

# Quadratic Functions

Sec 2.1 pg 143 #12, 23, 33, 37, 44-45, 47, 57, 74

#12) Describe how the graph of each equation related to  $y = x^2$

a)  $y = -\frac{1}{2}(x-2)^2 + 1$     b)  $y = \frac{1}{2}(x-2)^2 + 1$     c)  $y = -\frac{1}{2}(x+2)^2 - 1$

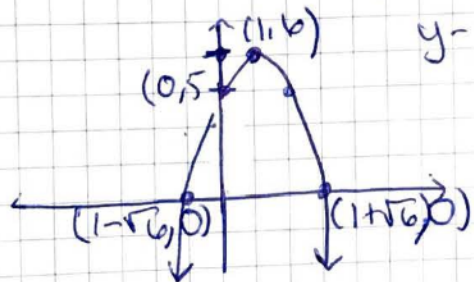
Reflection over x-axis,  
Vertical Compression of  $\frac{1}{2}$   
Shifted 2 units right  
and 1 unit up.

Vertical Compression  
of  $\frac{1}{2}$ , then shifted  
2 units right and  
1 unit up.

Reflection over x-axis,  
vertical compression of  $\frac{1}{2}$   
then shifted 2 units  
left and 1 unit down

#23)  $f(x) = -x^2 + 2x + 5$   
 $= -(x^2 - 2x + 1) + 5 + 1$   
 $\left(\frac{-2}{2}\right)^2 = 1$   
 $= -(x-1)^2 + 6$

V(1, 6), x-int =  $(1 \pm \sqrt{6}, 0)$   
y-int (0, 5)



#33)  $g(x) = \frac{1}{2}(x^2 + 4x - 2)$   
 $\left(\frac{4}{2}\right)^2 = 4$   
 $= \frac{1}{2}(x^2 + 4x + 4) - 1 - 2$   
 $g(x) = \frac{1}{2}(x+2)^2 - 3$

Vertex  $(-2, -3)$   
x-Intercepts:  $(-2 \pm \sqrt{6}, 0)$   
y-int  $(0, -1)$

$0 = \frac{1}{2}(x+2)^2 - 3$   
 $3 = \frac{1}{2}(x+2)^2$   
 $\sqrt{6} = \sqrt{(x+2)^2}$      $x = -2 + \sqrt{6}$   
 $\pm \sqrt{6} = x + 2$      $x = -2 - \sqrt{6}$   
 $-2$      $-2$

#37) Find eqn of Quadratic

V(-1, 4), (1, 0)

$f(x) = a(x+1)^2 + 4$

$0 = a(1+1)^2 + 4$

$0 = a(2)^2 + 4$

$0 = 4a + 4$

$-4 = 4a$   
 $-1 = a$

$f(x) = -1(x+1)^2 + 4$

#44) V(-1/4, 3/2), P(-2, 0)

$f(x) = a(x + 1/4)^2 + 3/2$

$0 = a(-2 + 1/4)^2 + 3/2$

$0 = a(-7/4)^2 + 3/2$

$0 = a(49/16) + 3/2$

$\frac{16}{49} \cdot -\frac{3}{2} = -\frac{49}{16} a \cdot \frac{16}{49}$

$-\frac{24}{49} = a$

$f(x) = -\frac{24}{49}(x + 1/4)^2 + 3/2$

#45)  $V(\frac{5}{2}, -\frac{3}{4}), P(-2, 4)$

$$f(x) = a(x - \frac{5}{2})^2 - \frac{3}{4}$$

$$4 = a(-2 - \frac{5}{2})^2 - \frac{3}{4}$$

$$4 = a(-\frac{4-5}{2})^2 - \frac{3}{4}$$

$$4 = a(-\frac{1}{2})^2 - \frac{3}{4}$$

$$\frac{16}{4} = 4 = a(\frac{1}{4}) - \frac{3}{4}$$

$$\frac{4}{81} \cdot \frac{19}{4} = \frac{81}{4} a \cdot \frac{4}{81}$$

$$\frac{19}{81} = a$$

$$f(x) = \frac{19}{81} (x - \frac{5}{2})^2 - \frac{3}{4}$$

#47)  $y = x^2 - 16$

$x$ -int =  $-4, 4$   
 $(-4, 0), (4, 0)$   
 $\Delta 0 = x^2 - 16$   
 $\sqrt{16} = \sqrt{x^2}$   
 $\pm 4 = x$

#57)  $(-1, 0), (3, 0)$

$$f(x) = (x+1)(x-3)$$

$$= x^2 - 3x + 1x - 3$$

①  $f(x) = x^2 - 2x - 3$  (opens upward)

$$g(x) = -(x+1)(x-3)$$

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

$$g(x) = -x^2 + 2x + 3$$
 (opens downward)

#74)  $y = -\frac{4}{9}x^2 + \frac{24}{9}x + 12$

$$(-\frac{6}{2})^2 y = \frac{4}{9}(x^2 - (6+9)x + 12 + 4)$$

$$-3^2 y = -\frac{4}{9}(x-3)^2 + 8$$

$$V(3, 8)$$

The max height is 8ft

