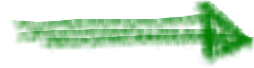


Pick Up the Warm Up

Do not use a Calculator (except for to check your answers)

**HW Help****Hotline**

Shifts to the right 2 units and down 5 units.

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

Shifts to the left 3 units and up 1 unit.

$$y = (x+3)^2 + 1$$

Shifts down 4 units.

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

Shifts right 10.9 units.

$$y = (x - 10.9)^2$$

Stretched vertically by a factor of 2.5 and shifted 9.8 units left and 8 units down.

$$y = 2.5(x + 9.8)^2 - 8$$

Compressed vertically by a factor of 0.4 and shifted 7.3 units to the right.

$$y = 0.4(x - 7.3)^2$$

$$\sqrt{3} \cdot \sqrt{3} = 3$$

$$\sqrt{3} + \sqrt{3} = 2\sqrt{3}$$

$$n + n$$

$$\sqrt{24} = \sqrt{4} \cdot \sqrt{6} = 2\sqrt{6}$$

$$\sqrt{\frac{7}{16}} = \frac{\sqrt{7}}{\sqrt{16}} = \frac{\sqrt{7}}{4}$$

$$\frac{\sqrt{250}}{\sqrt{10}} = \frac{\sqrt{250}}{\sqrt{10}} = \sqrt{\frac{250}{10}} = \sqrt{25} = 5$$

4  
9  
16

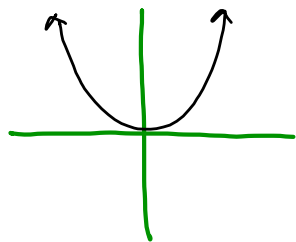
√2  
√3  
√4  
√5

$$\sqrt{\text{pizza}} \cdot \sqrt{\text{pizza}}$$

$$= \sqrt{\text{pizza}^2}$$

$$= \text{pizza}$$

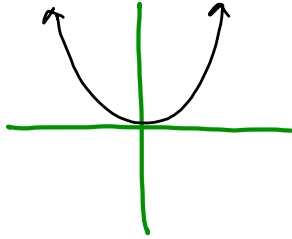
Example of a  
Parent Graph



$$y = x^2$$

for a quadratic  
function

Example of a  
Parent Graph



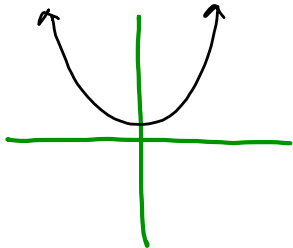
$$y = x^2$$

for a quadratic  
function

MAKE Transformations

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

Example of a  
Parent Graph

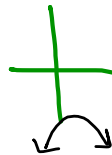


$$y = x^2$$

for a quadratic  
function

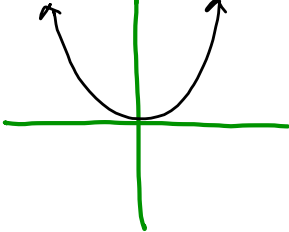
MAKE Transformations

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



$$y = -\frac{1}{2}(x+3)^2 - 7$$

Example of a Parent Graph



$y = x^2$

for a quadratic function

MAKE Transformations

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

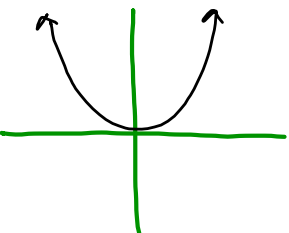
↓

$$y = -\frac{1}{2}(x+3)^2 - 7$$

↕

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

Example of a Parent Graph



$y = x^2$

for a quadratic function

MAKE Transformations

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

↓

$$y = -\frac{1}{2}(x+3)^2 - 7$$

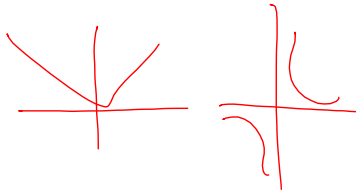
↕

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

↕

$$y = 1.1(x-4)^2 - 5$$

## Next Few Lessons (2.2)



New parent function  $\rightarrow$  Transform

GOAL:

