Check the HW from last night

(yes, it was long)

ask questions !

using a pen, of course

Pick up the Warm Up
do Side 1 only

- also pick up the Notes on Quadratic Functions

  You can tape them in your notes if you choose.

HW help

Using Factoring + Z.P.P.

$2n^2 - 11n + 14 = 0$

$(2n-7)(n-2) = 0$

ZPP

$2n-7=0$ $n-2=0$

$2n=7$

$n=\frac{7}{2}$ or 3.5 $n=2$

	$2n$	-7
n	$2n^2$	$-7n$
-2	$-4n$	14

$28n^2$, $-11n$

$-n$ $-28n$
$-2n$ $-14n$

$-1n$ $-28n$
$-2n$ $-14n$
$-4n$ $-7n$

Using Factoring + Z.P.P.

$2n^2 - 11n + 14 = 0$

$(2n-7)(n-2) = 0$

$a \cdot b = 0$

$2n-7=0$ $n-2=0$

$2n=7$ $n=2$

$n=\frac{7}{2}$

$n=3.5$

	$2n$	-7
n	$2n^2$	$-7n$
-2	$-4n$	14

$28n^2$, $-4n$, $-7n$, $-11n$

$-1n$ $-28n$
$-2n$ $-14n$
$-4n$ $-7n$

Q.F. $2n^2 - 11n + 14 = 0$

$a = 2 \quad b = -11$
$c = 14$

$$X = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(2)(14)}}{2(2)}$$

$$X = \frac{11 \pm \sqrt{9}}{4} = \frac{11 \pm 3}{4}$$

$$x = \frac{11 \pm 3}{4}$$

$$X = \frac{11+3}{4} = \frac{14}{4} = \frac{7}{2}$$

$$X = \frac{11-3}{4} = \frac{8}{4} = 2$$

Similarly, there are three forms of a single-variable quadratic equation.

Standard form: Any quadratic equation written in the form $ax^2 + bx + c = 0$.

Factored form: Any quadratic equation written in the form $a(x+b)(x+c) = 0$.

Perfect Square form: Any quadratic equation written in the form $(ax-b)^2 = c^2$.

Solutions to a quadratic equation can be written in **exact form (radical form)** as in:

$$x = \frac{-3+\sqrt{5}}{2} \quad \text{or} \quad x = \frac{-3-\sqrt{5}}{2}$$

Solutions can also be estimated and written in **approximate decimal form:**

$$x = -0.38 \quad \text{or} \quad x = -2.62$$

$$x = \frac{-3+\sqrt{5}}{2}$$

$$\approx$$

Q.F. $2n^2 - 11n + 14 = 0$ $a = 2$ $b = -11$ $c = 14$

$$x = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(2)(14)}}{2(2)}$$

$$x = \frac{11 \pm \sqrt{9}}{4}$$

$$x = \frac{11 \pm 3}{4}$$

$$x = \frac{11+3}{4} = \frac{14}{4} = 3.5$$

$$x = \frac{11-3}{4} = \frac{8}{4} = 2$$

Questions
on
HW ?

35a $y^2 - 6y = 0$

Solve
without using
Q.F.

35b $y^2-6y=0$

b $n^2+5n+7=7$

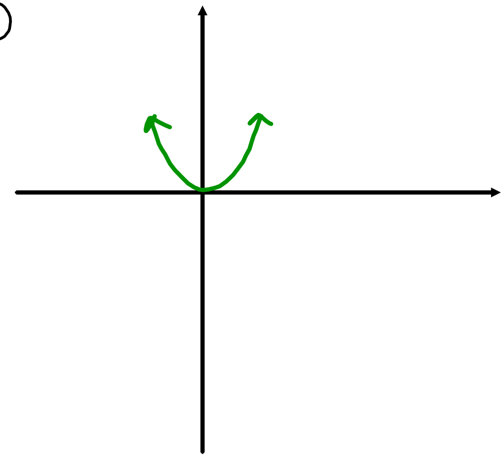
35c

$2t^2-14t+3=3$

35d

$\frac{1}{3}x^2+3x-4={}^-4$

$$y = 0.8(x+2)^2 + 5$$



<u>40c</u> $(2x^2 \cdot y^{-3})(3x^{-1} \cdot y^5)$

$$2 \cdot x^2 \cdot y^{-3} \cdot 3 \cdot x^{-1} \cdot y^5$$

$$6 \cdot x^2 \cdot x^{-1} \cdot y^{-3} \cdot y^5 = 6x^1y^2$$

$$= \boxed{6xy^2}$$

36 a ?

