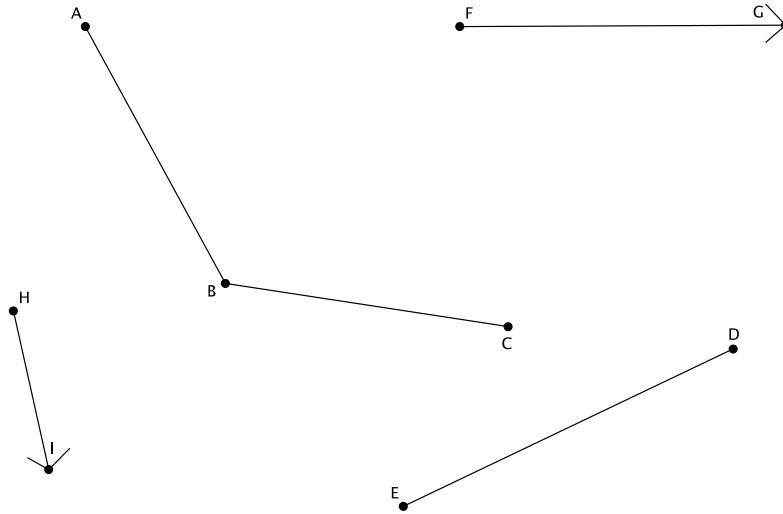


## Lesson 7: Sequencing Translations

### Classwork

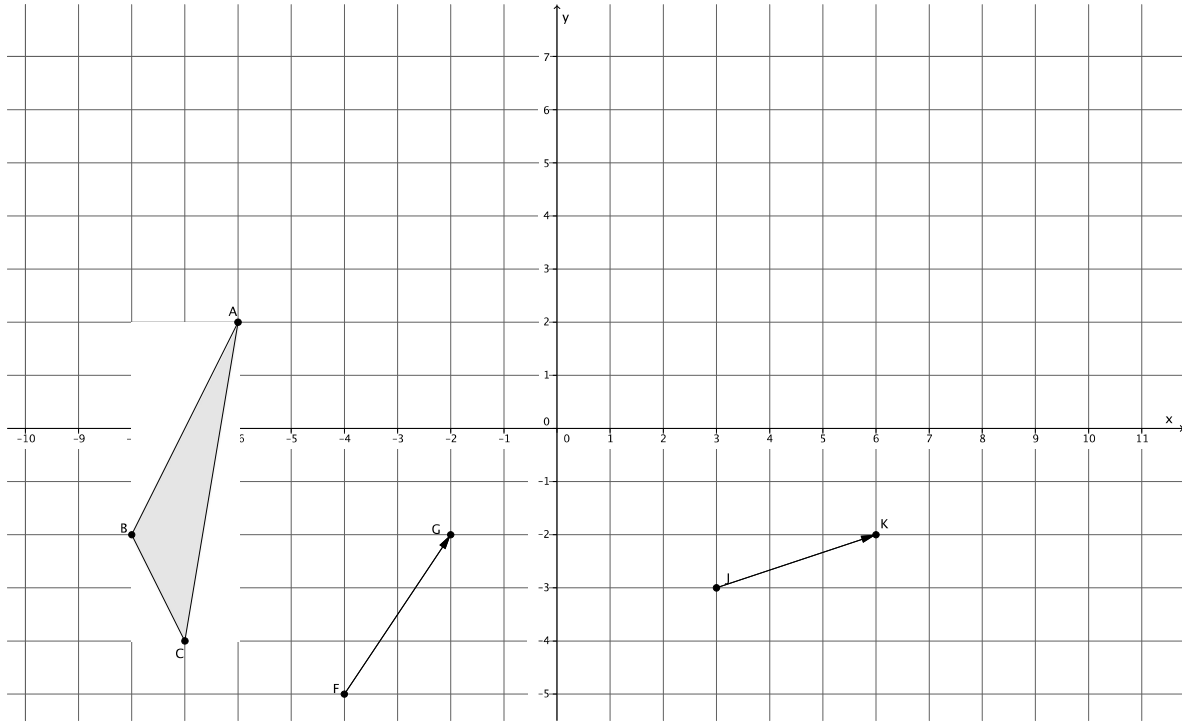
#### Exploratory Challenge

1.

