

# More Vertex Form Worksheet

Expand each quadratic and write in Standard Form. Identify the Vertex for each: ( ?, ? )

Vertex Form	Standard Form	Vertex is at ...
1. $y = (x+3)^2 - 10$		
2. $y = (x-5)^2 + 4$		
3. $y = (x + \frac{2}{3})^2 + \frac{2}{9}$		
4. $y = 2(x+1)^2 - 7$		

Now, take each of these and rewrite in Vertex Form. Then identify the vertex: ( ?, ? )

Standard Form	Vertex Form	Vertex is at ...
5. $y = x^2 + 8x - 1$		
6. $y = x^2 - 6x + 17$		
7. $y = x^2 - 5x - 11$		
8. $y = x^2 + 10x$		
9. $y = x^2 + bx + c$		

# Quadratic Functions

Vertex Form:  $f(x) = a(x - h)^2 + k$     Standard Form:  $f(x) = ax^2 + bx + c$

## Converting Quadratic Equations from vertex form into standard form:

Vertex Form: Square the binomial.

$$f(x) = -2(x - 4)^2 + 5$$

$$(\cancel{x} - 4)(\cancel{x} - 4) \text{ FOIL}$$

$$x^2 - 4x - 4x + 16$$

$$x^2 - 8x + 16$$

Distribute the coefficient of the trinomial.

$$= -2(x^2 - 8x + 16) + 5$$

Combine like terms.

$$= -2x^2 + 16x - 32 + 5$$

Standard Form

$$= -2x^2 + 16x - 27$$

Foil  
or  
Box Method

$$\begin{array}{r|l} x & -4 \\ \hline & x^2 - 4x \\ -4 & -4x + 16 \\ \hline & x^2 - 4x - 4x + 16 \end{array}$$

## More Vertex Form Worksheet

Expand each quadratic and write in Standard Form. Identify the Vertex for each: (?, ?)

Vertex Form	Standard Form	Vertex is at ...
1. $y = (x+3)^2 - 10$ $\begin{array}{r} x+3 \\ x \quad \boxed{x^2+3x} \\ +3 \quad \boxed{3x+9} \end{array}$	$y = x^2 + 3x + 3x + 9 - 10$ $y = x^2 + 6x - 1$	$(-3, -10)$
2. $y = (x-5)^2 + 4$ $\begin{array}{r} x-5 \\ x \quad \boxed{x^2-5x} \\ -5 \quad \boxed{-5x+25} \end{array}$	$y = x^2 - 5x - 5x + 25 + 4$ $y = x^2 - 10x + 29$	$(5, 4)$
3. $y = (x + \frac{2}{3})^2 + \frac{2}{9}$ $\begin{array}{r} x + \frac{2}{3} \\ x \quad \boxed{x^2 + \frac{4}{3}x} \\ \frac{2}{3} \quad \boxed{\frac{4}{3}x + \frac{4}{9}} \end{array}$	$y = x^2 + \frac{4}{3}x + \frac{4}{3}x + \frac{4}{9} + \frac{2}{9}$ $y = x^2 + \frac{8}{3}x + \frac{6}{9}$ $y = x^2 + \frac{8}{3}x + \frac{2}{3}$	$(-\frac{2}{3}, \frac{2}{9})$
4. $y = 2(x+1)^2 - 7$ $\begin{array}{r} x+1 \\ x \quad \boxed{x^2+x} \\ +1 \quad \boxed{x+1} \end{array}$	$y = 2(x^2 + 2x + 1) - 7$ $y = 2x^2 + 4x + 2 - 7$ $y = 2x^2 + 4x - 5$	$(-1, -7)$

Now, take each of these and rewrite in Vertex Form. Then identify the vertex: (?, ?)

Standard Form	Vertex Form	Vertex is at ...
5. $y = x^2 + 8x - 1$ $\begin{array}{r} +1 \\ y+1 = x^2 + 8x \\ +16 \\ y+17 = x^2 + 8x + 16 \end{array}$	$\rightarrow y+17 = (x+4)(x+4)$ $y+17 = (x+4)^2$ $-17$ $y = (x+4)^2 - 17$	$(-4, -17)$
6. $y = x^2 - 6x + 17$ $\begin{array}{r} -17 \\ y-17 = x^2 - 6x \\ +9 \\ y-8 = x^2 - 6x + 9 \end{array}$	$\rightarrow y-8 = (x-3)(x-3)$ $y-8 = (x-3)^2$ $+8$ $y = (x-3)^2 + 8$	$(3, 8)$
7. $y = x^2 - 5x - 11$ $\begin{array}{r} +11 \\ y+11 = x^2 - 5x \\ +6.25 \\ y+17.25 = x^2 - 5x + 6.25 \end{array}$	$\rightarrow y+17.25 = (x-2.5)(x-2.5)$ $y+17.25 = (x-2.5)^2$ $y = (x-2.5)^2 - 17.25$	$(2.5, -17.25)$
8. $y = x^2 + 10x$ $\begin{array}{r} +25 \\ y+25 = x^2 + 10x + 25 \\ y+25 = (x+5)(x+5) \end{array}$	$\rightarrow y+25 = (x+5)^2$ $y = (x+5)^2 - 25$	$(-5, -25)$
9. $y = x^2 + bx + c$ $\begin{array}{r} y-c = x^2 + bx \\ y-c + \frac{b^2}{4} = x^2 + bx + \frac{b^2}{4} \end{array}$	$\rightarrow y-c + \frac{b^2}{4} = (x + \frac{1}{2}b)^2$ $y = (x + \frac{1}{2}b)^2 + c - \frac{b^2}{4}$	$(-\frac{1}{2}b, c - \frac{b^2}{4})$

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$(x - 4)(x - 4)$  FOIL

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$$x^2 - 8x + 16$$

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