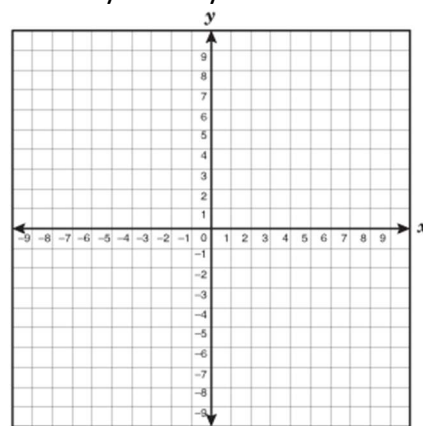


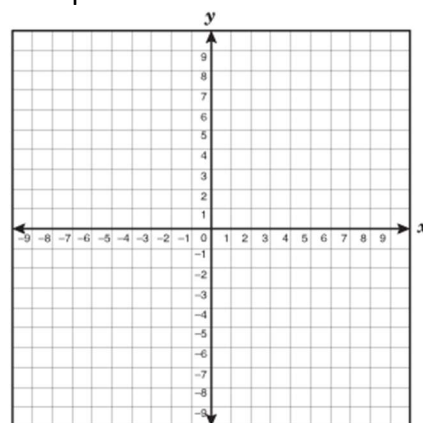
Exploring Quadratic Functions & Their Properties

- **Standard Form of a Polynomial Function**
 - $P(x) = a_nx^n + a_{n-1}x^{n-1} + \dots + a_1x + a_0$
 - Notice: State in Decreasing order of power
 - **Format of Quadratics/Parabola's**
 - Standard Form: $f(x) = ax^2 + bx + c$
 - Vertex Form: $f(x) = a(x - h)^2 + k$
 - **Axis of Symmetry:** A *LINE* that divides the parabola into 2 mirror images ($x = h$).
 - **Vertex:** *Point* where parabola hits axis of symmetry (h, k).
 - **Parent quadratic function:** $f(x) = x^2$
 - **Transformations of the parent quadratic**
 - Increasing a , narrows graph; Decreasing a , widens graph
 - a positive = up; a negative = down
 - h shifts graph left and right
 - k shifts graph up and down
 - For $y = \frac{1}{2}(x - 3)^2 - 5$, what are the vertex, axis of symmetry, minimum or maximum value, domain, and range?
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- **Information from *Standard Form* of Quadratic**
 - Axis of symmetry: $x = \frac{-b}{2a}$
 - Vertex: $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$
 - What are the vertex, axis of symmetry, maximum or minimum value, and range of $y = -x^2 + 6x + 3$?

- Sketch the graph of $f(x) = 3x^2 - 6x + 4$. Identify the vertex and the axis of symmetry.



- Sketch the graph of $f(x) = -x^2 + 6x - 8$. Identify the vertex and x-intercepts.



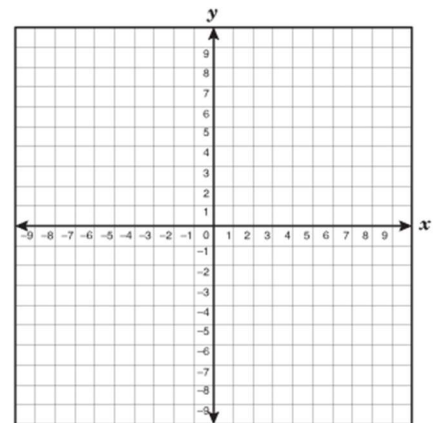
- Write the standard form of the quadratic function whose graph is a parabola with vertex $(-4, 11)$ and passes through the point $(-6, 15)$.

- How to go from one format to the other
 - $f(x) = ax^2 + bx + c$ TO $f(x) = a(x - h)^2 + k$
 - COMPLETE THE SQUARE!!!
 - $f(x) = a(x - h)^2 + k$ TO $f(x) = ax^2 + bx + c$
 - SQUARE BINOMIAL, DISTRIBUTE a TERM, COMBINE LIKE TERMS
- Completing the Square*
 - Method:
 - Set up in format of: $y = ax^2 + bx + c$ (Notice: a must be 1)
 - Take half of the middle term (b)

- Square it (b^2)
 - Add it and Subtract it
 - Factor perfect trinomial
 - The first 3 terms (trinomial) are now “perfect” square. Sign comes from original “b” term.
 - Combine leftover terms to obtain your k value
 - Remember, the a value is the same in both standard form and vertex form.
- Convert to Vertex form: $y = x^2 + 12x + 27$?

- What value completes the square for $x^2 + 14x$?

- Graph by Completing the Square to obtain Vertex form: $y = x^2 + 6x - 1$?



- What is $y = x^2 - 10x + 4$ in vertex form? Name the vertex and the y -intercept.

- Convert $y = 2(x - 3)^2 + 5$ to standard form of a quadratic.