

MYSTERY PICTURE

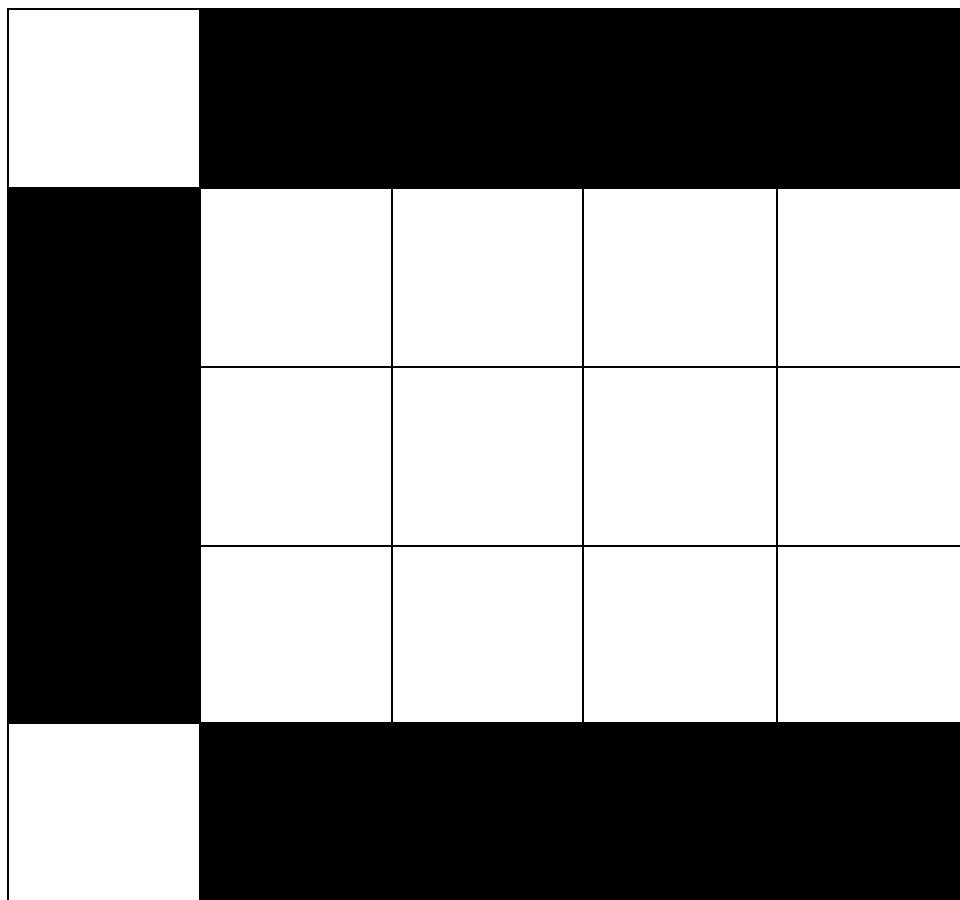


PROVING LINES PARALLEL

Proving Lines Parallel

Do the marks force it? · wrong answers show in the picture

FREE



1. **Hand out page 3.** That is the whole preparation.
2. **Say this once:** *“Nothing on this sheet is marked parallel. You are deciding whether it has to be. Sometimes the marks cannot tell you.”*
3. **Fill the square if the marks force the two lines to be parallel. Leave it white if they do not.** A picture appears. 11 of the 25 squares are filled.

Student sheet	page 3, one per student. It carries the five positions as pictures.
Answers	page 4 — the finished picture and the verdict on every square.

A white square is one of two different things, and the sheet says so. On seven of them the marks are in a named position and do not do what that name asks. For example, corresponding angles are not equal, or same-side interior angles do not add to 180° . So the lines are *not* parallel. On the other seven nothing can be told at all: both marks are at one crossing, or two squares carry a single angle with nothing to compare it to. Both kinds are white, because the sheet asks *must these lines be parallel?* and the answer is no in both cases. The answer page says which kind each white square is. It is worth two minutes at the end.

The most common mistake is in the second group, and this lesson exists to stop it. Two angles at one crossing are equal (a vertical pair) or add to 180° (a linear pair) on *any* two lines at all. They look just like the marks that prove lines parallel, but they prove nothing. A student who fills those squares gets a picture that does not come out right.

The picture does the marking, so you collect nothing. If one square is wrong, part of the shape is missing or does not fit, and the student sees it from their own desk. The student sheet says so, and says what to do.

Why the sheet says slanted lines and not “color it in”. 11 squares of pencil shading come out pale gray, and pale gray does not survive a school copier. Slanted lines do, they are faster, and the drawing stays readable underneath, so a student can check a square again.

