Framingham Seven

Helping your child with maths

Cluster Schools Calculation Policy 2018.

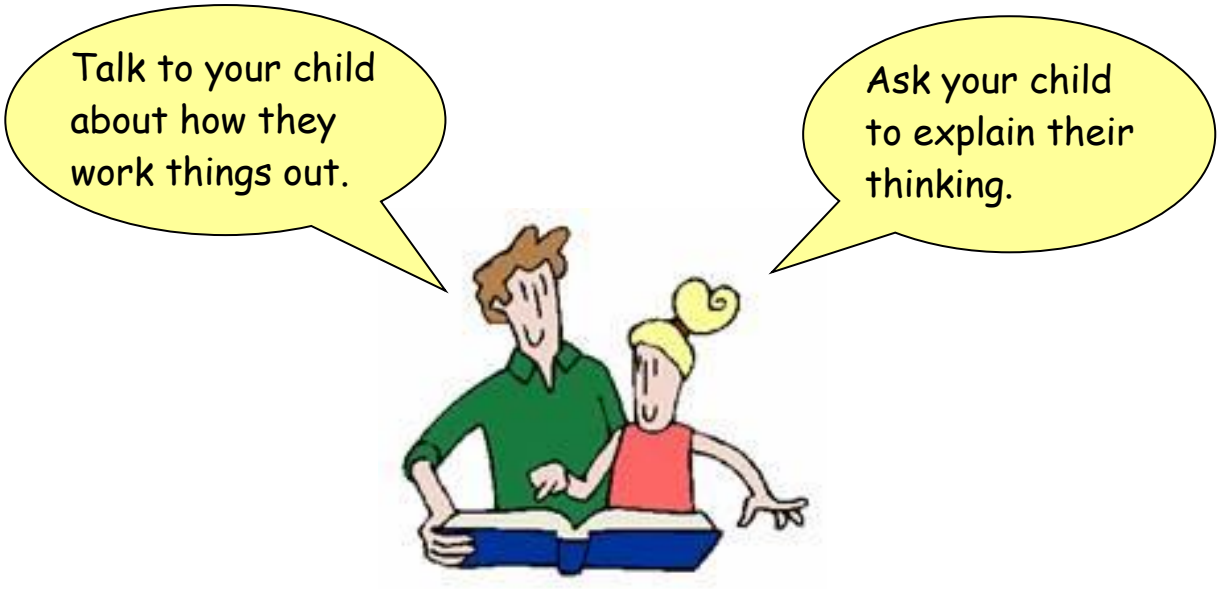
Adapted from Leicestershire Numeracy Team

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 (from late year 3 onwards), they are only encouraged to use these methods for calculations they cannot solve in their heads.

This policy shows the expected progression for each operation during the primary phase. We would greatly appreciate your support by following the guidelines contained within this document.

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



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?
- ★ Should I use a calculator?

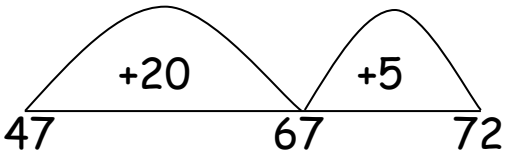
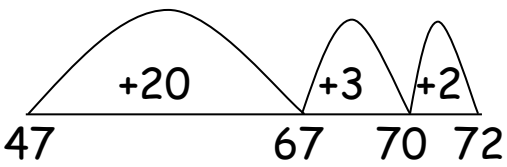
Also help your child to estimate and then check the answer. Encourage them to ask….

Is the answer sensible?

ADDITION

Children are taught to understand addition as combining two sets and counting on.

Progression

2 + 3 = At a party, I eat 2 cakes and my friend eats 3 cakes. How many cakes did we eat altogether? 	Children could draw a picture to help them work out the answer.
7 + 4 = 7 people are on the bus. 4 more get on at the next stop. How many people are on the bus now? /////// ////	Children could use dots or tally marks to represent objects (quicker than drawing a picture).
47 + 25 = My sunflower is 47cm tall. It grows another 25cm. How tall is it now?  or  	Drawing an empty number line helps children to record the steps they have taken in a calculation (start on 47, +20, then +5). This is much more efficient than counting on in ones.

Progression

ADDITION (Continued)

Progression

47 + 34 =

	T	U		
	4	7	⇨	40 + 7
+	3	4	⇨	30 + 4
	8	1	⇦	70 + 11

This method is known as partitioning. The children break down numbers into tens (T) and units (U), add each separately and then recombine to find the solution.

