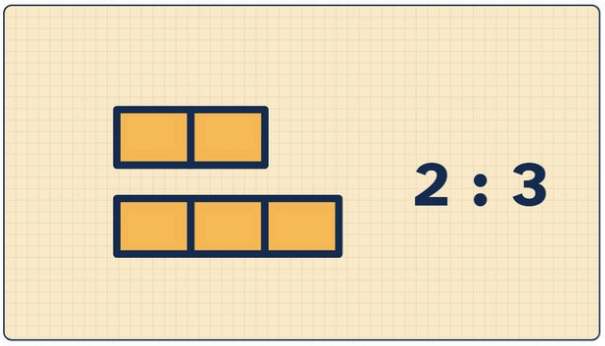
Maths · Simplifying, sharing, unit rates, direct proportion and scale

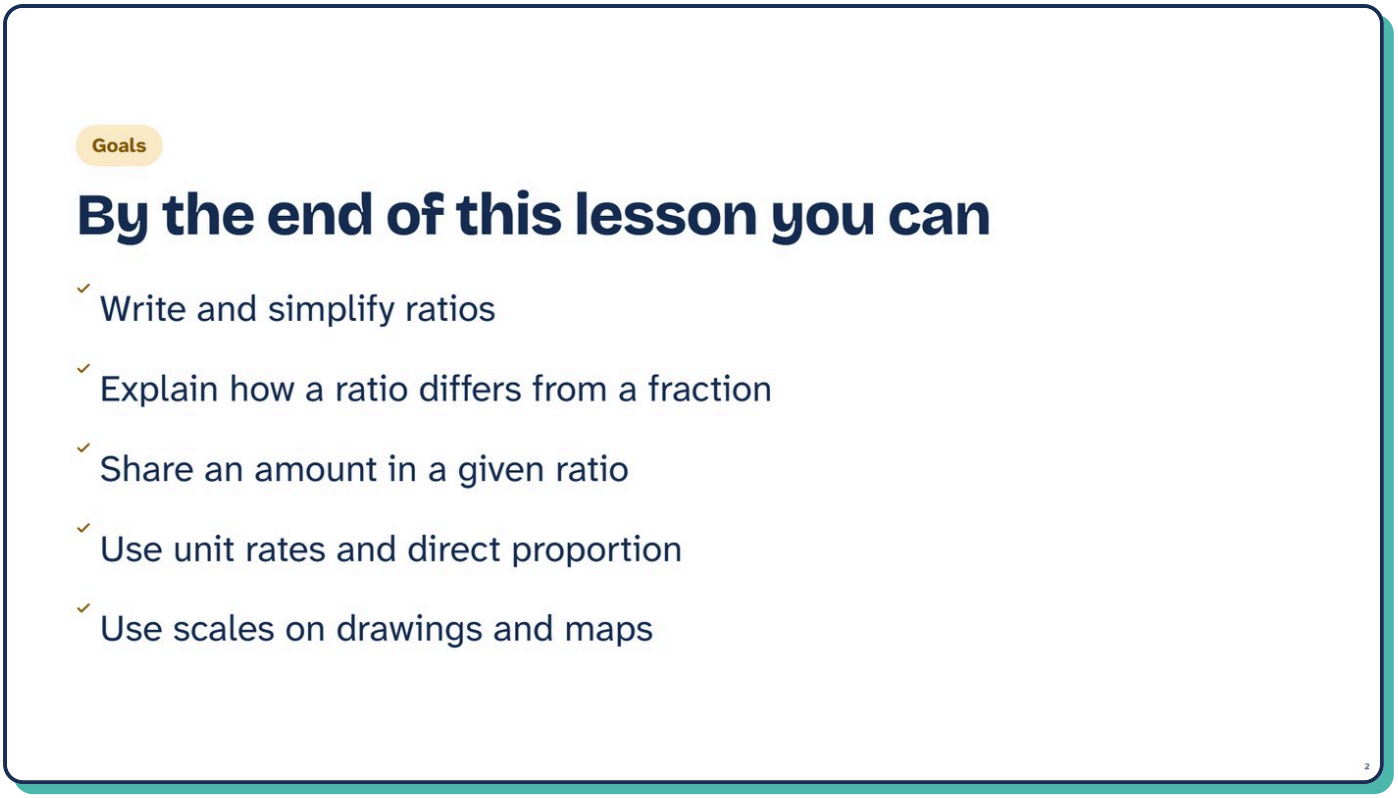
Ratio and Proportion



Ratio and Proportion

Teacher notes

Show two glasses of squash, one with 1 part juice to 4 parts water and one with 2 parts juice to 8 parts water. Ask: which one is stronger? Collect votes. Tell students that by the end of the lesson they will be able to prove that the two drinks taste the same.



By the end of this lesson you can

Teacher notes

Read the objectives aloud. Tell students there is a five-question quiz at the end, and that one method, finding the value of one part, solves most problems in the lesson.

