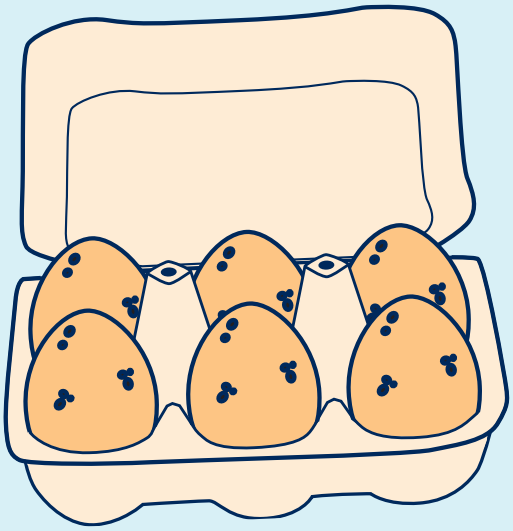
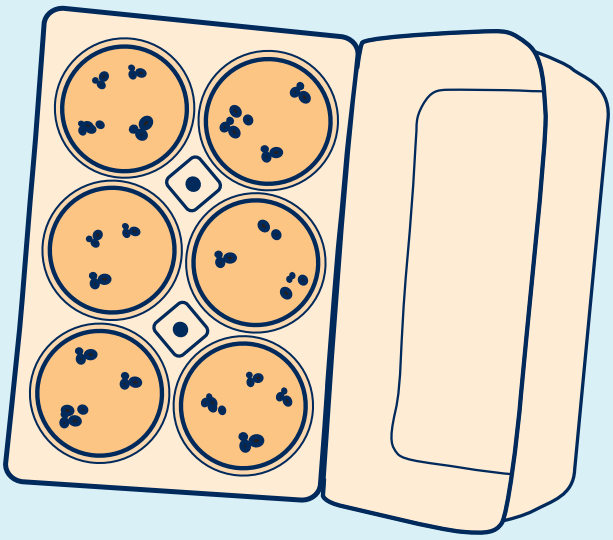


$2 \times 3 = 6$

48 × 36 =

×	40	8	
30	1200	240	1440
6	240	48	288
			1728



$3 \times 2 = 6$

28 × 7 =

×	20	8	
7	140	56	196

Maths in School

Multiplication in School

by Kate Robinson

Oxford OWL www.oxfordowl.co.uk

OXFORD

Multiplication in School

Contents

Multiplication in School

Introduction

In this booklet, you'll find out how your child is taught to multiply in school. You'll also find a wide range of games and activities that you can use at home to build your child's skills and confidence with multiplication. Our booklet 'Times Tables in School' provides further games and activities that will help your child to learn their times tables by heart. For further guidance, watch our Maths in School videos.

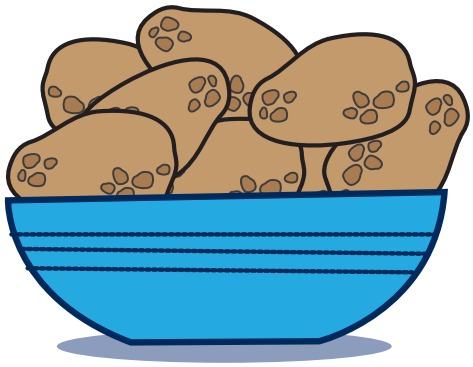
Multiplication is a part of real life

Multiplication is introduced to children as something we use in our real lives. Real things, especially fun or enticing things, bring maths to life and help children to learn using touch and even taste and smell, as well as sight and sound.

We want to give 3 children 2 strawberries each. How many strawberries will we need altogether?

