

1. Give the functions vertex, axis of symmetry, domain and range.

$$h(x) = -(x - 5)^2 + 2.$$

$V(5, 2)$

A.O.S.  $x = 5$

$D(-\infty, \infty)$

$R(-\infty, 2]$

2. Write the equation of the parabola in vertex form. Then rewrite the equation in standard form.

Vertex:  $(-2, 5)$  and passes through the Point:  $(2, 13)$

$$13 = a(2 + 2)^2 + 5$$

$$13 = 16a + 5$$

$$8 = 16a$$

$$a = \frac{1}{2}$$

$$y = \frac{1}{2}(x + 2)^2 + 5$$

$$y = \frac{1}{2}(x^2 + 4x + 4) + 5$$

$$= \frac{1}{2}x^2 + 2x + 2 + 5$$

$$= \frac{1}{2}x^2 + 2x + 7$$

3. Graph the parabola by finding the x-intercepts, y-intercept and vertex.

$$y = x^2 + 10x - 24$$

$$\frac{-b}{2a} = \frac{-10}{2(1)} = -5$$

$$(-5)^2 + 10(-5) - 24$$

$$25 - 50 - 24$$

$$-49$$

$$V(-5, -49)$$

y-inter  
 $(0, -24)$

$$x^2 + 10x - 24 = 0$$

$$(x - 2)(x + 12) = 0$$

$$x = 2 \quad x = -12$$

4. Find the x-intercepts of the parabola.

$$y = 3x^2 - 10x + 8$$

$$(3x + 2)(x - 4) = 0$$

$$3x + 2 = 0$$

$$x = -\frac{2}{3}$$

$$x - 4 = 0$$

$$x = 4$$

5. Solve the equation by factoring.

A.  $x^2 + 5x = 24$   
 $x^2 + 5x - 24 = 0$   
 $(x+8)(x-3)$   
 $x = -8 \quad x = 3$

B.  $3x^2 - 8x = -4$   
 $3x^2 - 8x + 4 = 0$   
 $(3x-2)(x-2)$   
 $x = \frac{2}{3} \quad x = 2$

6. The height, in feet, of a t-shirt launched from a t-shirt cannon high in the stands at a football stadium is given by  $h(x) = -16x^2 + 32x + 128$ , where  $x$  is the time in seconds after the t-shirt is launched. How long will it take before the t-shirt reaches the ground?

4 sec

7. Write the equation of a parabola with  $x$ -intercepts at  $(-3, 0)$  and  $(2, 0)$  that passes through the point  $(-2, 4)$  in **Factored form**, then rewrite the equation in **Standard Form**.

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

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

$$4 = a(-2+3)(-2-2)$$

$$4 = a(1)(-4)$$

$$4 = -4a$$

$$a = -1$$

$$y = -(x+3)(x-2)$$

$$y = -(x^2 + x - 6)$$

$$-x^2 - x + 6$$

8. Use your calculator to find the equation in standard form of the parabola that passes through the points  $(-3, 2)$ ,  $(-1, 0)$ ,  $(1, 6)$

$$y = x^2 + 3x + 2$$

Then use algebra to prove that the equation is correct.

~~$$3 = 4c$$~~

$$2 = 9a - 3b + c$$

$$0 = a - b + c$$

$$6 = a + b + c$$

$$1 + 3 + c = 6$$

$$4 + c = 6$$

$$c = 2$$

~~$$E_2 \quad 3 \bar{E}_1 \quad E_2$$~~

$$a + b + c = 6$$

$$\underline{(-) a - b + c = 0}$$

$$2b = 6$$

$$b = 3$$

~~$$E_2 \quad 3 - 6E_1$$~~

$$a + b + c = 6$$

$$\underline{(-) 9a - 3b + c = 2}$$

$$-8a + 4b = 4$$

$$-8a + 4(3) = 4$$

$$-8a + 12 = 4$$

$$-8a = -8$$

$$a = 1$$

$$y = 4x^2 + 3x + 2$$

