

CUT & GLUE SORT



CONSTRUCTING PERPENDICULAR LINES

Perpendicular Through a Point: The Line Asked For, a Bisector, or Another Line?

Read the arcs · read the name · the wrong line is the one no check catches

FREE

1 Draw a line through G that is perpendicular to HJ.	2 Draw a line through R that is perpendicular to PQ.	3 Draw a line through E that is perpendicular to FG.	4 Draw a line through D that is perpendicular to BC.
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1. **Hand out pages 3 and 4**, one of each per student, with scissors and glue.
2. **Say this once:** *“Find the point the first arc is centered on and the line it cuts. Then read what was asked. A line perpendicular to the wrong side looks correct in every other way. Only the name tells you it is wrong.”*
3. **Every row gets 4.** A row with more or fewer has a piece in the wrong place. (This is on your page only, not the student's.)

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

The two “Wrong” rows show the two most common test mistakes. In the first, the student builds the perpendicular bisector of a side instead. The finished drawing looks exactly like a perpendicular from a point, and many students choose it on tests. In the second, the student draws a perpendicular to the wrong line. The construction is correct, but it is on the wrong line. Every piece shows correct marks for *something*, stopped before the line is drawn. Both kinds of task are on the sheet. On three pieces, the point is on the side named in the task. On the rest, the line goes from a corner to the opposite side. That side is drawn longer when the perpendicular meets it outside the triangle.

The third row is the hard one. The usual checks are three points in a line, folding, or doing a second construction. They catch a line that drifts or an arc drawn badly. None of them catches a perpendicular built correctly to the wrong line. Only reading the task catches it. A student who reads the arcs but never the task gets only nine of the twelve right. A student who checks the point but not the line also gets nine.

No triangle has a right angle or two equal sides. So no perpendicular bisector of a side passes through the named point. Each one misses it by at least 3 mm. No line in the third row is within 15° of being perpendicular to the named line. So no piece fits two rows.



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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What did they really draw?

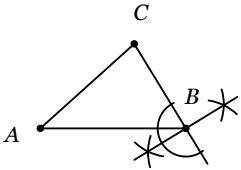
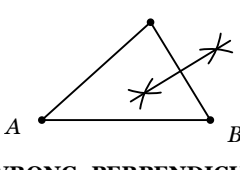
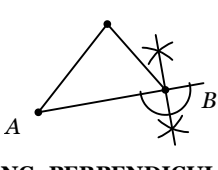
Correct, or which mistake?

Name _____

Period _____

Date _____

Cut out the twelve pieces on the next page. Each piece has a task, like **Draw a line through B that is perpendicular to BC**. Someone started the task with a compass and stopped before drawing the line. **Look at their compass marks and decide what line they really make.** Hint: find the point the first arc is centered on, and the side it cuts. Then glue the piece into the right row. The pictures show one example for each row.

 1 • CORRECT	 2 • WRONG: PERPENDICULAR BISECTOR	 3 • WRONG: PERPENDICULAR TO A DIFFERENT SIDE
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1 • CORRECT — The line goes through the named point and is perpendicular to the named side.

2 • WRONG: PERPENDICULAR BISECTOR — It goes through the middle of the side, not through the named point.

3 • WRONG: PERPENDICULAR TO A DIFFERENT SIDE — The line is perpendicular to another side, not the named one.

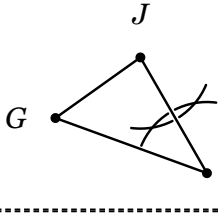
The twelve pieces

Cut along the dotted lines

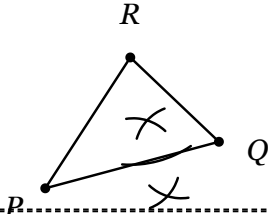
How the construction works. When P is on line k : draw an arc from P that cuts k twice. From the two cuts, draw two arcs of the same size, *bigger* than the first arc, so that they cross. The line goes through P and that crossing. When P is not on line k : draw an arc from P that cuts k twice. From the two cuts, draw two arcs of the same size that cross on the other side of k . The line goes through P and that crossing.

Last lesson: you bisected an angle. You drew an arc that cuts both sides of the angle. From those two points, you drew two arcs of the same size that cross.

