Section 4-2
Standard Form of a Quadratic Equation

Students will be able to:
-Describe the vertex and axis of symmetry of a quadratic equation in standard form.
-graph an equation in vertex form.

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Quadratic Equation in Standard Form

*$f(x) = ax^2 + bx + c$ (a cannot be 0)

*axis of symmetry: $x = \frac{-b}{2a}$

*This is the x-coordinate of the vertex. Use this to find y.

*the y-intercept is at (0, c)

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Find the axis of symmetry, vertex, min or max value, domain, and range.

14. $y = 2x^2 - 6x + 3$

$x = -\frac{b}{2a}$

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

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

$= 2 \cdot \frac{9}{4} - 9 + 3$

$= \frac{9}{2} - \cancel{6}\ \frac{12}{2}$

$y = -\frac{3}{2}$

$(\frac{3}{2}, -\frac{3}{2})$

axis of sym: $x = \frac{3}{2}$

vertex: $(\frac{3}{2}, -\frac{3}{2})$

min of $-\frac{3}{2}$

D: $\mathbb{R}$

R: $y \geq -\frac{3}{2}$

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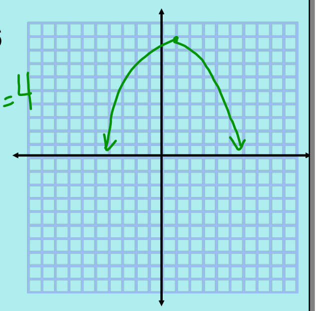
Finding the vertex helps to describe the graph of the parabola, making it easier to graph.

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

$x = -\frac{b}{2a} = \frac{-6}{2(-\frac{3}{4})} = \frac{-6}{-\frac{3}{2}} \cdot -\frac{2}{3} = 4$

$y = 18$

$(4, 18)$



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To write a quadratic function in vertex form, start by finding the vertex:

#29. $y = 2x^2 - 5x + 12$

$(\frac{5}{4}, \frac{71}{8})$

$x = -\frac{b}{2a} = +\frac{+5}{2(2)} = \frac{5}{4}$

$y = 2(x - \frac{5}{4})^2 + \frac{71}{8}$

$y = 2(\frac{5}{4})^2 - 5(\frac{5}{4}) + 12$

$y = \frac{25}{8} - \cancel{\frac{25}{4}}\ \frac{50}{8} + 12$

$-\frac{25}{8} + 12 = \frac{71}{8}$

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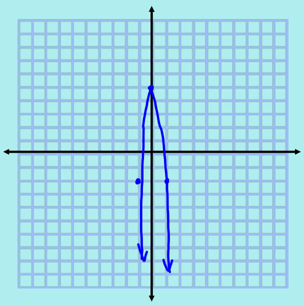
#35. Sketch the parabola with a vertex at (0, 5) and goes through (1, -2).



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#39. Find the unknown coefficients.
$y = x^2 + bx + c$; vertex (3, -4)

$X = \frac{-b}{2a}$

$2 \cdot 3 = \frac{-b}{\cancel{2}(1)} \cdot \cancel{2}$

$-6 = b$

$-4 = (3)^2 + \overset{-18}{\cancel{-6(3)}} + c$

$-4 = 9 + -18 + c$

$-4 = -9 + c$

$+9 \quad +9$

$5 = c$

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#12 - 38 (4th), 40, 46, 50

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