

CUT & GLUE SORT

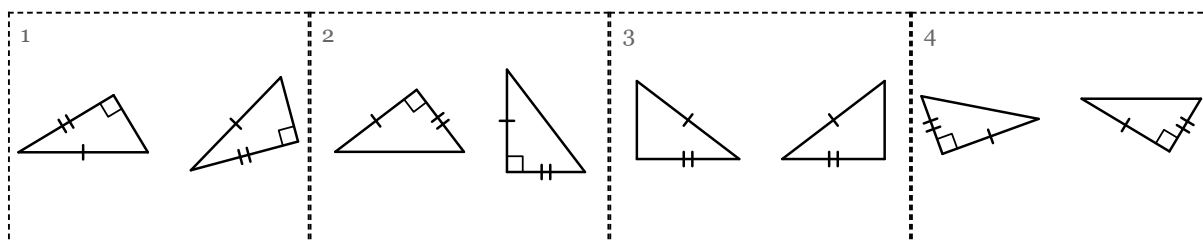


RIGHT TRIANGLE CONGRUENCE: HL

HL, SAS, or Not Settled?

Right triangles · check HL before you use it

FREE



1. **Hand out pages 3 and 4**, one of each per student, with scissors and glue. Nothing else is needed.
2. **Say this once:** *“A right angle counts only when it has the small square. Find the square in each triangle first. The side across from it is the hypotenuse.”*
3. **Check a sheet in ten seconds:** every row gets four pieces.

Student sheets	pages 3 and 4, one of each per student. Page 3 shows the HL, SAS and AAS marks on three small right triangles.
Answers	page 5.

The last row is the most important. HL says: if two right triangles have matching hypotenuses and one matching pair of legs, they are congruent. The most common mistake is to use HL without checking that both triangles have a right angle given. In two pieces of the last row, a small square is missing: the corners may look square, but nothing says they are. In the other two, the hypotenuse of one triangle is matched with a leg of the other. Those triangles are not congruent, and in one piece the difference in size is small, so the drawing does not give the answer away.

The middle row. Many students write HL for every pair of right triangles. When the two marked sides are both legs, the right angle is between them, and the reason is SAS. One of these pieces has a shared side, like the HL piece with a shared side, so the shared side does not decide the row.

How to see the mistake. A student who uses HL whenever the long sides are ticked, without looking for the small squares, places eight of the twelve pieces correctly, and the last row stays empty. Ask that student to point to the small square in each triangle. Other guessing rules place at most six pieces correctly.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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HL, SAS, or not settled?

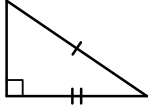
Right triangles

Name _____

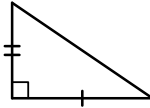
Period _____

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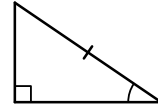
Cut out the twelve pieces on the next page. Each piece shows two triangles. **Decide which row the piece belongs in, and glue it there.**



HL Both have the small square. The **hypotenuses** match, and one pair of **legs** match.



SAS The small square is **between** the two marked legs.



AAS The small square, one more angle, and the hypotenuse.

Sides with the same ticks are equal. The **hypotenuse** is the side across from the small square. The other two sides are the **legs**. A right angle counts only when it has the small square. A side that two triangles share matches itself.

