CLASS 9 MATHS · 2026-27

Geometry proof and congruence

Triangles

18	35	3
QUESTIONS	MINUTES	EXERCISES

This belongs to _____ **Date** _____

WHAT YOU'LL GET GOOD AT

- Chooses the correct congruence criterion and says why it applies
- Knows why AAA is not a congruence criterion
- Writes a reason beside every statement in a proof
- Uses CPCT correctly and only after congruence has been established
- Sets out a full proof with figure, given and to prove

Take your time, and have a go at every one. If you get stuck, look at the orange box — Ollie has already done one for you.

Geometry proof and congruence

Triangles · 18 questions · tick each box as you finish

Exercise 1 of 3 · 11 questions Which congruence criterion applies? If none does, say so and explain.

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

AAA is not a congruence criterion, and the reason is worth saying rather than remembering: two equilateral triangles, one with sides of 2 cm and one with sides of 200 cm, have all three angles equal and are obviously not congruent. Angles fix shape; they say nothing about size. This is also the commonest wrong answer in the whole chapter.

1) Three pairs of sides are equal.

2) Two pairs of sides and the pair of angles between them are equal.

3) Two pairs of angles and the pair of sides between them are equal.

4) Two pairs of angles and a pair of sides not between them are equal.

5) Both triangles are right-angled, with equal hypotenuses and one equal side.

6) Three pairs of angles are equal.

7) Two pairs of sides and a non-included pair of angles are equal.

8) One pair of sides and two pairs of angles, the side lying between the two angles.

9) In two right triangles, one pair of legs and the pair of hypotenuses are equal.

10) Two pairs of sides are equal and the included angles are both 90 degrees.

11) All three pairs of sides are equal but the triangles face opposite ways.

Exercise 2 of 3 · 5 questions The statements are given. Write the reason for each one.

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

This is the proof that angles opposite equal sides of a triangle are equal, and it is five lines long. Notice that every statement has exactly one reason - given, construction, common, a criterion, or CPCT. Those five reasons cover almost every Class 9 proof, and a child who knows they are the only options stops staring at a blank page.

1) In triangle ABC, AB = AC, and AD bisects angle A meeting BC at D. Statement 1: AB = AC.

2) Statement 2: angle BAD = angle CAD.

3) Statement 3: AD = AD.

4) Statement 4: triangle ABD is congruent to triangle ACD.

5) Statement 5: angle B = angle C.

Exercise 3 of 3 · 2 questions Write the full proof. Figure, given, to prove, then steps with reasons.

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

The second proof is worth studying for its last two lines. Congruence gives you that the two angles are equal; it does not by itself give you a right angle. The linear pair does - equal angles adding to 180° must each be 90°. Class 9 proofs frequently end with one extra step like that after CPCT, and children who stop at CPCT lose exactly the mark the question was set for.

1) Prove that the diagonals of a parallelogram bisect each other.

2) In triangle ABC, AB = AC and AD is the median to BC. Prove that AD is perpendicular to BC.

All done? How did that feel?

Colour in a star. Three stars means you could teach it to someone else.

☆ ☆ ☆ Tricky · Getting there · Easy now

Answer key

For grown-ups

Geometry proof and congruence · keep this page back until your child has finished.

1. Which congruence criterion applies? If none does, say so and explain.

1) SSS.
2) SAS. The angle must be the included one - the angle between the two sides.
3) ASA. The side must be the one between the two angles.
4) AAS. This works because knowing two angles fixes the third, which reduces it to ASA.
5) RHS, which applies only to right-angled triangles.
6) None. Equal angles make the triangles similar, not congruent - they can be the same shape at completely different sizes.
7) No criterion. SSA does not guarantee congruence - two different triangles can fit the same data.
8) ASA. The side is included between the two angles, which is what ASA requires.
9) RHS. Right angle, hypotenuse and one side.
10) SAS. The angle is included between the two known sides, and 90 degrees is still an included angle.
11) SSS. Congruence does not depend on orientation - one triangle can be turned or flipped onto the other.

2. The statements are given. Write the reason for each one.

1) Given.
2) By construction, since AD bisects angle A.
3) Common side to both triangles.
4) By SAS - two sides and the included angle.
5) By CPCT - corresponding parts of congruent triangles.

3. Write the full proof. Figure, given, to prove, then steps with reasons.

1) Given: parallelogram ABCD with diagonals AC and BD meeting at O. To prove: AO = OC and BO = OD. Proof: AB = CD (opposite sides of a parallelogram are equal). Angle OAB = angle OCD (alternate angles, since AB is parallel to DC with transversal AC). Angle OBA = angle ODC (alternate angles, with transversal BD). Therefore triangle AOB is congruent to triangle COD (ASA). Therefore AO = OC and BO = OD (CPCT).

2) Given: triangle ABC with AB = AC, and D the mid-point of BC. To prove: AD is perpendicular to BC. Proof: AB = AC (given). BD = DC (D is the mid-point). AD = AD (common). Therefore triangle ABD is congruent to triangle ACD (SSS). Therefore angle ADB = angle ADC (CPCT). But these two angles form a linear pair, so they add to 180°. Each is therefore 90°, and AD is perpendicular to BC.

WHILE YOUR CHILD WORKS

- Check the figure first. A proof attempted without a labelled diagram almost always fails, and the diagram itself carries marks.
- Every statement needs one of five reasons: given, construction, common, a congruence criterion, or CPCT. Knowing the list is finite stops the blank page.
- A partial proof with reasons earns partial marks. A conclusion with no reasons earns almost nothing. Say that once and mean it.