

Cornell Notes



Topic/Objective: 2.4 Graphs of Quadratics

Name:

Class/Period: 4th

Date: 11/28/16

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

Questions:

Notes: Investigation:

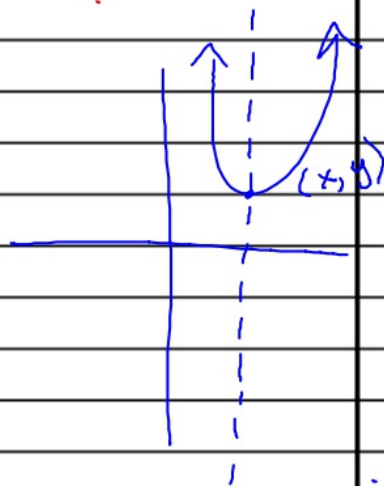
$b^2 - 4ac > 0$ 2 real roots
 < 0 no real roots
 $= 0$ 2 same

- i. find the value of $b^2 - 4ac$
- ii. Graph on Calculator

How does the discriminant relate to the graph?

positive vertex in III 2 x-int.
 doesn't touch x (+) vertex
 touches x-axis

- a. $y = x^2 - 3x - 5$ $9 + 20 = 29$ disc
- 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"

Example

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

Sketch and label the vertex and y-int.

$b = -6$

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

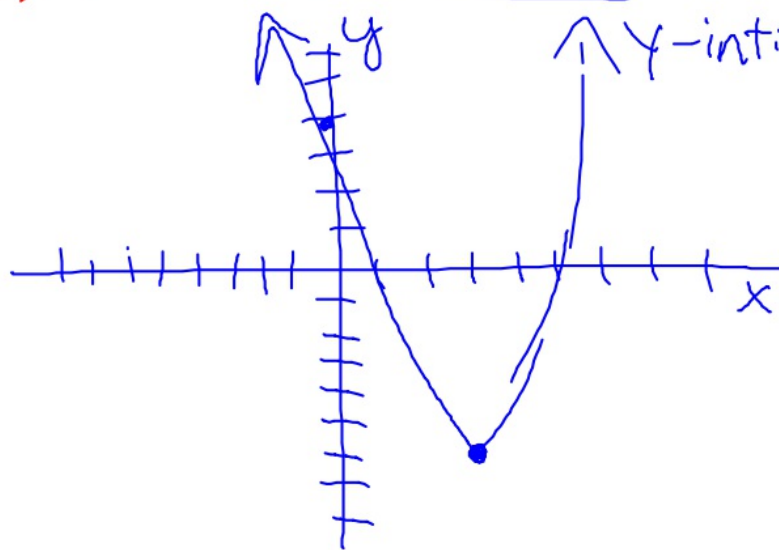
$\left(\frac{b}{2}\right)^2 = (-3)^2 = 9$

$y = x^2 - 6x + 9 - 9 + 4$

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

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

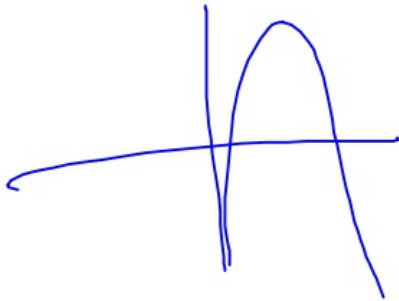
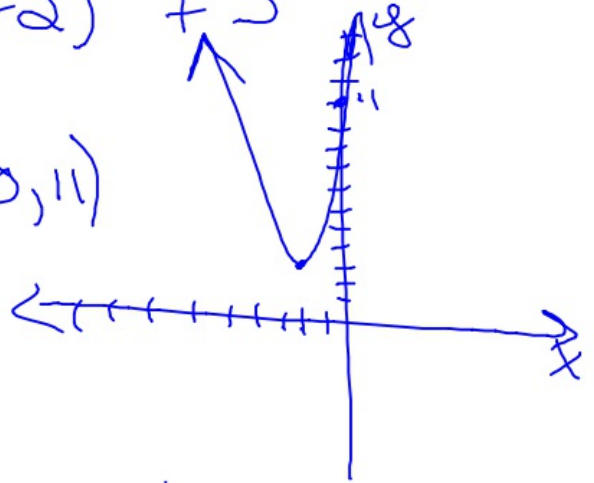
$$f(x) = 2(x^2 + 4x) + 11$$