487 + 546 =

There are 487 boys and 546 girls in a school. How many children are there in school altogether?

400 + 80 + 7
+ 500 + 40 + 6
900 + 120 + 13 = 1033

Children will be taught written methods for those calculations they cannot do 'in their heads'. Expanded methods build on mental methods and make the value of the digits clear to children. The language used is very important:

(6 + 7, 40 + 80, 500 + 400, then 900 + 120 + 13 - *add this mentally NOT in columns*).

Progression

Moving to:

	5	4	6
+	4	8	7
		1	3
	1	2	0
	9	0	0
1	0	3	3

ADDITION (Continued)

Progression

2.35 + 1.43 =

Two pounds thirty-five is added to one pound forty-three. How much is there altogether?

$$\begin{array}{r} 2 + 0.3 + 0.05 \\ +\ 1 + 0.4 + 0.03 \\ \hline 3 + 0.7 + 0.08 \end{array} = 3.78$$

Moving to:

$$\begin{array}{r} 2\,.\,35 \\ 1\,.\,43 \\ \hline 0\,.\,08 \\ 0\,.\,70 \\ 3\,.\,00 \\ \hline 3\,.\,78 \end{array}$$

This method can then be used with decimals, using the context of money to begin.

Progression

12 786 + 2 568 =

12 786 people visited the museum last year. The numbers increased by 2 568 this year. How many people altogether visited this year?

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

When children are confident using the expanded method, this can be 'squashed' into the traditional compact method. Remember that the numbers are said according to their value. For example:

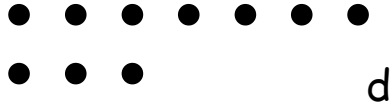
6 + 8, 80 + 60, 700 + 500, 2000 + 2000 (*not* 2 + 2).

SUBTRACTION

Children are taught to understand subtraction as taking away (counting back) and finding the difference (counting up or back).

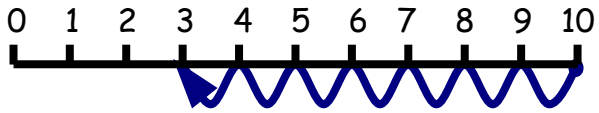
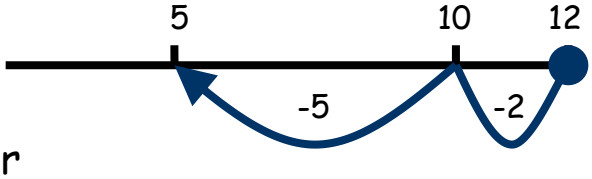
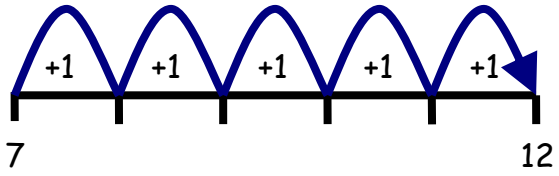
Progression

Progression

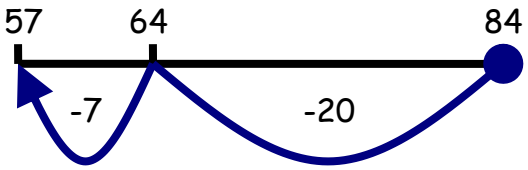
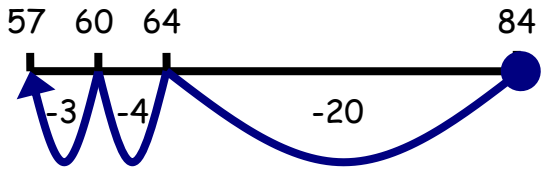
5 – 2 = I had five balloons. Two burst. How many did I have left?  Take away	Drawing a picture helps children to visualise the problem.
A teddy bear costs £5 and a doll costs £2. How much more does the bear cost?  Find the difference	Children can compare quantities and count up or back to find the difference.
7 – 3 = Mum baked 7 biscuits. I ate 3. How many were left? 	Using dots or tally marks is quicker than drawing a detailed picture.
Lisa has 7 felt tip pens and Tim has 3. How many more does Lisa have?  Find the difference	

SUBTRACTION (Continued)

Progression

10 – 7 = There were ten people on the bus. 7 people got off. How many people were left on the bus?  	Children can count back in ones on a numbered line.
12 – 7 = There were 12 children in a mixed class. 7 of the children were boys. How many girls were there in the class?  or  *(Count up to the largest number to find the difference)*	Using an empty number line to jump back in various amounts, choosing jumps of a sensible or manageable size.

