

MYSTERY PICTURE

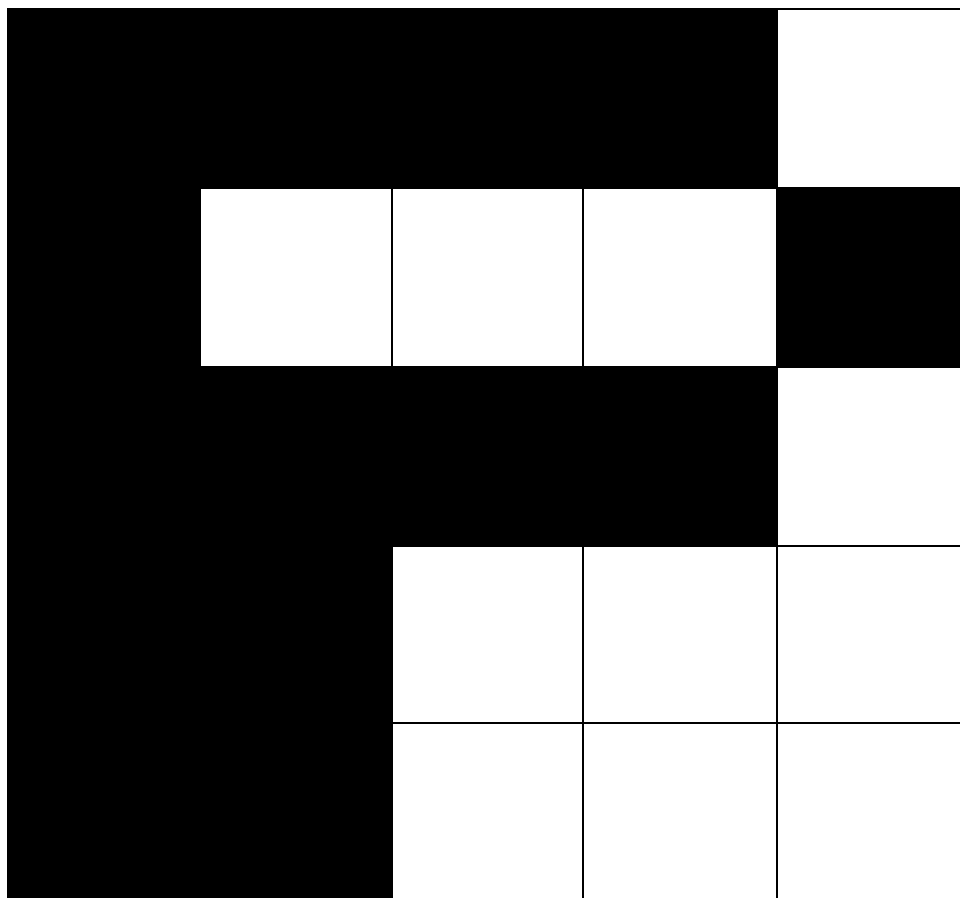


COMPOSITIONS OF RIGID MOTIONS

Compositions: Even or Odd Reflections?

25 triangles and their copies · go around the corners · no arithmetic ·
wrong answers show in the picture

FREE



Mystery Picture — how to run it

20–30 minutes

1. **Hand out page 3**, one per student. Pencils. Nothing else.
2. **Say this once:** *“Go around each triangle: the dot, then the circle, then the diamond. Do both triangles go the same way around? If yes, fill the square with slanted lines. If no, leave it white.”*
3. **When they finish, they look at the picture.** If part of it is missing, or one square does not fit, they check that square again.

Student sheet	page 3, one per student. Two small pictures at the top show a triangle marked counterclockwise and one marked clockwise.
Answers	page 4 — the finished picture and the reason for every square.

The question in every square is which way around the corners go. Each corner is marked: a dot, a circle, a diamond, and the same marks on the copy. Translations and rotations keep the way around. A reflection reverses it. So if the copy goes the same way around, the motions that carry the triangle onto it have no reflection, or two. If it goes the opposite way, they have one reflection, or three. The student decides only that. The student does not have to find the motions.

