LESSON MAKER PRO

Moves That Match

Track lines and segment lengths through transformations.

GRADE 8 · 8.G.A.1a

CCSS.Math.Content.8.G.A.1a "Lines are taken to lines, and line segments to line segments of the same length."

NAME _____ DATE _____

WHAT STAYS THE SAME

In a translation, rotation, or reflection, a line stays a line. A segment stays a segment with the same length, so apply the transformation rule to both endpoints and then measure if needed.

WORKED EXAMPLE

Segment UV has endpoints U(41, -29) and V(48, -29). Translate the segment 17 units left and 23 units up. Find U', V', and the length of U'V'.

1. Use the rule (x, y) -> (x - 17, y + 23).
2. U(41, -29) -> U'(24, -6).
3. V(48, -29) -> V'(31, -6).
4. The horizontal length is 31 - 24 = 7.

Answer: U'(24, -6), V'(31, -6); U'V' = 7 units.

PRACTICE 6 problems

1 Segment AB has endpoints A(-9, 4) and B(-4, 4). Translate it 13 units right. Find A', B', and the length of A'B'.

ANSWER _____

2 Segment CD has endpoints C(1, -5) and D(1, 3). Reflect it across the x-axis. Find C', D', and the length of C'D'.

ANSWER _____

3 Segment EF has length 10 units. A 90-degree rotation maps it to segment E'F'. What is the length of E'F'?

ANSWER _____

4 Segment JK has endpoints J(-4, 8) and K(-4, 13). Reflect it across the y-axis. Find J', K', and the length of J'K'.

ANSWER _____

5 A rotation maps line g to figure g'. What type of figure must g' be?

ANSWER _____

6 A translation maps M(2, 3) to M'(12, 9). The same translation maps N(11, 3) to N'. Find N'.

ANSWER _____

APPLY IT Show your work

1 On a game map, a designer moves a laser barrier from P(-11, 4) to Q(-11, 18) by translating it 8 units right and 9 units down. What are the new endpoints and the barrier's length?

WORK SPACE

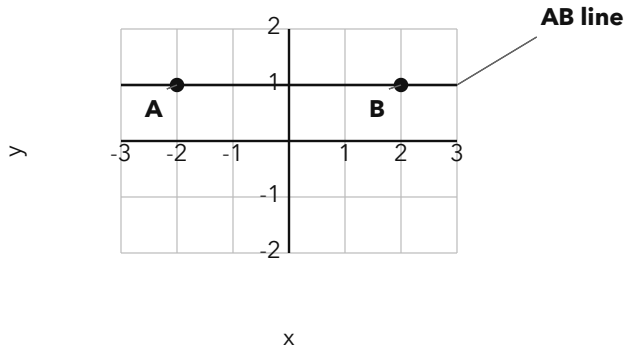
ANSWER _____

2 For a concert, a stage-light cable is represented on a design grid by segment MN from M(-15, 3) to N(-15, 12). The design is reflected across the y-axis. What are M', N', and the cable's length?

WORK SPACE

ANSWER _____

3 Test a reflection using the plotted A(-2,1) and B(2,1). Your teacher supplies tracing paper and a ruler. Draw segment AB and extend its supporting line. Trace them and the x-axis; fold the tracing on the x-axis and mark the reflected image on the grid. Label endpoints and extend the image line. Measure both segments in grid units. Record the original length, image length and difference, then describe whether each supporting figure is still a straight line. Use extra paper for your record.



ANSWER _____

CHALLENGE One step up

Segment AB has endpoints A(-3, 2) and B(5, 2). First translate the segment 4 units right and 10 units up. Then reflect the image across the y-axis. Find the final endpoints and final length. Explain why the length did not change.

WORK SPACE AND ANSWER

ANSWER KEY # Moves That Match

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Segment AB has endpoints A(-9, 4) and B(-4, 4). Translate it 13 units right. Find A', B', and the length of A'B'.	**A'(4, 4), B'(9, 4); A'B' = 5 units.**
2	Segment CD has endpoints C(1, -5) and D(1, 3). Reflect it across the x-axis. Find C', D', and the length of C'D'.	**C'(1, 5), D'(1, -3); C'D' = 8 units.**
3	Segment EF has length 10 units. A 90-degree rotation maps it to segment E'F'. What is the length of E'F'?	**10 units**
4	Segment JK has endpoints J(-4, 8) and K(-4, 13). Reflect it across the y-axis. Find J', K', and the length of J'K'.	**J'(4, 8), K'(4, 13); J'K' = 5 units.**
5	A rotation maps line g to figure g'. What type of figure must g' be?	**A line**
6	A translation maps M(2, 3) to M'(12, 9). The same translation maps N(11, 3) to N'. Find N'.	**N'(21, 9)**

PART 2 · APPLY IT

1. **P'(-3, -5), Q'(-3, 9); the barrier is 14 units long.** Add 8 to each x-coordinate and subtract 9 from each y-coordinate. The segment remains vertical, and its length is 9 - (-5) = 14 units.
2. **M'(15, 3), N'(15, 12); the cable is 9 units long.** A reflection across the y-axis changes each x-coordinate to its opposite. The vertical distance from 3 to 12 is 9 units, and reflection preserves that length.
3. **A'(-2,-1), B'(2,-1); AB = A'B' = 4 units; difference 0 units. Both supporting figures are straight lines.** Check the actual reflected tracing and ruler measurements, not only coordinate predictions. Reflection changes y to its opposite; segment length and straightness are preserved.

CHALLENGE

The translated endpoints are (1, 12) and (9, 12). After reflection, the final endpoints are A''(-1, 12) and B''(-9, 12), and A''B'' = 8 units. Translations and reflections send segments to segments of the same length.

Accept coordinates written in either endpoint order when the segment is clearly identified. Accept “units” or an omitted unit label for numerical lengths, and require the challenge explanation to state that both transformations preserve segment length. For Apply It 3 supply tracing paper/ruler and support folding on the x-axis. Inspect the actual original/image lines and measured records; accept reasonable measurement tolerance with lengths in grid units.

Apply It 3: original supporting line y=1 and reflected line y=-1; labeled segments each have length 4 units.

