

PRECALCULUS



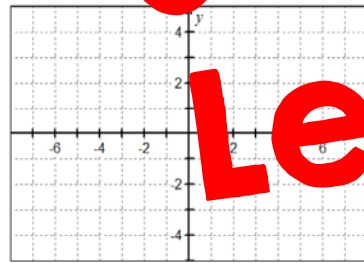
Library of Functions

Analyzing Functions

You should be able to give a complete analysis for each of the "parent functions". The analysis should include as many of the following as possible:

- Domain
- Range
- Period
- y-intercept
- Increasing/decreasing behavior
- Symmetry (even/odd)

For each function, match the graph to the function.



Identify

Cube Root Function $f(x) = \sqrt[3]{x}$

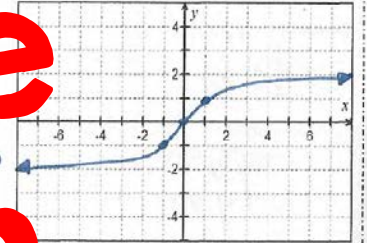
Domain: $(-\infty, \infty)$

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

End behavior:

$x \rightarrow -\infty; y \rightarrow -\infty$

$x \rightarrow \infty; y \rightarrow \infty$



Exponential Function $f(x) = b^x$ (base 2)

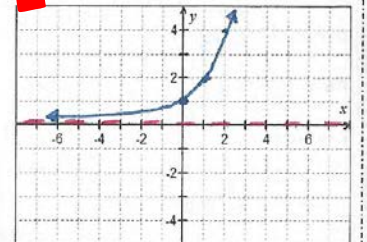
Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

End behavior:

$x \rightarrow -\infty; y \rightarrow 0$

$x \rightarrow \infty; y \rightarrow \infty$



Logarithmic Function $f(x) = \log_b x$ (base 2)

Freebie!
Sample Lesson

GUIDED NOTES AND FOLDABLES[©]

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Library of Functions

FLAMINGO MATH

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A LIBRARY OF FUNCTIONS

This is a **free lesson** for honors and advanced students to write a collection of information related to *18 Basic functions* for a general review. It is the fourth lesson in an eight-lesson unit on *Functions and Graphs* for students enrolled in Pre-Calculus Honors.

Students will be able to:

- Graph 18 basic parent functions
- Analyze properties and key-features of the parent functions

The product includes everything you need to teach a rigorous lesson:

- One option for an 8-page Bound-Book Foldable*
- SmartBoard® Presentation
- * Homework assignment
- * Two forms of a Daily Quiz (can be used as a warm up, exit ticket, or a homework check)
- * Answer keys and directions for assembly of the foldable

The SmartBoard lesson can be used in many ways. Teachers can display the presentation using the following:

1. Smart Board
2. Airliner Wireless Slate
3. [SmartNotebook for IPAD App](#)
4. Through the Smart Notebook Express <http://express.smarttech.com/#>
5. Promethean Boards®
6. Other APPS available for Tablets

This is a sample of a complete lesson for any unit in my store related to Algebra 2 Honors or Pre-Calculus Honors products. I hope you enjoy the detail and rigor that is provided for both you and your students.

8-Page Bound Book Style Foldables™ are my favorite format to create a daily routine for my students. Each daily lesson that I create has been inspired by the work of Dinah Zike, and is used by permission – see more of her ideas at www.Dinah.com

DIRECTIONS FOR PRINTING:

1. If you have a printer that allows double-sided printing, use the option “flip on short side.”
2. Otherwise, if you are printing single-sided and then photocopying double-sided, you may need to manually flip these pages - Orient the sheets up/down/up/down (shown below). Every printer/ copy machine is different! I suggest that you to print/ photocopy one copy, cut and fold to make sure it is copied correctly.
3. Assemble the Foldable from the directions on the following page.