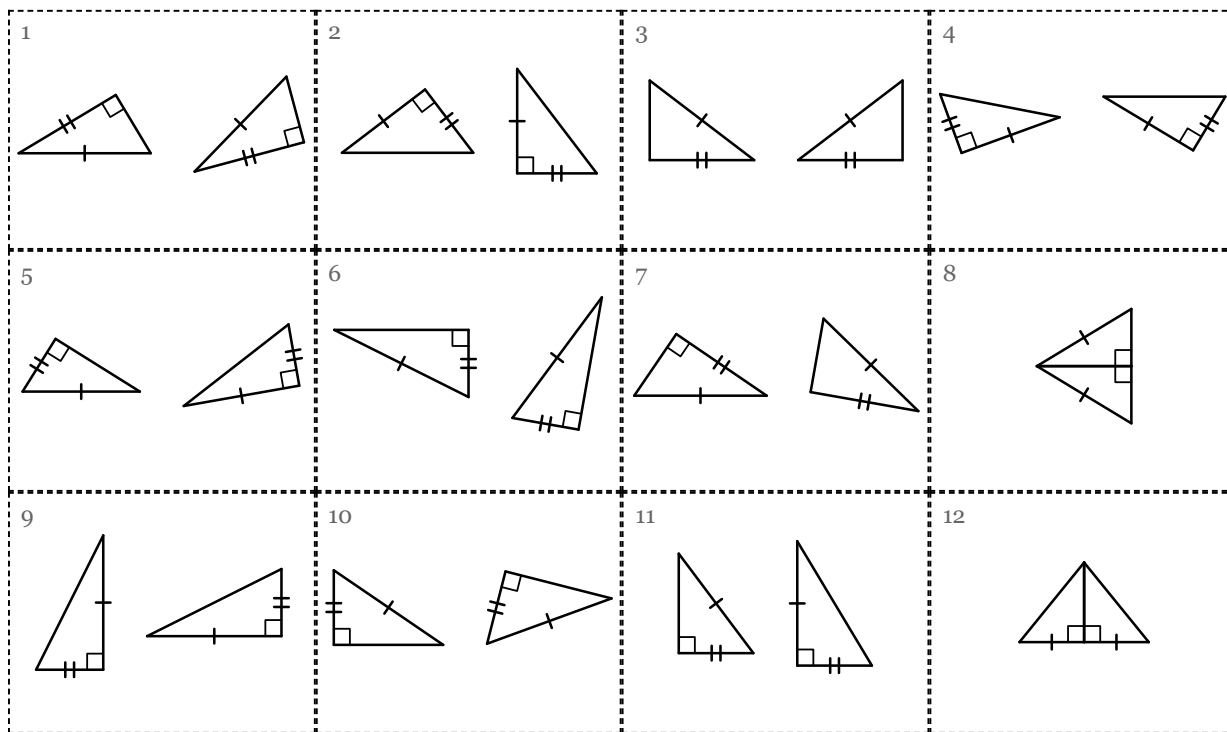
HL. Both triangles have the small square. The hypotenuses match, and one pair of legs match.

SAS, not HL. Both marked sides are legs. The small square is between them.

Not settled. A small square is missing, or a hypotenuse is matched with a leg.

The twelve pieces

Cut along the dotted lines



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Cut & Glue Sort — answers

For the teacher

HL	1 — Both triangles have the small square. The one-tick sides are across from the squares, so they are the hypotenuses. The two-tick sides are legs.	6 — The squares are at the top of one triangle and at the bottom of the other. In both, the one-tick side is across from the square, so the hypotenuses match. The two-tick sides are legs.	8 — The two triangles share a side. Both have the small square where that side meets the base. The one-tick sides are the hypotenuses, and the shared side is a leg of both that matches itself.	10 — The second triangle stands on its hypotenuse. The one-tick side is across from the square in both triangles. The two-tick sides touch the square, so they are legs.
SAS, not HL	2 — Both marked sides touch the small square, so both are legs. The right angle is between them.	4 — The one-tick and two-tick sides both touch the square in each triangle. They are the two legs, with the right angle between them. The hypotenuse has no tick.	9 — The long side has no tick. Both ticked sides touch the square, so they are the legs, and the right angle is between them.	12 — The two triangles share a side, and that side is a leg of both. The other legs have one tick each. Two legs with the right angle between them is SAS, even though a side is shared.
Not settled	3 — No small square is drawn. The corners look square, but a right angle is given only by the small square. So HL cannot be used.	5 — The one-tick side is the hypotenuse of the first triangle and a leg of the second. The triangles look almost alike, but the second is a little larger.	7 — Only the first triangle has the small square. HL needs a right angle given in both triangles.	11 — In the first triangle the one-tick side is across from the square: a hypotenuse. In the second it touches the square: a leg. A hypotenuse is matched with a leg, and the triangles are really different sizes.

Every row holds four pieces. Sides with the same number of ticks are equal. A right angle is given only by the small square. The hypotenuse is the side across from the small square; the other two sides are legs.

A piece goes in the HL row when both triangles have the small square, the two hypotenuses carry the same ticks, and a pair of legs carry the same ticks (or the two triangles share a leg). It goes in the SAS row when both marked sides touch the small square. It goes in the last row when a small square is missing in one or both triangles, or when a side is the hypotenuse in one triangle and a leg in the other.

To check a piece with a student, ask them to point to the small square in each triangle, and then to the side across from it.