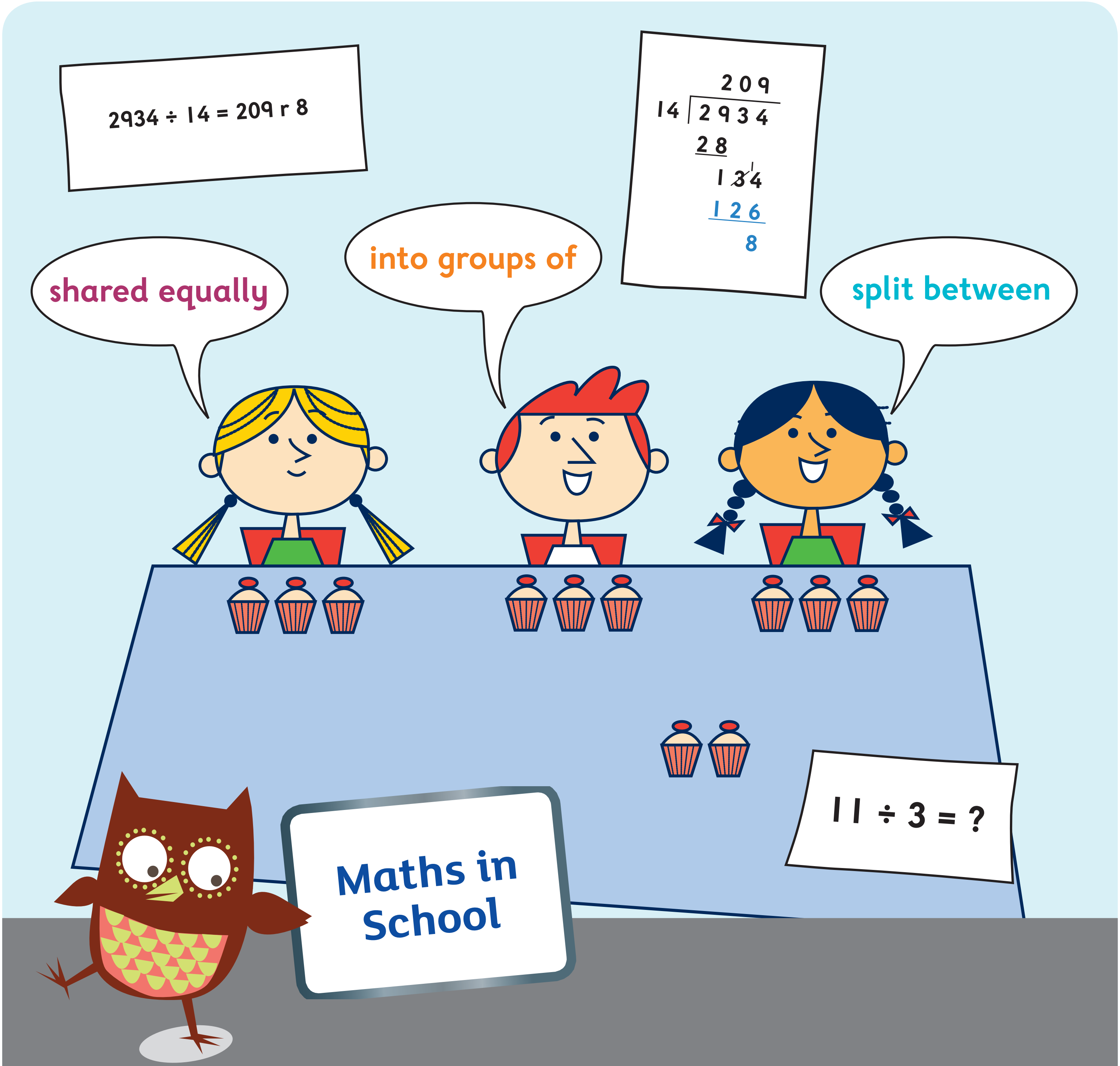

Division in School

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Introduction

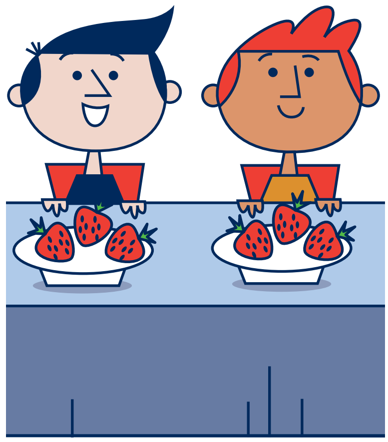
In this booklet, you'll find out how your child is taught to divide in school. You'll also find a range of games and activities that you can use at home to build your child's skills and confidence in division.

