

Homework

12/10 - 12/14

Name _____

Date _____

Advanced Algebra

Unit 4: Quadratics

Homework Week #2

Please start to read in your Green book 360 through 389

Learning Target: I can solve a quadratic with the quadratic formula and I can write the equation of a parabola given information.

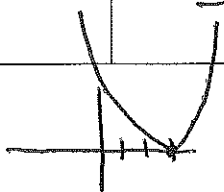
Monday 12/10/18

Solve the following with the quadratic formula:

Key point: To Solve a quadratic you must get everything to 1 side. You want the quadratic set equal to zero. You can then use the quadratic formula which is provided below.

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

a) $x^2 - 4x - 3 = 0$ $16 - 4(1)(-3) = 28$ $\frac{4 \pm \sqrt{28}}{2}$ $\left(\begin{matrix} 4.65 \\ -0.65 \end{matrix} \right)$	b) $x^2 + 6x + 7 = 0$ $36 - 4(1)(7) = 8$ $\frac{-6 \pm \sqrt{8}}{2}$ $\left(\begin{matrix} -1.6 \\ -4.4 \end{matrix} \right)$	c) $x^2 + 1 = 4x$ $x^2 - 4x + 1 = 0$ $16 - 4(1)(1) = 12$ $\frac{4 \pm \sqrt{12}}{2}$ $\left(\begin{matrix} 3.75 \\ 0.25 \end{matrix} \right)$
d) $x^2 + 4x = 1$ <u>SAME</u>	e) $x^2 - 4x + 2 = 0$ $16 - 4(1)(2) = 8$ $\frac{4 \pm \sqrt{8}}{2}$ $\left(\begin{matrix} 3.4 \\ .6 \end{matrix} \right)$	f) $2x^2 - 2x - 3 = 0$ $4 - 4(2)(-3) = 28$ $\frac{2 \pm \sqrt{28}}{4}$ $\frac{2 \pm 5.3}{4}$ $\left(\begin{matrix} 1.825 \\ .825 \end{matrix} \right)$



1) A parabola touches the x axis at 3 and passes through (-2, 25). Write the equation in vertex form. Then put it in General Form

$y = (x - 3)^2$
 or
 $y = x^2 - 6x + 9$

$y = a(x - 3)^2 + 0$

now substitute the y and x value
 $25 = a(-2 - 3)^2$
 $25 = 25a$
 $a = 1$

Tuesday 12/11/2018: I can move between forms of a quadratic. Fill in the missing forms. You can use any of the methods that are available to you. Complete the square, adding the roots and dividing by 2, using the axis of symmetry formula. I can write the equation of a parabola given information:

General Form	Factored form	Vertex Form
x^2-1x-6	$(x-3)(x+2)$	$\frac{3+(-2)}{2} = \frac{1}{2}$ $\text{VARs}(\frac{1}{2}) = -6.25$ $y = (x-\frac{1}{2})^2 - 6.25$
$8(x^2+8x-48)$ $8x^2+64x-384$	$8(x-4)(x+12)$	$\frac{-12+4}{2} = -4$ $\text{VARs}(-4) = -512$ $y = 8(x+4)^2 - 512$
$x^2-8x+16-12$ x^2-8x+4	Does not Factor	$(x-4)^2-12$

Solve by using the quadratic formula: $y = 4x^2-4x-24$

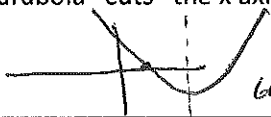
$$4(x^2-1x-6)$$

$$1-4(1)(-6) = 25 \text{ discriminant}$$

$$\frac{1 \pm \sqrt{25}}{2} = \frac{1 \pm 5}{2}$$

The x values of the roots or answers are 3 and -2

1) A parabola "cuts" the x axis at (1,0) and passes through a point (6,60) and has an axis of symmetry at $x=2.5$



$$y = a(x-1)(x-4) \text{ if the middle is } 2.5$$

$$60 = a(6-1)(6-1)$$

$$60 = 10a \quad a = 6$$

The other root must be 4

$$y = 6(x-1)(x-4)$$

Wednesday 12/12/2018 I can find the x intercepts, vertex and y intercept. I can do this by finding the roots. Once I find the roots, I can add them and divide by 2. This will give me the middle. Then I can do VARs(middle) to get the corresponding y value. Don't forget about the equation of the axis of symmetry $x = \frac{-b}{2a}$ or completing the square. You chose what is easiest. These should be short problems!

