Geometry 9.4

Draw glide reflections and other isometries

Draw compositions of reflections in parallel and intersecting lines

parallel same slope

perpendicular 90° (slope)(slope) = −1 opp/recip

composition

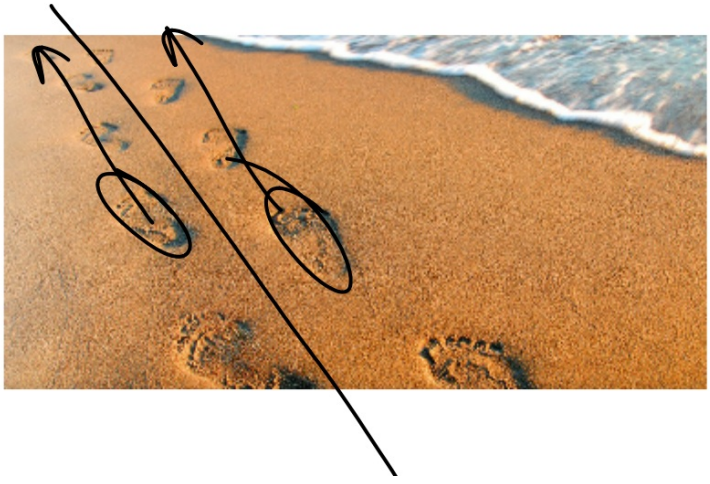
glide

isometry (rigid transformation) $\cong$

Quiz 9.3

whiteboards

glide = trans + reflection (// to trans)

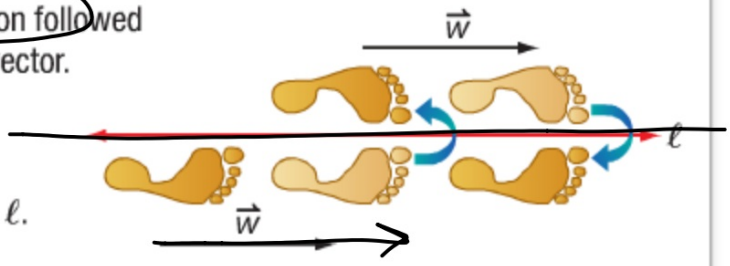


KeyConcept Glide Reflection

A **glide reflection** is the composition of a translation followed by a reflection in a line parallel to the translation vector.

Example

The glide reflection shown is the composition of a translation along $\vec{w}$ followed by a reflection in line ℓ.



1 2

1. translation + 2. reflection (parallel to translation vector)

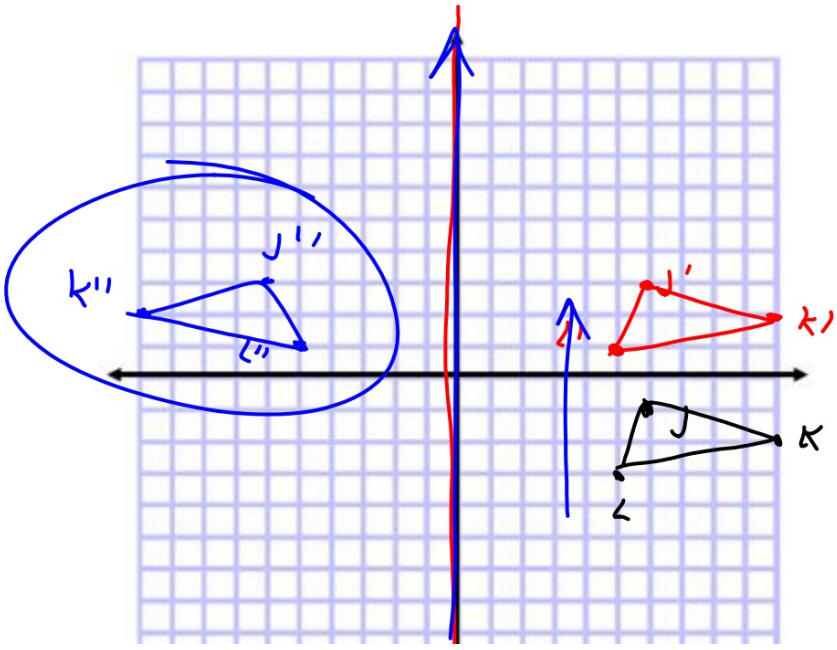
1. translation
2. reflection

} glide

Example 1 Graph a Glide Reflection

Triangle JKL has vertices $J(6, -1)$, $K(10, -2)$, and $L(5, -3)$. Graph $\triangle JKL$ and its image after a translation along $\langle 0, 4 \rangle$ and a reflection in the y-axis.

