

Feb 15 - 3:26 PM

☺☺

$$y = -3(x+4)^2 + 20$$

$$y = -3(x^2 + 8x + 16) + 20$$

$$y = -3x^2 - 24x - 48 + 20$$

$$y = -3x^2 - 24x - 28$$

Sep 4-12:56 PM

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

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

$$y = \frac{3}{4}x^2 - 3x + 3 + 6$$

$$y = \frac{3}{4}x^2 - 3x + 9$$

Sep 4-1:03 PM

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

$$y = x^2$$

$$y = 1(x-0)^2 + 0$$

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$y = 5(x-1)^2$	$a$	$h$	$k$	Range
$y = 4x^2 + 6$	5	1	0	$y \geq 0$
$y = x^2$	4	0	6	$y \geq 6$
$y = -4.9(x-1.5)^2 + 40.2$	1	0	0	$y \geq 0$
	-4.9	1.5	40.2	$y \leq 40.2$

Sep 4-12:50 PM

Vertex Form to Standard Form Expand

First, let's review expanding:

Shortcut Rule for Squaring a Binomial

- Square the First Term
- Multiply the terms together and double it
- Square the last term

$$(x+3)^2 = x^2 + 3x + 3x + 9 = x^2 + 6x + 9$$

$$(2x-5)^2 = 4x^2 - 20x + 25$$

Sep 4-10:39 PM

Changing equations from...

Standard Form  $y = ax^2 + bx + c$

"Complete the square"

Vertex Form  $y = a(x-h)^2 + k$

**EXAMPLE: Constructing a perfect square trinomial**

a)  $x^2 + 10x + 25 = (x+5)^2$

b)  $x^2 - 12x + 36 = (x-6)^2$

c)  $x^2 - 5x + \frac{25}{4} = (x - \frac{5}{2})^2$

d)  $x^2 + 7x + \frac{49}{4} = (x + \frac{7}{2})^2$

e)  $x^2 - \frac{3}{4}x + \frac{9}{64} = (x - \frac{3}{8})^2$

**RULE:** Look at the coefficient in front of the "x term" (the b value), and...

(1) Take half of it, then  
(2) Square it!

Feb 13 - 10:38 AM

**Completing the Square**

Express each of the following in vertex form:

1.  $y = x^2 - 14x$   
 $y = x^2 - 14x + 49 - 49$   
 $y = (x-7)^2 - 49$

2.  $y = x^2 + 6x - 5$   
 $y = x^2 + 6x + 9 - 9 - 5$   
 $y = (x+3)^2 - 14$

(Show multiple methods that could be used)

3.  $y = -x^2 + 2x + 7$   
 $y = -(x^2 - 2x + 1) + 7$   
 $y = -(x-1)^2 + 7$   
 $y = -(x-1)^2 + 6$

4.  $y = 4x^2 - 32x + 1$   
 $y = 4(x^2 - 8x + 16) + 1$   
 $y = 4(x-4)^2 - 64 + 1$   
 $y = 4(x-4)^2 - 63$

Sep 11-11:04 PM

Now that we have the method down...let's have some FUN!!!!

7.  $y = -\frac{3}{5}x^2 + \frac{1}{2}x - 4$

6.  $y = 2$

Sep 11-11:09 PM

**HOMWORK...**

Worksheet - Standard to Vertex (a not 1).doc

Pre-Calculus 110  
Completing the Square

Express the following functions in vertex form and state the vertex of each parabola.

