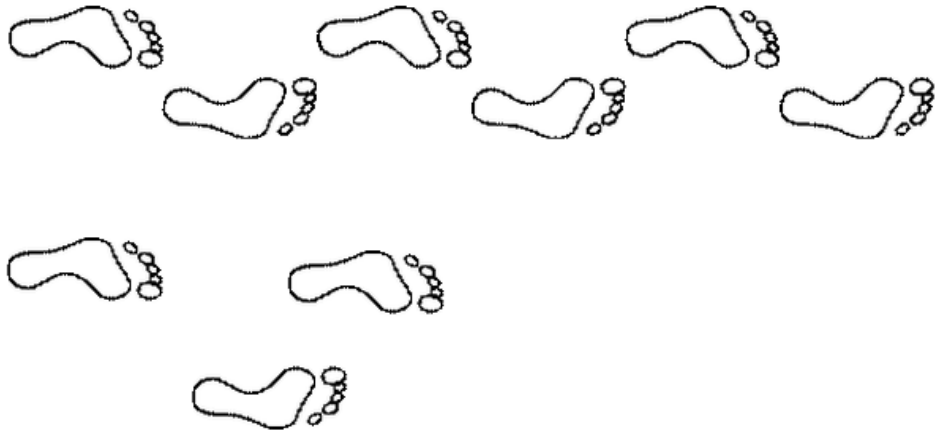
Geometry

Chapter 9

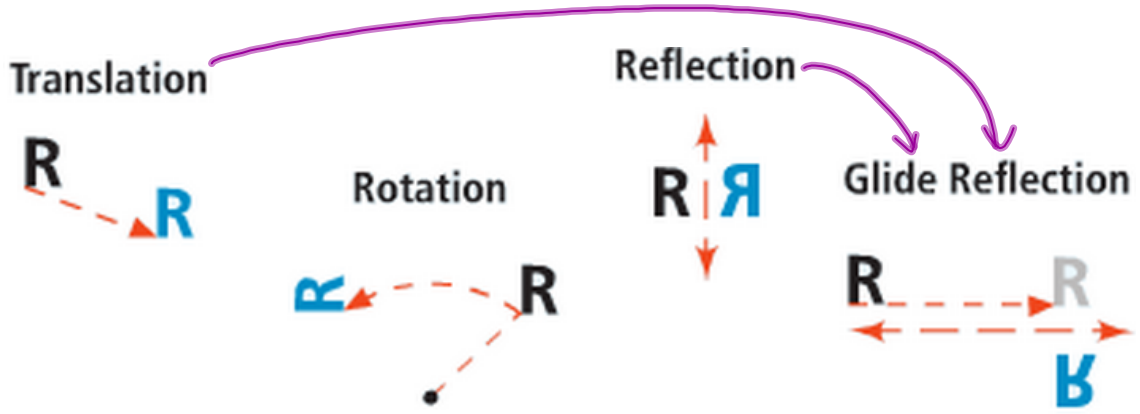
Section 9-4

Starting with the leftmost footprint, how could you make the following pattern of footprints using transformations?



Isometries

Isometry means same distance. Any transformation that preserves distance is an isometry. There are four types of isometries: translations, reflections, rotations, and glide reflections.



take note

Theorem 9-1

The composition of two or more isometries is an isometry.

When writing a composition, the transformations in the rule are performed from right to left.

Example:

of

$(T_{\langle 6, -3\rangle} \circ r_{(90)})(ABCD)$

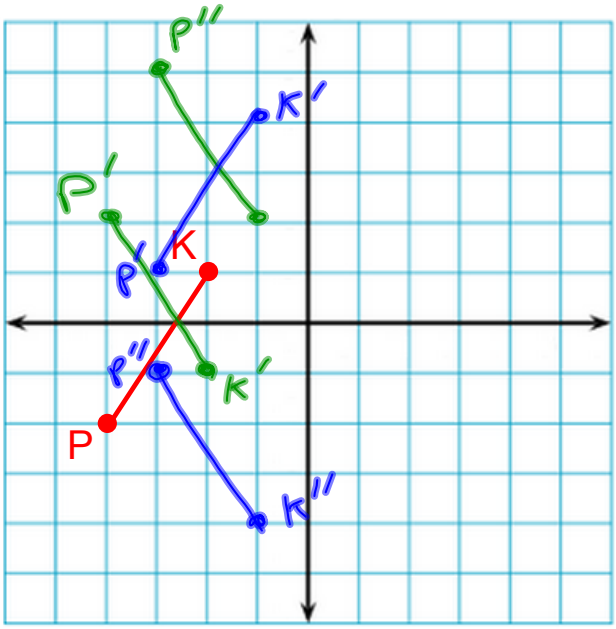
$ABCD \rightarrow A'B'C'D' \rightarrow A''B''C''D''$

