How to support your child with maths.

Introduction

The purpose of this booklet is to outline the various calculation methods that children are taught as they progress through the school, many of which look different to the methods that you may have been taught in your primary school days. As children progress through the school, they are building up a bank of strategies that can be applied when appropriate to every day situation and real life problems.

Calculations

A lot of emphasis in Numeracy teaching is placed on using mental calculations where possible to make working out quicker. Children are also encouraged to use jottings to help support thinking and as they progress, they will be required to use more efficient shorter methods that you will probably be familiar with. They will still be encouraged to think about mental strategies they could use first and only use written methods for those calculations they cannot solve in their heads.

It is important that children are secure with number bonds (adding numbers together and subtracting them eg 10-6=4, 13+7=20) and have a good understanding of place value (tens and units etc) before embarking on formal written methods.

When helping your child solve a problem at home, encourage them to think:

- 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?

Does it look big/small enough to be correct?

Children rely on tools such as number lines and written representations of numbers to help them with basic calculations.

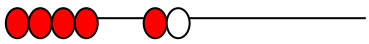
Number lines are available to children in many forms and are introduced to them at a very early age, from their first year of school.
Children make jumps up and down a number line to help them solve a mathematical problem.
As children progress though the school, they are also taught the value of drawing a blank number line that can accommodate relevant numbers to solve calculations. e.g. finding change from 50p after spending 36p

Calculation guidance

Addition

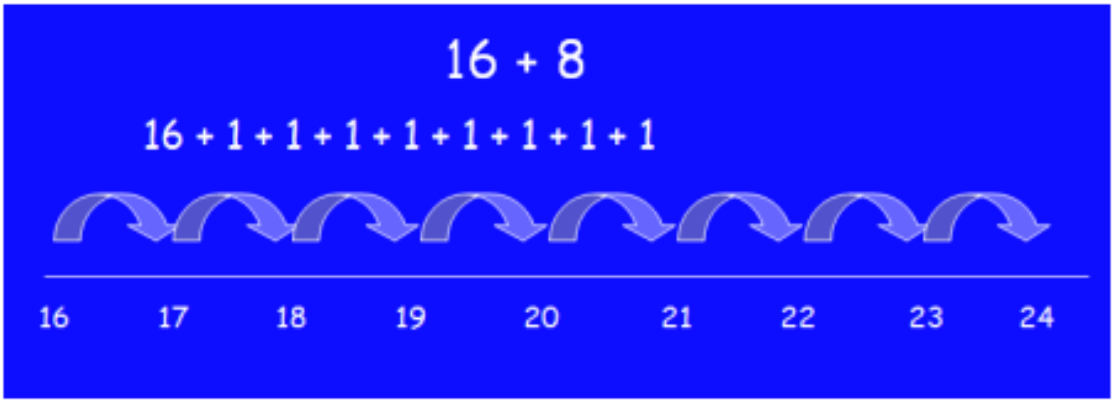
Addition starts very early on in primary school and children start to understand that addition is simply 'getting' more or increasing the number of objects they have.

Children work with equipment such as bead strings to add beads to a set of beads they already have and towards the end of the year, they work on representing this in digits on paper.