Family life can give loads of opportunities to make multiplication real:

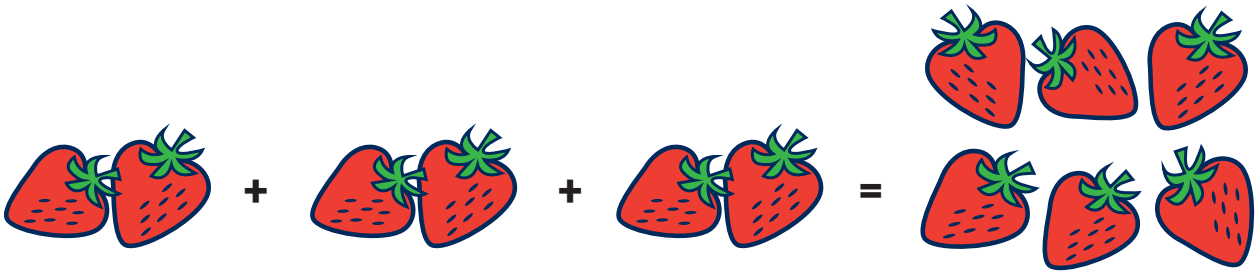
All 4 of us are going to have 2 potatoes for tea. How many potatoes will we need altogether?



Multiplication as adding on (repeated addition)

First, children are shown how to multiply using repeated addition:

We want to give 3 children 2 strawberries each. How many strawberries will we need altogether?



2 + 2 + 2 = 6

2 × 3 = 6

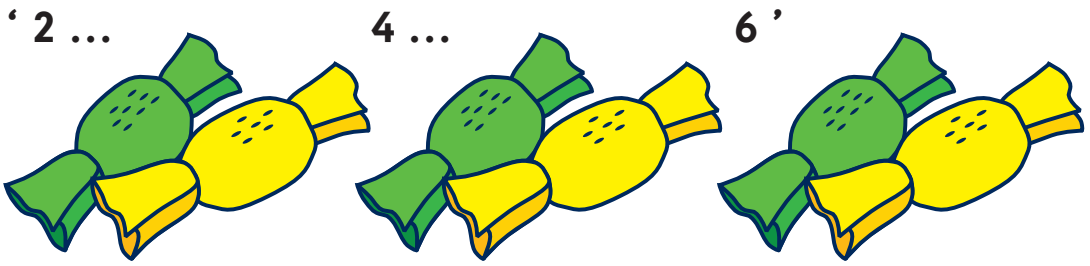
Counting in steps

During Reception, children are also taught to multiply by counting in 'steps' of 2: 2, 4, 6, 8, 10, etc.

They then move on to counting in different steps, e.g. in steps of 10, 5 or 3.

You can:

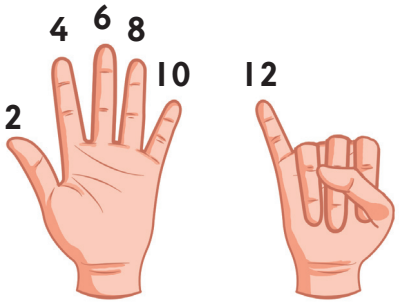
Count in steps with them, using toys, sweets or counters to make it real:



Using fingers to count in steps

If fingers help, use them! Children can use fingers to help them count in steps: they can hold up the number of fingers they are multiplying by and count in steps across those fingers.

So, for 6 × 2, children can hold up 6 fingers and wiggle each finger in turn as they recall 2, 4, 6, 8, 10 and 12.

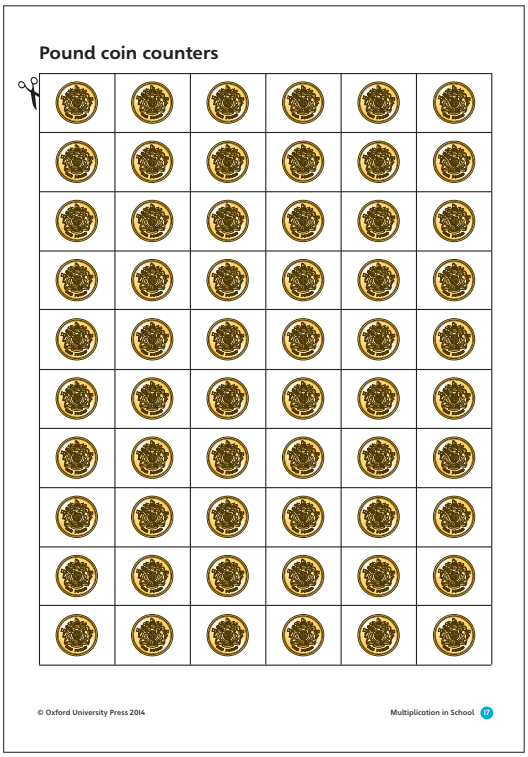


You can:

- *Cut out the cupcake counters on page 16. See if your child can find how many they would need to give 2, 3, 4 or 5 friends 2, 3, 4 or 5 cakes each. Try to find a multiplication that won't be too hard, and make sure your child has enough cupcakes!*
- *Use the pound coins on page 17 in the same way. This time, if your child is ready, the numbers can be higher.*
- *In your day-to-day life, find opportunities to help your child work out how many real things (potatoes, treats, pound coins, toy cars, etc.) are needed, if a few people are going to have the same number each.*
- *When doing these with your child, help them to use the 'adding on' method or, if they are ready, the 'counting in steps' method (with or without fingers).*

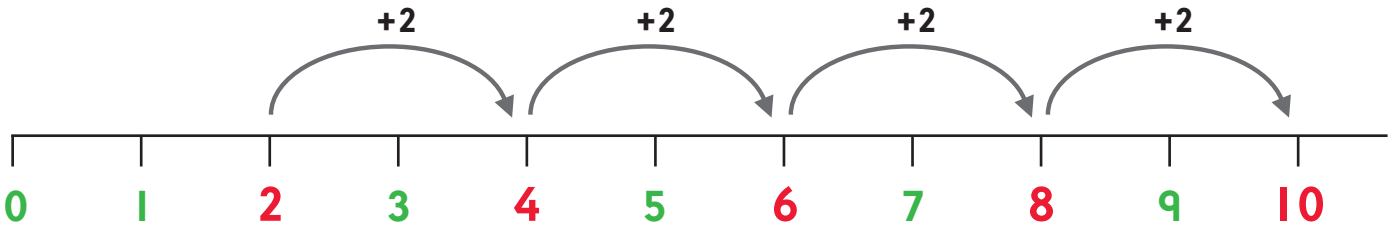

Resource sheets

Cupcake counters


Pound coin counters

Number lines

Number lines are also used to help children to multiply by adding on and counting in steps:



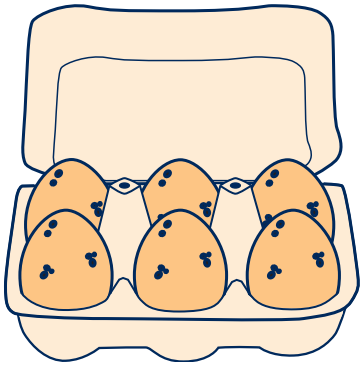
You can:

- *Help your child to use the number lines on page 18 to multiply by adding on or counting in steps. They can use a counter (see page 19), pencil or finger to hop from one number to the next and mark their place.*
- *Draw your own number lines. Use the tips below to help you.*

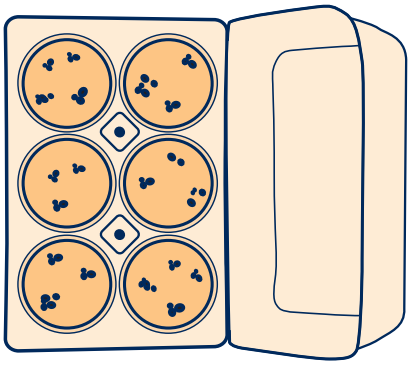
Tips:

- *Always include 0 on your number line. (Forgetting about 0 can get children into a real muddle!)*
- *Start by drawing them pretty big, with a nice gap between each number.*
- *Point out the pattern made by the jumps, e.g. 'land on one, miss one, land on one, miss one'.*
- *Blank number lines, on which you just write in the numbers that you need to remember, can be used too.*

Arrays



2 × 3 = 6



3 × 2 = 6

An egg box is an example of an array. An array is a set of objects arranged into rows and columns. Each row has the same number of objects as the other rows; each column has the same as the other columns.

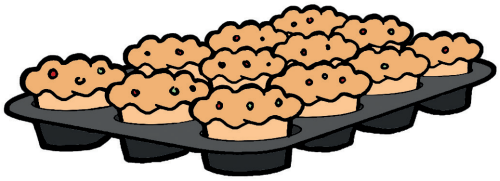
The arrays that we find in our daily lives help children to visualize and understand multiplication.

