GeoGebra Basics

Handbook 7

A Guide for Learning GeoGebra

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Translation using Geometer's GeoGebra - A First Look

Another type of geometric transformation is a translation. A translation is often called a slide. A geometric figure is translated or slid to the right or left, up or down.
Examples: Determine the coordinates of the image of P(3,2) if P has been translated 4 units horizontally to the right.

Type: (3,2) in the Input bar and press the enter key

Select Vector from the Toolbox. Message: Select starting point, then ending point. Construct any vector of 6 units horizontally to the left. This establishes the vector.
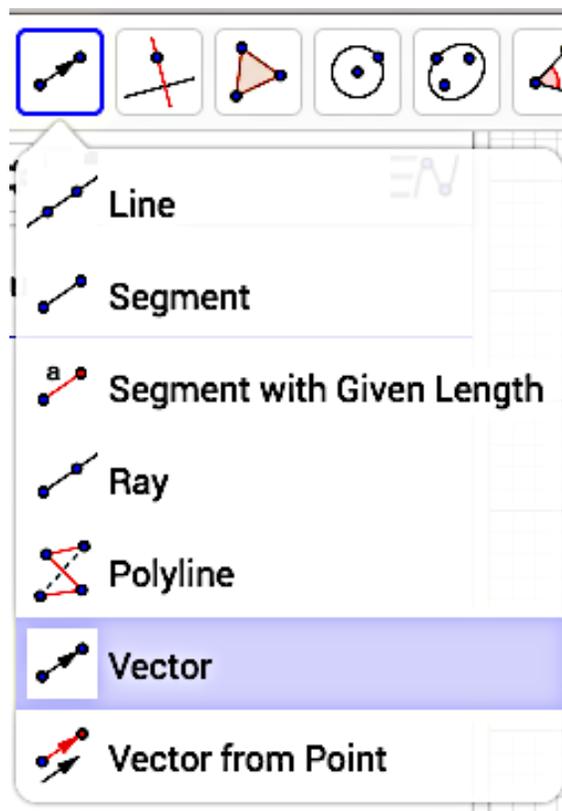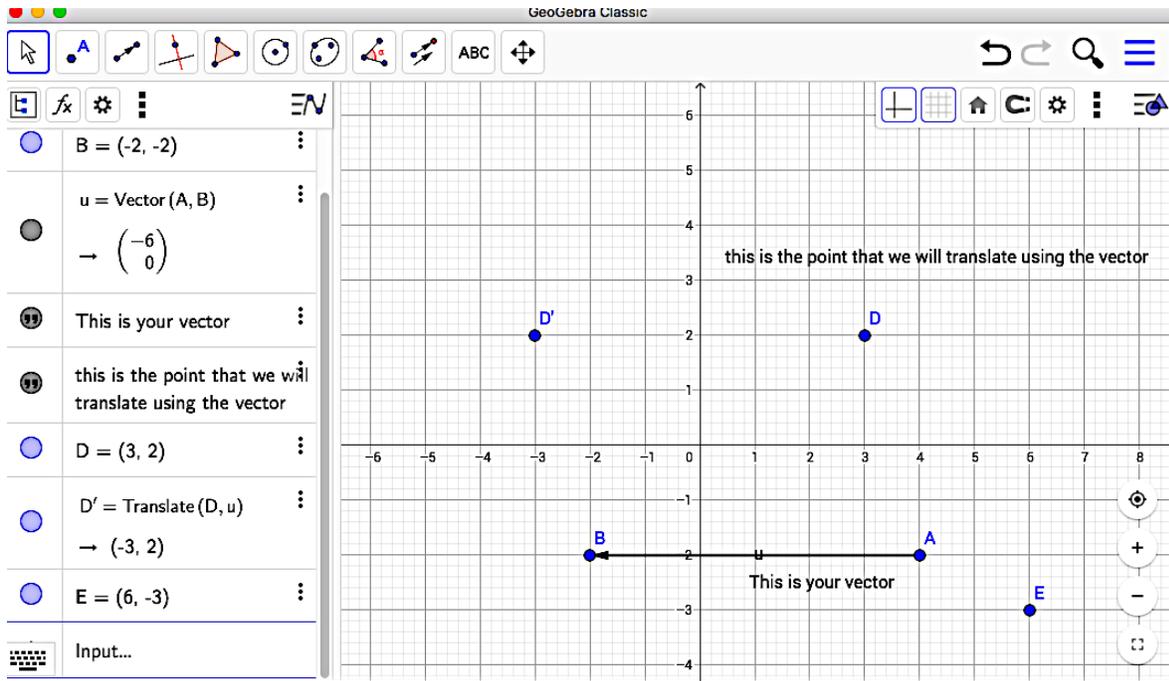
Segment AB is the vector length. Point C is the object that we will translate the vector length from its location.
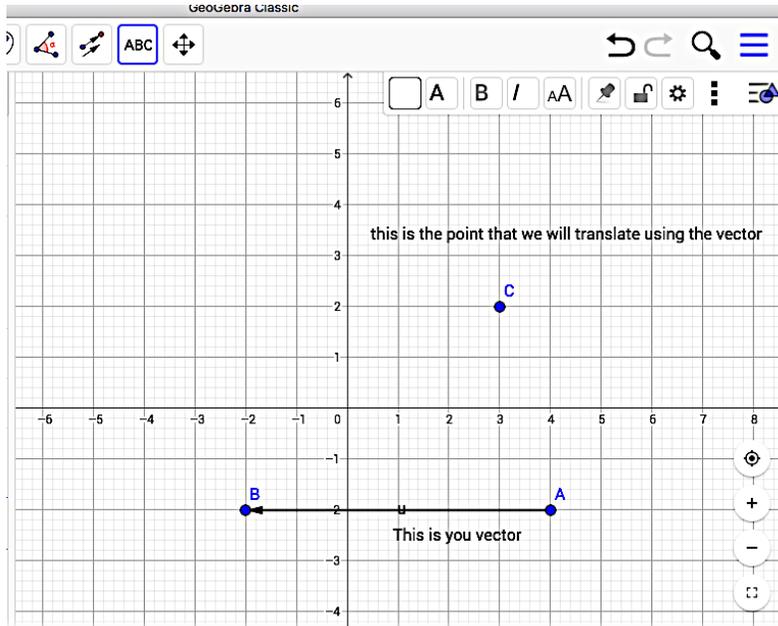
Select the **Translate by Vector** (message: select object to translated, then vector) option from the Toolbox.
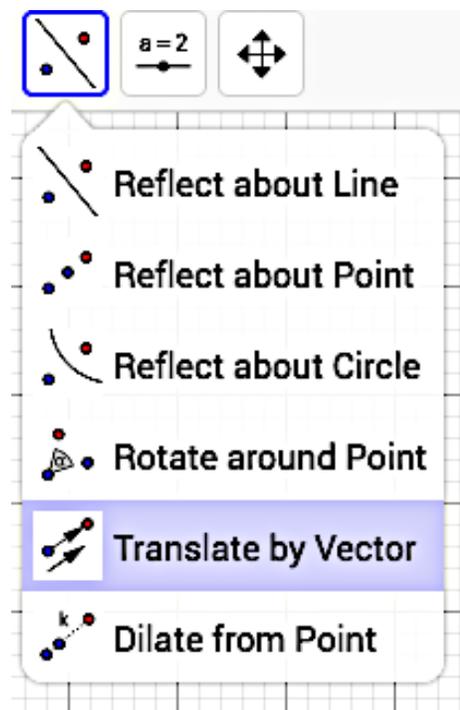
The following message will: Select object to translated, then vector.

Observe that point D has moved 6 units to the left (the vector length)

Translation Pictures using Geometer's GeoGebra -A Second Look

In this activity you are going to use the following tools and commands. Make sure you know how to use each tool and command before you begin.