Progression

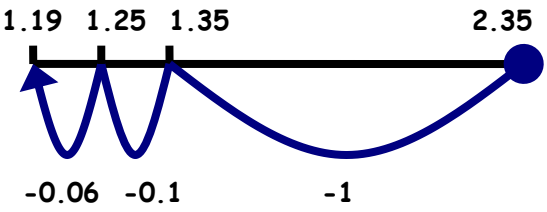
84 – 27 = I cut 27cm off a ribbon measuring 84cm. How much is left?  or  	Children could count back using an empty number line. This is a really good way for them to record the steps they have taken (start on 84, -20, then -7).

SUBTRACTION (Continued)

Progression

With decimals:

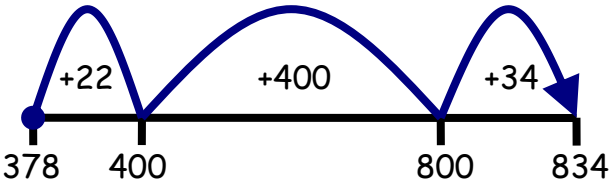
2.35 – 1.19



1.00
0.10 +
0.06
1.16

834 – 378 =

The library owns 834 books. 378 are out on loan. How many are on the shelves?



Counting on / find the difference method:-
Children could count up (from smallest number to the biggest) using an empty number line. It is easiest to count up to a multiple of 10 or 100 (a friendly number).

Progression

74 – 27 =

70 + 4
- 20 + 7

60
~~70~~ + 14
- 20 + 7
40 + 7 = 47

Expanded layout, leading to the Column Method.

Partitioning the numbers into tens and ones and writing one number under the other mirrors the column method, where ones are placed under ones and tens under tens.

Progression

741 – 367 =

$$\begin{array}{r} 700 + 40 + 1 \\ -\,300 + 60 + 7 \\ \hline \end{array}$$

$$\begin{array}{r} \overset{600}{\cancel{700}} + \overset{130}{\cancel{40}} + \overset{1}{1} \\ -\,300 + 60 + 7 \\ \hline 300 + 70 + 4 \end{array}$$

This does not link directly to mental methods of counting back or up but parallels the partitioning method for addition. It also relies on secure mental skills.

334 – 217 =

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

(Carrying tens to units)

537 – 274 =

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

(Carrying hundreds to tens)

The expanded method leads children to the more compact method or Column method sometimes known as Decomposition. The amount of time that should be spent teaching and practicing this method will depend on how secure the children are in their recall of number facts and with partitioning.

Progression

534 – 378 =

$$\begin{array}{r} \overset{4}{\cancel{5}}\ \overset{12}{\cancel{3}}\ \overset{1}{4} \\ -\ 3\ 7\ 8 \\ \hline 1\ 5\ 6 \end{array}$$

With decimals:

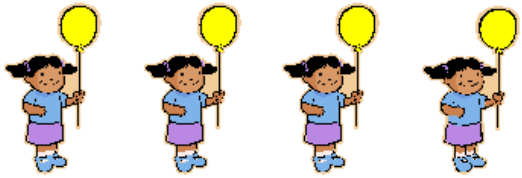
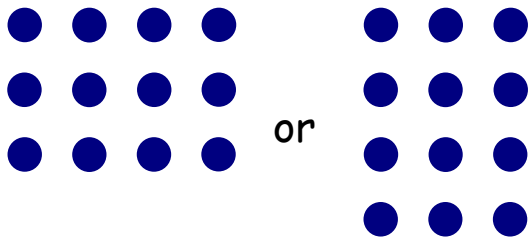
38.2 – 24.7 =

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

MULTIPLICATION

Children are taught to understand multiplication as repeated addition and scaling. It can also describe an array.

