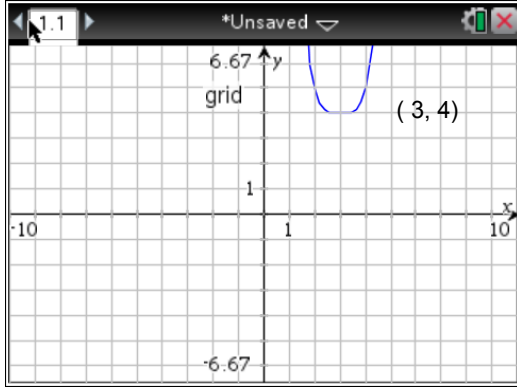
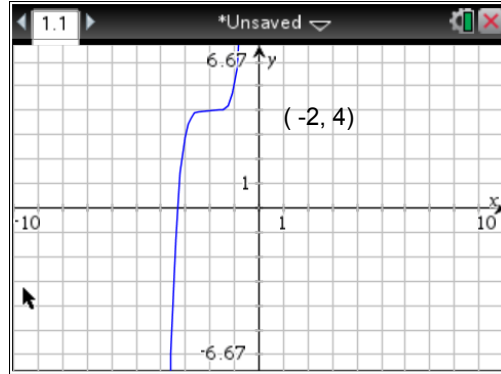


OPENER: Give the equations of the graph below.

$f(x) = x^4$



$f(x) = x^5$

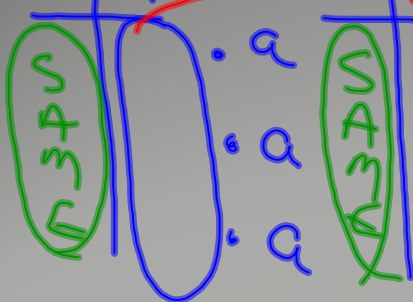


Dec 2-11:10 AM

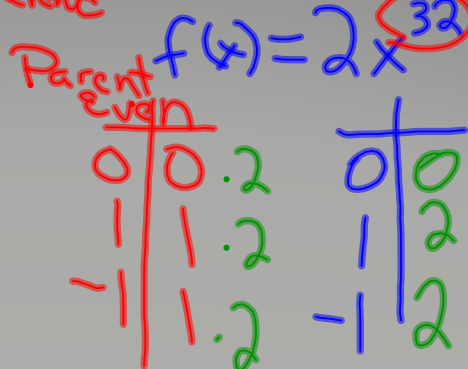
Algebra 2 Section 3-3

V. Stretching, Shrinking, and Reflecting the Graph of $f(x) = x^n$

Table Parent



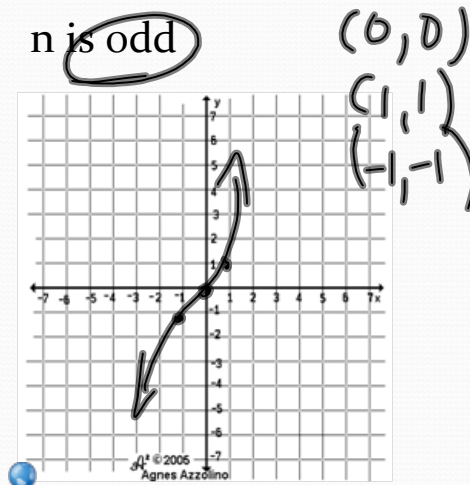
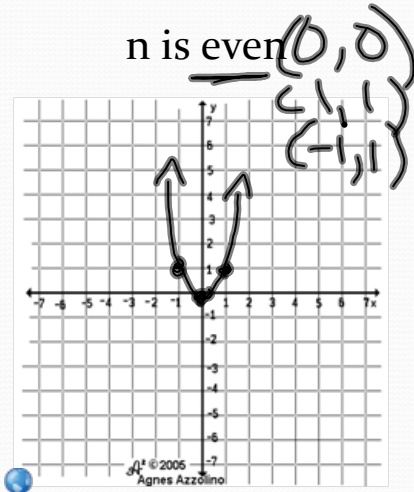
Different



Oct 9-10:45 AM

The Parent Graph of $f(x) = x^n$

- The graphs of $f(x) = x^n$ make the parent graphs below
- The Vertex is at $(0,0)$ or the turning point is at $(0,0)$.



