ALGEBRA 1 PACKET

6 - 10

Hamby

Hello everyone!

I hope this finds you doing well and enjoying your break. On the pages below you will find your packet for days 6-10. If you have a way to print it, please do that and work on the pages. If you don't have a way to print it, please work on your own paper; label each page with the packet number and work out the problems there. The activities you will see in this packet are a little bit of a review of the multiplying and factoring we have been doing in the last few weeks of school, and then there are some new things to learn. I have tried to provide some explanations and examples on the new things to help you learn them. If you have questions or need help, please send me a LiveGrades message and I can explain more.

On the nice days, try to get outside and enjoy the sunshine! I hope to see you soon!

Mrs. Hamby

Packet #6 (MULTIPLY)

Complete each box by multiplying. Write answers in descending order.

Example 1:

	$3x$	$+4$
$5x$	$15x^2$	$20x$
-2	$-6x$	-8

Answer: $15x^2+14x-8$

Example 2:

	$-2x$	-7
9	$-18x$	-63
$-4x$	$8x^2$	$+28x$

Answer: $8x^2+10x-63$

1.

	x	$+3$
x		
-4		

Answer: ____________________

2.

	x	$+6$
$-3x$		
$+1$		

Answer: ____________________

3.

	9	$+3x$
$4x$		
-6		

Answer: ____________________

4.

	5	$+2x$
$-8x$		
-2		

Answer: ____________________

5.

	x	-6
x		
-7		

Answer: ____________________

6.

	-8	$+x$
$-x$		
$+3$		

Answer: ____________________

Packet #6 continued

Use FOIL (**F**irst **O**utside **I**nside **L**ast) to find each product.

1) $(3n+2)(n+3)$

F	
O	
I	
L	

Answer: ____________________

2) $(n-1)(2n-2)$

F	
O	
I	
L	

Answer: ____________________

3) $(2x+3)(2x-3)$

F	
O	
I	
L	

Answer: ____________________

4) $(r+1)(r-3)$

F	
O	
I	
L	

Answer: ____________________

5) $(2n+3)(2n+1)$

F	
O	
I	
L	

Answer: ____________________

6) $(3p-3)(p-1)$

F	
O	
I	
L	

Answer: ____________________

7) $(3p+3)(3p+2)$

F	
O	
I	
L	

Answer: ____________________

8) $(k-2)(k-3)$

F	
O	
I	
L	

Answer: ____________________

Packet #7 FACTORING

For each box, factor by determining the top/side of each box that will make the insides true. Work backwards from multiplying. What numbers HAVE to be on the tops and sides so that the multiplying works out? In other words…factor!

EXAMPLE 1:

x^2	$8x$
$-3x$	-24

→

	x	$+8$
x	x^2	$8x$
-3	$-3x$	-24

Answer: $(x+8)(x-3)$

EXAMPLE 2:

$2x^2$	$8x$
$+x$	$+4$

→

	x	$+4$
$2x$	$2x^2$	$8x$
$+1$	x	$+4$

Answer: $(x+4)(2x+1)$

1.

x^2	$5x$
$-2x$	-10

Answer: (   )(   )

2.

x^2	$7x$
$6x$	42

Answer: (   )(   )

3.

$2x^2$	$6x$
$4x$	12

Answer: (   )(   )

4.

$3x^2$	$3x$
$2x$	2

Answer: (   )(   )

5.

$4x^2$	$8x$
$3x$	6

Answer: (   )(   )

6.

$2x^2$	$6x$
$3x$	9

Answer: (   )(   )

Packet #7 continued

Factor by finding factors of the last that add up to the middle.

