

Geometry and trigonometry – supported focus

4MA1 supported native-lesson focus only; qualification gaps remain

1. Supported teaching and tier boundary

Supported teaching and tier boundary

4MA1: Geometry and trigonometry. Version: Issue 2, November 2017; first assessment June 2018; linear Mathematics A.

2. Supported teaching and tier boundary

Supported teaching and tier boundary

Foundation teaching and Higher additions are labelled below. This reference packages the existing native-lesson crosswalk. It does not certify unreviewed specification rows or a whole qualification. Original diagnostics are separate and are not reproduced.

3. Angles, lengths and area · Foundation

Angles, lengths and area · Foundation

Use angle facts with a stated reason. Similar shapes have equal corresponding angles and proportional corresponding lengths. Areas of rectangles and triangles come from their dimensions; compound shapes can be split into simpler parts.

4. Angles, lengths and area · Foundation

Angles, lengths and area · Foundation

$$A_{\text{rectangle}} = LW, \quad A_{\text{triangle}} = \frac{1}{2}bh$$

5. Angles, lengths and area · Foundation

Angles, lengths and area · Foundation

A rectangle of length 8 cm and width 5 cm has area $A=LW=40\text{ cm}^2$. A triangle on the same base and height has area $A=bh/2=20\text{ cm}^2$. For a pentagon, the interior-angle sum is $(5-2)\times 180=540^\circ$.

6. Angles, lengths and area · Foundation

Angles, lengths and area · Foundation

Equal angles alone establish similarity, not equal size. Use corresponding lengths in the same order. Convert linear units before calculating area or volume, or square/cube the conversion factor correctly.

7. Angles, lengths and area · Foundation

Angles, lengths and area · Foundation

Use a labelled sketch and appropriate units. This Foundation/Core lesson does not test area/volume scale factors or advanced circle-theorem proofs.

8. Angle reasoning, similarity and mensuration · Higher

Angle reasoning, similarity and mensuration · Higher

For similar shapes with length scale factor k , areas scale by k^2 and volumes by k^3 .
State angle reasons explicitly. A circle's tangent is perpendicular to the radius at the contact point.

9. Angle reasoning, similarity and mensuration · Higher

Angle reasoning, similarity and mensuration · Higher

$$\frac{A_2}{A_1} = k^2, \quad \frac{V_2}{V_1} = k^3$$

10. Angle reasoning, similarity and mensuration · Higher

Angle reasoning, similarity and mensuration · Higher

If model-to-real length factor is 3, a model area of 12 cm^2 gives $12 \times 3^2 = 108 \text{ cm}^2$ and a model volume of 8 cm^3 gives $8 \times 3^3 = 216 \text{ cm}^3$. A cylinder with $r=3, h=5$ has volume $\pi r^2 h = 45\pi$.

11. Angle reasoning, similarity and mensuration · Higher

Angle reasoning, similarity and mensuration · Higher

Equal angles alone establish similarity, not equal size. Use corresponding lengths in the same order. Convert linear units before calculating area or volume, or square/cube the conversion factor correctly.

12. Angle reasoning, similarity and mensuration · Higher

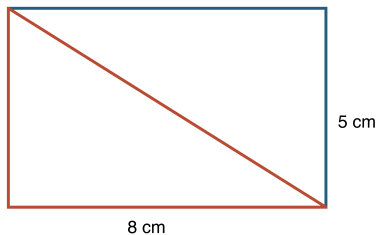
Angle reasoning, similarity and mensuration · Higher

A geometric proof should name the relevant theorem, identify the equal angle or ratio, and draw the conclusion. A scale drawing is evidence only when the task permits measurement.

Figure 13: Angle reasoning, similarity

Same base and height, half the area

Rectangle: 40 cm^2 ; triangle: 20 cm^2



Check the labelled values and conditions.

Figure 14: Angle reasoning, similarity

A length scale factor is squared for area



Check the labelled values and conditions.

15. Right triangles and non-right triangles · Foundation

Right triangles and non-right triangles · Foundation

Use Pythagoras in a right triangle and use sine, cosine or tangent with the sides labelled relative to the chosen angle.

16. Right triangles and non-right triangles · Foundation

Right triangles and non-right triangles · Foundation

$$a^2 + b^2 = c^2, \quad \tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

17. Right triangles and non-right triangles · Foundation

Right triangles and non-right triangles · Foundation

The ladder length is $c = \sqrt{3^2 + 4^2} = 5$ m. Its angle to the ground satisfies $\tan \theta = 4/3$, so $\theta \approx 53.1^\circ$. A right triangle with legs 6 and 8 has area $6 \times 8 / 2 = 24$.

18. Right triangles and non-right triangles · Foundation

Right triangles and non-right triangles · Foundation

Label sides relative to the chosen angle. Pythagoras needs a right angle. A calculator angle mode error can produce a plausible but wrong result. Keep unrounded values for later steps.

19. Right triangles and non-right triangles · Foundation

Right triangles and non-right triangles · Foundation

This Foundation/Core lesson uses right-angled triangles only. Sine and cosine rules for non-right triangles belong to the advanced-tier lesson.

20. Right triangles and non-right triangles · Higher

Right triangles and non-right triangles · Higher

In a right triangle $a^2 + b^2 = c^2$; $\sin\theta = \text{opposite/hypotenuse}$, $\cos\theta = \text{adjacent/hypotenuse}$ and $\tan\theta = \text{opposite/adjacent}$. For other triangles, use the sine or cosine rule, or $\text{area} = ab \sin C/2$.

