Is not confident in recalling multiplication facts

Opportunity for: exploring mathematical language

Resources

- *Multiplication grid 1* (Resource sheet 35) or for Year 6 work use *Multiplication grid 2* (Resource sheet 36)
- Different coloured pens, pencils
- *S*quared paper
- Cubes, counters
- Bead strings

Key vocabulary

groups of   equal groups

lots of   sets of

multiplied by   rows of

array   columns

divided by

Teaching activity

Time 15–20 minutes

Explain to the child that today's activity will help them to improve at multiplying and remembering their multiplication tables. Show them the equipment.

'You can choose any of this equipment to show something that you know about multiplication.'

Listen carefully to what the child says and build on any relevant words they use or images they draw.

If the child is unsure what to do, give a little more guidance.

? **Can you make me a picture on paper to show six groups of two?**

? **Or can you use cubes, counters or bead strings?**

Help the child to make equal groups.

? **Can you tell me about this arrangement of cubes?**

Establish that there are six groups and two in each group.

? **Can you put these cubes in an array to show two multiplied by six?**

- Two multiplied by six
- 2 × 6
- Six groups of two makes twelve altogether
- 2 + 2 + 2 + 2 + 2 + 2

Once the child has some kind of array, or a set of equal groups, ask them to talk about it.

If the child seems uncertain, you might want to probe for any misunderstandings by making a random arrangement of cubes, for example:
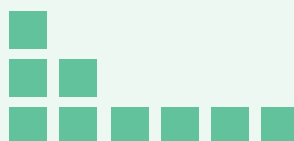
? **Is this an array to show multiplication and division facts? Why not?**

Establish that multiplication and division are about *equal* groups.

Note the language of multiplication that the child uses, and any errors.

Help the child to count the columns in twos and to record two multiplied by six in any way they want.

If the child has difficulty with the language, or with understanding that the array is two multiplied by six, you could encourage the child with some arm actions to help them to remember the way to record an array.

2

Point your left arm away from you, parallel to the column of two cubes and say 'two'.

Then, using your right arm, move it away from you, jumping it along the columns of two cubes as you say, 'multiplied by six'.

2

mul - ti - plied by 6

? If that is two multiplied by six, what would two multiplied by five look like?

Establish that you could take away one group of two, or let the child draw or make this array with cubes or counters.
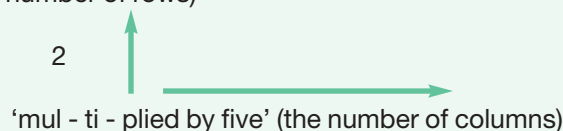
? Tell me about this array.

- Two multiplied by five
- 2 × 5
- Five groups of two makes ten altogether

If the child needs more support, use the hand movements again.

'Two going this way' (the number of rows)

2

'mul - ti - plied by five' (the number of columns)

'So that is two multiplied by five.'
2 + 2 + 2 + 2 + 2
2 × 5

Repeat with any other arrays and groups of two. Eventually end up with an array of 2 × 10 and ask the child to use the array to count.

? How many cubes do we have in this array altogether?

If the child starts to count in ones, stop them.

? Is there a quicker way to count?

If they seem unclear about what to do, help them to count in twos.

If they count in tens, accept this but point out that they can also count in twos and with two multiplied by ten it is two that is the group size. So, although you get the same answer as 10 + 10, really this calculation is 2 + 2 + 2, etc. But if you look sideways or move it a quarter turn, it is 10 + 10.

Keep the ten groups of two cubes on the table.

? How far can you go counting in twos?

Using *Multiplication grid 1* (Resource sheet 35) (or *Multiplication grid 2* (Resource sheet 36) for Year 6) ask the child to fill in the vertical column under the 2 in pencil. Establish that two multiplied by zero is zero, and that two multiplied by one is two and so on.

> If the child is struggling with this, use the array of twenty cubes or counters to count along the columns in twos.

Mark with a blue dot in the relevant space any facts that the child takes a while to remember or work out, and put a red dot next to any which they are not able to work out or remember at all.

'I'm just putting a blue mark beside the ones you have to stop and think about. We can practise these over the next few weeks. The red dots are ones we can work on together.'