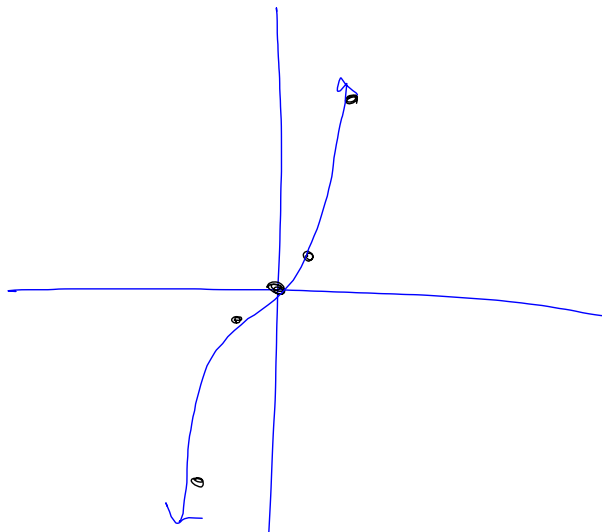
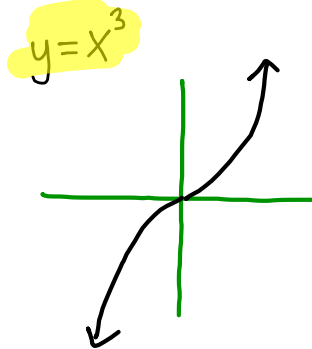
Transform any function  
using same techniques

TODAY'S AIM:

$$y = x^3$$

You'll experiment with  
Transforming  $y = x^3$

QUICK SKETCH



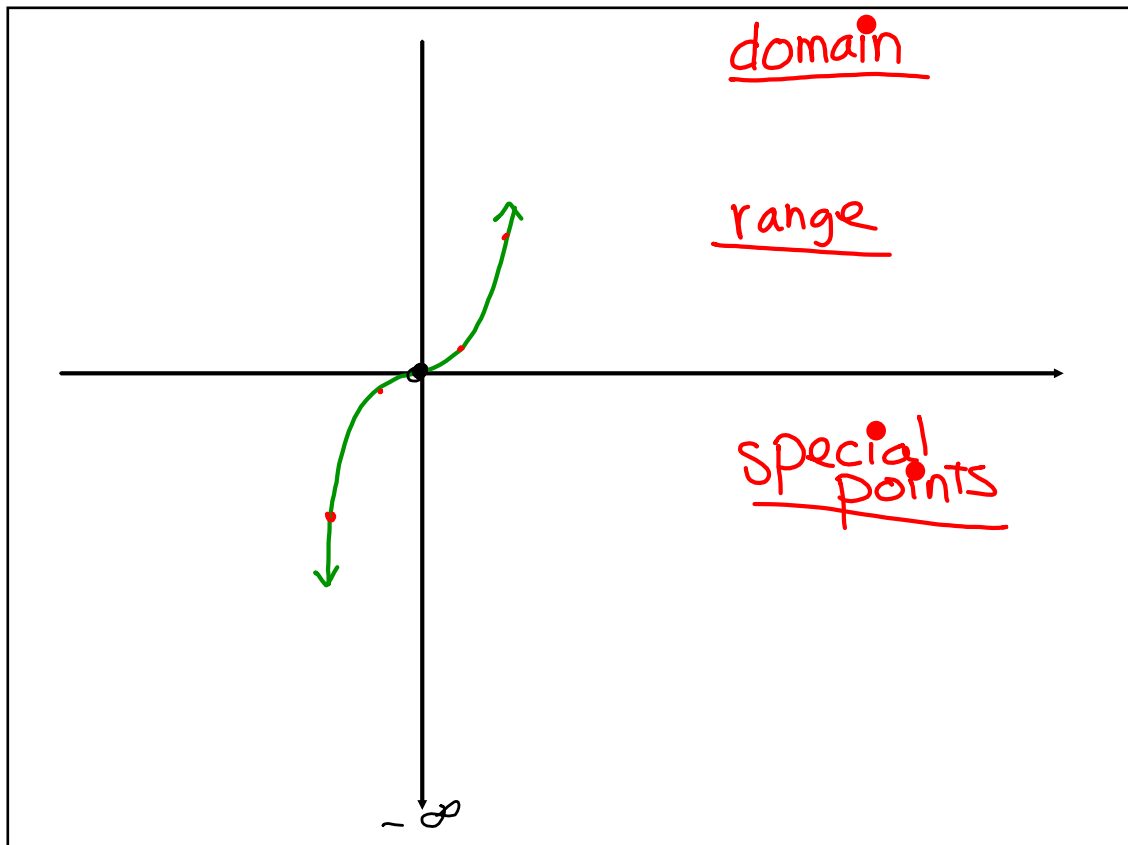
- in your notes*
- On a large piece of graph paper
  - Keep each square at 1 unit