They can also bring home to children an important multiplication fact: multiplication can be done in any order – the answer will still be the same.

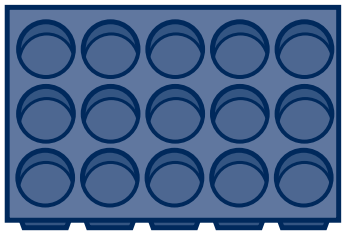
2 × 3 will always give the same answer as 3 × 2

You can:

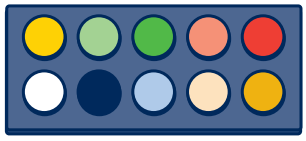
- *Hunt around your home with your child to see how many arrays you can find:*



3 × 4



5 × 3



5 × 2

8 × 2

- *Discuss with your child which multiplications they show.*

Multiplying by 10, 100 and 1000

In real life, we often need to multiply by 10, 100 or 1000 and there's a simple pattern that really helps. Look at this place value chart. It shows how the value of a digit changes depending on where it is in a number.

Thousands × 1000	Hundreds × 100	Tens × 10	Units × 1
			2
		2	0
	2	0	0
2	0	0	0

So:

2 in the units column = 2 single units: 2

2 in the tens column = 2 lots of ten: 20

2 in the hundreds column = 2 lots of a hundred: 200

2 in the thousands column = 2 lots of a thousand: 2000

Each time we move the 2 to the left, its value goes up ten times: 20 is ten times bigger than 2, 200 is ten times bigger than 20, and so on. The zeros act as place holders to keep the 2 in the correct column.

So, if we want to multiply a number by 10, all we have to do is push all the digits in the number one place to the left and fill the gap in the units column with a zero.

And, if we want to multiply a number by 100, we just push the digits two places to the left and fill the gaps with zeros. Multiplying by 1000 moves the digits three places to the left, and so on.

Partitioning

When children start to multiply bigger numbers, they are taught to partition them. This means breaking them up into smaller parts to make the multiplication easier:

$28 \times 7 =$

$20 \times 7 + 8 \times 7 =$
$140 + 56 = 196$

Partitioning often involves breaking numbers up into the hundreds, the tens and the units, but numbers can be broken into smaller chunks if this is easier:

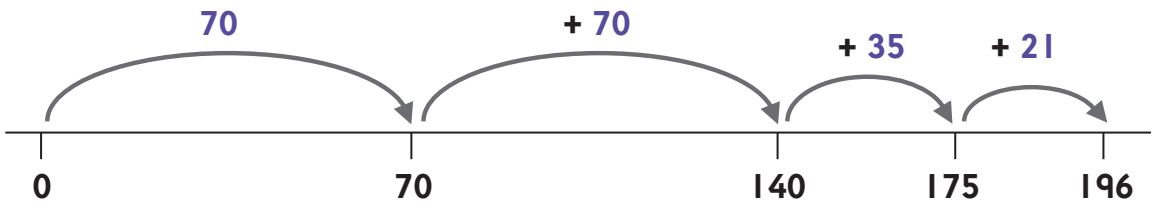
$28 \times 7 =$

$10 \times 7 + 10 \times 7 + 5 \times 7 + 3 \times 7 =$
$70 + 70 + 35 + 21 = 196$

Children are often encouraged to make number lines in order to keep track of where they are:

$28 \times 7 =$

$10 \times 7 + 10 \times 7 + 5 \times 7 + 3 \times 7 =$
$70 + 70 + 35 + 21 = 196$



You can:

- *Make a game of partitioning numbers that you see when you are out and about. Your child can partition numbers either into hundreds, tens, units and so on, or into other easy-to-use amounts.*

Grids

As their confidence grows, children are shown how to use a grid to lay out their partitioning:

28 × 7 =

×	20	8	
7	140	56	196

In this example:

- the red and blue numbers show us each number in the calculation, partitioned into tens and units
- the purple numbers show us the results of each part of the multiplication (**7 × 20 = 140**, **7 × 8 = 56**)
- the black number shows us the final result: each part of the multiplication added together (**140 + 56 = 196**).