Image	Vector	New!
A = (1, 1)	Translate by Vector	New!
Rigid Polygon　New!	Move	
Vector[O, P]	ABC　Text	
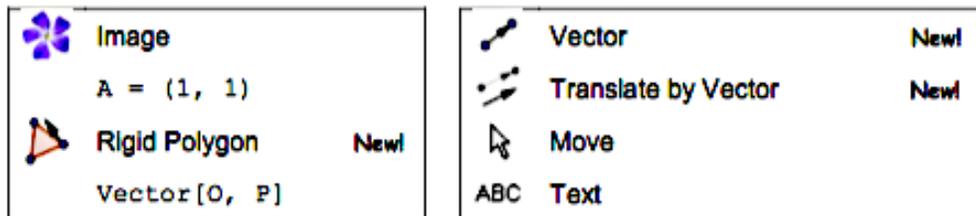
Preparations

| |
|---|
| Make sure you have the picture saved on your computer. |
| Open a new GeoGebra window. |
| Switch to Perspectives –Graphics and Show the Grid |
| Set the　Point Capturing to Fixed to Grid (Stylebar). |

Construction Steps

1		Insert picture into the first quadrant.
2		Create points A (1 ,1), B = (3, 1) and D = (1, 4).
3		Set point A as the FIRST, B as the SECOND, and D as the FOURTH corner point of the picture. (Properties dialog – Position)
4		Create triangle ABD.
5		Create points O = (0, 0) and P = (3, -2)
6		
7		Translate the picture by vector u.
8		Translate the three-corner points A, B, and D by vector u.
9		Create triangle A'B'D'.
10	Show / Hide Object	Hide point O so it can't be moved accidentally.
11		Change the color and size of objects to enhance your construction.

Deepening your Understanding of Translation

A translation is often called a slide. A geometric figure is translated or slid to the right or left, up or down. ΔABC is translated 3 units down to make ΔA′B′C′. In this vertical translation, every point of ΔABC has been moved 3 units straight down. Refer to the figure below.
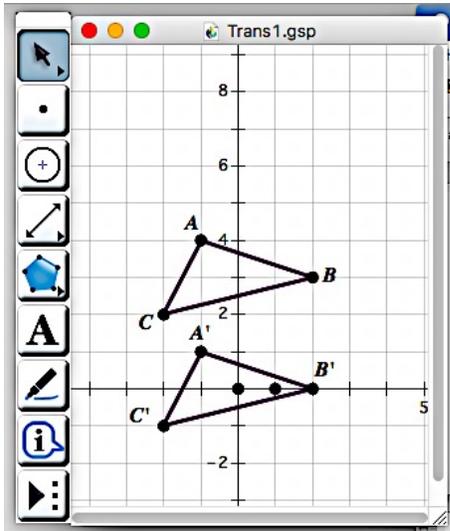

  In the next example, ΔJ′K′L′ is the image of pre-image ΔJKL under a translation of 6 units to the right. In this horizontal translation, every point of ΔJKL has been moved 6 units directly to the right. Refer to figure 103 below.
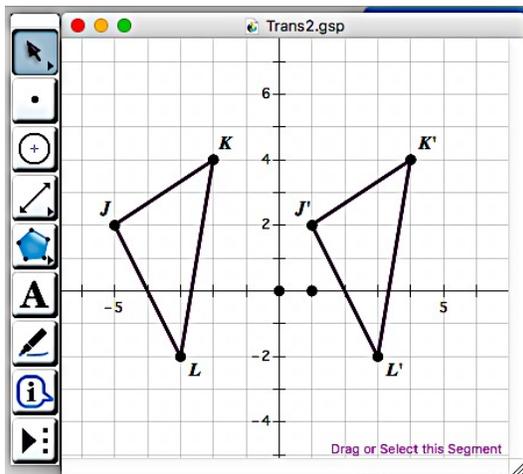
  Translation does not change the shape and size of a figure, so the translation image is congruent to the original figure (the preimage).

