Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_

 **Using Transformations to Graph Linear Functions**

Learning Goals

* Identify and use a vertical shift to graph a linear function.
* Identify and use a vertical stretch or compression to graph a linear function.
* Combine transformations to graph a linear function.

 =turn and talk. Stop and share your responses with your partner.

Activity

1. **Explore** the slope-intercept screen for 5 minutes and think of 1-3 questions or observations.

 2. Check the “$y=x$” checkbox and play around with the sim. A linear parent function is the equation $y=x$. How would you describe the linear parent function, $y=x$?



 3. Graph the equations on the same screen. Hit “save line”  after each line.

|  |  |
| --- | --- |
| Function | How is the parent function transformed? Check any that apply. |
| $y=x+6$ |  [ ] shifts up [ ] shifts down [ ] more steep [ ] less steep |
| $y=x+3$ |  [ ] shifts up [ ] shifts down [ ] more steep [ ] less steep |
| $y=x-3$ |  [ ] shifts up [ ] shifts down [ ] more steep [ ] less steep |
| $y=x-6$ |  [ ] shifts up [ ] shifts down [ ] more steep [ ] less steep |

 How does changing the value of ***b*** transform the graph of an equation in the form $y=mx+b$?



 4. Erase the lines  and graph the equations below on the same screen. Hit “save line” after each line.

|  |  |
| --- | --- |
| Function | How is the parent function transformed? Check any that apply. |
| $y=\frac{1}{2}x$ |  [ ] shifts up [ ] shifts down [ ] more steep [ ] less steep [ ] reflection |
| $y=2x$ |  [ ] shifts up [ ] shifts down [ ] more steep [ ] less steep [ ] reflection |
| $y=-2x$ |  [ ] shifts up [ ] shifts down [ ] more steep [ ] less steep [ ] reflection |
| $y=-\frac{1}{2}x$ |  [ ] shifts up [ ] shifts down [ ] more steep [ ] less steep [ ] reflection |

 How does changing the value of ***m*** transform the graph of an equation in the form $y=mx+b$?



 5. Erase the linesand graph the equations, $y=2x+5$ and $y=-2x+5$ on the same screen.

 How does changing the sign of **m** transform the graph of the equation?



6. Erase the lines . Use the sim to find the equation of each graph below. Describe how each line transformed.

|  |  |  |
| --- | --- | --- |
| Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ [ ] shifts up [ ] shifts down  [ ] more steep [ ] less steep  | Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ [ ] shifts up [ ] shifts down  [ ] more steep [ ] less steep  | Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ [ ] shifts up [ ] shifts down  [ ] more steep [ ] less steep  |



7. Without using the sim, graph $y=\frac{1}{2}x-3$ using transformations.

*Describe the transformations to the parent function.*

*Do you have to sketch the graph in the order of the transformation? What happens if you sketch it out of order?*

 How would you tell another student to graph using transformations?

8. Summary. *Fill in the blanks.*

The graph gets **less steep** when the slope is between \_\_\_\_ and \_\_\_\_. This is called a **vertical compression** of the parent function. The graph gets **more steep** when the slope is \_\_\_\_\_\_\_\_\_\_ than 1. This is called a **vertical stretch** of the parent function. **Reflections** happen when the slope is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. **Vertical shifts** happen when the y-intercept is not equal to \_\_\_\_\_.