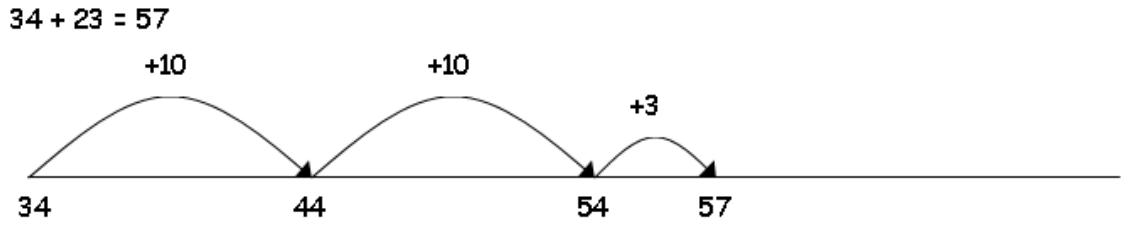


e.g. 4 + 2 = 6

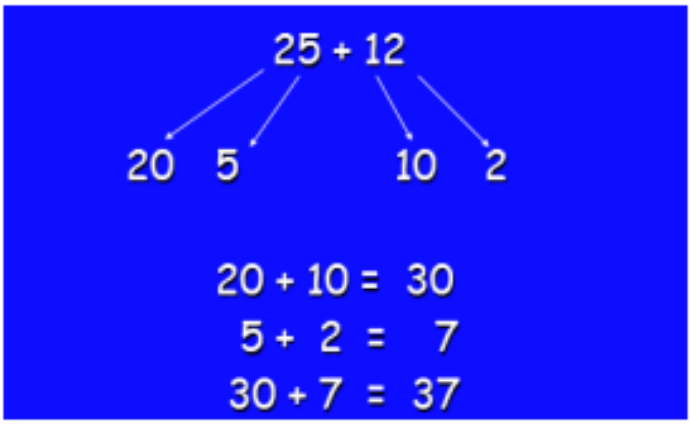
The number line method:
This builds on work done with bead strings but relies on children counting forwards in steps and recording the result.



As your child progresses, they will begin to move along the number line in jumps of more than 1.



Partitioning method:
Children partition (split up) the numbers into the separate values to then add together the units and tens. They then combine the two answers to reach their final answer.



Expanded written addition:
This is a method that combines partitioning and a more expanded method of written addition that will eventually lead onto the more efficient 'column method' of addition.
This allows the child to add the units and the tens separately and then combine both answers to give a final answer.

```
  67
+ 24
  11 ( 7 + 4)
  80 (60 + 20)
  91
```

```
  267
+  85
   12 ( 7 + 5)
  140 (60 + 80)
  200
  352
```

Standard column method of addition – short addition:
Children will now have the knowledge and understanding of place value to add using a short, efficient written method. Children must always start at the units when adding and then move onto the tens. Children often start at the hundreds but start to make errors when the numbers added exceed 9. It is important to encourage starting from the units at home.

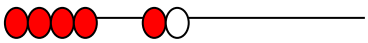
$$\begin{array}{r} 587 \\ +\ 475 \\ \hline 1062 \\ 1\ 1 \end{array} \qquad \begin{array}{r} 3587 \\ +\ 675 \\ \hline 4262 \\ 1\ 1\ 1 \end{array}$$

With 'carried numbers', we place them below to avoid any confusion. Children must ensure they add the extra digits onto their sum.

Subtraction:

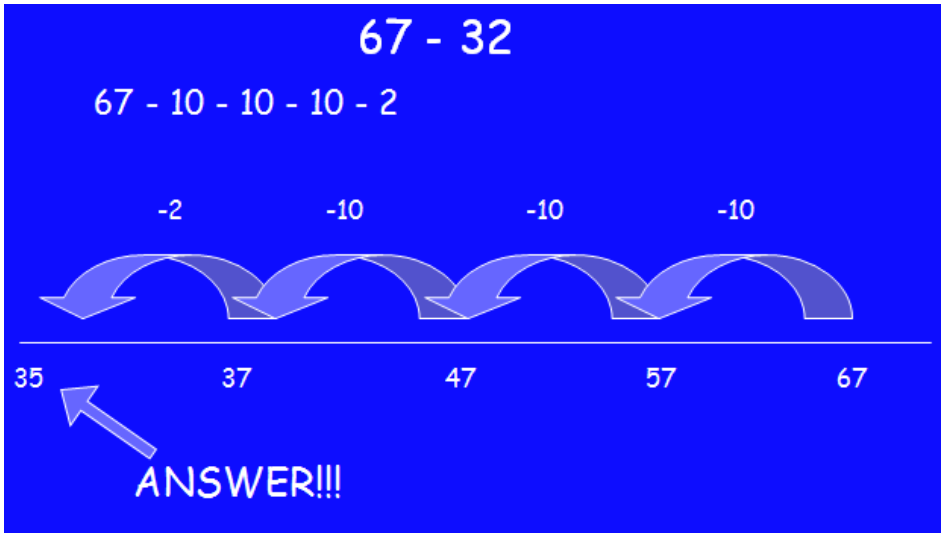
As with addition, subtraction begins in Reception with children physically 'taking away' objects to show that the number is decreasing.

