LESSON MAKER PRO

# Angle Moves Match

*Track angle measure through transformations.*

**GRADE 8 · NY-8.G.1.b**

**NY-8.G.1.b** "Verify experimentally angles are mapped to angles of the same measure."

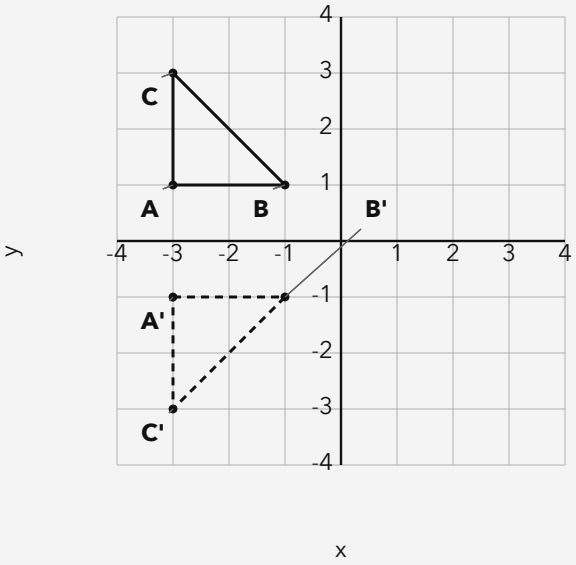
NAME _____ DATE _____

## SAME-SIZE ANGLES

A rotation, reflection, or translation can change an angle's location or direction, but not its measure. To verify this, match each original vertex to its image vertex and compare the two angle measures.

### WORKED EXAMPLE

The solid triangle is reflected across the x-axis to make the dashed triangle. Verify whether angle A and angle A' have the same measure.




1. At A, one side is horizontal and one side is vertical.
2. Perpendicular sides make m angle A = 90°.
3. At A', the matching sides are also horizontal and vertical.
4. m angle A = m angle A' = 90°, so the reflection preserved the angle measure.

**Answer: m angle A = m angle A' = 90°.**

## PRACTICE 4 problems

**1** A rotation maps angle R to angle R'. If m angle R = 47°, find m angle R'.

**ANSWER** _____

**2** A reflection maps angle S to angle S'. If m angle S = 118°, find m angle S'.

**ANSWER** _____

**3** A translation maps angle D to angle D'. If m angle D' = 63°, find m angle D.

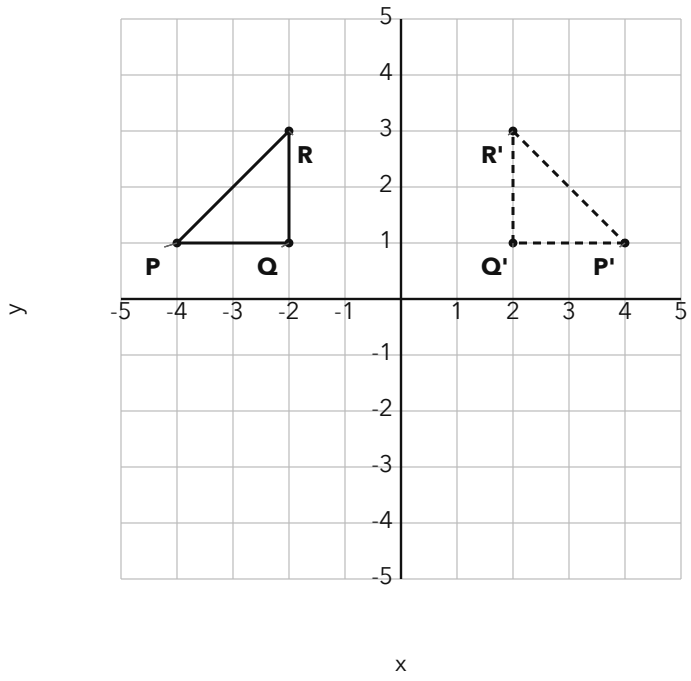
**ANSWER** _____

**4** A student says a reflection changes an 82° angle into a 98° angle. Is the student correct? Explain.

**ANSWER** _____

## APPLY IT Show your work

**1** The esports club reflects the solid badge design across the y-axis to make the dashed design. Use the grid. Find m angle P and m angle P'. What does this verify?




**ANSWER** _____

**2** A student animator rotates a 135° robot-arm corner, then translates it to a new spot on the screen. What is the corner's final angle measure?

WORK SPACE

**ANSWER** _____

**3** Run an angle experiment. Your teacher supplies drawing paper, tracing paper, a ruler and a protractor. On the drawing paper construct angle AOB measuring 67°. Measure it and record your actual reading. Trace O and both rays onto tracing paper. Keep O fixed and rotate the tracing paper one quarter-turn counterclockwise; transfer the two image rays to the drawing paper and label them OA′ and OB′. Measure angle A′OB′ with the same protractor. Record both readings and their difference, attach the original and rotated tracing, and explain what the observed comparison shows.

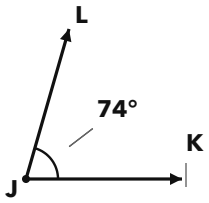
**ACTUAL ANGLE MEASUREMENTS**

| Angle | Measured degrees |
|---|---|
| AOB | |
| A′OB′ | |
| Absolute difference | |

**ANSWER** _____

## CHALLENGE One step up

A dance-team logo uses angle KJL shown. The logo is rotated, reflected, and translated. Maya says the final image is 106° because a flip changes angle size. Is Maya correct? State the final measure and explain.




WORK SPACE AND ANSWER

**ANSWER KEY**

# Angle Moves Match

**GRADE 8 · NY-8.G.1.b**

## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | A rotation maps angle R to angle R'. If m angle R = 47°, find m angle R'. | **47°** |
| 2 | A reflection maps angle S to angle S'. If m angle S = 118°, find m angle S'. | **118°** |
| 3 | A translation maps angle D to angle D'. If m angle D' = 63°, find m angle D. | **63°** |
| 4 | A student says a reflection changes an 82° angle into a 98° angle. Is the student correct? Explain. | **No. A reflection preserves angle measure, so the image angle is 82°.** |

## PART 2 · APPLY IT

1. **m angle P = 45° and m angle P' = 45°. The reflection preserved the angle measure.** At P and P', the diagonal rises the same distance that it runs, making each angle 45°. The matching angles have equal measure.
2. **135°** Both a rotation and a translation preserve angle measure. The final corner remains 135°.
3. **Both angles measure about 67°; their difference is about 0° within reasonable construction and measurement tolerance. Rotation preserves angle measure.** Supply the listed tools before class. Check the actual original angle, traced quarter-turn about O and transferred image rays. Accept the learner's actual readings with a small stated measurement discrepancy; do not require invented exact values. Both rays move together, so the opening between them remains unchanged. A student who only quotes preservation without making and measuring the image has not completed this experiment.

## CHALLENGE

**No. The final angle measure is 74° because rotations, reflections, and translations preserve angle measure.**

Accept equivalent statements that matching angles have equal measure. For explanations, students must state that the transformation preserves angle measure. Apply 3 requires an actual traced transformation and before/after protractor readings. Accept reasonable instrument tolerance and a conclusion linked to the actual observations.