

CUT & GLUE SORT

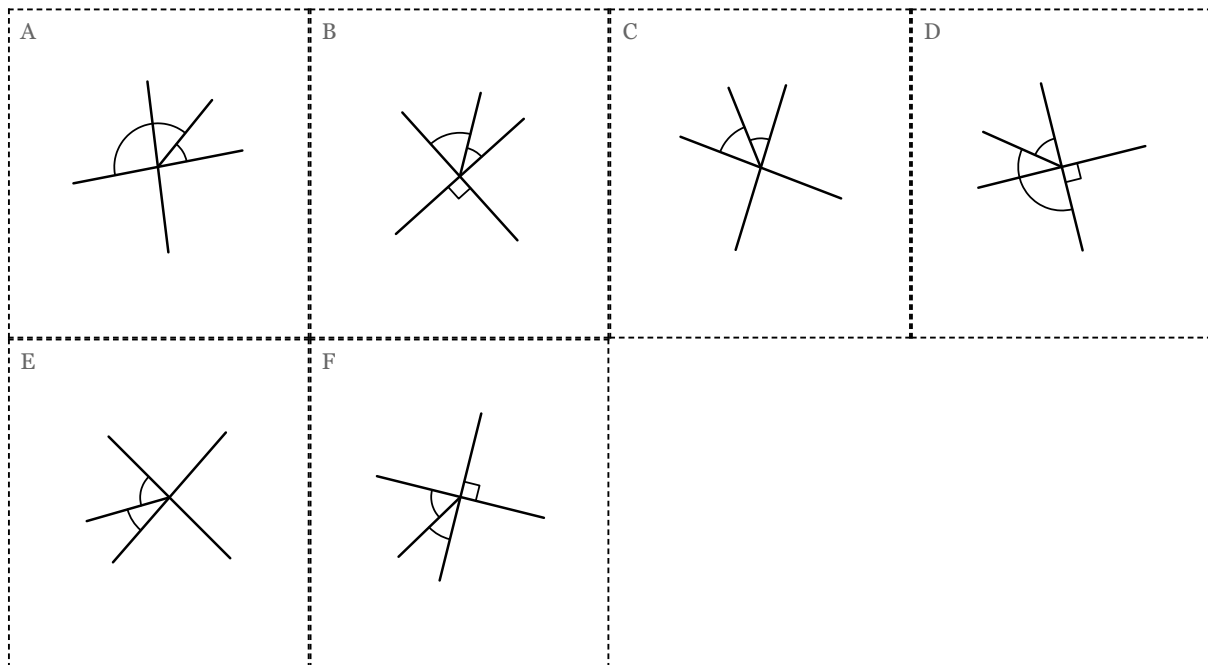


COMPLEMENTARY, SUPPLEMENTARY AND VERTICAL ANGLES

Complementary, Supplementary, or Neither

Adds to 180° · adds to 90° · no way to tell

FREE



Cut & Glue Sort — how to run it

25 minutes, including the cutting

1. **Hand out pages 3 and 4**, one of each per student. Nothing else to prepare. The students do the cutting. It takes the first ten minutes.
2. **Say this once:** *“Look at the two arms on the outside of the two arcs. One straight line means 180. Two lines with a little square means 90. Anything else means you cannot tell.”*
3. **Every row gets 4 pieces.** Say that too. It is how they know they have finished. It is also how you mark it.

Student sheets pages 3 and 4, one of each per student.

Answers page 5.

Students often mix up the words complementary and supplementary. Complementary angles add to 90° . Supplementary angles add to 180° . Many students choose the wrong word even when one angle is clearly obtuse. On this sheet the student must decide which total it is before doing any arithmetic.

The third row is the most important one. Four pieces belong in it. All four are drawn with the lines at 86° or 94° . Nobody can tell that from a right angle by eye. **You may assume vertical angles from a diagram. You may not assume that two lines are perpendicular.** Two straight lines that cross always make vertical angles, so the drawing is enough for them. A right angle is an extra fact, so it must be marked with a little square. A student who puts these pieces in the 90° row has trusted the drawing. Pieces C, E, H, L belong in this row.

The little square does not decide the row. Six pieces carry a little square, but only four of them belong in the 90° row. Pieces D and K are linear pairs on two perpendicular lines. A linear pair always adds to 180° , so they go in the 180° row. Because of them, a student cannot sort the sheet just by looking for the square.

What to ask a student who is stuck. Do not give the answer. Ask: *“Put your finger on the two arms on the outside of your two arcs. Do they make one straight line?”* That question decides every piece on the sheet.



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?

Angle pairs

Name _____

Period _____

Date _____

Cut out the twelve pieces on the next page. Glue each one into the row it belongs in. **Look at the two arms on the outside of the two arcs. If they make one straight line, the two angles add to 180° . If they are the two lines and a little square says the lines meet square, the two angles add to 90° . If neither, there is no way to tell. This is true even if the crossing looks square.** Every row gets 4.

