Bellwork
02/14/2012

1. Find the length of $\overline{BC}$ with endpoints B(-3,5) and C (1,2).

$\sqrt{(1+(+3))^2+(2-5)^2}$

$\sqrt{4^2+(-3)^2}$

$\sqrt{16+9}$

$\sqrt{25}$

$BC = 5$

2. Translate A(3,5) 4 units right and 2 units down. What are the coordinates of the image?

$(x, y) \rightarrow (x+4, y-2)$

$(3+4, 5-2)$

$(7, 3)$

Geometry
9.1 Translate Figures and Vectors
Standard(s): 3, 10

Vocabulary:

Image: A new figure created by transforming an original figure. (final product)

Preimage: The original figure before transformation.

Isometry: A transformation that preserves length and angle measure.

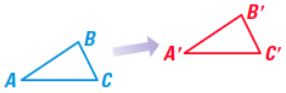
Vector: A quantity that has both direction and magnitude (or size).

THEOREM *For Your Notebook*

THEOREM 9.1 Translation Theorem

A translation is an isometry.

Proof: below; Ex. 46, p. 579



$\triangle ABC \cong \triangle A'B'C'$

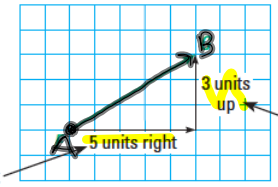
KEY CONCEPT *For Your Notebook*

Vectors

The diagram shows a vector named $\overrightarrow{FG}$, read as "vector *FG*."

The **initial point**, or **starting point**, of the vector is *F*.

$\overrightarrow{FG}$



The **terminal point**, or **ending point**, of the vector is *G*.

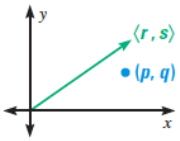
vertical component

horizontal component

The **component form** of a vector combines the horizontal and vertical components. So, the component form of $\overrightarrow{FG}$ is $\langle 5, 3 \rangle$.

USE NOTATION

Use brackets to write the component form of the vector $\langle r, s \rangle$.
Use parentheses to write the coordinates of the point (p, q).



★ component form is translation notation for vectors.

$(x+5, y+3)$

$\langle 5, 3 \rangle$

horizontal

vertical

Image and Preimage

Use the translation (x,y)→(x+2,y-5).

What is the image of $D(4,7)$?

$(x,y) \rightarrow (4+2, 7-5)$

$D'(6,2)$

What is the image of $E(-3,2)$?

$(x,y) \rightarrow (-3+2, 2-5)$

$E'(-1,-3)$

What is the preimage of $M'(-5,3)$?

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

change signs in notation!

$(-5-2, 3+5)$ $(x-2, y+5)$

$M(-7,8)$

What is the preimage of $N'(-9,-11)$?

$(-9-2, -11+5)$

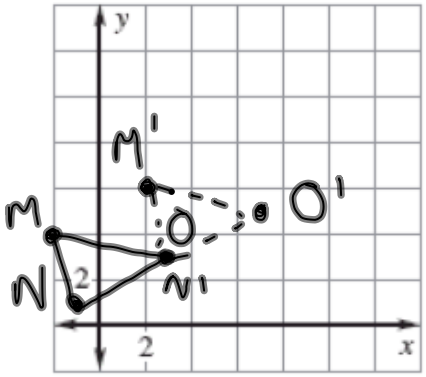
$N(-11,-6)$

Graphing an Image and Writing a Rule

The vertices of ΔMNO are *M*(-2,4), *N*(-1,1), and *O*(3,3).Graph the image of the triangle using prime notation.

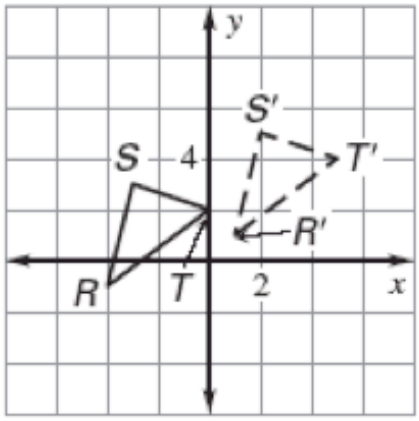
(x,y)→(x+4,y+2)

Final image use dotted lines.