21. Right triangles and non-right triangles · Higher

Right triangles and non-right triangles · Higher

$$a^2 + b^2 = c^2, \quad \tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

22. Right triangles and non-right triangles · Higher

Right triangles and non-right triangles · Higher

The ladder length is $c = \sqrt{3^2 + 4^2} = 5$ m. Its angle to the ground satisfies $\tan \theta = 4/3$, so $\theta \approx 53.1^\circ$. With two sides 6 and 8 enclosing 60° , $c^2 = 6^2 + 8^2 - 2 \times 6 \times 8 \cos 60^\circ = 52$.

23. Right triangles and non-right triangles · Higher

Right triangles and non-right triangles · Higher

Label sides relative to the chosen angle. Pythagoras needs a right angle. A calculator angle mode error can produce a plausible but wrong result. Keep unrounded values for later steps.

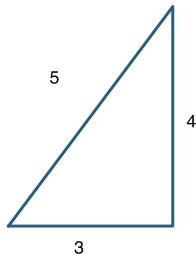
24. Right triangles and non-right triangles · Higher

Right triangles and non-right triangles · Higher

Use a plan or elevation for a three-dimensional problem before applying a triangle rule. Explain why the chosen triangle contains the required length or angle.

Figure 25: Right triangles and non-right

Label the known sides before choosing a rule



Check the labelled values and conditions.

26. Circle theorems and reasoned proofs · Higher

Circle theorems and reasoned proofs · Higher

The angle at the centre is twice the angle at the circumference on the same arc.
Angles in the same segment are equal. Opposite angles of a cyclic quadrilateral sum to 180° . A radius is perpendicular to a tangent at contact.

27. Circle theorems and reasoned proofs · Higher

Circle theorems and reasoned proofs · Higher

$$\theta_{\text{centre}} = 2\theta_{\text{circumference}}$$

28. Circle theorems and reasoned proofs · Higher

Circle theorems and reasoned proofs · Higher

If a central angle is 100° , the corresponding angle at the circumference is 50° . In a cyclic quadrilateral with one angle 112° , its opposite angle is $180-112=68^\circ$. A radius meeting a tangent gives 90° , even if the drawing looks oblique.

29. Circle theorems and reasoned proofs · Higher

Circle theorems and reasoned proofs · Higher

Identify the same chord and the correct arc before using a theorem. Two visible right angles do not prove a quadrilateral cyclic without a valid converse argument. A diagram need not be to scale.

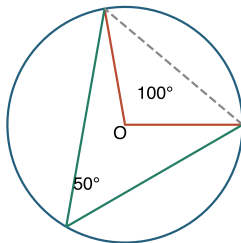
30. Circle theorems and reasoned proofs · Higher

Circle theorems and reasoned proofs · Higher

Write one reason alongside each angle calculation. For the alternate-segment theorem, name the tangent and chord, then identify the angle in the opposite segment. Use auxiliary radii only when they help the proof.

Figure 31: Circle theorems and reasoned

The centre angle is twice the circumference angle



Check the labelled values and conditions.

32. Constructions, loci and geometric conditions · Foundation

Constructions, loci and geometric conditions · Foundation

Points equally distant from A and B lie on the perpendicular bisector of AB. Points at fixed distance r from C lie on a circle. Points equally distant from two intersecting lines lie on their angle bisectors.

33. Constructions, loci and geometric conditions · Foundation

Constructions, loci and geometric conditions · Foundation

$$x = 3, \quad x^2 + y^2 = 25$$

34. Constructions, loci and geometric conditions · Foundation

Constructions, loci and geometric conditions · Foundation

For $A=(0,0)$ and $B=(6,0)$, the perpendicular bisector is $x=3$. Points also 5 units from A satisfy $x^2+y^2=25$. Substituting $x=3$ gives $y^2=16$, so $(3,4)$ and $(3,-4)$ satisfy both conditions.

35. Constructions, loci and geometric conditions · Foundation

Constructions, loci and geometric conditions · Foundation

The perpendicular bisector concerns distance to two points; the angle bisector concerns distance to two lines. A sketch is not a ruler-and-compass construction: preserve arcs as evidence of the method.

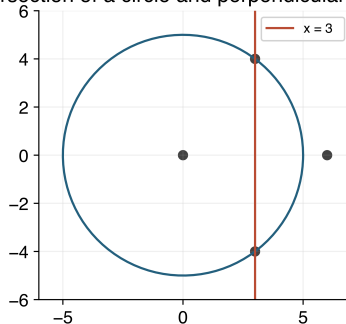
36. Constructions, loci and geometric conditions · Foundation

Constructions, loci and geometric conditions · Foundation

Translate each condition into a locus before finding intersections. For a region closer to A than B, choose the correct side of the perpendicular bisector and show whether a boundary is allowed.

Figure 37: Constructions, loci and geometric

Intersection of a circle and perpendicular bisector



Check the labelled values and conditions.

38. Remaining qualification limits

Remaining qualification limits

Official question-bank boundaries, scheme alignment and all objective-level teaching coverage require the recorded review; no practice registry promotion.

39. Remaining qualification limits

Remaining qualification limits

The authored diagnostic assessments are not full-length qualification mocks.

40. Remaining qualification limits

Remaining qualification limits

Only the mapped native skills are supplied here. Objective rows marked formula-review-required are not promoted to complete coverage by these print companions.

41. Terms

Terms

scale factor .

42. Terms

Terms

hypotenuse .

43. Terms

Terms

cyclic quadrilateral

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44. Terms

Terms

locus .

Check yourself

Reconstruct the method without looking back

Decide whether this claim is true. Give a concrete calculation or counterexample: A triangle and rectangle with the same base and height have the same area.