The Dilate Family lesson is at geometricfunctions.org/fc/unit1/dilate-family. In this lesson you will explore dilations and figure out how they are similar to, and different from, the other families you have already explored.

Warm-Up

There are only a few things you can drag or press in this activity. Can you can figure out how to score points? What’s the highest score you can get on page 1? If you want hints, or more challenges, explore the other pages.

**Q1** What do you notice about this game? What do you wonder?

Construct Dilate Functions

To start this activity, dilate a point and describe how the variables behave.

1. Use the first three tools    to create a dilate function.

2. Drag independent variable *x* and observe the behavior of *DC,s*(*x*). Then change *s* to 2 and drag *x* again.

**Q2** What do you notice about the behavior of *x* and *DC,s*(*x*)? What do you wonder?

3. On **page 2** of the sketch, construct a new dilate function. Set the scale factor to 2.

**Q3** Turn on tracing for both variables, drag *x* to make an interesting pattern, and draw a picture of the result in the space below on the left. Be sure to mark *x, C,* and *DC,s(x)* in your picture.

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| --- | --- |
| *s* = 2 | *s* = 0.5 |

**Q4** Change the scale factor to 0.50. (By changing s, you change the function rule and create a different function. Your traces came from a different function, so erase them now.) Drag *x* again, and draw your result on the right.

**Q5** What do you notice about the relative direction of the two variables? As you drag *x* in a particular direction*,* how can you describe which way *DC,s(x)* goes? Are the relative directions the same or different for your two scale factors?

**Q6** What do you notice about the relative speed of the two variables? As you drag *x,* how can you describe the speed of *DC,s(x)*? Are the relative speeds the same or different for your two scale factors?

**Q7** Drag *x* to try to find fixed points of the dilate function. (Remember, a *fixed point* is a place where *x* and *DC,s(x)* come together at the same time.)

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| What did you find out? |

Use Different SCALE FACTORs

5. On **page 3** of the sketch, begin by attaching independent variable *x* to a polygon. Then construct a dilate function and drag or animate *x* around the polygon

**Q8** How are the traces of the dependent variable related to the shape of the polygon?

**Q9** Try some different dilate functions, using different center points and different scales. What do you notice about the sizes and shapes of the two traces?

**Q7** On **page 4** you can use negative scale factors. When you use a negative scale factor, what do you notice about the motion of the variables?

**Q8** What effect does a negative scale factor have on the shape of the traces?

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| --- | --- | --- |
| **s = –1.00** | **Drag *x* left** | **Drag *x* up** |
| Which way does *DC,s*(*x*) move? |  |  |
| Which variable moves faster? |  |  |
| Which makes a bigger design? |  |  |

**Q9** What do you think would happen if you make *s* = 0.00? Test your guess.