Warm-up Determine vertex & y-intercepts

1) $y = -x^2 - 12x + 3$ $x = \frac{+12}{2(-1)} = -6$ v: (-6, 39) y-int: 3

2) $y = 3(x - 5)^2 + 7$ $a(x-h)^2+k$ v: (5, 7) y-int: 82

$3(25)+7$ $75+7$

Mar 3-1:07 PM

Homework Questions?

8) $y = x^2 - 12x + 46$ $a=1$ $x = \frac{-b}{2a} = \frac{+12}{2(1)} = 6$ v: (6, 10) h k

$a=1$ $h=6$ $k=10$ $y = a(x-h)^2 + k$ $y = (x-6)^2 + 10$

Sep 9-1:06 PM

Simplify each:

1) $(3 + 2i) + (7 - 8i) = 3 + 2i + 7 - 8i = 10 - 6i$

2) $(3 + 2i)(7 - 8i)$ $21 - 24i + 14i - 16i^2$ $+16$ $-16(-1)$

$37 - 10i$ $a + bi$

Oct 4-5:17 PM

From yesterday:

Write equation given vertex and a 2nd point

1) vertex: (3, 4) (h, k) point (5, -4) (x, y)

$y = a(x-h)^2 + k$ $-4 = a(5-3)^2 + 4$ $-4 = 4a + 4$ -4 -4 $\frac{-8}{4} = \frac{4a}{4}$ $-2 = a$ → $y = -2(x-3)^2 + 4$

2

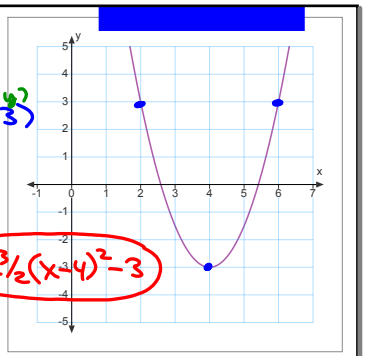
Oct 1-7:42 AM

$y = 3/2(x-4)^2 - 3$

2) v: (4, -3) (h, k) pt: (2, 3) (x, y)

$y = a(x-h)^2 + k$ $3 = a(2-4)^2 - 3$ $3 = 4a - 3$ $+3$ $+3$ $\frac{6}{4} = \frac{4a}{4}$ $a = 3/2$

$y = \frac{3}{2}(x-4)^2 - 3$



Mar 10-8:36 AM

Graphing parabolas as transformations of the parent function

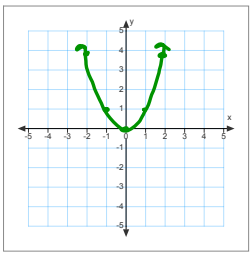
Lesson #3 Today

starts here.

Sep 24-11:04 AM

Graph parent function $y = x^2$

	x	y
v:	-2	4
	-1	1
	0	0
	1	1
	2	4



Mar 10-8:14 AM

Transformation Rules

Vertical shifts: $g(x) = f(x) + k$ up

$g(x) = f(x) - k$ down

Horizontal shifts: $g(x) = f(x - h)$ *right h units*

$g(x) = f(x + h)$ *left h units*

Reflections: $g(x) = -f(x)$ *over x-axis*

(later) $g(x) = f(-x)$ *over y-axis*

Stretch/compress $g(x) = a f(x)$ *vert. stretch/compress*

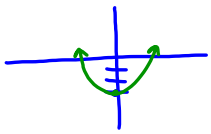
Sep 11-9:57 AM

A) Vertical translations

$g(x) = f(x) + k$ shifts up *k* units

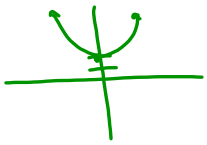
$g(x) = f(x) - k$ shifts down *k* units

1) $y = x^2 - 3$



Sep 9-1:08 PM

2) $y = x^2 + 2$



Sep 9-2:20 PM

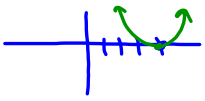
B) Horizontal translations

f(x)

$g(x) = f(x - h)$ *right h units*

$g(x) = f(x + h)$ *left h units*

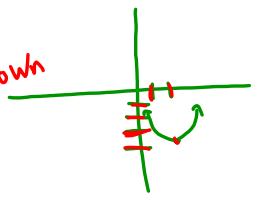
1) $y = (x - 4)^2$



Sep 9-1:08 PM

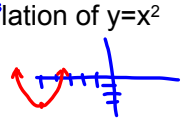
2) $y = (x - 2)^2 - 4$

2 right ↑ 4 down ↑



Sep 9-2:23 PM

3) Write an equation for a translation of $y=x^2$ that has a vertex of (-5, -3)