$\boxed{36\ c}$ $0 = 1x^2 - 14x + 40$

$0 = (x-4)(x-10)$

$x-4=0 \quad x-10=0$

$x=4 \quad x=10$

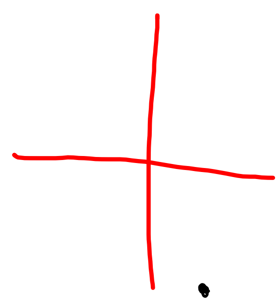
$avg = \frac{4+10}{2} = 7$

$(7, -9)$

$f(7)$

Graphing Form

$y = (x-7)^2 + 9$



39 Make predictions about how many places each will touch the x-axis.

(a) $y = (x-2)(x-3)$

(b) $y = (x+1)^2$

(c) $y = x^2+6x+9$

(d) $y = x^2+7x+10$

(e) $y = x^2+6x+8$

(f) $y = -x^2-4x-4$

Three forms of Quadratic Functions

Just watch don't take notes

Handout to look at, <u>not</u> needed in your notes

standard form

$y = ax^2 + bx + c$

y-intercept $(0, c)$

Example

$y = 3x^2 + 2x - 5$

$f(x) = 2x^2 - 7x$

graphing form

$y = a(x-h)^2 + k$

where (h, k) is the vertex

$(x+4)(x+4) - 6$

$y = 1(x+4)^2 - 6$

$(-4, -6)$ is the vertex

factored form

$y = a(x+b)(x+c)$

where $(-b, 0)$ and $(-c, 0)$ are the x-intercepts

$y = 2(x-3)(x+7)$

Each function form has its equation equivalent.

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

$$\frac{1}{2}(x-7)(x+2) = 0$$

$$(2x-3)^2 = 16$$

Graphing is <u>fast</u> if the equation is in Graphing form.

But what if its not.

$$y = x^2 - 7x + 9$$

Now
Take
Notes

Section 2.1.4

How can we convert?

$y = x^2 - 4x + 11$

Standard form

$y = (x-2)^2 + 7$

graphing form

Two methods • (1) Completing the square
(2) Average the x-intercepts

Completing the Square

to convert from Standard to Graphing Form

$$y = x^2 - 4x + 11$$

$$y = (x - 2)(x - 2) + 7$$

$$y = (x - 2)^2 + 7$$

The technique:

$$y = x^2 + 6x - 5$$

divide in two

$y + 9 =$

	x	3
x	x^2	$3x$
3	$3x$	9

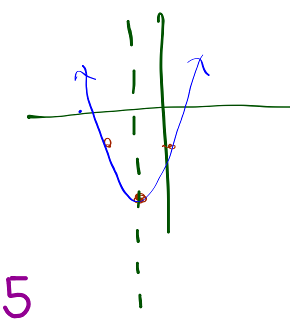
-5

$$y + 9 = (x+3)(x+3) - 5 - 9$$

-9

$3x \cdot 3x = 9x^2$

$$y = (x+3)^2 - 14$$ ← graphing form



Vertex

$(-3, -14)$

y-int

$(0, -5)$

The technique:

$y = x^2 + 6x - 5$

$y =$

	x	3
x	x^2	$3x$
3	$3x$	9

$-5 - 9$

Since $3x \bullet 3x = 9x^2$

$y = (x+3)(x+3) - 14$

$y = (x+3)^2 - 14$

graphing form

$\therefore$ Vertex $(-3, -14)$

Convert, find vertex, then sketch f(x)