a) Graph  $y = x^3$

b) With your group discuss and write down the domain and range.

c) Label any special points or asymptotes (if any).





Can make one darker

$$Y_1 = \text{experimental function}$$

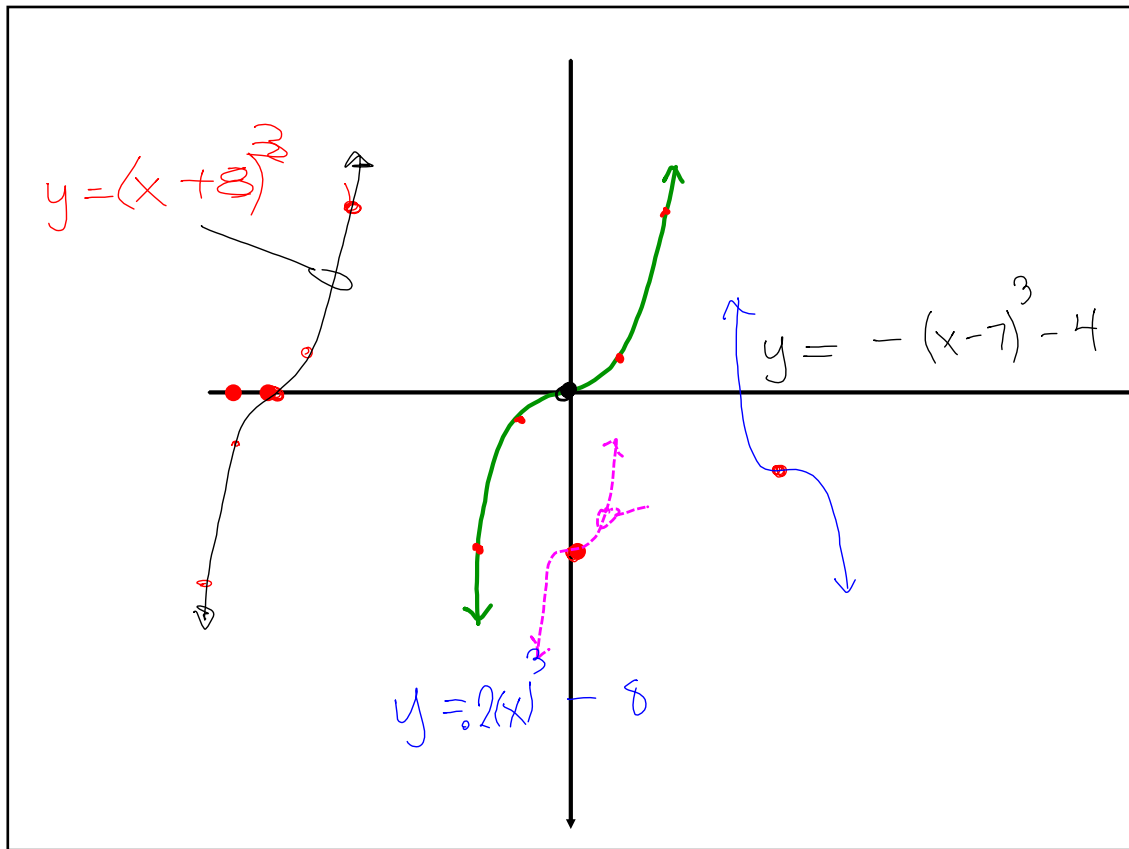
$$Y_2 = x^3$$

a)

Find and graph an equation that will shift (translate)  $y = x^3$

8 units left. (label the equation next to its graph.)