EXAMPLE 1:

$x^2 + 6x + 8$ **Factors of +8:**

$1 \cdot 8 \; adds \; to \; 9$

$2 \cdot 4 \; adds \; to \; 6$

Answer: (x + 2)(x + 4)

EXAMPLE 2:

$x^2 + 11x + 24$

$1 \cdot 24 \; adds \; to \; 25$

$2 \cdot 12 \; adds \; to \; 14$

$3 \cdot 8 \; adds \; to \; 11$

$4 \cdot 6 \; adds \; to \; 10$

Answer: (x + 3)(x + 11)

1) $b^2 + 8b + 7$

Answer: ( )( )

2) $n^2 - 11n + 10$

Answer: ( )( )

3) $m^2 + m - 90$

Answer: ( )( )

4) $n^2 + 4n - 12$

Answer: ( )( )

5) $n^2 - 10n + 9$

Answer: ( )( )

6) $b^2 + 16b + 64$

Answer: ( )( )

7) $m^2 + 2m - 24$

Answer: ( )( )

8) $k^2 - 13k + 40$

Answer: ( )( )

Packet #8 FACTORING

Factoring Special Cases

Perfect Square Trinomial

☺ $a^2 + 2ab + b^2 = (a + b)(a + b) = (a + b)^2$

Or

☾ $a^2 - 2ab + b^2 = (a - b)(a - b) = (a - b)^2$

Difference of Two Square

♡ $a^2 - b^2 = (a + b)(a - b)$

EXAMPLE 1: $x^2 + 6x + 9$

This is a trinomial (3 terms) that has a + + sign pattern, so it is a format like ☺.

$x \cdot x$ *makes* x^2 *and* $3 \cdot 3$ *makes* 9, *so* $(x + 3)(x + 3)$

EXAMPLE 1: $4x^2 - 25$

This is a binomial (2 terms) that has a - between, so it is a format like ♡.

$2x \cdot 2x$ *makes* $4x^2$ *and* $5 \cdot 5$ *makes* 25,

so $(2x + 5)(2x - 5)$

Factor Each Special Case. Remember, you should be able to multiply your answer out and get the original problem—if it is correct.

1. $n^2 - 25$

2. $16b^2 - 40b + 25$

3. $4x^2 - 4x + 1$

4. $16n^2 - 9$

6. $x^2 - 16x + 64$

7. $x^2 + 24x + 144$

REVIEW of FACTORING USING the "ac" METHOD

FACTOR BY THE A-C METHOD

A = 8
B = -10
C = 3

$8x^2 - 10x + 3$

$A \cdot C = 8 \cdot 3 = 24$

$8x^2 - 4x - 6x + 3$

$= 4x(2x - 1) - 3(2x - 1)$

$= (2x - 1)(4x - 3)$

$= 8x^2 - 6x - 4x + 3$

$= 8x^2 - 10x + 3$

24	Sum
1·24	25
2·12	14
3·8	11
4·6	10
-1·-24	-25
-2·-12	-14
-3·-8	-11
-4·-6	-10

STEPS:

- **Locate the A (first) and C (last) numbers.**
- **Multiply $a \cdot c$.**
- **Find factors of the ac number.**
- **Choose the factors that add to the middle.**
- **Rewrite the problem, but replace the middle term with the factor pair you found.**
- **Split that problem in half and factor out the number and/or letter that each pair has in common.**
- **Write (matches)(leftover)**

Packet #8 continued

EXAMPLE 2:

$2x^2 + 11x + 12$ $\quad ac: 2 \cdot 12 = 24$

Factors of 24:

$\mathbf{2x^2 + 3x + 8x + 12}$ $\quad 1 \cdot 24,\ 2 \cdot 12,\ 3 \cdot 8,\ 4 \cdot 6$

$\mathbf{x(2x+3)\ \ 4(2x+3)}$

$\mathbf{(2x+3)(x+4)}$

Try These:

1. $6x^2 + 7x + 2$ 2. $2x^2 - 9x - 18$ 3. $8x^2 + 2x - 3$

4. $3x^2 + 19x - 40$ **5.** $6x^2 - x - 2$ 6. $2x^2 + x - 10$:

Make up your own problems like #1-6 above. Hint: You might want to think about it backwards…make up a multiplication problem first and multiply it out.

7. **8.**

Packet #9

Tired of doing math yet? Let's try something different…

Since we can't communicate in person like we usually do, let's get creative! Complete each question prompt so we can share about what's going on.

What did you do this week? **Anything special, different, fun, difficult?**	**Answer:**
What are you enjoying about being out of school?	**Answer:**
What do you miss about not coming to school?	**Answer:**

Quote of the Day:

Henry Ford said, "Unless you have courage, a courage that keeps you going, always going, no matter what happens, there is no certainty of success. It is really an endurance race."

