

## Chapter 4: Transformation

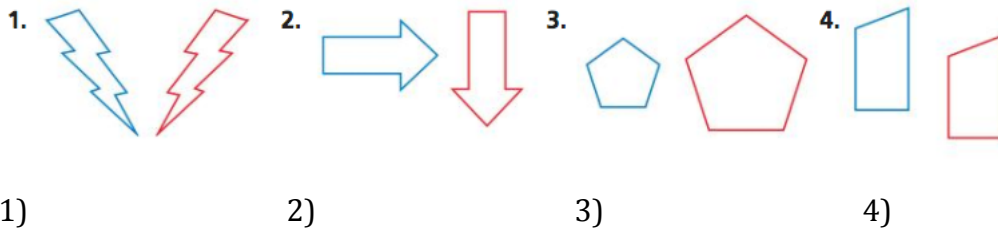
What is a transformation?

A function that moves or changes a figure in some way to produce a new figure called an *image*.

What are 4 types of transformations?

### 4.1: Translations

Tell whether the red figure is a translation, reflection, rotation, or dilation of the blue figure.



What is a vector?

A vector is a quantity that has both *magnitude* and *direction*. Represented in the coordinate plane by an arrow drawn from one point to another.

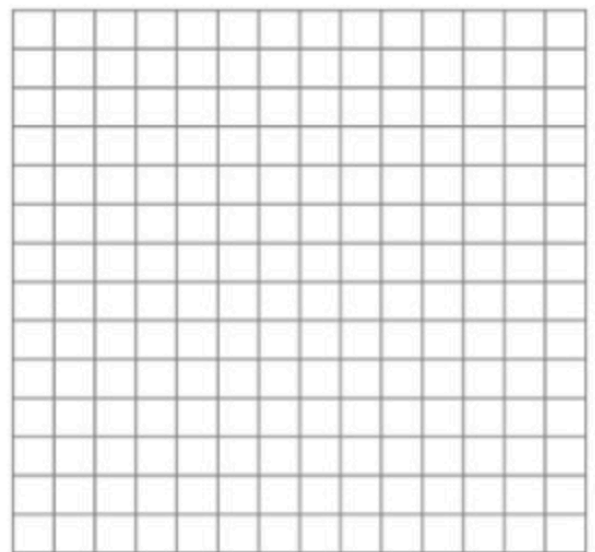
A vector has a starting point known as: \_\_\_\_\_

And an end point known as: \_\_\_\_\_

Horizontal component:

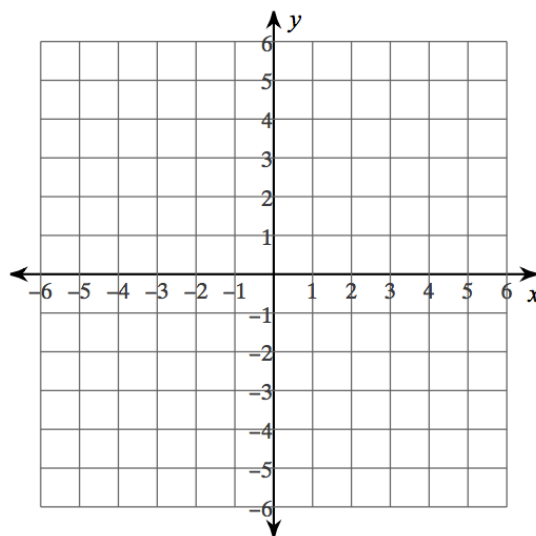
Vertical component:

Component form:

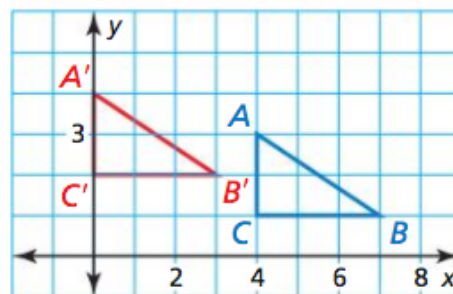


**Example 1:**

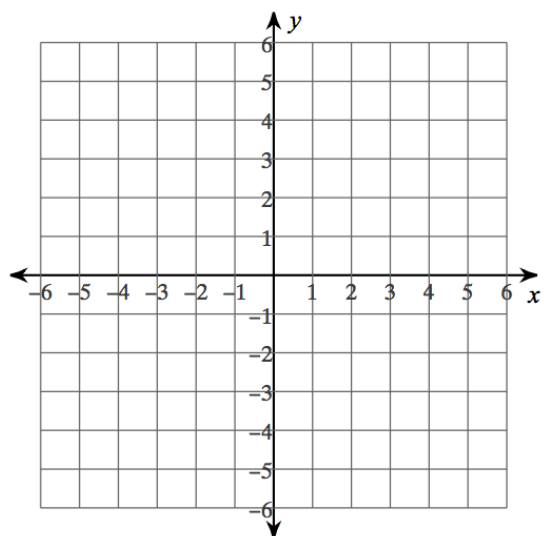
The vertices of  $\triangle ABC$  are  $A(0, 3)$ ,  $B(2, 4)$ , and  $C(1, 0)$ . Translate  $\triangle ABC$  using the vector  $\langle -5, 1 \rangle$

**Example 2:**

Write a rule for the translation of  $\triangle ABC$  to  $\triangle A'B'C'$

**Example 3:**

Graph the quadrilateral ABCD with the vertices  $A(-1, 2)$ ,  $B(-1, 5)$ ,  $C(4, 6)$ , and  $D(4, 2)$  and its image after the translation  $(x, y) \rightarrow (x + 3, y - 1)$



## Rigid motion

What does it mean to be rigid?

Rigid motion is a transformation that **preserves** length and angle measure.

### Postulate

#### Postulate 4.1 Translation Postulate

A translation is a rigid motion.

When two or more transformations are combined to form a single transformation, the result is  
**Composition of transformation**

### Theorem

#### Theorem 4.1 Composition Theorem

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

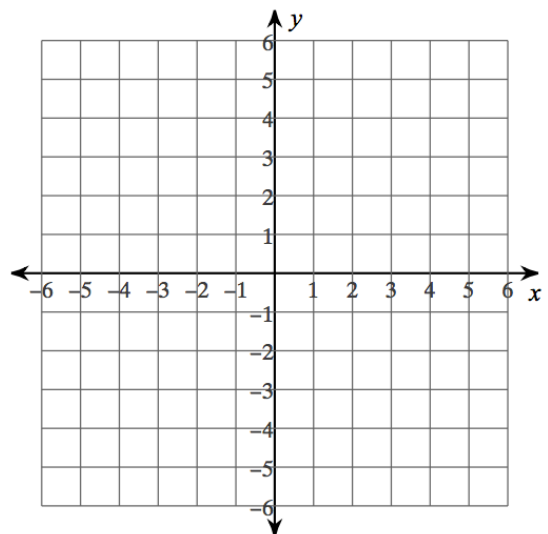
*Proof* Ex. 35, p. 180

### Example 4:

Graph segment RS with endpoints R( -4, 1), and S( -2 , 5) and its image after the compositions.

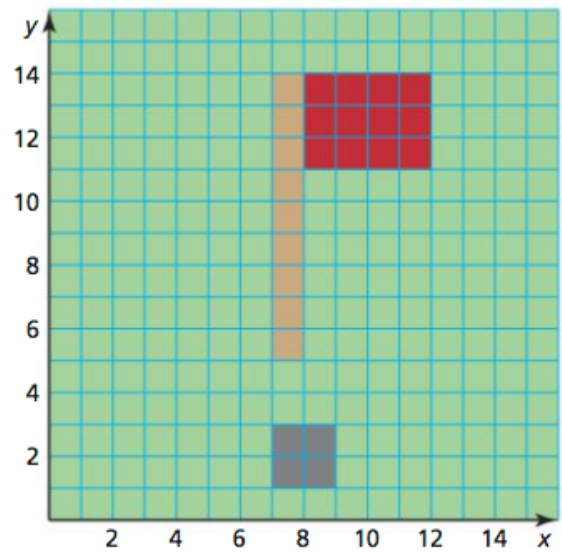
Translation 1:  $(x, y) \rightarrow (x + 6, y - 2)$

Translation 2:  $(x, y) \rightarrow (x - 3, y - 4)$



### Example 5:

You are designing a favicon for a golf website. In an image-editing program, you move the red rectangle 2 units left and 3 units down. Then you move the red rectangle 1 unit right and 1 unit up. Rewrite the composition as a single translation.



Homework / Classwork

5, 7, 9, 11, 12, 13, 15, 17, 19, 21, 26, 27