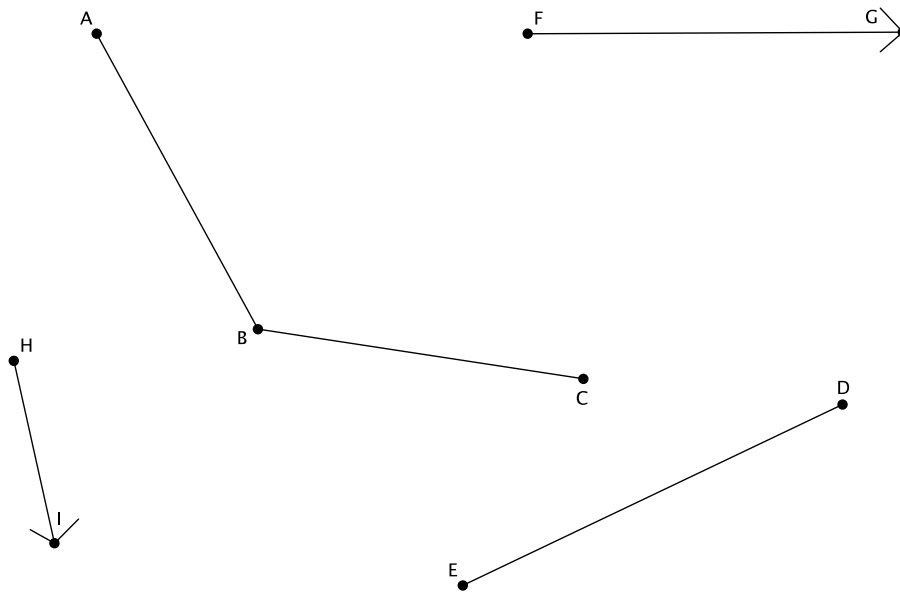


## Lesson 7: Sequencing Translations

### Classwork

#### Exploratory Challenge/Exercises 1–4

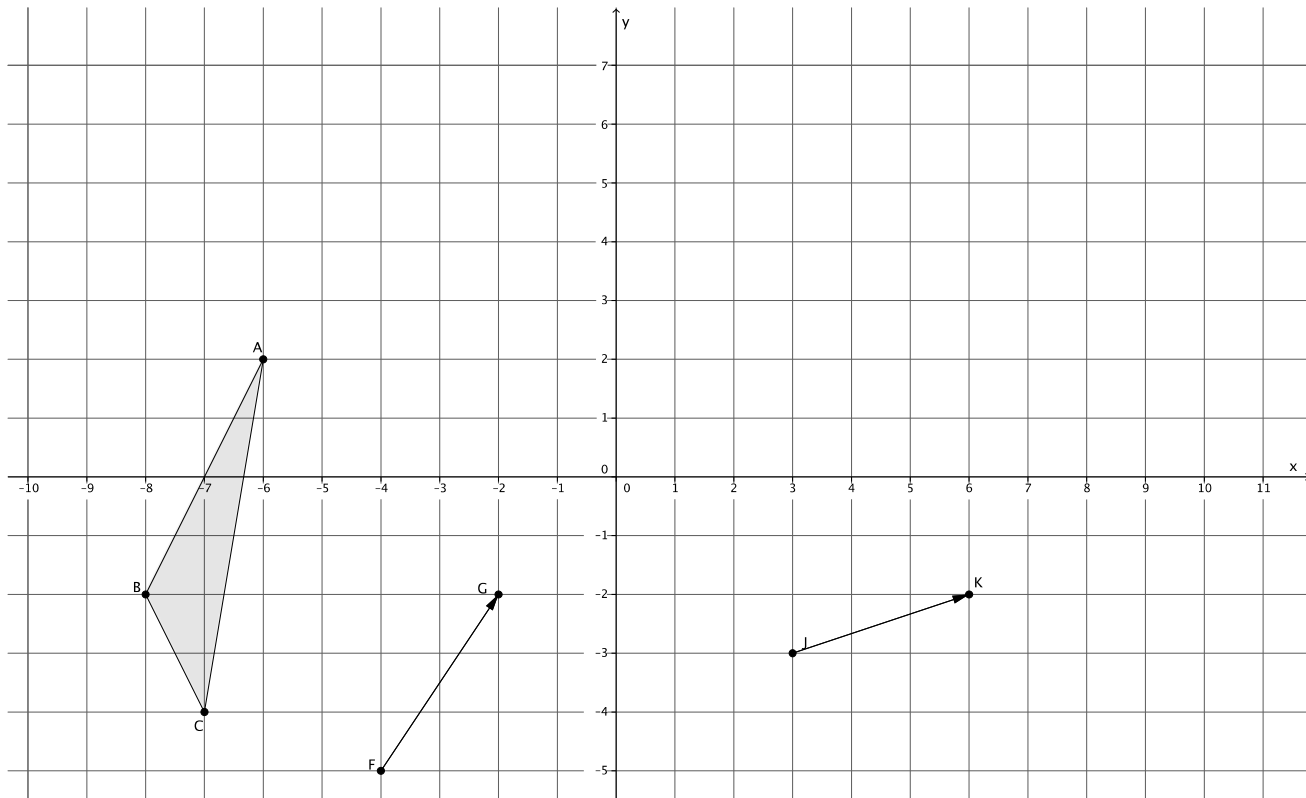
1.