Progression

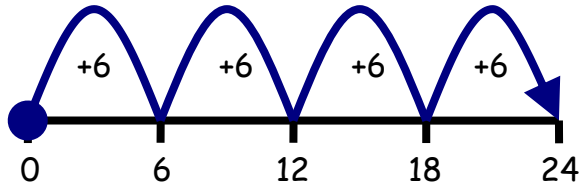
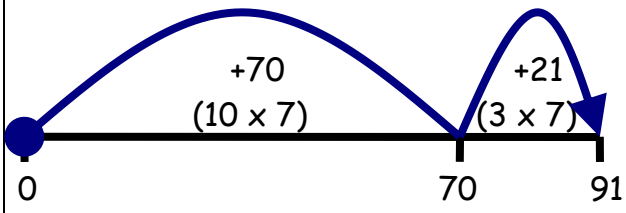
2 x 4 = Each child has two eyes. How many eyes do four children have?  2 + 2 + 2 + 2	Again a picture can be useful. Children can count in groups of 2.
5 x 3 = There are 5 cakes in a pack. How many cakes in 3 packs?  5 + 5 + 5	Dots or tally marks are often drawn in groups. This shows 3 groups of 5 or 3 lots of 5.
4 x 3 = A chew costs 4p. How much do 3 chews cost.  or	Drawing an array (3 rows of 4 or 3 columns of 4) gives children an image of the answer. It also helps develop the understanding that 4x3 (4 three times) is the same as 3x4 (3 four times).

Progression

MULTIPLICATION (Continued)

Progression

Progression

6 x 4 = There are 4 cats. Each cat has 6 kittens. How many kittens are there altogether?  	Children could count on in equal steps, recording each jump on an empty number line. This shows 4 jumps of 6 or 6 four times.
13 x 7 = There are 13 biscuits in a packet. How many biscuits in 7 packets?  or this could be written as:- 1 0 x 7 = 7 0 3 x 7 = 2 1 9 1	When numbers get bigger, it is inefficient to do lots of small jumps. Split 13 into parts (10 and 3). This gives you two jumps (10x7 and 3x7).
6 x 124 = 124 books were sold. Each book cost £6. How much money was taken? x | 1 0 0 | 2 0 | 4 6 | 6 0 0 | 1 2 0 | 2 4 = 744	This is called the Grid Method. 124 is split into parts (100, 20, and 4) and each of these parts is multiplied by 6. The three answers are then added together.

MULTIPLICATION (Continued)

Progression

72 x 34 =

A cat is 72cm long. A tiger is 34 times longer. How long is the Tiger?

x	70	2	
30	2100	60	= 2160
4	280	8	= 288
			2448

This method also works for 'long multiplication'. Again split up the numbers and multiply each part. Add across the rows, then add those two answers together.

72 x 34 =

(This is approximately 70 x 30 which equals 2100).

```
  7 2
 x3 4
2100
  60
 280
   8
2448
```

70	x	30	=	2	1	0	0
2	x	30	=			6	0
70	x	4	=		2	8	0
2	x	4	=				8

Reduce the recording, showing the links to the grid method above.

Progression

342 x 7

```
  342
   x7
2²3²9'4
```

Now using the formal concise method.

Progression

124 x 26

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 7'4^{2}4 \\ 2480 \\ \hline 3224 \\ \hline \end{array}$$

1.6 x 2.4

$$\begin{array}{r} 16 \\ \times 24 \\ \hline 6^{2}4 \\ 3'20 \\ \hline 384 \\ \hline \end{array}$$

= 3.84

The calculation is completed as in the example above, with the decimal point removed.

The decimal point is then replaced in the correct position with two digits following it.
This is because there were two digits following the decimal point in the question.
An alternative method is to use rounding.
1.6 x 2.4 when rounded is approximately 2 x 2, which equals 4.
4 is closer to 3.84 rather than 38.4 or 0.384 etc.

Progression

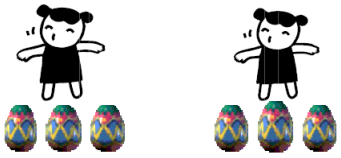
DIVISION

Children are taught to understand division as sharing and grouping.

Progression

6 ÷ 2 =

6 Easter eggs are shared between 2 children. How many eggs do they get each?



Sharing Between two

There are 6 Easter eggs. How many children can have two each?

Grouping in twos

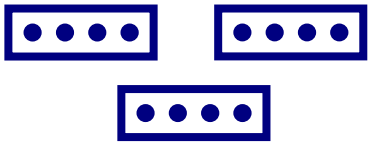
More pictures!

Drawing often gives children a way into solving the problem.

Progression

12 ÷ 4 =

4 Apples are packed in a basket. How many baskets can you fill with 12 apples?

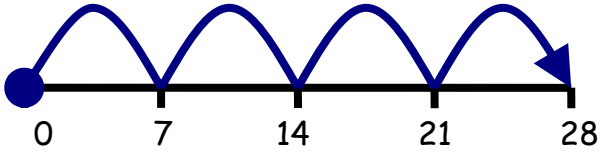


Grouping in fours

Dots or tally marks can either be shared out one at a time or split up into groups.

