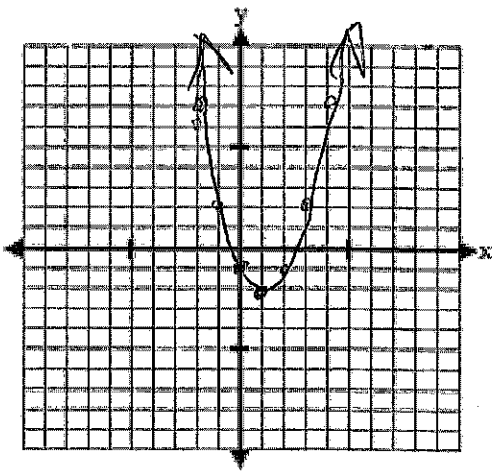
Day 36: Quadratic Formula

Do x-intercepts have to be whole numbers?

1. Make a table and graph $y = x^2 - 2x - 1$

x	$y = x^2 - 2x - 1$
-2	7
-1	2
0	-1
1	-2
2	-1
3	2
4	7



2. Estimate the x-intercepts on the graph: (-.5, 0) and (2.5, 0)

3. Compare your answers to the other students at your table. Are they the same? Who is right?

Not exact. Incorrect

Quadratic Formula: $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

You can use this formula when an equation is in standard form ($ax^2+bx+c=0$)

Examples: Solve.

a. $0 = x^2 - 2x - 1$

$x = \dfrac{-(-2) \pm \sqrt{(-2)^2-4(1)(-1)}}{2(1)}$

$\dfrac{2 \pm \sqrt{4+4}}{2}$

$\dfrac{2 \pm \sqrt{8}}{2} = \dfrac{2 \pm 2.82}{2}$ $\quad +: \dfrac{4.82}{2} = 2.41$ $\quad -: \dfrac{-.82}{2} = -.41$

b. $2x^2 - 7 = x$

$2x^2 - x - 7 = 0$

$x = \dfrac{-(-1) \pm \sqrt{(-1)^2-4(2)(-7)}}{2(2)}$

$= \dfrac{1 \pm \sqrt{1+56}}{4}$

$= \dfrac{1 \pm \sqrt{57}}{4} = \dfrac{1 \pm 7.55}{4}$ $\quad +: \dfrac{8.55}{4} = 2.14$ $\quad -: \dfrac{-6.55}{4} = -1.64$

You try:

1. $x^2 - 9x + 15 = 0$

$$x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(1)(15)}}{2(1)}$$

$$= \frac{9 \pm \sqrt{81 - 60}}{2}$$

$$= \frac{9 \pm \sqrt{21}}{2} = \frac{9 \pm 4.58}{2}$$

$+ \frac{13.58}{2} = 6.79$

$- \frac{4.42}{2} = 2.21$

2. $4x^2 - 7x = 2$

$4x^2 - 7x - 2 = 0$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(4)(-2)}}{2(4)}$$

$$= \frac{7 \pm \sqrt{49 + 32}}{8}$$

$$\frac{7 \pm \sqrt{81}}{8} = \frac{7 \pm 9}{8}$$

$+ \frac{16}{8} = 2$

$- \frac{2}{8} = -\frac{1}{4}$

Remember we've learned to solve quadratics (find the x-intercepts) by **1)** factoring trinomials, **2)** factoring out GCF, **3)** solving with square roots, and now **4)** the quadratic formula.

Tell what method you would use to solve the quadratic equations. *Explain.* Then solve.

3. $x^2 + x - 6 = 0$

Factorable b/c small easy #s

	x	$+3$
x	x^2	$3x$
-2	$-2x$	-6

$(x+3)(x-2) = 0$

$x = -3$ $x = 2$

4. $x^2 - 9 = 0$

Solve with square roots b/c no bx term. ($b = 0$)

$x^2 = 9$

$x = 3$ $x = -3$

5. $5x^2 + 9x - 4 = 0$

#s look hard, do QF

$$x = \frac{-9 \pm \sqrt{9^2 - 4(5)(-4)}}{2(5)}$$

$$= \frac{-9 \pm \sqrt{81 + 80}}{10}$$