Using Vertex Form

EX #7: Graph $f(x) = 2(x + 2)^2 - 3$

$a =$ _____
 $h =$ _____
 $k =$ _____

axis of symmetry: _____

vertex: _____

point: _____

reflected point : _____

domain: _____ range: _____

minimum/maximum: _____

Describe and explain the transformation of the parent graph $y = x^2$ to $f(x) = 2(x + 2)^2 - 3$.

QUADRATIC FUNCTIONS and TRANSFORMATIONS

Vocabulary

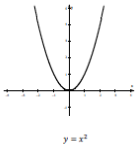
Parabola - the graph of a quadratic function

Quadratic function - any function that can be written in the form $f(x) = ax^2 + bx + c$, where $a \neq 0$.

Vertex form - any quadratic function written as $f(x) = a(x - h)^2 + k$, where $a \neq 0$.

Axis of symmetry - a line that divides the parabola into two mirror images, the equation for an axis of symmetry is $x = h$.

Vertex of the parabola - the intersection of the parabola and its axis of symmetry is (h, k) .



$y = x^2$

VERTEX FORM OF A PARABOLA

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

If $a > 0$, then _____

If $a < 0$, then _____

(h, k) is _____

$x = h$ is _____

EXPLORATION:

Use a graphing calculator to discover the rules for vertex form. Then complete the sentences above.

1. $y = (x - 2)^2 + 3$
2. $y = (x + 2)^2 - 3$
3. $y = -2(x - 1)^2 + 2$
4. $y = -0.5(x + 1)^2 + 2$

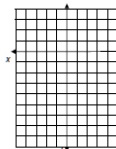
EX #1: Graph $y = 2x^2$

Vertex: _____

Axis of Symmetry: _____

Point: _____

Reflected Point: _____



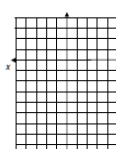
EX #2: Graph $y = \frac{2}{3}x^2$

Vertex: _____

Axis of Symmetry: _____

Point: _____

Reflected Point: _____



ORIENTATION FOR COPYING SHEETS
1 and 2 then 3 and 4

Graphing a Function of $f(x) = -4x^2$

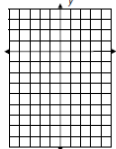
EX #3: Graph $y = -x^2$

Vertex: _____

Axis of Symmetry: _____

Point: _____

Reflected Point: _____



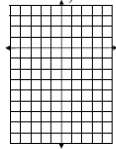
EX #4: Graph $y = -2x^2$

Vertex: _____

Axis of Symmetry: _____

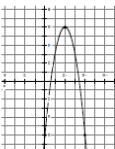
Point: _____

Reflected Point: _____



Writing a Quadratic Function

EX #8: Write a quadratic function to model the graph.



