

Enlargement and scale factors

Pearson Edexcel GCSE Mathematics 1MA1 • L030
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Enlarge shapes from a stated centre, including positive fractional factors, and explain how centre and factor determine the image.

Optional check: for C(1,1), P(2,3), $k=2$, calculate $1+2\times(2-1)$ and $1+2\times(3-1)$. Expect 3 and 5. Brackets preserve the displacement calculation.

Follow the task-specific calculator guidance below. Write on the lines or replace them with typed answers. Attempt before reading intentional practice feedback.

Connect & Check

Centre: fixed point from which displacements are scaled. Scale factor k : multiplier of directed distances from the centre. Similar: same shape, with corresponding lengths proportional.

R1

Find half of 6.

R2

Translate (1,1) by (2,3).

R3

A side grows from 3 cm to 9 cm. Find the multiplier.

Share | In pairs, predict the first step for this problem: For centre C and point P, the image lies k times as far along the ray CP for positive k. In coordinates $P' = C + k(P - C)$. Subtract the centre, multiply the displacement, then add the centre back. Compare your reasons before using the worked model.

Present through worked examples

For centre C and point P, the image lies k times as far along the ray CP for positive k. In coordinates $P' = C + k(P - C)$. Subtract the centre, multiply the displacement, then add the centre back. A factor between 0 and 1 makes the image smaller; $k=1$ leaves it unchanged.

D1

Model: centre origin, $k=2$ sends (2,1) to (4,2). Enlarge (3,2) by $k=3$ about origin.

D2

Model: centre origin, $k=1/2$ sends (6,4) to (3,2). Enlarge (8,6) by $k=1/2$.

D3

Model: C(1,1), P(3,1), $k=2$ gives $P'(5,1)$. Now C(1,1), P(2,3), $k=2$.

D4

Model: side $4 \rightarrow 10$ gives $k=2.5$. A matching side is $6 \rightarrow 9$. Find k and the image of a 4 cm side.

Apply with less support

Draw rays from the centre through vertices. Multiply each centre-to-vertex distance by k ; join images in order. Check a side-length ratio and one ray. The centre remains fixed.

A1

Centre origin: enlarge $(4,2)$ with $k=2$, $k=1$, $k=1/2$. Compare positions.

A2

Triangle $(1,1),(3,1),(1,2)$, centre origin, $k=2$. Give image vertices and a side-length check.

A3

Centre $C(1,1)$, triangle $P(2,1), Q(4,1), R(2,3)$, $k=1/2$. Find all image vertices.

Optional support: Multiply from the same centre.

Optional check: for $C(1,1)$, $P(2,3)$, $k=2$, calculate $1+2\times(2-1)$ and $1+2\times(3-1)$. Expect 3 and 5. Brackets preserve the displacement calculation.

Apply and extend reasoning

C1

A factor $1/2$ makes every angle half as large. Explain the error.

C2

A shape is enlarged by factor $3/4$. Its image has a side of length 9 cm. Find the original side and explain why it must be longer.

Intentional practice feedback — read after attempting

A1: (8,4); (4,2); (2,1).

A2: (2,2),(6,2),(2,4); horizontal side $2 \rightarrow 4$.

A3: P'(1.5,1), Q'(2.5,1), R'(1.5,2).

C1: Enlargement preserves angles; it halves lengths from the centre and side lengths.

C2: 12 cm; divide 9 by $3/4$. A positive factor below 1 reduces each length.

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 x of (3,2), origin, factor 2

Q2 y of (8,6), origin, factor $\frac{1}{2}$

Q3 Factor for side 4→10

Q4 Image length of 12 at factor $\frac{1}{4}$

Q5 x of P(3,1), centre (1,1), factor 2

Q6 Original length if image is 3 and factor $\frac{1}{2}$

Intentional retrieval feedback

Q1 6; Q2 3; Q3 2.5; Q4 3; Q5 5; Q6 6. 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

Enlarge $P(2,3)$ by factor 2 about $C(1,1)$, showing displacement. [2]

P2

A 10 cm side becomes 4 cm. Find the scale factor and the image of a 15 cm side. [2]

P3

Explain one corrected error. Record a fresh question and a date to check it without support.

Teacher feedback: _____

Fresh question and retry date: _____

Delayed independent evidence: _____

Prepare for the next lesson

L031: Bearings and scale drawings

F1

Tomorrow enlarge (6,8) by $\frac{1}{2}$ about origin.

F2

Before L031, convert 2 km to cm and find 1 cm on a 1:50 000 map in metres.

Read and prepare

A bearing is measured clockwise from north at the starting point and written using three digits.
Scale drawings convert real distances to paper lengths using a consistent scale.

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

Allow 10–15 minutes for learners who have secured the main practice. Show a method, explain a check and justify your conclusion.

Stretch

Enlarge a rectangle 3 cm by 5 cm by factor 2.5. Find new area.

Deep challenge

An enlargement factor is -2 about the origin. Where does $(3, -4)$ map, and what happens to orientation?

Recall & Review: feedback and extension integration

Lesson L030: Enlargement and scale factors

Objective: Enlarge shapes from a stated centre, including positive fractional factors, and explain how centre and factor determine the image.

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 one check, correct one error and record the next practice step.

What Went Well (WWW)

I selected the correct geometric fact, theorem, formula or transformation and used a clear diagram with appropriate labels and units.

Even Better If (EBI)

I will name the fact or theorem, show the substitution or construction step and check whether the size, direction and units of the result are reasonable.

Integrated stretch and deep challenge

Stretch: Enlarge a rectangle 3 cm by 5 cm by factor 2.5. Find new area.

Deep challenge: An enlargement factor is -2 about the origin. Where does $(3, -4)$ map, and what happens to orientation?

My next-step response