What are the coordinates of the special point ( , )



(b) Shift  $y = x^3$  down 8 units and vertically shrink by a factor of 0.2

- Graph with a dotted line
- label the equation

(c) Find and graph of a transformation that is translated 7 units right, down 4, and with a negative orientation

d

Transform  $y = x^3$  so it  
flips upside down

(but you don't need to graph it.)

Check your homework

2-50 (b)

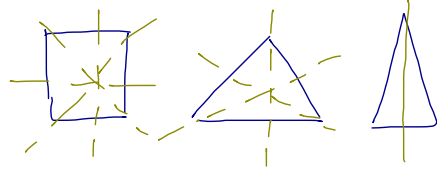
$$y = x^2 - 4x + 9$$

$$y = \begin{array}{|c|c|} \hline x^2 & -2x \\ \hline -2x & \\ \hline \end{array} + 9$$

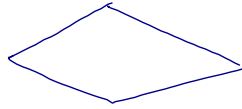
$$(d) \quad y = x^2 + 7x - 2$$

$$y = \begin{array}{|c|c|} \hline x^2 & \frac{7}{2}x \\ \hline \frac{7}{2}x & \\ \hline \end{array}$$

2-59 ] a) figures with lines of symmetry



b) with 2 lines of Sym



c) infinite ?

2-60 ]  $y = 3x - 1$       $2y + 5x = 53$

2-61 Leadfoot Lettice 80 mph limit 65 mph

a) how long for 50 miles

$$d = r t$$

$$50 = 80 \cdot t$$

$$t = \frac{50}{80} = .625 \text{ hours}$$

37.5 min

b) 50 miles at speed limit

$$d = r t \quad 50 = 65 \cdot t$$

↓

.77 hours

46.14 min

(c) Speeding ticket \$200

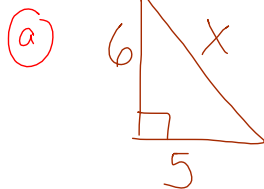
What would be her cost per minute of the time saved by speeding?

$$.77 \text{ hours} - .625 \text{ hours} = .145 \text{ hours} \\ \approx 8.7 \text{ min}$$

So 
$$\frac{\$200}{8.7}$$

$$\approx \$22.99 \\ \text{min}$$

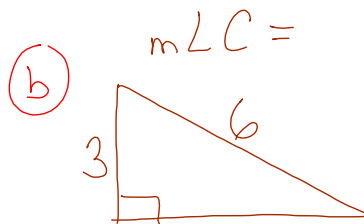
2-62 ]



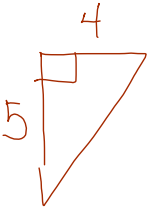
$$x^2 = 5^2 + 6^2$$

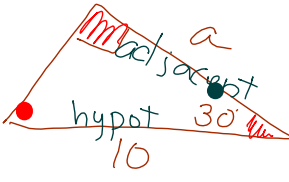
$$x = \sqrt{25 + 36}$$

$$x = \sqrt{61}$$



c

(c)  A right-angled triangle with a vertical side of length 5 and a horizontal side of length 4. A right-angle symbol is at the top vertex.

(d)  A triangle with a hypotenuse of length 10 and an angle of  $30^\circ$ . The side opposite the  $30^\circ$  angle is labeled 'a'. The side adjacent to the  $30^\circ$  angle is labeled 'adjacent'. A red dot is at the vertex with the  $30^\circ$  angle, and a black dot is at the vertex with side 'a'.