Bead strings or bead bars can be used to illustrate subtraction and children will be taught to write their findings down towards the end of the year.

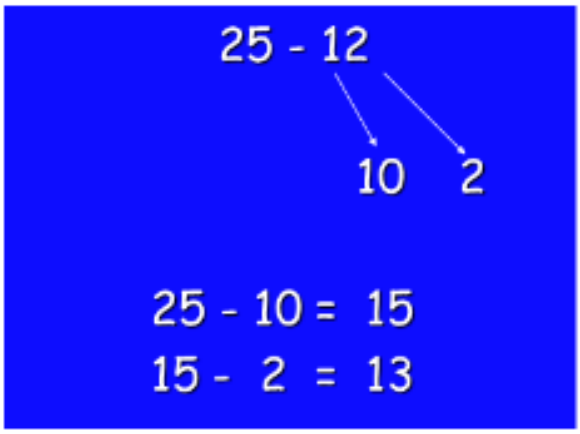


e.g. 6 – 2 = 4

Number line method:
Similar to the way in which children use a number line for addition, this works by counting backwards. The number they get to is the answer after taking away a number repeatedly.



Partitioning method of subtraction:
Children must have an understanding of which is the larger number. The smaller number is partitioned and then tens and unit are subtracted separately from the larger number.



Subtraction by partitioning and decomposition:
This leads onto the more efficient column method of subtraction. It looks long winded but this is because it is expanded to show children the place value of the numbers they are dealing with. Children must break the number down into it's hundreds, tens and units. If a number cannot be subtracted from the other, they must then adjust the number by 'borrowing' or 'exchanging' a number from the next column along.

754 =
- 86

Step 1 700 + 50 + 4
- 80 + 6

Step 2 700 + 40 + 14 *(adjust from T to U)*
- 80 + 6

Step 3 600 + 140 + 14 *(adjust from H to T)*
- 80 + 6
600 + 60 + 8 = 668

This would be recorded by the children as

600 140
~~700~~ + ~~50~~ + $^{1}4$
- 80 + 6
600 + 60 + 8 = 668

Column subtraction - short multiplication:
Once the partitioning and decomposition method is secure, children can then move onto a shorter method of working out. This method relies on children knowing their place value as this is a shorter, more efficient method. They need to understand that 2 – 6 can be done if they 'borrow' or 'exchange' a TEN from the next column to make that number 12. Children must remember to cross out the number they have borrowed from.

$$\begin{array}{r} {\scriptstyle 6\,14\,1} \\ 7\not{5}4 \\ -\ 286 \\ \hline 468 \end{array}$$

Multiplication

Times tables:
By the end of Year 4, pupils should have memorised their multiplication tables up to and including the 12 times table and use these to aid fluency and precision in their work. It is important for children to practice these daily.

When learning multiplication tables, children are taught to look for patterns such as odd and even number answers, or patterns made by adding together the separate digits in the answers.
Children are also taught to recognise the reversible effect so that they know 6 x 2 is the same as 2 x 6.
They are also taught the relationship with division (inverse) so that knowing 6 x 2 = 12 means they also know that 12 ÷ 2 = 6 and 12 ÷ 6 = 2.
Children should also understand that for each known times table fact, they also know three others:
6 x 7 = 42 so they know that 7 x 6 = 42
42 ÷ 6 = 7
42 ÷ 7 = 6

To help children with their multiplication, one of the ways that can be used is to find all the factors that make up a number. For example the factors of 18 are 1,18, 2, 9, 6, 3 because 18 x 1, 1 x 18, 3 x 6, 6 x 3, 9 x 2, 2 x 9 all equal 18.

