

Circles arcs and sectors

Pearson Edexcel GCSE Mathematics 1MA1 • L034
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Calculate circle circumference and area, arc length and sector area, distinguishing curved length from the full sector perimeter.

Calculator required for A3 only; other tasks use exact π forms. Enter $10 \times \pi$ and $\pi \times 5^2$, retaining full precision until rounding to 1 decimal place. Numeric retrieval asks for coefficients of π , not the full symbolic answer.

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

Radius: centre to circumference. Diameter: chord through centre. Chord: joins two circumference points. Tangent: line touching at one point. Arc: curved boundary portion. Sector: enclosed by two radii and an arc. Segment: enclosed by chord and arc.

R1

Radius 5 cm: find diameter.

R2

What fraction of a full turn is 90° ?

R3

Find 6^2 .

Share | In pairs, predict the first step for this problem: Every circle has circumference divided by diameter equal to π , so $C=\pi d=2\pi r$. Rearranging narrow sectors approaches a rectangle with height r and width πr , explaining area πr^2 . A cen Compare your reasons before using the worked model.

Present through worked examples

Every circle has circumference divided by diameter equal to π , so $C=\pi d=2\pi r$. Rearranging narrow sectors approaches a rectangle with height r and width πr , explaining area πr^2 . A central angle θ covers $\theta/360$ of a whole circle, so $\text{arc}=(\theta/360)2\pi r$ and $\text{sector area}=(\theta/360)\pi r^2$. A sector perimeter adds two radii to its arc.

D1

Model: $r=3$ gives $C=6\pi$ cm. Now diameter=10 cm; give exact circumference.

D2

Model: $r=3$ gives area 9π cm². Now diameter=8 cm; give exact area.

D3

Model: $r=6$, $\theta=90^\circ$ gives arc $(1/4)\times 12\pi=3\pi$ cm. Now $r=6$, $\theta=120^\circ$.

D4

Model: $r=6$, $\theta=90^\circ$ gives area 9π cm². Now $r=6$, $\theta=120^\circ$; find sector area and perimeter.

Apply with less support

Mark radius versus diameter. Decide whether the question asks for length or area. Use the central-angle fraction, retain π or full calculator precision, then round once at the end. Check units and that a minor part is smaller than the whole.

A1

For $r=4$ cm, find circumference, semicircle arc and quarter-circle arc exactly.

A2

A sector has $r=8$ cm and $\theta=90^\circ$. Find area and perimeter exactly.

A3

A circular pond has diameter 10 m. Find fencing for the whole edge, to 1 decimal place, and area to 1 decimal place.

Optional support: Use fractions of circumference.

Calculator required for A3 only; other tasks use exact π forms. Enter $10 \times \pi$ and $\pi \times 5^2$, retaining full precision until rounding to 1 decimal place. Numeric retrieval asks for coefficients of π , not the full symbolic answer.

Apply and extend reasoning

C1

Doubling radius doubles both circumference and area. Assess the claim.

C2

A semicircular garden of radius 3 m needs a fence round its full boundary. Explain why 3π m is insufficient.

Intentional practice feedback — read after attempting

A1: 8π , 4π , 2π cm.

A2: 16π cm²; $4\pi+16$ cm.

A3: 31.4 m; 78.5 m².

C1: Circumference doubles; area quadruples because $(2r)^2=4r^2$.

C2: 3π is curved arc only; include diameter 6, total $3\pi+6$ m.

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 Diameter for radius 7 cm

Q2 Radius for diameter 18 cm

Q3 Fraction of full circle for 120°

Q4 Coefficient of π in area for $r=5$

Q5 Coefficient of π in circumference for $d=12$

Q6 Coefficient of π in quarter arc for $r=8$

Intentional retrieval feedback

Q1 14; Q2 9; Q3 $\frac{1}{3}$; Q4 25; Q5 12; Q6 4. 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

Find sector area for $r=6$ cm and angle 60° , exactly. Show method. [2]

P2

Find perimeter of a quarter-circle sector with radius 6 cm, exactly. [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

L035: Prisms and cylinders

F1

Tomorrow find circumference and area for radius 5 cm, exactly.

F2

Before L035, a prism has cross-sectional area 12 cm^2 and length 5 cm. Predict its volume.

Read and prepare

A prism has the same cross-section throughout. Volume equals cross-sectional area times perpendicular length; for a cylinder the cross-section is a circle. Use cubic units.

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

A sector has radius 9 cm and angle 80° . Find arc length and area exactly.

Deep challenge

A learner finds the perimeter of a semicircle of radius 5 cm as 5π cm. Explain the missing part.

Recall & Review: feedback and extension integration

Lesson L034: Circles arcs and sectors

Objective: Calculate circle circumference and area, arc length and sector area, distinguishing curved length from the full sector perimeter.

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: A sector has radius 9 cm and angle 80° . Find arc length and area exactly.

Deep challenge: A learner finds the perimeter of a semicircle of radius 5 cm as 5π cm. Explain the missing part.

My next-step response