Note: Many children are likely to feel that they have failed at learning multiplication tables, and the resource sheet is designed to help both you and them to see how many facts they do know and also identify which they need to work on. To focus on success you can:

- record the number of facts known at the bottom of the sheet and date it;
- then work on other facts, perhaps counting how many blue and red dot facts still need to be learned and going over these in green pen once they are learned;
- help children to see that there are not dozens of unrelated facts to learn;
- keep praising and reassuring, using games, for example, to help with consolidation, as the number of unknown facts diminishes over time.

If you have time, end by asking the child to chant the two times table, using the language:

> One two is two.
> Two twos are four.
> Three twos are six.
> Four twos are eight…

This will link closely to division questions, such as 'How many twos make eight?'

Help children to make the link to division by sometimes chanting division tables, for example:

> Two divided by two is one.
> Four divided by two is two.
> Six divided by two is three…

? What is two multiplied by zero? What is two hundred multiplied by zero? What is two million multiplied by zero? *(Any number multiplied by zero is zero.)*

? Let's chant the two times table together. If we went on and on counting in twos like this, would we eventually say fifty-seven? Why not? *(It is an odd number.)*

? If you count in twos and say two as the first number, what would be the fiftieth number you said? *(100)* **So what would be the fifty-seventh number?** *(114)*

Spotlight 1

Is not confident in recalling multiplication facts

Opportunity for: exploring number patterns

· ·

Double twos

Time 10 minutes

Resources

- *Multiplication grid 1* (Resource sheet 35) or for Year 6 work use *Multiplication grid 2* (Resource sheet 36)
- L-shaped card
- Different coloured pens, pencils, paper
- Bead strings
- Cubes
- Dominoes

Key vocabulary

groups of

lots of

multiplied by

double and double again

Teaching activity

'Today we are going to do some doubling and we are going to use doubling to find ways to remember the two and four times tables.'

Put out the dominoes and ask the child to find the doubles.

? **How did you know that domino was a double?**

? **What is double three? What is double six?**

> If the child needs more help with understanding what doubling means, set out some cubes (or use a bead string) and then double the number. For example, lay out four cubes and another four, five and another five, six cubes and another six, then ask the child to put out cubes or beads to show double seven.
>
> ● ● ● ● ● ● ●   ● ● ● ● ● ● ●
>
> Explain that double seven is fourteen.

To make the link from doubling to the two times table, record for the child the numbers one to ten and their doubles, making the link from this to the numbers in the two times table which the child wrote last time on their *Multiplication grid 1* (Resource sheet 35).

> Two times table
> One doubled is two
> Two doubled is four
> Three doubled is six
> Four doubled is eight

Show a doubling method for working out the four times table.

'One doubled is two and then if we double the two we get to four. Two doubled is four and if we double the four we get eight.'

| Two times table	Four times table
One doubled is two	Two doubled is four
Two doubled is four	Four doubled is eight
Three doubled is six	Six doubled is twelve
Four doubled is eight	Eight doubled is sixteen
⋮	⋮

If the child is finding this too challenging, you can make the doubles with cubes or on a bead string as above. Explain that four doubled is eight and then if you double the eight you get to sixteen, illustrating the number relationships using the equipment.
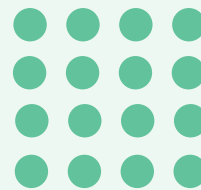
4   8   16

Help the child to fill in the four column on *Multiplication grid 1* (Resource sheet 35), reminding them that four multiplied by zero is zero, if necessary.

? **What number shall we stop at?** *(Try to get to 4 × 10.)*

? **So, if we don't get to forty, what might that tell us? What if we get to thirty-nine?**

Explain landing on 40 as a checking method and that we can sometimes make little mistakes so we must always find ways to check what we are doing.

Now, or in a later session, you might want to explore the patterns in the last digit of both the two times and the four times tables.

? **What pattern can you see in the last digit of each of our numbers?**

? **Why do you think this happens?**

Say that now we are going to circle every other number in the two times table. Show how every other number is part of the four times table.

