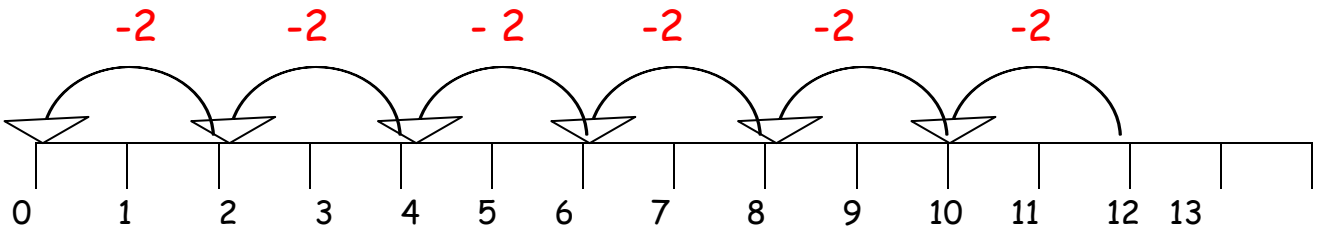
Children can draw pictures to explain to someone else how they have solved a simple division problem.

E.g. How many cars can you make with 4 wheels each if you have eight wheels?



Stage 3

Children will begin to recognise division as repeated subtraction.
E.g. 12 ÷2



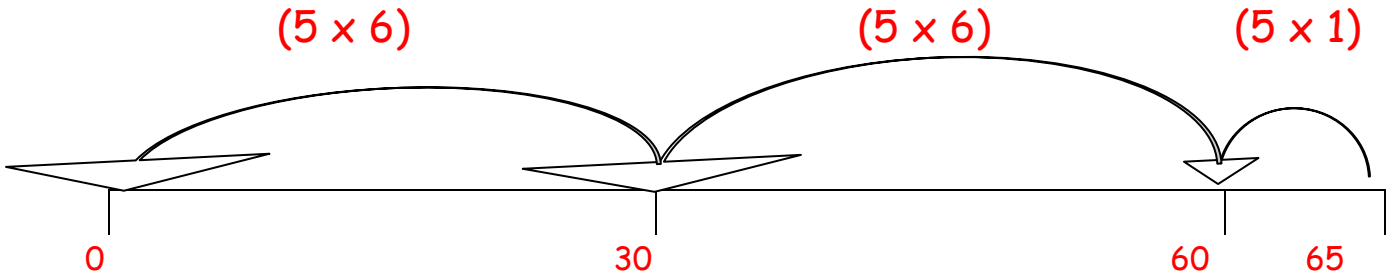
E.g. 24 ÷ 4 = 24 – 4 = 20
20 – 4 = 16
16 – 4 = 12
12 – 4 = 8
8 - 4 = 4
4 - 4 = 0 = 6 (lots of 4 subtracted)

Once mastered both stages 2 and 3 can be repeated using calculations that involve remainders.

Stage 4

Repeated subtraction on a number line can be used with larger numbers by taking away more than one group at a time.

E.g. 65 ÷ 5 =



Stage 5

Chunking – Using tables facts to help. The chunking method is the method which staff feel produces the fewest amount of errors.

E.g. 128 ÷ 4

128		
40	10	(10 x 4)
88		
-40	10	(10 x 4)
48		
-40	10	(10 x 4)
8		
- 8	2	(2 x 4)
0		

= 10 + 10 + 10 + 2 = 32

Examples should also include calculations that leave remainders.

E.g. 97 ÷ 3

97		
- 60	20	(20 x 3)
37		
- 36	12	(12 x3)
1	(remainder)	

=20 + 12 = 32

97 ÷ 3 = 32 remainder 1

Stage 6

In readiness for year 7, more able year six children will be introduced to standard written methods of long division, initially using the chunking strategy, but may look at other written methods (see E.g. 2).

E.g. $972 \div 36$

$$
\begin{array}{rl|ll}
36 & 972 & & \\
- & 720 & 20 & (20 \times 36) \\
\hline
 & 252 & & \\
- & 252 & 7 & (7 \times 36) \\
\hline
 & 0 & &
\end{array}
$$

$= 20 + 7 = 27$

$972 \div 36 = 27$

At this stage remainders may now be divided further leading to a decimal answer.

E.g. $634 \div 5$

$$
\begin{array}{r|l}
 & 126.8 \\
\hline
5 & 634.0
\end{array}
$$

COUNTING IDEAS

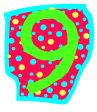
- Practise chanting the number names. Encourage your child to join in with you. When they are confident, try starting from different numbers - 4, 5, 6 . . .
- Sing number rhymes together - there are lots of commercial tapes and CD's available.
- Give your child the opportunity to count a range of interesting objects (coins, pasta shapes, buttons etc.). Encourage them to touch and move each object as they count.
- Count things you cannot touch or see (more difficult!!). Try lights on the ceiling, window panes, jumps, claps or oranges in a bag.
- Play games that involve counting (e.g. snakes and ladders, dice games, games that involve collecting objects).
- Look for numerals in the environment. You can spot numerals at home, in the street or when out shopping.
- Cut out numerals from newspapers, magazines or birthday cards. Then help your child to put the numbers in orders.
- Make mistakes when chanting, counting or ordering numbers. Can your child spot what you have done wrong?
- Choose a number of the week e.g. 5. Practise counting to 5 and on from 5. Count out groups of 5 objects (5 dolls, 5 bricks, 5 pens). See how many places you can spot the numeral 5.





