Quadratic Word Problems

1. The function $f(x) = -10x^2 + 700x - 6000$ represents the profit a company makes from selling headphones at different prices. What is the maximum profit the company is expected to make?

SF — y — x

→ y-value of vertex

$x = -b/2a$

$x = -700/2(-10) = 35$

$y = -10(35)^2 + 700(35) - 6000$

$y = \boxed{\$6{,}250}$

2. A water balloon was thrown from a window. The height of the water balloon over time can be modeled by the function $y = -16x^2 + 160x + 50$. What was the maximum height of the water balloon?

$x = -160/2(-16)$

$x = 5$

$y = -16(5)^2 + 160(5) + 50$

$y = \boxed{450 \text{ ft.}}$

3. Jonny and Sarah were playing catch in the backyard. Johnny threw the football for Sarah to run and catch. After two seconds the ball reached it's maximum height of 9 feet. Sarah ran and caught the ball right before the ball hit the ground, 1 foot above the ground, after 4 seconds. Find the equation for the path of the football in standard form.

(2, 9) vertex

(4, 1)

$y = a(x-2)^2 + 9$

$1 = a(4-2)^2 + 9$

$-8 = 4a$

$-2 = a$

$y = -2(x-2)^2 + 9$

$y = -2(x^2 - 4x + 4) + 9$

$y = -2x^2 + 8x - 8 + 9$

$\boxed{y = -2x^2 + 8x + 1}$