Translations

Section 4.1

Source: http://robertkaplinsky.com/work/ms-pac-man/

Video Game Design

How can you describe Ms. Pac-Man's movements?

Translations

Translations and Reflections

Translations, Reflections, and Rotations

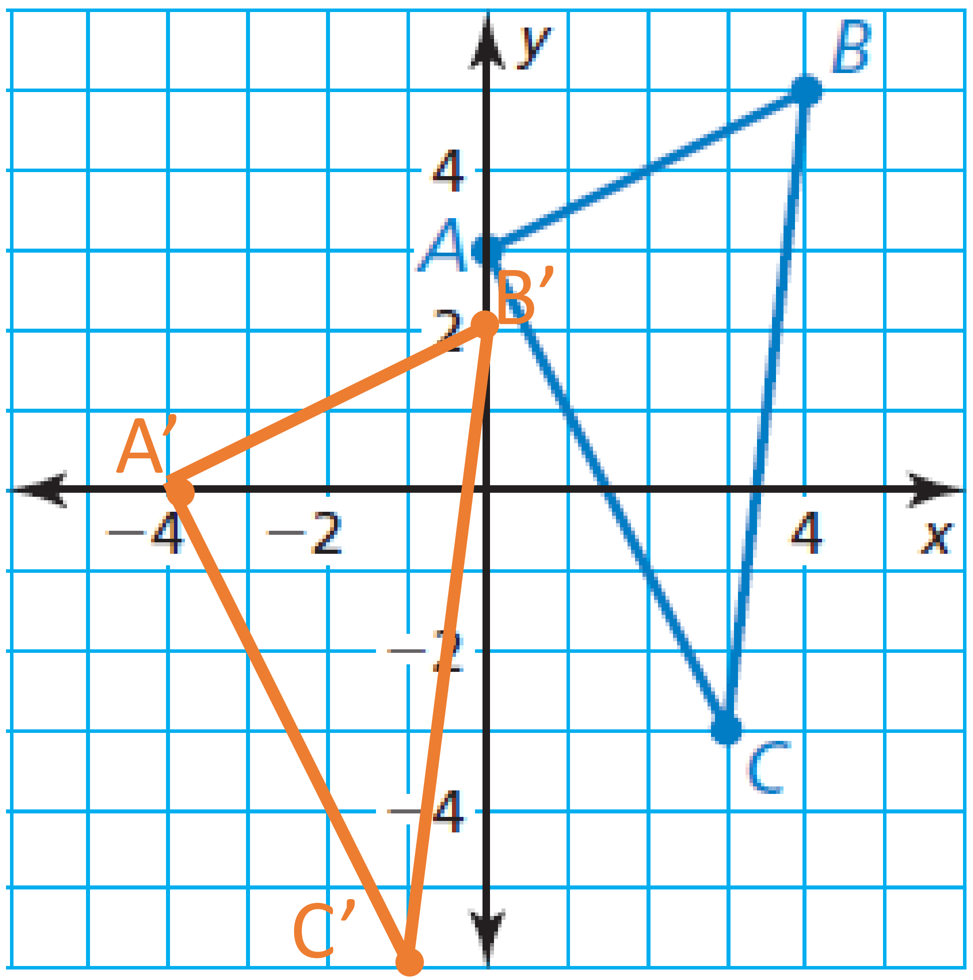
Translations, Reflections, Rotations, and Coordinate Plane

When a point is translated a units horizontally and b units vertically, a rule to determine the coordinates of the image (x, y) is $(x, y) \rightarrow (x + a, y + b)$.

Use this rule to translate ΔABC 4 units left and 3 units down.