$f(x) = x^2 - 4x + 9$

y-int $(0, 9)$

Vertex $(2, 5)$

$f(x) + 4 =$

	x	-2
x	x^2	$-2x$
-2	$-2x$	4

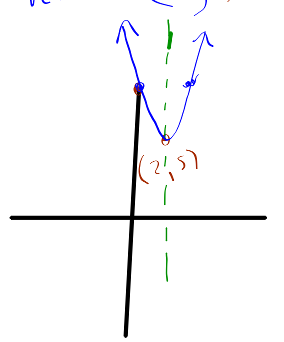
$+ 9$

$-2x \cdot -2x = 4x^2$

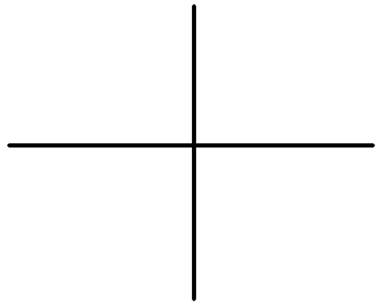
$f(x) + 4 = (x-2)^2 + 9$

$-4 \qquad -4$

$f(x) = (x-2)^2 + 5$



$$f(x) = (x - 2)^2 + 5$$



y-intercept ?

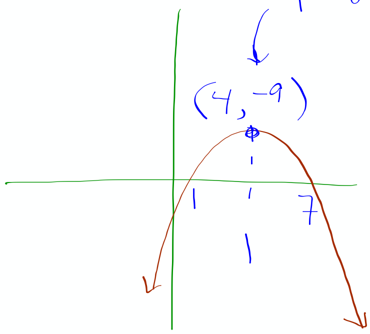
axis of symmetry ?

Just Watch Method 2

Convert standard form to graphing form (using x-intercepts)

How can we find the middle?

$4^2 - 8(4) + 7$

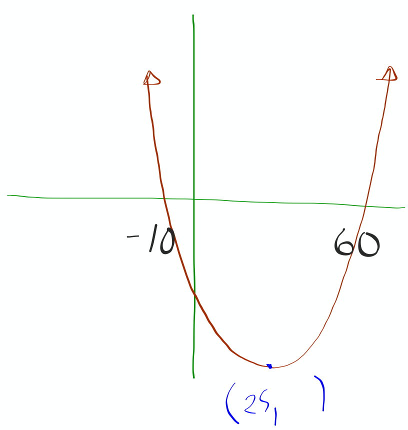


$y = x^2 - 8x + 7$

vertex (,)

graphing form is:

$y = 2x^2 + 3x - 7$



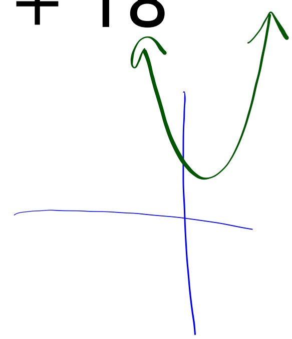
vertex (25,)

$y = 2(x - 25)^2 +$

standard form can't always be trusted to find x-intercepts.

$$y = x^2 + 8x + 18$$

Why ?



now go to the **Classwork** on the back of the **Warm Up**

Convert $\boxed{y = x^2 - 2x - 15}$ to Graphing Form using both methods.

$y = x^2 - 2x - 15$

completing the Square

$$\frac{-2x}{2} = -x$$

$$y + 1 = \begin{array}{c|c|c} & x & -1 \\ \hline x & x^2 & -x \\ \hline -1 & -x & 1 \end{array} - 15$$

$-x \cdot -x = x^2$

$$y + 1 = (x-1)^2 - 15$$
$$-1 \qquad\qquad -1$$

$$y = (x-1)^2 - 16$$

Alg 2A
2B

$y = x^2 + 8x + 10$ with x-intercepts
(set $y = 0$)

$$x^2 + 8x + 10 = 0$$

$a = 1$
$b = 8$
$c = 10$

$y = x^2 - 2x - 15$

method of x-intercepts

Vertical stretch factor $a=1$

find x-intercepts set $y=0$

$x^2-2x-15=0$

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

ZPP

$x=-3$ $x=5$

average the x-intercepts

$\frac{-3+5}{2}=1$

find the y-coordinate of the vertex.

