Today's Learning Goal(s):   Date: _____

By the end of the class, I will be able to:
a) understand the properties of families quadratic functions.
b) write a quadratic equation that represents a family of curves.
c) find a specific member of a family of curves.

Last day's work:

full solutions posted online => Quadrac Funcons Wkst #1, 1 – 8
(Optional Wksts 15.7, 14.18)

Friday's work: pp. 185-186 #1bde, 3ac, 4ac, 6, 7 [14,17,18]
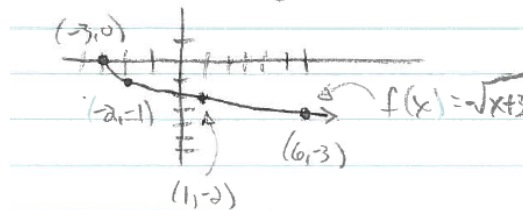(See 3.6 Homework Corrections)

Wkst #1, 4b

4. Graph $f(x) = -\sqrt{x+3}$ and determine
    a) the domain and range of $f(x)$.
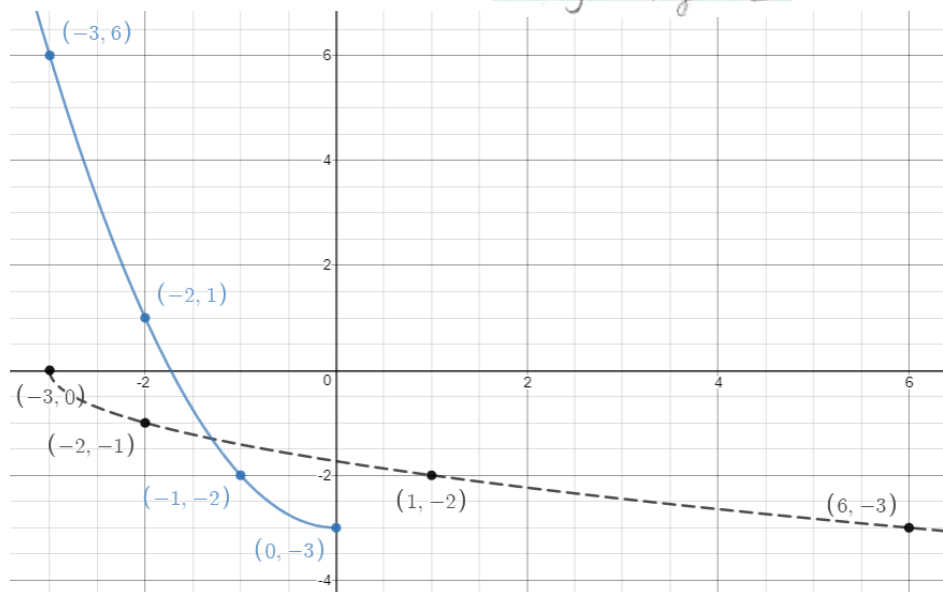   b) the equation of f^{-1}

4. $f(x) = -\sqrt{x+3}$

a) $D = \{x \in \mathbb{R} \mid x \geq -3\}$
   $R = \{y \in \mathbb{R} \mid y \leq 0\}$

(-3, 0)
(-2, -1)
$f(x) = -\sqrt{x+3}$
(6, -3)
(1, -2)

b) $x = -\sqrt{y+3}$
   $-x = \sqrt{y+3}$
   $(-x)^2 = y+3$
   $x^2 - 3 = y$ $\therefore f^{-1}(x) = x^2 - 3, \; x \leq 0$
   $D = \{x \in \mathbb{R} \mid x \leq 0\}$
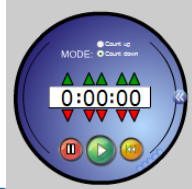 $R = \{y \in \mathbb{R} \mid y \geq -3\}$

$y = -\sqrt{x+3} \; \{x \geq -3\}$

$y = x^2 - 3 \{x \leq 0\}$

(-3, 6)
(-2, 1)
(-3, 0)
(-2, -1)
(-1, -2)
(0, -3)
(1, -2)
(6, -3)

3.7 Families of Quadratic Functions

Date: _____

For the next 15 minutes, with a partner, work on p. 187 A - J

MODE: ○ Count up ○ Count down

0:00:00

Use desmos **on your Chromebook!**
(3.7 Investigate)

INVESTIGATE the Math

Equations that define quadratic functions can look quite different, yet their graphs can have similar characteristics.