Fourteen squares are filled and eleven are white, and the finished picture is the letter P. The copies are turned through many angles, not only quarter turns, and stand on either side. Every filled copy is turned. The first triangle goes counterclockwise in some squares and clockwise in others. So a student must check both triangles in every square.

Guessing does not work. Every simple guessing rule, such as filling every square where the copy is on the right, gets at least eleven squares wrong. The picture then has holes that a student can see.



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

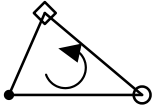
Even or odd reflections?

Name _____

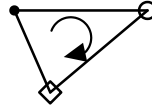
Period _____

Date _____

In each square, rigid motions carry one triangle onto the other. Go around each triangle: the dot, then the circle, then the diamond. Do both go the same way around? If yes, fill the square with slanted lines. If no, leave it white. You do not need to find the motions. When you finish, look at the picture. If part of it is missing, or one square does not fit, check that square again.



dot → circle → diamond: counterclockwise



dot → circle → diamond: clockwise

Same way around: no reflection, or two.
Fill.
Opposite ways around: one reflection.
Leave white.

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

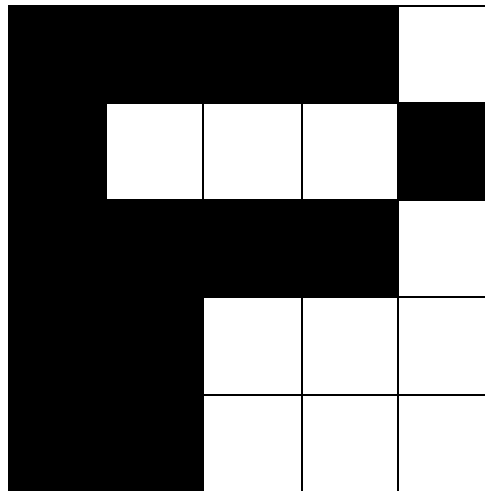


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Mystery Picture — answers

For the teacher

The finished picture is **the letter P**. The table reads left to right, the same way as the sheet. Go around each triangle from the dot to the circle to the diamond.



1–5	FILL. Both triangles go clockwise, so the copy is only turned.	FILL. Both triangles go counterclockwise, so the copy is only turned.	FILL. Both triangles go counterclockwise, so the copy is only turned.	FILL. Both triangles go clockwise, so the copy is only turned.	White. The first goes clockwise and the copy goes counterclockwise, so the copy is turned over.
6–10	FILL. Both triangles go counterclockwise, so the copy is only turned.	White. The first goes counterclockwise and the copy goes clockwise, so the copy is turned over.	White. The first goes clockwise and the copy goes counterclockwise, so the copy is turned over.	White. The first goes counterclockwise and the copy goes clockwise, so the copy is turned over.	FILL. Both triangles go clockwise, so the copy is only turned.
11–15	FILL. Both triangles go counterclockwise, so the copy is only turned.	FILL. Both triangles go counterclockwise, so the copy is only turned.	FILL. Both triangles go counterclockwise, so the copy is only turned.	FILL. Both triangles go clockwise, so the copy is only turned.	White. The first goes counterclockwise and the copy goes clockwise, so the copy is turned over.
16–20	FILL. Both triangles go clockwise, so the copy is only turned.	FILL. Both triangles go counterclockwise, so the copy is only turned.	White. The first goes clockwise and the copy goes counterclockwise, so the copy is turned over.	White. The first goes counterclockwise and the copy goes clockwise, so the copy is turned over.	White. The first goes counterclockwise and the copy goes clockwise, so the copy is turned over.
21–25	FILL. Both triangles go counterclockwise, so the copy is only turned.	FILL. Both triangles go clockwise, so the copy is only turned.	White. The first goes clockwise and the copy goes counterclockwise, so the copy is turned over.	White. The first goes clockwise and the copy goes counterclockwise, so the copy is turned over.	White. The first goes clockwise and the copy goes counterclockwise, so the copy is turned over.

For marking: a translation or a rotation keeps the way around, and a reflection reverses it. So motions with an even number of reflections (none or two) keep it. Motions with an odd number reverse it.