

MYSTERY PICTURE

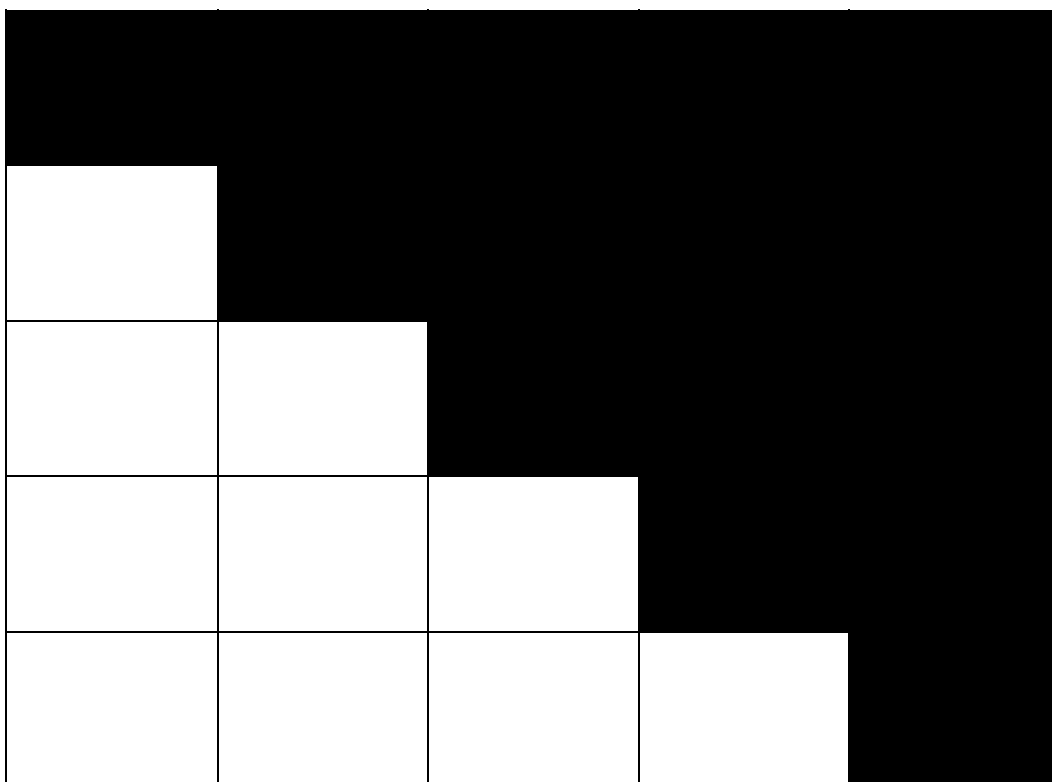


DISTANCE FROM A POINT TO A LINE

Distance from a Point to a Line

No numbers · 25–35 minutes · wrong answers show in the picture

FREE



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

Geometry · Grades 8–10 · chooseyourlesson.com

1. **Hand out page 3.** That is the whole preparation. Do not use a ruler or a protractor. There is not a number on the sheet.
2. **Say this once:** *“It is the distance only if it does all three: starts at the point, stops on the line, and carries the right-angle mark. Two out of three is not enough.”*
3. **Fill the square if the drawn segment is the distance. Leave it white if it is not.** A picture appears. Fifteen of the 25 squares are filled.

Student sheet page 3, one per student. It carries the four cases as four small pictures across the top.

Answers page 4 — the finished picture, and which part of the definition every white square breaks.

“Look for the little square” does not walk this sheet, and that is the whole design. Three of the white squares carry a right-angle mark and are still not the distance: the stroke crosses the line square and *keeps going*, so it is not a segment from the point to the line. Another three point straight at the line and stop before they reach it. The two together are six of the ten white squares, and they show one common mistake: the segment is square to the line but the wrong length. Students make it even in work that is otherwise correct, and ordinary marking often misses it, because it looks at the direction and not at the ends.

The other four white squares are the commonest error in the lesson — the stroke that was drawn is the one the student measures. It joins the point to the line and it is not square to it, and nothing on the drawing says it is. That is not carelessness: it is a coherent belief that “the distance” means “the length of the connection I can see”.

