

MYSTERY PICTURE

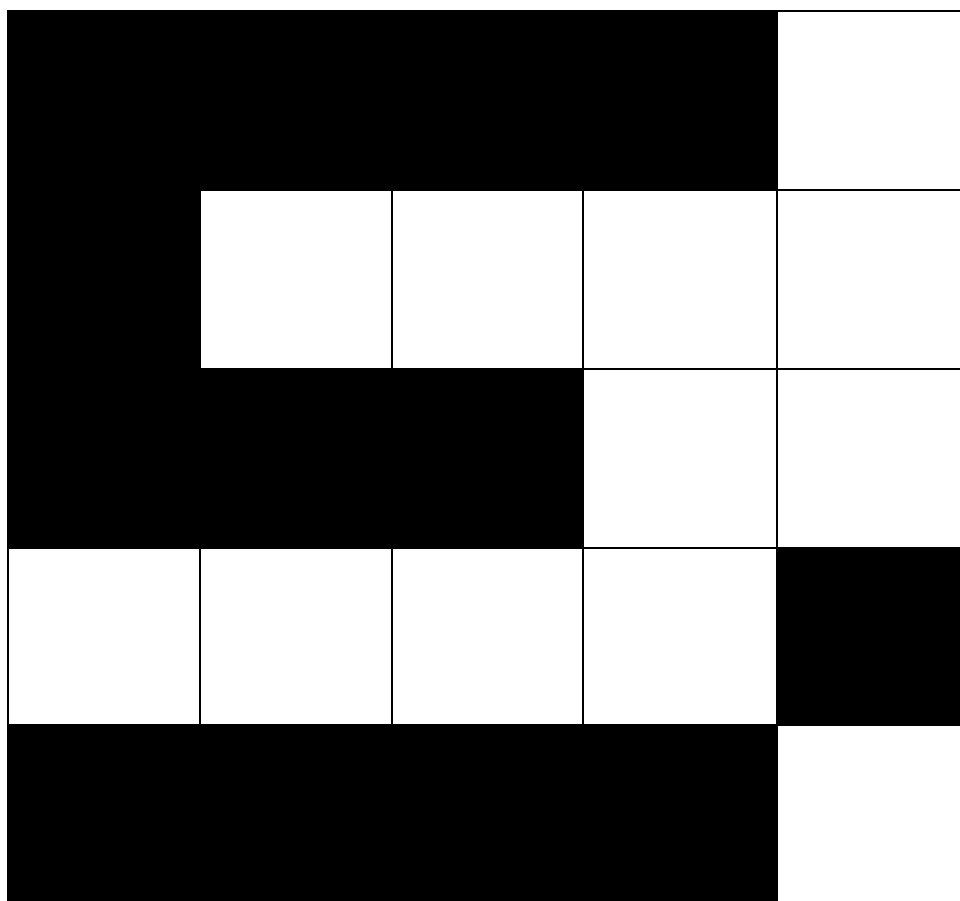


PERPENDICULAR LINES AND THEIR ANGLES

Perpendicular Lines: Complementary or Not?

25 squares · no numbers · wrong answers show in the picture

FREE



1. **Hand out page 3.** That is the whole preparation.
2. **Say this once:** “A corner is only a right angle if something on the figure says so. If there is no small square, there is no right angle, however square it looks.”
3. **Fill the square with slanted lines if the marks force the two marked angles to add to 90° . Leave it white if they do not.** A picture appears. 13 of the 25 are filled.

Student sheet page 3, one per student. It carries the three cases as pictures.
Answers page 4 — the finished picture and the reason for every square.

Every square has to be read twice, and that is the whole design. First: do the two arcs fill a corner, or do they fill the straight line? Second: does anything on the figure say that corner is a right angle? Only a square that answers *corner* to the first and *yes* to the second gets filled.

Each half-answer is wrong on its own, and the picture says so loudly. A student who fills every square whose arcs make a corner gets six of the 25 wrong. A student who fills every square that carries a small square anywhere on it gets four wrong. Either way the shape has holes in it and they can see that from their own desk before you do.

Do not let them measure, and say so if you see a protractor. Every drawing is to scale. The eight crossings that carry no mark are drawn 4° off square — a difference no eye can see, which is exactly why the mark and not the ink is what a student is allowed to use. The lesson's own first activity prints 86° beside 90° for the same reason.

