

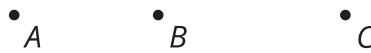


# Dilations on a Square Grid

Let's dilate figures on a square grid.

## 4.1 Estimating a Scale Factor

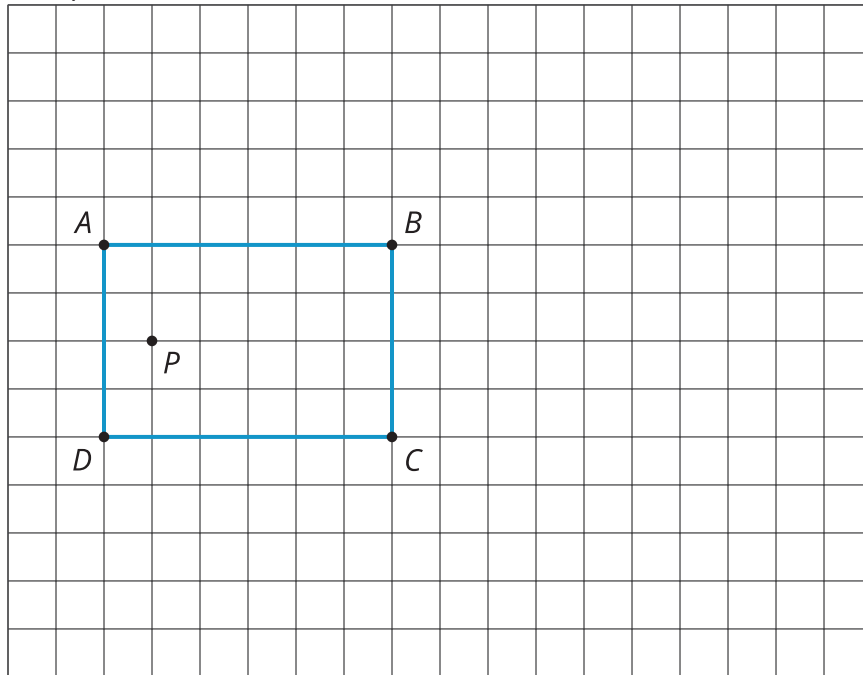
Point  $C$  is the dilation of point  $B$  with center of dilation  $A$  and scale factor  $s$ .



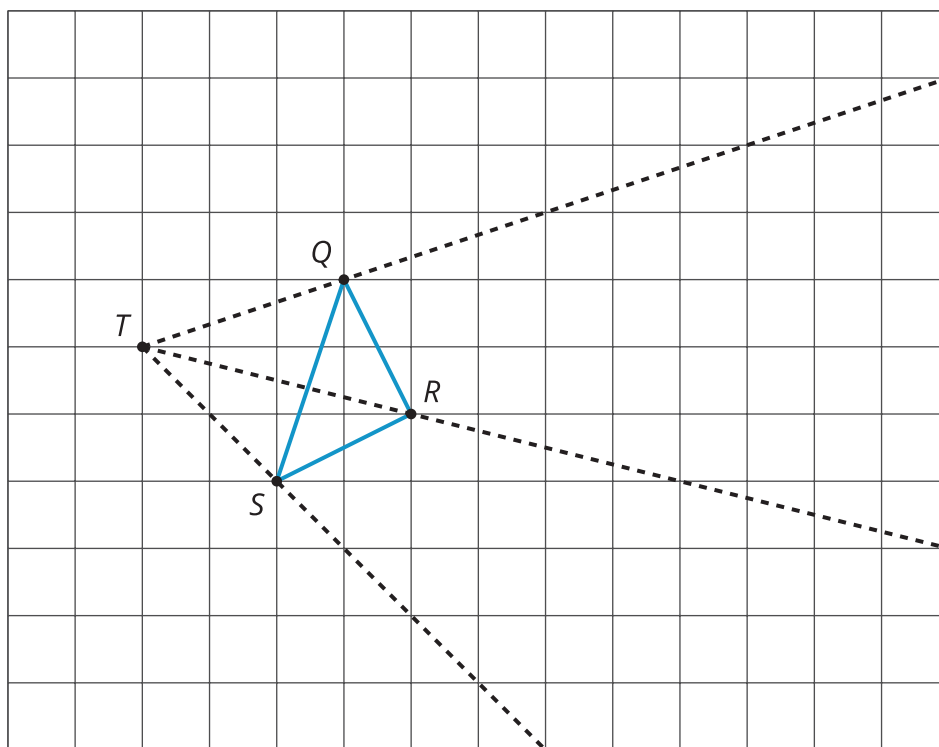
Estimate  $s$ . Be prepared to explain your reasoning.