0   4   8   12   16   20

Help the child to chant the four times table:

'One four is four.
Two fours are eight.
Three fours are twelve…'

If the child finds this hard, talk them through some strategies which they could use, for example counting on in fours.

Use a bead string to make groups of four.

'One four is four, two fours are eight, then add another four to make twelve.'

Help the child to see the pattern in the final digit. Remind them to check their numbers and to say the ending digits in order again.

> If the child struggles with writing the multiples of four, encourage them to go as far as they can and to say the end digit pattern to you again. Look again at how the four times table can be made by doubling the two times table.
>
> **?** **What is double five? So what is five multiplied by two?**
>
> **?** **How can we use five multiplied by two to find five multiplied by four?** *(5 × 2 = 10, so 5 × 4 is double 10)*

? **If you were writing the answers to the four times table and you wrote down seventeen, how would you know that you had gone wrong somewhere?**

? **Look at your multiplication grid and show me how you can find the answer to four multiplied by seven.**

Make sure that the child can use the multiplication grid, if necessary making them an L shape with card which they can line up with the 4 at the top of the resource sheet and the 7 at the side to read off 28 in the relevant square.

×	1	2	3	4
0	0	0		0
1	1	2		4
2	2	4		8
3	3	6		12
4	4	8		16
5	5	10		20
6	6	12		24
7	7	14		28

Note: When children are working in class using multiplication to solve problems, you might find that an L-shaped card and the completed multiplication grid can help children to have experience of engaging with the problems without feeling defeated because they can't remember their multiplication facts.

Using an L-shaped card helps to prevent mistakes and can help dyslexic children and others.

? **Which other multiplication tables might you be able to work out, starting by doubling the twos?**

? **How could you use doubling to work out the three and six times tables?**

? **Can you work out the nine times table with doubling?** *(Yes, if you work out a 4.5 times table! No, if you don't.)*

Spotlight 2

Is not confident in recalling multiplication facts

Opportunity for: developing mental images

∙∙∙

Fives and tens

Time 15–20 minutes

Resources

- *Multiplication grid 1* (Resource sheet 35) or for Year 6 work use *Multiplication grid 2* (Resource sheet 36)
- L-shaped card
- Different coloured pens, pencils, paper
- 100-square
- Base 10 equipment
- Number cards 1–10 (Resource sheet 1)
- Cubes
- Place value (arrow) cards

Key vocabulary

groups of

lots of

multiplied by

array

Teaching activity

'Today we are going to do some work on the five and ten times tables.'

? **Tell me what you already know about the ten times table.**

? **Can you circle the numbers in the ten times table on the 100-square?**

> If children find this too challenging, help them to find the tens numbers, talk about the zero endings, and lay out some numbers with Base 10 equipment.

? **How many ten rods do you need to show 10 × 5 = 50?**

Help the child to fill in the multiples of ten (10, 20, 30, etc.) on *Multiplication grid 1* (Resource sheet 35).

> If the child needs more support, show some 1 to 10 number cards, asking the child to multiply ten by each number. For example, show five and the child needs to say 'ten multiplied by five is fifty.'
>
> Support the child to see that the five moves one place to the left, rather than saying *you add a nought*.
>
> If the child doesn't see the pattern, you might find that place value cards help to show how five moves left into the tens column and there are no units.
>
> | 5 | | × 10 = | 5 | 0 |
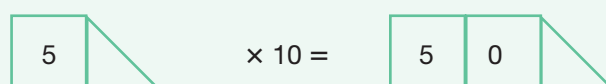
Help the child to find the fives on the 100-square and fill in the numbers on the multiplication grid.

If the child needs help to visualise the five times table, you could set it out in cubes in columns, or in a dice pattern.

$5 \times 1 = 5$ $5 \times 2 = 10$ $5 \times 3 = 15$

? **When you wrote the numbers on the multiplication grid, which answers were already there in other multiplication tables?** *(For example, 4 × 5 was there in the four times table.)*

? **Why do you think that some of the numbers in the five times table are the same as the numbers in the ten times table?**

If the child cannot see that the answers in the five times table are half those in the ten times table, you will need to demonstrate this with cubes or any other equipment which the child finds helpful.