Using a composition of rules

- Apply the rules from right to left

$(T_{<1,\ 3>} \circ R_{x\text{-axis}})(\overline{PK})$

$(R_{x\text{-axis}} \circ T_{<1,\ 3>})(\overline{PK})$

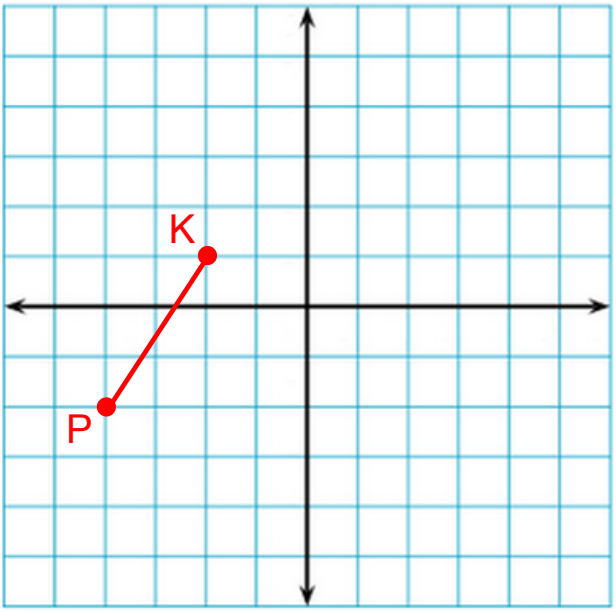


Using a composition of rules

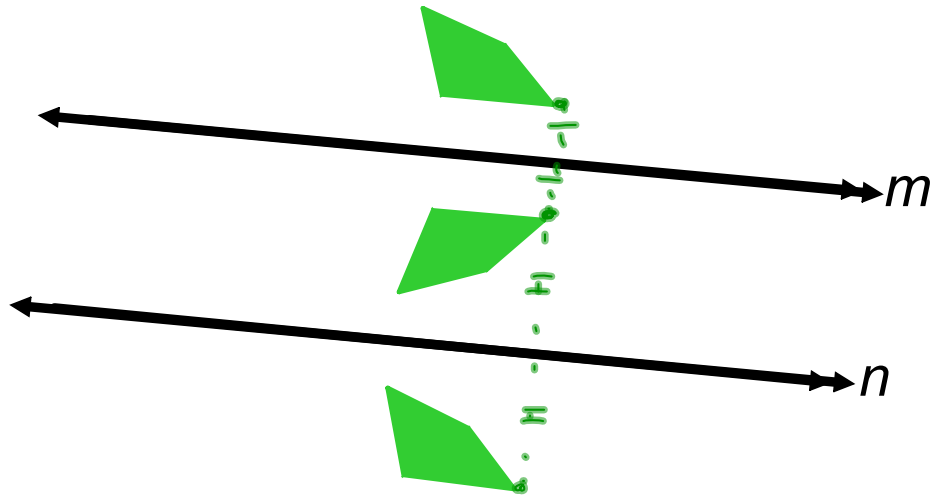
- Apply the rules from right to left

$(T_{<1,\ 3>} \circ R_{y\text{-axis}})(\overline{PK})$

$(R_{y\text{-axis}} \circ T_{<1,\ 3>})(\overline{PK})$



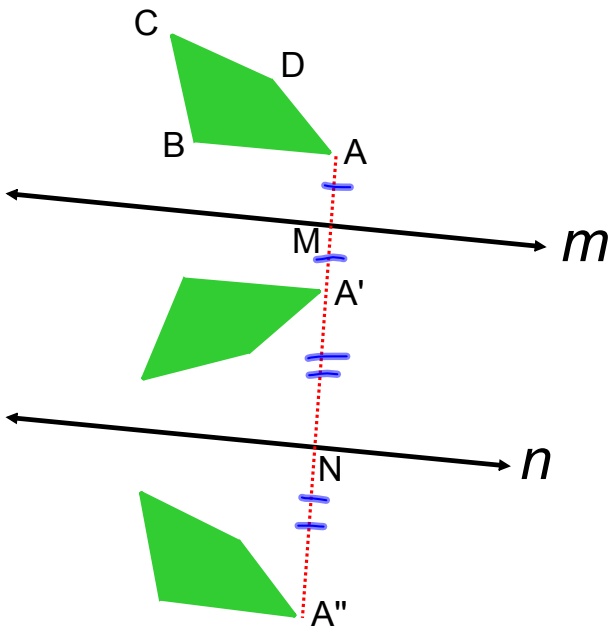
Reflect the object across line *m* and then line *n*



$(R_n \circ R_m)(A) = A''$

What do we know about the length from A to A"?

