

### Lesson 3 Developing a Better Understanding of Multiplication

#### Learning objectives

- Developing multiplication skills
- Developing efficient investigation skills
- Improving reasoning about calculations
- Linking area and perimeter to calculation

#### Activity

Use whiteboards and ask pupils to work with a partner to check the answer when they think they have found a solution.

- Give me two numbers that add up to 50 and multiply together to make 400?
- Ask pupils to make different products and totals, ask how they reach a solution quickly? Get a pair of pupils who were successful to explain their method and one pupil will record the skills and knowledge they used in finding the answer. For example which times table facts did they use, estimating skills, calculation skills, were they methodical, why didn't they try  $5 \times 45$  for example.
- **ASSESSMENT OF PRIOR LEARNING BY TEACHER AND PUPILS.** Ask pupils to copy and traffic light the skills and set themselves targets for improvement. Let them choose the area for development which they think is most important, for example recognising the patterns in the numbers or end digits for different tables or the rules of divisibility. At this point you could have little groups peer tutoring or let pupils study times table posters for a few minutes or do a quick revision session on a common problem area.

*Take a pupil vote for using smaller values to start with so that all pupils will experience success, more able can make up questions with larger values for each other.*

- **NEXT PROBLEM.** Ask them to make the biggest product they can if the two numbers still have to add together to give 50. Remind them of the way the successful pupils set about the first problem. As they work on the problem, a useful prompt could be looking at the extreme cases as a method of investigating, i.e. two numbers which are very different, or two numbers which are very similar.
- Discuss the answer.
- What does the answer tell you about the area of rectangles and squares? Using this observation can they guess which two numbers that add up to 20 will have the biggest product? What do they think is the general rule? How will they find out if their rule works? Is this a proof?

- How do the products and sums relate to the area and perimeter of the shapes? If they don't know what sort of things might they do to find out?
- What do they notice about the difference between  $25 \times 25$  and  $24 \times 26$ ? Can they draw a picture to help explain this? Prompts can be to look at smaller values e.g.  $2 \times 2 = 4$  but  $1 \times 3 = 3$ ,  $3 \times 3 = 9$  but  $2 \times 4 = 8$ . Extension what happens with odd totals such as 3 or 5 or 21, should pupils try decimal numbers?
- Could you make a higher product with 3 or 4 numbers that add to 50 rather than just two numbers?

### Pupils self assessment

- Can they formulate a 'what if' question which they now think they could investigate and answer?
- Has their mental image of multiplication changed and is it a better in helping them to use number facts?
- Can they write down 3 top tips for investigations?
- Can they give one new thing they have learnt?
- Can they find a use for something they learnt in the lesson?
- Have they improved their target skill?

You can use much smaller numbers to differentiate for pupils' calculation ability.

You could use bits of the activity as starters for a week to see if pupils can transfer the skills they develop to different situations.