? **What do answers in the five times table end in?**

? **What do answers in the ten times table end in?**

With shuffled number cards, show one card at a time and ask the child to multiply five by the number. For example, show seven and the child must say 'Five multiplied by seven is thirty-five', or they could say 'Ten multiplied by seven is seventy and half of seventy is thirty-five'.

Select a few 'blue dot' numbers from the child's resource sheet (multiplication facts that the child can work out but doesn't know by heart). You could write just a few of these on paper for the child to take back to class.

Explain that you are giving the child some multiplication facts that they nearly know by heart. They are going to focus on these this week to see if they can learn them by heart. You could also set them the challenge of spotting these facts in any lessons during the week.

? **What did you do today that you found easy? What was hard? What are you good at?**

? **Which do you find are the hardest multiplication facts to learn? Why are they hard?**

? **Can you think of a way to help yourself to remember these facts?**

Spotlight 3

Is not confident in recalling multiplication facts

Opportunity for: exploring mental images

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Lots of ways

Time 10–15 minutes

Resources

- *Multiplication grid 1* (Resource sheet 35) or for Year 6 work use *Multiplication grid 2* (Resource sheet 36)
- L-shaped card
- Different coloured pens, pencils, paper
- Cubes, counters
- Number lines
- Bead strings

Key vocabulary

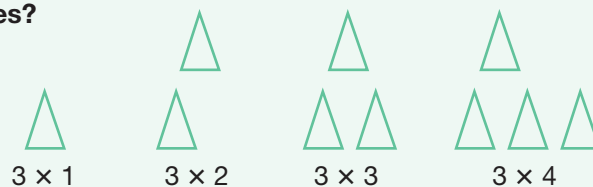|	
groups of	adding
lots of	multiplied by
sets of	array
rows of	hops of three
columns of	

Teaching activity

'Today we are going to work on the three times table.'

? **How far can you count in threes?**

? **What number should you get to for ten threes?**

> If the child needs help counting in threes, you might want to use triangles or cubes in rows of three.
>
> **?** **How many sides?**
>
> 3 × 1   3 × 2   3 × 3   3 × 4

Look at the child's multiplication grid (Resource sheet 35).

? **Which multiplications in the three times table are already on the grid in different tables?** *(For example, 5 × 3 and 10 × 3.)*

Keep helping the child to see that remembering all the multiplication facts is a manageable task because there are so many repeats, and because there are patterns in the endings of the numbers (though the endings in the three times table are not as straightforward as some other tables).

Help the child to identify any number facts that they already know. You could put a green tick over any blue dot and red dot numbers that the child now knows, or let the child go over the numbers in green pen. You could also put an encouraging note at the bottom of the page and date it.

? **Choose a number to multiply three by and show it with your favourite equipment.**

Build on what the child says and note down any strong points or difficulties which they demonstrate.

If the child can't do this activity, move to the following 'three multiplied by six' activity.
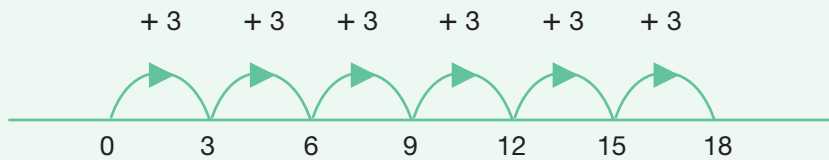
[?] Do you have a picture in your head when I ask you something like 'What is three multiplied by six?'

Help them to draw pictures or make arrays or hops along a number line, etc. for just this one multiplication.
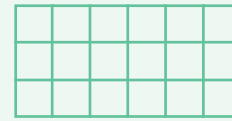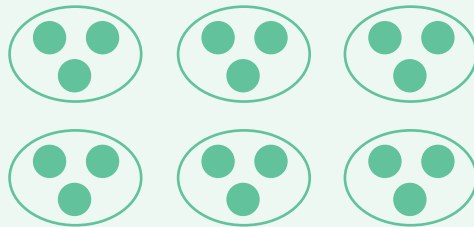
Six columns of three

[?] Can you think of another way to show three multiplied by six?