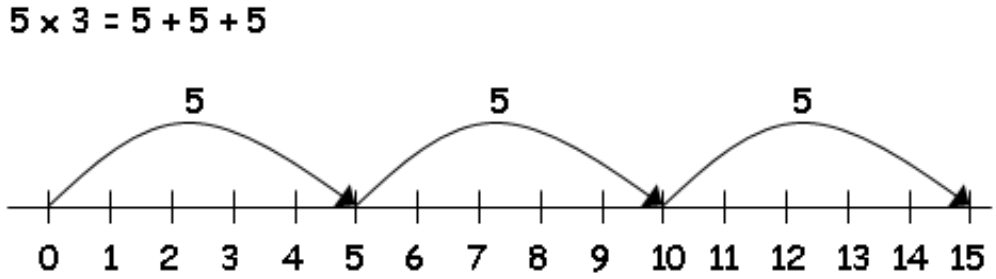
Grouping:

In Reception and Year 1, children will experience equal groups of objects. They will count in 2s and 10s and begin to count in 5s.

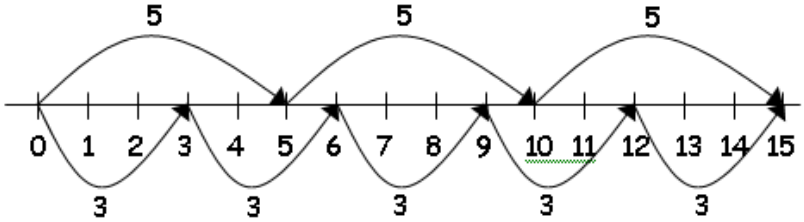
They will also work on problems involving them finding equal groups of objects. Children will be encouraged to record things pictorially and then, as they grow in confidence, start to record numbers that they are working with.

Repeated addition method:
This builds on the addition on a number line method but relies on children confidently jumping several numbers of equal value at a time.

To solve the sum 5 x 3, children are encouraged to start at the beginning of a number line and count in fives, three times.



Children will also be able to recognise that multiplication can be done in any order; that 5 x 3 gives the same answer as 3 x 5 as demonstrated below.



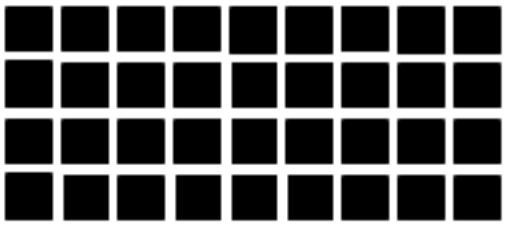
Arrays:
A visual representation of a multiplication can be useful if children are learning their tables.
Here, the number 15 is arranged in 3 rows of 5, or 5 columns of 3.

5 x 3 = 15

3 x 5 = 15

Children can also investigate other ways of representing the number 15 as an array by showing 1 row of 15 or 15 rows of 1.

As children gain more confidence using arrays to represent multiplication, they can start to use larger multiplications. This will help when they come to use the 'grid method' of multiplication.



9 x 4 = 36

9 x 4 = 36

Partitioning method:
As with addition and subtraction, children will understand the place value of the numbers they are working with. By partitioning the larger number into tens and units, the separate numbers can be multiplied to give two answers which will then be combined to give a final answer.

e.g. 38 x 5 = (30 x 5) + (8 x 5)

= 150 + 40

= 190

Grid method:
Children will by now have the skills to approximate the answer that they will get by using partitioning, so they can check that their multiplying is accurate.
The grid method draws on those skills of partitioning.

×	20	3
8	160	24

160
+ 24
184

Here, the numbers are partitioned and multiplied separately, children will then show this written formally as a column sum.

Expanded short multiplication:
The next stage of this is to show it as a column sum but using some of the skills that will lead onto short multiplication in the future.
Here we have 7 x 30 (=210) and 7 x 8 (56)
The answers have then been added using column addition.

38
× 7
210
56
266

Short multiplication:
The final stage of this is the formal method for short multiplication. Children, by now, have the knowledge and understanding of place value and know their

times tables well enough to multiply numbers by single digits, as well as by 10 and 100.

$$\begin{array}{r} 38 \\ \times\ \ 7 \\ \hline 266 \\ \hline {\scriptstyle 5} \end{array}$$

Here, 7 x 8 (=56) has been completed first, the 5 in 56 has to be carried under the next number as a ten.
Then 7 x 30 (=210) PLUS the 5 tens (50) carried before.

With these methods, children would then be expected to multiply larger numbers by each other such as three digit by two digit numbers and 4 digit numbers by three digit numbers.

