

CUT & GLUE SORT

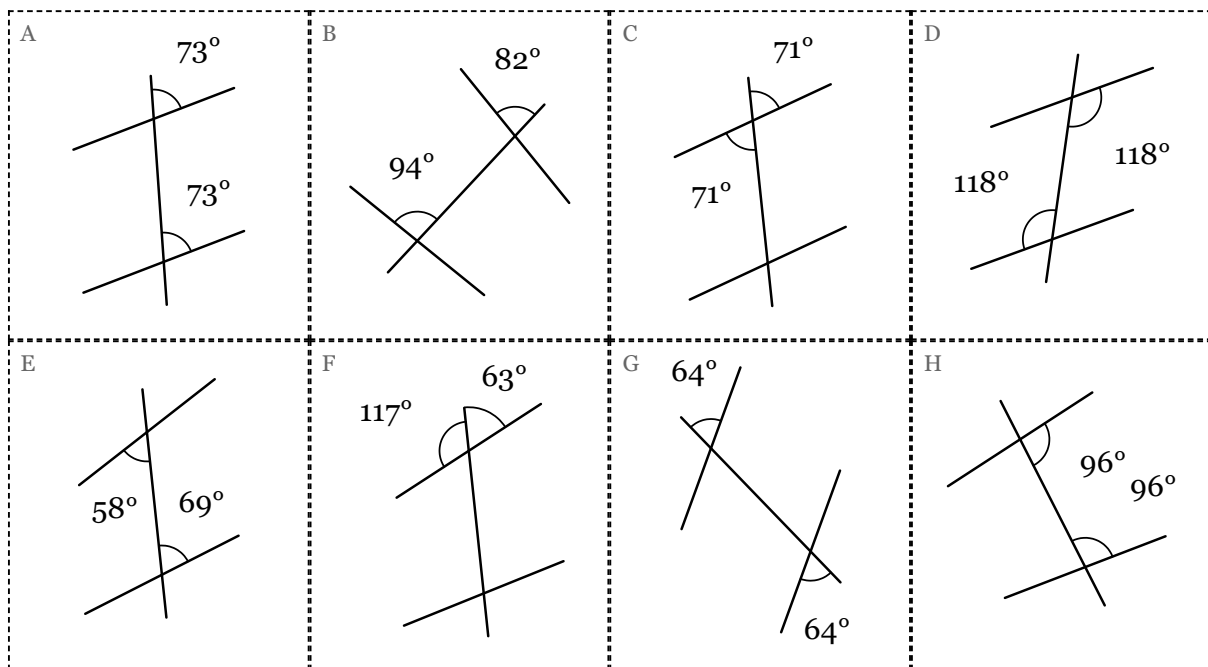


PROVING LINES PARALLEL

Proving Lines Parallel

Must be parallel · not parallel · no way to tell

FREE



Cut & Glue Sort — how to run it

25 minutes, including the cutting

1. **Hand out both sheets, scissors and glue.** You cut nothing.
2. **Say this once:** *“Two angles at the same crossing are equal, or add to 180° , whatever the other line does. They prove nothing. It does not matter how nice the numbers look.”*
3. **Cut out the twelve pieces.** Glue each one into its row: must be parallel, not parallel, or no way to tell. **Every row gets exactly 4.**

Both sheets pages 3 and 4, one of each per student.
Answers page 5.

Students rarely meet the middle row in this lesson. Each piece in it marks a pair in a named position, but the numbers do *not* do what the name asks. For example, corresponding angles are not equal, or same-side interior angles do not add to 180° . That settles it: the lines are *not* parallel. This is a real answer, not a failure. A class that has only ever proved lines parallel will put these four pieces in the bottom row.

The bottom row holds the most common mistake of the lesson. It is pieces C, F, I, L: three of them mark two angles at *one* crossing, and one marks a single angle with nothing to compare it to. A vertical pair is equal on any two lines at all. A linear pair adds to 180° on any two lines at all. They look just like the marks in the top row, but they prove nothing.

Nothing on this sheet is marked parallel, and that is the point. There is not an arrowhead anywhere, because parallel is what the student is deciding. The drawings are to scale. Where two lines are not parallel, they are between 10° and 12° apart. Nobody can see that on a 35 mm piece, so *the numbers are the evidence*. In the bottom row, two pieces are drawn genuinely parallel and two are not, so guessing from the picture is wrong in both directions.

Marking takes ten seconds a sheet. Every row holds 4 pieces. A row holding 3 or 5 is wrong before you read a single piece.

Twenty-five minutes, not fifteen. Cutting twelve pieces is five to eight minutes on its own for hands this age, before anybody has thought about an angle.



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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Where does each one go?

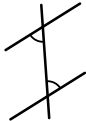
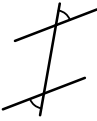
Proving lines parallel

Name _____

Period _____

Date _____

Cut out the twelve pieces on the next page. Glue each one into the row it belongs in. **Nothing here is marked parallel. The two numbers are all the evidence there is. Do not measure the drawing. Do not decide from how it looks.** Every row gets 4.