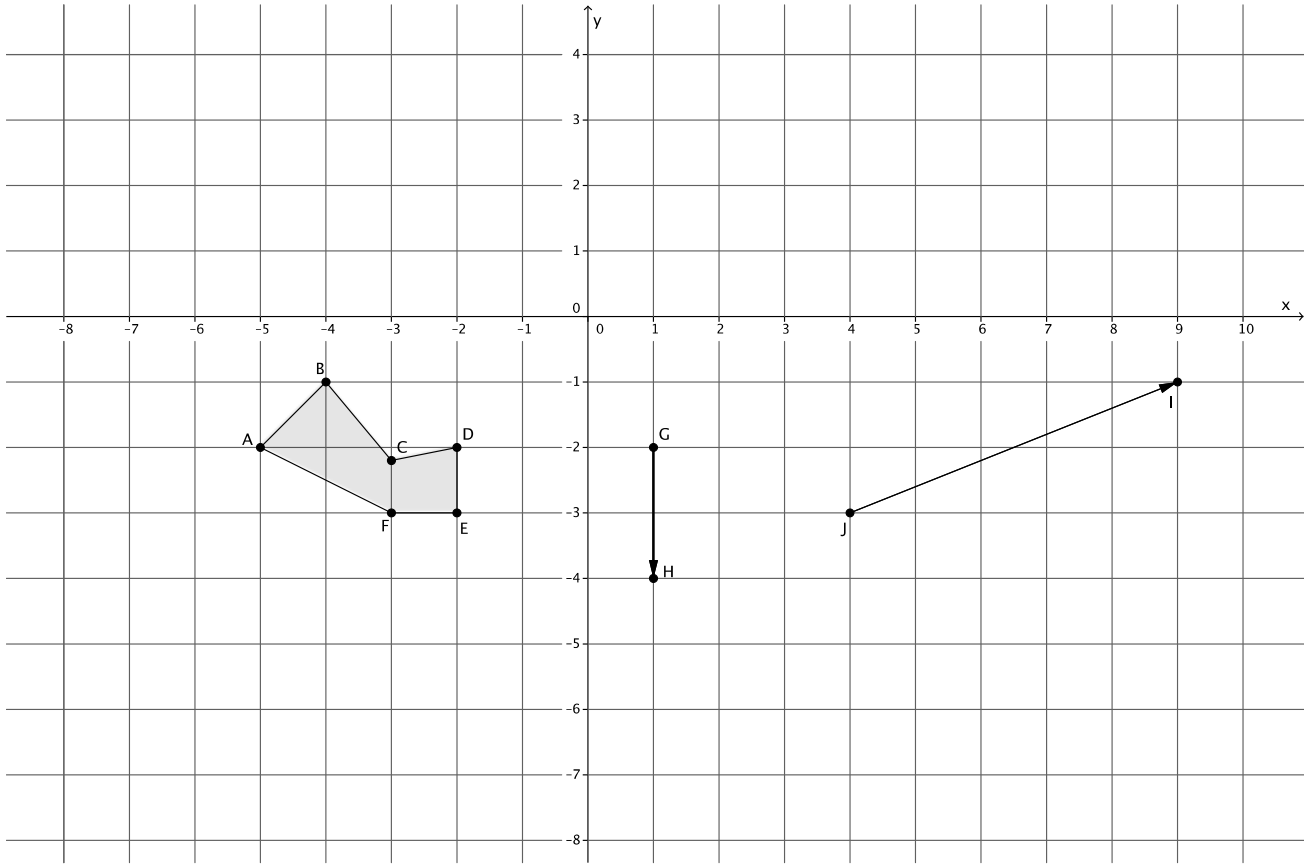
- Translate  $\angle ABC$  and segment  $ED$  along vector  $\overrightarrow{FG}$ . Label the translated images appropriately, that is,  $\angle A'B'C'$  and segment  $E'D'$ .
- Translate  $\angle A'B'C'$  and segment  $E'D'$  along vector  $\overrightarrow{HI}$ . Label the translated images appropriately, that is,  $\angle A''B''C''$  and segment  $E''D''$ .
- How does the size of  $\angle ABC$  compare to the size of  $\angle A''B''C''$ ?