Soh-Cah-Toa

2-63

(a) house purchased for \$120,000 annual appreciation 6%

(b) bacteria 180  $22\%$  per hour





On the road to becoming.....

proficient with  
transformating  
parabolas

proficient at writing  
functions of parabolas in  
both standard form and  
graphing form



Standard form:  $y = ax^2 + bx + c$  ✓

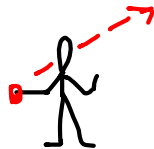
Graphing form:  $y = a(x - h)^2 + k$  ✓

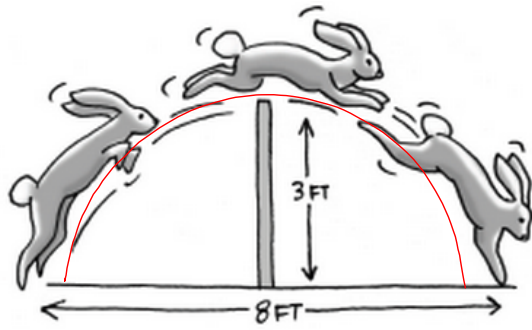
Factored form:  $y = a(x + b)(x + c)$ . ✓

AIM #1

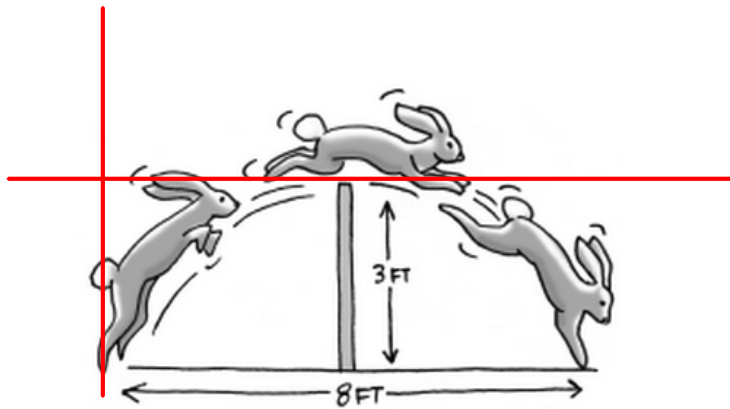
# Perform Mathematical Modeling with Parabolas

