

MYSTERY PICTURE

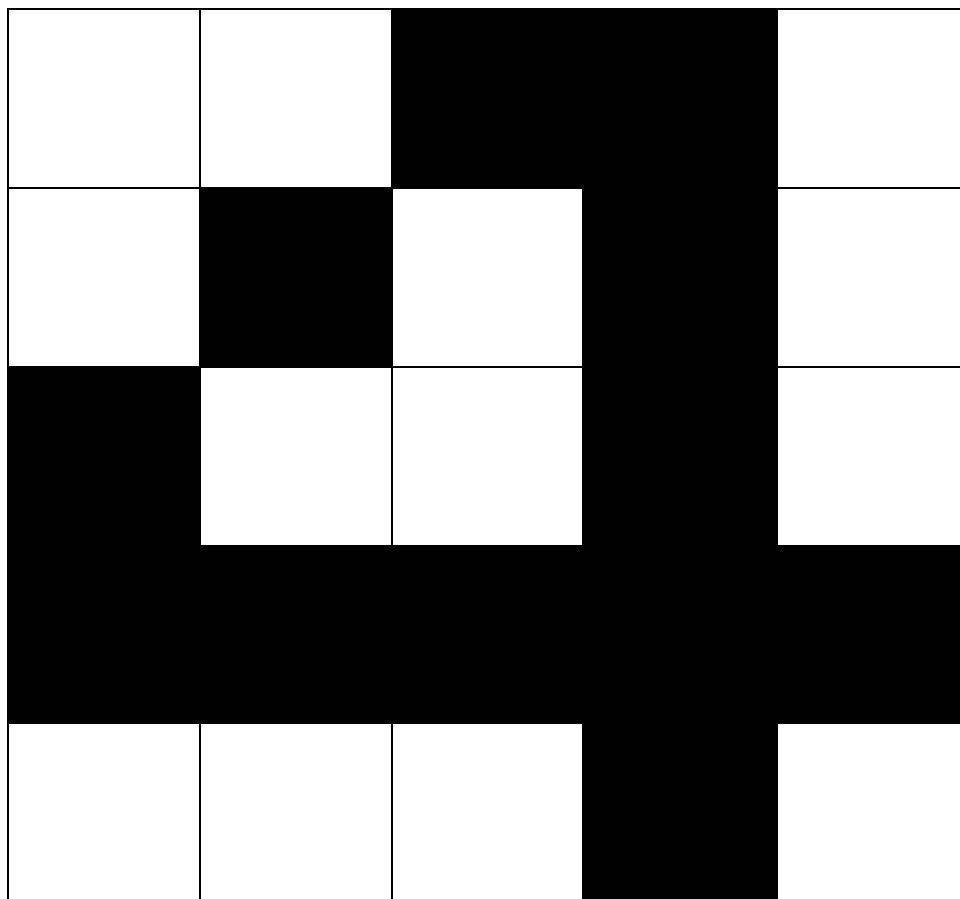


INTRO TO CONSTRUCTIONS: TOOLS AND RULES

Compass & Straightedge: Could the Six Moves Make This Page?

25 strangers' pages · no numbers · a wrong square breaks the picture

FREE



25 squares · 1 student sheet · answer key · 4 pages

Geometry · Grades 8–10 · chooseyourlesson.com

1. **Hand out page 3**, one per student, and a compass each. That is the whole preparation.
2. **Say this once:** *“Every line needs two dots on it. Every circle needs a dot at its center. Its opening has to come from two dots. A dot can go anywhere.”*
3. **Fill a square with slanted lines if every mark in it could have been made by the six moves. Leave it white if one mark could not.** A picture appears. Twelve of the 25 are filled.

Student sheet page 3, one per student. The six moves are printed on it as pictures.

Answers page 4 — the finished picture and the reason for every square.

Each square is a stranger's finished page, and the student judges it. The marks are left on, so the student can check every one. The thirteen white squares carry one impossible mark each, in five ways: a line through only one dot (three), a line through no dot (two), a circle with nothing marked at its center (three), a circle whose center is marked but whose opening came from no two dots (two), and a line through one dot and a crossing nobody marked (three). The twelve filled squares are all correct. Students need those too. Otherwise they learn that the answer is always “wrong”.

