Cornell Notes

Topic/Objective: 2.4 Graphs of Quadratics

Name:

Class/Period: 4 th

Date: 11/28/16

Essential Question: What special features do graphs of Quadratics have?

Questions:

$b^2-4ac > 0$ 2 real diff. roots

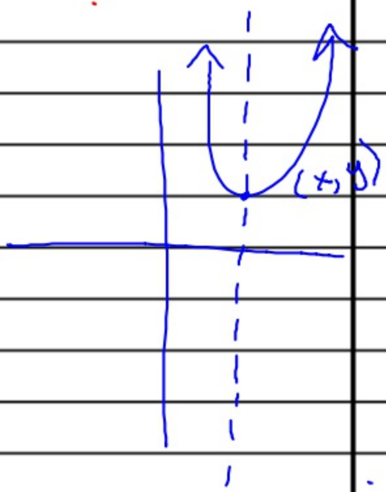
< 0 no real roots

$= 0$ 2 same

positive vertex in III 2 x-int.

doesn't touch x (+) vertex I

touches x-axis



Notes: Investigation:

i. find the value of b^2-4ac

ii. Graph on Calculator

How does the discriminant relate to the graph?

	disc
a. $y=x^2-3x-5$	$9+20=29$
b. $y=x^2+2x+7$	$(2)^2-4(1)(7)=4-28=-24$
c. $y=x^2-6x+9$	$(-6)^2-4(9)=0$
d. $y=-x^2+5x+2$	$25-2(-1)4=25+8=33$
e. $y=3x^2-6x+4$	$(-6)^2-4(3)(4)=36-48=-12$
f. $y=4x^2+3x+5$	$(3)^2-4(4)(5)=-71$
g. $y=2x^2-4x+2$	$(-4)^2-4(2)(2)=0$
h. $y=x^2+7x+3$	$(7)^2-4(1)(3)=37$

For quadratic functions in standard form ($y=ax^2+bx+c$), the graph crosses the y-axis at $(0, c)$ and the equation of the axis of symmetry is $x=\frac{-b}{2a}$

when the basic equation $y=x^2$ undergoes transformations, the resulting function can be written in the form

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

vert stretch — horizontal shift — vertical shift

vertex: (h, k)

"The Vertex form"

<u>Example</u>

place $y = x^2 - 6x + 4$ in the form $y = (x-h)^2 + k$

Sketch and label the vertex and y-int.

$b = -6$

$\frac{b}{2} = \left(\frac{-6}{2}\right) = -3$

$\left(\frac{b}{2}\right)^2 = (-3)^2 = 9$

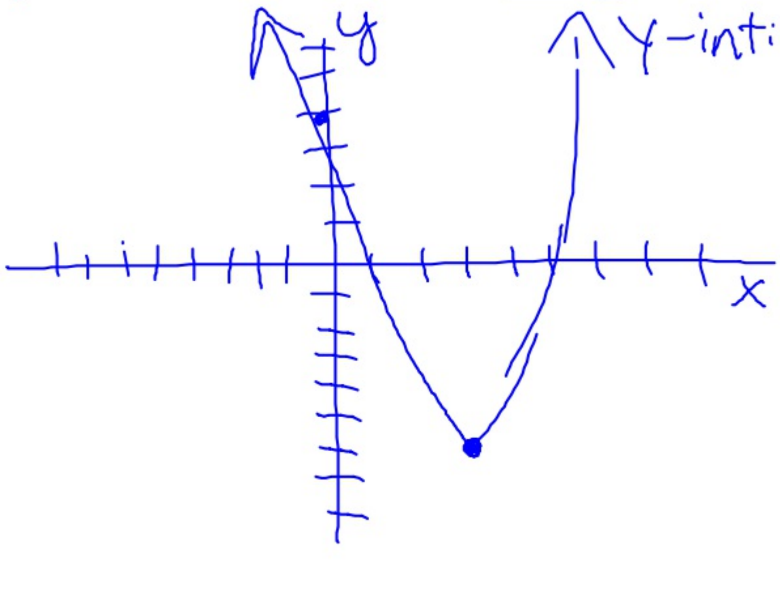
$y = \underbrace{x^2 - 6x + 9}\ \underbrace{-9 + 4}$

$$\boxed{y = (x-3)^2 - 5}$$

Vertex (h, k)

