

# Efficient multiplication

## Notes and guidance

In this small step, children consolidate their knowledge and understanding of multiplication and begin to make decisions regarding the most efficient or appropriate methods to use in a range of contexts.

Children look at times-tables facts, building strategies for finding unknown facts that will support them to strengthen their fluency of times-tables. They then examine a range of strategies for multiplying a 2-digit number by a 1-digit number. Finally, they use arrays to explore multiplicative structure, in particular the associative law and distributive law.

## Things to look out for

- Children may conflate different methods, leading to misunderstanding.
- Children may partition the numbers correctly, but then multiply the tens as if they are ones, for example  $34 \times 6 = 3 \times 6 + 4 \times 6$
- Children may attempt to learn the different methods procedurally. It is vital that children understand how they are manipulating the numbers, rather than try to remember a long series of instructions.

## Key questions

- Which method do you find most efficient? Explain how this method works.
- What is the most efficient way to work out  $\_\_\_\_\_ \times \_\_\_\_\_$ ?
- What happens if you double one factor and halve the other?
- How could you use factor pairs to help you calculate?

## Possible sentence stems

- $\_\_\_\_\_ \times \_\_\_\_\_ = \_\_\_\_\_ \times \_\_\_\_\_ + \_\_\_\_\_ \times \_\_\_\_\_$
- $\_\_\_\_\_ \times \_\_\_\_\_ = \_\_\_\_\_ \times \_\_\_\_\_ - \_\_\_\_\_ \times \_\_\_\_\_$
- $\_\_\_\_\_ \times \_\_\_\_\_ = \_\_\_\_\_ \times \_\_\_\_\_ \times 2$
- $\_\_\_\_\_ \times \_\_\_\_\_ = \_\_\_\_\_ \times \_\_\_\_\_ \div 2$

## National Curriculum links

- Solve problems involving multiplying and adding, including using the distributive law to multiply 2-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as  $n$  objects are connected to  $m$  objects

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## Key learning

- Jack and Sam are working out  $7 \times 6$



Jack

To work out  $7 \times 6$ ,  
I do  $7 \times 3 = 21$ ,  
then double  $21 = 42$



Sam

To work out  $7 \times 6$ ,  
I do  $7 \times 5 = 35$ ,  
then add  $7 = 42$

- Use Jack's method to work out  $8 \times 6$
- Use Sam's method to work out  $9 \times 6$
- For each calculation, show two ways that you could find the answer if you do not know the times-table fact.

$9 \times 4$

$9 \times 7$

$4 \times 7$

$7 \times 8$

- Work out the missing numbers.

$5 \times 8 = 5 \times 4 \times \underline{\quad}$

$16 \times 5 = 16 \times 10 \div \underline{\quad}$

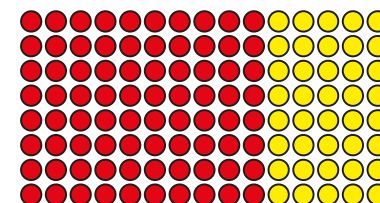
$7 \times 4 = 7 \times 2 \times \underline{\quad}$

$19 \times 7 = 20 \times 7 - \underline{\quad} \times 7$

- Here are four different ways of working out  $15 \times 8$  mentally. Complete the calculation in each method.

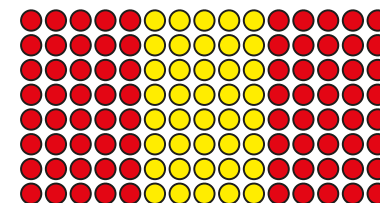
### Method 1

$$\begin{aligned} 15 \times 8 &= 10 \times 8 + 5 \times 8 \\ &= 80 + \underline{\quad} \\ &= \underline{\quad} \end{aligned}$$



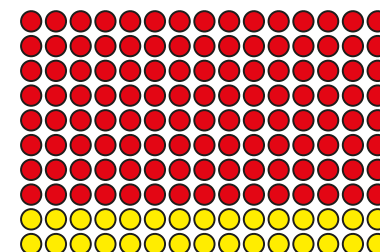
### Method 2

$$\begin{aligned} 15 \times 8 &= 3 \times 5 \times 8 \\ &= 3 \times \underline{\quad} \\ &= \underline{\quad} \end{aligned}$$



### Method 3

$$\begin{aligned} 15 \times 8 &= 15 \times 10 - 15 \times 2 \\ &= \underline{\quad} - \underline{\quad} \\ &= \underline{\quad} \end{aligned}$$



### Method 4

$$\begin{aligned} 15 \times 8 &= 30 \times 8 \div 2 \\ &= \underline{\quad} \div 2 \\ &= \underline{\quad} \end{aligned}$$

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## Reasoning and problem solving

Find four different ways to work out  $18 \times 5$

Compare methods with a partner.



multiple possible answers, e.g.  
 $(18 \times 10) \div 2$

Kim uses an array to help her work out  $19 \times 3$



$$20 \times 3 = 60$$

$$60 - 1 = 59$$

$$19 \times 3 = 59$$

Kim has subtracted one counter, rather than one group of 3 counters.

What mistake has Kim made?

Draw or make the array correctly.



21	42	38
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Teddy, Eva and Amir choose one of the number cards each.

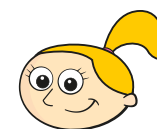
They multiply their number by 5



Teddy

I did  
 $40 \times 5$  and  
then subtracted  
2 lots of 5

I multiplied  
my number by 10  
and then divided  
210 by 2



Eva

42

Which number card has Amir got?

Talk about the different methods Amir could have used.

