

CUT & GLUE SORT

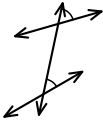
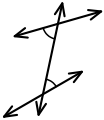
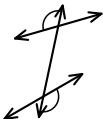
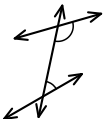
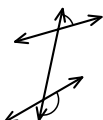
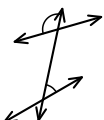


PARALLEL LINES, TRANSVERSALS AND ANGLE PAIRS

The five names for a pair of angles

Corresponding · alternate · same-side · none of these

FREE

 Corresponding <i>same side · one interior, one exterior</i>	 Alternate interior <i>opposite sides · both interior</i>
 Alternate exterior <i>opposite sides · both exterior</i>	 Same-side interior <i>same side · both interior</i>
 Same-side exterior <i>same side · both exterior</i>	 None of these five <i>both at one crossing, or neither fits</i>

Cut & Glue Sort — how to run it

30 minutes, including the cutting

1. **Hand out both sheets, scissors and glue.** You cut nothing.
2. **Say this once:** *“Before you name anything, run your pencil along the strip between the two lines. That strip is the interior. Everything outside it is the exterior.”*
3. **Cut out the twelve pieces. Glue each one into one of the six bins. Every bin gets exactly 2.**

Both sheets pages 3 and 4, one of each per student. The pieces first, then the bins.

Answers page 5.

6 of the twelve have no arrowheads, and there is one of them in every bin. The arrowheads are the small marks drawn on two lines to say that the lines are parallel. Having pieces without them is the whole point of this sheet, and it is worth saying out loud when somebody notices. Each name only says where the two angles are: which side of the transversal, and which region. It applies to any two lines a transversal crosses, and the word *parallel* is not in any of the five definitions. A student who puts every piece without arrowheads in the last bin overfills that bin, and the count in the bins shows it.

The last bin is the lesson, not a trick, and there are two ways into it. Piece C — both angles at the same crossing, a vertical pair. Piece G — opposite sides of the transversal, and one interior, one exterior. A named pair always takes one angle from each crossing *and* answers both comparisons, so a pair can fail to have a name for either reason. Every class will try to force these two somewhere, and that is the conversation the sheet exists for.

What to say when they ask, and they will. “Are these two equal?” Nothing on this sheet is equal to anything, and no angle on it is measured. These are names for where two angles sit. Whether a named pair is also equal is the next lesson, and it is a different question with a different answer.

Marking takes ten seconds a sheet. Every bin holds 2 pieces. A bin holding 1 or 3 is wrong before you read a single piece, and the bin that is over is the name the class has too wide.

Thirty minutes, not twenty. 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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The twelve pieces

Cut along the dotted lines

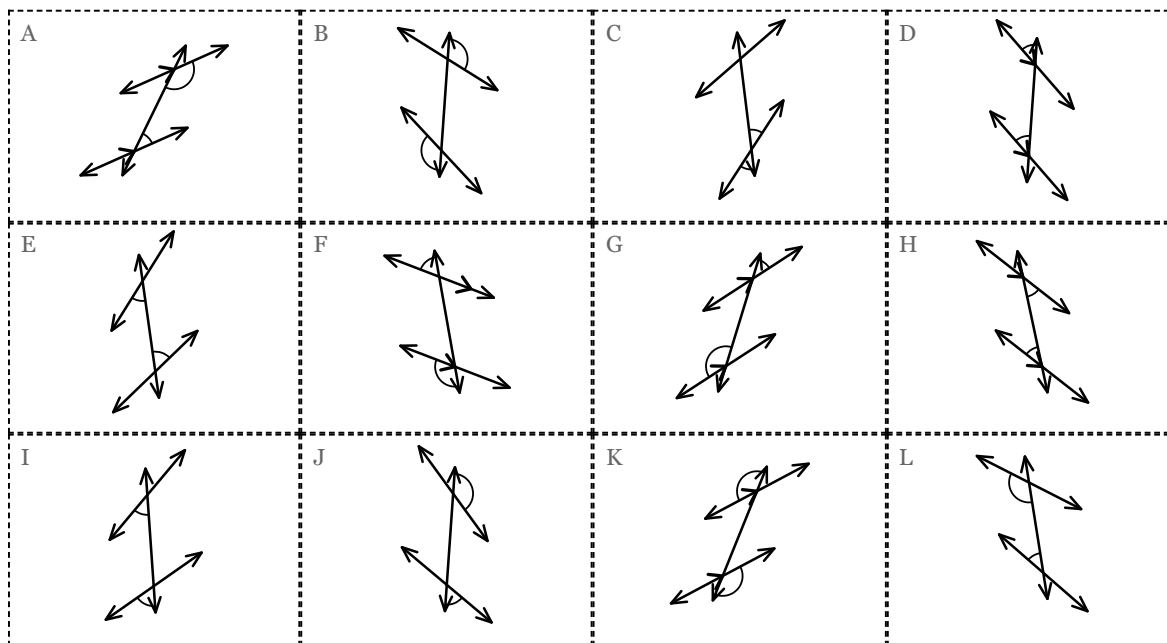
Cut out all twelve before you sort any of them. Then look at the other sheet. **6 of the twelve have no arrowheads on the two crossed lines. Those two lines are not parallel. That changes nothing about where a piece goes.**