Sharing and grouping

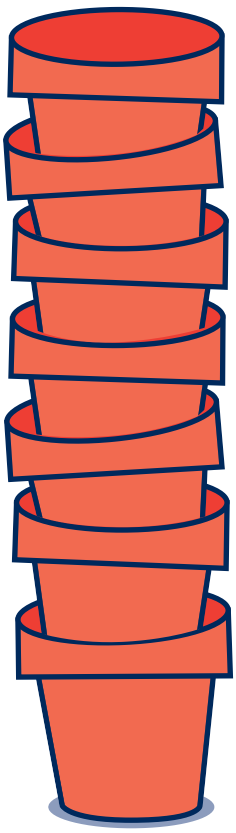
Children learn that division is about ***sharing*** things or ***grouping*** things. They will find out how ***they*** can share things and group things:

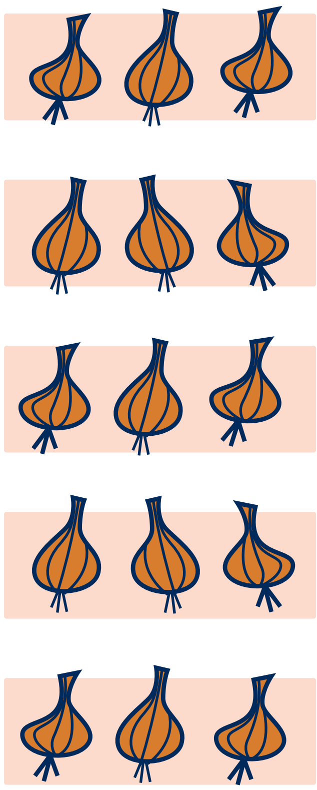
Sharing:

We have 6 strawberries to share between you and Joe. How many will you each get?



Grouping:





We have 15 bulbs. Each flower pot needs 3 bulbs. Put the bulbs into groups of 3 to see how many flower pots we can fill.

Whenever we help our children do either of these things, we're building their ability to divide. Sharing or grouping toys, food, money or counters – as long as we're doing it equally, these are all opportunities to help our children divide.

Dividing in everyday life

Many children learn best when they use real things that they can see and touch. Further still, when those things are used in real situations, such as sharing toys or food, division comes alive for children: it has a real purpose that makes sense.

In their real lives, it's not numbers and signs on a page that children will need to deal with most, but real events; so schools often give children life-like problems to solve.

You can:

- *Include your child whenever you need to share things out or group things equally, whether it's potatoes for tea, armbands for swimming or something else.*
- *Cut out the cupcake counters on page 18. Count out an amount of cakes that you know can be divided into whole numbers. See if your child can share them out equally.*
- *Use the pound coins on page 19 in the same way. This time, if your child is ready, the amount you start with can be higher.*

Different words for division

In real life, we use all sorts of words and phrases for division.
Here are some examples:

shared equally

between

into groups of

into sets of

split between

For example, we might say to a child:

We have 18 grapes to split between 6 children. How many grapes can each child have?

Children need to understand that this question requires a ***division*** calculation that we can write down like this:

$$18 \div 6 = ?$$

and ***not*** a subtraction, addition or multiplication calculation.