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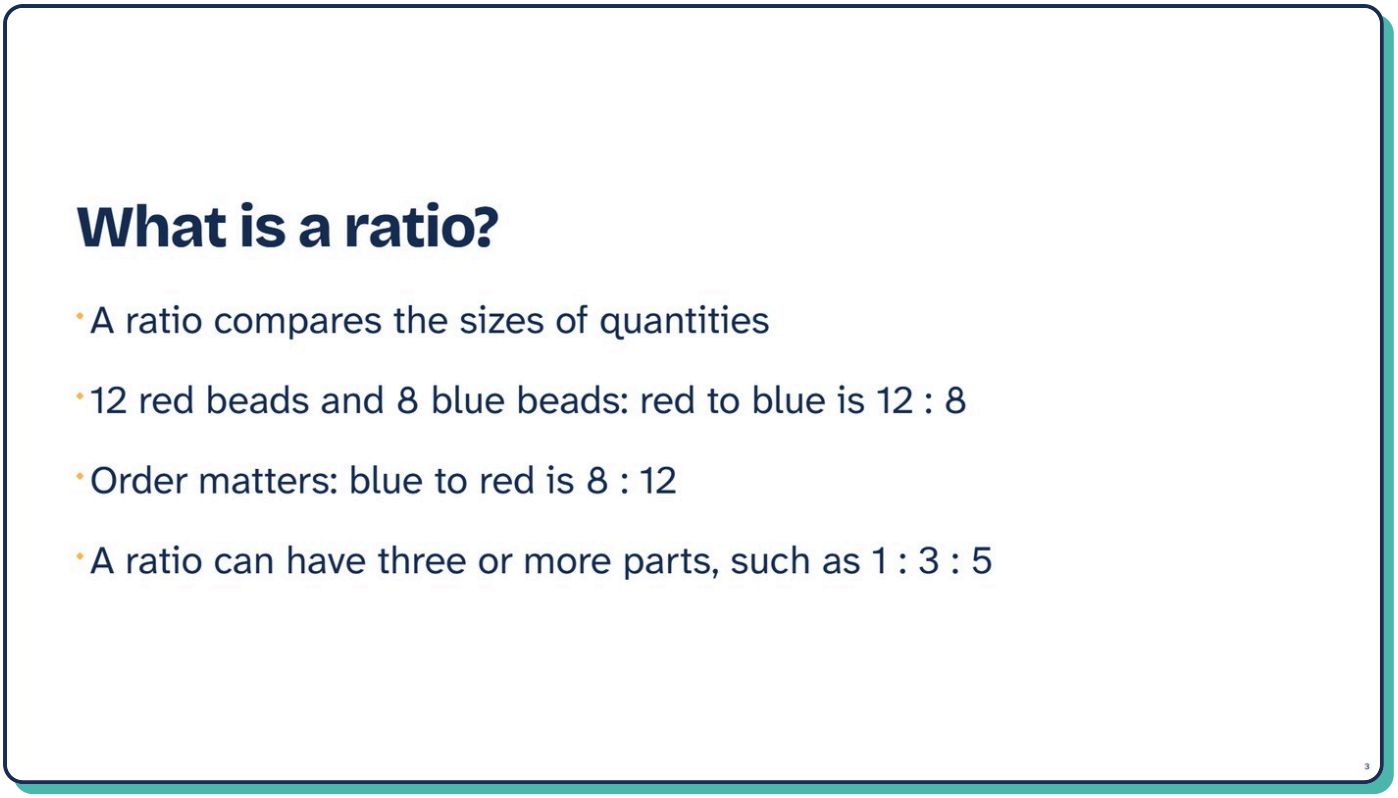
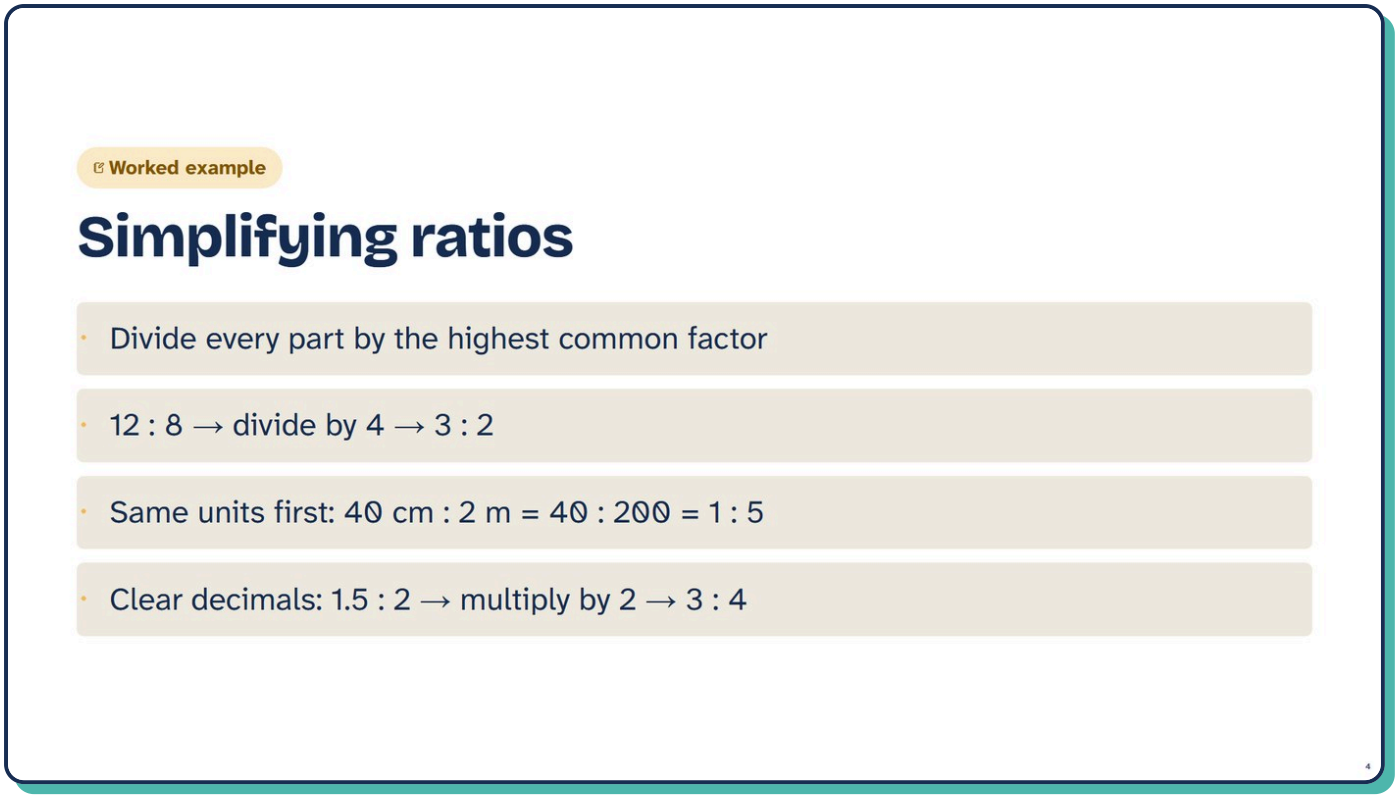


What is a ratio?

Teacher notes

Ask students to write the ratio of students wearing glasses to students not wearing glasses in the room. Stress that the order of the words gives the order of the numbers. A common mistake is writing the parts the wrong way round.



Simplifying ratios

Teacher notes

Link back to the starter: 2 : 8 simplifies to 1 : 4, so both drinks are the same strength. Ask: what is 15 : 25 in its simplest form? 3 : 5. Students often divide by a common factor that is not the highest, such as 6 : 4 from 12 : 8; ask them to keep going until no factor is left.

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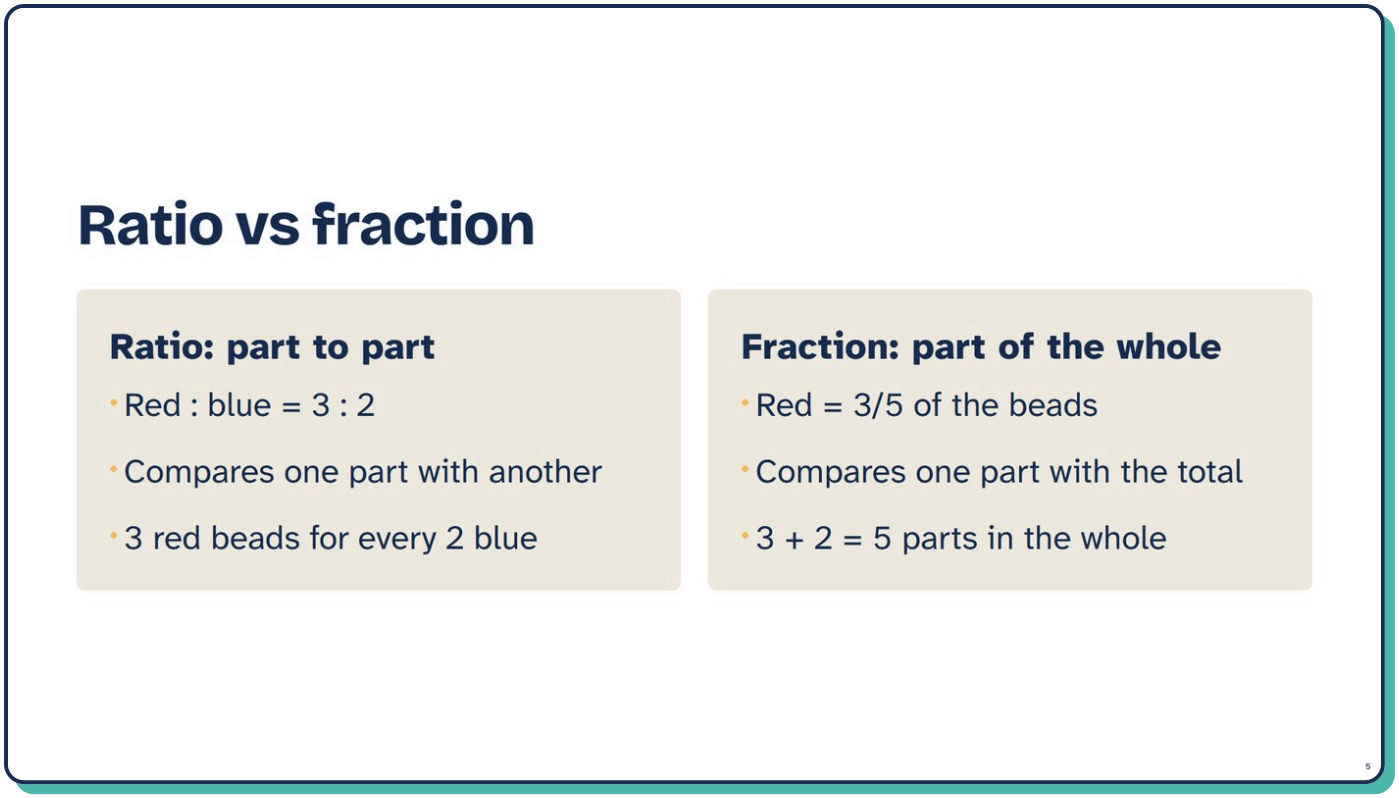