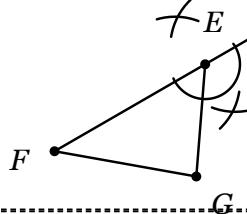
- 1 Draw a line through G that is perpendicular to HJ .



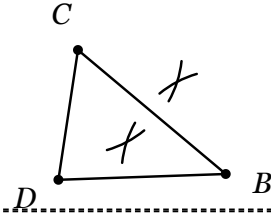
- 2 Draw a line through R that is perpendicular to PQ .



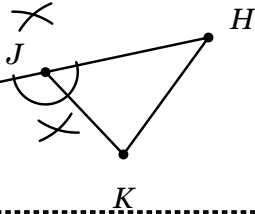
- 3 Draw a line through E that is perpendicular to FG .



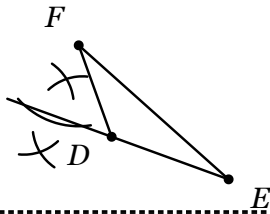
- 4 Draw a line through D that is perpendicular to BC .



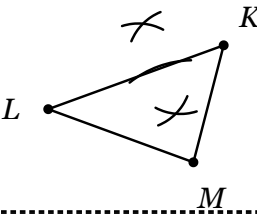
- 5 Draw a line through J that is perpendicular to HK .



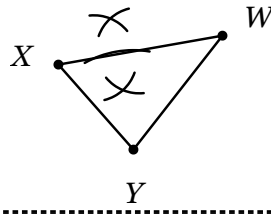
- 6 Draw a line through F that is perpendicular to DE .



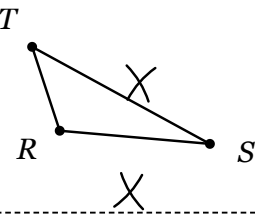
- 7 Draw a line through M that is perpendicular to KL .



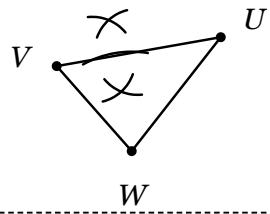
- 8 Draw a line through Y that is perpendicular to WY .



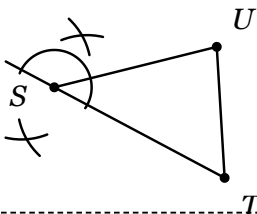
- 9 Draw a line through T that is perpendicular to RS .



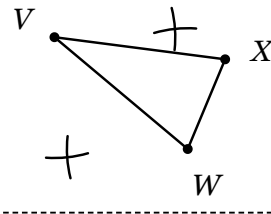
- 10 Draw a line through U that is perpendicular to VW .



- 11 Draw a line through S that is perpendicular to ST .



- 12 Draw a line through V that is perpendicular to VW .



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Cut & Glue Sort — answers

For the teacher

	CORRECT	2 — Draw a line through R that is perpendicular to PQ. Built from a first arc centered at R that cuts PQ.	6 — Draw a line through F that is perpendicular to DE. Built from a first arc centered at F that cuts DE.	7 — Draw a line through M that is perpendicular to KL. Built from a first arc centered at M that cuts KL.	11 — Draw a line through S that is perpendicular to ST. Built from a first arc centered at S that cuts ST.
	WRONG: PERPENDICULAR BISECTOR	1 — Draw a line through G that is perpendicular to HJ. Built from arcs centered at H and J.	4 — Draw a line through D that is perpendicular to BC. Built from arcs centered at B and C.	9 — Draw a line through T that is perpendicular to RS. Built from arcs centered at R and S.	12 — Draw a line through V that is perpendicular to VW. Built from arcs centered at V and W.
	WRONG: PERPENDICULAR TO A DIFFERENT SIDE	3 — Draw a line through E that is perpendicular to FG. Built from a first arc centered at E that cuts EF.	5 — Draw a line through J that is perpendicular to HK. Built from a first arc centered at J that cuts HJ.	8 — Draw a line through Y that is perpendicular to WY. Built from a first arc centered at Y that cuts WX.	10 — Draw a line through U that is perpendicular to VW. Built from a first arc centered at W that cuts UV.

Each cell gives the task, then how the marks were built. For the third row, compare the point and the line in the marks with the point and the line in the task.