You can:

- *Use a range of words and phrases to mean divide when you are exploring division at home with your child.*

Division and its links to multiplication and times tables

Children will learn that knowledge of the times tables is a great help in solving division questions. They are shown that:

20 ÷ 5 = ?

can be said as

'How many lots of 5 make 20?'

or

? x 5 = 20

So they just need to think through their 5 times table:

5, 10, 15, 20 ... That's 4 x 5 = 20

So 20 ÷ 5 = 4

You can:

- *Help your child turn division questions into multiplication questions.*
- *Help your child to learn their times tables as a way of helping their division as well as their multiplication skills. You'll find lots of games and activities to make learning tables fun in the 'Times Tables in School' booklet in the Maths in School series.*

Division tables

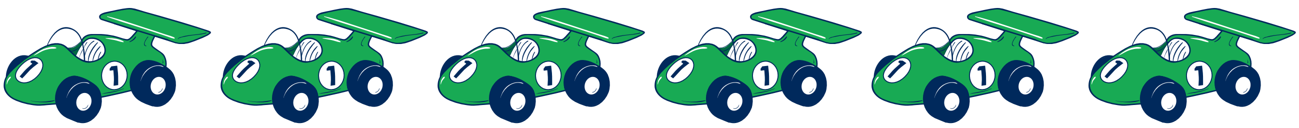
For some children it can be useful to re-write times tables as division tables. Just like with times tables, we can stick tables like this up at home for our children to practise. A bathroom wall is often a good place, as children can read through the table while brushing their teeth.

You can:

- *Print the Divide by 6 table on page 20 and find a good place at home to display it for your child to practise.*
- *Turn another times table into a division table for your child to practise.*

Dividing by 2 and halving

In life, the number we divide by most of all is 2. This is the first number children will learn to divide by in school. Dividing by 2 is exactly the same as finding a half ($\frac{1}{2}$) of something or an amount.



6 toy cars ÷ 2 = 3 toy cars

half of 6 toy cars = 3 toy cars

Children will be shown that dividing by 2 and halving are the same. If we can help children to understand this at home as well, they will find it easier to remember what they need to do when asked to divide by 2 or halve in school. It will also help them when they need to see the link between further division and fraction problems.

You can:

- *Use the word 'half' and the phrase 'divide by 2' together. Discuss with your child what they need to divide by when they are trying to find a half, or what fraction they need to find when they are dividing by 2.*

Games

Popular and fun games such as Pairs, Snap and Treasure hunt can all be adapted to give children practice at matching division questions with their answers, e.g. **56 ÷ 7** and **8**.

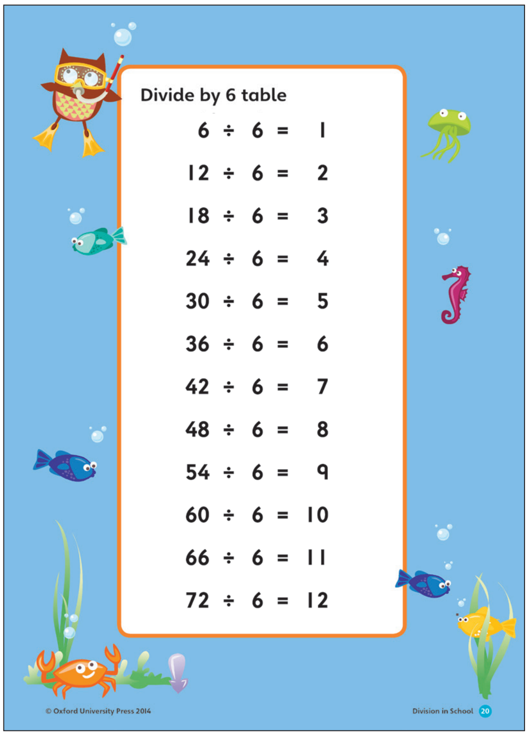
They make great short, quick-fire games that can be fitted in any time of the day. Maybe the winner could get a treat, or maybe everybody who joins in can get a treat!

You can:

- *Print off the Divide by 7 Question and Answer cards on page 23 and use them to play Snap, Pairs or Treasure hunt with your child. You'll find game instructions on pages 21–22.*
- *Make some Question and Answer cards for another division table and use them to play Snap, Pairs, Treasure hunt or another matching memory game.*

Tip:

- *Start by giving children a copy of the division table to refer to if they need it. Then, when they're ready for the challenge, they can try the game without it.*



Divide by 6 table

6	÷	6	=	1
12	÷	6	=	2
18	÷	6	=	3
24	÷	6	=	4
30	÷	6	=	5
36	÷	6	=	6
42	÷	6	=	7
48	÷	6	=	8
54	÷	6	=	9
60	÷	6	=	10
66	÷	6	=	11
72	÷	6	=	12