Ratio vs fraction

Teacher notes

Many students write the ratio 3 : 2 as the fraction 3/2. Ask: if there are 3 red and 2 blue beads, what fraction is blue? 2/5, because the total is 5. Adding the parts of a ratio always gives the denominator.

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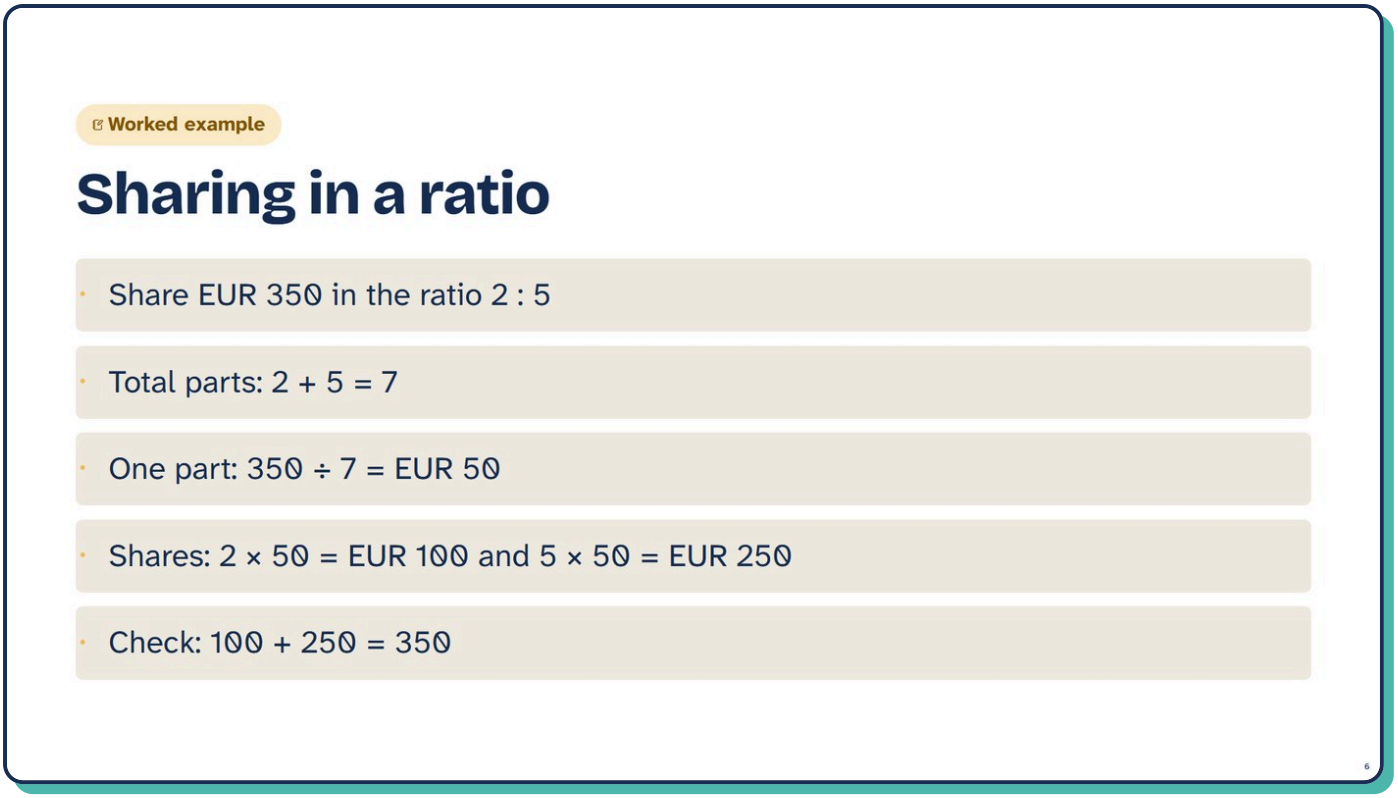

Sharing in a ratio

Teacher notes

Draw a bar model with 7 equal boxes, 2 for the first person and 5 for the second. The most common mistake is dividing by 2 and by 5 instead of by the total 7. Always finish by checking that the shares add back to the amount.

