Warm-up:

Solve the system by elimination.

1. $2x^2 - 8x + y = -5$
   $2x^2 - 16x - y = -31$

Agenda:

1) **Warm-up**
2) **Homework questions**
3) **New Lesson---mini review**
4) **Homework/in-class activity**

Algebra 2: Mini Review with Activity:

Learning Targets for Today:

1) **Solve quadratic equations by graphing, square-root method, factoring, completing the square and the quadratic formula!**

(A) Solving Quadratic Equations by graphing

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: $y = ax^2 + bx + c$

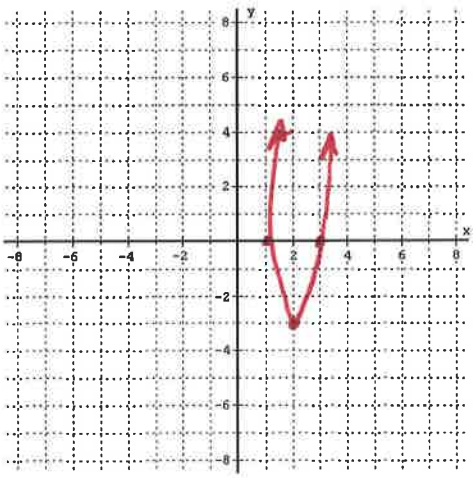
Try:

1) $3(x-2)^2 - 3 = 0$

Vertex Form!

Vertex (2, -3)

a-value = 3/1



Solutions

X = 1 & X = 3

(B) Solving Quadratic Equations by 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**

Try:

1) $3x^2 - 6 = 6$

$+6 \quad +6$

$\frac{3x^2}{3} = \frac{12}{3}$

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

$x = 2 \text{ & } -2$

2) $9(x-4)^2 + 1 = 0$

$-1 \quad -1$

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

$\rightarrow$ $x-4 = \pm\frac{1}{3}i$

$x = 4 \pm \frac{1}{3}i$

(C) Solving Quadratic Equations by Factoring

Step1: Set the equation equal to zero

Step2: Factor the left side

a) **Common term factoring?**
b) **Easy trinomial factoring?**
c) **Factor by grouping?**
d) **Binomial Factoring?**

Step 3: Set each factor equal to zero and solve

Try:

16·1
8·2
4+4

1) $x^2 + 6x - 16 = 0$

$(x + 8)(x - 2) = 0$

$x+8=0 \quad x-2=0$

$x = -8$ & $x = 2$

Common term

2) $2y^2 + 6y = 0$

$2y(y+3)=0$

$2y=0 \quad y+3=0$

$y=0$ & $y=-3$

grouping

3) $3x^2 - 17x = -10$

$+10 \quad +10$

$3x^2 - 17x + 10 = 0$

30·1
15·2
10·3
6·5

$(3x^2 - 15x) - 2x + 10) = 0$

$3x(x-5) - 2(x-5) = 0$

$(x-5)(3x-2)=0$

$x-5=0 \quad 3x-2=0$

$x = 5$ & $x = \frac{2}{3}$

(D) Completing the Square:

Completing the Square:

Step 1: The leading coefficient must be 1. (if it is not, then divide by the number in front of the x^2)

Step 2: Write your equation in the correct form:

$a(x^2 + bx \qquad\qquad)\quad + c$

Step 3: Take half of b…then "square" it….add & subtract it

Step 4: Move the negative one outside of the ( )

Step 5: Factor the ( )

Try: Solve by completing the square:

1) $x^2 + 2x - 9 = 0$

$(x^2 + 2x + 1 - 1) - 9 = 0$

$(1)^2 = 1$

$(x^2 + 2x + 1) - 10 = 0$

Now solve

$(x+1)^2 - 10 = 0$

$\sqrt{(x+1)^2} = \sqrt{10}$

$x + 1 = \pm\sqrt{10}$

$-1 \qquad -1$

$x = -1 \pm \sqrt{10}$

2) $9x^2 - 54x - 81 = 0$

$(9x^2 - 54x \qquad) - 81 = 0$

$9(x^2 - 6x + 9 - 9) - 81 = 0$

-81

$(3)^2 = 9$

$9(x^2 - 6x + 9) - 162 = 0$

Now solve

$9(x-3)^2 - 162 = 0$

$9(x-3)^2 - 162 = 0$

$+162 \qquad +162$

$\frac{9(x-3)^2}{9} = \frac{162}{9}$

$\sqrt{(x-3)^2} = \sqrt{18}$

$(x-3) = \pm\sqrt{18}$

$x - 3 = \pm 3\sqrt{2}$

$x = 3 \pm 3\sqrt{2}$

$9 \cdot 2$

$\sqrt{18}$

$\sqrt{9 \cdot 2}$

$\sqrt{9} \cdot \sqrt{2}$

$3\sqrt{2}$

(E)Quadratic Formula:

***Used for find x-intercepts to quadratics: $ax^2+bx+c = 0$**

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Step 1: Set your equation equal to zero

Step 2: list a= b= c=

Step 3: Plug a, b, c into the formula

Step 4: Simplify

***This finds x-intercepts or solutions to quadratic equations!**

Try: Solve the quadratic using the quadratic formula:

1) $-2x^2 = -2x + 3$

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

$a=2 \quad b=-2 \quad c=3$

$\frac{2 \pm \sqrt{4-4(2)(3)}}{2(2)}$

$\sqrt{20} = \sqrt{4 \cdot 5}$
$\sqrt{4}\sqrt{5}$
$2\sqrt{5}$

$\frac{2 \pm \sqrt{4-24}}{4} \rightarrow \frac{2 \pm \sqrt{-20}}{4} \rightarrow \frac{2 \pm \sqrt{20}\,i}{4} \rightarrow \frac{2 \pm 2\sqrt{5}\,i}{4}$

$\frac{2}{4} \pm \frac{2\sqrt{5}\,i}{4} \rightarrow \frac{1}{2} \pm \frac{\sqrt{5}\,i}{2}$

(F) Solving a nonlinear system by substitution

Step 1: Solve one equation for either x or y

Step 2: Replace the letter you solved for in the other equation

Step 3: Solve your "new" one variable equation

Try:

$x^2 + x - y = -1$

$x + y = 4$

step1 $y = -x + 4$

step2: $x^2 + x - (-x + 4) = -1$

step3: $x^2 + x + x - 4 = -1$

$x^2 + 2x - 4 + 1 = 0$

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

3.1

$(x + 3)(x - 1) = 0$

$x + 3 = 0 \quad x - 1 = 0$

$x = -3 \quad x = 1$

Y-parts $y = -x + 4$

$x = 1$

$y = -(1) + 4$

$y = -1 + 4$

$y = 3$

$x = -3$

$y = -(-3) + 4$

$y = 3 + 4$

$y = 7$

$(1, 3) \quad (-3, 7)$

- **Ladder Time!**