Vertex $(1, -16)$

$f(1)=1^2-2(1)-15$

$y = (x-1)^2-16$

Graphing Form

$y = x^2 - 2x - 15$

method of x-intercepts

Vertical stretch factor 1

find x-intercepts

$0 = x^2-2x-15$

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

$x=-3$ $x=5$

average the x-intercepts

$\frac{-3+5}{2}=$

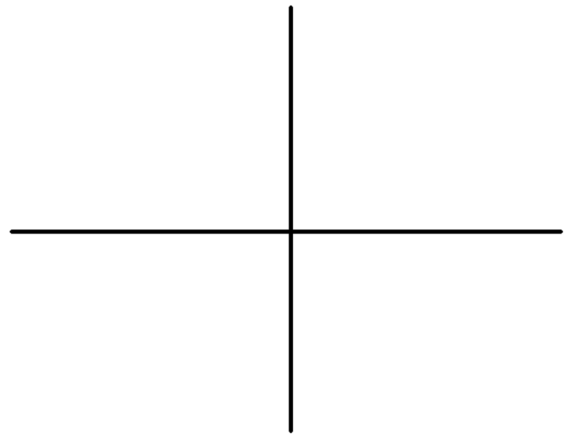
find the y-coordinate of the vertex.

Graphing Form

now sketch the graph

including both intercepts

$y = (x - 1)^2 - 16$



Use your graphing calculator to verify that they are equivalent

$y_1 = x^2 - 2x - 15$

$y_2 = (x - 1)^2 - 16$

B.B.

In your Algebra Log

do $\boxed{2\text{-}42}$b $\longrightarrow$ first by x-intercepts

on page 71

$$f(x) = x^2 + 8x + 10$$

$0 = x^2 + 8x + 10$

$a = 1$
$b = 8$
$c = 10$

$$x = \frac{-(8) \pm \sqrt{(8)^2 - 4(1)(10)}}{2(1)}$$

$$x = \frac{-8 \pm \sqrt{24}}{2} = \frac{-8 \pm 2\sqrt{6}}{2} = \frac{\cancel{2}(-4 \pm \sqrt{6})}{\cancel{2}}$$

x-intercepts $(-4+\sqrt{6}, 0)$ $(-4-\sqrt{6}, 0)$

$y = (x+4)^2 - 6$ avg $(-4, -6)$ $(-4)^2 + 8(-4) + 10$

2 - ... 50ac, 52, 53a, 54, 55bc, 56a

$$\frac{-4 + \cancel{\sqrt{6}} + -4 - \cancel{\sqrt{6}}}{2} = \frac{-8}{2} = -4$$

Round to 2 dp
or to nearest .01
or to nearest hundredth

25.36 25.4 25.368

$\sqrt{24} = \sqrt{4}\sqrt{6}$ $\sqrt{3}\sqrt{8}$

$\sqrt{4}\sqrt{6}$ $\sqrt{12}\sqrt{2}$

$2\sqrt{6}$ 6

$\sqrt[3]{}$

$f(x) = x^2 + 8x + 10$

$a = 1$

$b = 8$

$c = 10$

$$x = \frac{-(8) \pm \sqrt{(8)^2 - 4(1)(10)}}{2(1)}$$

$$\frac{-8 \pm \sqrt{24}}{2} =$$

$$x = -4 \pm \sqrt{6}$$

$(-4, -6)$

$y = (x+4)^2 - 6$

$$\frac{-4 + \cancel{\sqrt{6}} + -4 - \cancel{\sqrt{6}}}{2} = \frac{-8}{2} = -4$$

then by Completing the Square

$f(x) = x^2 + 8x + 10$

Assignment

2- 50ac, 52, 53a, 54, 55bc, 56a