+ 3   + 3   + 3   + 3   + 3   + 3

0   3   6   9   12   15   18
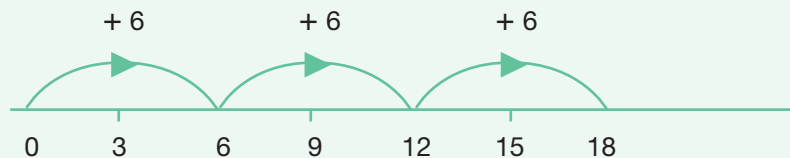
Three multiplied by six is 3 + 3 + 3 + 3 + 3 + 3

Six lots of three

It is likely that the question of changing around the pictures to six multiplied by three will arise, so, if you have time, support the child to shift around the array and regroup the eighteen counters into three groups of six. Ask the child to talk about how the picture has changed.

[?] How would you show three groups of six on a number line?

If the child doesn't know, show them how to take three hops of six.

+ 6   + 6   + 6

0   3   6   9   12   15   18

6 + 6 + 6 = 18

Stress that this is six multiplied by three, but before we were finding three multiplied by six.

[?] If I asked you a question like 'What is nine threes?' and you didn't know that answer immediately, what could you do to work it out?

If the response indicates that the child has few mental strategies, and underdeveloped mental images for multiplication, you might want to repeat these activities in your next session, maybe choosing another number to multiply three by. You might want to build on what the child says about their favourite equipment to show multiplication.

Continuation for Years 5 and 6

You can show how the six times table can be found by doubling the three times table. The endings for the three times table are a bit awkward; every other one is an odd number. The answers to the six times table are all even numbers.

The nine times table can be made by adding answers from the three and six times tables.

$$2 \times 3 = 6 \qquad 2 \times 6 = 12 \qquad 2 \times 9 = 6 + 12$$

The endings of the nine times table are memorable:

9, 1**8**, 2**7**, 3**6**, 4**5**, 5**4**, …

? **Can you see a pattern?**

You can repeat the activities above (showing a whole range of pictures and images of multiplication) with facts like seven multiplied by eight that the child finds hard.

? **Can you find even more ways of saying or drawing three multiplied by six?**

? **Can you explain those endings to the nine times table? Three multiplied by nine is twenty-seven and four multiplied by nine is thirty-six. Explain why the tens number goes up by one and the units number goes down by one.**

Spotlight 4

Is not confident in recalling multiplication facts

Opportunity for: solving problems in a real-life context

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At the shop   **Time** 10–20 minutes

Resources

- *Multiplication grid 1* (Resource sheet 35) or for Year 6 work use *Multiplication grid 2* (Resource sheet 36)
- L-shaped card
- *Things to buy* (Resource sheet 37)
- Different coloured pens, pencils, paper
- Coins (various denominations)
- Kitchen timer or stop clock

Key vocabulary

groups of	array
lots of	costs
multiplied by	how much

Teaching activity

'Today we are going to do some shopping to help you to practise your multiplication tables.'

Show the child the money and check that they can recognise the coins.

? Do you do any shopping on your own? What do you buy?

Fill in the amounts of money on *Things to buy* (Resource sheet 37) to practise the tables you want. For example, to practise the two times table, make the lollies two pence each, for the ten times table make the cookies ten pence each, and so on.

? How much would ten lollies cost if they are two pence each?

> If the child can't work this out relatively quickly, show them how to use their L-shaped card to find two multiplied by ten on *Multiplication grid 1* (Resource sheet 35). For Year 6 work use *Multiplication grid 2* (Resource sheet 36).

? If you had twenty pence/fifty pence/one hundred pence and you wanted to spend all of it buying lots of just one item, what could you buy? *(For example, ten balloons at ten pence each.)*

Ask a range of questions to suit the child.

? How much would it cost to buy six packets of stickers?

? What could you buy with eighteen pence?

? If you bought two boxes of pencils at twenty pence a box, how much change would you get from sixty pence?

? Without using your L-shaped card, can you tell me how much ten balloons at eight pence each would cost?

Now ask the child to look at the things to buy and make up a multiplication question. Help the child to make up these questions using *Things to buy* (Resource sheet 37) for ideas.