Oct 9-10:45 AM

Graphing $f(x) = ax^n$

- Type the following functions and write down what you notice about the graph compared to the parent graph

1) $f(x) = 3x^3$

$a = 3$

V. Stretch
BAFO 3
Graph

0	0	0	0
1	1	3	3
-1	-1	-3	-3

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

$a = \frac{1}{2}$

V. Shrink
BAFO $\frac{1}{2}$

0	0	0	0
1	1	$\frac{1}{2}$	$\frac{1}{2}$
-1	-1	$-\frac{1}{2}$	$-\frac{1}{2}$

3) $f(x) = -x^6$

$a = -1$

Reflection
over the x-axis

0	0	0	0
1	1	-1	-1
-1	-1	-1	-1

Oct 9-10:45 AM

Graph the functions on page 81

- Using the information from our previous slide and the graph on page 81 answer the following (page 82)
- How is the graph of $f(x) = ax^n$ related to the parent function when $a > 1$? V. Stretch BAFO a
- When $0 < a < 1$? V. Shrink BAFO a
- How is the graph of $f(x) = ax^n$ related to the parent function when $a < -1$? Reflection BAFO a
- When $-1 < a < 0$? Reflection BAFO a
- How is the end behavior of the graph of $f(x) = ax^n$ related to the end behavior of the graph of the parent function?


Even:

Even: $a > 0$ $x \rightarrow +\infty$ $f(x) \rightarrow +\infty$
 $x \rightarrow -\infty$ $f(x) \rightarrow +\infty$

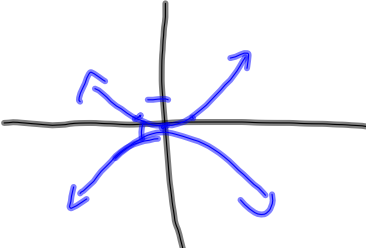
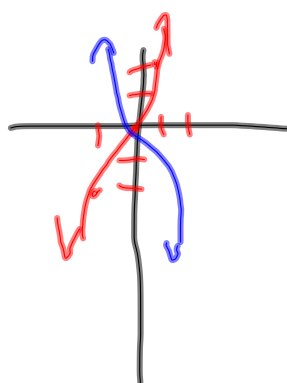
a < 0 neg. $x \rightarrow +\infty$ $f(x) \rightarrow -\infty$
 $x \rightarrow -\infty$ $f(x) \rightarrow -\infty$

ODD $a > 0$ $x \rightarrow +\infty$ $f(x) \rightarrow +\infty$
 $x \rightarrow -\infty$ $f(x) \rightarrow -\infty$

a < 0 $x \rightarrow +\infty$ $f(x) \rightarrow -\infty$
 $x \rightarrow -\infty$ $f(x) \rightarrow +\infty$



Oct 9-10:45 AM

$\begin{array}{c c c} -1 & 1 \cdot \frac{1}{4} & -1 \cdot \frac{1}{4} \\ \hline 0 & 0 \cdot \frac{1}{4} & 0 \\ \hline 1 & 1 \cdot \frac{1}{4} & 1 \cdot \frac{1}{4} \end{array}$	
$\begin{array}{c c c} -1 & 1 \cdot -\frac{1}{4} & -1 \cdot -\frac{1}{4} \\ \hline 0 & 0 \cdot -\frac{1}{4} & 0 \\ \hline 1 & 1 \cdot -\frac{1}{4} & 1 \cdot -\frac{1}{4} \end{array}$	
$\begin{array}{c c c} -1 & 1 \cdot 2 & -1 \cdot 2 \\ \hline 0 & 0 \cdot 2 & 0 \\ \hline 1 & 1 \cdot 2 & 1 \cdot 2 \end{array}$	

Mar 15-2:31 PM

Summarize your thinking

- How is the graph of $f(x) = ax^n$ related to the parent graph of $f(x) = x^n$?

- If $|a| > 1$, then V. Stretch BAFO a
- If $|a| < 1$, then V. Shrink BAFO a
- If there is a negative sign in front of "a", then Reflection

- How is the domain related to the above equation?

All real numbers $x \in \mathbb{R}$

- How is the range related?

ODD: $y \in \mathbb{R}$

Even:

$a > 0$
pos.