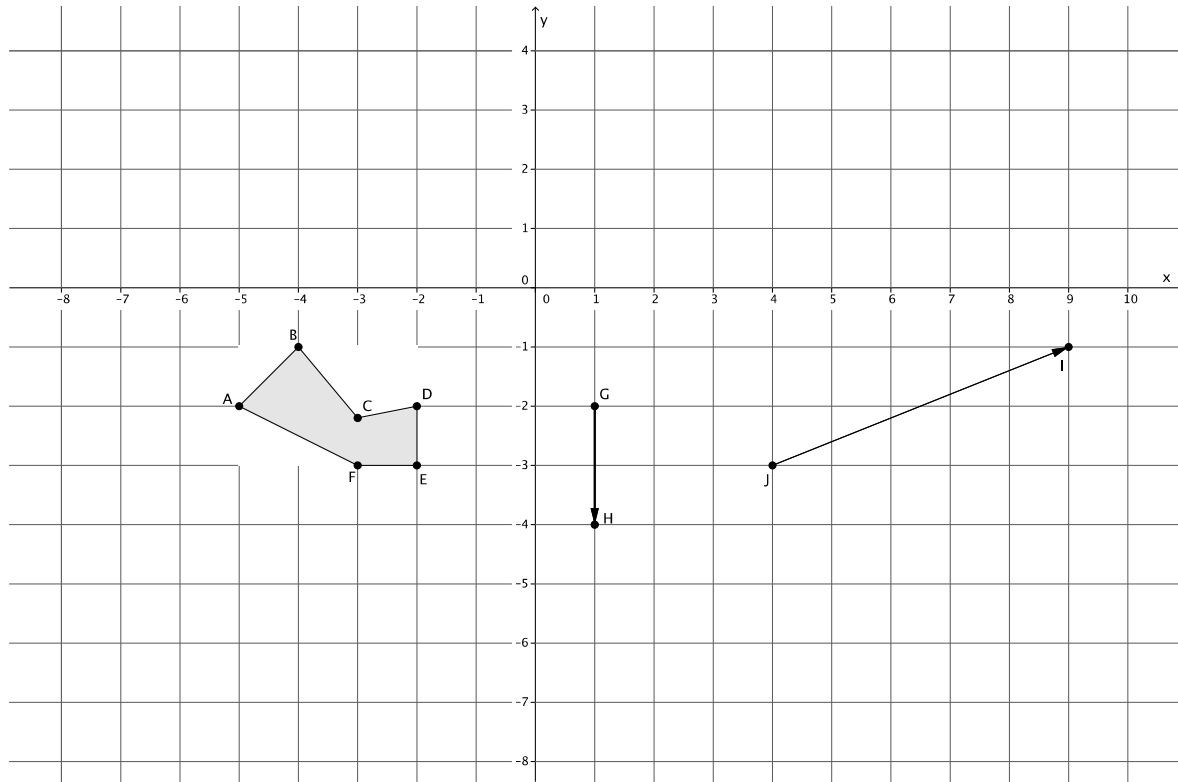


- Translate  $\angle ABC$  and segment  $ED$  along vector  $\overrightarrow{FG}$ . Label the translated images appropriately, i.e.,  $A'B'C'$  and  $E'D'$ .
- Translate  $\angle A'B'C'$  and segment  $E'D'$  along vector  $\overrightarrow{HI}$ . Label the translated images appropriately, i.e.,  $A''B''C''$  and  $E''D''$ .
- How does the size of  $\angle ABC$  compare to the size of  $\angle A''B''C''$ ?
- How does the length of segment  $ED$  compare to the length of the segment  $E''D''$ ?
- Why do you think what you observed in parts (d) and (e) were true?

