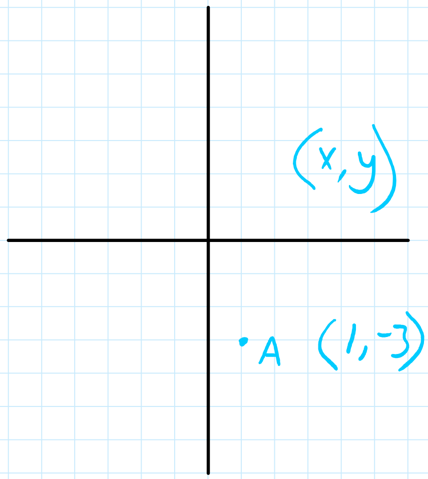
4.1 Translations

Monday, November 9, 2015 1:45 PM

Translations and Vectors



A **transformation** is a function that moves or changes a figure in some way to produce a new figure called an **image**. Another name for the original figure is the **preimage**. The points on the preimage are the inputs for the transformation, and the points on the image are the outputs.

Catapiller Butterfly

Core Concept

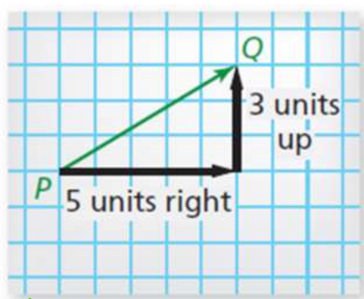
$\overline{AB}$ $\overleftrightarrow{AB}$ AB $\overrightarrow{AB}$ $\overrightarrow{AB}$

Vectors

The diagram shows a vector. The **initial point**, or starting point, of the vector is P, and the **terminal point**, or ending point, is Q. The vector is named $\overrightarrow{PQ}$, which is read as "vector PQ." The **horizontal component** of $\overrightarrow{PQ}$ is 5, and the **vertical component** is 3. The **component form** of a vector combines the horizontal and vertical components. So, the component form of $\overrightarrow{PQ}$ is $\langle 5, 3 \rangle$.

Catapiller

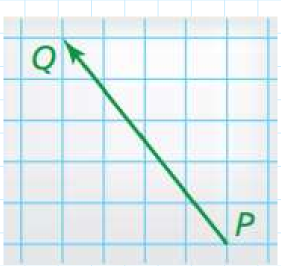
Butterfly



$\overrightarrow{QP}$ $\langle -5, -3 \rangle$

$\langle 5, 3 \rangle$ component form

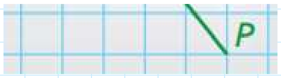
$\overrightarrow{PQ}$



Name the vector and write it in component form. If you were going to write it as a rule what would it be?

$\overrightarrow{PQ}$ $\langle -4, 5 \rangle$ - component form

$(x + -4, y + 5)$



x, y

$(x+{-4}, y+5)$
$(x-4, y+5)$ Rule

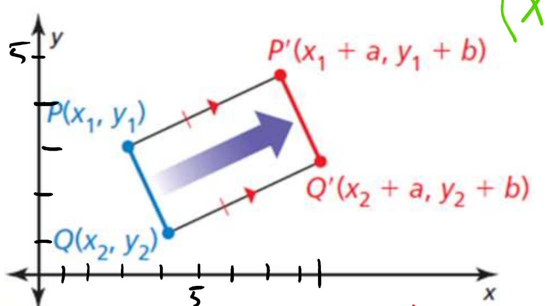
Core Concept

Translations

A **translation** moves every point of a figure the same distance in the same direction. More specifically, a translation *maps*, or moves, the points P and Q of a plane figure along a vector $\langle a, b\rangle$ to the points P' and Q', so that one of the following statements is true.

- $PP' = QQ'$ and $\overline{PP'} \parallel \overline{QQ'}$, or
- $PP' = QQ'$ and $\overline{PP'}$ and $\overline{QQ'}$ are collinear.

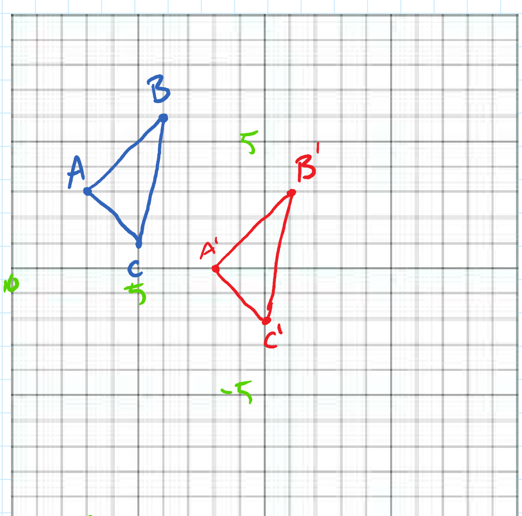
$\overline{PQ}$



$P(3,3)$ $\langle 5,1\rangle$ $P'(8,4)$

$\langle 5,1\rangle$
$(x+5, y+1)$

$Q(4,1)$ $Q'(9,2)$



A $(-7,3)$

What vector was applied to ΔABC to get ΔA'B'C'? Write the vector in component form and write the translation in rule form.