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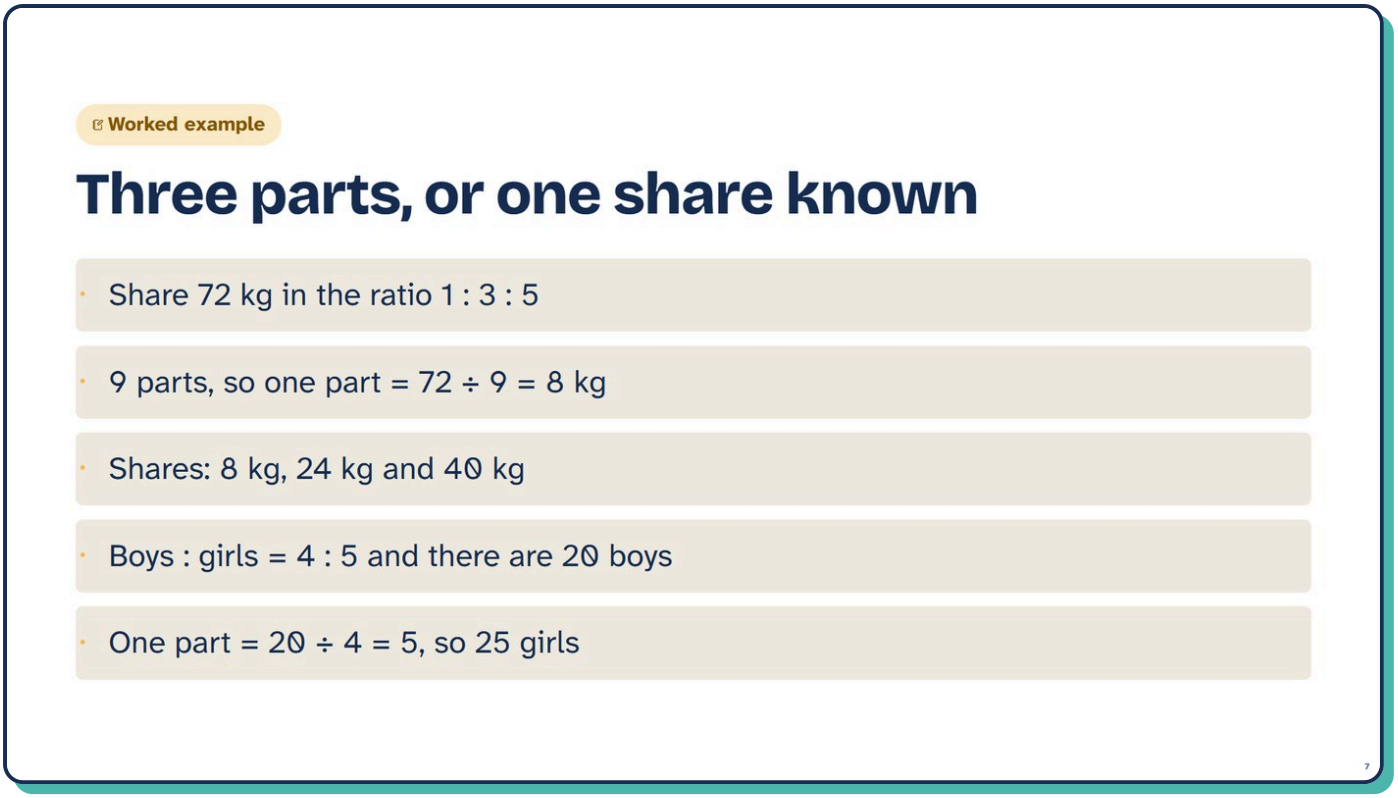
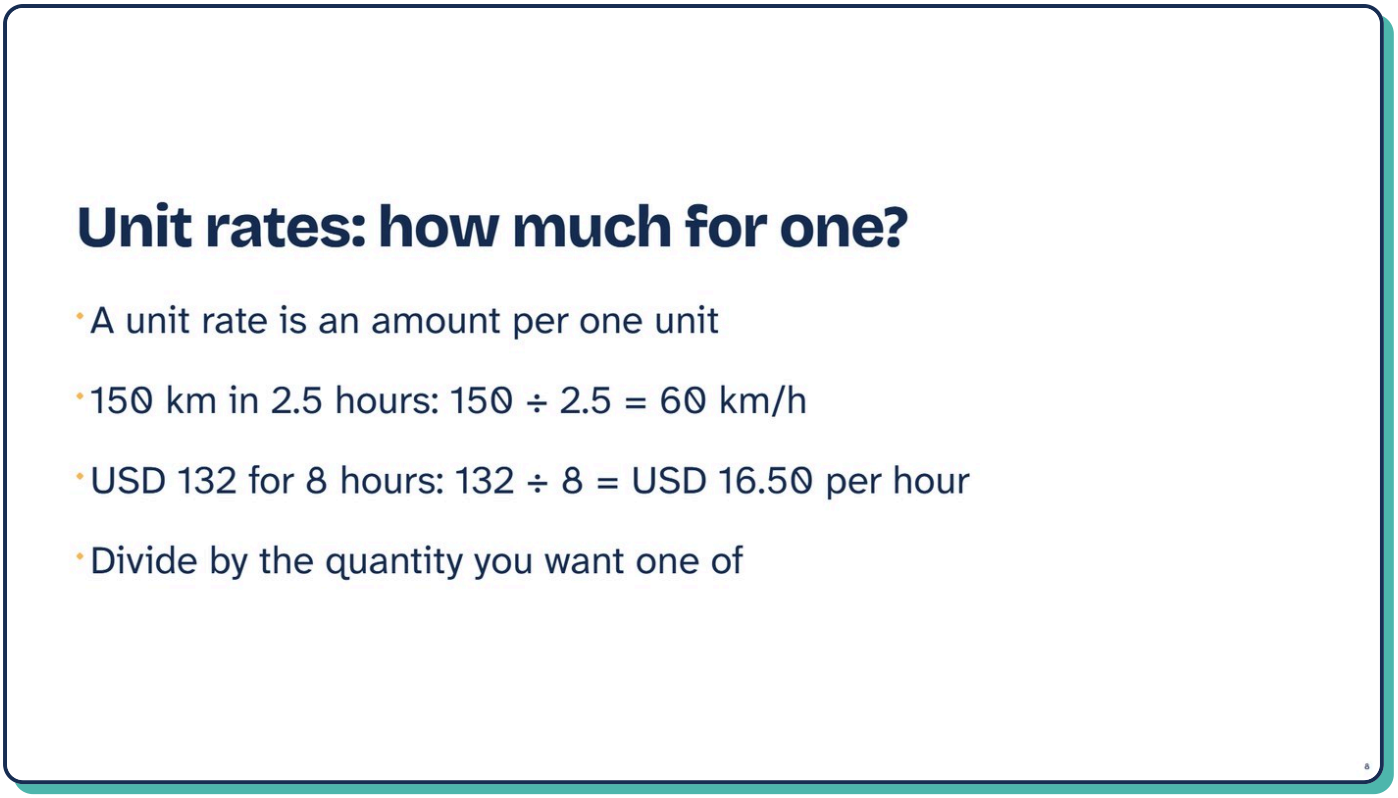


Three parts, or one share known

Teacher notes

The second problem gives one share, not the total, so we find one part from the share we know. Ask: how many children are in the club altogether? 9 parts × 5 = 45. Students who divide 20 by 9 have treated 20 as the total.



Unit rates: how much for one?

Teacher notes

Ask students for unit rates they see in daily life: price per kilogram, kilometres per hour, pay per hour. Ask: what is the cost per litre if 5 litres of paint cost EUR 42? EUR 8.40. Watch for students who divide the wrong way, such as 2.5 ÷ 150.