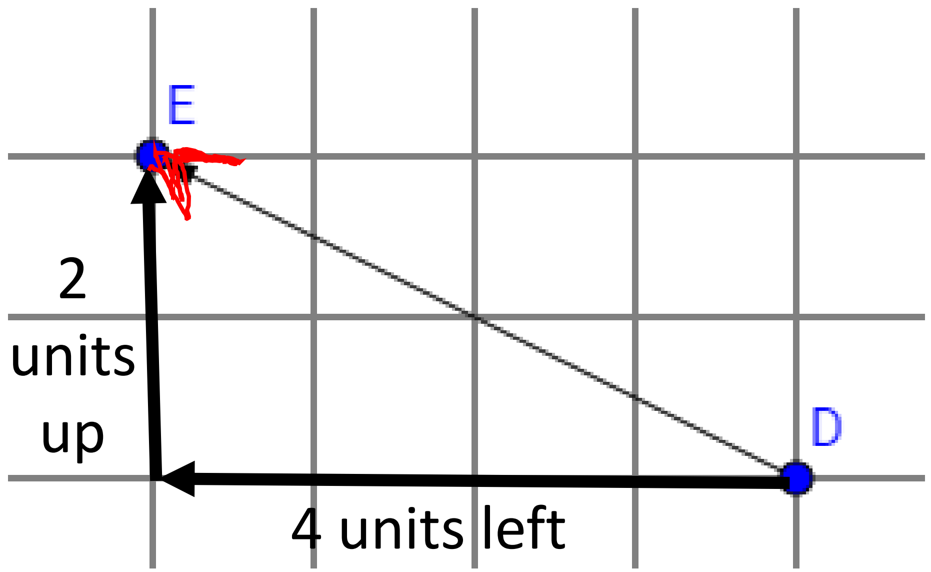
What are the coordinates of the vertices of the image, ΔA′B′C′?

Are the side lengths the same as those of ΔABC ? Justify your answer.



Vectors

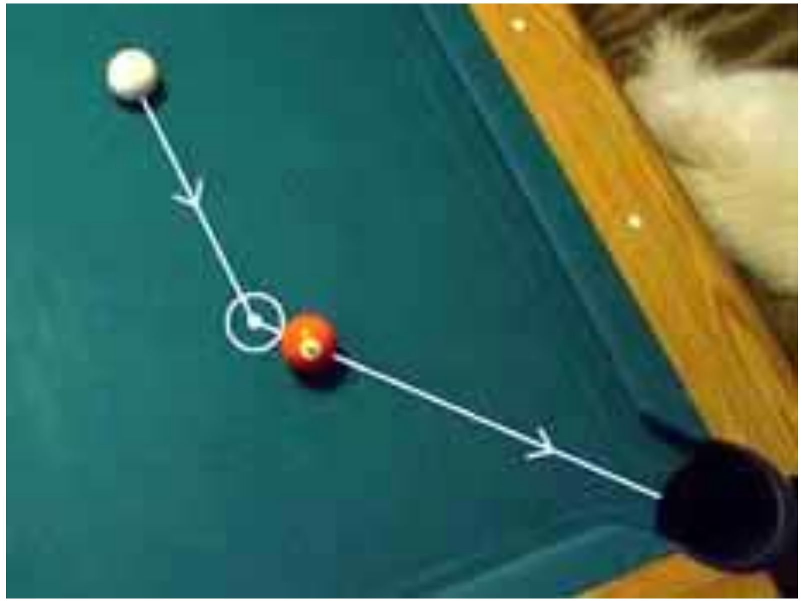
Vectors have direction and magnitude (size). The initial point of this vector is D and the terminal point is E. The vector is named $\overrightarrow{DE}$. The component form of $\overrightarrow{DE}$ is $\langle -4, 2 \rangle$.