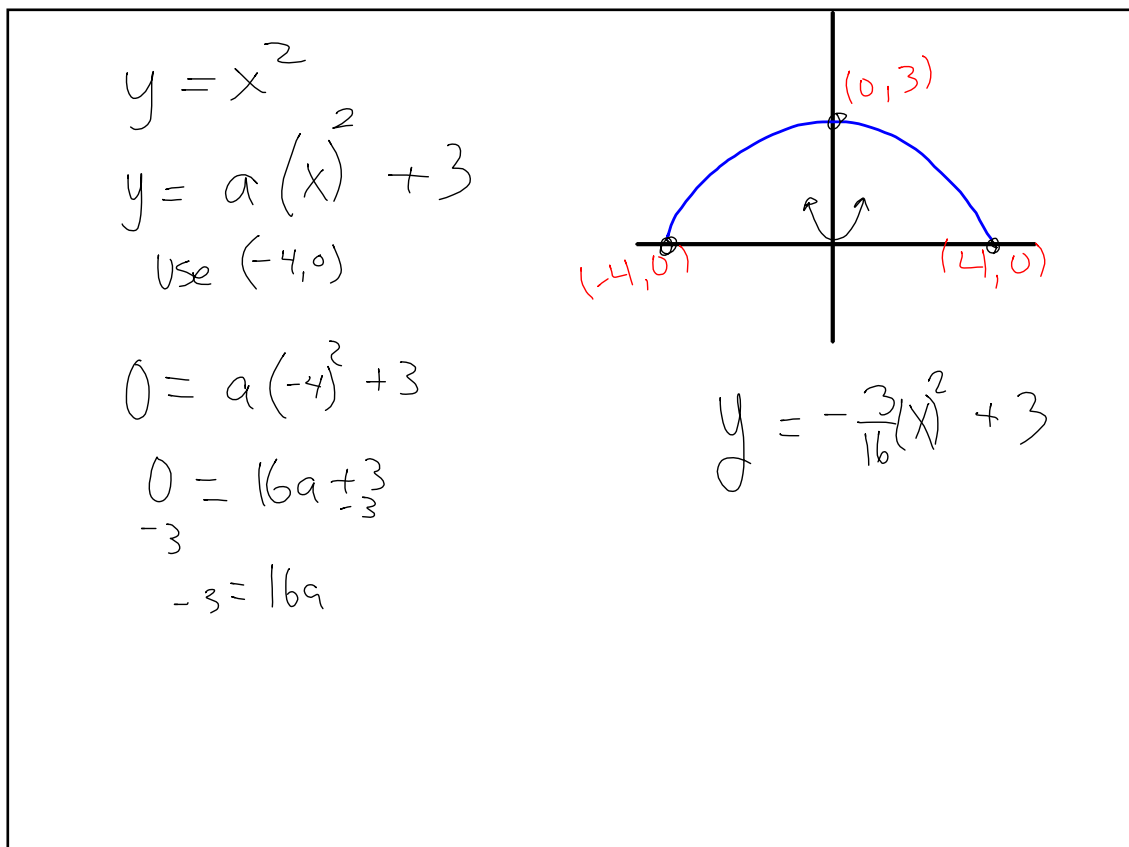
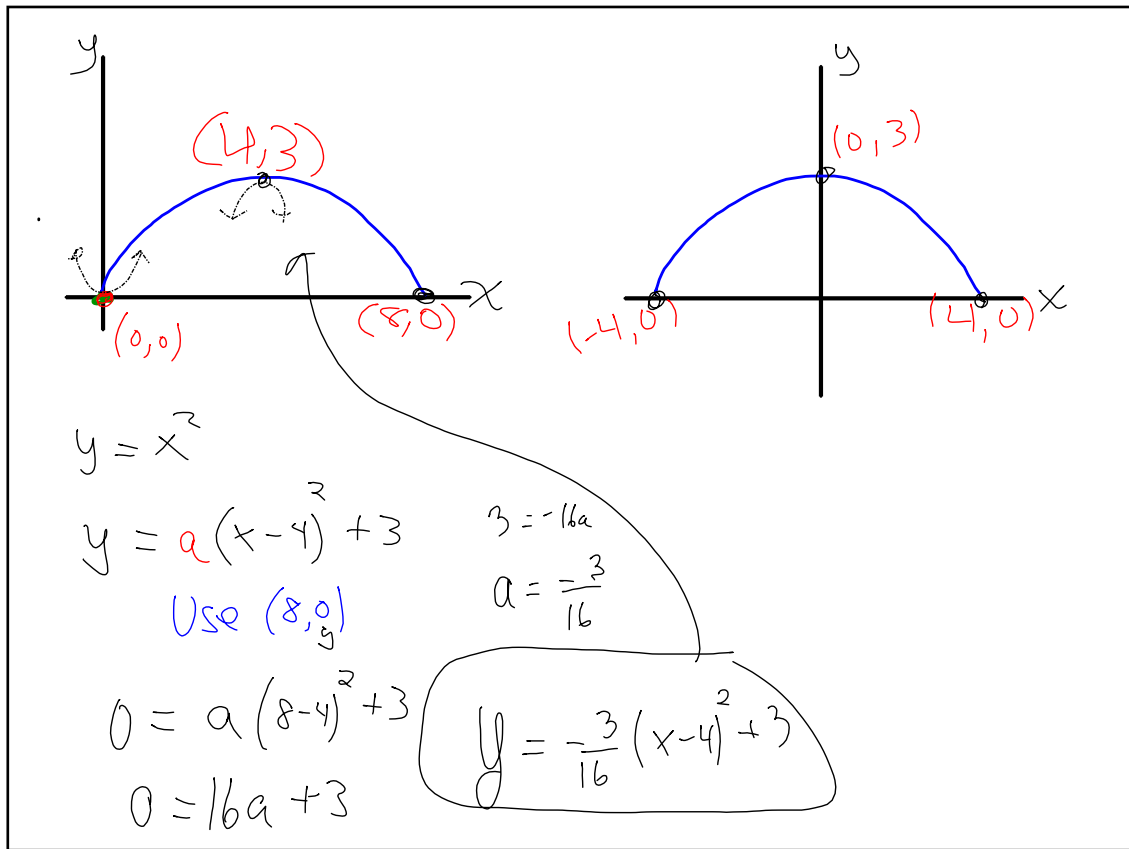
← Title





