

CUT & GLUE SORT

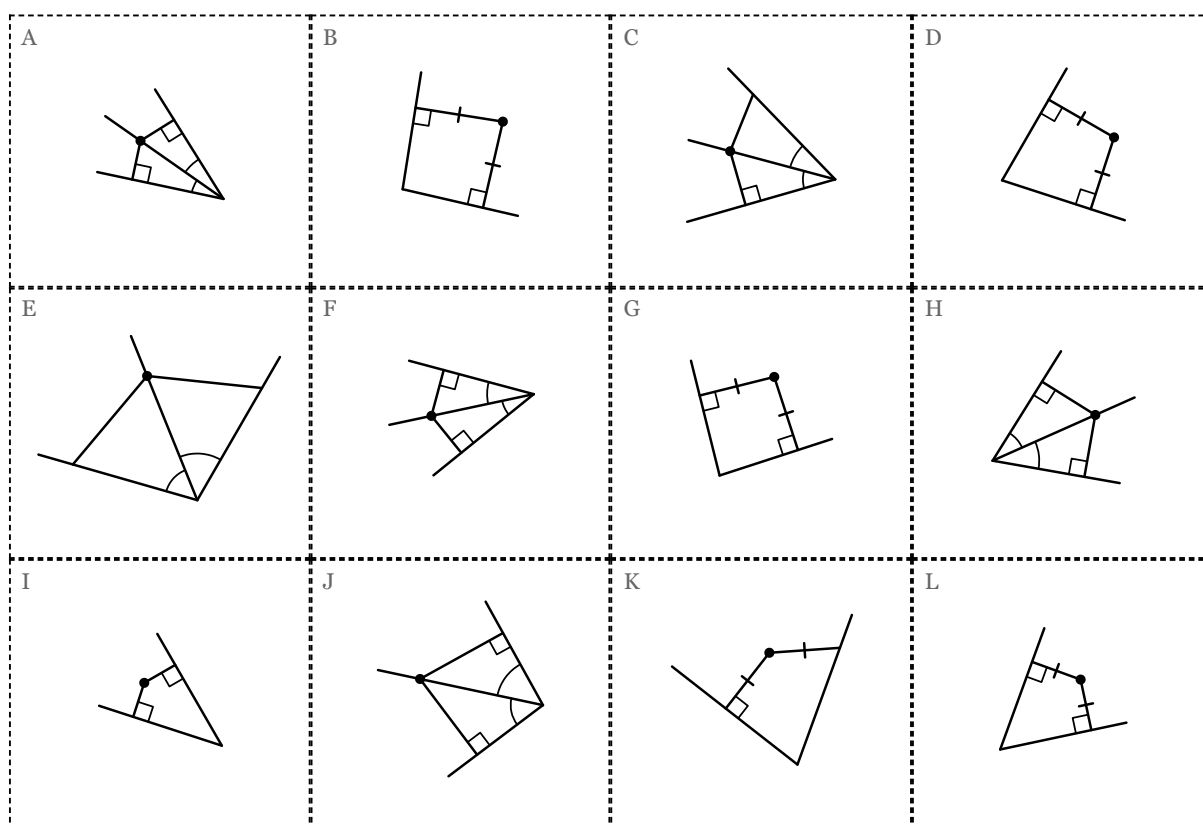


THE ANGLE BISECTOR THEOREM

The Angle Bisector, Both Ways Round

Three rows · 25 minutes, including the cutting

FREE



12 pieces · 2 student sheets · answer key · 5 pages

Geometry · Grades 8–10 · chooseyourlesson.com

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:** “Find the two little squares first. If there is no little square, there is no distance. Then it does not matter what else is marked.”
3. **Every row gets exactly four pieces**, so a row with three or five in it is wrong before you read a single one.

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

Answers page 5.

The two top rows are the same theorem read in opposite directions, and telling them apart is the whole sheet. Every piece in both is the same picture — a dot inside an angle, a stroke to each side, a right-angle mark on both — and what differs is which mark is the *given*. Arcs at the vertex say the angle is halved, so the distances are equal (A, F, H, J). Ticks on the strokes say the distances are equal, so the dot is on the bisector (B, D, G, L). Sorting by how the picture looks cannot separate those two rows at all.

The bottom row is the hardest one. A stroke with no right-angle mark is not a distance, and once one of the two is missing neither direction of the rule has anything to say. Its four pieces fail in four different ways: **C**, the angle is halved and only one stroke is square; **E**, the angle is halved and neither stroke is square; **I**, both strokes are distances and nothing says the angle is halved; **K**, two equal strokes, and one of them is not a distance.

Piece I is the one to stop the class on, and the argument for it is on page 5 with the answers.

Yesterday's theorem and today's, side by side. Say it once and the pair is finished: the same instrument used twice, and the rows are where it differs. A student reaches for yesterday's because it is fresher; the second row settles it.

	5.8 — perpendicular bisector	5.9 — angle bisector
The object	a segment, two ends	an angle, two sides
Distance to what	two <i>points</i> — the segment is already there to measure	two <i>lines</i> — nothing is there until a perpendicular is drawn
The set is	a <i>line</i>	a <i>ray</i> , starting at the vertex
Side condition	none	the dot must be <i>inside</i> the 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?

