



WARM UP: Determine ALL properties for the given quadratic...

Standard

Vertex Form	$y = -2(x-1)^2 + 3$
Direction of Opening	Down
Stretch Factor	2 (narrow)
Vertex	(1, 3)
y - intercept	(0, 1)
Domain	$\{x \in \mathbb{R}\}$
Range	$\{y \leq 3\}$
Max or Min y - value	Max y value 3
Axis of Symmetry	$x = 1$
Sketch (label ALL key Points)	

$y = -2x^2 + 4x + 3$   
 $y = -2(0-1)^2 + 3$   
 $y = -2(1)^2 + 3$   
 $y = 1$

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

**Standard --> Vertex Form**

NOTES - Standard to Vertex Form.pdf

**STANDARD**

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

- 'a' value
  - stretch factor
  - direction of opening
- y-intercept

**VERTEX**

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

- 'a' value
  - stretch factor
  - direction of opening
- vertex
  - A.O.S
  - Domain/Range
  - Max/Min y value
  - Sketch/Graph

We need to FACTOR... 'Complete the Square' Method!!!

S  $\rightarrow$  V by completing the square

**STEPS:**

- 1) Factor out the 'a' value from both the x and  $x^2$  terms [GCF].
- 2) **Complete the square** on the x term...
  - take half and square it!
  - add this constant within bracket
  - subtract constant outside bracket multiplied by the 'a' value in front.
- 3) **FACTOR** the perfect square trinomial

**Note:**  $\sqrt{\text{First}}$  &  $\sqrt{\text{Last}}$  with sign from middle

**VERTEX FORM!!!**

**EXAMPLE #1...**

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

$$a = 1$$

$$y = (x^2 - 6x + \underline{9}) - 9 + 4$$

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

vertex  
(3, -5)

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

Diagram illustrating the factoring process:

- Two arrows labeled  $\sqrt{15x}$  point to the  $x$  and  $-3$  terms in  $(x-3)^2$ .
- A vertical arrow labeled "middle" points to the  $-3$  term in  $(x-3)^2$ .

$$x \rightarrow 9$$
$$+ \rightarrow -6$$
$$\underbrace{-3, -3}$$

$$\text{OR } \frac{-3}{-3} \times \frac{-3}{-3} = 9$$
$$\frac{-3}{-3} + \frac{-3}{-3} = -6$$

More Examples: S → V : Complete the square with "a=1"

#2.  $y = x^2 + 14x$

$$y = (x^2 + \underline{14}x + \underline{49}) - 49$$

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

Vertex  
(-7, -49)

Y-int (0, -49)

#3.  $y = x^2 - 8x - 15$

$$y = (x^2 - \underline{8}x + \underline{16}) - 16 - 15$$

$$y = (x - 4)^2 - 31$$

Vertex (4, -31)

#4.  $y = x^2 + 9x + 2$

$$y = (x^2 + \underline{9}x + \underline{\frac{81}{4}}) - \frac{81}{4} + \frac{2 \cdot 4}{1 \cdot 4}$$

$$\left(\frac{9}{2}\right)^2 = \frac{81}{4}$$

$$y = \left(x + \frac{9}{2}\right)^2 - \frac{73}{4}$$

Vertex  $\left(-\frac{9}{2}, -\frac{73}{4}\right)$

# HOMEWORK

Worksheet - Standard to Vertex and Properties.pdf



# 1-5

\* Weakest Test : Review

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## Attachments

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NOTES - Standard to Vertex Form.pdf

Worksheet - Standard to Vertex and Properties.pdf