Pick Up the small rectangular paper on Quadratic Functions and either tape (or quickly copy) into your notes.

HW
Help

QUADRATIC FUNCTIONS

FunctionType		EQUATION	HOW TO SOLVE
$f(x) = ax^2 + bx + c$	Standard Form	$ax^2 + bx + c = 0$	Quad. form. * Factor + ZPP
$f(x) = a(x-d)(x-e)$	Factored form	$a(x-d)(x-e) = 0$ $\longrightarrow$ $2(x-3)(x+7) = 0$	Z.P.P.
$f(x) = (x-h)^2 + k$	Graphing form	$(x-h)^2 + k = 0$ $(x-2)^2 + 7 = 0$	extract sq. root

showing solutions to
quadratic equations

$x = \dfrac{2}{3}$ $x = -7$

$$X = \frac{-3 \pm \sqrt{16}}{2} = \frac{-3 \pm 4}{2} \begin{cases} \dfrac{-3+4}{2} = \\[2mm] \dfrac{-3-4}{2} = \end{cases}$$

$$X = \frac{-3 \pm \sqrt{5}}{4}$$

$$X = \frac{-3 \pm 2.1367..}{4}$$

$$X = \frac{-3 \pm \sqrt{5}}{4} =$$

$$X = \frac{-3 + \sqrt{5}}{4} \approx$$

$$X = \frac{-3 - \sqrt{5}}{4} \approx$$

$$X = \frac{-3 \pm 2.1367}{4}$$

Advantages and
Disadvantages of each

standard form

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

↑ y-intercept
$(0, c)$

graphing form

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

where (h, k) is

the vertex

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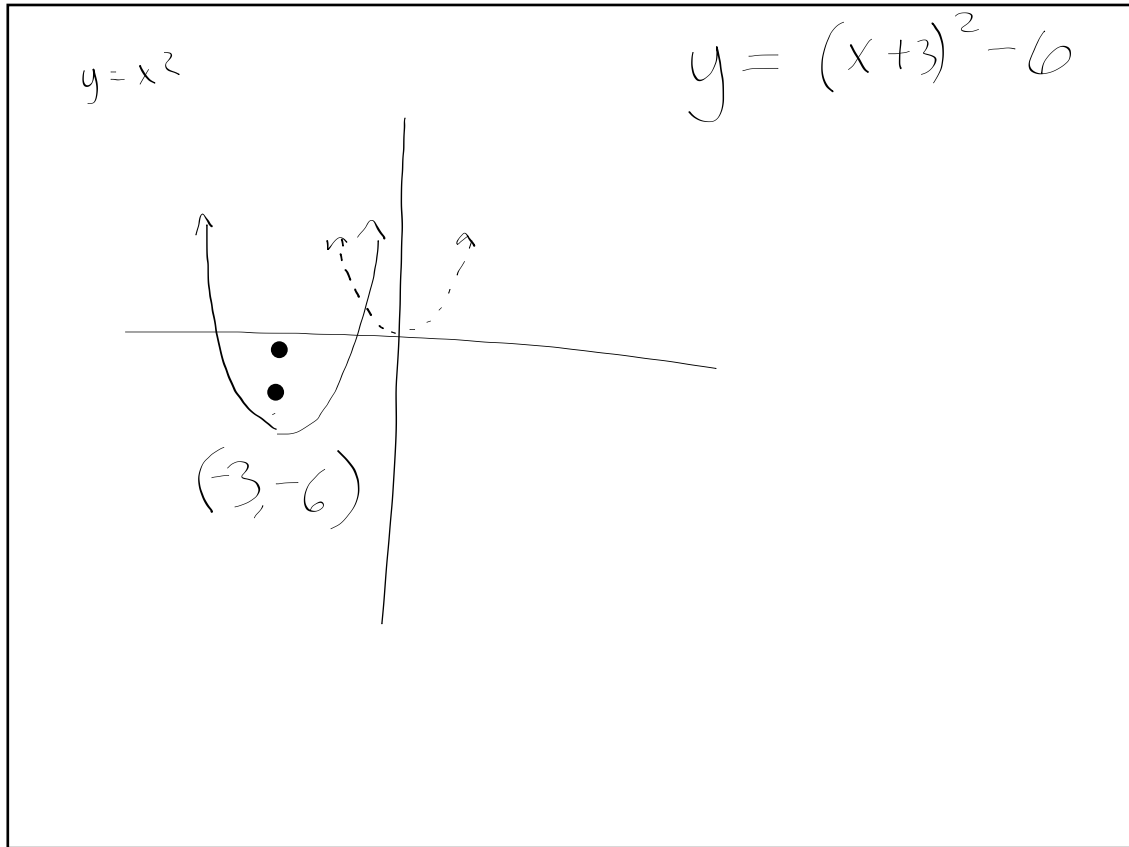
$$y = 3x^2 + 2x - 5$$

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

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

$(-4, -6)$ is the

vertex

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factored form

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

$(-b, 0)$ and $(-c, 0)$

are the x-intercepts

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

$y = x^2$

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

(-3, -6)

Now pick up the
Warm Up

Using Factoring + Z.P.P.