↑4



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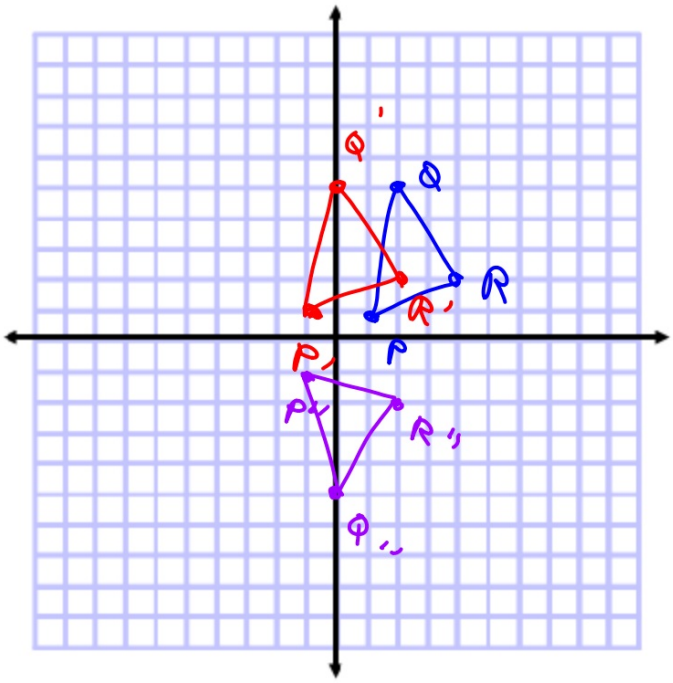
Triangle PQR has vertices $P(1, 1)$, $Q(2, 5)$, and $R(4, 2)$. Graph $\triangle PQR$ and its image after the indicated glide reflection.

1A. Translation: along $\langle -2, 0 \rangle$

Reflection: in x-axis



Theorem 9.1 Composition of Isometries

The composition of two (or more) isometries is an isometry.

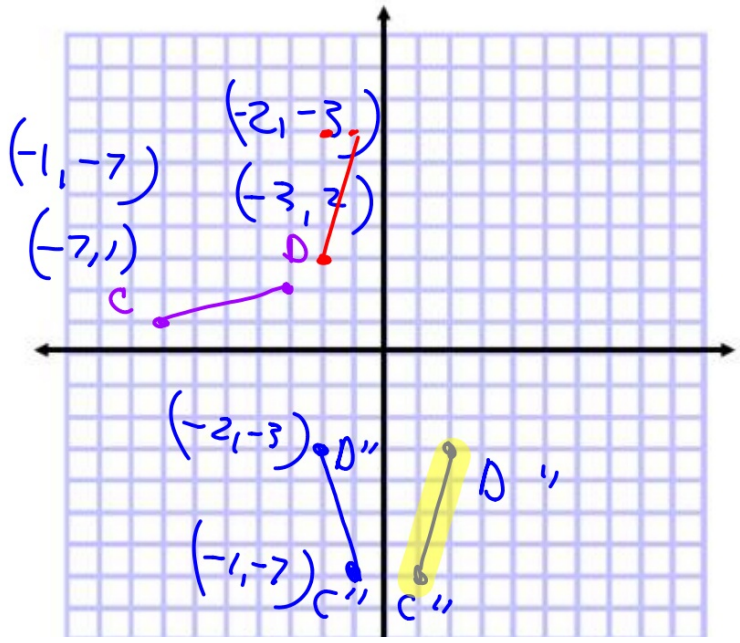
Isometry: a linear transformation which preserves length. ... (shape)
Isometries include rotation, translation, reflection, glides,
Two geometric figures related by an isometry are said to be geometrically congruent

in order listed (might make a difference)

Example 2 Graph Other Compositions of Isometries

The endpoints of $\overline{CD}$ are $C(-7, 1)$ and $D(-3, 2)$. Graph $\overline{CD}$ and its image after a reflection in the x-axis and a rotation 90° about the origin.

