

GRADE 9 | 2024

Geometry: Triangles and Similarity

Mathematics

CAPS ALIGNED

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1. Congruent Triangles

Two triangles are CONGRUENT if they have the same shape AND size (all corresponding sides and angles equal).

Tests for Congruence

- SSS: all 3 corresponding sides equal
- SAS: 2 sides and the included angle equal
- AAS: 2 angles and a corresponding side equal
- RHS: right angle, hypotenuse, one other side equal

2. Similar Triangles

Two triangles are SIMILAR if they have the same shape but different sizes. Corresponding angles are equal and corresponding sides are in proportion.

FORMULA: If triangle ABC $\sim$ triangle DEF, then:

$AB/DE = BC/EF = AC/DF$ (ratios of corresponding sides)

3. The Theorem of Pythagoras (Revision and Extension)

FORMULA: $a^2 + b^2 = c^2$ (where c is the hypotenuse)

Converse: if $a^2 + b^2 = c^2$, then the triangle is right-angled.

EXAMPLE: 3D Pythagoras

Find the space diagonal of a box 3 cm x 4 cm x 12 cm.

Base diagonal: $\sqrt{3^2 + 4^2} = 5$ cm

Space diagonal: $\sqrt{5^2 + 12^2} = \sqrt{169} = 13$ cm

4. Midpoint Theorem

KEY POINT: The line joining the midpoints of two sides of a triangle is parallel to the third side and half its length.

5. Geometry of Straight Lines (Proof)

In Grade 9, you must be able to PROVE angle relationships, stating reasons for each step.

EXAMPLE: State reason

If two parallel lines are cut by a transversal:

Angle 1 = Angle 2 "Alternate angles, $AB \parallel CD$ "