Pick up the Warm Up

Please only do the front side :)

- also pick up the Notes on Quadratic Functions

  You can tape them in your notes if you choose. (not required)

HW help

Using Factoring + Z.P.P.

$-n \quad -28n$
$-2n \quad -14n$
$-4n \quad -7n$

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

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

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

$28n^2$

$-11n$

$2n - 7 = 0 \qquad n - 2 = 0$

$2n = 7$

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

3.5

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

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

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

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

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

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

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

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:**

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

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

$$X\approx -.38 \qquad X\approx -2.62$$

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 $y^2 - 6y = 0$

$\boxed{b}$ $n^2 + 5n + 7 = 7$

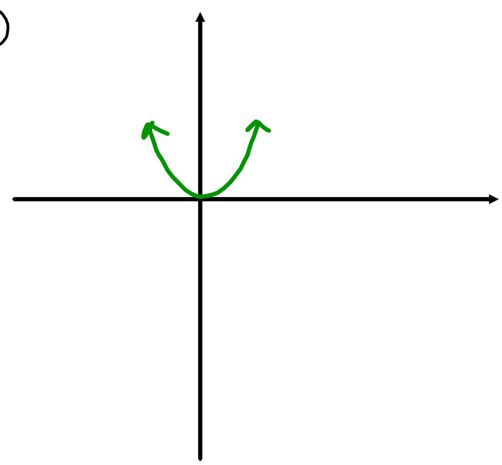
$\boxed{35c}$

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

$\boxed{35d}$

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

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



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

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

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

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

36 a ?

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

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

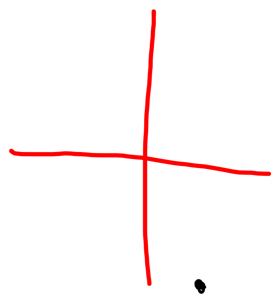
$x - 4 = 0 \quad x - 10 = 0$

$x = 4 \quad x = 10$

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

$(7, -9)$

$f(7)$



Graphing Form

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

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

STAPLE AND TURN IN HW PACKET

8 assignments → $\overline{80}$

JUST watch
don't take notes

Three forms of Quadratic Functions

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

$y = ax^2 + bx + C$

y-intercept $(0, c)$

Example

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

graphing form

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

where (h,k) is the vertex

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

$(-4,-6)$ 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 fast 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 Avgering the x-intercepts

2nd method

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:

$$y = \underbrace{x^2 + 6x}\ -\ 5$$

Vertex

$y = x^2$

$y + 9 =$

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

-5

Vertex $(-3, -14)$

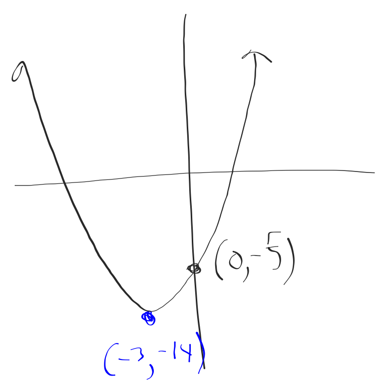
y-intercept $(0, -5)$

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

$$y + 9 = (x+3)^2 - 5$$

$$-9 \qquad\qquad -9$$

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



The technique:

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

$y =$

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

$-5 - 9$

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

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

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

graphing form

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

Convert, find vertex, then sketch f(x)

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

Vertex $(2, 5)$

y-int $(0, 9)$

$f(x) + 4 =$

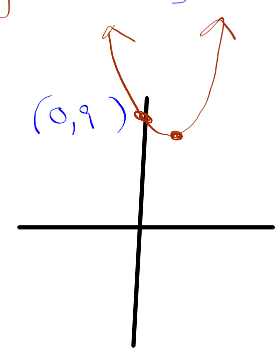
	x	-2
x	x^2	$-2x$
-2	$-2x$	4

$+ 9$

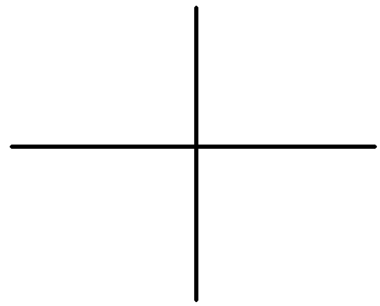
$f(x) + 4 = (x-2)^2 + 9$

$\quad -4 \qquad\qquad\quad -4$

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



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



y-intercept ?

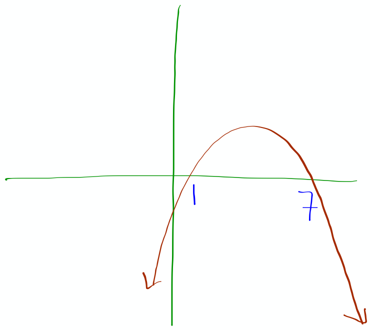
axis of symmetry ?

Just Watch Method 2

Convert standard form to graphing form

(using x-intercepts)

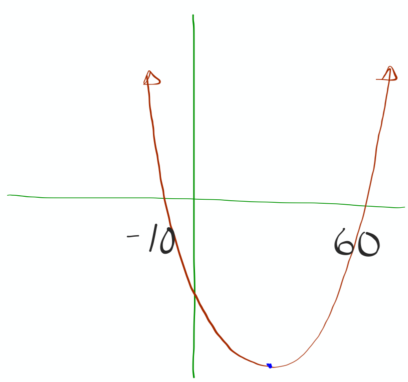
How can we find the middle?



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

vertex (,)

graphing form is:



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

vertex (,)

$y =$

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

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

method of x-intercepts

Vertical stretch factor 1

find x-intercepts Set $y=0$

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

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

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

so $x=-3$ $x=5$

average the x-intercepts

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

find the y-coordinate of the vertex.

$(1, -16)$

$y = (1)^2 - 2(1) - 15$
$= -16$

Graphing Form

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

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

same!

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

method of x-intercepts

Vertical stretch factor 1

find the y-coordinate of the vertex.

find x-intercepts

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

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

$x = -3 \quad x = 5$

average the x-intercepts

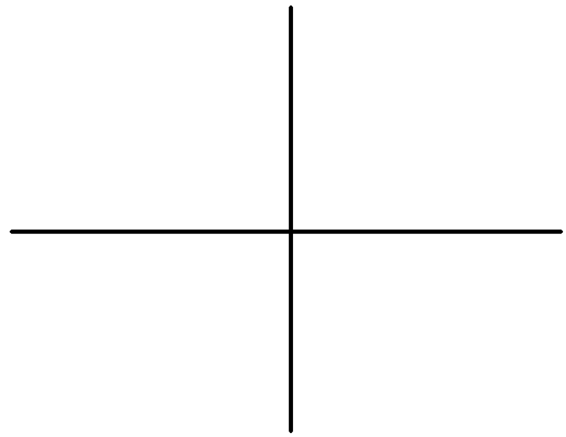
$$\frac{-3 + 5}{2} =$$

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.

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

Assignment

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