Unit 3: Inverses and Graphing Polynomials
Guided Notes

KEY

Name

Period

If found, please return to Mrs. Brandley's room, M-8.

Concept 1: Inverse Functions

Inverse Function: An inverse functions has all the same point values as the original function, except the x-values and y-values of each point have been switched.

Find the inverse of the following functions:

1. f(x)={(0,3),(5,4),(8,9)}

f'(x)= {(3,0), (4,5), (9,8)}

2. f(x)={(0,5),(5,7),(8,3)}

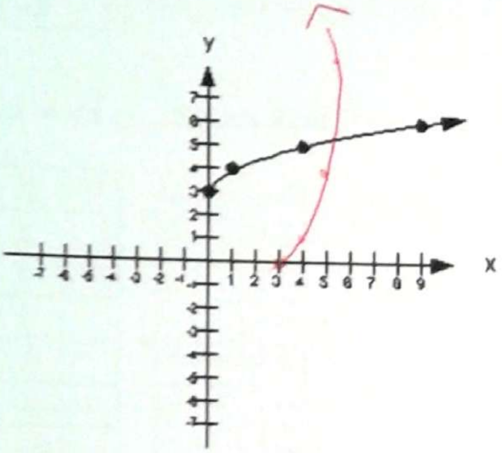
f'(x)= {(5,0), (7,5), (3,8)}

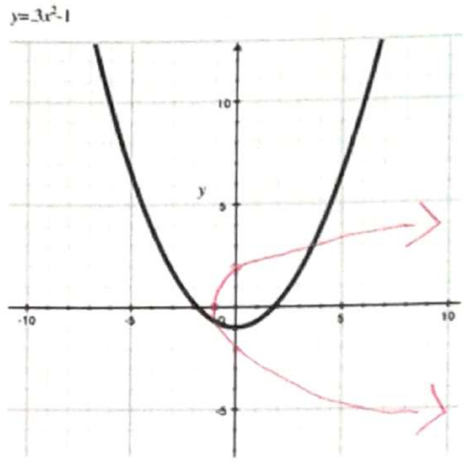
3. f(x)= {(1,6),(7,4),(2,3)}

f'(x)= {(6,1), (4,7), (3,2)}

Graph the inverse of the following functions:

(Either by switching the x and y values of each point, or reflecting the graph over the line y=x)





Find the inverse of the following functions:

(Switch x and y then solve for y)

$y = x + 3$

$x = y' + 3$
$-3 \quad -3$

$y' = x - 3$

$y = x^2 + 2$

$x = y'^2 + 2$
$-2 \quad -2$

$\sqrt{x-2} = \sqrt{y'^2}$

$y' = \sqrt{x-2}$

$y = \sqrt{x-1}$

$x^2 = (\sqrt{y'-1})^2$

$x^2 = y' - 1$
$+1 \quad +1$

$y' = x^2 + 1$

$y = x^3$

$\sqrt[3]{x} = \sqrt[3]{y^3}$

$y' = \sqrt[3]{x}$

$y = x^2 - 5$

$x = y^2 - 5$

$\sqrt{x+5} = \sqrt{y^2}$

$y' = \sqrt{x+5}$

$y = (x+2)^3 + 4$

$x = (y'+2)^3 + 4$

$\sqrt[3]{x-4} = \sqrt[3]{(y'+2)^3}$

$\sqrt[3]{x-4} = y' + 2$

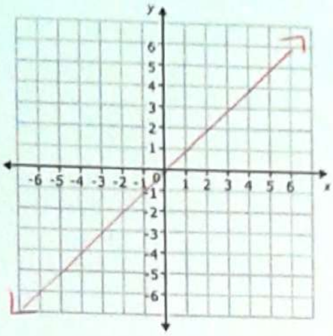
$y' = \sqrt[3]{x-4} - 2$

Concept 2: Graphing

Graph the following functions using the t-tables provided.

