|  |
| --- |
| **INVESTIGATION: Type** $y=af(x)$1. On the same set of axes, sketch the graphs of $f\left(x\right)=\sqrt{x}, y=2f\left(x\right) and y=\frac{1}{2}f\left(x\right).$ |
| 0$$x$$149$$\sqrt{x}$$$$2\sqrt{x}$$ $$\frac{1}{2}\sqrt{x}$$2. If $y = f(x)$ is transformed to $y=af(x)$, where *a* is a number, describe the transformation:1. If |a| > 1, then the parent function is \_\_\_\_\_\_\_\_\_\_ **vertically** by a factor of “|**a|”.**
2. If 0 < |a| < 1, then it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**vertically** \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Any point (x, y) under this transformation becomes ( , )** |
| **INVESTIGATION: Type** $y=f(kx)$1. On the same set of axes, sketch the graphs of $f\left(x\right)=\sqrt{x}, y=f\left(2x\right) and y=f\left(\frac{1}{2}x\right).$ |
| $$x$$00.524.5$$\sqrt{2x}$$$$x$$02818$$\sqrt{\frac{1}{2}x}$$ 4. If $y = f(x)$ is transformed to$ y = f(kx)$, where *k* is a number, describe the transformation:1. If |k| > 1, then the parent function is \_\_\_\_\_\_\_\_\_\_\_\_\_ **horizontally** by factor of “$\frac{1}{|k|}$**”**.
2. If 0 < |k| < 1, then it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Any point (x, y) under this transformation becomes ( , ).** |

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| **INVESTIGATION: Type** $y=-f\left(x\right)$1. On the same set of axes, sketch the graphs of $f\left(x\right) and-f\left(x\right).$ |
|  $$a. f\left(x\right)=|x|$$

|  |  |  |
| --- | --- | --- |
| **x** | **-|x|** |  |
| **-3** |  |
| **-2** |  |
| **-1** |  |
| **0** |  |
| **1** |  |
| **2** |  |
| **3** |  |

 | b. $f\left(x\right)=\sqrt{x}$

|  |  |  |
| --- | --- | --- |
| **x** | $$-\sqrt{x}$$ |  |
| **0** |  |
| **1** |  |
| **4** |  |
| **9** |  |
|  |  |
|  |  |
|  |  |

 |
| 2. If $y=f(x)$ is transformed to $y=-f(x)$, where *a* is a negative number, describe the transformation:I noticed that the graph is reflected about the “\_\_” axis.**Any point (x, y) under this transformation becomes ( , ).** |

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| --- |
| **INVESTIGATION: Type** $y=f(-x)$3. On the same set of axes, sketch the graphs of $f\left(x\right) and f\left(-x\right).$ |
| a. $f\left(x\right)=x^{2}$

|  |  |  |
| --- | --- | --- |
| **x** | **(-x)2** |  |
| **-2** |  |
| **-1** |  |
| **0** |  |
| **1** |  |
| **2** |  |
|  |  |
|  |  |

 | b. $f\left(x\right)=\sqrt{x}$

|  |  |  |
| --- | --- | --- |
| **x** | $$\sqrt{-x}$$ |  |
| **-9** |  |
| **-4** |  |
| **-1** |  |
| **0** |  |
|  |  |
|  |  |
|  |  |

 |
| 4. If $y = f(x)$ is transformed to $y=f(kx)$, describe the transformation:a) If k = -1, then the graph is **reflected** about the “\_\_” axis.**Any point (x, y) under this transformation becomes ( , ).** |

|  |
| --- |
| Vertical stretches of *f* (x) |
|  |
| Horizontal Stretches of *f* (x) |
|  |

Let$ f\left(x\right)=x^{2}$.

What do the following transformations represent in terms of stretches, reflections, and shifts?

|  |  |  |
| --- | --- | --- |
| a. $ 2f(x)$  | d. $ -f(2x)$  |  |
| b. 3$f(x)$  | e. $ f\left(\frac{1}{3}x\right)+4$  |  |
| c.$ \frac{1}{2}f(x)$  | f. $-2f(x-1)$  |  |

Verify your answers using DESMOS or graphing calculator.