Ask the same two questions about every piece.

1. Are the two arcs on the same side of the transversal, or on opposite sides?

2. Is each arc between the two crossed lines, or outside them?

Put your two answers together. They give the piece's name. If both arcs are at the *same* crossing, none of the five names fits. That piece goes in the last bin.



Where does each one go?

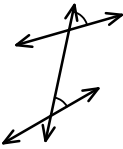
Every bin gets 2

Name _____

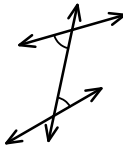
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Date _____

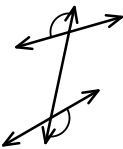
Glue each of the twelve pieces into the bin it belongs in. **The drawing in each bin is what that name looks like. Every bin gets exactly 2.**



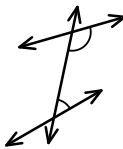
Corresponding
same side · one interior, one exterior



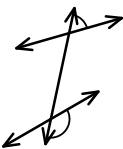
Alternate interior
opposite sides · both interior



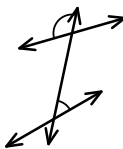
Alternate exterior
opposite sides · both exterior



Same-side interior
same side · both interior



Same-side exterior
same side · both exterior



None of these five
both at one crossing, or neither fits



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Cut & Glue Sort — answers

For the teacher

2 pieces to every bin, always. A bin holding 1 or 3 is wrong before any piece is read. The angle numbers below are 1 to 4 at the upper crossing and 5 to 8 at the lower, each in the order upper left, upper right, lower left, lower right. They are not printed on any piece.

Corresponding	D — angles 1 and 5 (<i>arrowheads</i>) I — angles 3 and 7 (<i>no arrowheads</i>)
Alternate interior	E — angles 3 and 6 (<i>no arrowheads</i>) H — angles 4 and 5 (<i>arrowheads</i>)
Alternate exterior	B — angles 2 and 7 (<i>no arrowheads</i>) K — angles 1 and 8 (<i>arrowheads</i>)
Same-side interior	A — angles 4 and 6 (<i>arrowheads</i>) L — angles 3 and 5 (<i>no arrowheads</i>)
Same-side exterior	F — angles 1 and 7 (<i>arrowheads</i>) J — angles 2 and 8 (<i>no arrowheads</i>)
None of these five	C — angles 6 and 7, both angles at the same crossing, a vertical pair (<i>no arrowheads</i>) G — angles 2 and 5, opposite sides of the transversal, and one interior, one exterior (<i>arrowheads</i>)

Why 6 pieces have no arrowheads, and why one of them is in every bin. Each of the five names fixes two things and only two: which side of the transversal the two angles are on, and which region each of them is in. Neither of those is a claim about the two crossed lines, so every one of the five names applies exactly as well when the lines are not parallel. A student who has quietly learned that these names mean *equal* sorts the 6 pieces without arrowheads into the last bin, and the count catches it.

And the last bin has two different reasons in it. **C** — both angles at the same crossing, a vertical pair. **G** — opposite sides of the transversal, and one interior, one exterior. Two angles at one crossing already have names that students have met before: *vertical angles* and a *linear pair*. Those names will do much of the work in the lessons that follow.