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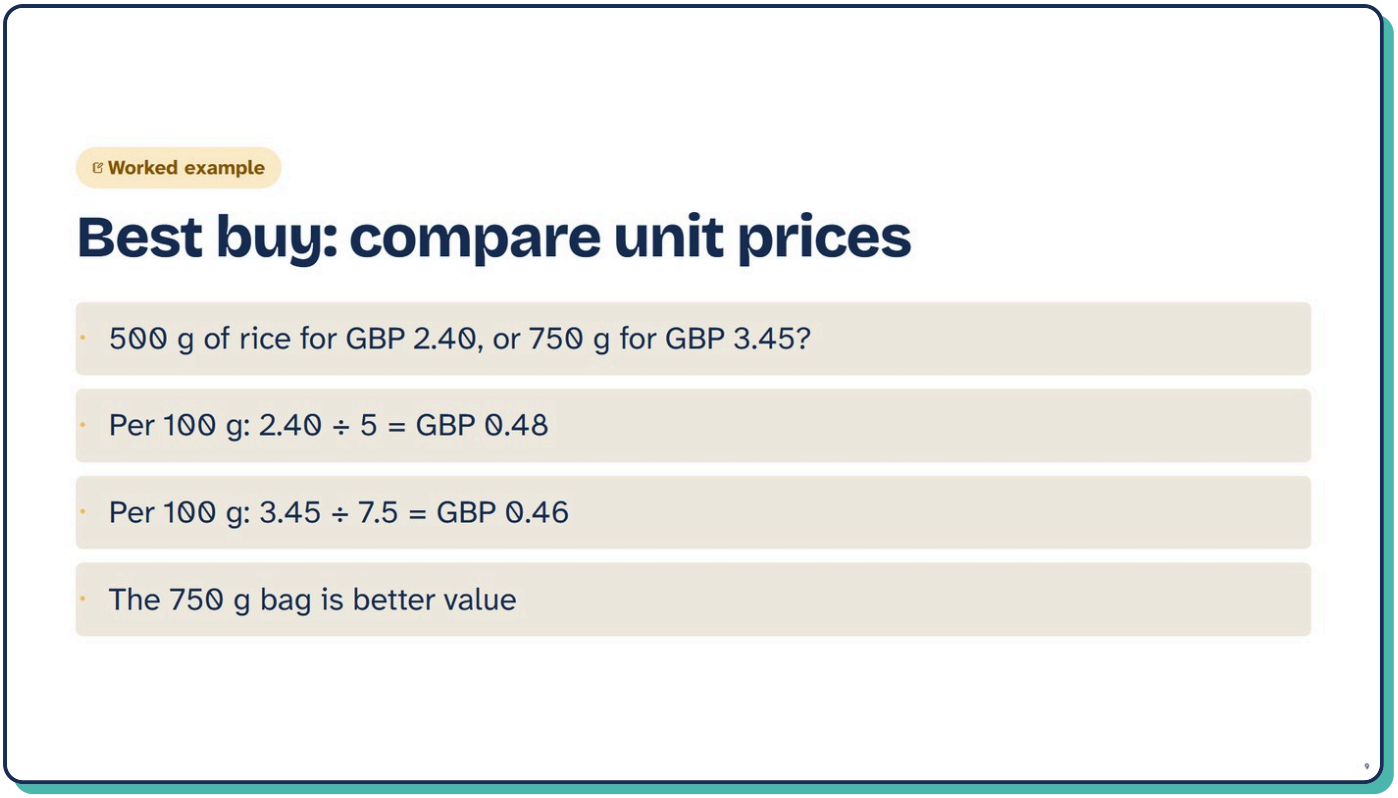
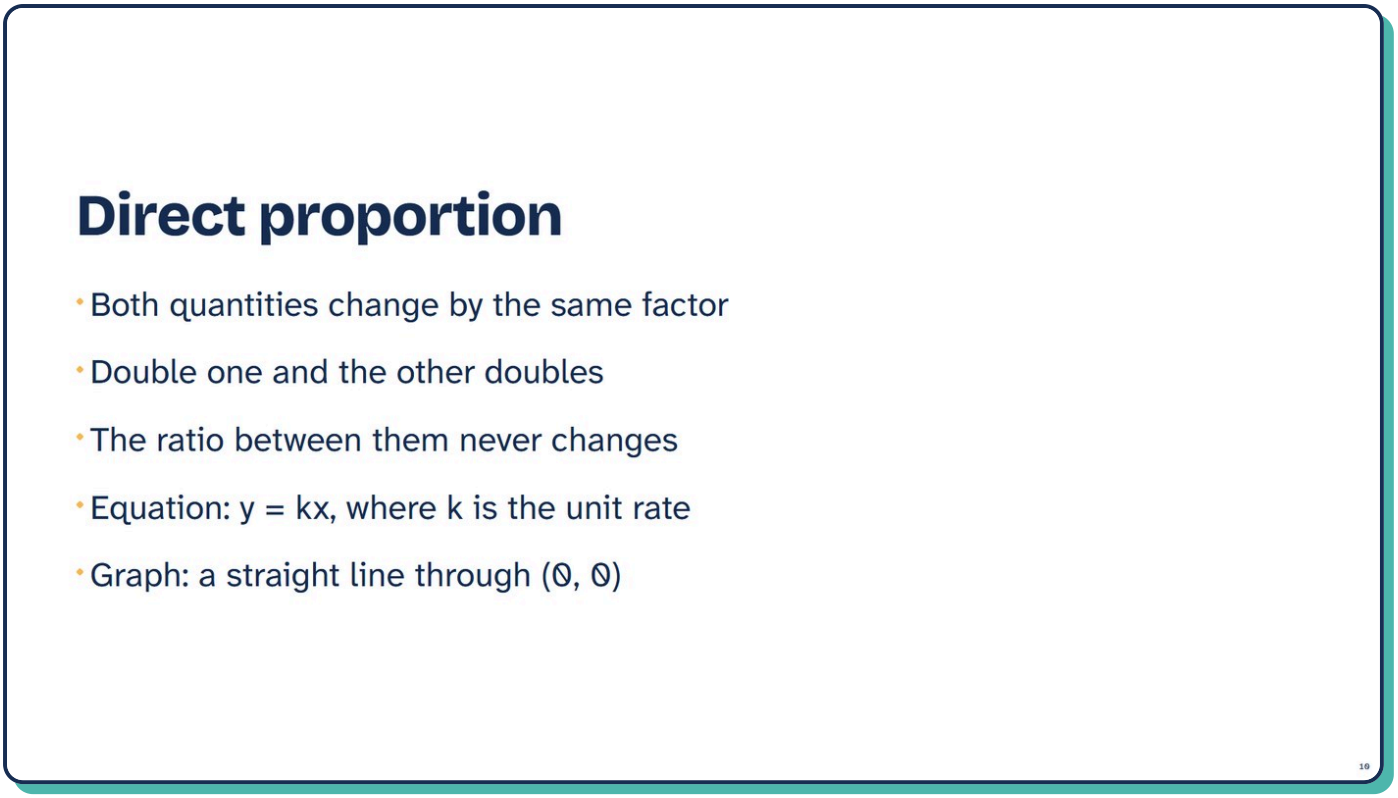