## 4.2 Dilations on a Grid

1. Draw the image of quadrilateral  $ABCD$  after a dilation with center  $P$  and scale factor 2.



2. Draw the image of triangle  $QRS$  after a dilation with center  $T$  and scale factor 2.
3. Draw the image of triangle  $QRS$  after a dilation with center  $T$  and scale factor  $\frac{1}{2}$ .



## 4.3

## Card Sort: Matching Dilations on a Coordinate Plane

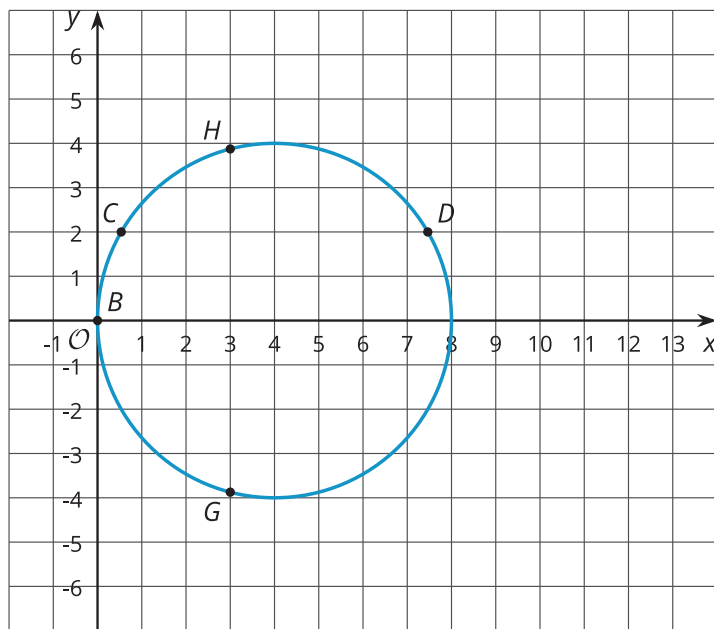
Your teacher will give you a set of cards containing descriptions of dilations and graphs. Match each number card showing a figure in the coordinate plane with a letter card describing the image after the given dilation. Record your matches and be prepared to explain your reasoning.

One of the number cards will not have a match. For this card, you will need to draw an image.



## Are you ready for more?

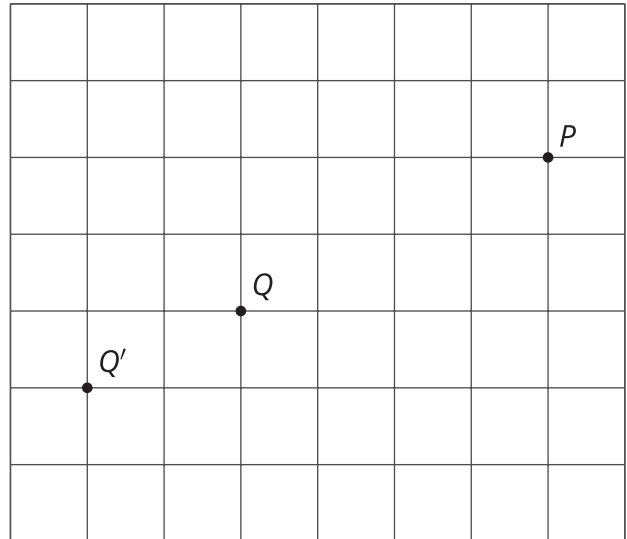
The image of a circle under dilation is a circle when the center of the dilation is the center of the circle. What happens if the center of dilation is a point on the circle? Using center of dilation  $(0, 0)$  and scale factor 1.5, dilate the circle shown on the diagram. This diagram shows some points to try dilating.



## Lesson 4 Summary

Square grids can be useful for showing dilations, especially when the center of dilation and the point(s) being dilated lie at grid points. Rather than using a ruler to measure the distance between the points, we can count grid units.

For example, the dilation of point  $Q$  with center of dilation  $P$  and scale factor  $\frac{3}{2}$  will be 6 grid squares to the left and 3 grid squares down from  $P$ , since  $Q$  is 4 grid squares to the left and 2 grid squares down from  $P$ . The dilated image is marked as  $Q'$ .



Sometimes the square grid comes with coordinates, giving us a convenient way to name points. Sometimes the coordinates of the image can be found just using arithmetic, without having to measure.

For example, to perform a dilation with center of dilation at  $(0, 0)$  and scale factor 2 on the triangle with coordinates  $(-1, -2)$ ,  $(3, 1)$ , and  $(2, -1)$ , we can just double the coordinates to get  $(-2, -4)$ ,  $(6, 2)$ , and  $(4, -2)$ .