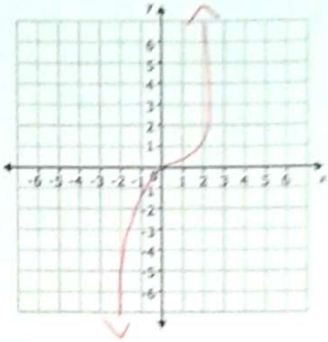
1. $y = x$ Linear

X	Y
3	3
2	2
1	1
0	0
-1	-1
-2	-2
-3	-3



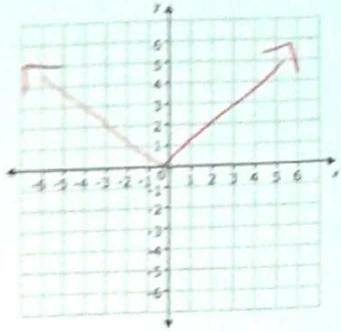
2. $y = x^3$ *Cubic*

X	Y
3	27
2	8
1	1
0	0
-1	-1
-2	-8
-3	-27



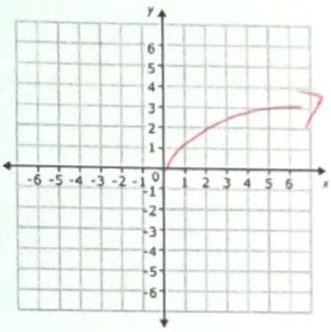
3. $y = |x|$ *Absolute Value*

X	Y
3	3
2	2
1	1
0	0
-1	1
-2	2
-3	3



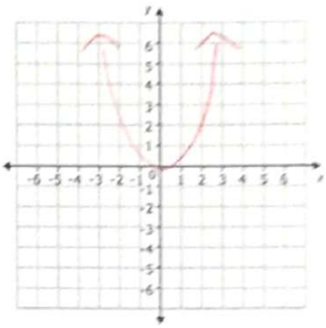
4. $y = \sqrt{x}$ Square Root

X	Y
3	1.7
2	1.4
1	1
0	0
-1	—
-2	—
-3	—



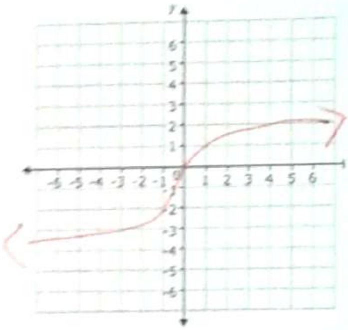
5. $y = x\text{^}2$ Quadratic

X	Y
3	9
2	4
1	1
0	0
-1	1
-2	4
-3	9



6. $y = \sqrt[3]{x}$ Cube Root

X	Y
3	1.4
2	1.3
1	1
0	0
-1	-1
-2	-1.3
-3	-1.4



These are the basic types of functions we will be discussing in this class. Every other function we look it will have one of these functions as their "base" function or "parent" function.

For the equations given below state what the parent function is from the 6 above:

1. $y = 3x^2 - 5$

Quadratic

2. $y = \sqrt[3]{x - 6}$

Cube Root

3. $y = 3x - 4$

Linear

4. $y = \sqrt{x + 5}$

Square Root

5. $y = x^3 + 2$

cubic

6. $y = 2|x - 5| + 4$

absolute value

Concept 3: Transformations of Graphs

As discussed yesterday, every graph we look at it in this class will be a transformation of one of the parent functions we looked at yesterday. Today we want to discover how those parent functions are transformed.