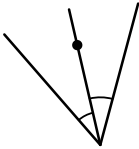
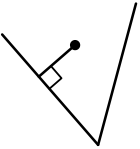
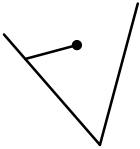
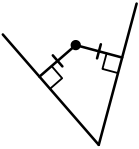
The angle bisector, both ways round

Name _____

Period _____

Date _____

Cut out the twelve pieces on the next page. Glue each one into the row it belongs in. **A stroke is only a distance if it carries the little square. The marks are all the evidence there is. Do not measure. Do not decide from how the drawing looks.** Every row gets four.

			
two arcs <i>the ray halves the angle</i>	a square at the foot <i>this stroke is the distance to that side</i>	no square <i>just a stroke, not a distance</i>	two ticks <i>these two strokes are equal</i>

The two distances must be equal

The dot must be on the bisector

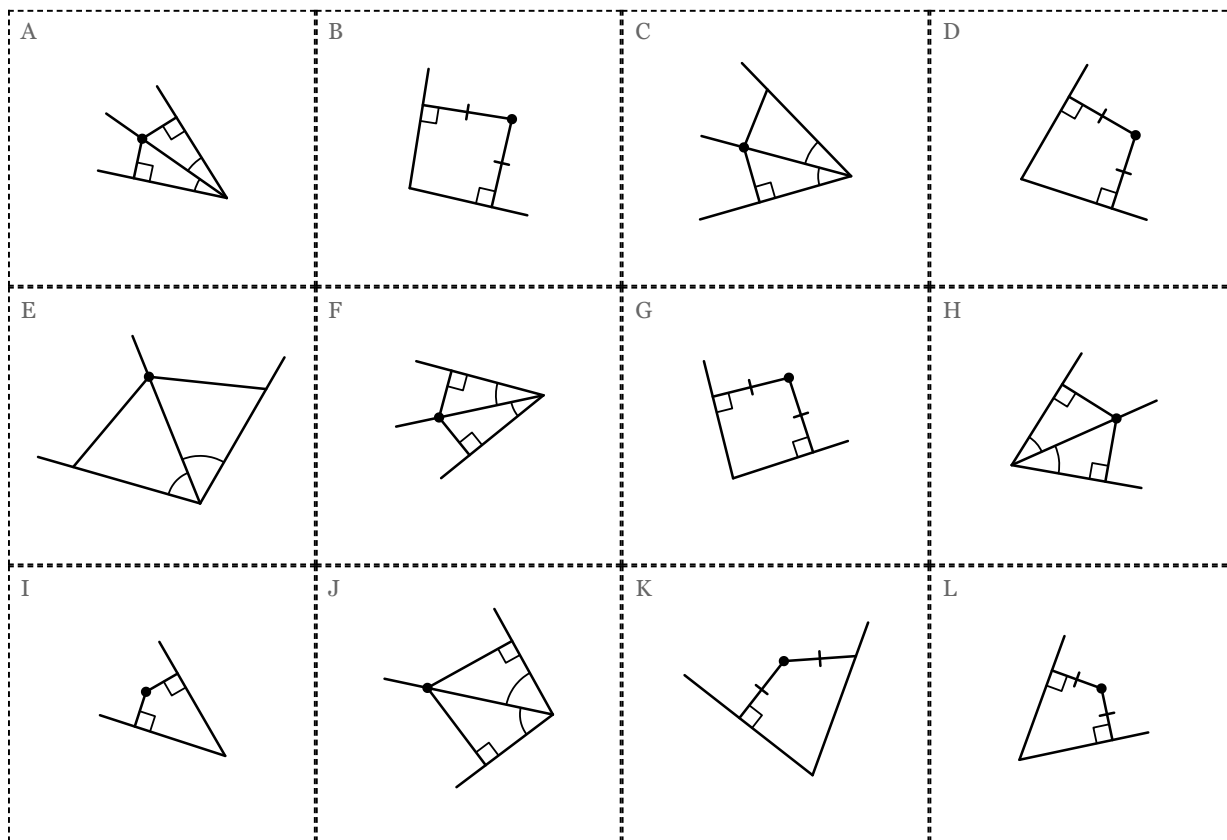
There is no way to tell *Four of the twelve pieces belong here.*



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The twelve pieces

Cut along the dotted lines



Cut & Glue Sort — answers

For the teacher

The two distances must be equal: A, F, H, J · **The dot must be on the bisector:** B, D, G, L · **There is no way to tell:** C, E, I, K. Four to a row, always — a row with any other number in it is wrong before any piece is read.

Piece	Row	What is marked on it
A	The two distances must be equal	arcs at the vertex and a right-angle mark on both strokes
B	The dot must be on the bisector	a right-angle mark on both strokes and a tick on each
C	There is no way to tell	The angle is halved and only one stroke is square
D	The dot must be on the bisector	a right-angle mark on both strokes and a tick on each
E	There is no way to tell	The angle is halved and neither stroke is square
F	The two distances must be equal	arcs at the vertex and a right-angle mark on both strokes
G	The dot must be on the bisector	a right-angle mark on both strokes and a tick on each
H	The two distances must be equal	arcs at the vertex and a right-angle mark on both strokes
I	There is no way to tell	Both strokes are distances and nothing says the angle is halved
J	The two distances must be equal	arcs at the vertex and a right-angle mark on both strokes
K	There is no way to tell	Two equal strokes, and one of them is not a distance
L	The dot must be on the bisector	a right-angle mark on both strokes and a tick on each

The rule, both ways round. Arcs and two squares — the two distances are equal. Two squares and two ticks — the dot is on the bisector. One square missing and that stroke is not a distance, so neither half of the rule applies and the answer is the bottom row.

Piece I is the one to stop the class on, and it is worth five minutes. Both of its strokes are marked square, so both really *are* distances — and they are drawn the same length. Everyone will want it in the top row. But nothing on it says the angle is halved, and a dot inside an angle has equal distances to the two sides only if it happens to lie on the bisector. The drawing is not a reason. That is the whole lesson on one piece of paper 42 mm wide.