

MYSTERY PICTURE

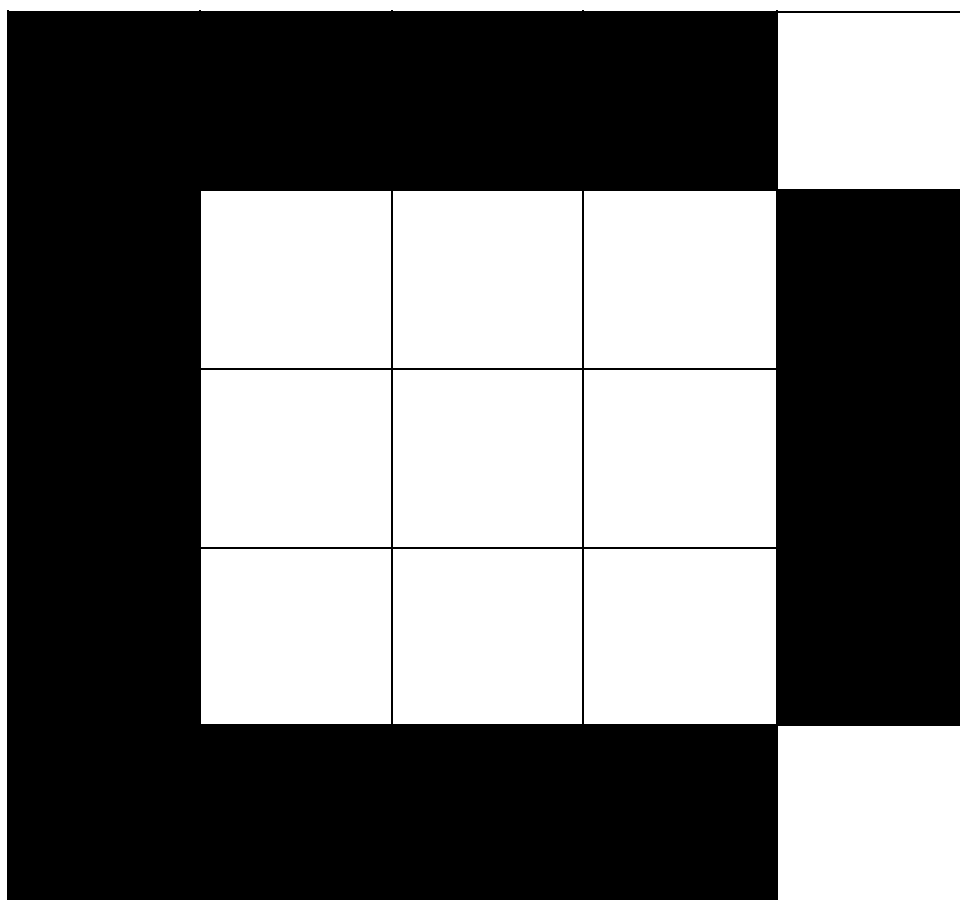


CONSTRUCTING A PARALLEL LINE

Parallel Through a Point: Do the Marks Prove It?

25 strangers' angle copies · looking parallel proves nothing · a wrong square breaks the picture

FREE



1. **Hand out page 3**, one per student, and a compass each. Nothing is measured and no protractor is needed. That is the whole preparation.
2. **Say this once:** *“A line that looks parallel proves nothing. The marks must copy the angle at k up to P. Use the same compass opening at k and at P. Copy the gap between the sides. The copy must also open the same way, on the same side of the slanted line.”*
3. **Fill a square with slanted lines if its marks prove the line through P is parallel to k. Leave it white if they do not.** A picture appears. Fourteen of the 25 are filled.

Student sheet	page 3, one per student. The compass-opening box is printed on it.
Answers	page 4 — the finished picture and the reason for every square.

Each square is someone's finished attempt to draw a line through P parallel to k. Every attempt copies the angle that a slanted line makes with k, up at P, in the same position (the corresponding angle). The eleven white squares show the usual mistakes. The angle is copied exactly, but on the wrong side of the slanted line (three). The arc at P has a different opening from the arc at k (two). The gap between the sides is not copied (one). There are arcs at both places, but no gap is copied, so the line is drawn by eye (three). There are no arcs at all (two).