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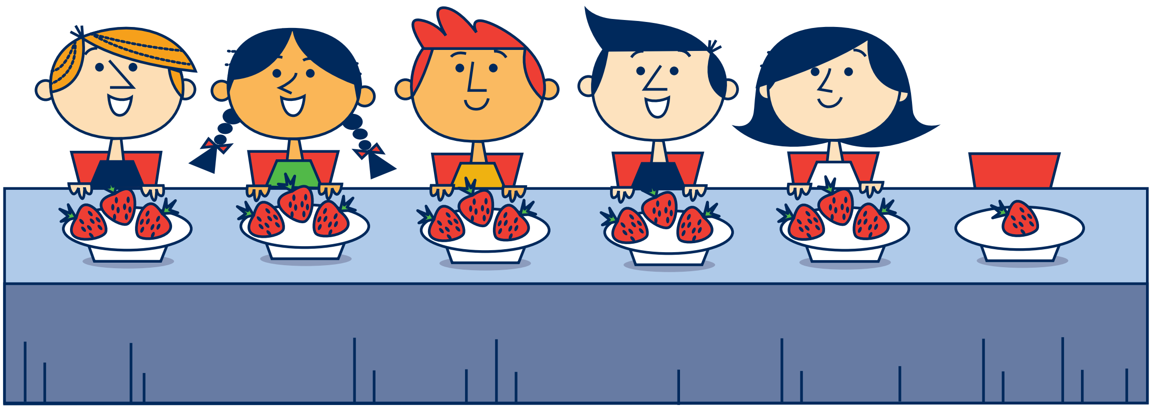
Remainders

As children develop their division skills, they are introduced to the concept of **remainders**. A remainder is any number that's left over when an amount has been divided, or shared out, equally.

If we have 16 strawberries to share equally between 5 children, how many strawberries will each child get? How many strawberries are left over?



Each child can have 3 strawberries, and there's 1 more strawberry left over.

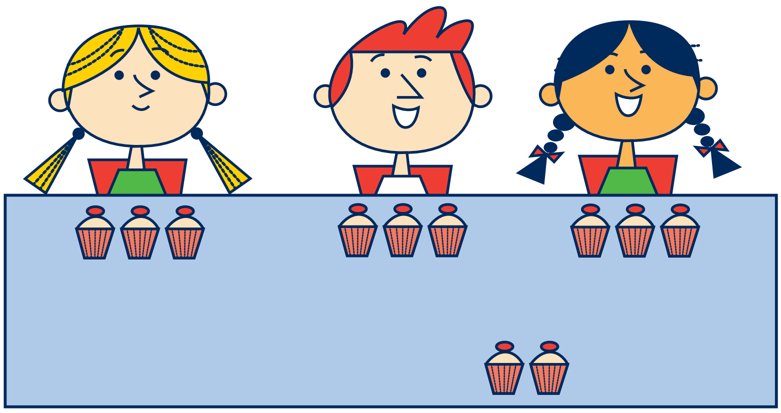
16 ÷ 5 = 3 remainder 1

When we write remainders, we shorten the word 'remainder' to an **r**. So, **16** ÷ **5 = 3 remainder 1** is written **16** ÷ **5 = 3 r 1**.

Children can take time to understand that, if you're sharing equally, if you're *dividing*, every person, or group, has to get the same, and anything left over can't just be added to one of the piles!

You can:

- *Ask your child to help you when you're sharing things out equally at home and there's going to be a remainder.*
- *Use the counters on pages 18 and 19 to set your child some division challenges. Make sure you start with an amount of counters that will leave a remainder, e.g. ask your child to divide 11 cupcakes between 3 children.*



In upper primary school, children will find out how to turn remainders into fractions or decimals. See the section 'What can be done with remainders?' (page 16) for more detail.

Short division

Children will be introduced to a written method called **short division**. This will help them when they are dividing a number with two or more digits by a single-digit number.

Let's say we want to split 204 books equally between 6 classrooms. We write the calculation like this:

$$\begin{array}{r|l} \cline{2-2} 6 & 2\;0\;4 \end{array}$$

We then ask: How many whole lots of 6 are there in the first digit, 2? 2 is less than 6 so there are no lots of 6 in 2.

