4/2 Solve Quadratic Equations by Graphing
(2nd degree trinomial)

"to solve" a quadratic equation:
find x-intercepts
find zeros
find roots
find solutions

Solve by factoring:

$x^2 - 4 = 0$

Difference of perfect squares $(x+2)(x-2) = 0$ zero product property

$x+2=0$ OR $x-2=0$

$-2 \quad -2 \qquad +2 \quad +2$

$\boxed{x=-2 \text{ OR } x=2}$

$(-2,0)$ and $(2,0)$ x-intercepts

Solve by graphing

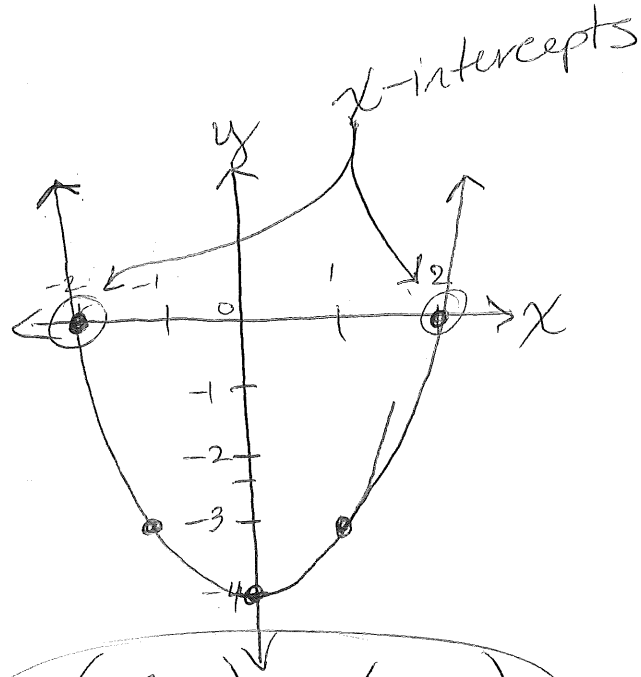
$x^2 - 4 = 0$

$x = \frac{-b}{2a} = \frac{-0}{2(1)} = 0$

x	y
-2	0
-1	-3
0	-4
1	-3
2	0

Vertex ★

x-intercepts



x-intercepts $(-2,0)$ + $(2,0)$

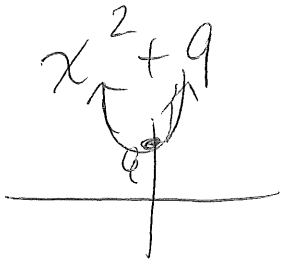
Table - x-intercepts are the points where y is 0.

Graph: x-intercepts the points where the line passes through the x-axis.

$$x^2+4x=5$$
$$\underline{\quad -5 \quad -5}$$
$$x^2+4x-5=0$$
$$y=x^2+4x-5$$

$$\boxed{\begin{array}{l}(1,0)\ \&\ (-5,0)\\ \text{2 solutions}\end{array}}$$

x^2+9 Prime



$$-x^2-6x=9$$
$$\underline{\quad -9 \quad -9}$$
$$-x^2-6x-9=0$$
$$y=-x^2-6x-9$$

$$\boxed{\begin{array}{c}(-3,0)\ \text{one solution}\\ \text{double root}\end{array}}$$

factor "GCF" = -1

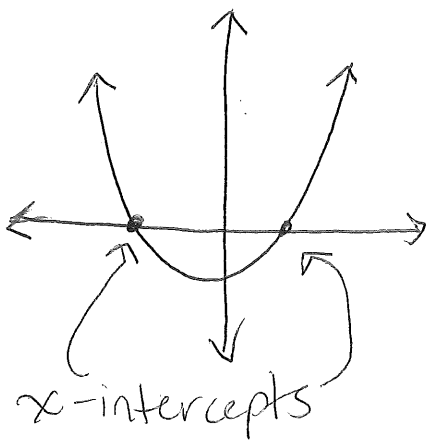
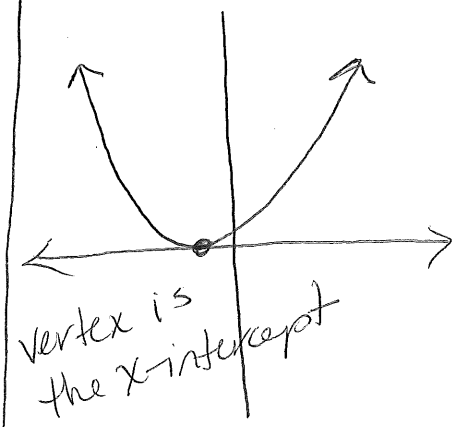
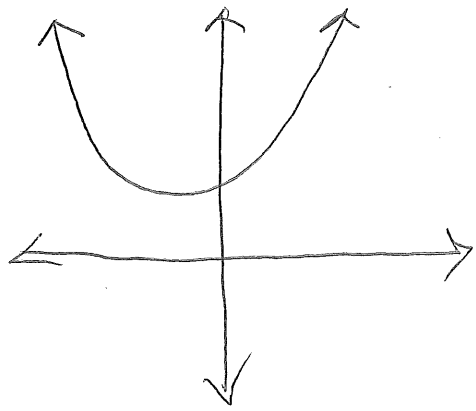
$$-x^2-6x-9=0$$
$$-1(x^2+6x+9)=0$$
$$-1(x+3)(x+3)=0$$
$$x+3=0 \quad \text{OR} \quad x+3=0$$
$$\underline{-3 \quad -3} \qquad \underline{-3 \quad -3}$$
$$x=-3 \qquad x=-3$$

The vertex is the x-intercept.

$$x^2+6=-4x$$
$$\underline{+4x \qquad +4x}$$
$$x^2+4x+6=0$$

no <u>real</u> solutions

How many solutions?

2 solutions	1 solution double root	no real solutions
		
The quadratic equation has 2 solutions if the graph has 2 x-intercepts.	The quadratic equation has one solution if the vertex is on the x-axis. Vertex = x-intercept	A quadratic equation has no real solutions if the graph has no x-intercepts.

double root

d. r.