Things to Remember about Translations

Vertical and horizontal translations can be combined. Refer to the figure below.
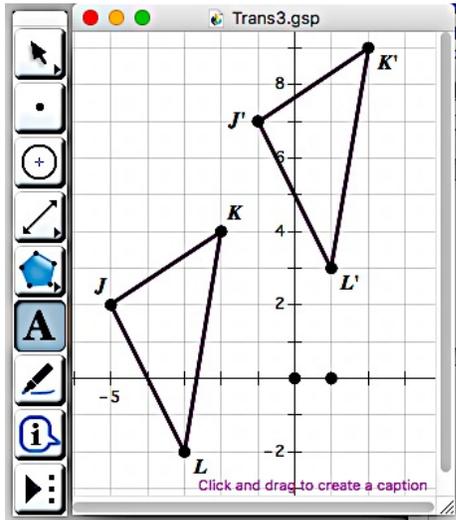
ΔJKL has been translated 4 units to the left and 5 units up to make ΔJ′K′L′.

Translation notations:

$$T_{h,\,k}(F) = F'$$

A Figure F is translated h units to the right and k units up. (If h is negative, the translation is to the left. If k is negative, the translation is down.)

$$T_{0,\,-3}(\Delta JKL) = \Delta J'K'L'$$

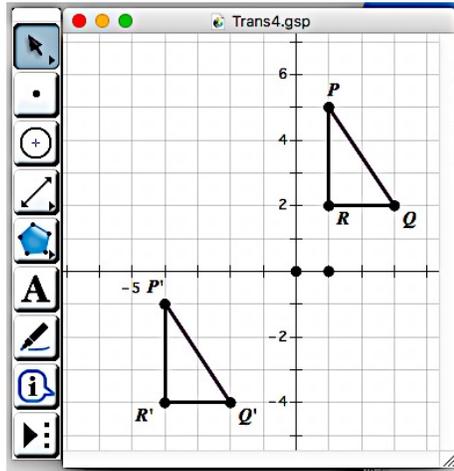ΔJKL is translated 3 units down to make ΔJ′K′L′.

$$T_{-4,\,5}(\Delta JKL) = \Delta J'K'L'$$

ΔJKL is translated 4 units to the left and 5 units up to make ΔJ′K′L′.
Translation changes coordinates of points as follows:

$$T_{h,k}(x,y) = (x + h,\, y + k).$$

Test Your Understanding of Translations

In the figure below, ΔP′Q′R′ is the translation image of its' pre-image ΔPQR. First use the appropriate translation notation formula to solve the problem, then check your solution by using GeoGebra to translate ΔPQR. Refer to the figure below

Use the figure below to answer questions 1-3. In the diagram below, ΔSTU will be translated 2 units to the right and 4 units down to make ΔS′T′U′ (not shown). Refer to the figure below.
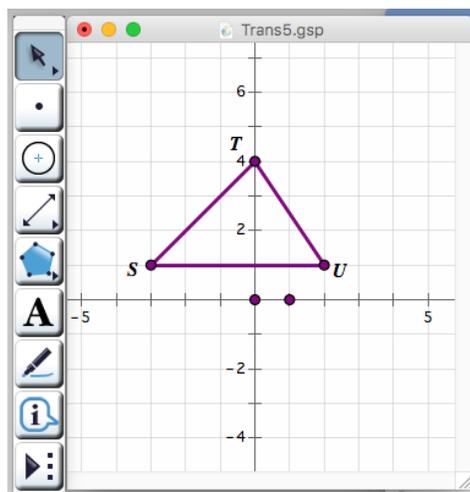
1.   Which best describes this translation for the above figure?

A $T_{-4, 2}(\Delta STU) = \Delta S'T'U'$

B $T_{2, -4}(\Delta STU) = \Delta S'T'U'$

C $T_{4, -2}(\Delta STU) = \Delta S'T'U'$

D $T_{-2, 4}(\Delta STU) = \Delta S'T'U'$

1. What will be the coordinates of Points S′?

a. (-5,5)   b. (-1,5)
c. (-5,-3)   d. (-1,-3)

3.   The trapezoid on the coordinate grid will be translated 6 units to the right. Refer to the figure below.

4.On your screen, draw the trapezoid in its new position after the translation. Label the new trapezoid Z'. Then describe this translation using translation notation.