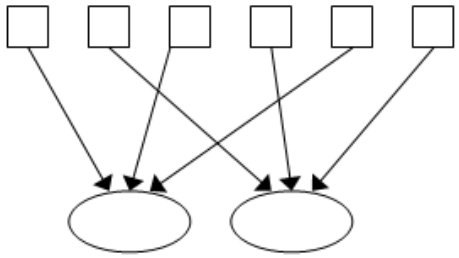
Division:
Children are taught to understand division as sharing and grouping. Multiplication and division
are interlinked and children that know their multiplication tables can often grasp division much quicker due to seeing patterns in the numbers they are dealing with.

In reception and year 1, children will understand division as sharing out a given number of objects.
E.g.

By the end of year 1, children will be comfortable in grouping in 2s, 5s and 10s.

Sharing equally:
Children will work with objects to share between a given number.

For example, this illustrates 6 divided by 2.

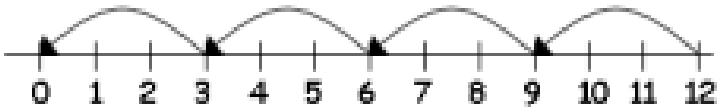


Calculations are put into practical contexts so that the child sees the relevance of the method they are learning.

Six sweets are shared between two children. How many sweets does each child get?

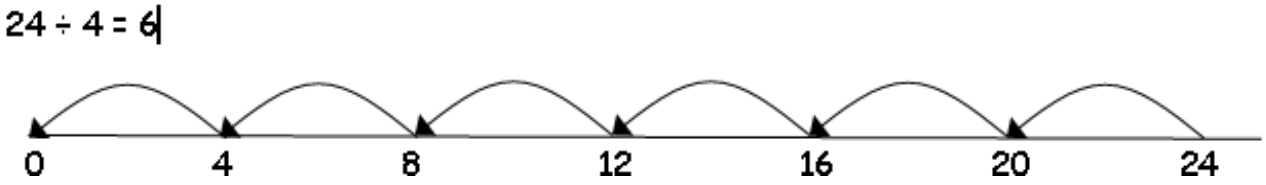
Drawing pictures make it easy for the child to visualise the problem and often makes it
easier to solve. Practical equipment is also used to model and solve the problem.

Repeated subtraction:
As with multiplication, children can use a number line to work out problems involving division.

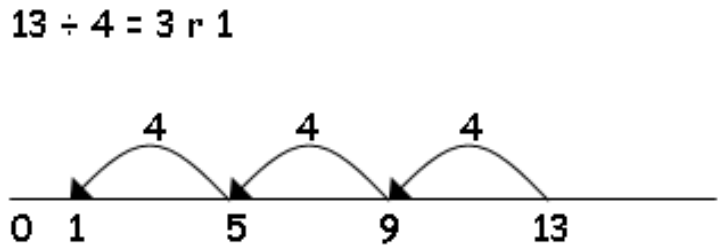


The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?'

In year 3, children will still rely on tools such as a number line to solve mathematical problems, they will move onto unmarked, empty number lines and use their knowledge of multiplication tables to help them count backwards. E.g.



Children will then begin to see that not all division sums end in equal groups. Remainders are possible and on a number line, if they cannot get back to zero, they will find that their answer contains a reminder.



Moving forward, children will then be able to complete larger jumps in multiples. This requires a sound knowledge of multiplication tables and children to be confident when adding up the amount of jumps they have done.

Vertical method – Chunking:
With chunking, children are applying the same knowledge as they would when using a number line.
They are taking away groups of numbers at a time and calculating what is left until they reach 0 or a remainder.
Again, their knowledge of multiplication tables must be secure so that they can confidently take away 'chunks' of the number.

e.g. 165 ÷ 6 = 27r3

1	**6**	**5**		
-	**6**	**0**	**10 x 6**	
1	**0**	**5**		
-	**6**	**0**	**10 x 6**	
	4	**5**		
-	**3**	**0**	**5 x 6**	
	1	**5**		
-	**1**	**2**	**2 x 6**	
		3		

Chunks of the number are taken away each time and the left over number is calculated. If more chunks can be taken away, it should be done until you are left with 0 or a remainder.