1. First: Graph parent function $y = x^2$

Second: Graph $y = x^2 + 3$

How did the graphs change from their parent graph?

up 3

Third: Graph parent function $y = x$

Fourth: Graph $y = x + 4$

up 4

2. First: Graph parent function $y = x^2$

Second: Graph $y = x^2 - 3$

How did the graphs change from their parent graph?

down 3

Third: Graph parent function $y = |x|$

Fourth: Graph $y = |x| - 5$

down 5

3. First: Graph parent function $y = x^2$

Second: Graph $y = (x + 2)^2$

How did the graphs change from their parent graph?

left 2

Third: Graph parent function $y = \sqrt[3]{x}$

Fourth Graph $y = \sqrt[3]{x + 4}$

left 4

4. First: Graph parent function $y = x^2$

Second: Graph $y = (x - 2)^2$

How did the graphs change from their parent graph?

right 2

Third: Graph parent graph $y = \sqrt{x}$

Fourth: Graph $y = \sqrt{x - 1}$

right 1

5. First: Graph parent function $y = x^2$

Second: Graph $y = -x^2$

Third: Graph parent graph $y = x^3$

Fourth: Graph $y = -x^3$

How did the graphs change from their parent graph?

Flip over x-axis

6. First: Graph parent function $y = x^2$

Second: Graph $y = (-x)^2$

Third: Graph parent graph $y = x^3$

Fourth: Graph $y = (-x)^3$

How did the graphs change from their parent graph?

Flip over y-axis

7. First: Graph parent function $y = x^2$

Second: Graph $y = 2x^2$

Third: Graph parent function $y = x$

Fourth: Graph $y = 4x$

How did the graphs change from their parent graph?

Steeper, vertical stretch

8. First: Graph parent function $y = x^2$

Second: Graph $y = \frac{1}{2}x^2$

Third: Graph parent function $y = x$

Fourth: Graph $y = \frac{1}{3}x$

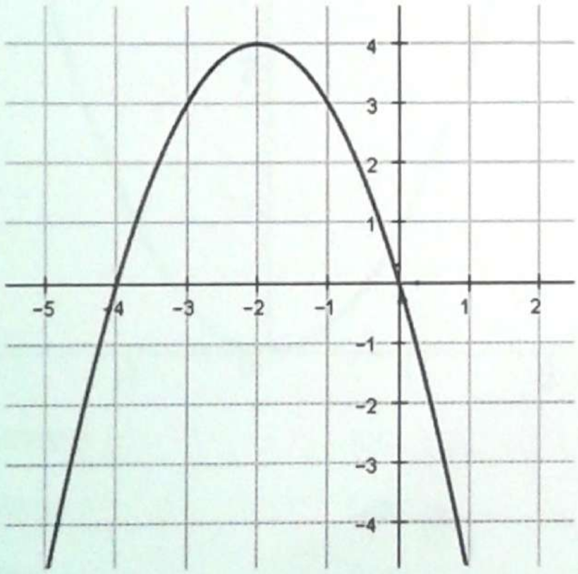
How did the graphs change from their parent graph?

less steep, vertical compression

Based on what you discovered through the previous activity, fill out the table below:

Function Notation	Description of Transformation
$f(x) = f(x) + c$	up c
$f(x) = f(x) - c$	down c
$f(x) = f(x + c)$	left c
$f(x) = f(x - c)$	right c
$f(x) = -f(x)$	Flip over x-axis
$f(x) = f(-x)$	Flip over y-axis
$f(x) = c * f(x)$ or $f(x) = c * f(x)$	vertical stretch of C (Steeper)
$f(x) = \frac{1}{c} * f(x)$ or $f(x) = f\left(\frac{1}{c}x\right)$	vertical compression of 1/C (less steep)

Identify the transformations in the graph and equations below:



$y = 2(x-1)^2 + 5$

V.S. 2
right 1
up 5

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

V.C. 1/2
left 2
down 4

$y = -\frac{1}{3}(x+1)^3 + 7$

Flip over X-axis
V.C. 1/3
left 1
up 7

Concept 4: Key Features of Graphs

Define the following:

X-Intercepts: points where graph crosses x-axis

Y-Intercepts: points where graph crosses y-axis

Maximum (relative): points where graph is decreasing on both sides

Minimum (relative): points where graph is increasing on both sides

Even: symmetric about the y-axis

Odd: symmetric about the origin

Increasing Intervals: interval where graph is going up from left to right

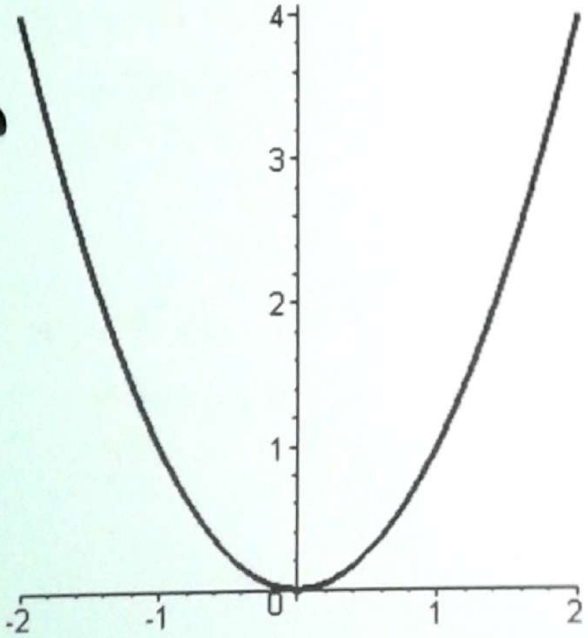
Decreasing Intervals: interval where graph is going down from left to right

Positive Intervals: interval where graph is above x-axis

Negative Intervals: interval where graph is below x-axis

End Behavior: what y approaches as x approaches $-\infty$ & ∞

Identify each of the above in the graphs given below:



X-Ints: (0, 0)

Y-Ints: (0, 0)

Max: N/A

Min: (0, 0)

Even/Odd/Neither

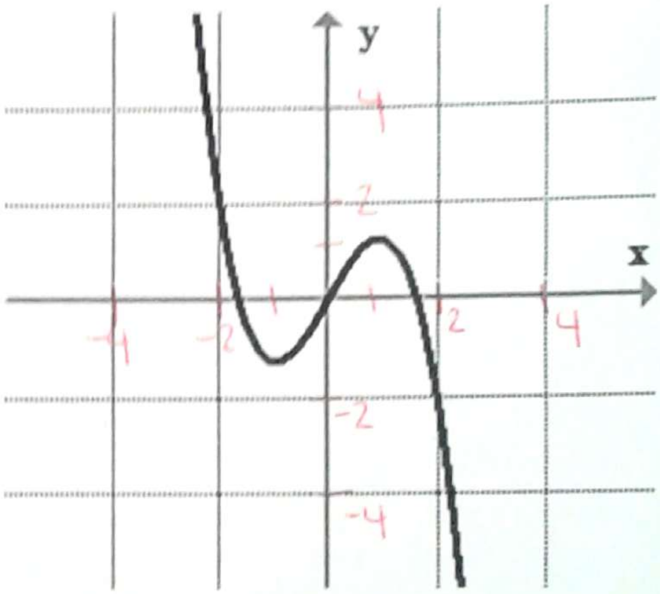
Inc: $(0, \infty)$

Dec: $(-\infty, 0)$

Pos: $(-\infty, \infty)$

Neg: N/A

EB: $x \to \infty$, $y \to \infty$
$x \to -\infty$, $y \to \infty$



X-Ints: (-1.5, 0) (0, 0) (1.5, 0)

Y-Ints: (0, 0)

Max: (1, 1)

Min: (-1, 1)

Even/Odd/Neither

Inc: (-1, 1)

Dec: $(-\infty, -1)(1, \infty)$

Pos: $(-\infty, -1.5)$ (0, 1.5)

Neg: $(-1.5, 0)(1.5, \infty)$

EB: $x \to \infty$ $y \to -\infty$
$x \to -\infty$ $y \to \infty$