Grids are also used with bigger numbers:

48 × 36 =

×	40	8	
30	1200	240	1440
6	240	48	288
			1728

In this example:

- the orange and purple numbers show us each number in the calculation, partitioned into tens and units
- the light blue numbers show us the results of each part of the multiplication (**30 × 40 = 1200**, **30 × 8 = 240**, **6 × 40 = 240** and **6 × 8 = 48**)
- each of the pink numbers shows one row of light blue numbers added together (**1200 + 240 = 1440**, **240 + 48 = 288**)
- the black number shows both the pink numbers added together (**1440 + 288 = 1728**).

You can:

Print page 20 onto a piece of card. Cut out the number cards and purple grid lines. Help your child to use the grid lines and numbers to try some multiplications using the grid format. Lots of children like using card numbers that they can juggle around until they get it right.

Vertical format

When they are ready, children are introduced to a vertical format, still using the partitioning method for working out:

Th	H	T	U	
		4	8	
	×	3	6	
		4	8	(6 × 8)
	2	4	0	(6 × 40)
	2	4	0	(30 × 8)
1	2	0	0	(30 × 40)
1	7	2	8	

Short multiplication

The next step in learning to multiply bigger numbers is the short multiplication method.

In this method, not every part of the calculation is written out in full. Here's an example:

	H	T	U
		4	
		3	8
×			6
	2	2	8

In this calculation:

Step 1:

First we multiply the 8 by 6:

- 6 × 8 = 48: 48 is 4 lots of 10 and 8 units.
- Write down the 8 units underneath all the units.
- *Carry over* the 4 lots of 10 to add on to the tens part of the calculation coming next.

Step 2:

Next we multiply the 3, which really means 30 or 3 lots of 10, by 6:

- 6 × 3 lots of 10 = 18 lots of 10.
- Add on the 4 lots of 10 that we carried over = 22 lots of 10.
- Write this down next to the 8 units already there and we have our total: 228.

Long Multiplication

Long multiplication uses a similar method for multiplying by numbers over 10:

	H	T	U	
	1	4		
		3	8	
×		2	6	
	2	2	8	*(Step 1)*
	7	6	0	*(Step 2)*
	9	8	8	*(Step 3)*

Step 1:

- 6 × 38 is completed as a short multiplication.

Step 2:

- The 2 in 26 means 20, or 2 lots of 10. So, instead of multiplying 38 by 20 in one go, we can multiply by 10 first and then 2.
- To multiply by 10 we need to move our digits one place to the left. We can do this by putting a zero in the units column.
- Then we multiply 38 by 2, as in a short multiplication:
- 2 × 8 = 16. Put down the 6 units and carry over the 1.
- 2 × 3 = 6. Add on the 1 we carried over = 7.
- Write down the 7 in the hundreds column to give our answer to *step 2*: 760.

Step 3:

- Add the two answers together to give our final answer: 228 + 760 = 988.

More games and activities for multiplying

You can:

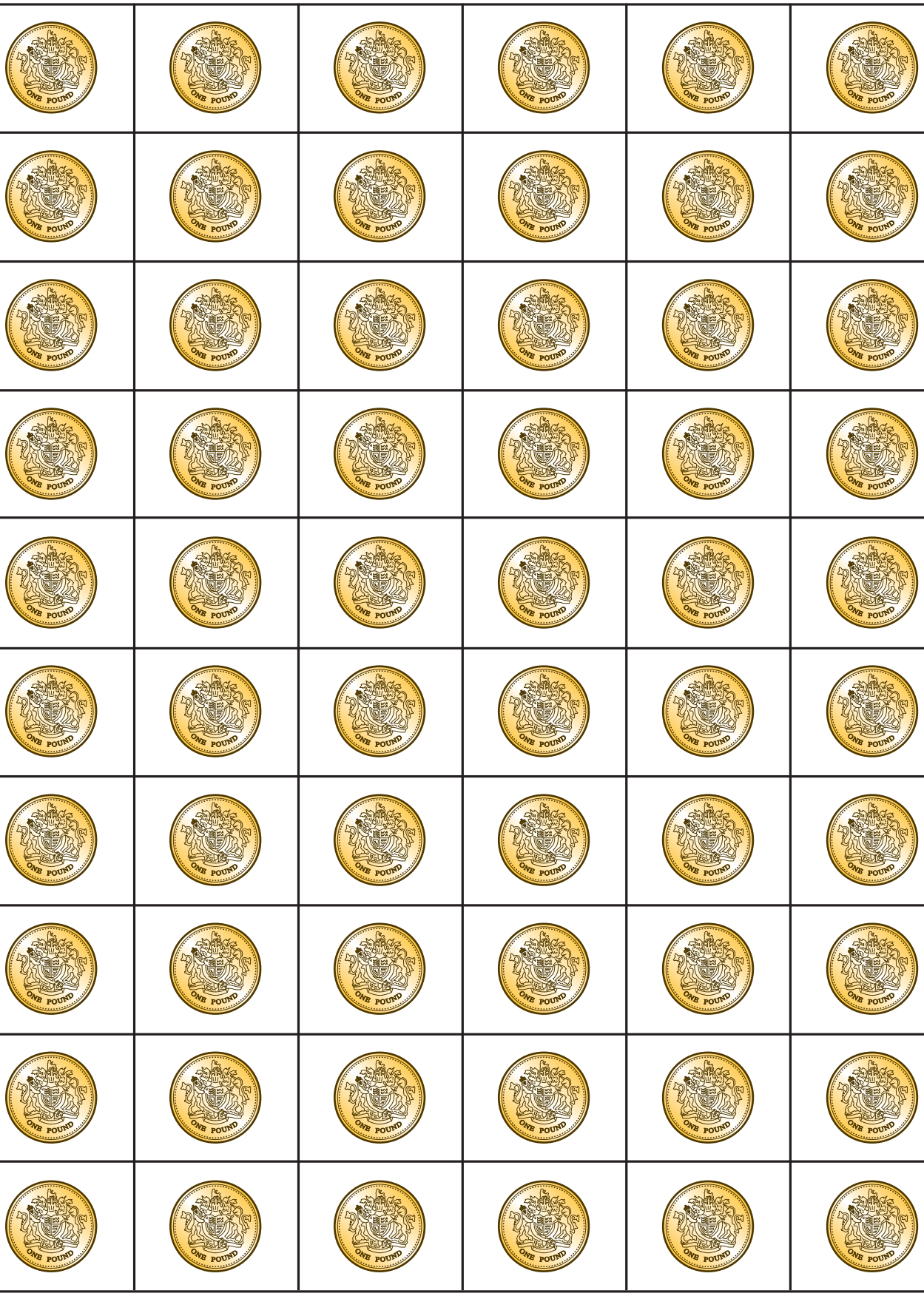
- *Cook: follow some recipes, but try multiplying the quantities by 2, 3, 4 or more.*
- *Budget: involve children in some multiplication calculations: 'The tickets cost £5 each. How much for 6 of us?'*
- *Play shops: with your child, create a shop at home. Price up some things to sell and role play buying and selling more than one of some items:*

The prices can be quite simple (5p), or quite hard (42p, £1.49) depending on what kind of multiplication your child is ready to try. Have some paper and pens handy for trying out methods to work out the answers.

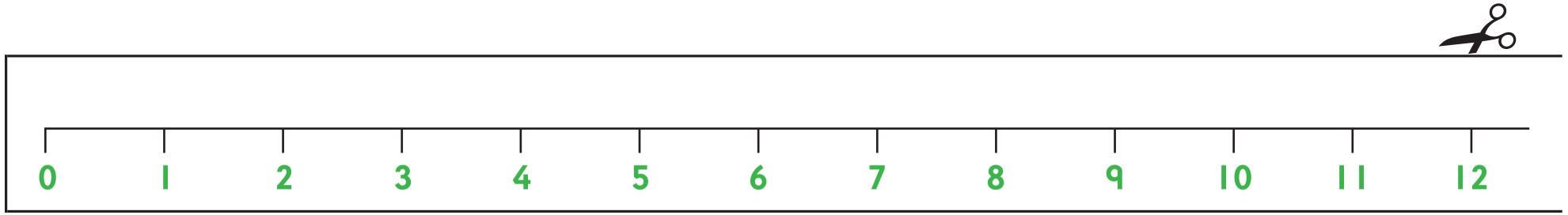
- *Ask your child to teach you any multiplication methods they are using that you are not used to – sometimes the best way to learn is to teach.*
- *Read through our additional booklet, 'Times Tables in School', for tips on how to help your child learn the times tables by heart.*
- *Watch the multiplication video that accompanies this booklet for extra support.*