$(3, -5)$

Y-int: $(0, 4)$



Ex) $f(x) = 2x^2 + 8x + 11$

write in form $f(x) = a(x-h)^2 + k$

graph, labeling vertex and y-intercept

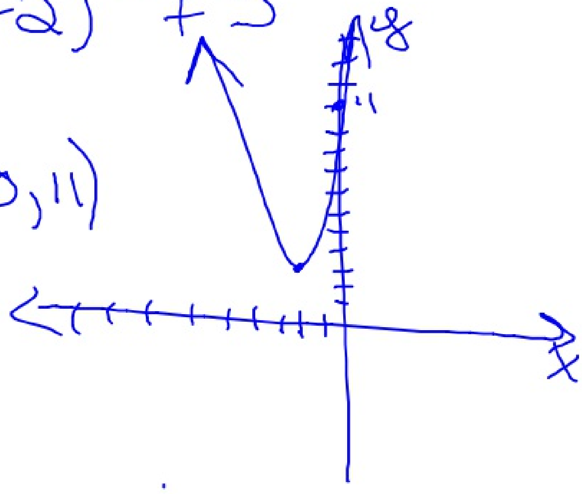
$$f(x) = 2(x^2 + 4x) + 11$$

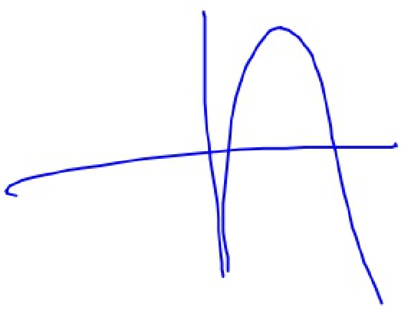
$$= 2(x^2 + 4x + 4) - 8 + 11$$

$$f(x) = 2(x+2)^2 + 3$$

vertex: $(-2, 3)$

y-int: 11 or $(0, 11)$





Questions:	Notes:

Where we are now

① standard form $y=ax^2+bx+c$

- b^2-4ac tells about roots

>0 two diff real

<0 no real

$=0$ two same real

$x=\frac{-b}{2a}$ axis of symmetry

y-int $(0,c)$

② vertex form $y=a(x-h)^2+k$

(h,k) is vertex

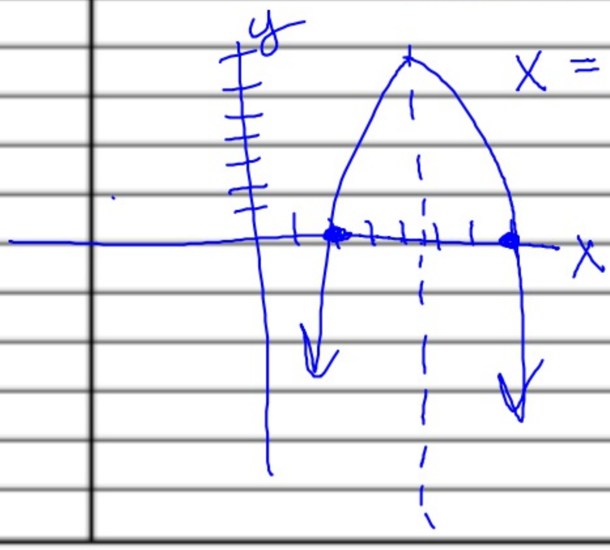
③ factorized form

$y=a(x-p)(x-q)$

For quadratic functions in the form $y=a(x-p)(x-q)$ the graph crosses the x-axis at $(p,0)$ and $(q,0)$

and, the equation for the axis of symmetry is

$$x=\frac{p+q}{2}$$



$\frac{2+7}{2}=\frac{9}{2}=4.5$

Ex] write $f(x) = x^2 + 3x - 10$
in factorized form $f(x) = a(x-p)(x-q)$
the sketch, labeling x-and y-intercepts

$f(x) = x^2 + 3x - 10$

$\underline{5} \cdot \underline{-2} \quad -10$

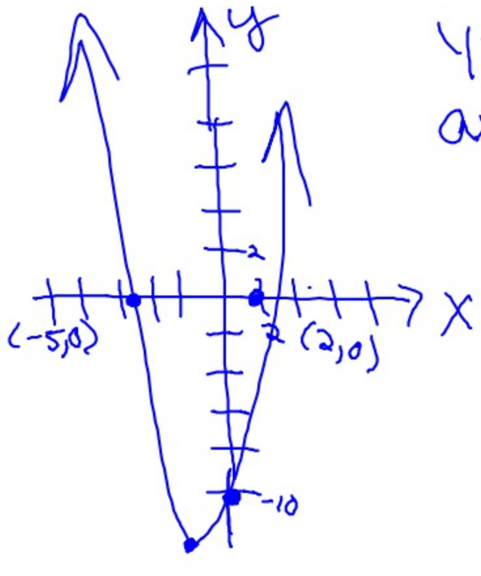
$\underline{5} + \underline{-2} \quad 3$

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

$p = -5$

$q = 2$

x-int: $(p, 0)$ and $(q, 0)$
$(-5, 0)$ and $(2, 0)$



y-int: $(0, c) = (0, -10)$

axis of symm: $x = \frac{p+q}{2}$

$x = \frac{-5+2}{2} = \frac{-3}{2}$
$= -1.5$

HW p.46 2H #1-3
48 2I #1bc, 2d, 3ad, 4, 5