Multiplying and dividing by single-digit numbers and multiplying by two-digit numbers

Once pupils are familiar with some multiplication facts, they can use these facts to work out others.

- One strategy that can be used is writing one of the numbers as the sum of two others about which more is known: $6 \times 7 = 6 \times (2 + 5) = 6 \times 2 + 6 \times 5$.
- Another strategy is making use of factors, so 7×6 is seen as $7 \times 3 \times 2$.
- A third strategy, for multiplication by 2, 4, 8, 16, 32, …, is to use a method of doubling, so that 9×8 is seen as $9 \times 2 \times 2 \times 2$.
- A fourth strategy to use is compensating, so that $2.9 \times 9 = (3 \times 9) - (0.1 \times 9)$, or $37 \times 19 = (37 \times 20) - 37 = 740 - 37 = 703$.

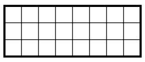
Since each of these strategies involves at least two steps, most pupils will find it helpful to make jottings of the intermediate steps in their calculations.

Expectations leading up to national curriculum level 5

12 × 4
93 ÷ 3
31 × 5
128 ÷ 4
46 × 3
135 ÷ 5
428 × 2
154 ÷ 7
3.1 × 7
48.6 ÷ 6
7.9 × 8
2.98 × 3
13 × 50
14 × 15
44 × 25
Change 15 minutes to seconds

Activities

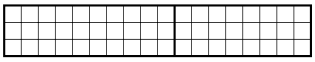
Use an area model for simple multiplication facts. For example, illustrate 8 × 3 as:



Ask pupils: 'How many rows are there? How many columns? How many squares?'

Encourage pupils to visualise other products in a similar way.

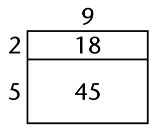
Extend this model to larger numbers, such as 18 × 3: split the 18 into 10 + 8 and use 10 × 3 + 8 × 3.



How many rows? columns? squares?

The rectangles give a good visual model for multiplication: the areas can be found by repeated addition (in the case of the first example, 8 + 8 + 8), but pupils should then commit 3 × 8 to memory and know that it is the same as 8 × 3.

Use multiplication facts that pupils know in order to work out others. For example, knowing 9 × 2 and 9 × 5, work out 9 × 7.



Area models like this discourage the use of repeated addition. The focus is on the separate multiplication facts. The diagram acts as a reminder of the known facts, which can be entered in the rectangles, and the way that they are added in order to find the answer.

Give pupils some examples which can be worked either by factors or by partitioning, such as:

27 × 12, 48 × 15

Discuss the special cases of multiplying by 25 and 50, which are easily done by multiplying by 100 and dividing by 4 or 2 respectively.

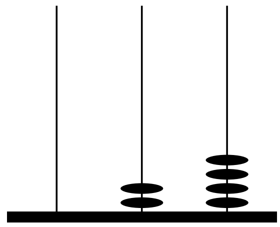
The use of factors often makes a multiplication easier to carry out.

Use base 10 material to model multiplication. Ask a pupil to put out rods to represent, say, 24.

Then ask for two more groups of 24 to be added, making three groups altogether. Make sure the pupil knows that as soon as there are 10 'ones' they are exchanged for a 'ten' or a 'long'.

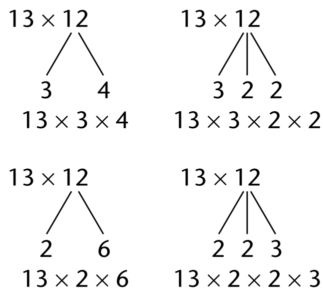
Record the result as 24 × 3.

Do the same, using a spike abacus. This time, as soon as there are 10 beads on a spike, they are removed and replaced by one bead on the spike to the left.



Base 10 material is an excellent model of the way in which we group numbers in tens. It lends itself to the concept of multiplication by 10 as each time a 'one' becomes a 'ten' and a 'ten' becomes a 'hundred'. Spike abacuses focus on place value, with multiplication by 10 resulting in the 10 beads on one spike being replaced by a single bead on the spike to the left.

Use factors to help with certain calculations. For example, do 13 × 12 by factorising 12 as 3 × 4 or 6 × 2:



Discuss which factors pupils prefer to use.

These diagrams can help pupils to keep track of the separate products when they split a number into its factors.