$(x, y) \rightarrow (-y, x)$



9.4 7-27 odd 28-33

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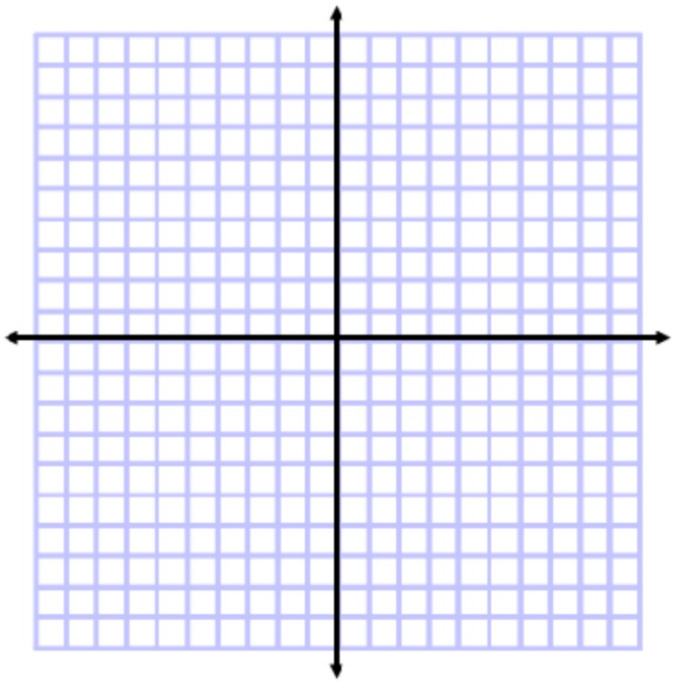
Triangle ABC has vertices $A(-6, -2)$, $B(-5, -5)$, and $C(-2, -1)$. Graph $\triangle ABC$ and its image after the composition of transformations in the order listed.

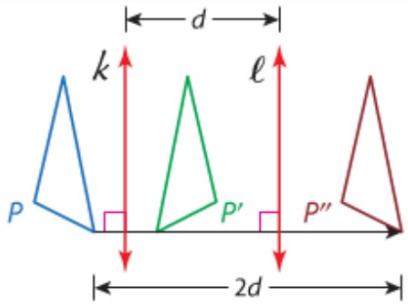
2A. Translation: along $\langle 3, -1 \rangle$
Reflection: in y-axis



Theorem 9.2 Reflections in Parallel Lines

The composition of two reflections in parallel lines can be described by a translation vector that is

- perpendicular to the two lines, and
- twice the distance between the two lines.



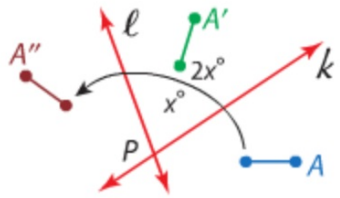
2x distance

letters

Theorem 9.3 Reflections in Intersecting Lines

The composition of two reflections in intersecting lines can be described by a rotation

- about the point where the lines intersect and
- through an angle that is twice the measure of the acute or right angle formed by the lines.



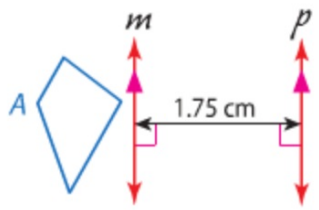
2x angle

letters

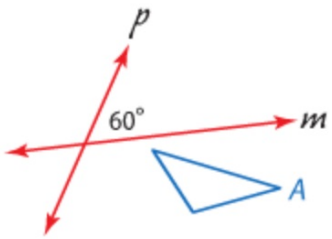
Example 3 Reflect a Figure in Two Lines

Copy and reflect figure A in line m and then line p. Then describe a single transformation that maps A onto A''.

a.



b.



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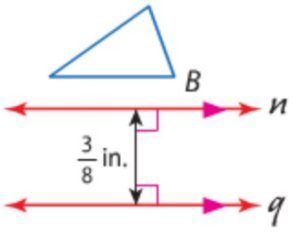
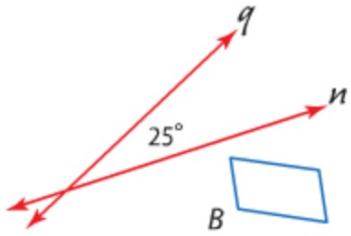
Copy and reflect figure B in line n and then line q. Then describe a single transformation that maps B onto B''.

3A.



3B.



Combination

b. 

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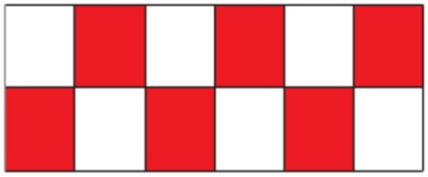
4. CARPET PATTERNS Describe the transformations that are combined to create each carpet pattern shown.

A.

B.



ConceptSummary Compositions of Translations

Glide Reflection	Translation	Rotation
the composition of a reflection and a translation	the composition of two reflections in parallel lines	the composition of two reflections in intersecting lines