				
Corresponding <i>equal $\rightarrow$ parallel</i>	Alternate interior <i>equal $\rightarrow$ parallel</i>	Alternate exterior <i>equal $\rightarrow$ parallel</i>	Same-side interior <i>add to $180^\circ \rightarrow$ parallel</i>	Both at one crossing <i>proves nothing</i>

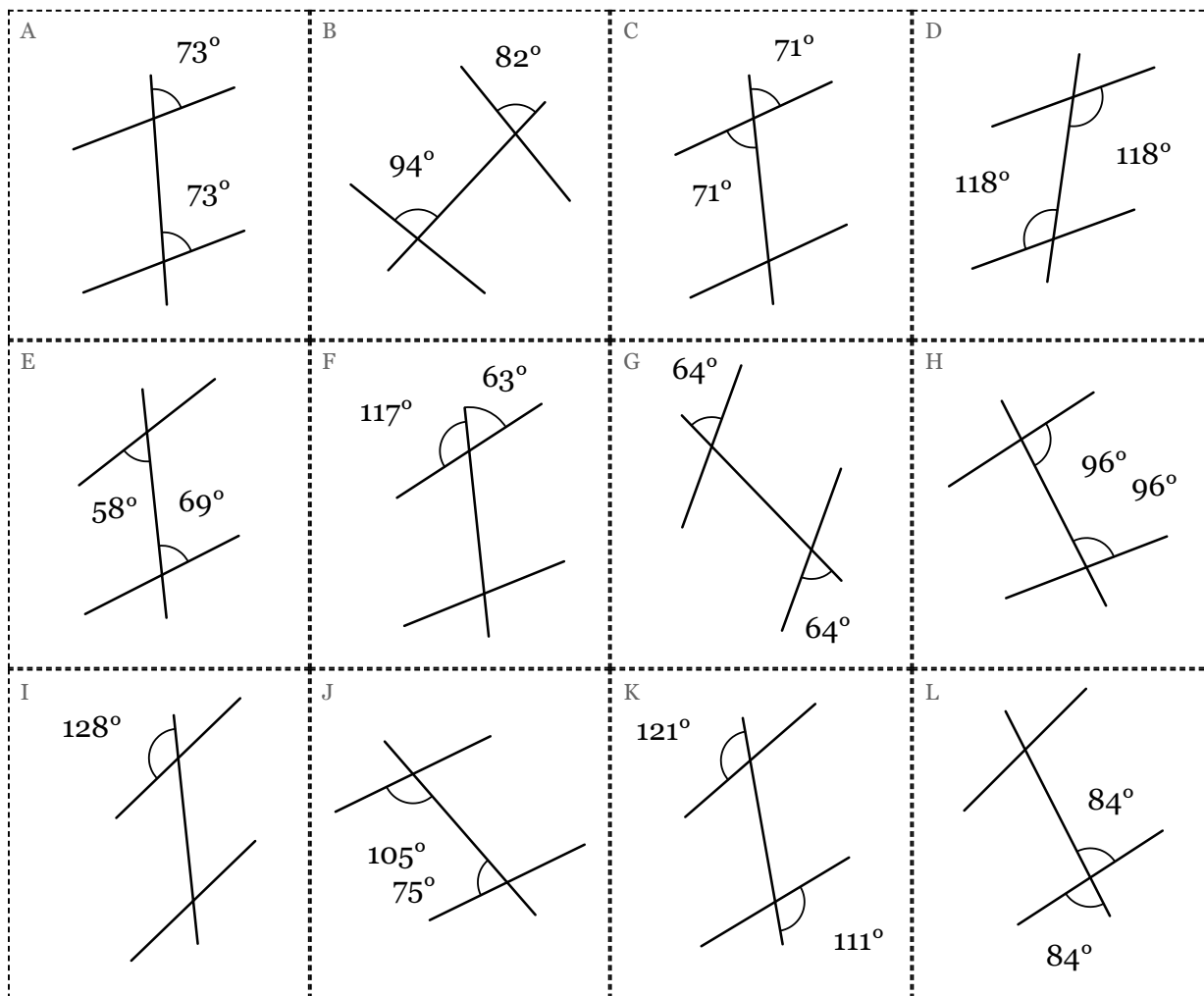
The lines **MUST** be parallel

The lines are **NOT** parallel

There is no way to tell *Four of the twelve pieces belong here.*

The twelve pieces

Cut along the dotted lines



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Cut & Glue Sort — answers

For the teacher

4 pieces to a row, always. A row holding 3 or 5 is wrong before any piece is read.

The lines MUST be parallel	A — corresponding, 73° and 73° D — alternate interior, 118° and 118° G — alternate exterior, 64° and 64° J — same-side interior, 105° and 75°
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The lines are NOT parallel	B — corresponding, 82° and 94° E — alternate interior, 58° and 69° H — same-side interior, 96° and 96° K — alternate exterior, 121° and 111°
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There is no way to tell	C — vertical pair — both at one crossing F — linear pair — both at one crossing I — one angle only — nothing to compare it to L — vertical pair — both at one crossing
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Why the top two rows are two different jobs. Corresponding, alternate interior and alternate exterior angles have to be *equal*; same-side interior angles have to *add to 180°* . When the marks do what the name asks, the converse proved in this lesson makes the lines parallel. When they do not, the lines are not parallel. If the lines were parallel, that pair would have to match, and it does not.

Why the bottom row has no answer. Every piece in it marks angles that tell you nothing about the second line. Two angles at one crossing are made by the first line and the transversal alone. The second line was never measured, so it may be anywhere. One angle on its own has nothing to be compared with. The answer here is *not enough information*, and it is a real answer.