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

Vertex: _____

Point: _____

2. Substitute values into the vertex form and solve for the a value.

3. Write the quadratic function: _____

4. Name the domain, range and minimum value: _____

EX #5: Graph $y = x^2 - 2$

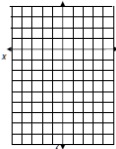
Vertex: _____

Axis of Symmetry: _____

Point: _____

Reflected Point: _____

Describe the translation from $y = x^2$



EX #6: Graph $y = (x + 1)^2$

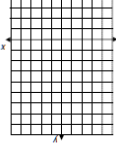
Vertex: _____

Axis of Symmetry: _____

Point: _____

Reflected Point: _____

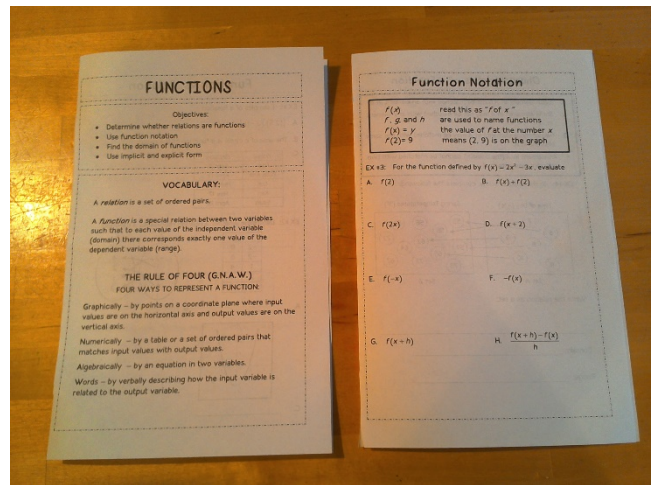
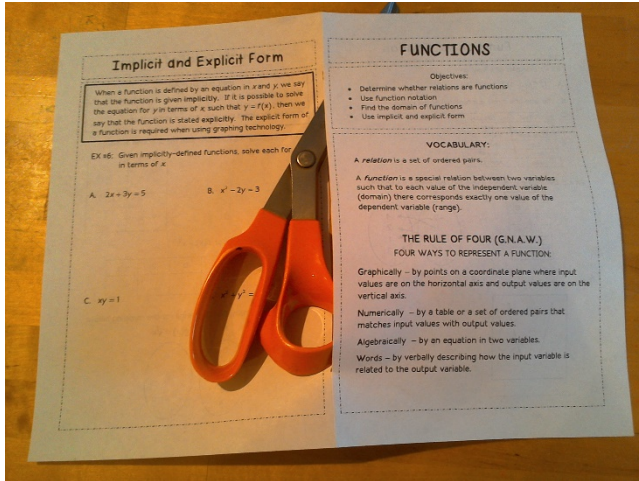
Describe the translation from $y = x^2$





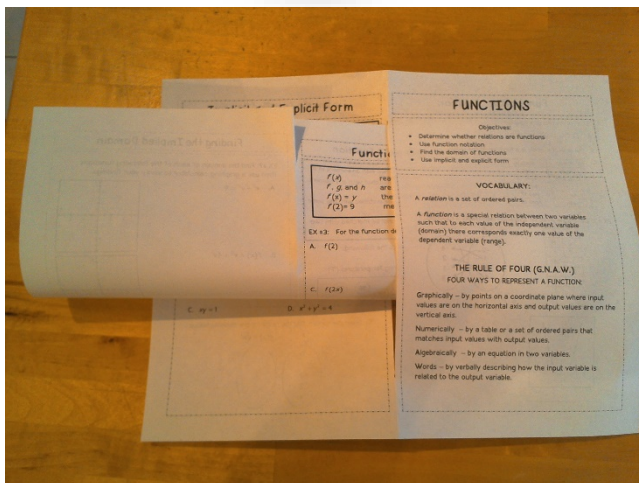
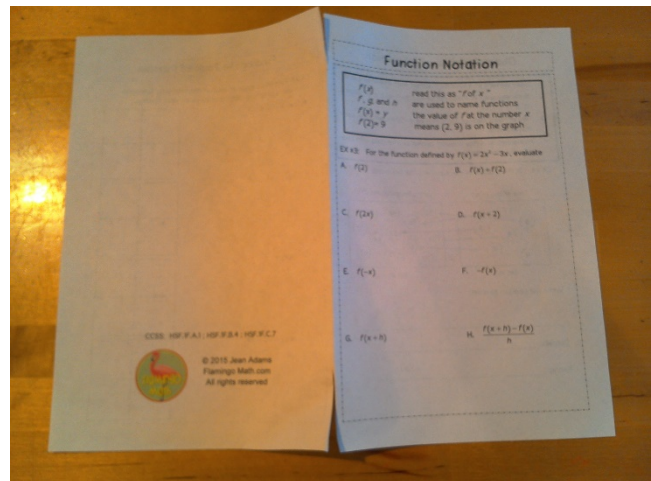
DIRECTIONS TO ASSEMBLE FOLDABLE:

1. Fold each sheet in half, hamburger style.



2. On the title page, cut out (or shave) on the fold within about an inch from the top and bottom. BE CAREFUL NOT TO CUT ALL THE WAY THROUGH. You are making a slit only.