$AA'' = 2MN$



take note

Theorem 9-1

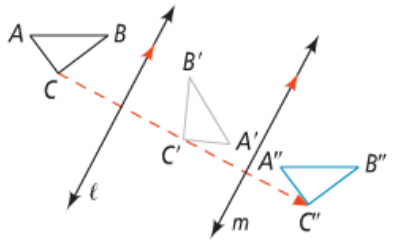
The composition of two or more isometries is an isometry.

take note

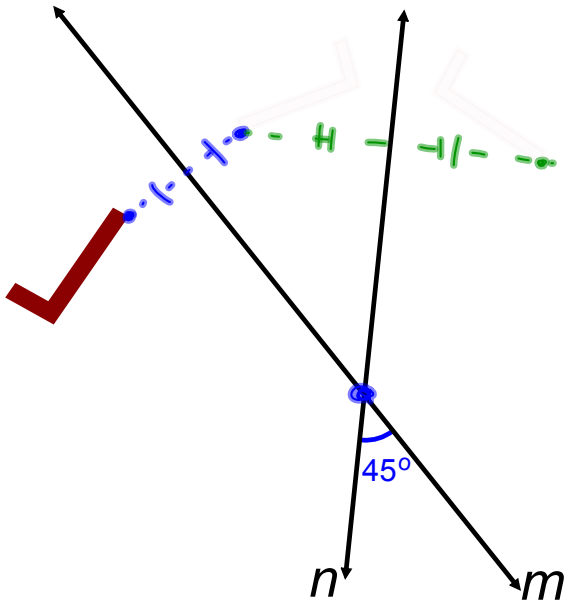
Theorem 9-2 Reflections Across Parallel Lines

A composition of reflections across two parallel lines is a translation.
You can write this composition as
$(R_m \circ R_\ell)(\triangle ABC) = \triangle A''B''C''$
or $R_m(R_\ell(\triangle ABC)) = \triangle A''B''C''$.

$\overline{AA''}$, $\overline{BB''}$, and $\overline{CC''}$ are all perpendicular to lines ℓ and m.



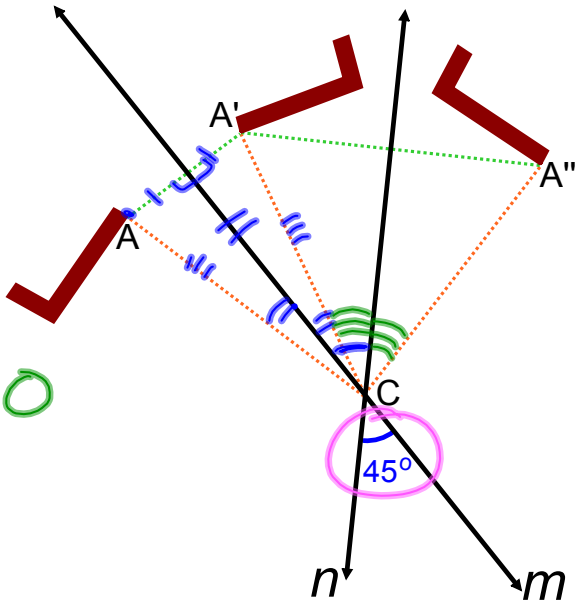
Reflect the object across line *m* and then line *n*



$(R_n \circ R_m)(A) = A''$

What do we know about $m\angle ACA''$?

$m\angle ACA'' = 90$



take note

Theorem 9-1

The composition of two or more isometries is an isometry.

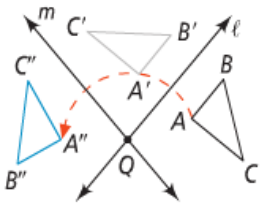
take note

Theorem 9-3 Reflections Across Intersecting Lines

A composition of reflections across two intersecting lines is a rotation.

You can write this composition as $(R_m \circ R_\ell)(\triangle ABC) = \triangle A''B''C''$ or $R_m(R_\ell(\triangle ABC)) = \triangle A''B''C''$.

The figure is rotated about the point where the two lines intersect. In this case, point Q.