$\langle 5,-3\rangle$

$(x+5, y-3)$

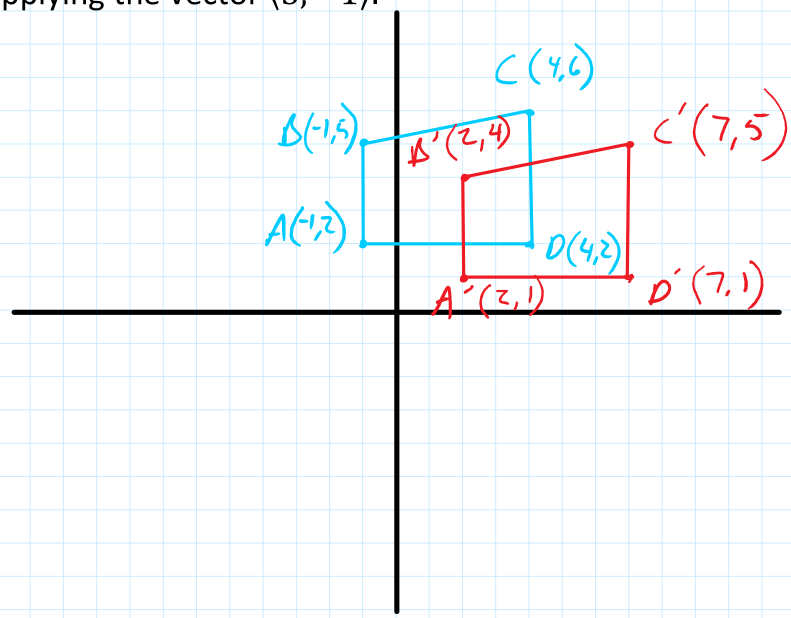
$(-7+5, 3-3)$

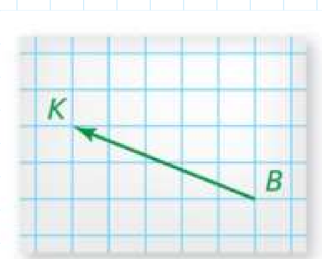
$(-2, 0)$

A (-7,3)

(-2,0)

Translate quad ABCD with points A(-1,2), B(-1,5), C(4,6), D(4,2) to quad A'B'C'D', by applying the vector $\langle 3, -1 \rangle$.

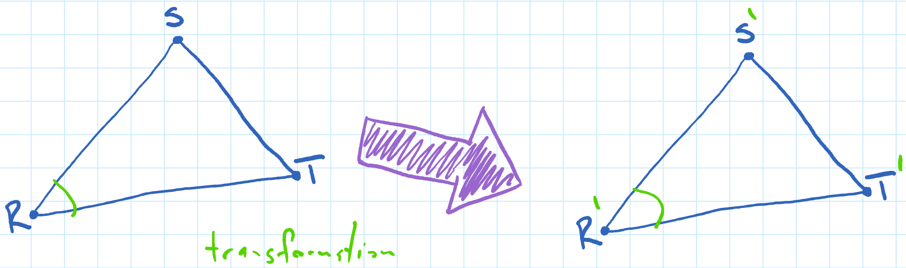




Name the vector and write it in component form. If you were going to write it as a rule what would it be?

$\overrightarrow{BK}$ $\langle -5, 2 \rangle$

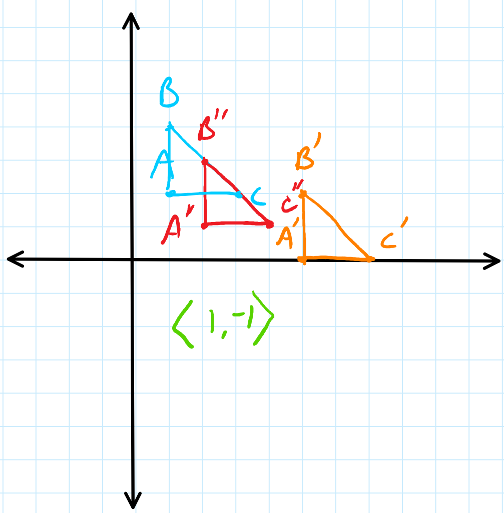
$(x-5, y+2)$



Since a ridged ~~translation~~ transformation does not change length or angle measure what can be said about:

RS and R'S' | ST and S'T' | TR and T'R'
= | = | =

$m\angle R$ and $m\angle R'$ | $m\angle S$ and $m\angle S'$ | $m\angle T$ and $m\angle T'$
= | = | =



Draw triangle ABC with points A(1, 2), B(1, 4), C(3,2) and perform the following translations:

Translation #1: $\langle 4, -2 \rangle$.

Translation #2: $\langle -3, 1 \rangle$.

$\langle 1, -1 \rangle$

Practice

Sec 4.1 **Pg. 178:**

1, 2, 3-25EO