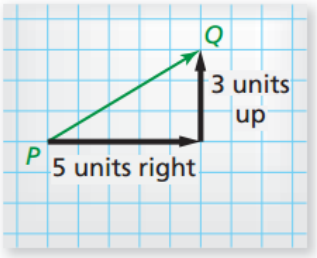
4.1 Notes: Translations **Name:** _____ **Per:** _____

Vector: A vector is a _____ that has both _____ and _____ (also known as _____)

➔ Represented in the coordinate plane by an _____ drawn from one point to another.



← This diagram shows a vector.
The initial point (or starting point) of this vector is point _____
The terminal point (or ending point) of this vector is point _____

The name of the vector is _____, which is read as "vector PQ"

The horizontal component of $\overrightarrow{PQ}$ is _____ The vertical component of $\overrightarrow{PQ}$ is _____

The component form of a vector combines the horizontal and vertical components.
So, the component form of $\overrightarrow{PQ}$ is

IN GENERAL: _____ is the horizontal component, _____ is the vertical component, so the vector is written as:

Transformation: A transformation is a function that moves or changes a figure in some way to produce a *new* figure called an _____.

➔ Another name for the original figure is the _____.

➔ The points on the _____ are the _____ for the transformation

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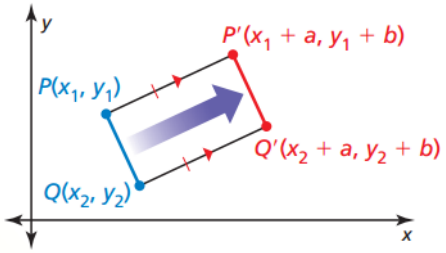
Transformation #1: Translation

A translation moves every point of a figure the _____ distance in the _____ direction.

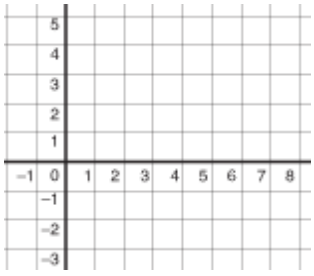
More specifically, a translation _____ (or moves) the preimage points (in this case, P and Q) along some vector _____ to the image points (in this case, P' and Q')



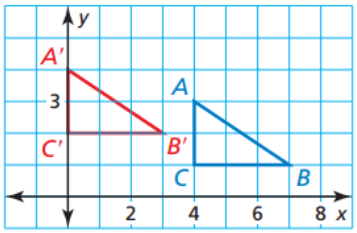
**Translations also map lines to parallel lines and segments to parallel segments. In this case,

Examples:

1. The vertices of ΔABC are A(0, 3), B(2, 4) and C(1, 0). Translate ΔABC using the vector $\langle 5, -1 \rangle$

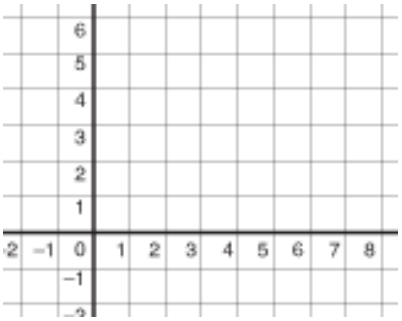


2. Write a rule for the translation of ΔABC to $\Delta A'B'C'$



3. Graph the image (and give its coordinates) of quadrilateral ABCD with vertices A(-1, 2), B(-1, 5), C(4, 6) and D(4, 2) with the translation:

$(x, y) \rightarrow (x + 3, y - 1)$



A' (_____ , _____) B' (_____ , _____)

C' (_____ , _____) D' (_____ , _____)

Rigid Motions: A rigid motion is a transformation that preserves _____ and _____.

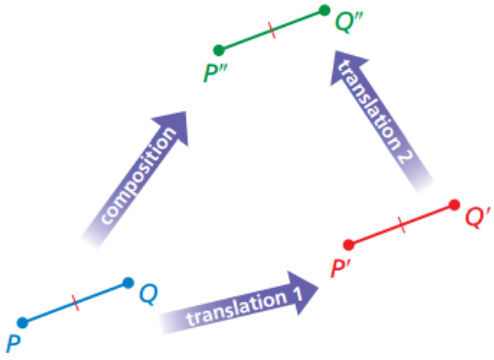
→ Another name for a rigid motion is an _____.

→ A rigid motion maps lines to lines, rays to rays, and segments to segments.

Translation Postulate: A translation is a rigid motion.

Composition transformations: When two or more transformations are combined to form a single transformation.

Composition Theorem: The composition of two (or more) rigid motions is a rigid motion.

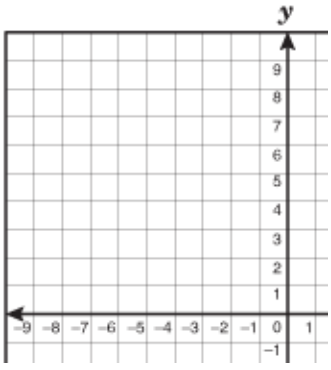


Examples:

4. Graph $\overline{RS}$ with endpoints R(-8, 5) and S(-6, 8) and its image after the following two translations

Translation: $(x, y) \rightarrow (x + 5, y - 2)$

Translation: $(x, y) \rightarrow (x - 4, y - 2)$



5. Write the rule for the single translation from $\overline{RS}$ to $\overline{R''S''}$