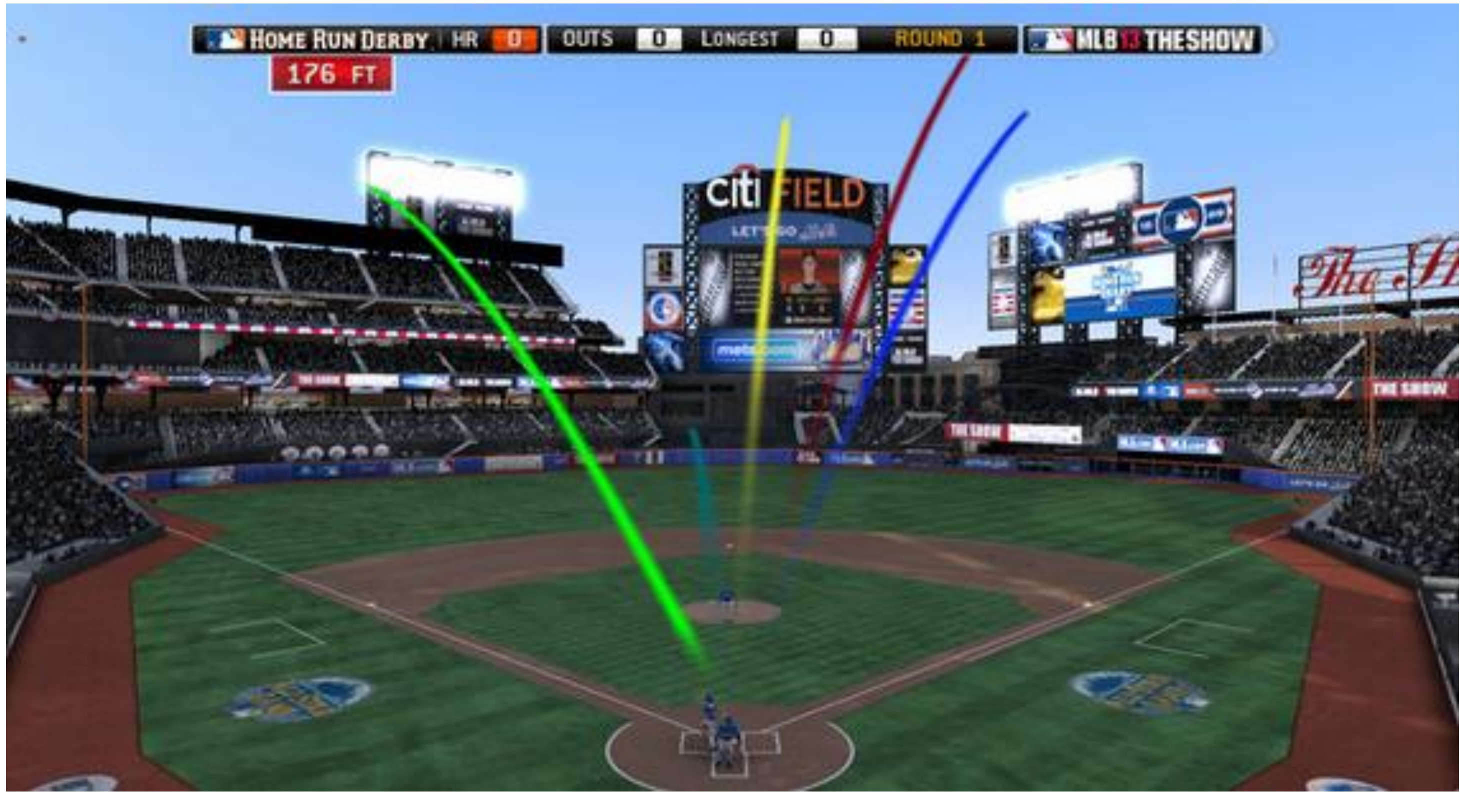


$\overrightarrow{DE}$

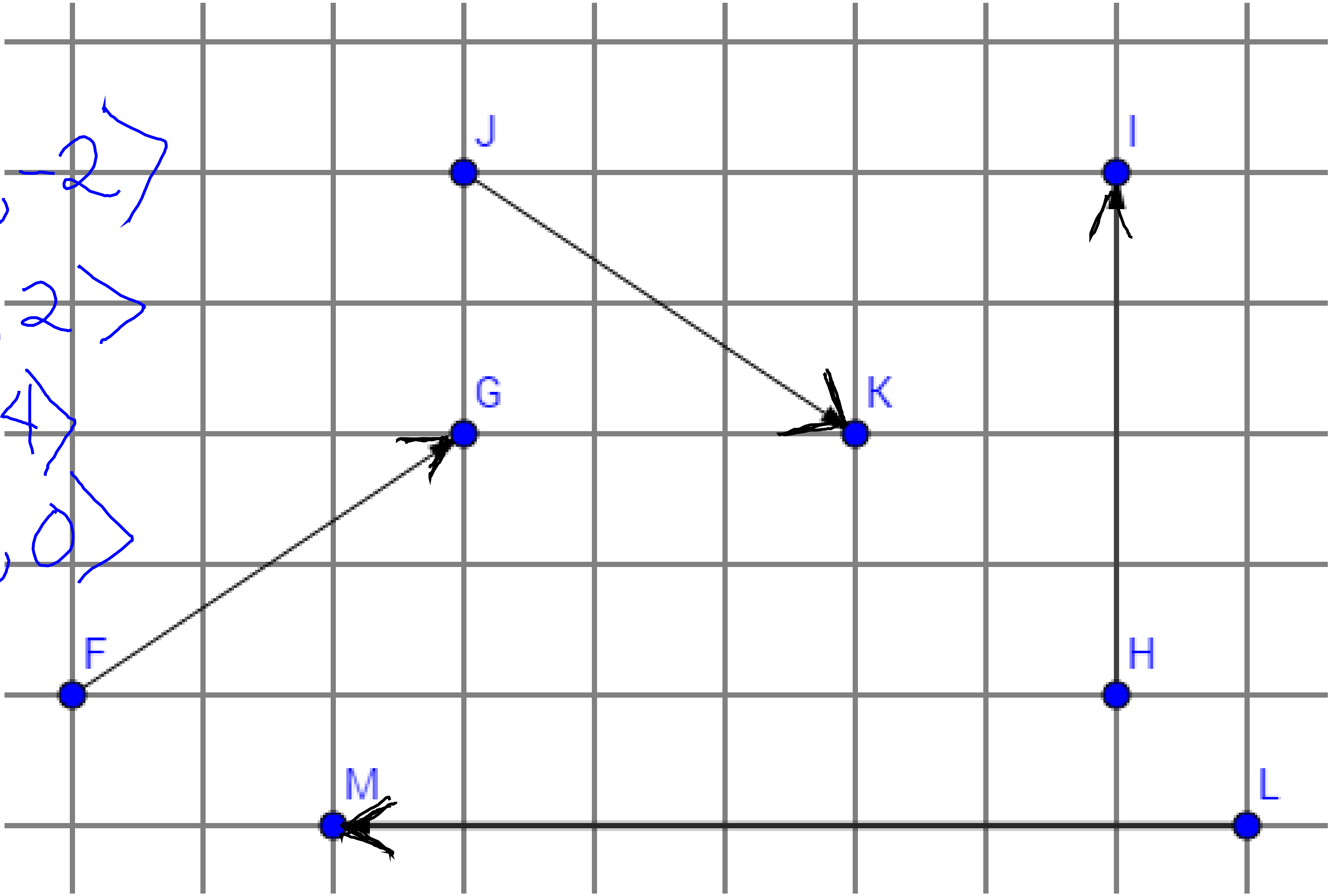
$\langle -4, 2 \rangle$

Real World Vectors





Name the vectors. Write their component forms.