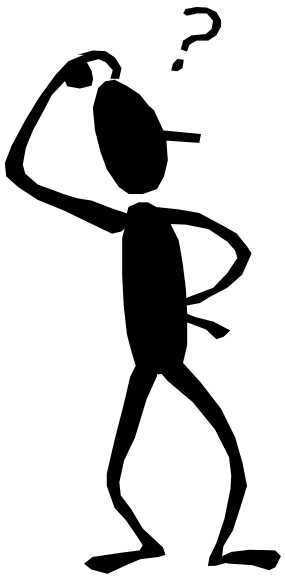






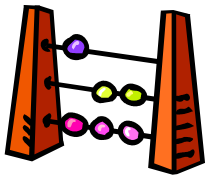
REAL LIFE PROBLEMS

- Go shopping with your child to buy two or three items. Ask them to work out the total amount spent and how much change you will get.
- Buy some items with a percentage extra free. Help your child to calculate how much of the product is free.
- Plan an outing during the holidays. Ask your child to think about what time you will need to set off and how much money you will need to take.
- Use a TV guide. Ask your child to work out the length of their favourite programmes. Can they calculate how long they spend watching TV each day / each week?
- Use a bus or train timetable. Ask your child to work out how long a journey between two places should take? Go on the journey. Do you arrive earlier or later than expected? How much earlier/later?
- Help your child to scale a recipe up or down to feed the right amount of people.
- Work together to plan a party or meal on a budget.



These are just a few ideas to give you a starting point. Try to involve your child in as many problem-solving activities as possible. The more 'real' a problem is, the more motivated they will be when trying to solve it.

PRACTISING NUMBER FACTS



- Find out which number facts your child is learning at school (addition facts to 10, times tables, doubles etc). Try to practise for a few minutes each day using a range of vocabulary.
- Have a 'fact of the day'. Pin this fact up around the house. Practise reading it in a quiet, loud, squeaky …. voice. Ask your child over the day if they can recall the fact.
- Play 'ping pong' to practise complements with your child. You say a number. They reply with how much more is needed to make 10. You can also play this game with numbers totalling 20, 100 or 1000. Encourage your child to answer quickly, without counting or using fingers.
- Throw 2 dice. Ask your child to find the total of the numbers (+), the difference between them (-) or the product (x). Can they do this without counting?
- Use a set of playing cards (no pictures). Turn over two cards and ask your child to add or multiply the numbers. If they answer correctly, they keep the cards. How many cards can they collect in 2 minutes?
- Play Bingo. Each player chooses five answers (e.g. numbers to 10 to practise simple addition, multiples of 5 to practise the five times tables). Ask a question and if a player has the answer, they can cross it off. The winner is the first player to cross off all their answers.
- Give your child an answer. Ask them to write as many addition sentences as they can with this answer (e.g. 10 = □+□). Try with multiplication or subtraction.
- Give your child a number fact (e.g. 5+3=8). Ask them what else they can find out from this fact (e.g. 3+5=8, 8-5=3, 8-3=5, 50+30=80, 500+300=800, 5+4=9, 15+3=18). Add to the list over the next few days. Try starting with a x fact as well.

SHAPES AND MEASURES

- Choose a shape of the week e.g. cylinder. Look for this shape in the environment (tins, candles etc). Ask your child to describe the shape to you (2 circular faces, 2 curved edges ..)
- Play 'guess my shape'. You think of a shape. Your child asks questions to try to identify it but you can only answer 'yes' or 'no' (e.g. Does it have more than 4 corners? Does it have any curved sides?)
- Hunt for right angles around your home. Can your child also spot angles bigger or smaller than a right angle?
- Look for symmetrical objects. Help your child to draw or paint symmetrical pictures / patterns?
- Make a model using boxes/containers of different shapes and sizes. Ask your child to describe their model.
- Practise measuring the lengths or heights of objects (in metres or cm). Help your child to use different rulers and tape measures correctly. Encourage them to estimate before measuring.
- Let your child help with cooking at home. Help them to measure ingredients accurately using weighing scales or measuring jugs. Talk about what each division on the scale stands for.
- Choose some food items out of the cupboard. Try to put the objects in order of weight, by feel alone. Check by looking at the amounts on the packets.
- Practise telling the time with your child. Use both digital and analogue clocks. Ask your child to be a 'timekeeper' (e.g. tell me when it is half past four because then we are going swimming).
- Use a stop clock to time how long it takes to do everyday tasks (e.g. how long does it take to get dressed?). Encourage your child to estimate first.