Write something about what that means to you, how you could apply (or not apply) this to your life or our situation right now:

Let's try to stay connected…

If you have internet access, go to my Flipgrid and join in on our conversation! You can use your school email to join "login with Microsoft" but you don't need to make an account.

https://flipgrid.com/8c9eb7f1

flipcode hamby3131

If you can't join us, we will miss you!

Packet #9 continued

Now, let's look at some new information:

Notes 8.1

Identifying Characteristics of Quadratic Functions

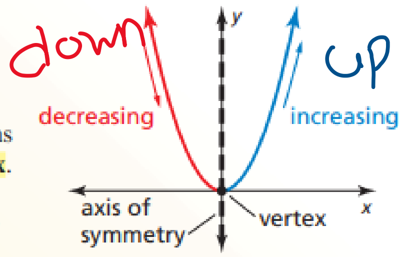
A **quadratic function** is a nonlinear function that can be written in the standard form $y = ax^2 + bx + c$, where $a \neq 0$. The U-shaped graph of a quadratic function is called a **parabola**. In this lesson, you will graph quadratic functions, where b and c equal 0.

Core Concept

Characteristics of Quadratic Functions

The *parent quadratic function* is $f(x) = x^2$. The graphs of all other quadratic functions are *transformations* of the graph of the parent quadratic function.

The lowest point on a parabola that opens up or the highest point on a parabola that opens down is the **vertex**. The vertex of the graph of $f(x) = x^2$ is (0, 0).

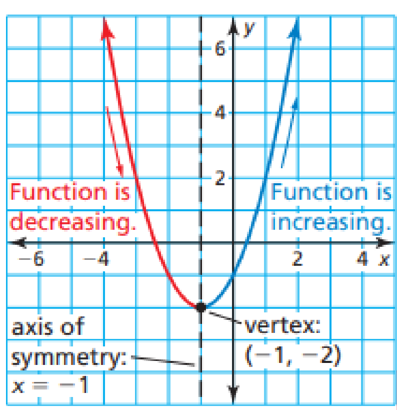


The vertical line that divides the parabola into two symmetric parts is the **axis of symmetry**. The axis of symmetry passes through the vertex. For the graph of $f(x) = x^2$, the axis of symmetry is the y-axis, or $x = 0$.

EXAMPLE 1 Identifying Characteristics of a Quadratic Function

Consider the graph of the quadratic function.

Using the graph, you can identify characteristics such as the vertex, axis of symmetry, and the behavior of the graph, as shown.



You can also determine the following:

- The domain is all real numbers.
- The range is all real numbers greater than or equal to −2.
- When $x < -1$, y increases as x decreases. down
- When $x > -1$, y increases as x increases. up

The x numbers in the equation can be any real number.

X at -1 is the dividing line for where the picture goes down, then turns and goes up

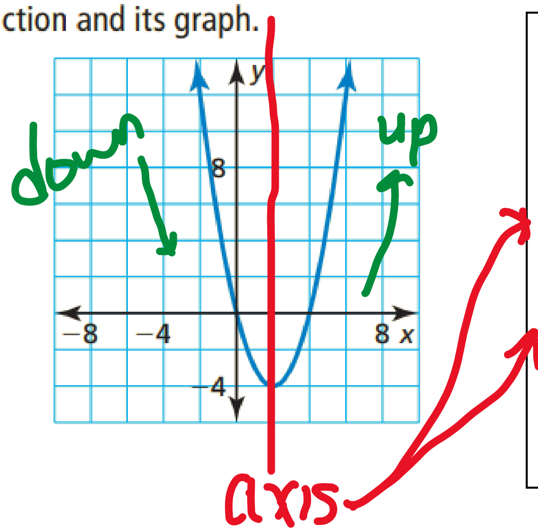
The y numbers in the equation are everything -2 and bigger

Packet #9 continued

PAY ATTENTION TO THE SCALE LABELS ON THE GRAPHS!

EXAMPLES:

Identify characteristics of the quadratic function and its graph.