$\overrightarrow{JK}$ $\langle 3, -2 \rangle$

$\overrightarrow{FG}$ $\langle 3, 2 \rangle$

$\overrightarrow{HI}$ $\langle 0, 4 \rangle$

$\overrightarrow{LM}$ $\langle -7, 0 \rangle$

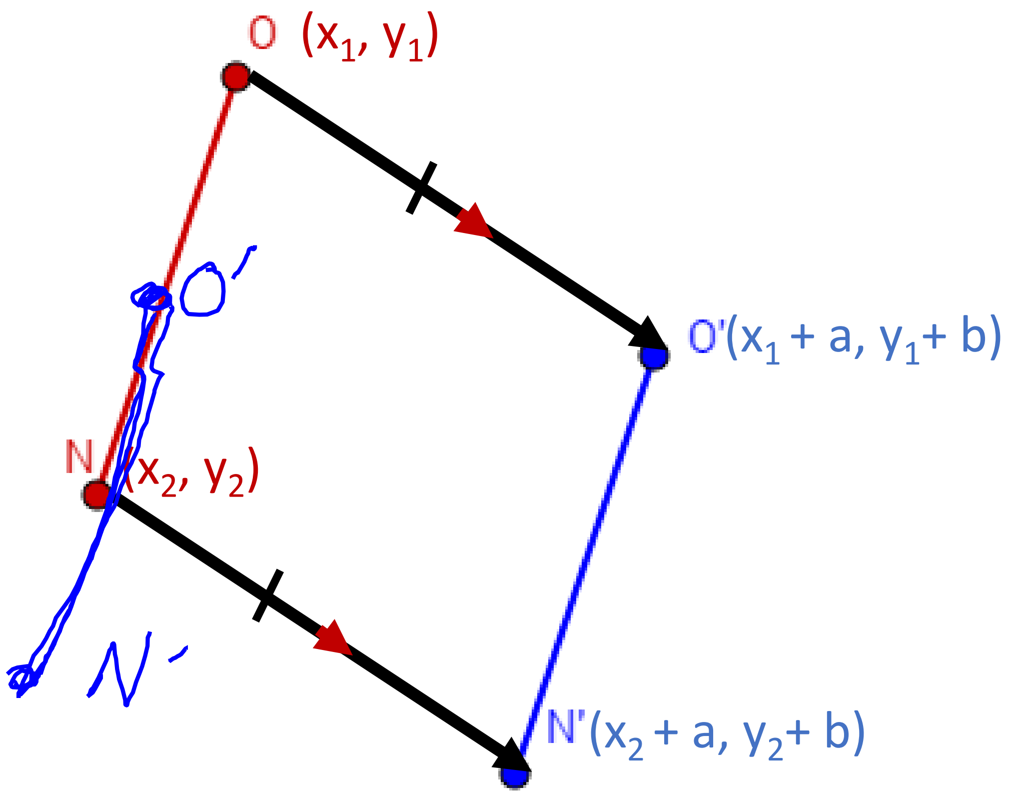
Translations

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

The preimage is the original image before movement and the image is the new figure.