Best buy: compare unit prices

Teacher notes

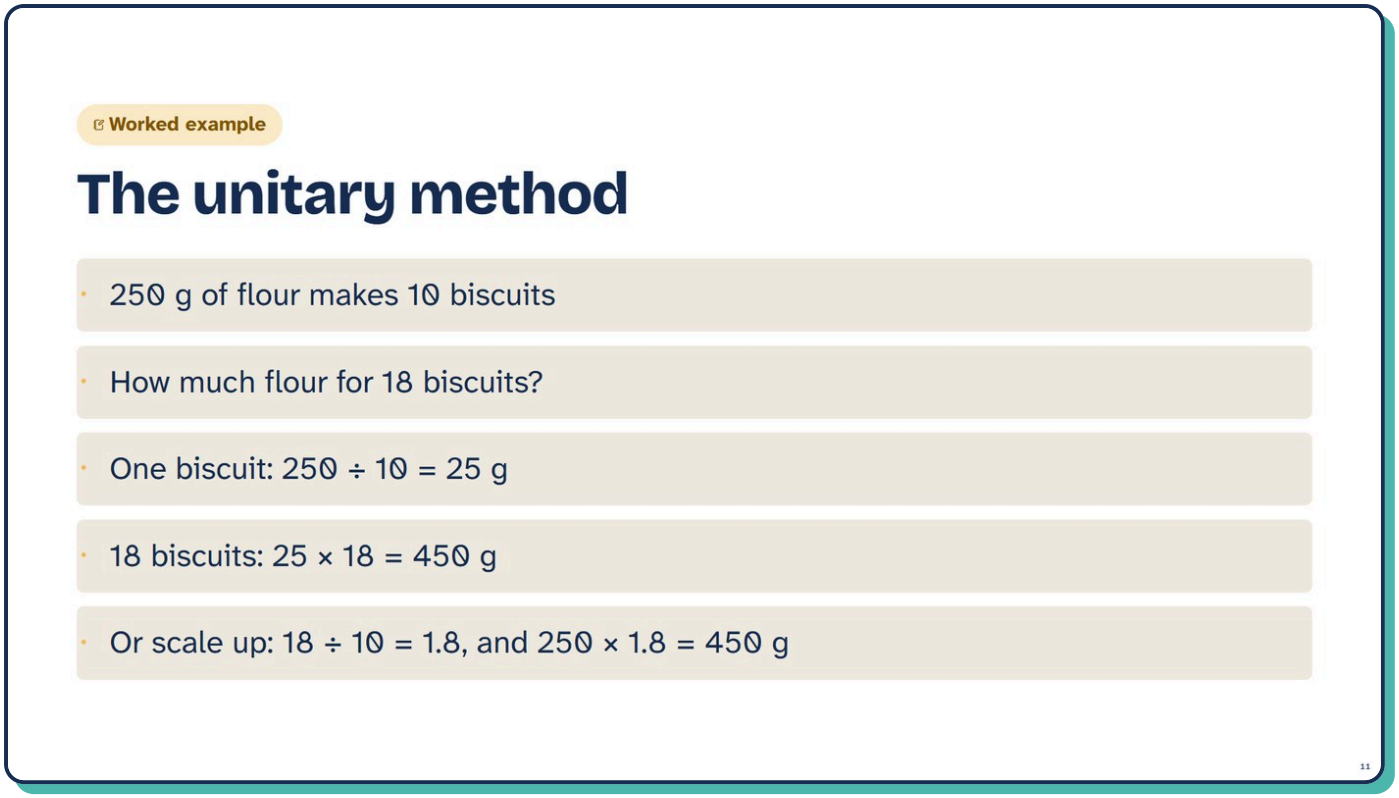
Point out that we compare the same amount (100 g) of each. Ask: is the cheapest bag always the best value? No: the small bag costs less in total but more per 100 g. Also mention that a bigger bag is only better value if you use it all.



Direct proportion

Teacher notes

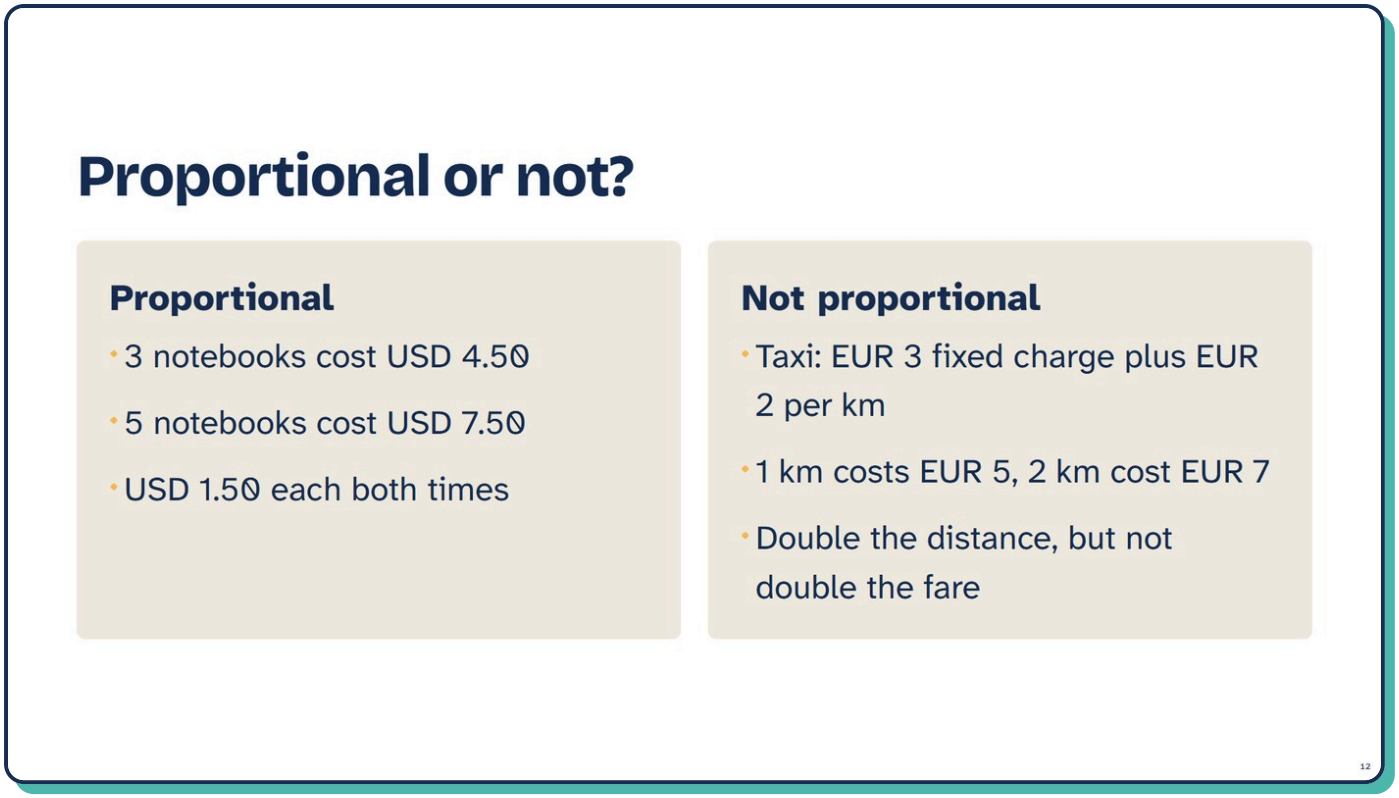
Sketch a graph of cost against number of notebooks at USD 1.50 each: the points lie on a straight line through the origin, and k = 1.50. Ask: what does the point (0, 0) mean here? Zero notebooks cost nothing.