M'(2,6)
N'(3,3)
O'(7,5)

ΔR'S'T' is the image of ΔRST after a translation. Write a rule for the translation. Then *verify* that the translation is an isometry.



Find the difference starting with the prime notation!

R(-4,-1) R'(1,1)
S(-3,3) S'(2,5)
T(0,2) T'(5,4)

R'(1,1), R(-4,-1)
1+(+4), 1+(+1)
5, 2
(x,y)→(x+5, y+2)

Use distance form.

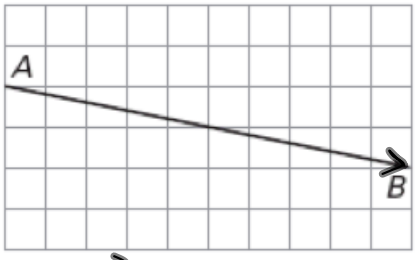
RS= R'S'=

ST= S'T'=

RT= R'T'=

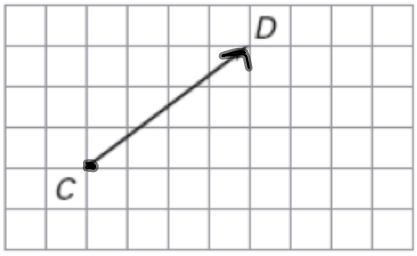
Identifying Vectors

Name the vector and write its component form.



$\overrightarrow{AB}$

$\langle 10, -2 \rangle$



$\overrightarrow{CD}$

$\langle 4, 3 \rangle$

Use the point S(-3,2). Find the component form of the vector that describes the translation to S'.

S'(9,-7), S(-3,2)

$9+(+3), -7-2$

$\langle 12, -9 \rangle$

S'(-11,13), S(-3,2)

$-11+(+3), 13-2$

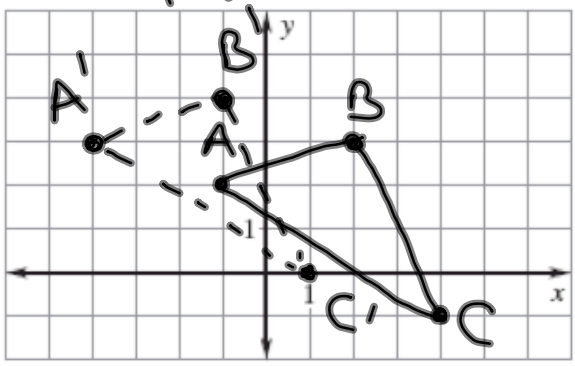
$\langle -8, 11 \rangle$

Translating a Triangle

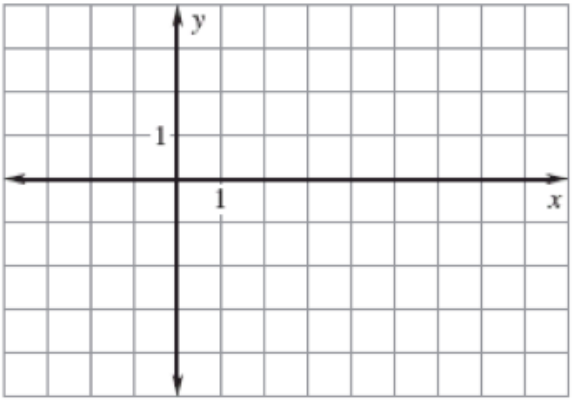
The vertices of ΔABC are *A*(-1,2), *B*(2,3), and *C*(4,-1). Translate ΔABC using the given vector. Graph ΔABC *and* its image.

⟨-3,1⟩

h v



⟨2,-3⟩



Homework Assignment

Worksheet 9.1B