If the child still has many facts to learn by heart, you could use a blank copy of *Multiplication grid 1* (Resource sheet 35) to practise tables again. Set the clock and explain that the child has to fill in the answers to the tables as quickly as they can. Then the next day they should try again and try to beat their time.

More-confident children could use *Multiplication grid 2* (Resource sheet 36). If you white out the numbers along the top, you could put the tables in a different order to make the task more challenging.

Spotlight 5: a learning check

Is not confident in recalling multiplication facts

Opportunity for: talking about multiplication and explaining images

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Red race

Time 10–20 minutes

Resources

- At least one other child
- *Multiplication grid 1* (Resource sheet 35) or for Year 6 work use *Multiplication grid 2* (Resource sheet 36)
- Number cards 0–10 (Resource sheet 1)
- L-shaped card
- Different coloured pens, pencils, paper
- Cubes
- 2-cm squared paper
- Red dice, spinners

Check: does the child use key vocabulary?

groups of	equal groups
lots of	sets of
multiplied by	rows of
array	columns
divided by	

Teaching activity

'Today we are going to play a multiplication game, **Red race**, so that you get better at knowing your multiplication tables by heart.'

Number a red dice or red spinner 1 to 6 (or whichever multiples you want the children to practise). Each player will need an array cut out of 2-cm squared paper to keep their own score. Three rows of four is a good size for this purpose.

(If you are playing a game with a red dice with numbers 5 to 10, you need to make the paper array much bigger, perhaps ten rows of six.)

- The red dice will decide the size of the column for the array in each round of the game.
- Number cards 0 to 10 (or those to suit the children) are the multiplying cards and will decide the number of columns in each round of the game.

How to play

1. Players throw the red dice and draw a card to define the size of their array. For example:


Size of columns

Number of columns (the number to multiply by)

4 multiplied by 5

2. When every player has their two numbers, they write them down, for example, four multiplied by five or 4 × 5. If any players have the same numbers, one of the players can throw again.

3. Each player makes an array with cubes, the right size for their dice and card numbers.

4. When all of the arrays have been made, the players take it in turns to tell everyone about their array. Everyone must listen very carefully.
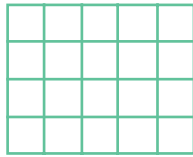
> I've made an array with five columns of four.
>
> Four multiplied by five is twenty.
>
> 4 + 4 + 4 + 4 + 4
>
> That is five hops of four along a number line.

If everyone agrees that the player said everything correctly, that player wins all of the cubes in one of their columns and places the cubes on their paper array.

If a player doesn't describe their array correctly, but shows some understanding, give them an appropriate number of cubes to acknowledge their efforts.

5. The first player to cover all of the squares on their paper array wins, but only if they can describe their paper array correctly! Ask the children to listen carefully.

If a child is not coping with the game, play alongside them, or play the game in cooperating pairs.

Note which numbers the child seems not to remember and give them some further experiences to practise those numbers, using any of the activities above.

Frequent repetition of numbers can aid the memory, so in one week you might ask the child just four calculations in odd moments throughout the week (and ask for help at home as well). For example, you could keep asking what is:

- three multiplied by seven?
- four multiplied by six?
- four multiplied by seven?
- three multiplied by nine?

Repeat these in any order until the child seems to remember them – but you will need to come back to these numbers in the following weeks as well.

Variations

- Instead of making the array with cubes, each player draws their array and has to make at least one other correct drawing using a different image, for example, hops along a number line or spots in groups.

- Instead of winning just one column, players keep a running total of all their numbers, so they score twenty with four multiplied by five. The player with the largest total wins. (A variation on this is that they only win if they can describe an array that would use almost all of their score, so a score of 109 might make an array of ten multiplied by ten with nine left over.)

? **Can you explain to me how you would work out three multiplied by seven if you didn't have your grid and you didn't have any cubes?**

? **What is your favourite picture in your head for multiplication?**

Learning outcomes

By the end of this set of activities, children should be able to:

- tackle related learning tasks with increased motivation and confidence;
- use and understand connected mathematical vocabulary;
- recall multiplication facts;
- use a range of strategies to work out multiplication facts;
- use their mental images and language for multiplication confidently;
- apply multiplication facts in real-life situations.