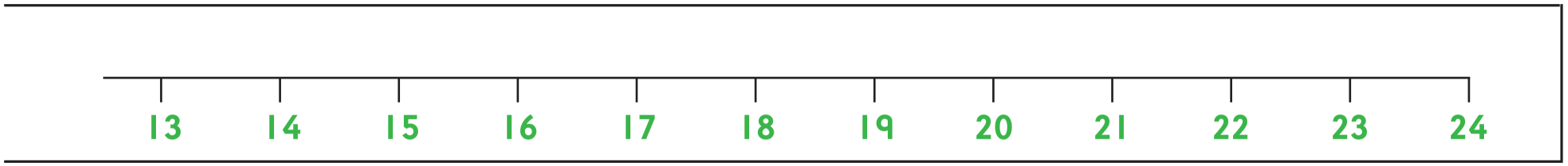
Cupcake counters

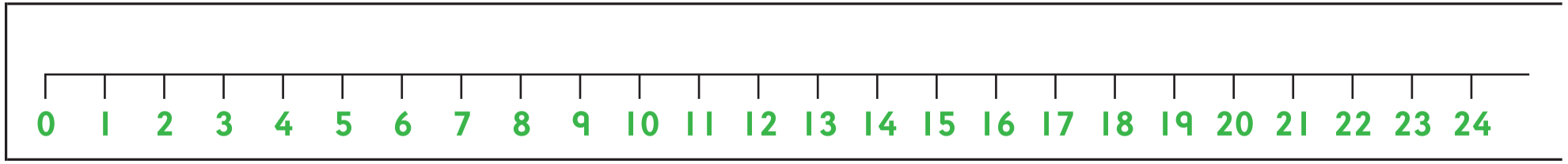
Pound coin counters

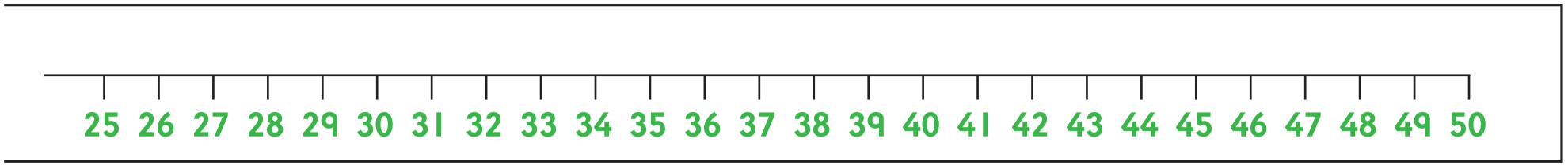


Number lines

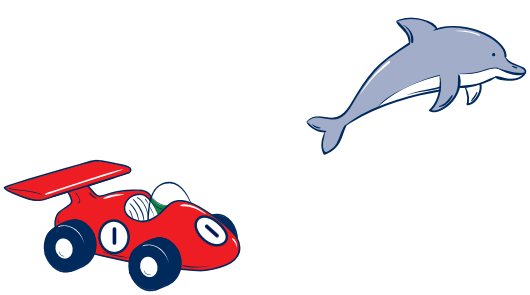






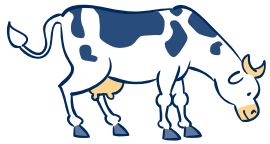
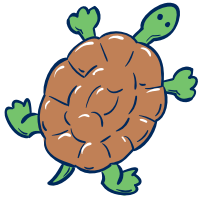


Number line counters



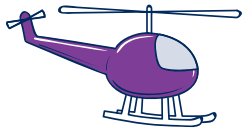









Number cards and grid lines

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