The white squares are two different things and it is worth two minutes at the end. On six of them nothing can be told at all: the two angles fill what looks like a right angle and no mark says it is one. On the other six the two angles fill a straight line, so they add to 180° and not 90° — and four of those crossings *do* carry a small square, which is what stops “find the square” from being a way through the sheet.

Turn the sheet round if an answer is being argued about. If an answer changes when the page is rotated, it was read off the appearance. 21 different tilts are printed and one crossing is square with the paper, which is the one shape a class this age recognises without thinking.

Why the sheet says slanted lines and not “color it in”. 13 squares of pencil shading comes out pale grey, and pale grey is the one thing that does not survive a school copier. Hatching survives, it is faster, and the drawing stays readable underneath so a square can be checked again.



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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Mystery Picture

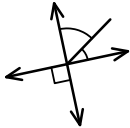
The mark decides, not the drawing. Do not measure.

Name _____

Period _____

Date _____

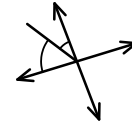
Do the marks force the two marked angles to add to 90° ? Yes: fill it with slanted lines. No: leave it white. A corner is a right angle only if a mark says so. A picture appears. If it does not look right, one square is wrong.



A ray inside the right angle
the two parts add to 90°



A ray and the line itself
the two add to 180°



No square, no conclusion
it only looks square

1 	2 	3 	4 	5
6 	7 	8 	9 	10
11 	12 	13 	14 	15
16 	17 	18 	19 	20
21 	22 	23 	24 	25

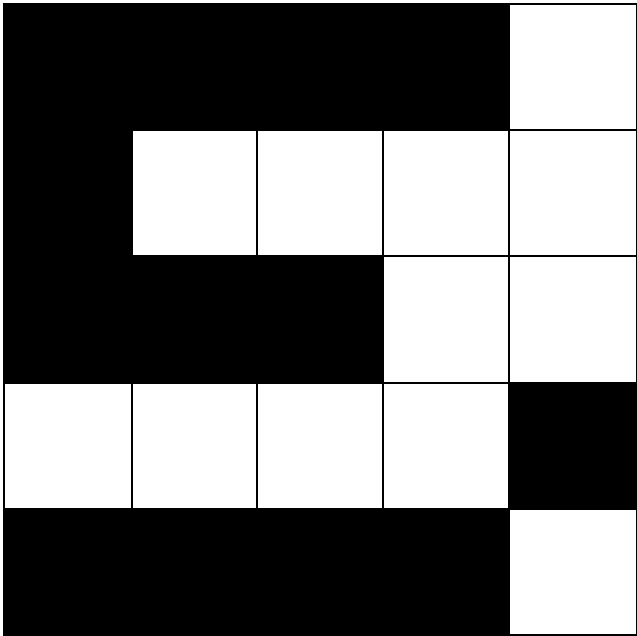


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Mystery Picture — answers

For the teacher

The finished sheet is **the number 5** — a bar across the top, a hook, then a bar across the bottom. The table reads left to right, the way the sheet is read; the squares are numbered on the student's sheet.



1–5	FILL corner, marked	FILL corner, marked	FILL corner, marked	FILL corner, marked	white — nothing corner, no mark
6–10	FILL corner, marked	white — 180° straight line, marked	white — 180° straight line	white — nothing corner, no mark	white — 180° straight line, marked
11–15	FILL corner, marked	FILL corner, marked	FILL corner, marked	white — 180° straight line	white — nothing corner, no mark
16–20	white — 180° straight line, marked	white — nothing corner, no mark	white — 180° straight line, marked	white — nothing corner, no mark	FILL corner, marked
21–25	FILL corner, marked	FILL corner, marked	FILL corner, marked	FILL corner, marked	white — nothing corner, no mark

Where the two half-answers break. Squares 5, 9, 15, 17, 19, 25 are lost by filling everything whose arcs make a corner: the corner is there and nothing says it is a right angle. Squares 7, 10, 16, 18 are lost by filling everything that carries a small square: the crossing really is square, and the two marked angles are not its two halves — they lie along one of the lines and add to 180°.

The unmarked crossings are 86° and 94°, and that is deliberate. No eye can see four degrees, so a student who answered those by looking was guessing — and would have guessed the same way whichever answer was right.