<u>Domain</u>: x can be all real numbers

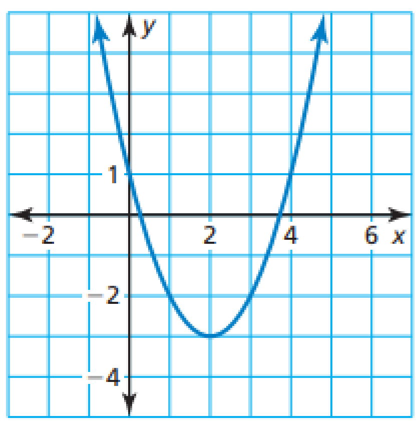
<u>Range</u>: y ≥ −4 because all of the picture is at -4 or higher.

<u>Decreasing</u> (going down) is x < 2 or the left side of the axis of symmetry.

<u>Increasing</u> (going up) is x > 2 or the right side of the axis of symmetry.

<u>Vertex:</u> (2,-4) the turning point at the bottom.

1.



<u>Domain</u>: x can be ______________

<u>Range</u>: y is _________________

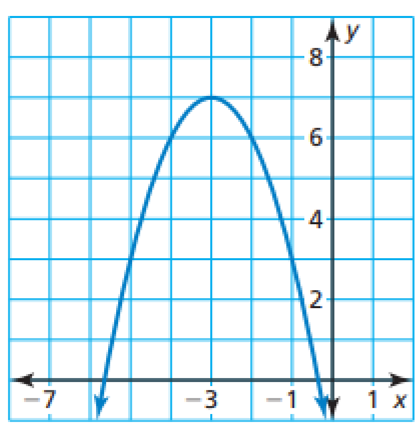
<u>Decreasing</u> (going down) _____________ or the left side of the axis of symmetry.

<u>Increasing</u> (going up) ________________ or the right side of the axis of symmetry.

<u>Vertex:</u> ____________ the turning point at the bottom.

THIS ONE IS DIFFERENT…Upside Down!

2.



<u>Domain</u>: x can be ______________

<u>Range</u>: y is _________________

<u>Decreasing</u> (going down) _____________ or the right side of the axis of symmetry.

<u>Increasing</u> (going up) ________________ or the left side of the axis of symmetry.

<u>Vertex:</u> ____________ the turning point at the top.

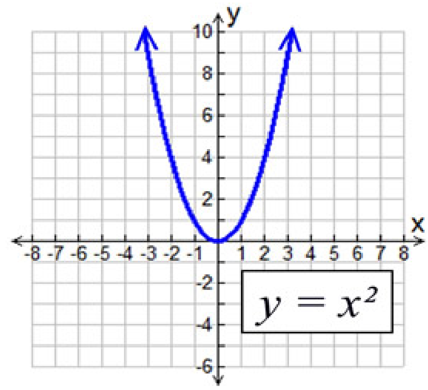
Packet #10

(from mathbits.com)

The "Parent" Graph:

The simplest parabola is $y = x^2$, whose graph is shown at the right. The graph passes through the origin (0,0), and is contained in Quadrants I and II.

This graph is known as the "Parent Function" for parabolas, or quadratic functions. All other parabolas, or quadratic functions, can be obtained from this graph by one or more transformations.



The "Children" Graphs:

The "parent" parabola can give birth to a myriad of other parabolic shapes through the process of transformations.

Brush off your memories of transformations and let's take a quick look at what is possible.

When graphing quadratic functions (parabolas), keep in mind that two forms of equations may be used:

$$y = ax^2 + bx + c \quad \text{or} \quad y = a(x - h)^2 + k$$

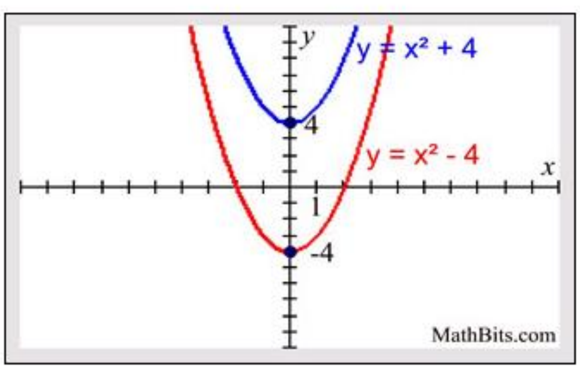
Vertical Translation

move the graph vertically - up or down

$y = x^2 + k$

$y = x^2 + 4$ moves the graph UP 4 units

$y = x^2 - 4$ moves the graph DOWN 4 units



EXAMPLE 1 **Graphing $y = x^2 + c$**

Graph $g(x) = x^2 - 2$. Compare the graph to the graph of $f(x) = x^2$.