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

$(\quad)(\quad) = 0$

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

$28n^2$

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

$-11n$

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

Using Factoring + Z.P.P.

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

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

$a \cdot b = 0$

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

$2n = 7 \qquad n = 2$

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

$n = 3.5$

$2n \quad -7$

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

$28n^2$
$-4n \quad -7n$
$-11n$

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

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

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

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

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

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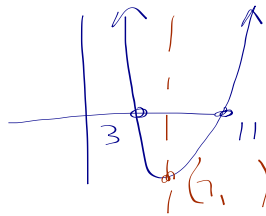
$$X = \frac{11 - 3}{4} = \frac{8}{4} = 2$$

2-36

$y = (x-3)(x-11)$
        4   -4

find
X-int when $y = 0$
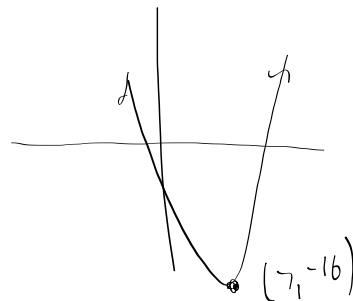
$0 = (x-3)(x-11)$
        ZPP
$X - 3 = 0$ $X - 11 = 0$

$X = 3$ $X = 11$

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

Vertex $(7, -16)$

$y = (x-7)^2 - 16$

$(7,)$

$(7, -16)$

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.
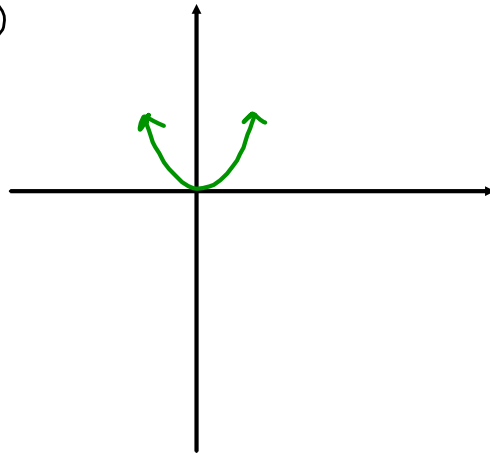
35b $y^2 - 6y = 0$ [b] $n^2 + 5n + 7 = 7$

35c
$$2t^2 - 14t + 3 = 3$$

35d
$$\frac{1}{3}x^2 + 3x - 4 = {}^-4$$

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

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

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

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

$= \boxed{6xy^2}$

36 c $\quad 0 = 1x^2 - 14x + 40$

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

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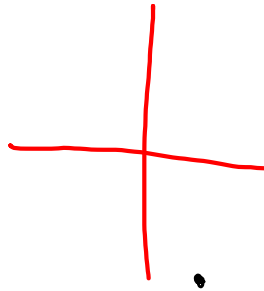
$x=4 \qquad x=10$