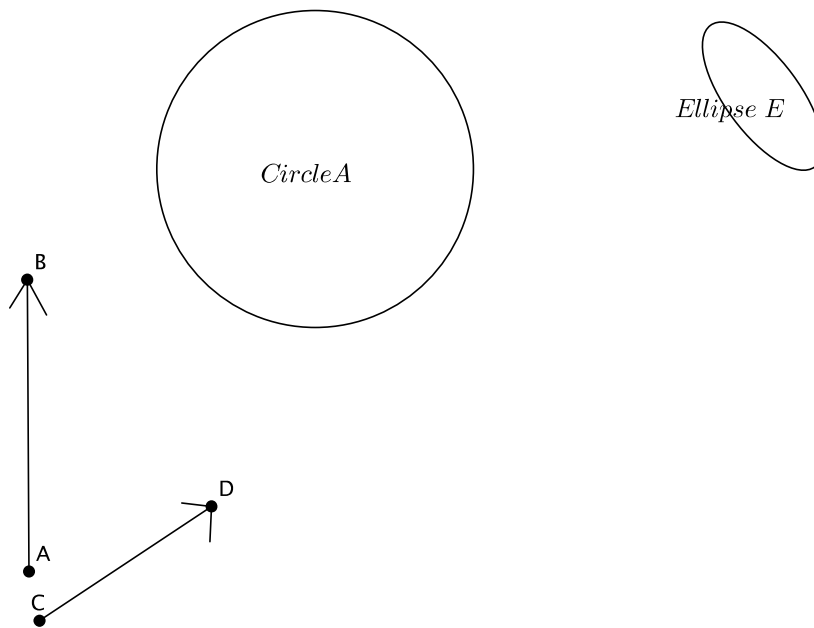
2. Translate  $\triangle ABC$  along vector  $\overrightarrow{FG}$  and then translate its image along vector  $\overrightarrow{JK}$ . Be sure to label the images appropriately.



3. Translate figure  $ABCDEF$  along vector  $\overrightarrow{GH}$ . Then translate its image along vector  $\overrightarrow{JI}$ . Label each image appropriately.

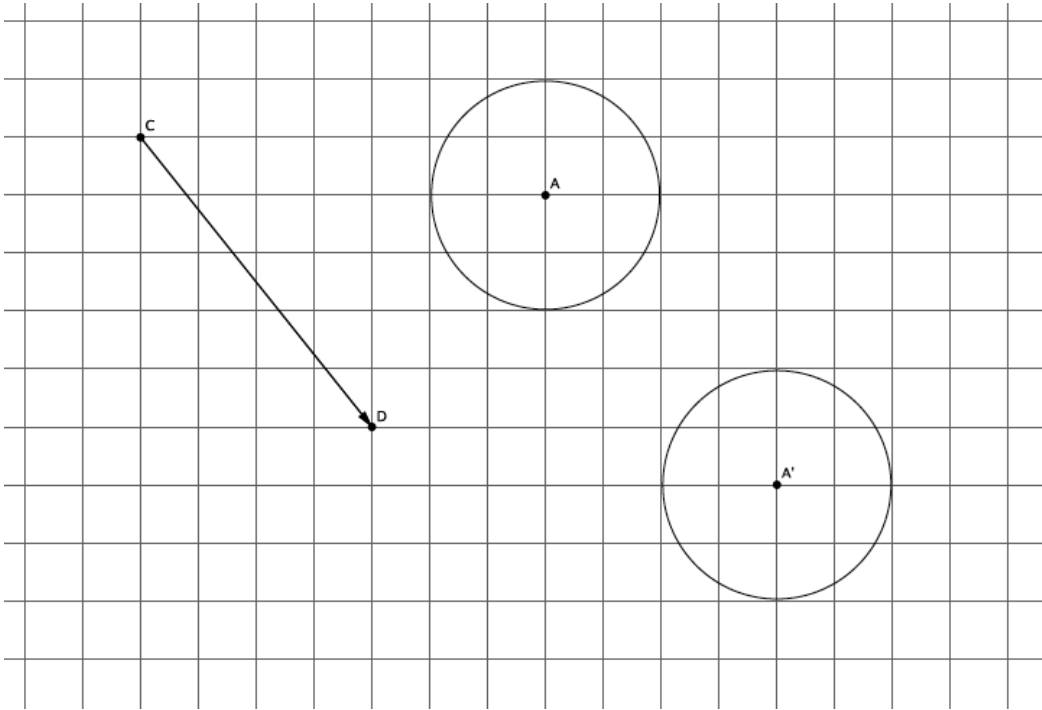


4.