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

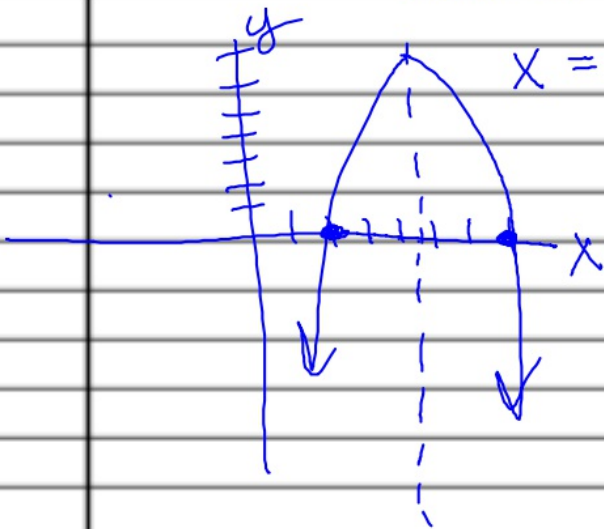
$$f(x) = 2(x+2)^2 + 3$$

vertex: $(-2, 3)$

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



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Questions:	Notes:
	<p><u>Where we are now</u></p> <p>① <u>standard form</u> $y = ax^2 + bx + c$ $-b^2 - 4ac$ tells about roots > 0 two diff real < 0 no real $= 0$ two same real $x = \frac{-b}{2a}$ axis of symmetry y-int $(0, c)$</p> <p>② <u>vertex form</u> $y = a(x-h)^2 + k$ (h, k) is vertex</p> <p>③ <u>factorized form</u> $y = a(x-p)(x-q)$</p> <p>For quadratic functions in the form $y = a(x-p)(x-q)$ the graph crosses the x-axis at $(p, 0)$ and $(q, 0)$</p> <p>and, the equation for the axis of symmetry is</p> <p>$x = \frac{p+q}{2}$</p>  <p>$\frac{2+7}{2} = \frac{9}{2} = 4.5$</p>

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

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

$$\begin{array}{r} \underline{5} \cdot \underline{-2} \quad -10 \\ \underline{5} + \underline{-2} \quad 3 \end{array}$$

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

$$p = -5$$

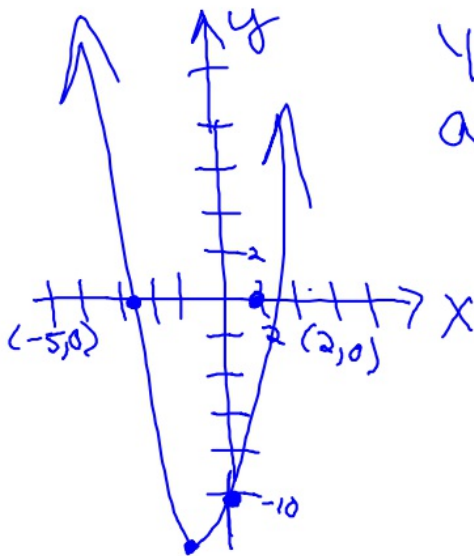
$$q = 2$$

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 2# #1-3

48

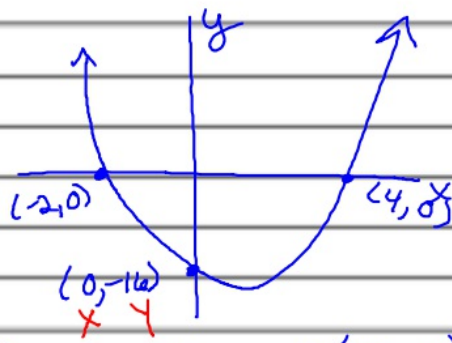
2# #1bc, 2d, 3ad, 4, 5

Questions:

Notes:

Finding the Equation of a Quadratic from its graph

Ex) Use the info in the graph to write the equation, put in standard form.



Know

x-int: (-2, 0)
(4, 0)

y-int: (0, -16)

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

$$p = 2$$

$$q = -4$$

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

$$\frac{y}{(x+2)(x-4)} = a$$

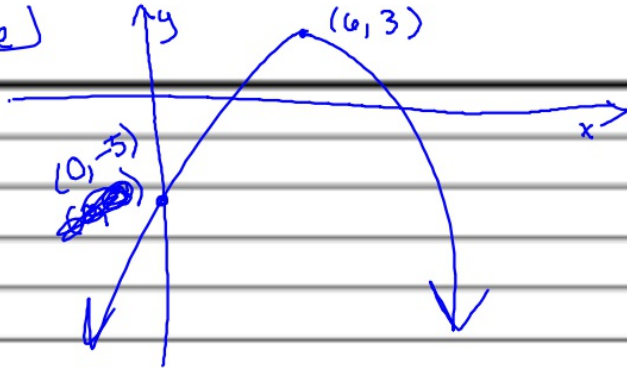
$$\frac{-16}{(0+2)(0-4)} = a$$

$$\frac{-16}{(2)(-4)} = a$$

$$\frac{-16}{-8} = a \quad a = 2$$

$$y = 2(x+2)(x-4)$$
$$y = 2x^2 - 4x - 16$$

Example



Questions:

Notes:

Know

vertex: (h, k)
 (h, k)

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

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

$$y = -\frac{2}{9}(x-6)^2 + 3$$

$$y = -\frac{2}{9}(x^2 - 12x + 36) + 3$$

$$y = -\frac{2}{9}x^2 + \frac{8}{3}x - 8 + 3$$

$$y = -\frac{2}{9}x^2 + \frac{8}{3}x - 5$$

HW p 52:

2J

1, 2, 4, 7, 8