28 ÷ 7 =

A chew bar costs 7p. How many can I buy with 28p.



Use what you already know about multiplication.

4 x 7 = 2 8

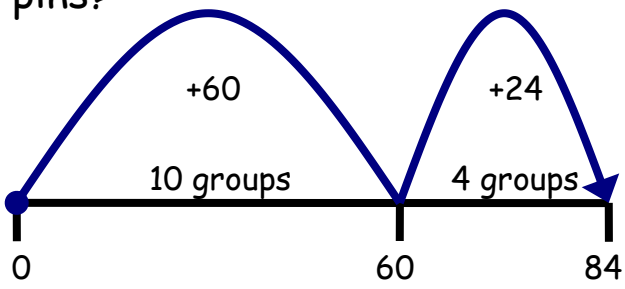
2 8 ÷ 7 = 4

DIVISION (continued)

Progression

84 ÷ 6 =

I need 6 drawing pins to put up a picture. How many pictures can I put up with 84 pins?



It would take a long time to jump in sixes to 84 so children can jump on in bigger 'chunks'. A jump of 10 groups of 6 takes you to 60. Then you need another 4 groups of 6 to reach 84. Altogether, that is 14 sixes.

192 ÷ 8 =

8 pencils fit in each pocket. If you have 192 pencils, how many packets can be filled?

1 9 2 = 1 6 0 + 3 2

20 groups + 4 groups = 24

It is helpful to split 192 into sensible 'chunks' before dividing. As you are dividing by 8, the 'chunks' chosen must also be multiples of 8. Divide each 'chunk' (how many groups of 8?) and then add the answers together.

Progression

106 ÷ 8 =

W D I K? What Do I Know?

Consider what facts you know.

10 x 8

106
- 80
26

You know 10 x 8 = 80 which leaves 26.

3 x 8

- 24
2

You know 3 x 8 = 24 which leaves 2.

So you altogether there are 13 lots of 8 with a remainder of 2.

13 r2

DIVISION (continued)

Progression

196 ÷ 6 =

What easy facts do I know about the 6 times table?

1 x 6 = 6
5 x 6 = 30
10 x 6 = 60
20 x 6 = 120
30 x 6 = 180

That leaves 16, so 16 ÷ 6 = 2 r4

30 lots of 6 + 2 lots of 6 and the remainder equals:-

196 ÷ 6 = 32 r4

Children can work out larger division, with remainders, by using their own number knowledge. This method is called 'What do I know?'
Children write down easy table facts and use these to estimate what the answer could be.
Workings out could be jottings, columns or using a number line.

Progression

184 ÷ 7 =

I need 184 chairs for a concert. I arrange them in rows of 7. How many rows do I need?

```
   026  r. 2
7 | 184
  -140    20 groups
    44
  - 42     6 groups
     2
```

= 26 r2

This method is known as chunking. In this example, you are taking away chunks of 7. First subtract 140 (20 groups of 7) and you are left with 44. Then subtract 42 (6 groups of 7), to leave 2. Altogether, that is 26 sevens with a remainder of 2.

This is long division by a single digit number.

DIVISION (continued)

Progression

432 ÷ 15 0 2 8 r. 12 1 5 ⟌ 4 3 2 - 3 0 0 20 1 3 2 - 1 2 0 8 1 2 = 2 8 r. 12	This is long division by a two digit number.
4 5 r. 1 1 1 ⟌ 4 9^{5} 6	The most able would progress onto short division.

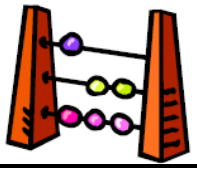
COUNTING IDEAS

- 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 apps and CDs 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 order.
- 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 / 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 or later?
- Help you child to scale a recipe up or down to feed the right amount of people.
- Work together to plan a party 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 practice 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 recall the fact.
- Play 'ping pong' to practice 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 totaling 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 practice the five times tables). Ask a question and if a player has the answer, they can cross it off. The winner is the first one 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 a 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 '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.

HOW CAN PARENTS HELP

- Be positive – show an interest and enthusiasm.
- Remember to make activities fun.
- Use the same method being used in school.
- Allow your children to show you how they do it.
- Do maths regulalry

Revision for Key Stage 1 and 2

https://www.bbc.com/education