LESSON MAKER PRO

Map the Match

Find the moves that make figures similar.

HIGH SCHOOL · GDA.GM.F

GDA.GM.F "Showing that two figures are similar involves finding a similarity transformation (dilation or composite of a dilation with a rigid motion) or, equivalently, a sequence of similarity transformations that maps one figure onto the other."

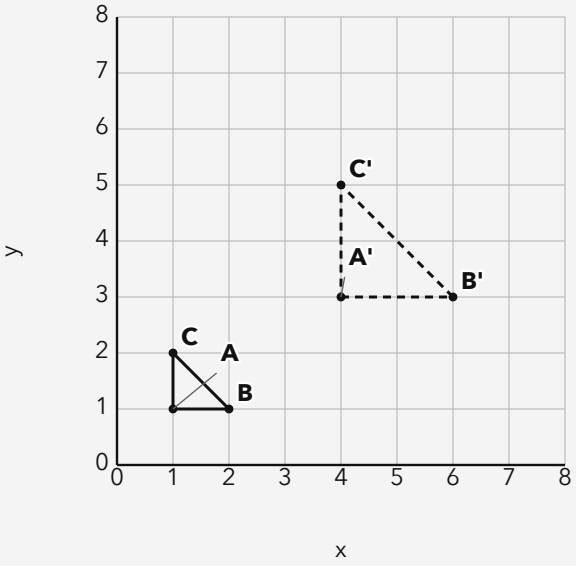
NAME _____ DATE _____

DILATION, THEN MOTION

A dilation changes every length by the same scale factor, k. A translation, rotation, or reflection can then move the resized figure onto its image without changing its size or shape.

WORKED EXAMPLE

What dilation about the origin, followed by a translation, maps the solid triangle onto the dashed triangle?



1. AB is 1 unit; A'B' is 2 units. So k = 2.
2. The dilation sends A(1,1) to (2,2).
3. Translate (2,2) right 2 and up 1 to reach A'(4,3).

Answer: Dilate by k = 2 about the origin, then translate right 2 and up 1.

PRACTICE 4 problems

1 Map A(4,4), B(6,4) to A'(15,13), B'(21,13). Find k for a dilation about the origin, then the translation.

ANSWER _____

2 Map A(6,6), B(10,6) to A'(13,12), B'(15,12). Find k for a dilation about the origin, then the translation.

ANSWER _____

3 Map A(-2,4), B(0,4) to A'(-12,19), B'(-4,19). Find k for a dilation about the origin, then the translation.

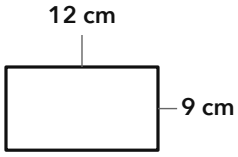
ANSWER _____

4 Map A(2,-4), B(6,-4) to A'(10,-9), B'(16,-9). Find k for a dilation about the origin, then the translation.

ANSWER _____

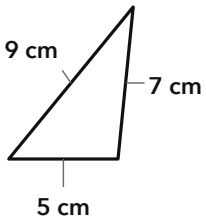
APPLY IT Show your work

1 A printer enlarges the sticker shown until its long side is 16 cm, then rotates it 90°. What are the scale factor and the final horizontal width?



ANSWER _____

2 A designer enlarges the skate-park logo shown until its shortest side is 15 cm, then reflects it. What are its other two side lengths?



ANSWER _____

CHALLENGE One step up

Map A(0,0), B(1,0), C(0,2) to A'(4,-1), B'(4,2), C'(-2,-1). Find a dilation about the origin, a 90° rotation about the origin, and a translation that work in that order. Explain how you checked.

WORK SPACE AND ANSWER

Map the Match

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Map A(4,4), B(6,4) to A'(15,13), B'(21,13). Find k for a dilation about the origin, then the translation.	**k = 3; translate right 3 and up 1.**
2	Map A(6,6), B(10,6) to A'(13,12), B'(15,12). Find k for a dilation about the origin, then the translation.	**k = 1/2; translate right 10 and up 9.**
3	Map A(-2,4), B(0,4) to A'(-12,19), B'(-4,19). Find k for a dilation about the origin, then the translation.	**k = 4; translate left 4 and up 3.**
4	Map A(2,-4), B(6,-4) to A'(10,-9), B'(16,-9). Find k for a dilation about the origin, then the translation.	**k = 3/2; translate right 7 and down 3.**

PART 2 · APPLY IT

1. **Scale factor 4/3; final horizontal width 12 cm.** The scale factor is 16/12 = 4/3. The original 9 cm side becomes 12 cm and runs horizontally after the rotation.
2. **21 cm and 27 cm.** The scale factor is 15/5 = 3. The other sides become 7 × 3 = 21 cm and 9 × 3 = 27 cm; reflection does not change their lengths.

CHALLENGE

Dilate by k = 3, rotate 90° counterclockwise, then translate right 4 and down 1. The dilation and rotation send A, B, C to (0,0), (0,3), and (-6,0); the translation sends these to A', B', and C'.

Accept translation vectors in place of directions. In the challenge, rotating before dilating is also valid because both transformations are centered at the origin.