Five white squares are drawn exactly parallel. They are white because their marks prove nothing, not because they look wrong. A drawing can show that two lines meet, but no drawing can show that they never meet. Guessing does not work: every simple guessing rule, such as filling every square whose line looks parallel, gets at least five squares wrong. When two compass openings decide a square, they differ by at least 4 mm, so a compass set to one arc clearly misses the other.

The side of the slanted line matters. The copy must be on the same side of the slanted line as the angle at k, and it must open the same way. A student who checks everything else but not the side gets four squares wrong. A student who fills every square that has arcs and a line that looks parallel gets three wrong.



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

Do the marks prove it parallel?

Name _____

Period _____

Date _____

Each square shows an attempt at the line through P parallel to k . A slanted line crosses k through P , and the angle it makes with k has been copied up to P , with every arc left on. The one dot is P . Do the marks prove the new line is parallel to k ? If yes, fill the square with slanted lines. If no, leave it white. The copy must open the same way, matching the angle on the same side. A line that only looks parallel is white. Compare arcs with your compass. Nothing is measured. **When you finish, look at the picture. If it does not look right, check a square again.**

This lesson has no new rule. This is the only sheet in the unit with no opening rule of its own. Whichever method you use, follow that method's own rule. If you copy an angle, use one opening at both vertices, then carry the chord. If you use two perpendiculars, follow last lesson's rules.

Last lesson: on the line, the pair must be larger than the first arc. If they are equal, that is the failure. Off the line, the first arc must reach the line twice. The pair can be any size. If it equals the first arc, the construction still works.

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

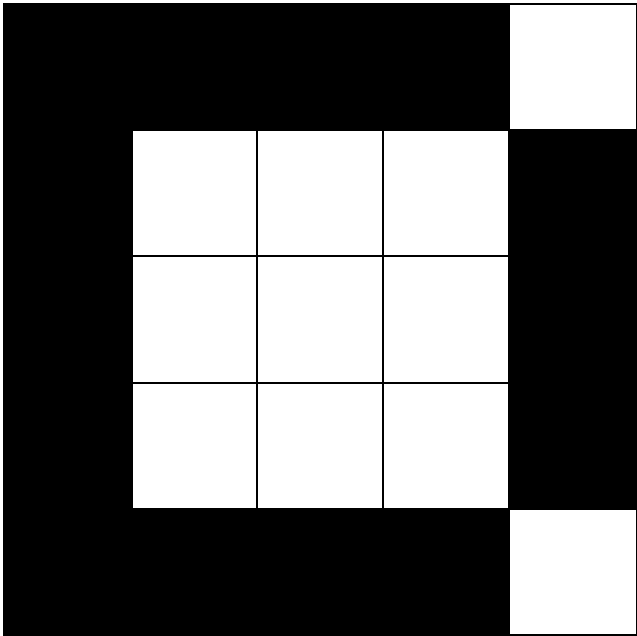


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Mystery Picture — answers

For the teacher

The finished sheet is **the letter D — a straight left side, a bar across the top and bottom, and a curve down the right**. The table reads left to right, the way the sheet is read; the squares are numbered on the student's sheet.



1–5	FILL angle copied correctly	FILL angle copied correctly	FILL angle copied correctly	FILL angle copied correctly	white copied on the wrong side
6–10	FILL angle copied correctly	white arc at P has another opening	white gap between sides not copied	white no gap copied, line by eye	FILL angle copied correctly
11–15	FILL angle copied correctly	white no arcs, line drawn by eye	white copied on the wrong side	white arc at P has another opening	FILL angle copied correctly
16–20	FILL angle copied correctly	white no gap copied, line by eye	white no arcs, line drawn by eye	white copied on the wrong side	FILL angle copied correctly
21–25	FILL angle copied correctly	FILL angle copied correctly	FILL angle copied correctly	FILL angle copied correctly	white no gap copied, line by eye

Two common half-right ideas, and the squares they get wrong. A student who checks the compass openings and the crossing of arcs, but never which side of the slanted line the copy is on, gets squares 5, 8, 13 and 19 wrong. A student who fills every square that has arcs and a line that looks parallel gets squares 9, 17 and 25 wrong.

No square depends on sharp eyes. Two arcs either have the same compass opening or differ by at least 4 mm. A crossing of two arcs is either on a line or at least 2.5 mm away from it.