- a. Translate Circle  $A$  and Ellipse  $E$  along vector  $\overrightarrow{AB}$ . Label the images appropriately.
- b. Translate Circle  $A'$  and Ellipse  $E'$  along vector  $\overrightarrow{CD}$ . Label each image appropriately.
- c. Did the size or shape of either figure change after performing the sequence of translations? Explain.

5. The picture below shows the translation of Circle A along vector  $\overrightarrow{CD}$ . Name the vector that will map the image of Circle A back onto itself.



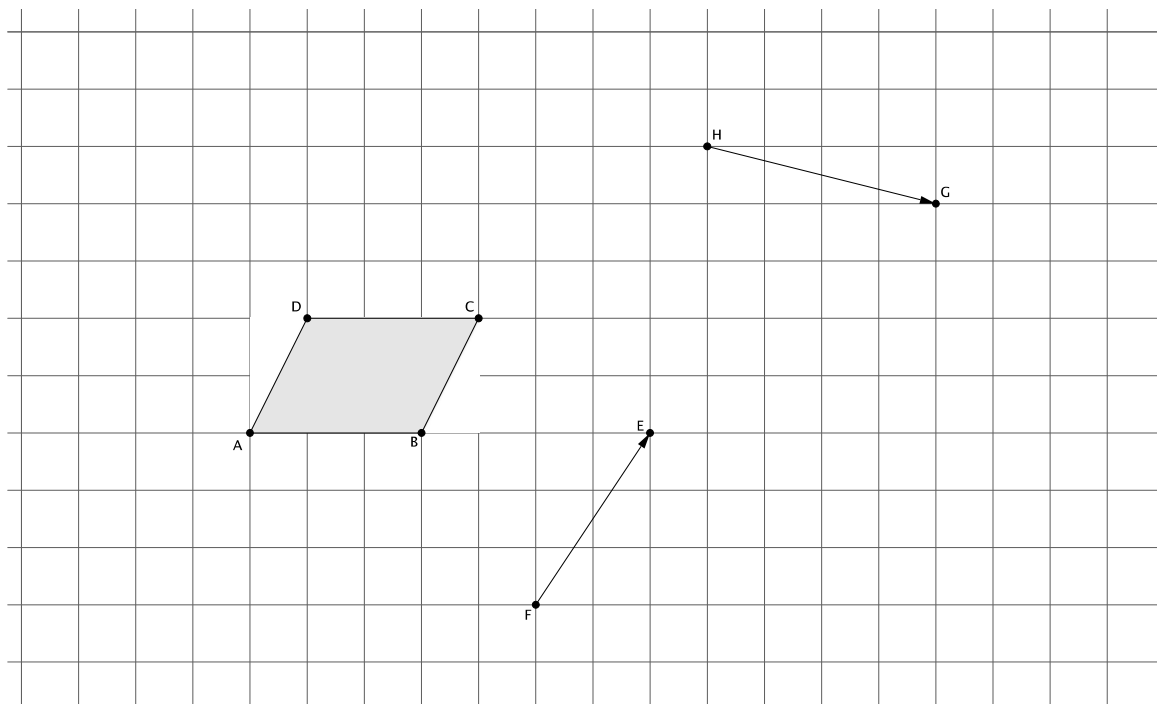
6. If a figure is translated along vector  $\overrightarrow{QR}$ , what translation takes the figure back to its original location?

**Lesson Summary**

- Translating a figure along one vector then translating its image along another vector is an example of a sequence of transformations.
- A sequence of translations enjoys the same properties as a single translation. Specifically, the figures' lengths and degrees of angles are preserved.
- If a figure undergoes two transformations,  $F$  and  $G$ , and is in the same place it was originally, then the figure has been mapped onto itself.

**Problem Set**

1. Sequence translations of Parallelogram  $ABCD$  (a quadrilateral in which both pairs of opposite sides are parallel) along vectors  $\overrightarrow{HG}$  and  $\overrightarrow{FE}$ . Label the translated images.



2. What do you know about  $AD$  and  $BC$  compared with  $A'D'$  and  $B'C'$ ? Explain.
3. Are  $A'B'$  and  $A''B''$  equal in length? How do you know?
4. Translate the curved shape  $ABC$  along the given vector. Label the image.

5. What vector would map the shape  $A'B'C'$  back onto  $ABC$ ?

