## Lesson 5 Transformation Exploration

## A Solidify Understanding Task

In this unit, you have been introduced to two new types of functions - the square root function and the
 inverse variation function.
Each of these functions also have a parent function:
Square root function parent function: $y=\sqrt{x}$
Inverse variation function parent graph: $y=\frac{1}{x}$
Complete the table below to compare the key features of these three parent functions:


NC Math 2 Unit 6 Square Root and Inverse Variation Functions

| Domain |  |  |  |
| :--- | :--- | :--- | :--- |
| Range |  |  |  |
| Description <br> of Rate of <br> Change |  |  |  |
| Intercepts |  |  |  |
| Intervals <br> Where <br> Increasing <br> or <br> Decreasing |  |  |  |
| Maximum |  |  |  |
| or Minimum |  |  |  |
| Symmetry |  |  |  |
| End <br> Behavior |  |  |  |

Jeff graphed the following pairs of functions to see if transformations with square root functions behave in the same way that transformations with quadratic functions do. What do you think? (The parent graph is the dotted curve.)

$$
y=\frac{1}{2}(x-3)^{2}
$$



$$
y=-(x+6)^{2}-2
$$



$$
y=\frac{1}{2} \sqrt{x-3}
$$



$$
y=-\sqrt{x+6}-2
$$



Jeff is intrigued by your insights about transformation with these two functions, and he wants to explore further. You will be given a set of cards with various graphs and equations of transformed functions. Your task is to match each graph with its equation and to group together cards that show similar transformations. What conclusions do you have to share with Jeff?

## Summarizing Transformations

Describe what happens to the parent function for each of the following transformations:
$y=\mathrm{f}(\mathrm{x})+k$, where $k>0$
$y=\mathrm{f}(\mathrm{x})-k$, where $k>0$
$y=\mathrm{f}(x+k)$, where $k>0$
$y=\mathrm{f}(x-k)$, where $k>0$
$y=k \cdot \mathrm{f}(\mathrm{x})$, where $0<k<1$
$y=k \cdot \mathrm{f}(\mathrm{x})$, where $k>1$
$y=k \cdot \mathrm{f}(\mathrm{x})$, where $k$ is a negative number

Graph the following transformations. Be sure to show the key points of the transformed function. The parent function with key points has been provided for you.

1. $y=\frac{1}{(x-4)}+2$

2. $y=\sqrt{x-2}-6$

3. $y=-\sqrt{x+5}$

4. $y=-\frac{1}{x}-3$


## Period

## Topic: Solving Systems of Linear and Quadratic Equations.

Find any points of intersection for the two equations in each problem.

1. $\left\{\begin{array}{c}y=x^{2}+x-2 \\ y=-x+1\end{array}\right.$
2. $\left\{\begin{array}{c}y+x=5 \\ y=x^{2}-6 x+9\end{array}\right.$
3. $\left\{\begin{array}{c}y=3 x+4 \\ y=-x^{2}\end{array}\right.$
4. $\left\{\begin{array}{c}y=x^{2}+11 \\ y=-12 x\end{array}\right.$
5. $\left\{\begin{array}{c}y=3 x^{2}+21 x-5 \\ -10 x+y=-1\end{array}\right.$
6. $\left\{\begin{array}{c}y=x^{2}-11 x-20 \\ y=25(4-x)\end{array}\right.$

SET
Topic: Graphing Transformations.
Given the equation or description, graph the transformation of the parent function shown in each graph.
7. The graph has been reflected over the $x$-axis and shifted three units down, and two units right.

8. The graph has been stretched by a factor of 2, and shifted 5 units to the left.


10. The graph has shifted six units left, and two units down.


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## GO!

## Topic: Identify the type of function.

Each table is a model for a different type of function. Determine if each table is linear, exponential, quadratic, square root, or inverse variation.
12.

| $\mathbf{x}$ | $\mathbf{f ( x )}$ |
| :---: | :---: |
| 0 | 0.25 |
| 1 | 0.50 |
| 2 | 1 |
| 3 | 2 |
| 4 | 4 |

13. 

| $x$ | $g(x)$ |
| :---: | :---: |
| 1 | 5 |
| 5 | 1 |
| 10 | $\frac{1}{2}$ |
| 15 | $\frac{1}{3}$ |

14. 

| $\mathbf{x}$ | $\mathbf{h ( x )}$ |
| :---: | :---: |
| 0 | -2 |
| 1 | 2 |
| 2 | 8 |
| 3 | 16 |
| 4 | 26 |

15. 

| $\mathbf{x}$ | $\mathbf{m}(\mathbf{x})$ |
| :---: | :---: |
| 16 | 5 |
| 9 | 4 |
| 4 | 3 |
| 1 | 2 |

16. 

| $\mathbf{x}$ | $\mathbf{p}(\mathbf{x})$ |
| :---: | :---: |
| -1 | 6 |
| -2 | 10 |
| -3 | 14 |
| -4 | 18 |
| -5 | 22 |

17. 

| $\mathbf{x}$ | $\mathbf{v ( x )}$ |
| :---: | :---: |
| 1 | 12 |
| 2 | 6 |
| 3 | 4 |
| 4 | 3 |

