

CUT & GLUE SORT

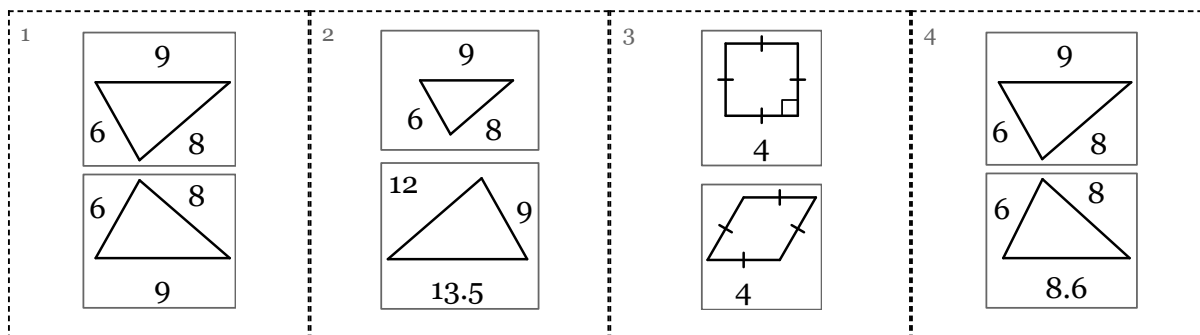


CONGRUENCE AND RIGID MOTIONS

Congruent, or What Does Not Match?

Congruent · a side fails · every side matches but an angle fails

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:** *“Check every side and every angle on both shapes. A flip is allowed. If the sides all match but an angle does not, the piece goes in the last row.”*
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 a slide, a turn and a flip as small pictures.
Answers	page 5.

The last row is the hardest. Many students check only the side lengths, because that is enough for most problems they meet. Every piece in the last row has the same side lengths on both shapes, in the same order around, and the shapes are still not congruent, because an angle is different. A student who checks only lengths glues all four of these pieces into the first row. That row then holds eight pieces, and you see the mistake at once.

The first row holds shapes that look different but are congruent. They are a mirror image of a triangle and of a parallelogram, a square turned to look like a diamond, and an isosceles triangle standing on one of its equal sides. A student who thinks a flipped or turned shape is a different shape puts these in the wrong row. The second row holds shapes that share something but not every side. There is a bigger copy with the same angles (similar, but not congruent), a near miss of 8.6 against 9, and two parallelograms with the same angle and the same area. Every row has at least one piece where one shape is flipped over. So a flip never tells a student which row to use.

Your class may have learned either definition of congruent. One says a slide, a turn or a flip, or several of them, moves one shape exactly onto the other. The other says every pair of matching sides and angles is equal. Both definitions put every piece in the same row.

Guessing does not work. Every simple guessing rule, such as sorting by whether a degree sign is printed, places at most six of the twelve 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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Congruent, or what does not match?

Sides and angles

Name _____

Period _____

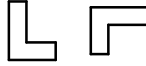
Date _____

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

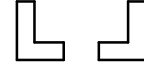
Two shapes are **congruent** when every side and every angle of one matches the other. That is the same as saying slides, turns and flips can move one shape exactly onto the other. A flip is allowed.



slide



turn



flip (turn over)