Add up the amount of 6s that have been subtracted (27)

No more groups of 6 can be taken away so the answer is 27r3.

Formal method for short division:
Once children have mastered how division works with numbers 'going into' another number a certain amount of times, they can then move onto short division.

Here, children will have to work out how many times the 3 goes into 8.
The answer is 2 and the remainder then gets carried to the next number to create 21.
Children then have to work out how many 3s go into 21.

$$3\overline{)8^{2}1}\quad 27$$

Children must ensure that they carry their remainder over so that they are diving with the correct numbers.

When they have mastered dividing by 1 digit numbers, they can then move onto dividing by 2 digit numbers.

How to support your child with counting and understanding number.

Using a number line:

When they are confident with the names and order of numbers, try starting from different numbers – eg 4,5,6…. Also try counting backwards.

Say a number sequence out loud with a number missing, encourage your child to work out the missing number.

• Sing number rhymes and times tables songs together.

• Give your child the opportunity to count objects when out and about/helping around the house etc.

Encourage them to move each object as they count them.

• Count things you cannot touch – windows, jumps, claps, fruit in a bag.

• Play games that involve counting – eg snakes and ladders, dice games.

• Look for numerals in the environment – eg car number plates

Look for different representations of numerals in the environment such as roman numerals on clock faces.

• Make mistakes when chanting, counting or ordering numbers. Can your child spot what you have done wrong?

• Chose a number of the week e.g. 5. Practice counting in 5's, up to 5, on from 5,collect groups of 5 items.

Practicing Number Facts:

• Its important children learn number bonds to 10. eg 4 + 6 = 10 and number bonds to 20 eg. 14+6 = 20 by heart. This will lead naturally onto number bonds to 100 and 1000 when their knowledge is secure.

• Play 'ping pong' to practice number bonds with your child. You say a number and they reply with how much more is needed to make 10, 20, 100 or 1000. Encourage your child to answer quickly without counting or using fingers. Eg make 100 you shout 40 they shout 60.

• Throw two dice. Ask your child to find the total of the numbers (+), the difference between them (-) or the product (x).

• Use a set of playing cards (without the picture cards). 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 two minutes?

• Play 24 with a pack of playing cards using all of them. You need 4 players each puts a card down and first one to make 24 using any or all of the 4 operations and using all or some of the cards. First one to make number keeps all the cards. Eg you put down a Jack , 2 hearts, 7 spades and 2 clubs. You could say 2x Jack add 2 hearts.

• Play Bingo. Each player chooses five answers (e.g. numbers to 10 to practice simple addition, multiples of 5 to practice the five times table etc). 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 number sentences as they can with this answer. You could just ask for addition sentences or any type of calculation.

• Give your child a number fact – eg 5 + 8 = 13. Ask them what else they can find out from this fact – 50 + 80 = 130, 8 + 5 = 13, 13 – 8 = 5, 130 – 50 = 80 etc

• Look out for car number plates. What is the number on the plate? What is this to the nearest 10 or 100 or 1000? How many more would you need to reach the next multiple of 10, 100 or 1000?
• Make up rhymes together to help your child remember tricky times tables.

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 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 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/later than expected? By how much?
• Help your child to scale a recipe up or down to feed the right amount of people.
Getting children involved in real situations where they are using mathematical skills is motivating and stimulating.

Shape and Measure
• Choose a shape of the week. Look for this shape in the environment. Ask your child to describe the shape to you.
• Play 'guess my shape'. You think of shape. Your child asks questions to try to identify it but you can only answer 'yes' or 'no'.
• Hunt for right angles around your home. Can your child spot angles that are bigger or smaller than a right angle?
• Look for symmetrical objects. Help your child to paint or draw symmetrical pictures/patterns.
• Make a model using different boxes/containers of different sizes. Ask your child to describe their model to you.
• Practise measuring the lengths and heights of objects in metric measurements. Help your child use different rulers or tape measures correctly. Encourage them to estimate before measuring. Compare measurements in metric and imperial.
• Let your child help with the cooking. Help them to measure ingredients accurately. Talk about what each division on a scale represents.
• Choose some food items out of the cupboard. Try to put the objects in order of weight by feel alone. Then check by looking at the weights 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 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.
• 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?