

In this activity you will investigate *families of functions*. Functions from the same family behave similarly. Functions from different families behave differently.

INVESTIGATE FUNCTION BEHAVIOR

1. Open **Family Resemblances.gsp**. Page 1 contains four functions.
2. Try to drag each of the points on this page.

Q1 How do the labels of the points help you determine which points are independent variables and which are dependent variables?

Q2 How do the labels help you determine which dependent variable is related to each independent variable?

3. Press *Tracing On*. Then drag each independent variable to make a small shape such as a circle or triangle.



Q3 Describe how each function behaves, based on the shapes. Circle the name of the function that's different.

Write complete sentences. Use a separate sheet if you need more room.

Function	Behavior
f	
g	
h	
j	

4. On page 2, turn on tracing and drag the independent variables. You may have to drag farther on this page to see the differences.

Q4 Which function behaves differently? Describe the behavior of the three similar functions, and tell how the other function behaves differently.

5. On page 3, turn on tracing and drag the input variables. For each function, try to drag the independent variable to bring the input and output variables together in the same location. (Such a location is called a *fixed point* of the function.)

Q5 Which function is different? Use the fixed points to describe how three functions are similar and the fourth is different.

6. Trace the functions on page 4. For each function, drag the input variable in a straight line and notice the direction of the output variable.

Q6 Which function is different? Use the relative directions of the traces to describe the similarities and differences.

7. Trace the functions on page 5. For each function, drag the input variable in a straight line and notice the speed of the output variable.

You can use the lengths of the traces to help judge the relative speeds of the variables.

Q7 Which function is different? Use the relative speeds of the traces to describe the similarities and differences.

Q8 For pages 6, 7, and 8, list the different function in the Fn column, and describe how it's different.



Page	Fn	Describe the difference
6		
7		
8		

Q9 For pages 9, 10, and 11, drag the pictures. Then list the different function and describe how it's different.

On p. 9, identify the different function by its letter. On pp. 10–11, name the animal or the shape.

Page	Different Function	Describe the difference
9		
10		
11		

EXPLORE MORE

- On page 12, follow the directions to reflect three of the independent variables, and to rotate the fourth variable. Hide the mirror and the center point, and challenge a friend to figure out which function is different from the others.
- On pages 13 and 14, use transformations to make a challenge for your partner. For tips on using transformations, choose **Help | Using Sketchpad | Sketchpad Tips | Transform** and then click the  icon for **Translate, Rotate, Dilate, or Reflect**. (Don't click the  icon unless you have headphones.)