

Triangles and polygons

Pearson Edexcel GCSE Mathematics 1MA1 • L026
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Derive angle sums and use triangle, quadrilateral and regular-polygon properties to solve problems.

Optional check after A2: $15 \times 24 = 360$. Angle sums are exact; do not round the number of sides.

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

Polygon: closed straight-sided shape. Regular: all sides and angles equal. Interior: inside angle. Exterior: turn between a side and the extension of the previous side. Isosceles: two equal sides.

R1

Find the supplement of 65° .

R2

Solve $2x + 40 = 180$.

R3

Divide 360 by 8.

Share | In pairs, predict the first step for this problem: A triangle has angle sum 180° , proved using a parallel through a vertex. A convex n -gon splits from one vertex into $n-2$ triangles, giving $(n-2)\times 180^\circ$. Walking once round a convex po Compare your reasons before using the worked model.

Present through worked examples

A triangle has angle sum 180° , proved using a parallel through a vertex. A convex n -gon splits from one vertex into $n-2$ triangles, giving $(n-2)\times 180^\circ$. Walking once round a convex polygon turns 360° . In a regular polygon each exterior angle is $360\div n$ and the interior is 180 minus that turn.

D1

Model: triangle angles 45° , 65° , x° give $x=70^\circ$. Now use 38° , 77° , y° .

D2

Model: isosceles apex 40° gives base angles 70° . Now the apex is 56° .

D3

Model: a pentagon splits into 3 triangles, sum 540° . Find the sum for a heptagon.

D4

Model: regular octagon exterior 45° , interior 135° . Find both for a regular decagon.

Apply with less support

Decide whether an angle sum or a single regular angle is needed. Use equal sides to identify equal opposite angles. Check regularity before dividing a sum by n .

A1

Find interior sums for 4, 5 and 6 sides. Explain the constant increase.

A2

A regular polygon has exterior angle 24° . Find its sides and interior angle.

A3

In a parallelogram one angle is 68° . Find the other three and justify.

Optional support: Draw diagonals from one vertex.

Optional check after A2: $15 \times 24 = 360$. Angle sums are exact; do not round the number of sides.

Apply and extend reasoning

C1

All rhombuses are squares. Disprove the claim using angle properties.

C2

Can a regular polygon have exterior angle 50° ? Explain.

Intentional practice feedback — read after attempting

A1: 360° , 540° , 720° ; add 180° for one extra triangle.

A2: 15 sides; 156° .

A3: 112° , 68° , 112° .

C1: A rhombus with angles $60^\circ, 120^\circ, 60^\circ, 120^\circ$ has equal sides but is not a square.

C2: No; $360 \div 50 = 7.2$ is not a whole number of sides.

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 Triangle: $35^\circ, 65^\circ$, third in degrees

Q2 Isosceles apex 32° , base in degrees

Q3 Pentagon angle sum, degrees

Q4 Regular hexagon interior, degrees

Q5 Regular polygon exterior 20° : sides

Q6 Solve $4x=180$

Intentional retrieval feedback

Q1 80; Q2 74; Q3 540; Q4 120; Q5 18; Q6 45. 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

An isosceles triangle has apex angle 74° . Find each base angle with working. [2]

P2

A regular polygon has interior angle 150° . Find the number of sides. [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

L027: Congruence and geometric reasoning

F1

Tomorrow find the interior sum of a nonagon.

F2

Before L027, explain whether triangles with sides 3,4,5 cm and 6,8,10 cm have the same size.

Read and prepare

Congruent figures have the same shape and size. Corresponding sides and angles match even when one figure is rotated or reflected. Triangle congruence needs sufficient measurements.

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

Find each interior angle of a regular 15-sided polygon.

Deep challenge

A regular polygon has interior angle 165° . Find its number of sides.

Recall & Review: feedback and extension integration

Lesson L026: Triangles and polygons

Objective: Derive angle sums and use triangle, quadrilateral and regular-polygon properties to solve problems.

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: Find each interior angle of a regular 15-sided polygon.

Deep challenge: A regular polygon has interior angle 165° . Find its number of sides.

My next-step response