Dilatations Learning Strategies

What should students be able to do within this interactive?

- Demonstrate that a scale factor will enlarge or reduce any shape.
- Demonstrate that for scale factors other than zero, the original shape and its dilatation image are either similar or congruent.
- Demonstrate that a scale factor of zero will reduce the image to a point at the dilatation centre.

Common mistakes made by students:

- not distinguishing the image from the original
- not recognizing a reduction or enlargement
- not seeing that the sides of the image are a product of the scale factor
- not using the rays from the dilatation centre to help in locating the image
- not recognizing that the placement of the dilatation centre affects the placement of the image
- not seeing that scale factor affects the image coordinates differently when the dilatation centre is off the origin

Curriculum Connections:

Please note all of the following correlations match outcomes in the new Mathematics Kindergarten to Grade 9 Program of Studies (2007).

Grade 7 Shape and Space SO4: Identify and plot points in the four quadrants of a Cartesian plan, using integral ordered pairs.

Grade 8 Shape and Space SO6: Demonstrate an understanding of the congruence of polygons.

Grade 9 Shape and Space SO3: Demonstrate an understanding of similarity of polygons.

Grade 9 Shape and Space SO4: Draw and interpret scale diagrams of 2-D shapes.
Print Activity notes:
*Note: The Print Activity is not intended to be an assessment piece

It is recommended that students use the “Explore It” mode to work through the Print Activity. Students will be asked to scale figures and draw the resulting image. They must also determine the connection between the original figure and the dilatation image as similar or congruent.

Questions on the Print Activity may be changed by opening it in Word format instead of PDF.

Dilatations Print Activity Key

Use the “Explore It” mode to answer the following questions.

1. Click on reset, then complete each statement:
   a. The colour of the original triangle is yellow and its vertices are labeled ABC.
   b. The colour of the image triangle is green and its vertices are labeled A'B'C'.
   c. The scale factor is 2.
   d. The dilatation centre is (0, 0).
   e. The image is similar to the original.
   f. The ordered pairs of the image are twice as large as the original.

2. Click on reset and complete the chart. Note: the dilatation center is labeled as D.C.

<table>
<thead>
<tr>
<th>Scale factor</th>
<th>D.C.</th>
<th>Size of image to original (larger/smaller/same)</th>
<th>Shape of image to original (similar/congruent)</th>
<th>Ordered pairs</th>
<th>(x, y) →</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>(0, 0)</td>
<td>Larger</td>
<td>Similar</td>
<td>A = (2, 3)</td>
<td>(x, y) → (3x, 3y)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A' = (6, 9)</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>(0, 0)</td>
<td>Larger</td>
<td>Similar</td>
<td>B = (2, 2)</td>
<td>(x, y) → (2.5x, 2.5y)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B' = (5, 5)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(0, 0)</td>
<td>Larger</td>
<td>Similar</td>
<td>C = (3, 2)</td>
<td>(x, y) → (2x, 2y)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C' = (6, 4)</td>
<td></td>
</tr>
</tbody>
</table>
2. Use the “Explore It” mode to assist you in drawing the image on the grid for each of the following.

a. Draw the image formed by a scale factor of 3 if the D.C. is at (-6, 3).

![Image of the grid showing the original and transformed shapes]

i) The image is larger than the original.

ii) The base of the original shape is 1 unit. The base of the image shape is 3 units.

iii) The image is similar to the original.
b. Draw the image formed by a scale factor of 2 if the D.C. is at (4, -3).

![Image](image_url)

i) The image is **larger than** the original.

ii) The base of the original shape is 1 unit.

   The base of the image shape is 2 units.

iii) The image is **similar** to the original.

c) Draw the image formed by a scale factor of 3 if the D.C. is at (3.5, 1).

![Image](image_url)

i) The image is **larger than** the original.

ii) The base of the original shape is 1 unit.

   The base of the image shape is 3 units.

iii) The image is **similar** to the original.
d. Draw the image formed by a scale factor of 0.5 if the D.C. is at (-9, -7).

<table>
<thead>
<tr>
<th>Original</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (2, 2)</td>
<td>A' (-4.01, -2.5)</td>
</tr>
<tr>
<td>B (1, 1)</td>
<td>B' (-4.01, -2.5)</td>
</tr>
<tr>
<td>C (3, 1)</td>
<td>C' (-3.01, -5)</td>
</tr>
<tr>
<td>D (3, 2)</td>
<td>D' (-3.01, -2.5)</td>
</tr>
</tbody>
</table>

Dilation Centre: (-9, -7)

Choose Original: 

Show: 

i) The image is **smaller than** the original.

ii) The base of the original shape is 2 units.
    The base of the image shape is 1 unit

iii) The image is **similar** to the original.

3. Compare any image to its original and answer the following:

   a. A scale factor **larger than** 1 always makes the image **larger than the original**.

   b. A scale factor **between 0 and 1** always makes the image **smaller than the original**.

   c. A scale factor of 1 always makes the image **the same as the original**.

   d. A scale factor of 0 always makes the image **reduce to a point**.