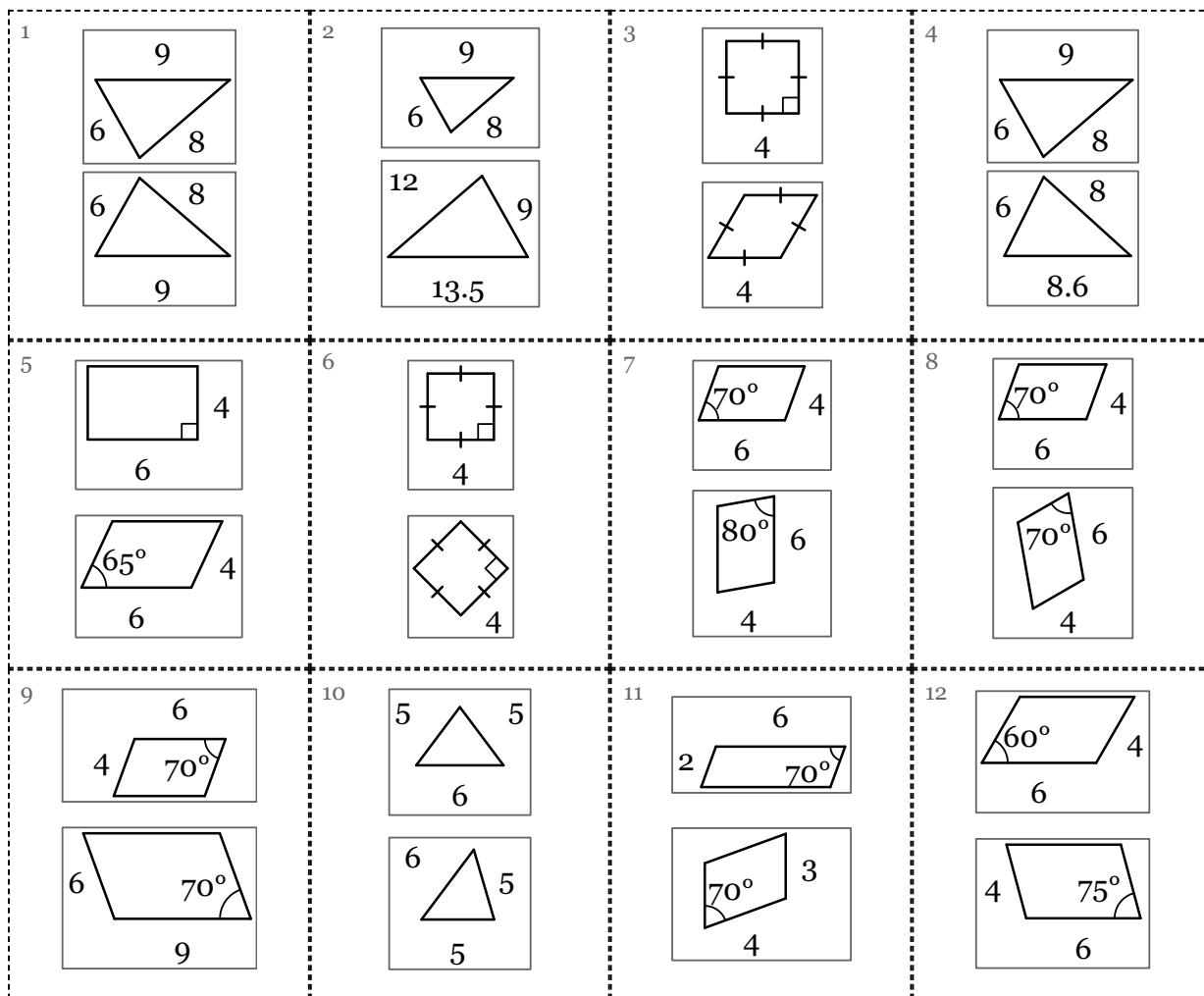
Congruent. Every side and every angle matches.

Not congruent. A side does not match.

Not congruent. Every side matches, but an angle does not.

The twelve pieces

Cut along the dotted lines



135 free geometry lessons — worksheets, worked answers and lesson plans.
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Cut & Glue Sort — answers

For the teacher

Congruent. Every side and every angle matches.	1 — Both triangles have sides 6, 8 and 9. One is the other flipped over, and a flip is allowed.	6 — Both are squares with sides of 4. The “diamond” is the same square turned, and a turn is allowed.	8 — Both have sides 6 and 4 and an angle of 70°. One is the other flipped and turned.	10 — Both triangles have sides 6, 5 and 5. One is the other turned to stand on a side of 5.
Not congruent. A side does not match.	2 — The sides 9, 12 and 13.5 are longer than 6, 8 and 9. It is the same shape made bigger, not the same size.	4 — The shapes look alike, but one side is 9 and the matching one is 8.6.	9 — The angle is 70° on both, but the sides are 9 and 6 against 6 and 4. The angle matching is not enough.	11 — The angle is 70° on both and the areas are equal, but the sides are 6 and 2 against 4 and 3.
Not congruent. Every side matches, but an angle does not.	3 — Every side is 4 on both shapes. The square has right angles and the rhombus has none.	5 — Both have sides 6 and 4. The rectangle has a 90° angle where the parallelogram has 65°.	7 — Both have sides 6 and 4, but one angle is 70° and the matching one is 80°.	12 — Both have sides 6 and 4, but one angle is 60° and the matching one is 75°.

Every row holds four pieces. A piece goes in the first row when the corners of one shape can be matched to the corners of the other so that every side and every angle is equal. It goes in the second row when there is no way to give every side a matching side of the same length. It goes in the last row when every side has a matching side of the same length, but an angle still does not match.