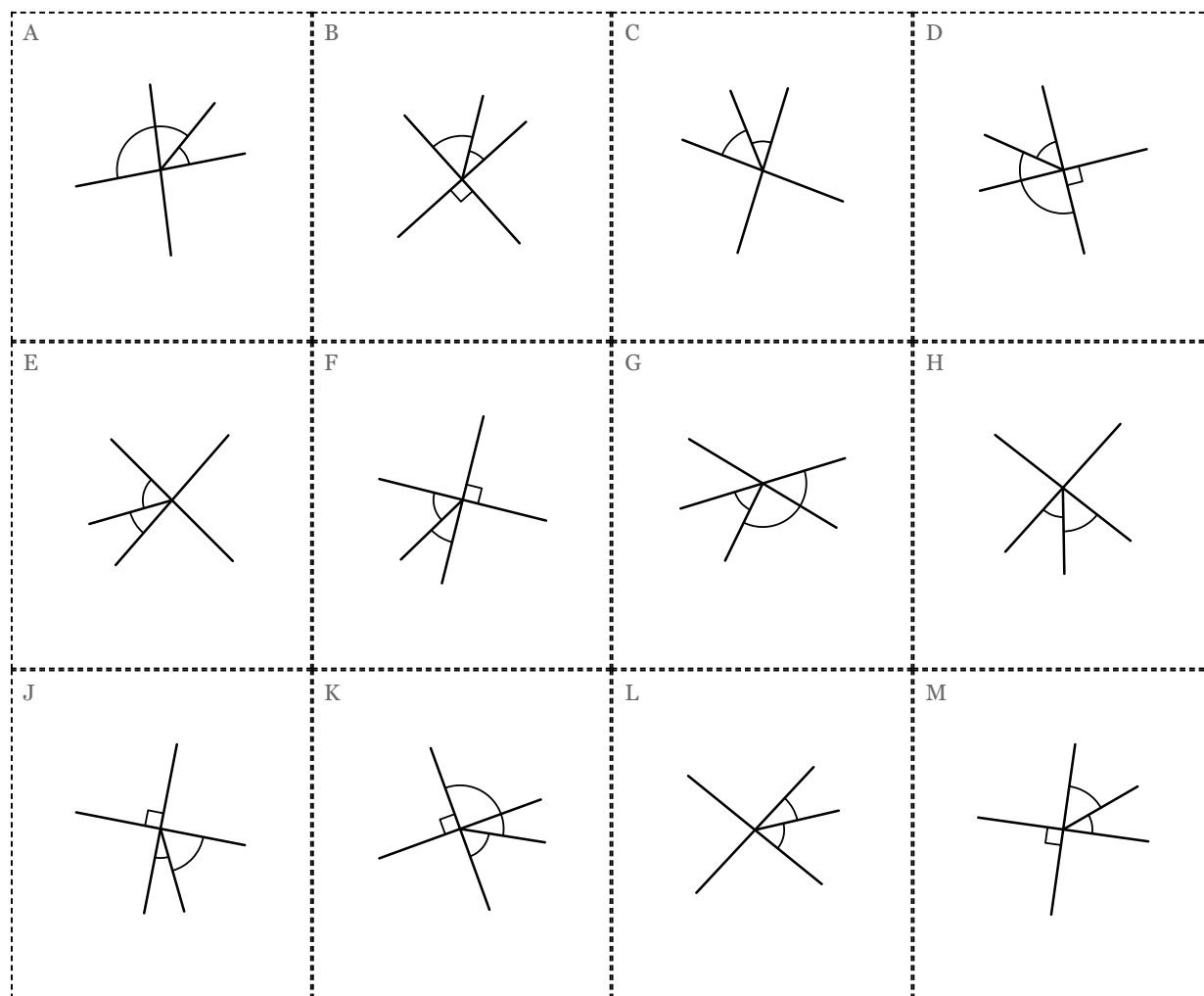
The two marked angles must ADD TO 180°

The two marked angles must ADD TO 90°

There is no way to tell. *All four crossings look square.*

The twelve pieces

Cut along the dotted lines



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Cut & Glue Sort — answers

For the teacher

Row	Pieces	Why
The two marked angles must ADD TO 180°	A · D · G · K	the outer arms are the two halves of one line, so the two angles fill a straight angle
The two marked angles must ADD TO 90°	B · F · J · M	the outer arms are the two lines, and the little square says they are perpendicular
There is no way to tell	C · E · H · L	the outer arms are the two lines, and nothing says they are perpendicular

Every row holds four pieces. That lets you mark a sheet in ten seconds. The table below gives the size of each marked angle as it is drawn. These numbers are not printed on any piece. A student who sorts correctly never needs them.

	The two angles	What the outer arms are	Marked	Row
A	40° and 140°	the outer arms are one straight line	nothing marked	ADD TO 180°
B	34° and 56°	the outer arms are the two lines, drawn 90° apart	a square at the crossing	ADD TO 90°
C	39° and 47°	the outer arms are the two lines, drawn 86° apart	nothing marked	no way to tell
D	52° and 128°	the outer arms are one straight line	a square at the crossing	ADD TO 180°
E	61° and 33°	the outer arms are the two lines, drawn 94° apart	nothing marked	no way to tell
F	58° and 32°	the outer arms are the two lines, drawn 90° apart	a square at the crossing	ADD TO 90°
G	47° and 133°	the outer arms are one straight line	nothing marked	ADD TO 180°
H	43° and 51°	the outer arms are the two lines, drawn 94° apart	nothing marked	no way to tell
J	27° and 63°	the outer arms are the two lines, drawn 90° apart	a square at the crossing	ADD TO 90°
K	61° and 119°	the outer arms are one straight line	a square at the crossing	ADD TO 180°
L	52° and 34°	the outer arms are the two lines, drawn 86° apart	nothing marked	no way to tell
M	38° and 52°	the outer arms are the two lines, drawn 90° apart	a square at the crossing	ADD TO 90°

The pieces drawn at 86° and 94° are not a trick. Nobody can see a difference of four degrees. A student who sorts by eye puts them in the 90° row. The rule is that you may not assume two lines are perpendicular from a diagram. If every unmarked crossing were drawn clearly slanted, the sheet would teach the opposite.