General Form	Roots	Vertex	Y intercept	Vertex form
x^2-6x-9	$x = 7.25$ -1.25	$\frac{7.25 + (-1.25)}{2}$ $(3, -18)$	$(0, -9)$	$y = (x-3)^2 - 18$
x^2-8x+4	7.45 $.55$	$(4, -12)$	$(0, 4)$	$y = (x-4)^2 - 12$
$x^2-12x+34$	7.4 4.6	$(6, -2)$	$(0, 34)$	$y = (x-6)^2 - 2$

$$\frac{8 \pm \sqrt{64 - 4(1)(4)}}{2} = \frac{8 \pm 6.9}{2}$$

$$\frac{6 \pm \sqrt{36 - 4(1)(-9)}}{2}$$

$$\frac{12 \pm \sqrt{144 - 4(1)(34)}}{2}$$

Put the equation $y = x^2 - 20x + 96$ into vertex form

$$(x^2 - 20x + 100) - 100 + 96$$

$$(x-10)^2 - 4$$

$$\frac{6 \pm 8.5}{2} = 7.25$$

$$\frac{12 \pm \sqrt{8}}{2} = \frac{12 \pm 2.8}{2}$$

For the following problems, find the maximum or minimum values of the quadratics.

Remember the formula for the axis of symmetry of the parabola is given by $X = \frac{-b}{2a}$. This will give you the x coordinate of the vertex and then you can do VARS of that answer to get the corresponding y value.

<p>1) $y = x^2 - 2x$</p> $\frac{2}{2} = 1$ <p>VARS(1) = -1</p> <p>Vertex (1, -1)</p> <p>Vertex Form</p> $y = 1(x-1)^2 - 1$	<p>2) $y = 7 - 2x - x^2$</p> <p>Re-write $-x^2 - 2x + 7$</p> $\frac{2}{-2} = -1$ vertex <p>VARS(-1) = 8</p> <p>Vertex Form</p> $y = -1(x+1)^2 + 8$	<p>3) $y = 8 + 2x - 3x^2$</p> $-3x^2 + 2x + 8$ $\frac{-2}{-6} = \frac{1}{3}$ <p>VARS($\frac{1}{3}$) = 8.33</p> <p>Vertex</p> $y = -3(x - \frac{1}{3})^2 + 8.33$
<p>4) $y = 2x^2 + x - 1$</p> $\frac{-1}{4}$ <p>VARS($-\frac{1}{4}$) = -1.125</p> $y = 2(x + \frac{1}{4})^2 - 1.125$	<p>5) $y = 4x^2 - x + 5$</p> $\frac{-1}{8}$ <p>VARS($-\frac{1}{8}$) = 5.1875</p> $y = 4(x + \frac{1}{8})^2 + 5.1875$	<p>6) $Y = 7x - 2x^2$</p> $-2x^2 + 7x$ <p>$x(-2x + 7)$</p> <p>Roots $-2x + 7 = 0$</p> <p>$x = 0$ $x = \frac{7}{2}$</p> $\frac{0 + \frac{7}{2}}{2} = 1.75$ <p>VARS(1.75) = 6.125</p> $y = -2(x - 1.75)^2 + 6.125$

Multiply out $y = (x-2)(4)(x+5)$ What order should you multiply this to make it as easy as possible?

$$(x-2)(x+5) = 4(x^2 + 3x - 10) \quad \boxed{4x^2 + 12x - 40}$$

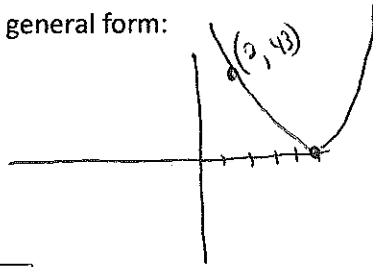
Multiply out $y = (x-6)(10)(x+12)$ What order should you multiply this to make it as easy as possible?

