Activity 30   Translations

Aim: Translate points and describe algebraically.

1. Describe what happens when an object is translated and what is the information required to describe the translation precisely?
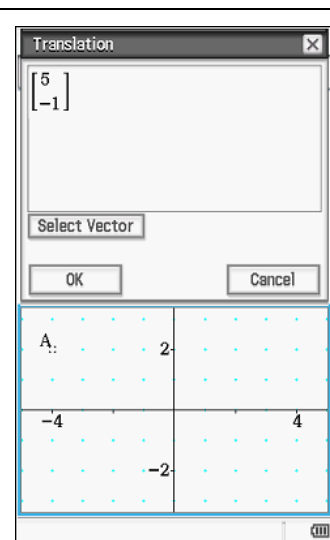
2.

| Translate objects in Geometry	
Setup • Open Main • Open a geometry window • Select [File | New] • Select [View | Grid | On] • Draw a point **Translate object** • Select object(s) in this case your point • Select [Draw | Construct | Translation] • Enter the values (in this case 5 and −1) • Tap OK	
Drag object into Main • Select the original point • Drag onto the command line in Main • Press [EXE] **Drag object and image into Main** • Select the point and its translation • Drag onto a new command line in Main • Press [EXE]	
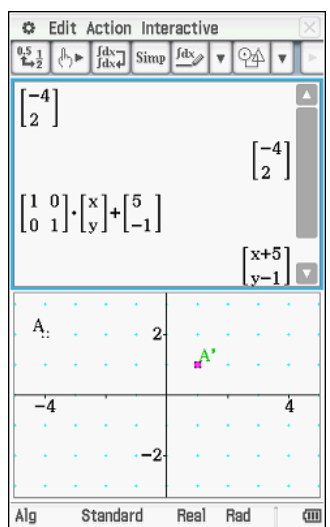
The transformation is displayed in the form $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} a \\ b \end{bmatrix}$.

a)   Expand this by hand.

b)   What is the effect of pre-multiplying $\begin{bmatrix} x \\ y \end{bmatrix}$ by the 2×2 identity matrix?

c)   What is the meaning of a and b in the context of a translation?

3.   Draw a vector diagram on your ClassPad to represent the translation of point A (−4, −2) to A' (1, 1). Record a copy of your diagram.

4.   What single transformation is equivalent to successive translations of

a) $\begin{bmatrix} 3 \\ -4 \end{bmatrix}$ and $\begin{bmatrix} -2 \\ 2 \end{bmatrix}$

b) $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$ and $\begin{bmatrix} 2 \\ -3 \end{bmatrix}$

5.   Suggest at least two alternative sequences of translations that are equivalent to

a) $\begin{bmatrix} 0 \\ 21 \end{bmatrix}$

b) $\begin{bmatrix} 2a - 3b \\ a + b \end{bmatrix}$

Extension
Explore translations of other shapes and objects.