The compass has two jobs, and two squares turn on the second. They show a circle centered at a dot that passes through no dot at all. It is legal by move 4: its opening is the distance between the other two dots. The student checks it with the compass: set it on the two dots, move it to the center, and see whether it follows the circle. A student who thinks the compass only draws circles leaves those white, and the figure 4 comes out with two holes. A student who thinks any opening will do fills the two squares whose opening came from no two dots. Nothing is measured. The compass only compares two distances.

One square has only dots in it, and it is filled. Move 1 says a point may be put down anywhere. Many students find it hard to believe that a free choice is allowed in a construction.

Guessing does not work. Every simple guessing rule, such as filling every square that has a circle, gets at least ten squares wrong. The picture then has holes that a student can see from their own desk.



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

Could the six moves have made every mark?

Name _____

Period _____

Date _____

Each square is a tiny finished page. Every point that was marked has a dot. Could every mark be made by the six moves? If yes, fill the square with slanted lines. If no, leave it white. If a circle goes through no dot, its size must be copied from two other dots. Check it: put your compass on those two dots, then on the circle. Same size? Then it is allowed. You do not measure anything. **When you finish, look at the picture. If it does not look right, check a square again.**

 Move 1 <i>mark a point anywhere</i> Move 2 <i>line through two marked points</i> Move 3 <i>circle: marked center, through a marked point</i> Move 4 <i>circle: marked center, size copied from two marked points</i> Move 5 <i>mark where two drawn lines or arcs cross</i> Move 6 <i>mark a point on a drawn line or arc</i>				
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

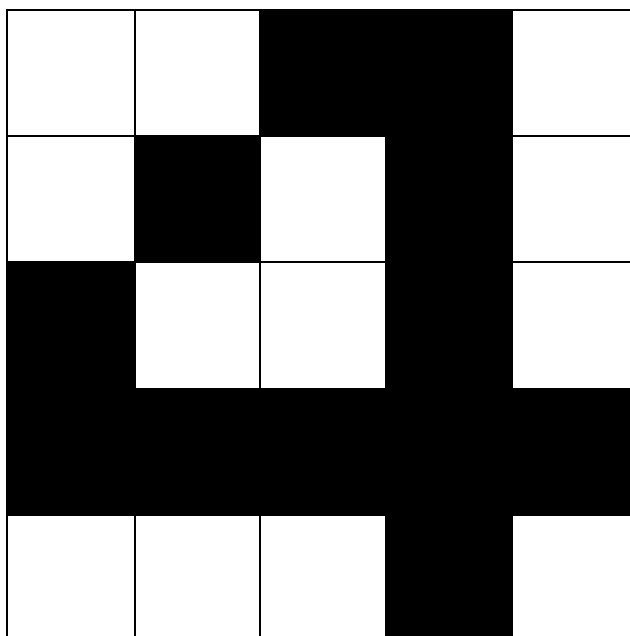


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Mystery Picture — answers

For the teacher

The finished sheet is **the figure 4 — the slanting stroke down the left, the bar across the fourth row, and the upright on the right running from the top row to 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	white the line has one dot	white the line has no dot	FILL line through two dots (move 2)	FILL dot at center, through a dot (3)	white no dot at the center
6–10	white opening from no two dots	FILL no dot on it; opening carried from two dots (4)	white line through one dot and an unmarked crossing	FILL two legal circles, dot at the crossing (3, 5)	white the line has one dot
11–15	FILL line and arc, both legal (2, 3)	white the line has no dot	white no dot at the center	FILL dot put on a legal circle (3, 6)	white opening from no two dots
16–20	FILL dots only (move 1)	FILL line through two dots (move 2)	FILL dot at center, through a dot (3)	FILL no dot on it; opening carried from two dots (4)	FILL two legal circles, dot at the crossing (3, 5)
21–25	white line through one dot and an unmarked crossing	white the line has one dot	white no dot at the center	FILL line and arc, both legal (2, 3)	white line through one dot and an unmarked crossing

Two common half-right ideas, and the squares they get wrong. A student who thinks “a circle must pass through a dot (the compass only draws circles)” gets squares 7 and 19 wrong. A student who thinks “a circle needs only a dot at its center (any opening will do)” gets squares 6 and 15 wrong. **No square depends on sharp eyes.** A dot is either on a line or at least 2.5 mm away from it. An opening either equals the distance between two dots or differs from every such distance by 3 mm.