$$10(x^2 + 6x - 72)$$

$$10x^2 + 60x - 720$$

Thursday 12/13/2018 "I can write the equation of a parabola given information"

- 1) A parabola touches the x axis at 5 and passes through the point (2,43). Write the equation in both vertex and general form:



$$y = a(x-5)^2$$

$$43 = a(2-5)^2$$

$$43 = 9a$$

$$a = 4.77$$

Vertex form:

$$y = 4.77(x-5)^2$$

General Form

$$4.77(x^2 - 10x + 25)$$

$$4.77x^2 - 47.7x + 119.25$$

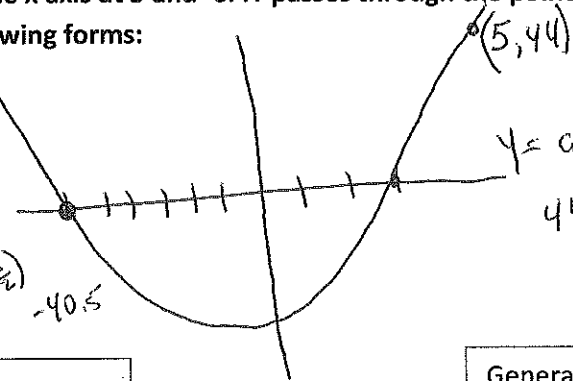
- 2) A parabola cuts the x axis at 3 and -6. IT passes through the point (5,44). Write the equation of this parabola in the following forms:

Factored

$$y = 2(x-3)(x+6)$$

$$-\frac{6+3}{2} = -\frac{3}{2}$$

VARs (-3/2)



$$y = a(x-3)(x+6)$$

$$44 = a(5-3)(5+6)$$

$$44 = 22a$$

$$a = 2$$

Vertex form:

$$y = 2\left(x + \frac{3}{2}\right)^2 - 40.5$$

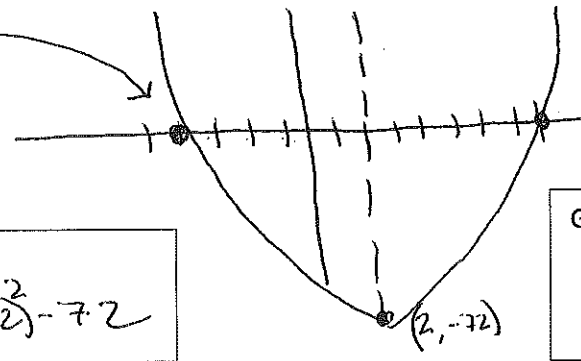
General form:

$$x^2 + 3x - 18$$

$$2x^2 + 6x - 36$$

- 3) A parabola has one root at 8. The equation of the axis of symmetry is $x=2$. It passes through a given point of (2,-72). Write the equation of the parabola in the following forms:

I know this is other root Reasoning is over to rt.



A parabola is symmetrical
The distance from 2 to 8 is 6
so I need to go back 6 from 2 to find other root

Vertex form:

$$y = 2\left(x - \frac{2}{2}\right)^2 - 72$$

General form:

$$2(x^2 - 4x + 4)$$

$$2x^2 - 8x + 8 - 72$$

$$2x^2 - 8x - 64$$

- 4) A graph cuts the x axis at 4 and -10 and passes through (6,64)
5) A graph cuts the x axis at 8 and -12 and passes through (6, -180)

$$y = a(x-2)^2 - 72$$

point (8,0)

$$0 = a(8-2)^2 - 72$$

$$36a = 72$$

$$a = 2$$

point (6,64)

$$y = a(x-4)(x+10)$$

$$64 = a(6-4)(6+10)$$

$$64 = 32a$$

$$2 = a$$

$$y = 2(x-4)(x+10)$$