Ask one question at every desk, and it is the same question. *“Where does it start and where does it stop?”* A student who cannot answer that about the stroke in front of them has not looked at the ends at all.

The picture is the marking, so you collect nothing to know who has it. One square wrong and the shape has a bite out of it, and the student sees that from their own desk before you do. The sheet tells them so, and tells them what to do about it.

Why the sheet says slanted lines and not “color it in”. Fifteen 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 student can check a square 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

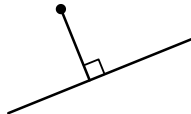
Where does it start, and where does it stop?

Name _____

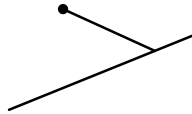
Period _____

Date _____

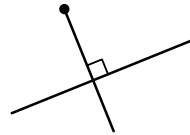
Every square shows a point, a line, and one segment drawn from the point. Is that segment the distance from the point to the line? Yes: fill the square with slanted lines. No: leave it white. It is the distance only if it stops *on* the line *and* carries the right-angle mark. A picture appears. If it does not look right, check the squares again.



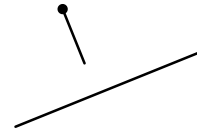
The distance
stops on the line, marked square



Not the distance
nothing says it is square



Not the distance
runs on past the line



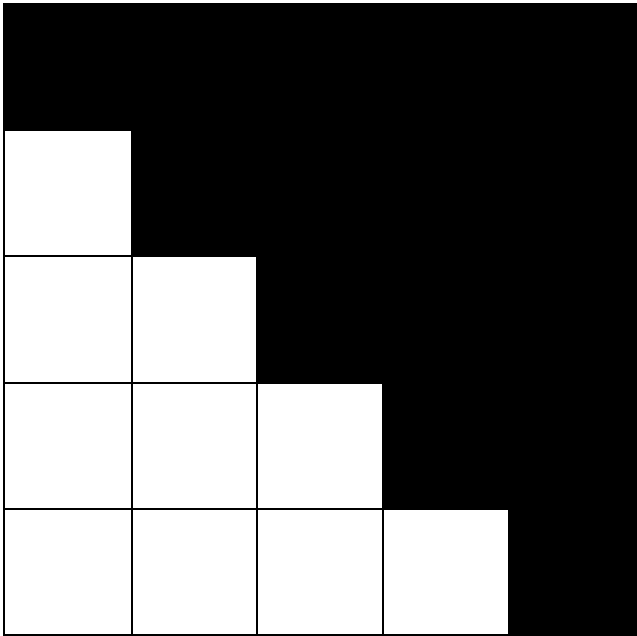
Not the distance
stops before the line

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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What appears is a solid right triangle with its right angle at the top right. The finished sheet is below, and then what every square is. The table reads left to right, the way the sheet is read; the squares are numbered on the student's sheet.



1–5	<i>FILL — the distance</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>
6–10	<i>white — no right-angle mark</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>
11–15	<i>white — runs past the line</i>	<i>white — stops short</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>
16–20	<i>white — no right-angle mark</i>	<i>white — runs past the line</i>	<i>white — stops short</i>	<i>FILL — the distance</i>	<i>FILL — the distance</i>
21–25	<i>white — no right-angle mark</i>	<i>white — runs past the line</i>	<i>white — stops short</i>	<i>white — no right-angle mark</i>	<i>FILL — the distance</i>

Every white square breaks one clause of the definition, and it is worth naming which. On four of them the stroke does both the easy things — it starts at the point and it stops on the line — and nothing says it is perpendicular: *nothing marks it square to the line*. On three the stroke is square to the line and the mark says so, and then *runs on past the line* — a perpendicular that does not stop at the line is not a segment from the point to the line, so it has no length worth the name. On three it never gets there at all.

The check a student can run with nobody around. The distance is the *shortest* segment from the point to the line. If they can draw a shorter one than the one they called the distance, theirs is wrong. That refutes a wrong answer without a key, and it is the strongest thing this lesson owns.