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

$(7, -9)$

$\downarrow \quad \nearrow$

$f(7)$

Graphing Form

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

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39 Make predictions about how many places each will touch the x-axis.
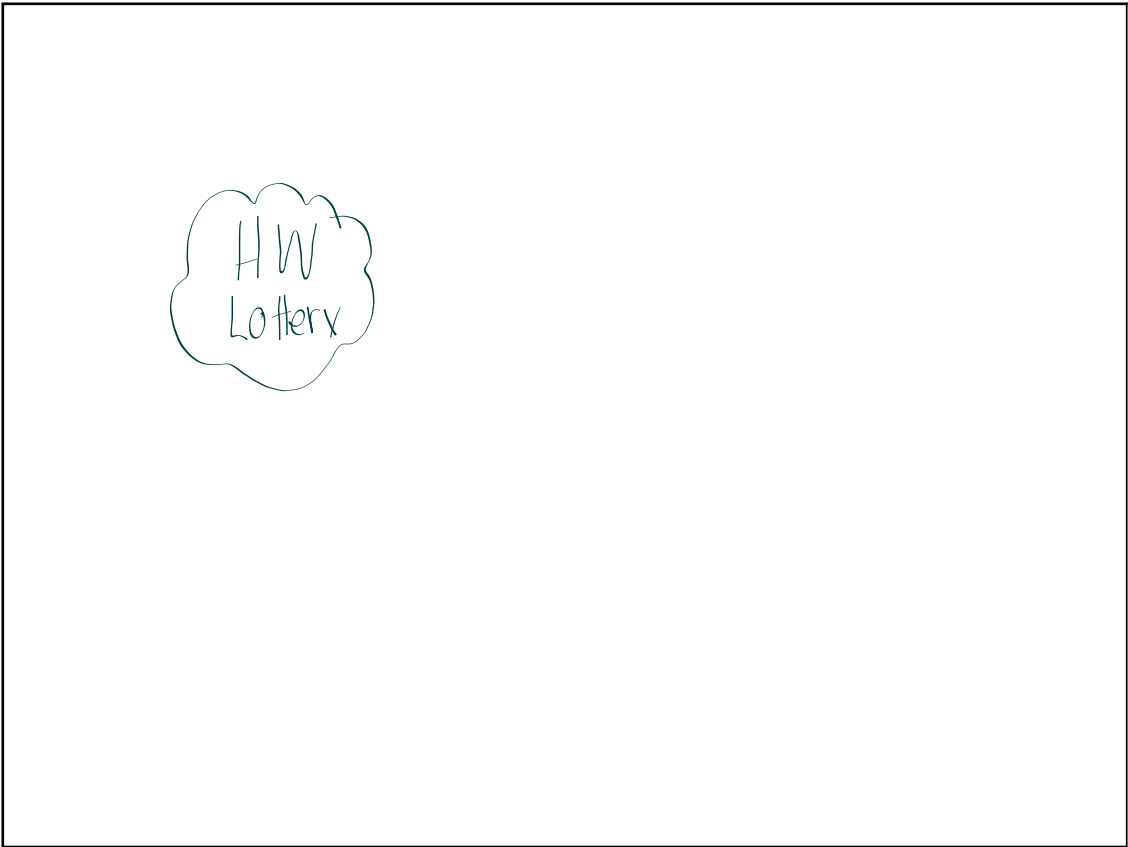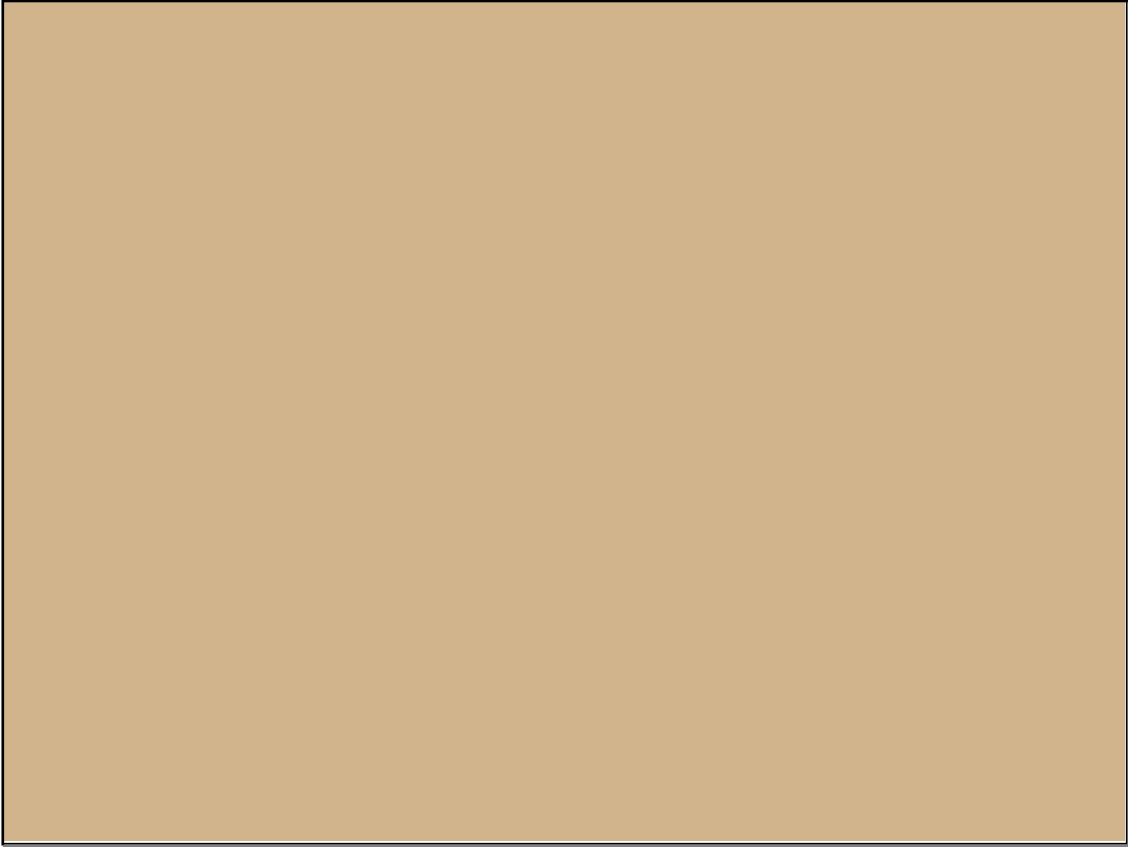
(a) $y = (x-2)(x-3)$ (b) $y = (x+1)^2$

