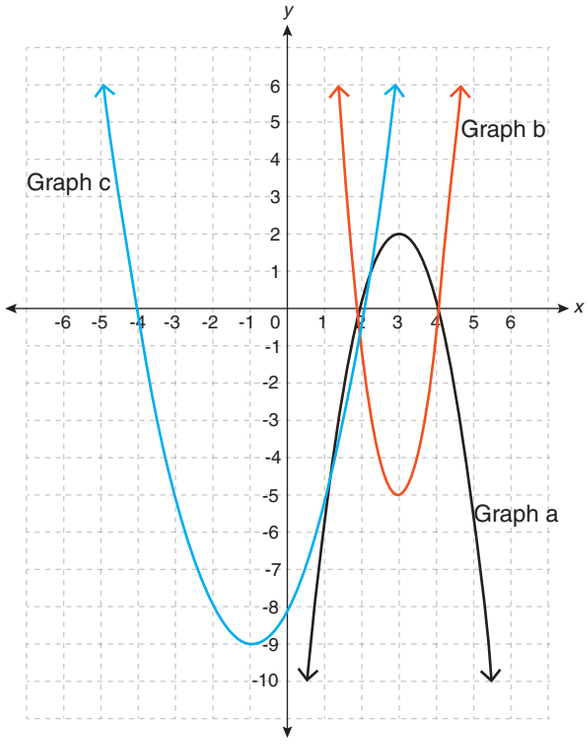
Unit 2: Quadratic Functions Lesson 2.2

Coach's Corner - IV

1. Three quadratic functions are listed below. Complete the chart by writing the letter to the matching function.

Function	Graph
$f(x) = 3(x-3)^2 - 5$	**b**
$g(x) = x^2 + 2x - 8$	**c**
$h(x) = -2(x-2)(x-4)$	**a**



2. For each function from question 1, list two characteristics you used to correctly match it to its graph.

   a. $f(x) = 3(x-3)^2 - 5$

   - Graph opens up since a > 0
   - Vertex of (3, –5)
   - equation of the axis of symmetry is $x = 3$
   - minimum at $y = -5$

b. $g(x) = x^2 + 2x - 8$

- factorable to $(x + 4)(x - 2)$, so x-intercepts are $x = -4$ and $x = 2$
- a is > 0, so graph opens up

c. $h(x) = -2(x - 2)(x - 4)$

- factors are $(x - 2)$ and $(x - 4)$, so x-intercepts are $x = 2$ and $x = 4$
- $a < 0$, so graph opens down

3. Convert the function $h(x) = -2(x - 2)(x - 4)$ to standard form by expanding.

$h(x) = -2(x - 2)(x - 4)$
$h(x) = -2(x^2 - 6x + 8)$
$h(x) = -2x^2 + 12x - 16$

4. a. Research the track and field sport of high-jumping on the Internet or You Tube. Describe in several sentences how the athlete maneuvers successfully over the high-jump bar.

High jump athletes take a running start before attempting to clear the horizontal bar. The take-off is usually very close to the bar with one leg bending at the knee and swinging the arms in an upward motion to increase momentum. Transferring the forward momentum to upward momentum the athlete leans over the bar with his shoulders and head, arching his back, squeezing his buttocks, and finally kicking his feet up once the knees are over the bar. Finally, the athlete lands on the crash pad on his shoulder blades. In other words, using the Fosbury Flop method.

b. Assume that the shape of the athlete's high-jump is parabolic. Determine the equation of the function, in vertex form, where $h(t)$ is the height of the jump in metres and t is the time that the jump takes in seconds.

- Starting lift off point of athlete (0,0)
- Maximum height is 1.80 metres
- Landing on a crash pad that is 0.75 metres thick.
- Equation of the axis of symmetry is $t = 0.6$.

The vertex is (0.6,1.80) since the equation of the axis of symmetry is $t = 0.6$ and the maximum height is 1.80 m.

$(h,k) = (0.6,1.80)$
Use the point (0,0) and the coordinates of the vertex to determine the equation of the function in vertex form.

$h(t) = a(t-h)^2 + k$ $h(t) = a(t-0.6)^2 + 1.80$ $0 = a(0-0.6)^2 + 1.80$ $-1.80 = a(-0.6)^2$ $-1.80 = 0.36a$ $\frac{-1.80}{0.36} = \frac{0.36}{0.36}a$ $-5 = a$	$h(t) = -5(t-0.6)^2 + 1.80$