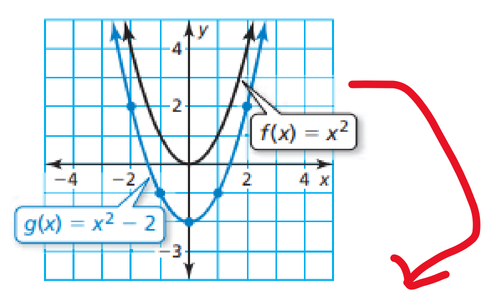
SOLUTION

Step 1 Make a table of values.

x	−2	−1	0	1	2
$g(x)$	2	−1	−2	−1	2

Step 2 Plot the ordered pairs.

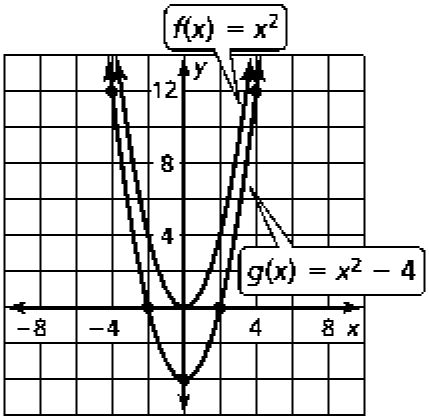
Step 3 Draw a smooth curve through the points.



Do you notice that the "child" graph went down 2, and the equation had a – 2 at the back? Not a coincidence! It's always true.

Packet #10 continued

Example:



They graphed the parent $y = x^2$ and the child $y = x^2 - 4$. Notice that the graph moved 4 down!

POINTS for the PARENT: ALWAYS!

-3	-2	-1	0	1	2	3
9	4	1	0	1	4	9

You Try!

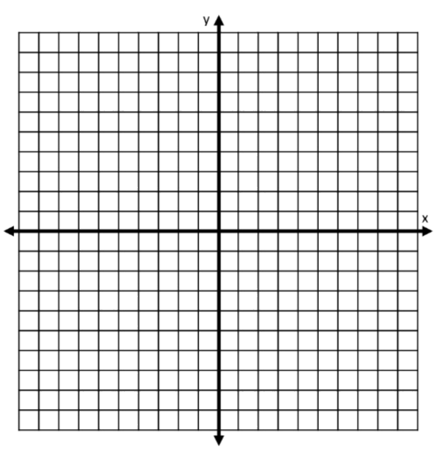
Graph the parent $y = x^2$ on each graph, then tell how the graph moved to get to the “child” graph.

Graph the function. Compare the graph to the graph of $f(x) = x^2$.

1. $g(x) = x^2 - 5$

Table for $y = x^2 - 5$ (fill it in)

-3	-2	-1	0	1	2	3

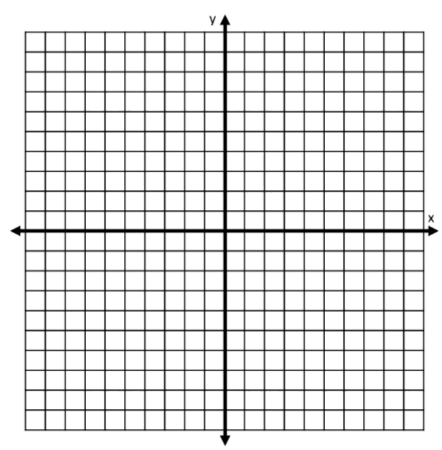


Description of the change from the parent to the child:

2. $h(x) = x^2 + 3$

Table for $y = x^2 + 3$ (fill it in)

