

**Precalculus Warm Up**

1. Recall the standard quadratic function  $f(x)=x^2$ . What's the vertex of this parabola?  $(0,0)$
2. What would the new function be if you were to shift the standard parabola up 3 units? What's the vertex now?  $f(x)=x^2+3$   $(0,3)$
3. Now take  $f(x)=x^2$  and shift it to the right 4 units. Give the equation and vertex.  $f(x)=(x-4)^2$   $(4,0)$
4. Finally, take  $f(x)=x^2$  and shift it both up 3 and to the right 4 units. Give the equation and the vertex.  
 $f(x)=(x-4)^2+3$   $(4,3)$

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**Example 1 p. 100 #30**

Write the standard form of the quadratic function with vertex  $(4, 1)$  and whose graph passes through the point  $(6, -7)$ . Then find where  $f(x) > 0$ .

$$f(x) = a(x-h)^2 + k \quad f(x) = -2(x-4)^2 + 1$$

$$-7 = a(6-4)^2 + 1 \quad \text{zero}(3.2929, 0) (4.7071, 0)$$

$$-7 = a(2)^2 + 1$$

$$-7 = 4a + 1$$

$$-8 = 4a$$

$$-2 = a$$

$$(3.2929, 4.7071)$$

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Write the standard form of the quadratic function with vertex  $(1, 2)$  and whose graph passes through the point  $(3, -6)$ . Then find where  $f(x) > 0$ .

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

$$(0,0) (2,0)$$

$$(0,2)$$

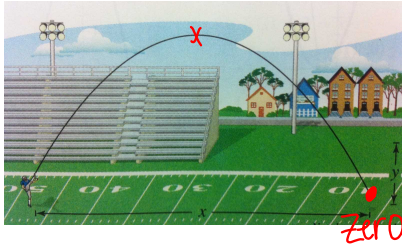
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**Important Aspects of Polynomial Functions**

1. End Behavior
2. Zeros
3. Relative extrema (min's and max's)

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**So...what is important about a quadratic?**



A football is thrown at a point 6 feet above the ground at a velocity of 60 feet per second at an angle of 45 degrees with respect to the ground. The path of the football is given by the function  $f(x) = -0.0168x^2 + x + 6$ , where  $f(x)$  is the height of the football (in feet) and  $x$  is the horizontal distance from the quarterback (in feet). What is the maximum height reached by the football? How far will the ball go when it hits the ground?

$$x = \frac{-b}{2a} = \frac{-1}{2(-0.0168)} = \frac{-1}{-0.0336} = 29.76$$

$f(x) = -0.0168(29.76)^2 + 29.76 + 6$   
 $f(x) = 20.88 \text{ ft}$   
 65.02 ft

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**Conclusion**

1. Explain how to write the equation of a quadratic in vertex-form from a vertex and point on the parabola.
2. What are important aspects of a parabola?
3. Questions???????

**Homework**

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**29 - 34 all (also find  $f(x) < 0$ ), 55, 57, 59, 61**

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