HOW I TEACH... MATHS IN SCIENCE

Amanda Clegg and **Karen Collins** are both experienced science teachers with a passion for maths in science and purposeful practical work.

Research and Anticipate

Anticipating misconceptions

Knowing about common misconceptions in mathematics allows you to consider them in your planning.

"Multiplying makes numbers bigger."

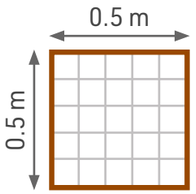
This conception applies to positive whole numbers but is a misconception for numbers less than or equal to 1.

"1 metre squared is the same as 100 centimetres squared."

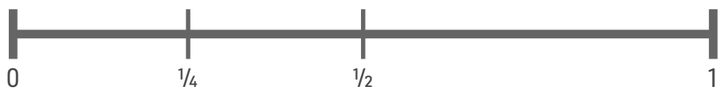
Many students confuse linear metric relationships with metric units of area. 1 m = 100 cm, but 1 m^2 = 10,000 cm^2.

Using diagrams to support understanding

Evidence supports the use of diagrams from problem solving in maths. Students can use a number line to aid multiplication and division, particularly with fractions and decimals.



When calculating the area of this quadrat, students may believe that 0.25 m^2 is incorrect because the number did not become larger. However, 0.5 x 0.5 is the same as saying "half of a half". Use a number line to show half of a half is a quarter.



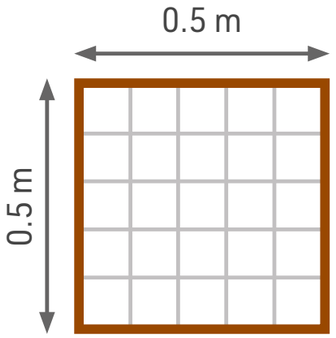
Using simpler numbers can help students understand:

$0.5 \times 10 = 5$ $0.5 \times 8 = 4$ $0.5 \times 0.5 = ?$

Diagnose and Address

Diagnostic questions

Diagnostic questions uncover misconceptions students hold.



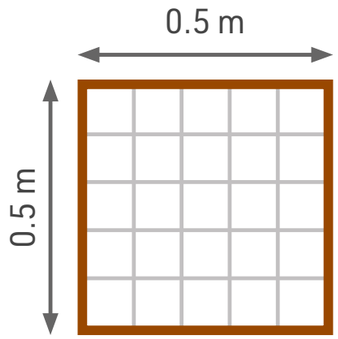
What is the area of this quadrat?

- **A** 1.0 m^2
- **B** 2.5 m^2
- **C** 0.25 m^2
- **D** 2.0 m^2

Why do you think a student might believe C is incorrect?

Digging deeper: Accounting for units

Issues can arise when students need to convert between units. Students know 1 m = 100 cm, so may assume that 1 m^2 = 100 cm^2, or 0.25 m^2 = 25 cm^2.



What is the area of the quadrat?

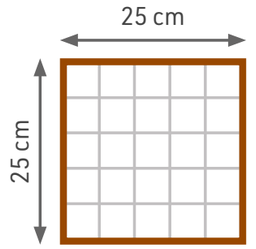
- **A** 25 cm^2
- **B** 2500 cm^2
- **C** 250 cm^2
- **D** 100 cm^2

Why do you think a student might believe A is correct?

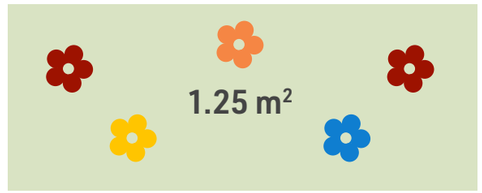
Assess and Review

Applying in context

Check understanding by applying ideas in context.



How many quadrats can fit in this area?



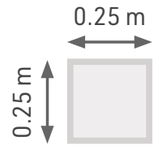
A student may think:

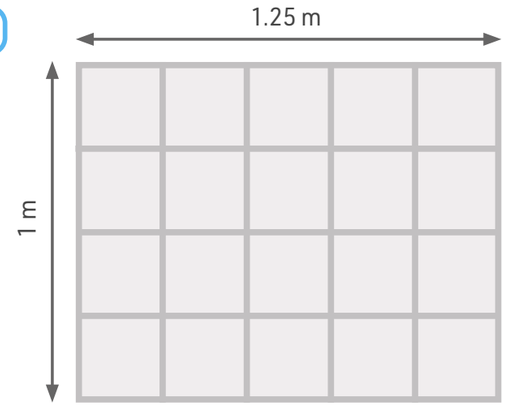
1.25 m^2 = 125 cm^2
25 cm × 25 cm = 625 cm^2
The quadrat is bigger than the sample area!

The student is incorrect because 1 m^2 = 100 cm × 100 cm = 10,000 cm^2. Therefore 1.25 m^2 = 1.25 × 10,000 = 12,500 m^2, so the area will fit 20 quadrats. Use diagrams to help students convert units of area.

Using visuals

How many of the small blocks fit into the larger block?





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