So then we have to include the next digit, 0, in our question: How many lots of 6 are there in 20?

There are 3 lots of 6 in 20, so we write down 3 as the first digit in our answer. See that we put it above the last digit in the question we've just answered (in this case, the 0).

$$\begin{array}{r|l} \multicolumn{1}{r}{} & \;3 \\ \cline{2-2} 6 & 2\;0\;4 \end{array}$$

But when we divided 20 by 6, as well as 3 lots of 6 there was also a remainder. 3 lots of 6 is 18. To get to 20 is another 2, so we've got a remainder of 2.

In short division, we ***carry*** remainders over to the next part of the question: so we take our 2 and write it beside the next digit in our question, the 4.

$$\begin{array}{r|l} \multicolumn{1}{r}{} & \;3 \\ \cline{2-2} 6 & 2\;0\;{}^{2}4 \end{array}$$

Now we must remember to include our carried over ***2*** in our next question: What's ***2***4 divided by 6? 24 divided by 6 is 4, so we write that down as the last part of our answer:

$$\begin{array}{r|l} \multicolumn{1}{r}{} & \;3\;4 \\ \cline{2-2} 6 & 2\;0\;{}^{2}4 \end{array}$$

Each of the **6** classrooms can have **34** books: 204 ÷ 6 = 34

Here's another short division example:

$$\begin{array}{r|l} \multicolumn{1}{r}{} & 1\;3\;6 \\ \cline{2-2} 6 & 8\;{}^{2}1\;{}^{3}6 \end{array}$$

Long division

Once they are comfortable using short division, children will start to divide larger numbers by 2-digit numbers. To do this, they will be shown a method called long division.

A baker has 2934 cup cakes to share equally between her 14 shops. To find out how many cupcakes she needs to send to each shop, we can write a calculation like this:

$$14\,\overline{\smash{)}\,2\;9\;3\;4}$$

The first question to ask is: How many 14s are there in 2 (the first digit in the number we're dividing)? There are no 14s in 2 because 2 is smaller than 14.

So instead we need to ask, how many 14s are there in 29 (the 2 and the 9 together)?

We can either work this out in our heads or write it down on the side, something like this:

$$\begin{array}{rrl} & 14 & \textit{1 lot} \\ + & 14 & \textit{2 lots} \\ \hline & 28 & \\ \hline + & 14 & \\ \hline & 42 & \textit{3 lots} \\ \hline \end{array}$$

2 lots of 14 is 28, and 3 lots is 42, which is much more than our 29, so there must be **2** lots of 14 in 29.

So we write that answer, **2**, above the last digit in the question we just asked (the 9):

$$\begin{array}{r|llll} & & 2 & & \\ \hline 14 & 2 & 9 & 3 & 4 \end{array}$$

We also write the exact amount that 14 × 2 came to, 28, under the 29, so that we can work out and use the remainder:

$$\begin{array}{r|llll} & & 2 & & \\ \hline 14 & 2 & 9 & 3 & 4 \\ & 2 & 8 & & \\ \cline{2-3} & & 1 & & \end{array}$$

We can see that there is a remainder of 1 from the last part of the calculation: if we take 28 away from 29, we've got 1 left over.

This 1 is the start of our next question. There are no 14s in 1, so now we ***bring down*** the next digit along, the 3, and write it next to our 1:

$$\begin{array}{rl} & 2 \\ 14 & \overline{)2934} \\ & \underline{28} \\ & 13 \end{array}$$

So now we ask: How many 14s are there in 13? Well 13 is just less than 14, so there are no 14s in 13. To show this we need to write a **0** above our 3:

$$\begin{array}{rl} & 20 \\ 14 & \overline{)2934} \\ & \underline{28} \\ & 13 \end{array}$$

It's really important for children to put **zeros** like this into their calculations. We need them in order to keep the digits in the right place and to give them the right value.

As our 13 is not big enough to divide by 14, we bring down the next digit in the question, the 4:

$$\begin{array}{rl} & 20 \\ 14 & \overline{)2934} \\ & \underline{28} \\ & 134 \end{array}$$

How many 14s in 134? Children can either work this out on the side, as before, or they can see if they can work it out in their heads.

