Subject	Year	Month
Mathematics	9	February

Topic

SIMILARITY AND CONGRUENT TRIANGLES — 5 LESSONS

Content (Intent)

Prior Learning

Y7
- Constructing shapes
- Properties of 2D shapes and angle facts.

Y8
- Enlargements
- Multipliers with proportions
- angle facts including parallel lines and vertically opposite angles

Future Learning

- Using similarity of shapes to find length, area and volume scale factors.
- Using similar triangles with cones and frustums
- Using congruent triangles within circle theorem proofs

Objectives

- Identify **similarity** of shapes in a range of situations
- Finding missing lengths in similar shapes
- Solve problems involving similarity

- Identify **congruence** of shapes in a range of situations
- Identify **congruent triangles**
- Know and use the criteria for triangles to be congruent (SSS, SAS, ASA, RHS)
- Solve problems, including geometrical proof, involving congruence
- Test conjectures using known facts in geometrical situations, including why the base angles in an isosceles triangle must be equal

For teaching purposes

Possible Questions
- Show me a pair of congruent triangles. And another. And another
- Show me a pair of similar triangles. And another. And another
- What is the same and what is different: Proof, Conjecture, Justification, Test?
- Convince me the base angles of an isosceles triangle are equal.

Misconceptions
- Some students think AAA is a valid criterion for congruent triangles.
- Some students try and prove a geometrical situation using facts that 'look OK', for example, *'angle ABC looks like a right angle'*.
- Some students do not appreciate that diagrams are often drawn to scale.

Pedagogical notes (implementation)

'Known facts' should include angle facts, triangle congruence, similarity and properties of quadrilaterals
NCETM: Glossary

Common approaches
All students are asked to draw 1, 2, 3 and 4 points on the circumference of a set of circles. In each case, they join each point to every other point and count the number of regions the circle has been divided into. Using the results 1, 2, 4 and 8 they form a conjecture that the sequence is the powers of 2. They test this conjecture for the case of 5 points and find the circle is divided into 16 regions as expected. Is this enough to be convinced? It turns out that it should not be, as 6 points yields either 30 or 31 regions depending on how the points are arranged. This example is used to emphasise the importance and power of mathematical proof. See KM: Geometrical proof

How will understanding be assessed & recorded (Impact)

Exams in May
9BAM8 Similar shapes

How can parents help at home?

MathsWatch clips (Qualification KS3)
R10, G31

Further reading/discussion

Reading / Enrichment

KM: Geometrical proof
KM: Shape work: Triangles to thirds, 4×4 square, Squares, Congruent triangles
KM: Daniel Gumb's cave
KM: Pythagorean triples
KM: Stick on the Maths: Congruence and similarity
NRICH: Tilted squares
NRICH: What's possible?

Literacy

Congruent, congruence
Similar (shapes), similarity
Conjecture
Derive
Prove, proof
Counterexample

Notation
Notation for equal lengths and parallel lines
SSS, SAS, ASA, RHS
The 'implies that' symbol (⇒)

Numeracy Links

Careers Links

Groundsperson
Architect