-3	-2	-1	0	1	2	3



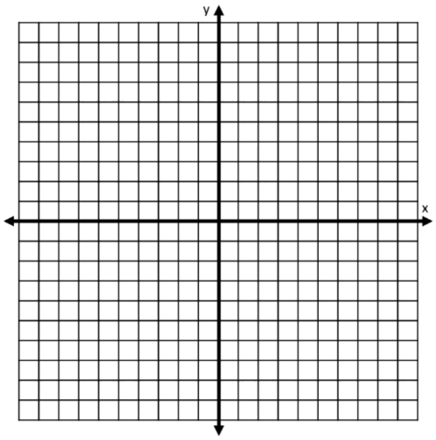
Description of the change from the parent to the child:

Packet #10 continued

COULD WE GRAPH THESE CHANGES (TRANSFORMATIONS) WITHOUT USING A TABLE?

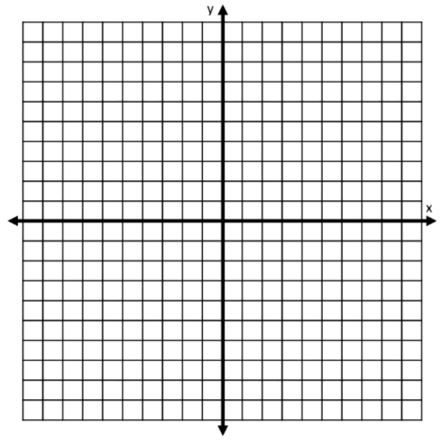
YES! Just move the parabola up or down the right amount! Below graph the parent and the child.

3. $y = x^2 + 8$



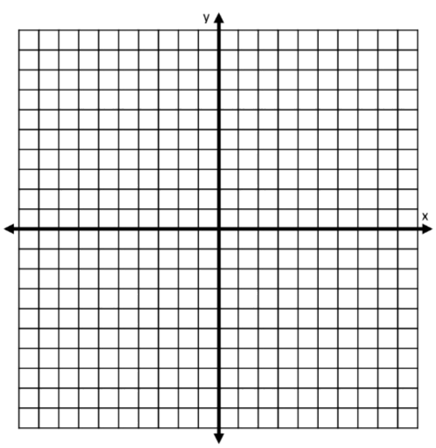
Description of the change from the parent to the child:

4. $y = x^2 - 7$



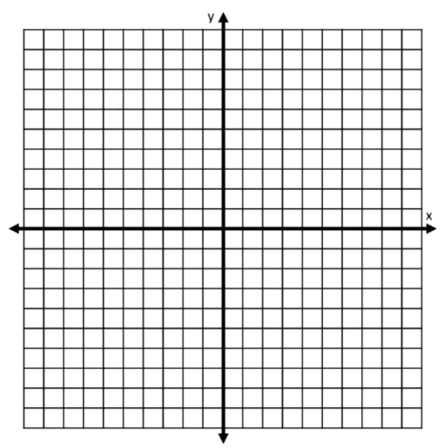
Description of the change from the parent to the child:

5. $y = x^2 + 6$



Description of the change from the parent to the child:

6. $y = x^2 - 1$



Description of the change from the parent to the child:

Packet #10 continued

A **zero of a function** f is an x-value for which $f(x) = 0$. A zero of a function is an x-intercept of the graph of the function.

****To find the zero, factor, and set each part equal to 0.**

EXAMPLES to find the zeros!

$y = x^2 - 9$ difference of 2 squares

$y = (x + 3)(x - 3)$

$x + 3 = 0 \quad and\ x - 3 = 0$

$* remember\ doing\ this\ recently$? Now get x by itself.

$y = 3\ and - 3$ THESE ARE THE ZEROS!

$Also\ written\ as\ pairs\ (0,3)\ and\ (0,-3)$

$y = x^2 - 100$

$y = (x + 10)(x - 10)$

$x + 10 = 0 \quad and\ x - 10 = 0$

$y = 10\ and\ y = -10$

$Also\ written\ as\ pairs\ (0,10)\ and\ (0,-10)$

FIND THE ZEROS!

1. $y = x^2 - 64$

2. $y = x^2 - 4$

3. $y = x^2 - 1$

4. $y = x^2 - 16$

OK TAKE A BREAK!!
MESSAGE ME IF YOU NEED HELP!