- d. How does the length of segment  $ED$  compare to the length of the segment  $E''D''$ ?
  
- e. Why do you think what you observed in parts (d) and (e) were true?

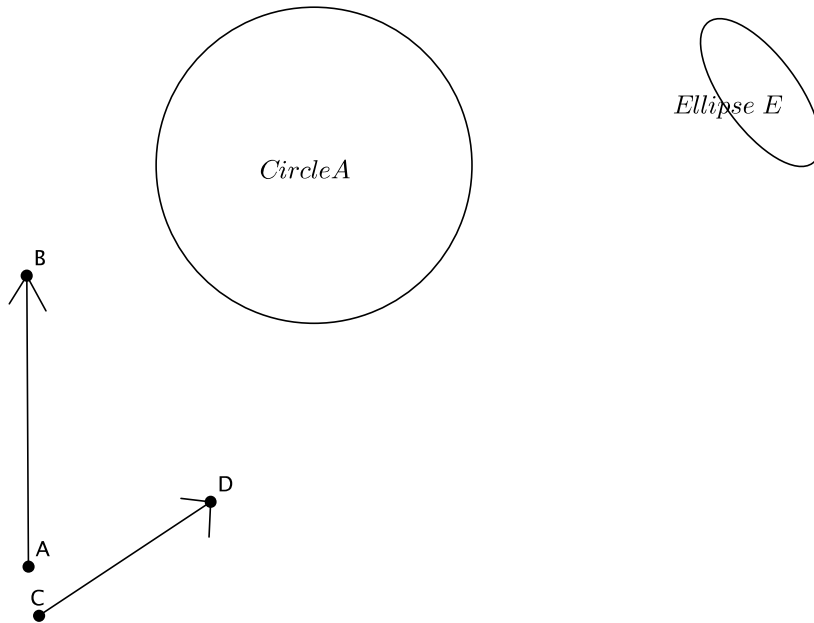
2. Translate  $\triangle ABC$  along vector  $\overrightarrow{FG}$ , and then translate its image along vector  $\overrightarrow{JK}$ . Be sure to label the images appropriately.