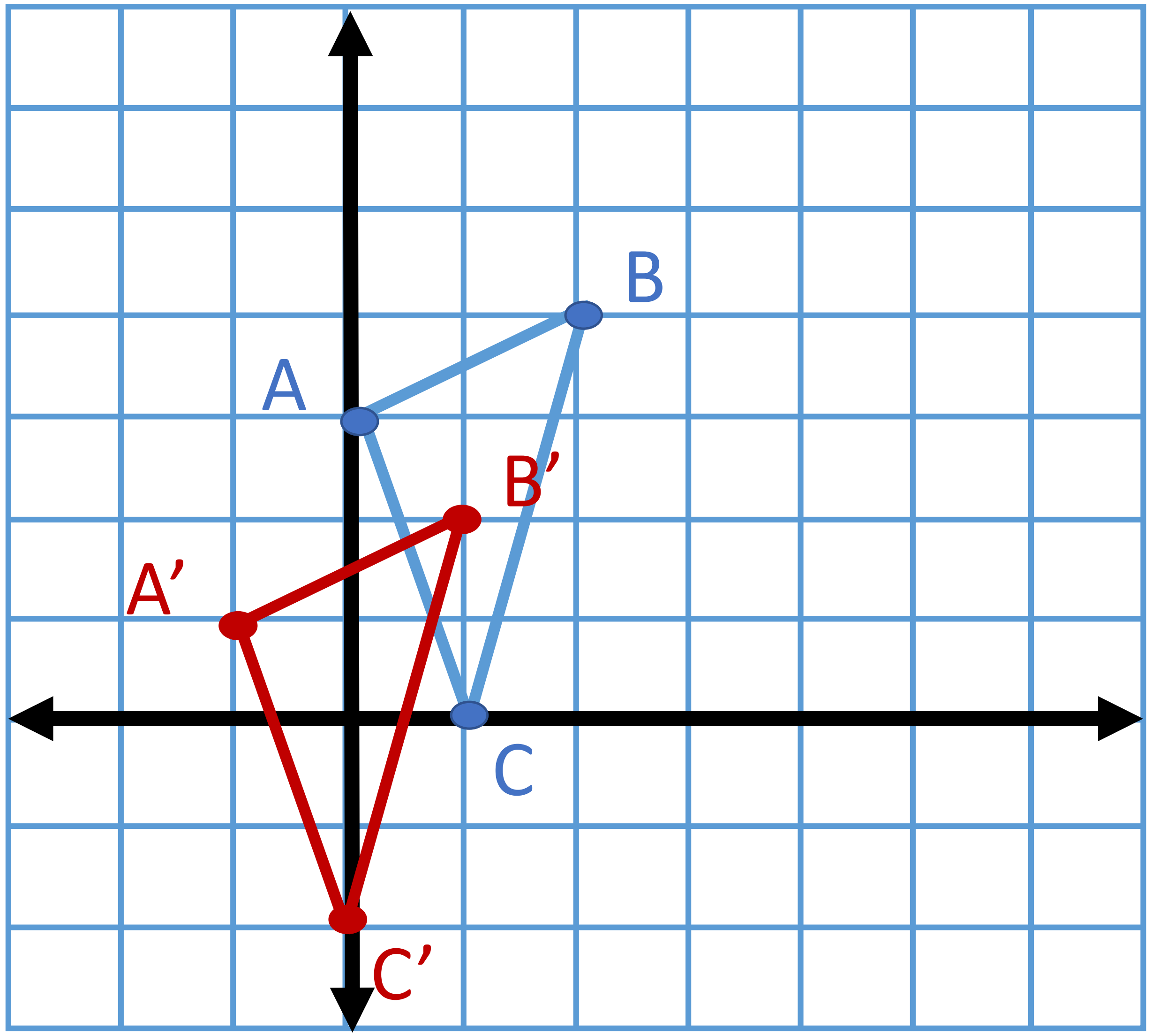
OO' = NN' and $\overline{OO'} \parallel \overline{NN'}$ or

OO' = NN' and $\overline{OO'}$ and $\overline{NN'}$ are collinear.



The vertices of ΔABC are

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



Component Form vs. Coordinate Notation

A(1, 1), B(7, 3), C(4, 8). Write the component form of the vector that can be used to describe the translation to A'(-3, -1), B'(3, 1), C'(0, 6).