If we multiply 14 by 10 we get 140. 140 is only 6 more than our number: 134. That can tell us that there must be, not 10 lots of 14 in 134, but just one lot less – 9 lots. So we add that digit, **9**, to our answer:

$$\begin{array}{rl} & 209 \\ 14 & \overline{)2934} \\ & \underline{28} \\ & 134 \end{array}$$

We can find out **exactly** what 9 lots of 14 is by taking our 10 lots of 14 (140), and subtracting 1 lot of 14 from it:

$$\begin{array}{r} 1\,\cancel{4}^{3}\,{}^{1}0 \\ -\quad 14 \\ \hline 126 \\ \hline \end{array}$$

So we write 126 under the 134, ready to take away from 134 to find the remainder:

$$\begin{array}{rl} & 209 \\ 14 & \big)\overline{2934} \\ & \underline{28} \\ & 1\cancel{3}{}^{1}4 \\ & \underline{126} \\ & 8 \end{array}$$

134 take away 126 is 8.

We can't get any more 14s out of 8, and there are no more digits to bring down, so we can see that our final answer is **209 remainder 8**.

That's 209 cup cakes for each shop, with a remainder of 8 cupcakes – the baker can eat those!

$$2934 \div 14 = 209 \text{ r } 8$$

Remembering the different rules and stages in short and long division calculations can take lots of practice, so any help we can give, whether through homework help or through finding real opportunities for children to divide larger amounts, is great.

You can:

- *Ask your child to help with bigger division problems at home when they are ready, e.g. if you have to divide a budget over a number of days, or split the cost of something between a number of people. Have a paper and pencil handy so that children can use the short or long division methods if they choose.*

Dividing decimals

Children learn that if a division calculation has a decimal point, e.g. if they're dividing money with pounds and pence, they do the calculation in exactly the same way.

All you have to remember is to put the decimal point in the answer at the exact place that you meet it during the calculation.

If, in the earlier long division calculation, we were dividing, not **2934** cup cakes, but ***£29.34*** between 14 people, the answer would contain *the same digits*, but would have a decimal point at the exact place that we meet it in the calculation:

$$\begin{array}{r|r} & 2.09 \\ \hline 14 & 29.34 \\ & 28 \\ \cline{2-2} & 1\,{}^{2}\cancel{3}\,{}^{1}4 \\ & 126 \\ \cline{2-2} & 8 \end{array}$$

So £29.34 divided by 14 people is £2.09 with 8p left over (the remainder).

What can be done with remainders?

In upper primary school, children will find out how to turn remainders into fractions or decimals.

Remainders into fractions

Look at this example:

$$17 \div 5 = 3 \text{ r } 2$$

Instead of leaving this remainder 2, we can turn it into a fraction by continuing to divide by 5:

$$17 \div 5 = 3 \text{ r } 2$$
$$2 \div 5 = \frac{2}{5}$$

The line in the middle of a fraction can be seen as meaning either ***'out of'*** or ***'divided by'***. Therefore, to write a division question as a fraction we can simply write the number we're dividing (**2**) above the line and number we're dividing by (**5**) below the line.

So, we can say:

$$17 \div 5 = 3\frac{2}{5}$$

Sometimes you will then need to go through a further stage called **simplifying** or **cancelling down** the fraction. For more information, see the 'Fractions in School booklet' in the Maths in School series.

Remainders as decimals

Children will be taught that we can also express remainders as decimals. Let's consider 17 ÷ 5. Without decimals this is:

$$\begin{array}{rl} & \text{3 remainder 2} \\ 5 & \overline{\big)\,1\;7} \end{array}$$

By adding a decimal point and a zero to the number being divided (17), we are able to carry on the calculation. The remainder is then carried over to the next column. We must also add a decimal point to our answer, lined up with the one in the question:

$$\begin{array}{rl} & \;\;\;\;3\,\cdot \\ 5 & \overline{\big)\,1\;7\cdot{}^{2}0} \end{array}$$

How many 5s in 20? There are four 5s in 20 so we write a 4 above our 20.

$$\begin{array}{r|l} & 3\cdot4 \\ \hline 5 & 17\cdot{}^{2}0 \end{array}$$

20 divides exactly by 5 so we have no remainder and the calculation is complete. We can say:

$$17 \div 5 = 3\cdot4$$

For some divisions there will still be a remainder after writing in the extra zero and carrying on the calculation. In this case, children can write as many zeros as they need to carry on the calculation. They are able to do this because writing more zeros after the decimal point does not change the value of the number. Some divisions have decimal answers that carry on indefinitely, but children would not be given a division like this to calculate with written methods.