Find...

$(R_{y=x} \circ R_{y\text{-axis}})(2,4)$

$r_{(270,O)}(2,4)$

$(4,-2)$

$(T_{\langle -4,9\rangle} \circ r_{(180,O)})(-2,2)$

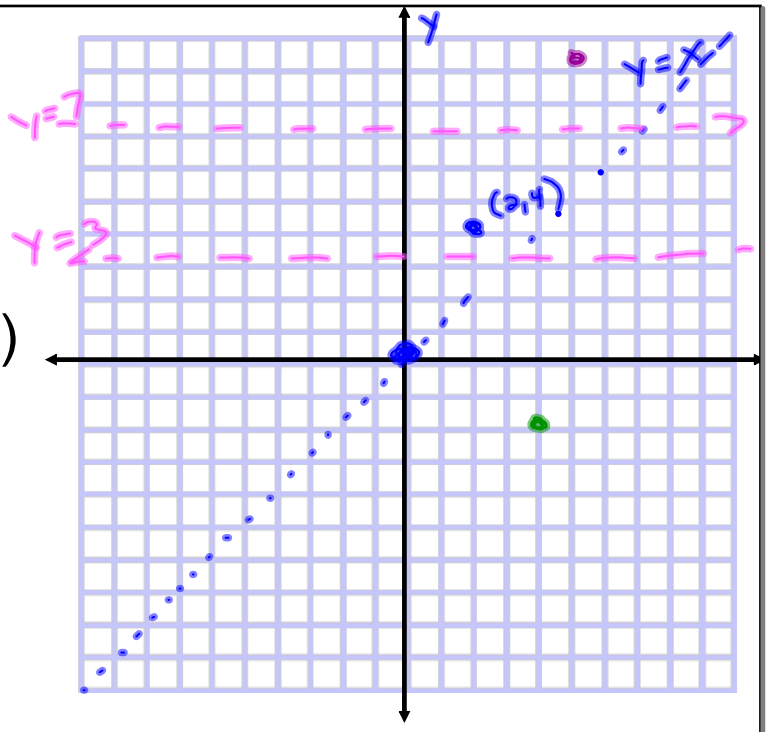
$T_{\langle -4,9\rangle}(2,-2)$

$(-2,7)$

$(R_{y=3} \circ R_{y=7})(5,9)$

$T_{\langle 0,-8\rangle}(5,9)$

$(5,1)$

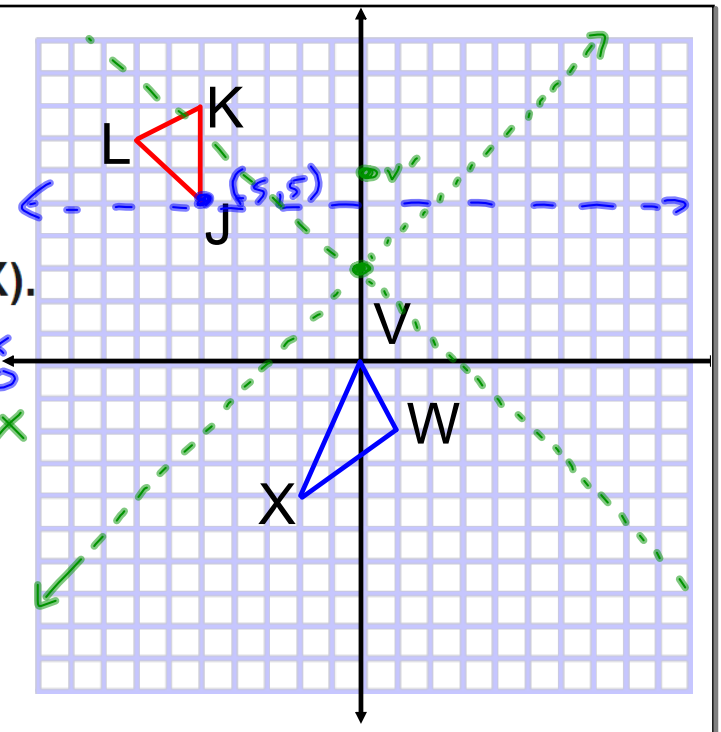


Find $(R_{x\text{-axis}} \circ R_{y=5})(\Delta JKL)$.

$T_{\langle 0,-10\rangle}(\Delta JKL$

Find $(R_{y=x+3} \circ R_{y=3-x})(\Delta VWX)$.

$r_{(180,(0,3))}(\Delta VWX$



Homework

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