$y \in \mathbb{R}: y \geq k$

$a < 0$
neg

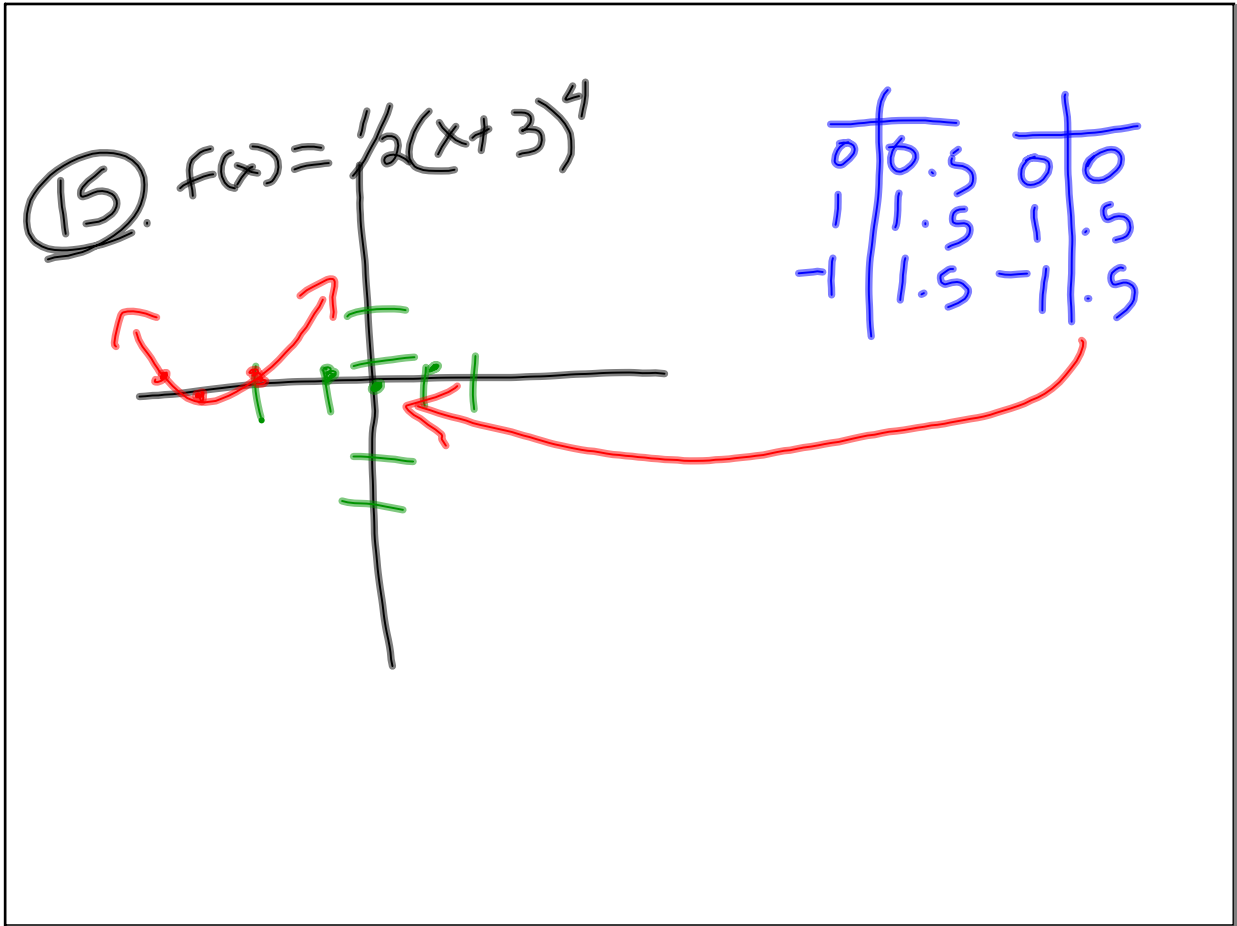
$y \in \mathbb{R}: y \leq k$

Oct 9-10:45 AM

Graph the function on page 82

- Fill in the blanks and the chart.
-
- Compare your answers with your partners.
- Page 83:
- Describe how you think the graph of $g(x) = -0.5(x + 1)^5 - 1$ is compared to the parent graph of $f(x) = x^5$

Oct 9-10:45 AM



Mar 16-2:28 PM

Writing Equations for $f(x) = a(x-h)^n + k$ Graphs

- Use what you know about the vertex or turning point to help write an equation for each graph. State the domain and range of each.

$(-4, 2)$
 $(-3, 5)$

$f(x) = a(x-h)^n + k$
 $n=4$
 $a=3$
 $h=-4$
 $k=2$

$f(x) = a(x-h)^n + k$
 $f(x) = a(x-(-4))^4 + 2$
 $f(x) = a(x+4)^4 + 2$
 $5 = a(-3+4)^4 + 2$
 $5 = a(1)^4 + 2$
 $5 = 1a + 2$
 $3 = a$
 $f(x) = 3(x+4)^4 + 2$

$(-2, 3)$
 $(-1, 2.5)$

$f(x) = a(x-h)^n + k$
 $f(x) = a(x-h)^3 + 3$
 $2.5 = a(-2+3)^3 + 3$
 $2.5 = a(1)^3 + 3$
 $2.5 = 1a + 3$
 $-3 = a$

Oct 9-10:45 AM

Try page 83

- From the graph the turning point is _____, so $h =$ _____ and $k =$ _____
- To move over one box from the turning point requires moving up or down _____ boxes, so $a =$ _____.
- The graph has different end behavior than the parent graph so there is a _____.
- The equation for the graph shown is _____.
- Check point $(-3, 5)$ in the above equation since it appears to be on the graph.
- Translate the above graph 4 units right and 5 units down

Oct 9-10:45 AM

① 3.1 - 3.3

②

Mar 17-10:11 AM