Do not let them measure, and say so if you see a protractor. Every drawing is to scale. Where two lines are not parallel, they are between 11° and 12° apart, and nobody can see that on a square this small. A square that cannot be told either way is drawn parallel about half the time. The two numbers are the only evidence.



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.
chooseyourlesson.com — 135 free geometry lessons.

Mystery Picture

The marks decide, not the drawing. Do not measure.

Name _____

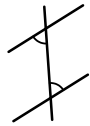
Period _____

Date _____

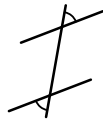
Do the marks force the two lines to be parallel? Yes: fill the square with slanted lines. No: leave it white. “No” means not parallel, or no way to tell. A picture appears. If it does not look right, one square is wrong.



Corresponding
equal $\rightarrow$ parallel



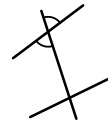
Alternate interior
equal $\rightarrow$ parallel



Alternate exterior
equal $\rightarrow$ parallel



Same-side interior
add to $180^\circ \rightarrow$ parallel



Both at one crossing
proves nothing

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

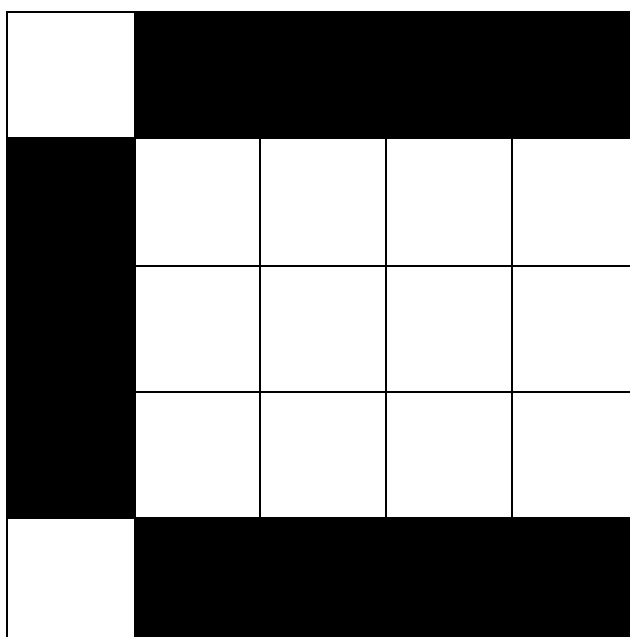


135 free geometry lessons — worksheets, worked answers and lesson plans.
chooseyourlesson.com

Mystery Picture — answers

For the teacher

The finished sheet, and the verdict on every square. The table reads left to right, the way the sheet is read; the squares are numbered on the student's sheet.



1–5	corresponding 79°, 91° <i>white — not parallel</i>	corresponding 71°, 71° <i>FILL — must be parallel</i>	alternate interior 65°, 65° <i>FILL — must be parallel</i>	alternate exterior 107°, 107° <i>FILL — must be parallel</i>	same-side interior 112°, 68° <i>FILL — must be parallel</i>
6–10	corresponding 63°, 63° <i>FILL — must be parallel</i>	vertical pair — one crossing <i>white — no way to tell</i>	same-side interior 76°, 116° <i>white — not parallel</i>	linear pair — one crossing <i>white — no way to tell</i>	alternate interior 64°, 75° <i>white — not parallel</i>
11–15	alternate interior 112°, 112° <i>FILL — must be parallel</i>	vertical pair — one crossing <i>white — no way to tell</i>	alternate exterior 104°, 115° <i>white — not parallel</i>	one angle only <i>white — no way to tell</i>	same-side interior 104°, 65° <i>white — not parallel</i>
16–20	alternate exterior 128°, 128° <i>FILL — must be parallel</i>	linear pair — one crossing <i>white — no way to tell</i>	alternate exterior 125°, 113° <i>white — not parallel</i>	vertical pair — one crossing <i>white — no way to tell</i>	corresponding 58°, 69° <i>white — not parallel</i>
21–25	one angle only <i>white — no way to tell</i>	same-side interior 77°, 103° <i>FILL — must be parallel</i>	corresponding 61°, 61° <i>FILL — must be parallel</i>	corresponding 46°, 46° <i>FILL — must be parallel</i>	corresponding 87°, 87° <i>FILL — must be parallel</i>

Every white square is worth a sentence, and they are not all the same sentence. Where the pair is in a named position and the numbers do not match it, the lines are *not* parallel. That is a real conclusion: if the lines were parallel, the pair would have to match. Where both marks are at one crossing, or only one angle is measured, nothing follows either way. The answer there is *not enough information*, and it is a real answer.