3. On the inside page, cut about an inch from the top and bottom on the fold.



4. Open the title page to show the "slit" in the middle of the fold. Roll the inside page into a "burrito" and stuff it under the title page. (Notice that you can see the front page and the back page at this stage.)

5. Unroll the inner page and the book is now complete.

UNIT 1: FUNCTIONS & GRAPHS

Sample Pacing Guide

	TOPIC	HOMEWORK
DAY 1	Functions	
DAY 2	Graphs of Functions	
DAY 3	Piecewise Functions	
DAY 4	Twelve Basic Functions	
DAY 5		
DAY 6	Graphical Transformations	
DAY 7		
DAY 8	QUIZ	
DAY 9	Combinations of Functions	
DAY10	Inverse Functions	
DAY11		
DAY 11	Modeling With Functions	
DAY 12		
DAY 13	Unit 1 Review	
DAY 14	Functions & Graphs Stations Lab Activity	
DAY 15	UNIT 1 TEST	
Notes:		

UNIT 1: Functions

SKILL	LEARNING GOAL	MASTERY		
	Functions and Graphs			
1	Determine whether a relation represents a function	N	B	A
2	Find the value of a function	N	B	A
3	Find the domain of a function	N	B	A
4	Evaluate a function using function notation	N	B	A
5	Use both explicit and implicit form of a function	N	B	A
	Graphs of Functions			
6	Find the domain and range of a function	N	B	A
7	Determine intervals on which the function is increasing, decreasing, or constant	N	B	A
8	Determine relative maximum and minimum values	N	B	A
9	Identify even and odd functions	N	B	A
	Piecewise Functions			
10	Evaluate piecewise functions	N	B	A
11	Analyze piecewise functions in real-world applications	N	B	A
	Twelve Basic Functions			
12	Recognize 12 basic functions	N	B	A
13	Analyze properties of functions	N	B	A
14	Associate characteristics of functions	N	B	A
	Graphical Transformations of Functions			
15	Use vertical and horizontal shifts to sketch graphs	N	B	A
16	Use reflections to sketch graphs	N	B	A
17	Use both rigid and non-rigid transformations to sketch graphs			
	Combinations of Functions			
18	Perform operations on functions	N	B	A
19	Find a composition of one function with another function	N	B	A
20	Model and solve real-world problems	N	B	A
	Inverse Functions			
21	Show two functions are inverses algebraically or graphically	N	B	A
22	Read and explain function related to real-world scenarios	N	B	A
	Model Real-World Scenarios			
23	Write and solve real-world problems from verbal descriptions	N	B	A
24	Use data to write functions solve problems with/without technology.	N	B	A

UNIT 1: FUNCTIONS & GRAPHS

CCSS Alignment

	Lesson Topic	CCSS
1	Functions	HSF.1F.A.1 ; HSF.1F.B.4 ; HSF.1F.C.7
2	Graphs of Functions	HSF.1F.B.4 ; HSF.1F.C.7.A; HSF.1F.C.7.B
3	Piecewise Functions	HSF.IF.A.1; HSF.IF.A.2; HSF.BF.B.3 ; HSF.IF.C.7.B
4	Twelve Basic Functions	HSF.1F.B.4 ; HSF.1F.C.7.A; HSF.1F.C.7.B; HSF.1F.C.7.C; HSF.1F.C.7.D; HSF.1F.C.7.E
5	Graphical Transformations	HSF.1F.C.7.A ; HSF.1F.C.7.B; HSF.1F.C.7.C; HSF.BF.B.3
6	Combinations of Functions	HSF.1F.A.2; HSF.BF.A.1.B; HSF.BF.A.1.C
7	Inverse Functions	HSF.BF.B.4.A; HSF.BF.B.4.B; HSF.BF.B.4.C; HSF.BF.B.4.D
8	Modeling With Functions	HSF.BF.A.1.C; HSF.IF.B.4; HSF.IF.B.5; Modeling MP4, MP 5, MP 6

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