

Scale and proportion

Pearson Edexcel GCSE Mathematics 1MA1 • L014
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Use constant multiplicative relationships for recipes and length scales, with consistent units and checks.

Work without a calculator except where a check is invited. Write on the lines or replace them with typed answers. Attempt before reading intentional practice feedback.

Connect & Check

Direct proportion: corresponding quantities have a constant ratio. Scale factor: multiplier from one length to another. Scale 1:n: one unit on the drawing represents n of the same units in reality. Unit rate: amount for one unit.

R1

Simplify 12:18. Share 50 in ratio 2:3.

R2

Convert 3 m to cm and 1500 g to kg.

R3

Find $\frac{3}{2}$ of 300.

Share | In pairs, predict the first step for this problem: If a recipe for 4 people needs 300 g, the same recipe for 6 needs $300 \times (6/4) = 450$ g. Both quantities scale together. On a 1:500 plan, 1 cm represents 500 cm=5 m. A labelled scale is Compare your reasons before using the worked model.

Present through worked examples

If a recipe for 4 people needs 300 g, the same recipe for 6 needs $300 \times (6/4) = 450$ g. Both quantities scale together. On a 1:500 plan, 1 cm represents 500 cm=5 m. A labelled scale is a relationship; printed diagram size can change when a page is resized.

D1

Model: 4 people need 300 g, so 6 need $300 \times 6/4 = 450$ g. Same recipe: 8 people need 600 g. Find the amount for 10 people.

D2

Model: direct-proportion table (2,5), (4,10), (6,15) has constant $\text{second/first} = 2.5$. Find the second value when the first is 10.

D3

Model: on scale 1:500, 2 cm represents 1000 cm=10 m. Find the real length represented by 7 cm.

D4

Model: a real length of 20 m is 2000 cm; at 1:500 its drawing length is 4 cm. Find drawing length for 15 m at 1:500.

Apply with less support

State corresponding quantities and units. Use a unit rate or one scale factor across a direct-proportion table. For scale lengths, multiply drawing by n to get real length, or divide real length by n for drawing length, after converting to matching units.

A1

At scale 1:500, find real lengths for 1 cm, 3 cm and 6 cm. Explain the pattern.

A2

A recipe uses 240 g for 6 people. Find the amount for 9 people. At scale 1:200, find drawing length for 8 m.

A3

A rectangular garden has plan lengths 6 cm and 4 cm at scale 1:500. Find real length, width and perimeter. Use labelled lengths, not a ruler.

Optional support: One centimetre represents five metres.

Optional check after A3: $6 \times 500 \div 100 = 30$ m; $4 \times 500 \div 100 = 20$ m; $2 \times (30 + 20) = 100$ m. Drawings are schematic and not for measuring. Print resizing does not change the labelled lengths.

Apply and extend reasoning

C1

Taxi A charges £3 per kilometre. Taxi B charges £4 plus £3 per kilometre. Which cost is directly proportional to distance? Explain with zero and a doubling test.

C2

A 1:500 plan is enlarged to twice its original printed width and height. What scale does the new print have? Explain why measuring a resized worksheet can mislead.

Intentional practice feedback — read after attempting

A1: 5 m; 15 m; 30 m.

A2: 360 g; 4 cm.

A3: 30 m; 20 m; perimeter 100 m.

C1: Only A. A costs £0 at 0 km and doubles when distance doubles; B has a fixed £4 charge.

C2: 1:250. Each printed centimetre now represents half the previous real distance.

Correct one response and explain your change. Stretch is available to either tier; temporary support needs do not determine entry tier.

Recall & Review through retrieval

Work without notes. Six retrieval points; this attempt does not establish mastery. Equivalent exact numeric forms are accepted. Where accuracy is requested, also state the requested form in your written work.

Q1 Metres represented by 2 cm at 1:500

Q2 Drawing cm for 12 m at 1:400

Q3 Grams for 6 people if 4 need 200 g

Q4 Grams per person if 5 need 300 g

Q5 Centimetres in 2.5 m

Q6 First share of 42 in ratio 2:5

Intentional retrieval feedback

Q1 10; Q2 3; Q3 300; Q4 60; Q5 250; Q6 12. Correct and retry tomorrow, then in one week.

Prove independently and improve

P1–P2: five minutes without notes; 4 marks. Your teacher reviews explanations and method marks.
P3 has no mark.

P1

A recipe needs 200 g for 4 people. Find the amount for 7, showing a method. [2]

P2

At scale 1:400, 5 cm represents what real length in metres? Show units. [2]

P3

Name one decision you can now explain. Set a fresh question and a date for checking it without support.

Teacher feedback: _____

Fresh question and retry date: _____

Delayed independent evidence: _____

Prepare for the next lesson

L015: Unit rates and best buys

F1

Tomorrow find real length for 3 cm at 1:200 and the flour for 8 people if 5 need 250 g.

F2

Before L015, 4 identical notebooks cost £6. Find the price of one.

Read and prepare

A unit rate is an amount for one unit. Compare like units, such as price per notebook or per kilogram. In L015, the lower unit price will help identify the better buy when the product and conditions are comparable.

Digital workbook: save locally where available; export a JSON backup before closing or moving the file. Restore only this lesson/version. Printing records answers, not mastery. Live browser checks remain pending; use Word/PDF if required.

Optional extension activities

Stretch

A scale drawing is 1:25,000. What actual distance does 8 cm represent?

Deep challenge

Similar shapes have length factor 1.5. Compare their area factor and explain.

Recall & Review: feedback and extension integration

Source-integrated WWW/EBI and extension page

Lesson L014: Scale and proportion

Objective: Use constant multiplicative relationships for recipes and length scales, with consistent units and checks.

Timing for a 60-minute lesson

0-7 Connect & Check; 7-14 Share; 14-25 Present/model; 25-44 Apply route choice/practice; 44-52 independent exam-style check; 52-60 Recall & Review, WWW/EBI and next step.

Recall & Review evidence

At the end of the lesson, solve a fresh question without prompts, explain a check, correct one error and record the next practice step.

What Went Well (WWW)

I selected a suitable representation or multiplier and kept the reference amount clear.

Even Better If (EBI)

I will state the whole/part, show each operation and check that the size of my answer is reasonable.

Integrated stretch and deep challenge

Stretch: A scale drawing is 1:25,000. What actual distance does 8 cm represent?

Deep challenge: Similar shapes have length factor 1.5. Compare their area factor and explain.

My next-step response