$\langle -4, -2 \rangle$

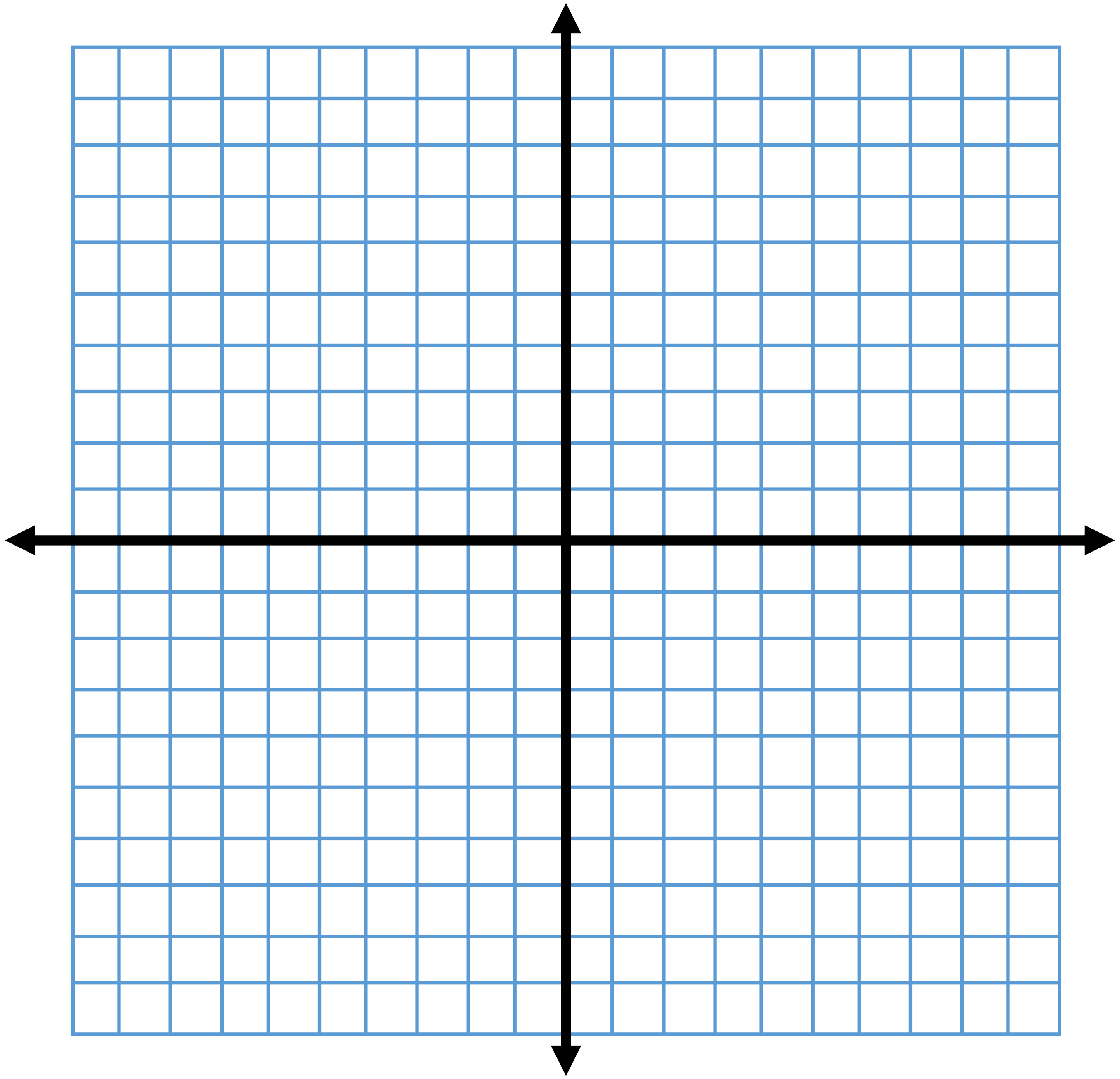
Coordinate Notation – (x, y)→ (x – 4, y - 2) This is also known as “writing a rule” for the translation.

Use points A(-3, 4), B(-5, -1) and C(-1, 0) to

a) map the translation: $(x, y) \Rightarrow (x + 4, y + 6)$

b) map the translation: $\langle -2, 4 \rangle$.

c) map the translation: $\langle 2, -7 \rangle$.



Rigid Motion - Isometry

Rigid Motion - A transformation that preserves length and angle measure. Another name for rigid motion is "**Isometry**". What you start with is what you have at the end.

Composition of Transformations – when two or more transformations are combined to a single transformation.

Composition Theorem - The composition of two or more rigid motions is a rigid motion.

Composition Example

Graph $\overline{RS}$ with endpoints R(-8, 5) and S(-6, 8).

Graph its image after the composition.

Translation: (x, y) →(x – 1, y + 4)

Translation: (x, y) →(x + 4, y – 6)