The more we help children to divide large amounts such as money amounts for budgets or shopping, or scores in games, the easier they will find division throughout their lives.

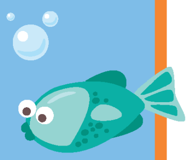
Cupcake counters

Pound coin counters

Divide by 6 table

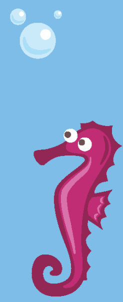
$6 \div 6 = 1$

$12 \div 6 = 2$



$18 \div 6 = 3$

$24 \div 6 = 4$

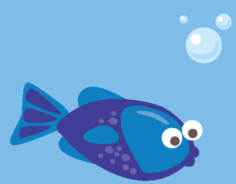


$30 \div 6 = 5$

$36 \div 6 = 6$

$42 \div 6 = 7$

$48 \div 6 = 8$

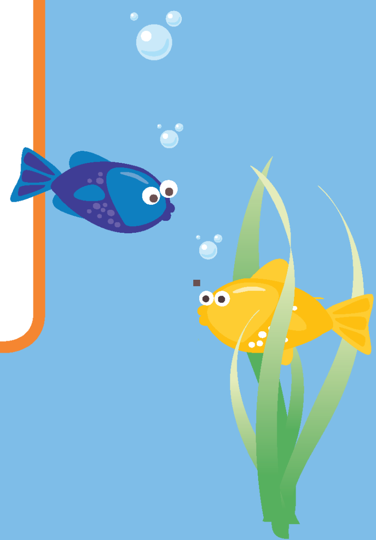


$54 \div 6 = 9$

$60 \div 6 = 10$

$66 \div 6 = 11$

$72 \div 6 = 12$



Divide by 7 Pairs, Snap and Treasure hunt

What to do

Cut out the Divide by 7 Question and answer cards on pages 23 and 24.
A double deck of the cards is recommended for Snap.

Pairs (two or more players)

Place all cards face down on the table.

In turns, turn over two cards and see if they match, e.g. a Divide by 7 question (**56 ÷ 7**) and answer (**8**).

If they match, keep the pair. If they don't, turn them back over.

The winner is the person with the most pairs.

Snap (two players)

Shuffle the cards and deal them into two piles, face down.

Both players turn their top card over at the same time.

If the cards match, shout 'Snap!' The first person to shout Snap takes all of the upturned cards.

If they don't match, keep turning over cards, placing them on top of the upturned ones. If you run out of cards without getting a match, shuffle them and deal again.

The winner is the first person to get all of the cards.

Treasure hunt

Choose one person who's not going to play – perhaps an adult. This person shuffles the cards and hides them around an agreed area - perhaps a room in your home or an outside space.

Choose a 'home area' – a table, shelf or bit of floor where players can pile up matching sets that they find.

Now all the players need to hunt for the cards. If a player finds a card, they need to memorize it and leave it where it is until they've spotted the card that matches it, e.g. **28 ÷ 7** matches **4**. When they've spotted both cards in a pair, they've got 7 seconds to pick up both cards and place the pair in the home area.

The person not playing makes sure that no one holds any cards for more than 7 seconds and that each player has their own pile in the home area for their matching sets.

The winner is the player with the most pairs when all twelve pairs have been found.

Divide by 7 Question and answer cards

$7 \div 7$	1
$14 \div 7$	2
$21 \div 7$	3
$28 \div 7$	4
$35 \div 7$	5
$42 \div 7$	6

Divide by 7 Question and answer cards (continued)

$49 \div 7$	7
$56 \div 7$	8
$63 \div 7$	9
$70 \div 7$	10
$77 \div 7$	11
$84 \div 7$	12