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

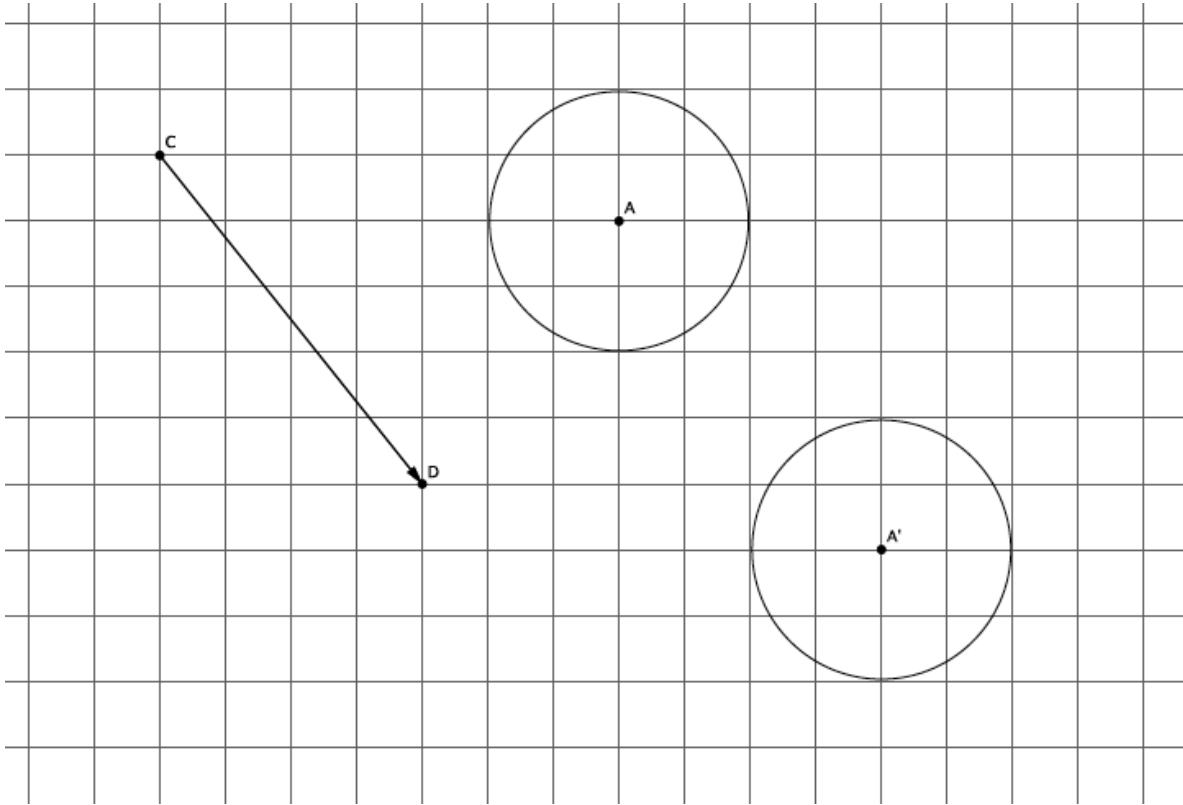


4.



- 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 maps the image of Circle  $A$  back to its original position.



