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Master 1.1a Activate Prior Learning: Factoring Polynomials

Factoring Trinomials of the Form $x^2 + bx + c$

This method requires determining two numbers with a sum of b and a product of c.
For example, to factor $n^2 + 5n - 6$:
Determine two numbers with a sum of 5 and a product of –6.
$6 + (-1) = 5$
$(6)(-1) = -6$
The factors are:
$n^2 + 5n - 6 = (n + 6)(n - 1)$

Factoring Trinomials of the Form $ax^2 + bx + c$

This method requires determining two numbers with a sum of b and a product of ac.
For example, to factor $3t^2 - 13t - 10$:
Determine two numbers with a sum of –13 and a product of –30.
$-15 + 2 = -13$
$(-15)(2) = -30$
Replace $-13t$ with $-15t + 2t$.
$3t^2 - 13t - 10 = 3t^2 - 15t + 2t - 10$
Remove common factors from the 1st pair of terms and the 2nd pair of terms.
$3t^2 - 13t - 10 = 3t(t - 5) + 2(t - 5)$
Remove the binomial common factor.
$3t^2 - 13t - 10 = (t - 5)(3t + 2)$

Factoring a Difference of Squares Binomial

This method requires writing each term in the binomial as a perfect square.
For example, to factor $4m^2 - 25t^2$:
$4m^2 - 25t^2 = (2m)^2 - (5t)^2$
$4m^2 - 25t^2 = (2m + 5t)(2m - 5t)$

Check Your Understanding

1. Factor each trinomial.

a) $x^2 - 6x + 5$ **b)** $m^2 - 9m - 36$ **c)** $r^2 + 23r - 50$
d) $n^2 + 18n + 32$ **e)** $a^2 - a - 72$ **f)** $c^2 - 17c + 70$

2. Factor each trinomial.

a) $2x^2 - 11x - 21$ **b)** $3c^2 - 11c + 10$ **c)** $4m^2 - 8m - 5$
d) $5b^2 - 9b - 2$ **e)** $5y^2 - 23y + 12$ **f)** $6n^2 + 25n + 14$

3. Factor each difference of squares.

a) $x^2 - 16$ **b)** $9u^2 - w^2$ **c)** $49g^2 - 36$

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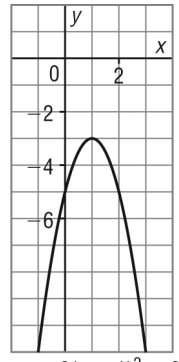
Master 1.1b Activate Prior Learning: Graphing Quadratic Functions

Here are two forms of the quadratic function: $y = a(x - p)^2 + q$ and $y = ax^2 + bx + c$

Graphing a Quadratic Function of the Form $y = a(x - p)^2 + q$

For example, to graph $y = -2(x - 1)^2 - 3$:
Identify the coordinates of the vertex:
$(p, q) = (1, -3)$
The graph opens down because a is negative.
Plot a point at the vertex, then use a step pattern to determine the coordinates of other points on either side of the vertex. That is, from the vertex, go across 1 unit and down 2 units, and mark a point; then, from that point, go across 1 unit, and down 6 units. Join the points with a smooth curve.
The domain is $x \in \mathbb{R}$; and the range is $y \leq -3$.



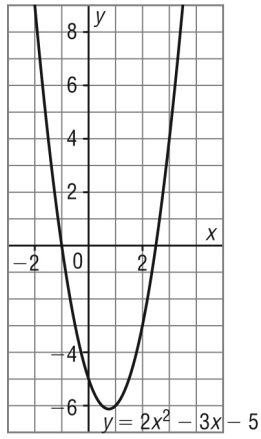
$y = -2(x - 1)^2 - 3$

Graphing a Quadratic Function of the Form $y = ax^2 + bx + c$

For example, to graph $y = 2x^2 - 3x - 5$:
Determine the intercepts.
Substitute $x = 0$, then $y = -5$
Substitute $y = 0$, then $2x^2 - 3x - 5 = 0$
Factor: $(2x - 5)(x + 1) = 0$
$x = 2.5$ or $x = -1$
Complete a table of values to determine then plot the coordinates of some other points on the graph.

x	−2	1	2	3
y	9	−6	−3	4

The domain is $x \in \mathbb{R}$; and the approximate range is $y \geq -6$.
To determine the range exactly, use technology to graph the function.



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

Check Your Understanding

1. Graph each quadratic function. State the domain and range.
a) $y = (x - 5)^2 + 3$ **b)** $y = 2(x + 1)^2 - 1$ **c)** $y = -(x - 2)^2 + 4$

2. Graph each quadratic function. State the domain and approximate the range.
a) $y = x^2 - 2x - 8$ **b)** $y = -2x^2 + 5x + 3$ **c)** $y = 3x^2 + 9x - 12$

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