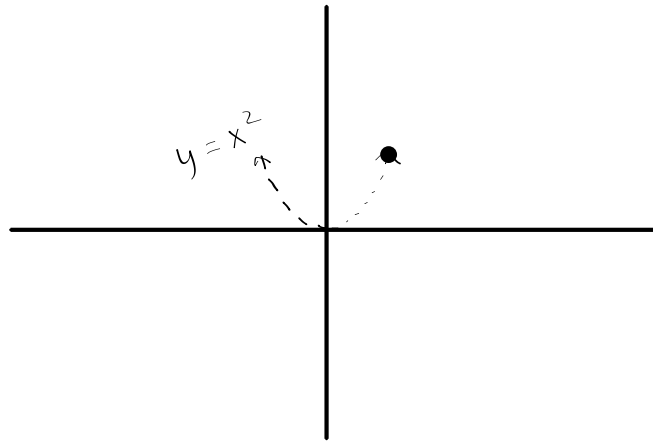(c) $y = x^2 + 6x + 9$ (d) $y = x^2 + 7x + 10$

(e) $y = x^2 + 6x + 8$ (f) $y = -x^2 - 4x - 4$

HW
Lottery

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

$y = x^2$

Sketch and label the vertex

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

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:

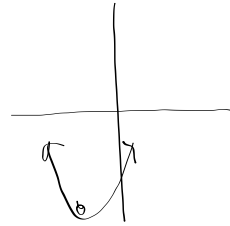$$y = \underline{x^2 + 6x} - \textcolor{red}{5}$$

$$y + 9 = \boxed{\begin{array}{cc} x^2 & 3x \\ 3x & 9 \end{array}} \quad -5$$

$$y + 9 = (x+3)(x+3) \quad \begin{array}{c} -5 \\ -9 \end{array}$$
$$(x+3)^2$$

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

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

y-int
$$(0, -5)$$

Convert, find <u>vertex</u> , then sketch   f(x)

$$f(x) = \underline{x^2 - 4x} + 9$$

$$f(x) + 4 = \boxed{\begin{array}{cc} x^2 & -2x \\ -2x & 4 \end{array}} + 9$$

$$f(x) + 4 = (x-2)^2 + 9 \quad \begin{array}{c} -4 \end{array}$$

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

$$(2, 5)$$
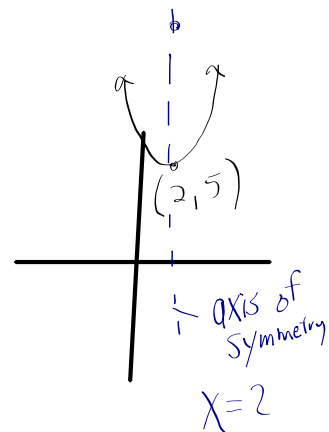
axis of symmetry
$$X = 2$$

$f(x) = (x - 2)^2 + 5$
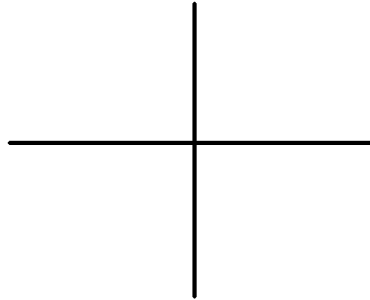
y-intercept ?   axis of symmetry ?

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

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

find x-intercepts

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

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

ZPP

$x = -3 \quad x = 5$

average the x-intercepts

$x = \dfrac{-3 + 5}{2} = 1$

find the y-coordinate of the vertex.

$(1, -16)$

$f(1)$

$(1, -16)$
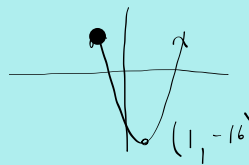
Graphing Form

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

B.B.

Challenge

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

Convert to graphing form
without the box

$$y^{+16} = x^2 + 8x^{+16} + 10$$

$$y + 16 = (x+4)^2 + 10$$
$$\quad{}_{-16} \qquad\qquad\qquad {}_{-16}$$

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

x^2	$4x$
$4x$	16

$$\mathbf{0} = x^2 + 8x + 10$$

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

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

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

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

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

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

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

$(-4, -6)$

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

$-4 + \sqrt{6} \quad + \quad -4 - \sqrt{6}$

$$2$$

$= \dfrac{-8}{2} = -4$

then by Completing the Square

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

Assignment

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

Will be the last assignment to add to the Yellow recording sheet.... which will be turned in on Monday with its corresponding assignments.