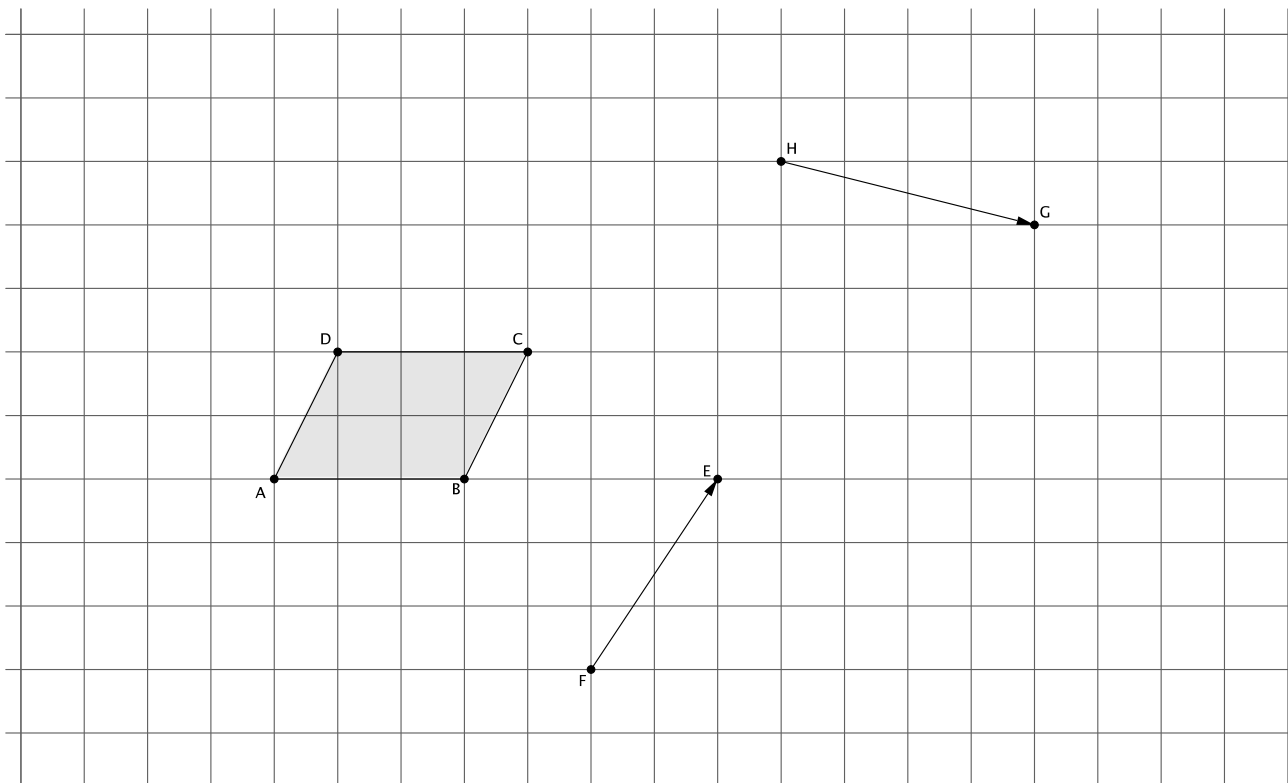
6. If a figure is translated along vector  $\overrightarrow{QR}$ , what translation takes the figure back to its original location?

**Lesson Summary**

- Translating a figure along one vector and 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.

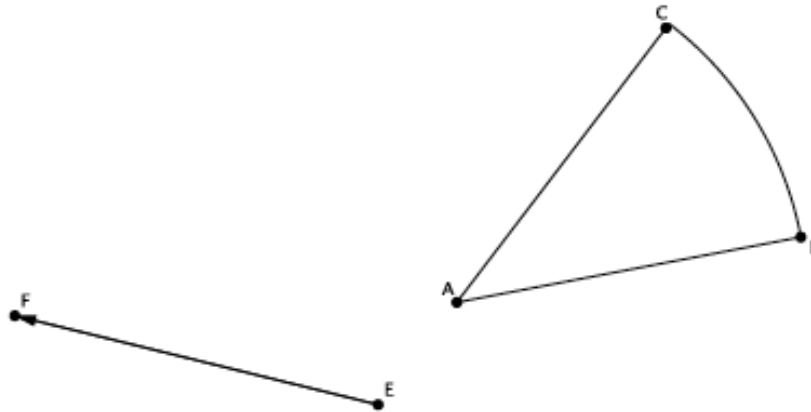
**Problem Set**

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  $\overline{AD}$  and  $\overline{BC}$  compared with  $\overline{A'D'}$  and  $\overline{B'C'}$ ? Explain.
3. Are the segments  $A'B'$  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 shape  $ABC$ ?