The unitary method

Teacher notes

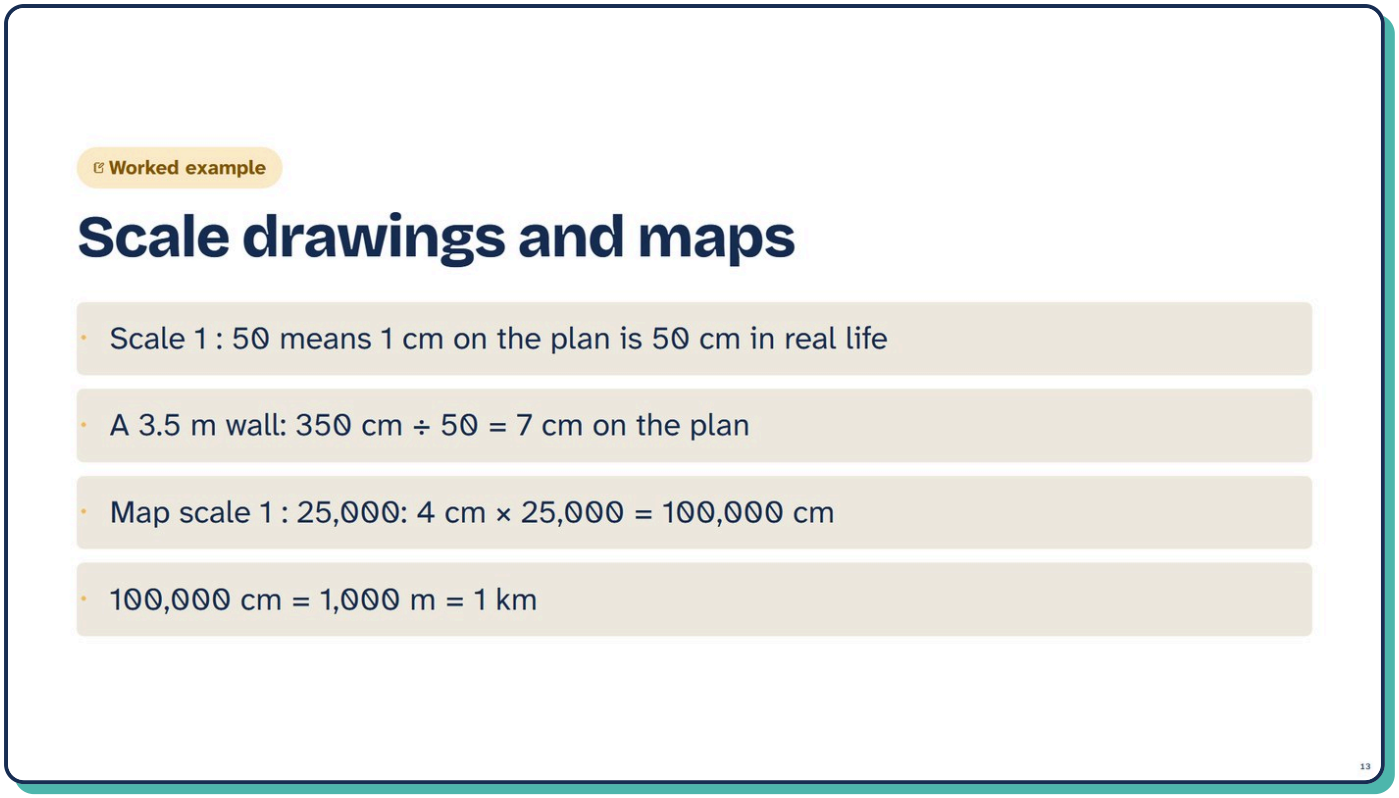
Show both routes and let students choose. The unitary method always works; the scale factor is quicker when the numbers are friendly. A common error is additive thinking: 8 more biscuits so 8 more grams, giving 258 g.



Proportional or not?

Teacher notes

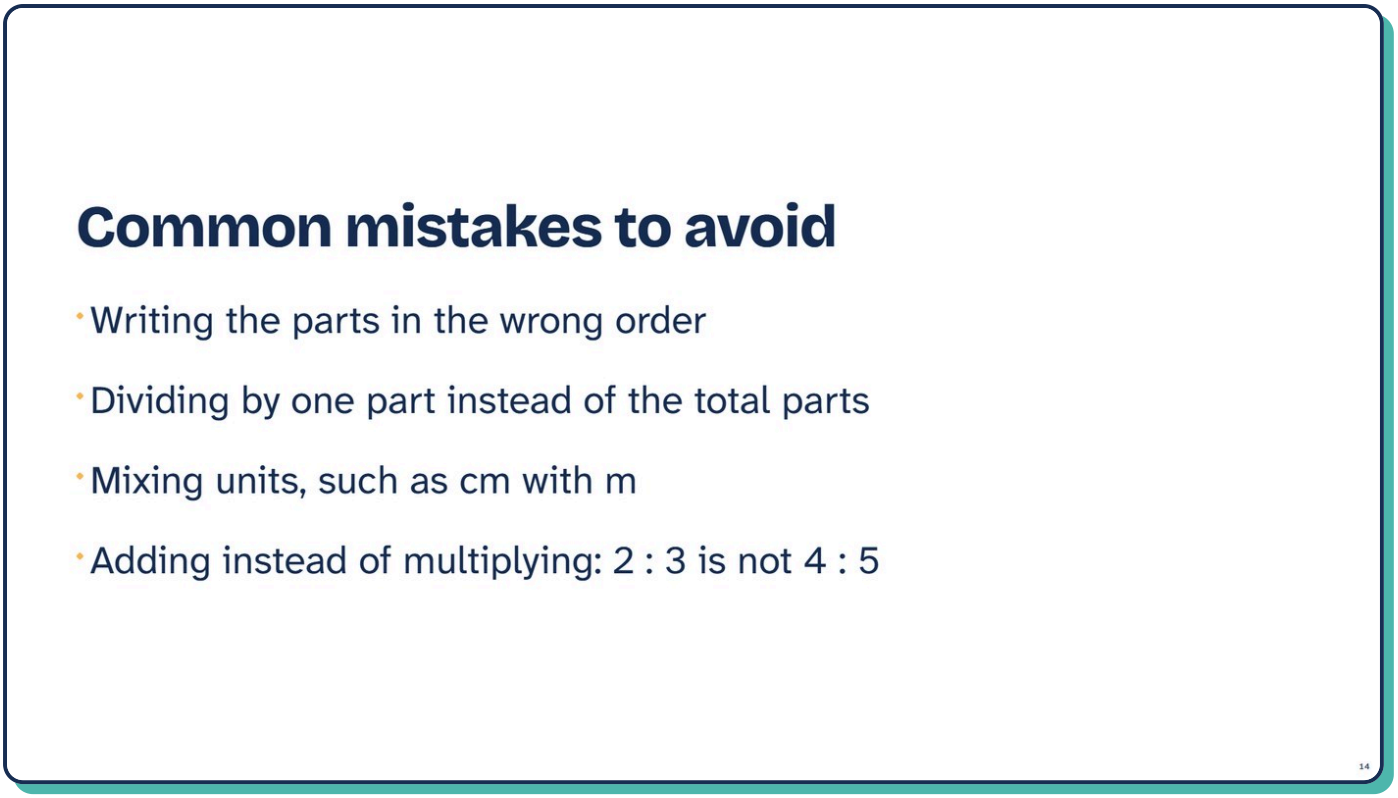
Ask students to divide cost by quantity for each pair. The notebooks give 1.50 every time; the taxi gives 5 and then 3.50. The fixed charge means the taxi graph is a straight line that does not pass through the origin.