PROBLEMS:	SOLUTIONS:
1) $y = 2x^2 - 8x + 7$	#1. $y = 2(x-2)^2 - 1$
2) $y = -3x^2 + 9x + 2$	#2. $y = -3(x - \frac{3}{2})^2 + \frac{35}{4}$
3) $y = -x^2 - 3x + 1$	#3. $y = -(x + \frac{3}{2})^2 + \frac{13}{4}$
4) $y = -2x^2 + 16x + 7$	#4. $y = -2(x - 4)^2 + 39$
5) $y = 3x^2 - 12x - 5$	#5. $y = 3(x - 2)^2 - 17$
6) $y = \frac{1}{2}x^2 + 3x + 2$	#6. $y = \frac{1}{2}(x + 3)^2 + \frac{5}{2}$
7) $y = -\frac{2}{3}x^2 - 8x + 1$	#7. $y = -\frac{2}{3}(x + 6)^2 + 25$
8) $y = 2x^2 + 4x + 5$	#8. $y = 2(x + 1)^2 + 3$
9) $y = -5x^2 + 12x - 7$	#9. $y = -5(x - \frac{6}{5})^2 - \frac{17}{5}$
10) $y = 5x^2 - 10x + 3$	#10. $y = 5(x - 1)^2 - 2$
11) $y = \frac{1}{4}x^2 - x + 1$	#11. $y = \frac{1}{4}(x - 2)^2 - \frac{1}{4}$
12) $y = -\frac{1}{2}x^2 + 3x + 1$	#12. $y = -\frac{1}{2}(x - 3)^2 + \frac{27}{2}$
13) $y = x^2 - 3x - 1$	#13. $y = (x - \frac{3}{2})^2 - \frac{13}{4}$
14) $y = x^2 - 5x + 1$	#14. $y = (x - \frac{5}{2})^2 - \frac{21}{4}$
15) $y = 2x^2 - 3x + 4$	#15. $y = 2(x - \frac{3}{4})^2 + \frac{23}{8}$
16) $y = -3x^2 + 6x - 3$	#16. $y = -3(x - 1)^2$
17) $y = -2x^2 + 3x - 2$	#17. $y = -2(x - \frac{3}{4})^2 - \frac{7}{8}$
18) $y = -0.2x^2 - x + 3$	#18. $y = -\frac{1}{5}(x + \frac{5}{2})^2 + \frac{17}{4}$

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$y = -2(x+4)^2 - 10$

$y = -2(x^2 + 8x + 16) - 10$

$y = -2x^2 - 16x - 32 - 10$

$y = -2x^2 - 16x - 42$

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$y = \frac{2}{3}(x+1)^2 - 5$

$y = \frac{2}{3}(x^2 + 2x + 1) - 5$

$y = \frac{2}{3}x^2 + \frac{4}{3}x + \frac{2}{3} - 5$

$y = \frac{2}{3}x^2 + \frac{4}{3}x + \frac{13}{3}$

Sep 4-8:52 AM

One more

$y = 1(x+3)^2 + 7$

$y = 1(x^2 + 6x + 9) + 7$

$y = x^2 + 6x + 16$

Sep 4-9:14 AM

Complete the Square

ex.  $x^2 + 10x + 25 = (x+5)^2$   
 $x^2 - 8x + 16 = (x-4)^2$

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$y = x^2 + 6x - 10$   
 $y = x^2 + 6x + 9 - 9 - 10$   
 $y = (x+3)^2 - 19$

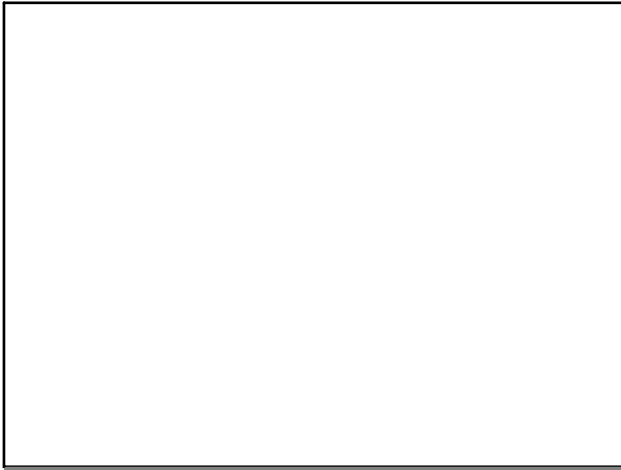
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$y = x^2 + 20x + 50$   
 $y = x^2 + 20x + 100 - 100 + 50$   
 $y = (x+10)^2 - 50$

Sep 4-9:15 AM

$y = 2x^2 + 8x + 10$   
 $y = 2(x^2 + 4x + 4 - 4) + 10$   
 $y = 2(x+2)^2 - 8 + 10 - 2$

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Sep 5-8:17 AM

## Attachments

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Worksheet - Standard to Vertex (a not 1).doc