Group 1	Group 2	Group 3
$f(x) = x^2 - 3x - 10$	$m(x) = -2x^2 + 4x + 1$	$r(x) = -3x^2 + 5x - 2$
$g(x) = -2x^2 + 6x + 20$	$n(x) = 0.5x^2 - 1x + 3.5$	$s(x) = 2x^2 + x - 2$
$h(x) = 4x^2 - 12x - 40$	$p(x) = -6x^2 + 12x - 3$	$t(x) = 7x^2 - 2x - 2$
$k(x) = -0.5x^2 + 1.5x + 5$	$q(x) = 10x^2 - 20x + 13$	$u(x) = -4x^2 - 4x - 2$
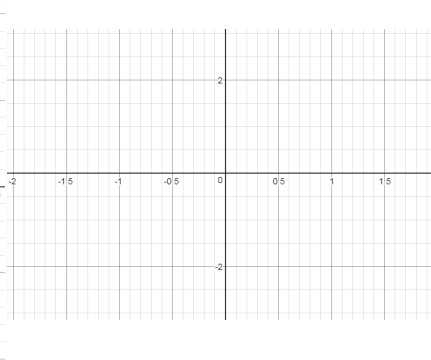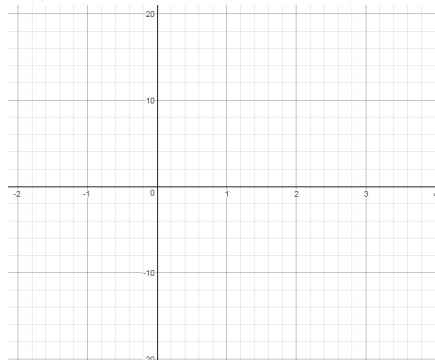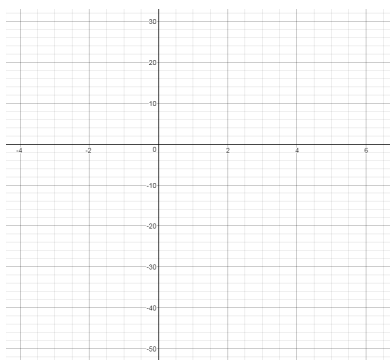
Summary of Invesgaon   (p. 187):

$f(x) = a(x - r)(x - s)$ $f(x) = a(x - d)^2 + c$ $f(x) = ax^2 + bx + c$

$f(x) = a(x + 2)(x - 5)$ $f(x) = a(x - 1)^2 + 3$ $f(x) = ax^2 + bx - 2$

all have the same **roots/x-ints**   all have the same **vertex**   all have the same **y-intercept**
stretch/compression differs   stretch/compression differs   stretch/compression differs

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3.7 Families of Quadratic Functions

Date: _Mar. 13/20_

Ex.1: Determine the equation of the quadratic function that passes
through $(-3, 20)$ if its zeros are 4 and -1.

(x, y)

(working backwards)   if the zeros are 4 and -1.

then $x = 4$ and $x = -1$

$x - 4 = 0$ and $x + 1 = 0$

$f(x) = \mathbf{a}\ (x - 4)(x + 1)$ $\leftarrow$ family

$(20) = \mathbf{a}\ (-3 - 4)(-3 + 1)$

$20 = a(-7)(-2)$

$20 = 14a$

$\dfrac{20}{14} = a$

$\dfrac{10}{7} = a$

$f(x$

$f(x) = \dfrac{10}{7}\ (x-4)(x+1)$ is the equation of the parabola.

Ex.2: A tunnel with a parabolic arch is 14m wide. The edge of the arch
is at the origin, and a point 4 m from the edge of the arch is 10m high.

a) What is the equation of the parabola?

WIK: point $(4,10)$ $r = 0$ $s = 14$

$ \overset{x\ y}{}$

$f(x) = \mathbf{a}\,(x - r)(x - s)$

$f(x) = \mathbf{a}\,(x - 0)(x - 14)$

$= a\,x\,(x - 14)$

$10 = a\,(4)(4 - 14)$

$10 = 4a\,(-10)$

$10 = -40\,a$

$\dfrac{10}{-40} = a$

$a = -\dfrac{1}{4}$

$f(x) = -\dfrac{1}{4}x\,(x - 14)$ is the equation of the parabola.

$y =$

b) Will a truck that is 12 m high and 4 m wide fit under the arch?
Justify your answer.

Check 2 m on each side of the centre (ie. A of S: $x = 7$)
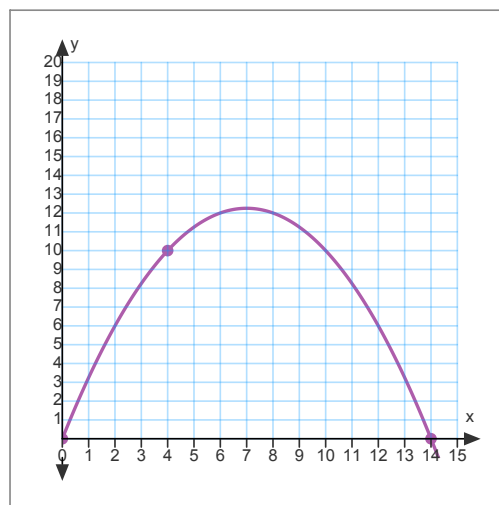If the height at $x = 5$ (and also $x = 9$) is more than 12 m, then the truck WILL fit.

$f(5) = -\dfrac{1}{4}(5)(5 - 14)$

$= \dfrac{-5}{4}(-9)$

$= \dfrac{45}{4}$

$= 11\dfrac{1}{4}$

∴ the truck will NOT fit

Are there any questions from last day's assigned work you would like to see on the board?

Last day's Assigned Practice: pp. 185-186 #1bde, 3ac, 4ac, 6, 7 [14,17,18]

Today's Assigned Practice includes:

READ pp. 188-191

p. 192 #1 – 3, 4ac, 5ac, 6, 8, 10