

4.1 Geometry

Name: _____ Class: _____ Date: _____

KEY WORDS scale factor

<!-- Session 2 native-skill companion -->

Objective

Practise geometry within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ 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.

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

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 $(5-2) \times 180 = 540^\circ$.

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.

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

■ 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.

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

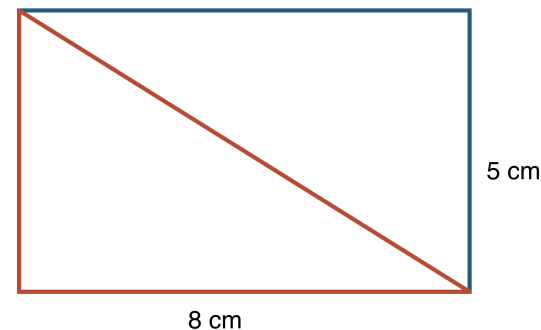
If model-to-real length factor is 3, a model area of 12 cm^2 gives $12 \times 3^2 = 108 \text{ cm}^2$ and a model volume of 8 cm^3 gives $8 \times 3^3 = 216 \text{ cm}^3$. A cylinder with $r=3, h=5$ has volume $\pi r^2 h = 45\pi$.

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.

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.

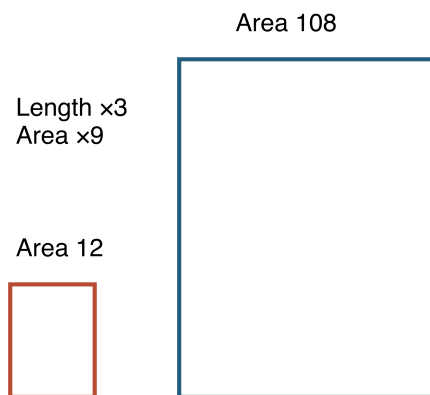
Same base and height, half the area

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



Original native-lesson illustration; labels belong to its worked example.

A length scale factor is squared for area



Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) Find the area of a rectangle of sides 8 cm and 5 cm.

2.2 (Foundation) Find the area of a triangle of base 8 cm and height 5 cm.

2.3 (Foundation) Find the sum of interior angles of a pentagon in degrees.

2.4 (Higher) Two similar figures have length factor 3. Find the area factor.

2.5 (Higher) Two similar solids have length factor 3. Find the volume factor.

3 Exam-style questions

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

Solutions

2.1 Rectangle area= $8 \times 5 = 40$ cm².

2.2 Triangle area= $8 \times 5 / 2 = 20$ cm².

2.3 Interior-angle sum= $(5-2) \times 180 = 540^\circ$.

2.4 Area scales by the square of the length factor: $3^2 = 9$.

2.5 Volume scales by the cube: $3^3 = 27$.

3.1 False. Base 8 cm and perpendicular height 5 cm give rectangle area 40 cm² and triangle area 20 cm².

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.