$y=(x+5)^2-3$

Oct 4-5:11 PM

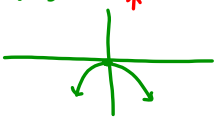
C) Reflections:

$g(x)=-[f(x)]$ over x-axis

Has a negative sign (-) in front of x^2

Sketch each:

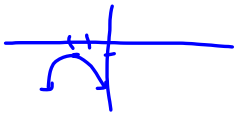
1) $y=-x^2$



open down

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

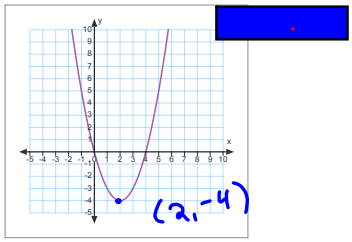
2 left 1 down



Sep 12-9:04 AM

Write tranformation equations from graph

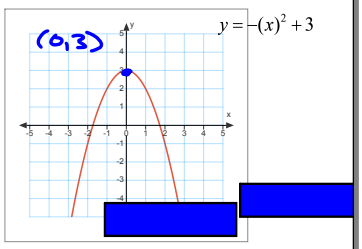
$y=(x-2)^2-4$



Oct 4-5:01 PM

Write tranformation equations from graph

$y=-x^2+3$



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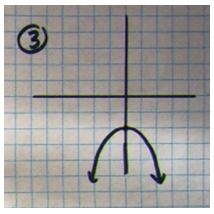
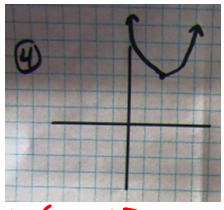
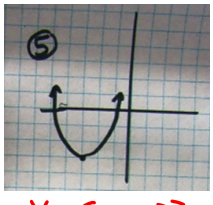


$y=-x^2-2$

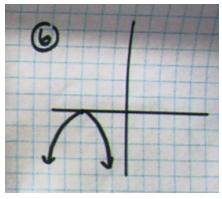


$y=-(x-2)^2+3$

Oct 4-5:06 PM



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



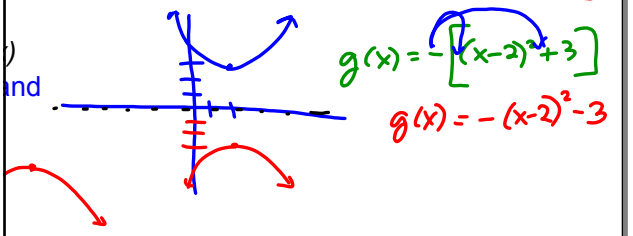
$y=-(x+3)^2$

Oct 4-5:07 PM

Writing transformations *(not from the parent function!)*

Oct 4-5:08 PM

1) $f(x) = (x - 2)^2 + 3$



Sep 9-2:28 PM

2) $f(x) = (x - 2)^2 + 3$ $g(x) = f(x) + k$

a) Write equation for *g(x)* which is a vertical shift of f(x) 6 units up

$g(x) = [(x-2)^2 + 3] + 6$

$g(x) = (x-2)^2 + 9$

b) Write equation for *g(x)* which is a hortizontal shift of f(x) 7 units left

$f(x) = (x-2)^2 + 3$ $g(x) = f(x+h)$

$g(x) = ((x+7)-2)^2 + 3$

$g(x) = (x+5)^2 + 3$

Sep 10-9:24 AM

D) Vertical Stretch/compress

$$g(x) = a\,f(x)$$

$|a| > 1$ vertical stretch (makes skinny)

$0 < |a| < 1$ vertical compress (makes wide)

Oct 4-5:17 PM

1) Stretch the graph of $f(x) = (x - 4)^2 - 2$ vertically by a factor of 3

Oct 4-5:19 PM

2) Compress the graph of $f(x) = (x + 2)^2 - 1$ vertically by a factor of 1/2

Oct 4-5:19 PM

Practice with Calculator

1) Find min value of $2x^2 + 5x + 20$

2) Find max value of $-3x^2 + 55x + 200$

Oct 5-7:15 AM