Name _____ Date _____ Class _____

Problem Solving
The Quadratic Formula

In a shot-put event, Jenna tosses her last shot from a position of
about 6 feet above the ground with an initial vertical and horizontal
velocity of 20 feet per second. The height of the shot is modeled by
the function $h(t) = -16t^2 + 20t + 6$, where t is the time in seconds
after the toss. The horizontal distance traveled after t seconds is
modeled by $d(t) = 20t$.

1. Jenna wants to know the exact distance the shot travels at a velocity
   of 20 feet per second.

   a. Use the Quadratic Formula $t = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
      to solve the height function for t.   _____

   b. Use the value for t and the distance function to
      find the distance her shot travels.   _____

2. Jenna is working to improve her performance. She makes a table to show
   how the horizontal distance varies with velocity. Complete the table.

	Velocity (ft/s)	Formula	Time (s)	Distance (ft)
a.	22	$t = \dfrac{-22 \pm \sqrt{(22)^2 - 4(-16)(6)}}{2(-16)}$	$t = -0.23, 1.61$	35.4 ft
b.	25			
c.	28			

Jenna has not reached her full potential yet. Her goal is to toss the
shot from a height of 6 feet 6 inches with a vertical and horizontal
velocity of 30 feet per second. Choose the letter for the best answer.

3. If she achieves her goal, how long will
   her shot stay in the air?

   A 1.65 s

   B 1.87 s

   C 2.07 s

4. If she achieves her goal, what horizontal
   distance will the shot travel?

   A 56.1 ft

   B 62.1 ft

   C 68.1 ft

LESSON	**Problem Solving**
5-6	*The Quadratic Formula*

In a shot-put event, Jenna tosses her last shot from a position of about 6 feet above the ground with an initial vertical and horizontal velocity of 20 feet per second. The height of the shot is modeled by the function $h(t) = -16t^2 + 20t + 6$, where t is the time in seconds after the toss. The horizontal distance traveled after t seconds is modeled by $d(t) = 20t$.

1. Jenna wants to know the exact distance the shot travels at a velocity of 20 feet per second.

   a. Use the Quadratic Formula $t = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to solve the height function for t.

   $t = -0.25, 1.5$

   b. Use the value for t and the distance function to find the distance her shot travels.

   30 ft

2. Jenna is working to improve her performance. She makes a table to show how the horizontal distance varies with velocity. Complete the table.

	Velocity (ft/s)	Formula	Time (s)	Distance (ft)
a.	22	$t = \dfrac{-22 \pm \sqrt{(22)^2 - 4(-16)(6)}}{2(-16)}$	$t = -0.23, 1.61$	35.4 ft
b.	25		**$t = -0.21, 1.77$**	**44.3 ft**
c.	28		**$t = -0.19, 1.94$**	**54.3 ft**

Jenna has not reached her full potential yet. Her goal is to toss the shot from a height of 6 feet 6 inches with a vertical and horizontal velocity of 30 feet per second. Choose the letter for the best answer.

3. If she achieves her goal, how long will her shot stay in the air?

   A 1.65 s

   B 1.87 s

   Ⓒ 2.07 s

4. If she achieves her goal, what horizontal distance will the shot travel?

   A 56.1 ft

   Ⓑ 62.1 ft

   C 68.1 ft