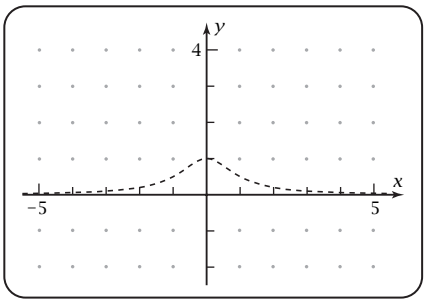
Name: _____ Group Members: _____

Exploration 1-3b: Translations and Dilations, Algebraically

Date: _____

Objective: Find the effect on a function graph of adding and multiplying by constants.

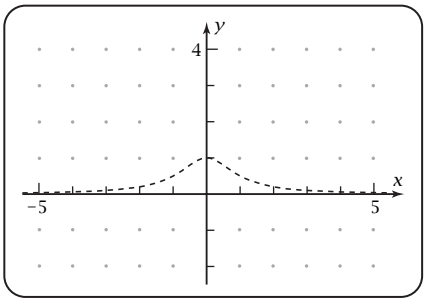
1. The graph shows the **pre-image** function $f(x) = \frac{1}{1 + x^2}$. Plot this graph as y_1 on your grapher. Use the window shown, using GRID ON format.



2. Plot the graph of $y_2 = f(x) + 3$. Sketch the result on the graph in Problem 1.

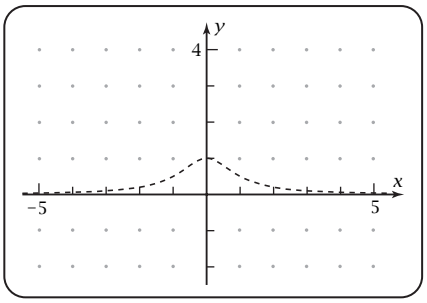
3. The transformation in Problem 2 is a **vertical translation** of 3. Give the meaning of a vertical translation.

4. Deactivate y_2 from Problem 2. Then plot $y_3 = f(x - 3)$. Sketch the result here.



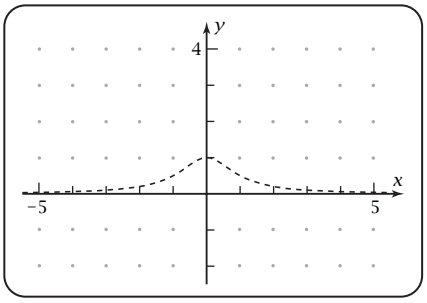
5. What words describe the transformation in Problem 4?

6. Deactivate y_3 from Problem 4. Then plot $y_4 = 3f(x)$. Sketch the result here.



7. The transformation in Problem 6 is a **vertical dilation** by a factor of 3. Give the meaning of a vertical dilation, and explain how it differs from a vertical translation.

8. Deactivate y_4 from Problem 7. Then plot $y_5 = f(3x)$. Sketch the result here.



9. The transformation in Problem 8 is a **horizontal dilation.** By what factor is the graph dilated?

10. What did you learn as a result of doing this Exploration that you did not know before?