Scale drawings and maps

Teacher notes

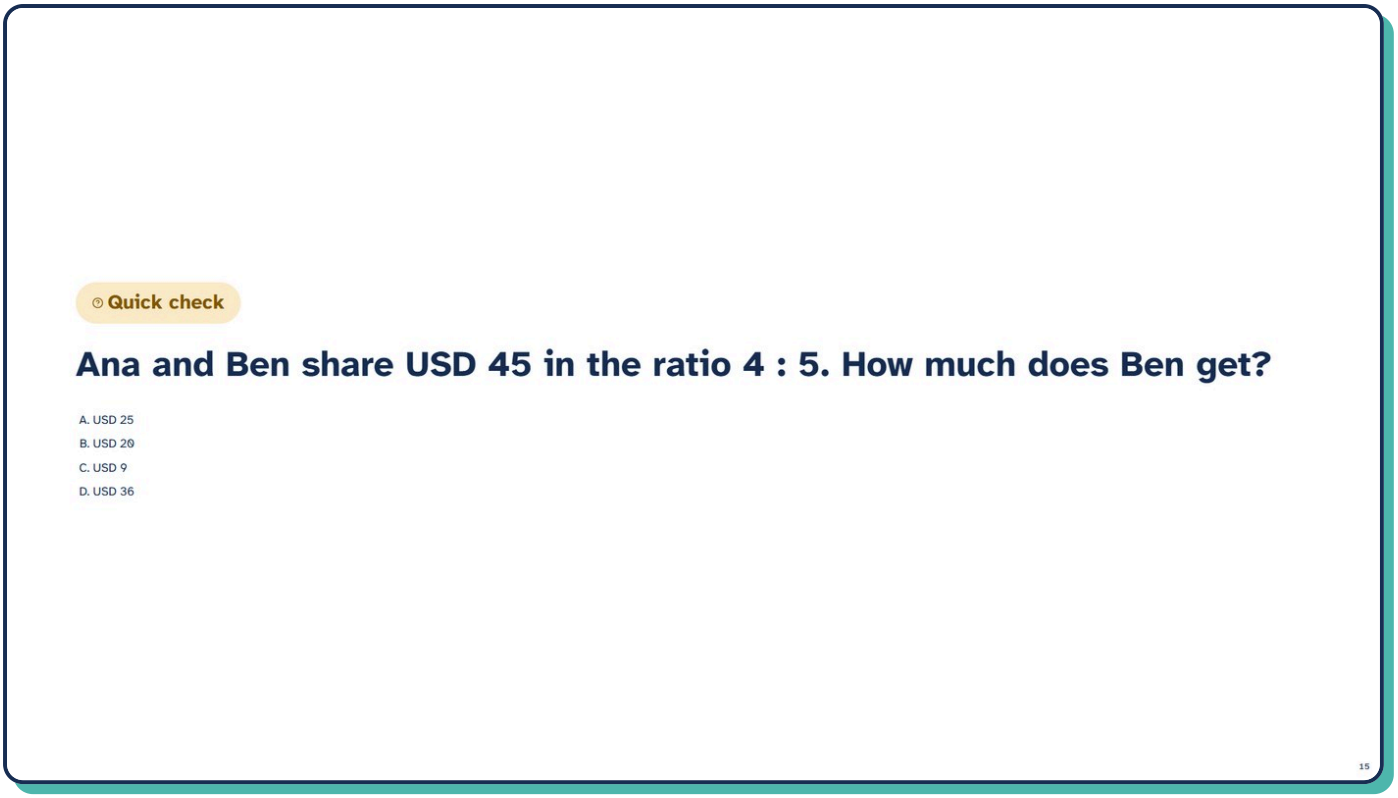
Remind students that a scale has no units: both parts are in the same unit. Converting at the end is where most errors happen, so write the chain cm → m → km on the board. Ask: how long would a 2 km road be on that map? 8 cm.



Common mistakes to avoid

Teacher notes

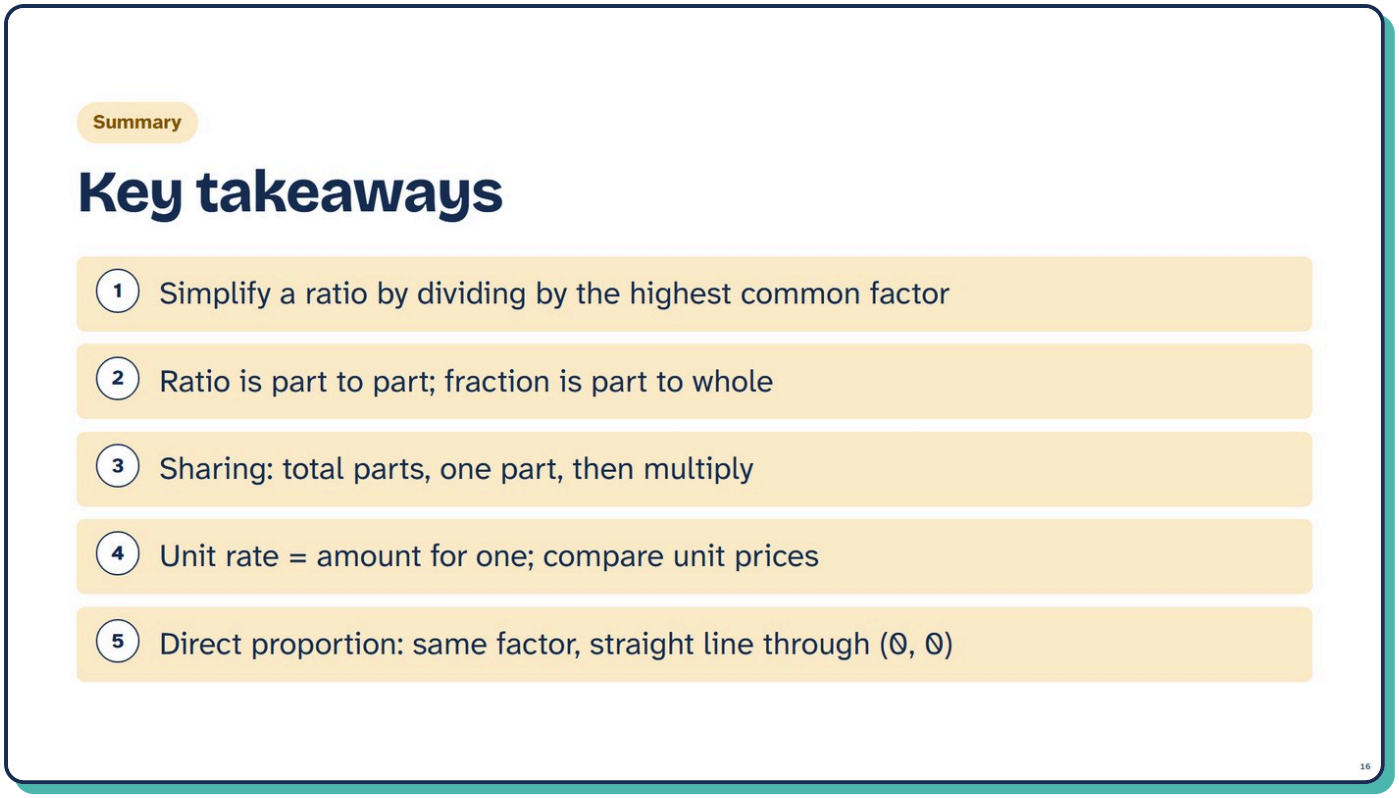
Show one worked example of each mistake and ask students to find the error. The last one is the most important: equivalent ratios come from multiplying both parts by the same number, so 2 : 3 becomes 4 : 6, not 4 : 5.



Quick check

Teacher notes

Answer: A, USD 25. There are 9 parts, one part is 45 ÷ 9 = USD 5, so Ben gets 5 × 5 = USD 25 and Ana gets USD 20. USD 20 is Ana's share, USD 9 is the number of parts, and USD 36 comes from working out four-fifths of 45.



Key takeaways

Teacher notes

Recap one example for each bullet aloud, including the scale example from the previous slides. Then move to the five-question quiz on the page and set the worksheet for practice.

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