read 2-64 p.79





$$y = a(x-4)^2 + 3$$

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

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

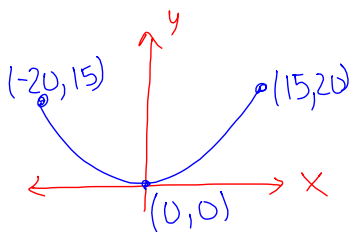
Move on to

2-66

**When Ms. Bibbi kicked a soccer ball, it traveled a horizontal distance of 150 feet and reached a height of 100 feet at its highest point. Sketch the path of the soccer ball and find an equation of the parabola that models it.**

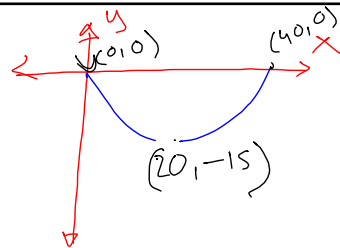
Next....

2-67



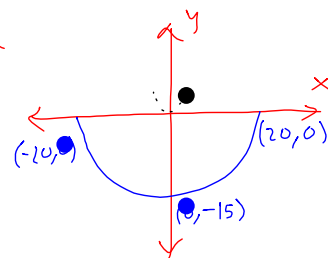
$$y = a(x)^2$$

$$\frac{3}{80}$$



$$y = a(x-20)^2 - 15$$

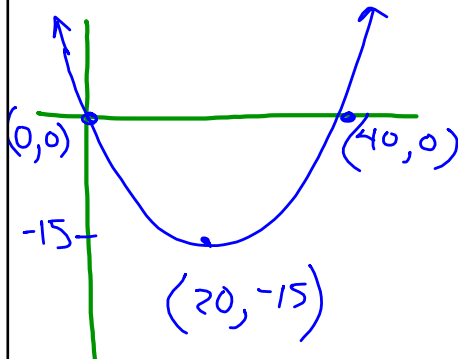
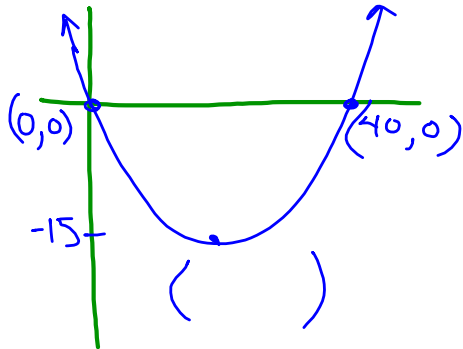
$$\frac{3}{80}$$



$$y = a(x)^2 - 15$$

$$\frac{3}{80}$$

At the skateboard park, the hot new attraction is the *U-Dip*, a cement structure embedded into the ground. The cross-sectional view of the *U-Dip* is a parabola that dips 15 feet below the ground. The width at ground level, its widest part, is 40 feet across. Sketch the cross-sectional view of the *U-Dip*, and find an equation of the parabola that models it.



Model:

$$y = a(x - 20)^2 - 15$$

$$0 = a(40 - 20)^2 - 15$$

$$0 = a \cdot 400 - 15$$

$$15 = 400a$$

$$a = \frac{15}{400} = \frac{3}{80} \quad \bullet 0.375$$



B.B.

Mid  
Chapter  
Check

See your  
LCA

## Assignment

**2-** 69-71, 72a, 73-74, 75a, 91

graph paper  
needed for #70

pdf →