Agenda:

1) Re-turn chapter 2 test
2) Class Grades
3) New lesson over section 3.1 --- Solving Quadratic Equations
4) Homework/Engagement Activity

Algebra 2: 3.1 Solving Quadratic Equations:

Learning Targets for Today:

1) Solve quadratic equations by graphing
2) Solve quadratic equations by the square root method

(A) Solving Quadratic Equations by Graphing

A quadratic equation is an equation that can be written in the form $f(x) = ax^2 + bx + c$, where "a" cannot be 0. A root of an equation is a solution of the equation.

Core Concept:

To solve a quadratic equation by graphing, graph the equation and find the x-intercepts.

- Vertex form: $y = a(x-h)^2 + k$
- Intercept form: $y = a(x-p)(x-q)$
- Standard form: $y = ax^2 + bx + c$

Example:

Solve the equation by graphing.

$X^2 - x - 6 = 0$

Step1 $a=1$ $b=-1$ $c=-6$

Step2 Vertex

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

$Y = (1/2)^2 - (1/2) - 6$

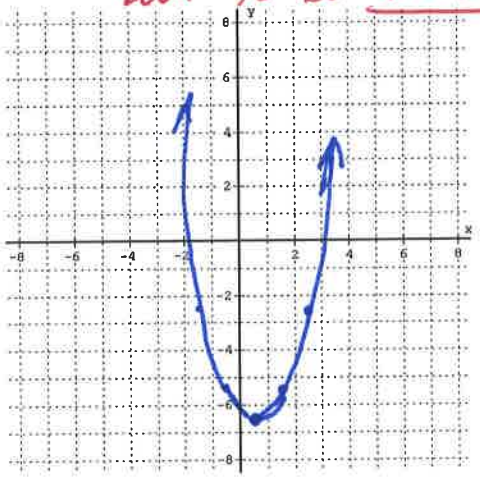
$Y = \frac{1}{4} - \frac{1}{2} - 6$

$\frac{1}{4} - \frac{2}{4} - 6 = -\frac{1}{4} - 6 = -6.25$

Step3 a-value

1/1

The x-int or solutions look to be $x=3$ & $x=-2$



Vertex: $(\frac{1}{2}, -6.25)$

A.S. $x=1$

Try: Solve the equation by graphing.

1) $-2x^2 - 2 = 4x$

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

$a = -2 \quad b = -4 \quad c = -2$

Vertex

$\frac{-b}{2a} \rightarrow \frac{4}{2(-2)} = \frac{4}{-4} = -1$

~~$-2(-1)^2 - 4(-1) - 2 = 0$~~

$-2(-1)^2 - 4(-1) - 2 = 0$

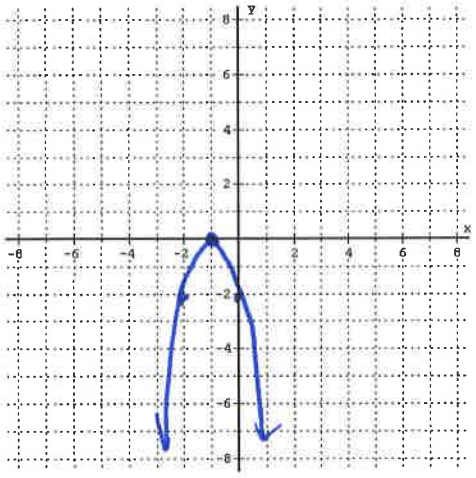
$-2(1) + 4 - 2$

$-2 + 4 - 2$

$2 - 2$

0

The x-int or solution is $(-1, 0)$



Vertex: $(-1, 0)$ A.S. $x = -1$

2) $x^2 - 8x + 12 = 0$

$a = 1 \quad b = -8 \quad c = 12$

Vertex:

$\frac{-b}{2a} = \frac{8}{2(1)} = \frac{8}{2} = 4$

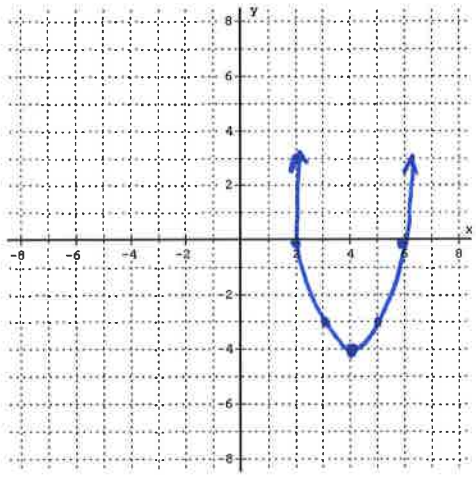
a-value $1/1$

$(4)^2 - 8(4) + 12$

$16 - 32 + 12$

$-16 + 12$

-4



Vertex $(4, -4)$ A.S. $x = 4$

The solution or x-int are $x = 2$ & $x = 5$

(B) Solving Quadratic Equations by the Square Root Method

Solving Quadratics: (square-root method)

You can use the square-root method when your equation is:

$$A(x)^2 + b = c$$

Notice: it has an x being squared, but no regular x!

Square- Root method:

Step 1: isolate the "squared" part [move all numbers out-side the squared-part to the other side]

Step 2: Take the square-root of both sides

***Should get two answers**

Examples:

Do show them how to reduce

$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$

ex. $\sqrt{20}$ → 20·1, 10·2, 5·4

$\sqrt{4 \cdot 5}$

$\sqrt{4} \cdot \sqrt{5}$

$2\sqrt{5}$

1) $2x^2 + 1 = 17$

$-1 \quad -1$

$\frac{2x^2}{2} = \frac{16}{2}$ → $\sqrt{x^2} = \sqrt{8}$ → $x = \pm\sqrt{8}$

or

$x = \pm\sqrt{4 \cdot 2}$

$x = \pm\sqrt{4}\sqrt{2}$

$x = \pm 2\sqrt{2}$

2) $3x^2 + 2 = 50$

$-2 \quad -2$

$\frac{3x^2}{3} = \frac{48}{3}$

$x^2 = 16$ → $\sqrt{x^2} = \pm\sqrt{16}$ → $x = 4, -4$

Do stress that the +/- happens right when you take $\sqrt{}$

can't distribute through ( )

(3) 3) $\frac{1}{3}(x+5)^2 = 7$ (3)

$\sqrt{\ }$ $(x+5)^2 = 21$ → $x+5 = \pm\sqrt{21}$ → $x = -5 \pm \sqrt{21}$

or

$-.42$ & -9.58

Try:

1) $x^2 = 100$

$\sqrt{\ }$ $x^2 = \sqrt{100}$

$x = 10$ & -10

2) $x^2 + 4 = 20$

$-4 \quad -4$

$\sqrt{\ }$ $x^2 = \sqrt{16}$

$x = \pm 4$

3) $2x^2 - 3 = 47$

$+3 \quad +3$

$\frac{2x^2}{2} = \frac{50}{2}$

$\sqrt{\ }$ $x^2 = \sqrt{25}$

$x = 5$ & -5

4) $-x^2 - 5 = -13$

$+5 \quad +5$

$\frac{-x^2}{-1} = \frac{-8}{-1}$

$\sqrt{\ }$ $x^2 = \sqrt{8}$ → $x = \pm\sqrt{8}$ or $\sqrt{8 \cdot 1} = \sqrt{4 \cdot 2}$

$\sqrt{4} \cdot \sqrt{2}$

$x = \pm 2\sqrt{2}$

5) $2(x+1)^2 - 1 = 17$

$+1 \quad +1$

$\frac{2(x+1)^2}{2} = \frac{18}{2}$

$\sqrt{\ }$ $(x+1)^2 = \sqrt{9}$ → $x+1 = 3$ & -3

$-1 \quad -1 \quad -1$

$x = 2$ & -4

6) $\frac{4(x+1)^2}{4} = \frac{100}{4}$

$\sqrt{\ }$ $(x+1)^2 = \sqrt{25}$

$x+1 = 5$ & -5

$-1 \quad -1 \quad -1$

$x = 4$ & -6

Homework: pg. 99 (3 , 4, 10, 13 – 23)