Are You My Parent? A Family of Linear Graphs.

To begin, open the file Parent Function on the TI-Nspire. Go to the (⌂) key and press number 7, My Documents. Open the document entitled Parent Function. Remember, to turn a page press (ctrl) ▶.

The definitions of family of graphs and parent graph are given. Study the definitions and be prepared to answer questions and identify family functions and parent functions.

ARE YOU MY PARENT?
A family of linear graphs

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Problem 1:

On page 1.4 graph the function f(x) = x. To graph the line press (ctrl)(G) to show the function line and type in f1(x) = x, then hit (enter). The graph will show with the function posted next to the line. If you wish to move the function hover over the function notation until you get the open hand and hold the (⊙) until the hand closes. Move the function notation wherever you wish on the graph.

*A **Family of Graphs** has at least one thing in common that makes them different from other groups of graphs.

*Families of graphs fall into two categories. Those with the **same slope** and those with the **same x− or y− intercept**.

*A **Parent Graph** is the simplest of the graphs in a family.

1.   What does the graph look like?

2   Where does it cross the y-axis?

3   What is the slope of the line?

Go back to the graph on page 1.4 and insert the functions f(x) = 2x and f(x) = $\frac{x}{2}$. Go back to the graph, if you do not see the function line press (ctrl)(G). Enter beside f2(x), 2x, press (enter) and the function will graph and advance to the next function f3(x). Enter $\frac{x}{2}$ and press enter. If you want to distinguish between the three graphs, change the attributes of the lines to make one bold and one dashed. Compare the traits of all of the lines.   To change the attributes press (menu)(1) Actions, (4) Attributes then scroll to the line that you wish to make a change and press (⊙) make the desired change and press (enter).

Graph the function f(x) = x on the next page. After graphing the line answer the following question.

Question

What does the graph look like? Where does it cross the y axis? What is the slope of the line?

Answer   ⧉
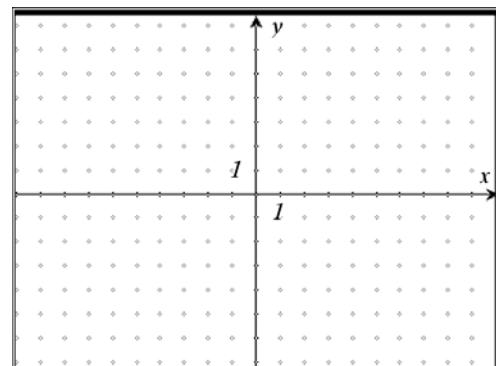
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Answer the following questions while examining the graphs.

4. Do these lines appear to be a family of graphs? Why or why not?

Go back to the graph on page 1.4 and insert the functions f(x) = 2x and f(x) = $\frac{x}{2}$.
Do these lines appear to be a family of graphs?
✓ ○ Yes
✓ ○ No

5. What do the graphs have in common?

What do the graphs have in common?
Student types answer here

6. What is the parent function?

What is the parent function?
Student types answer here
Suggested Response:

Next, turn to the next page. Click on the ▾ and insert the function you wish to insert. After inserting the first function toggle over and insert the other two functions. Look at the function tables and compare the function tables to the graphs on page 1.4. Then answer the following questions.

On the next page complete the function table. After completing the table answer the following questions.

7. How are the function tables and the graphs related?

How are the function table and the graphs related? List some of the things the table and graph have in common.
Student types answer here

8. List some of the things the function table and graph have in common. Interpret the sequences and predict what will follow on the table. Interpret the change in x to the change in y.

-1.	
0.	
1.	
2.	
3.	
4.	

2

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Questions to think about:

9. Would it change the y-intercept to add 3 to each of the functions?

10. Would it change the slope?

11. Are the functions still a family of functions?

12. Do they still have the same parent functions?

Go back to the graph on page 1.4 and go the function line and insert +3 to each of the functions f1(x) = x, f2(x) = 2x, and f3(x) = $\frac{x}{2}$.

13. Did it change the y-intercept?

14. Did it change the slope?

15. Is there still a parent function?

16. If you multiplied the slope of each of the graphs by 4 what would happen to the linear graphs? Would it change the y-intercept? Would it change the slope?

Would it change the y intercept to add +3 to each of the functions? Would it change the slope? Are the functions still a family of functions? Do they all still have the same parent function?

Suggested Response:

Type suggested response here (optional)

Go back to the graphs on page 1.4 and add +3 to each function.

After you added the +3 to each function did it change the y intercept? Did it change the slope? Is there still a parent function?

Student types answer here

Go back to the graphs on page 1.4 and add +3 to each function.

After you added the +3 to each function did it change the y intercept? Did it change the slope? Is there still a parent function?

Student types answer here

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Problem 2

Graph the functions f(x) = x, f(x) =x-2, and f(x) =x+2. Answer the questions about the graph.

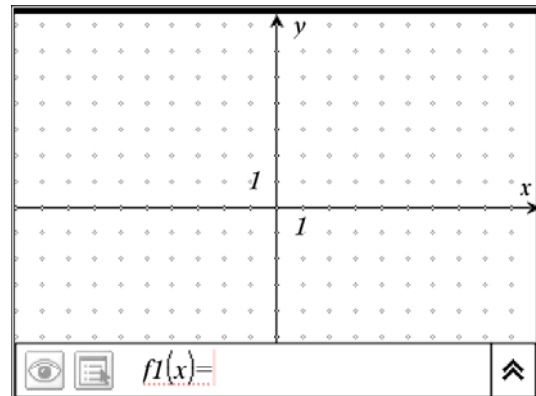17. What are the similarities and differences of the functions?

18. Do they appear to be a family of graphs?

19. What appears to be the parent graph?

20. What makes them a family of graphs? What are their similarities?

On page 2.2 graph the functions f(x) =x, f(x) = x − 2, f(x) = x + 2

Look at the similarities and differences in the functions.

$f1(x)=$

Do they appear to be a family of graphs?

- ○ Yes
- ○ No

What appears to be the parent graph?

Student types answer here

Suggested Response:

What makes them a family of graphs? What are their similarities?

Student types answer here

Suggested Response:
Type suggested response here (optional)

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Extension #1:

Graph the functions and answer the questions. Analyze the functions and discuss the family of functions and parent functions.

Extension #1:

Graph the functions $f(x) = -x$, $f(x) = -2x$, $f(x) = -\dfrac{x}{2}$ Look at the similarities and differences. What happens to the slope and y=intercepts? Are they a family of functions? What is the parent function?

Extension #2:

Graph the functions and answer the questions. Analyze the functions and discuss the family of functions and parent functions.

Extension #2:

Graph $f(x) = -x$, $f(x) = -x+3$, and $f(x) = -x-3$. Look at the similarities and differences. What happens to the slope and y−intercepts? Are they a family of functions? What is the parent function?

Extension #3:

Graph your own family of functions. What is the parent function?

Extension#3: Come up with your own set of 3 functions that are a family of graphs that have the same y intercept besides (0,0).Discuss the properties of each graph.