Use the following situation for questions below. The formula for the height of a thrown object can be approximated by the formula: $h(t) = -16t^2 + v_0 t + h_0$ where $h(t)$ is the height of the object in feet after t seconds, v_0 is the initial velocity in feet/second and h_0 is the initial height in feet. Suppose you throw a football at an initial velocity of 48 ft/s from a cliff that is 64 feet high.

(a) $h(t) = -16t^2 + 48t + 64$

ft/s^2 ft/s ft

(b) $h(t) = \frac{-16t^2}{-16} + \frac{48t}{-16} + \frac{64}{-16}$ $\frac{GCF}{-16}$

$h(t) = -16(t^2 - 3t - 4)$

a·c: −4 ; b: −3 ; factors: −4 · 1, −4 + 1 = −3

	t	−4
t	t^2	$-4t$
1	$1t$	-4

$h(t) = -16(t+1)(t-4)$

(c) Zeros = x-intercepts

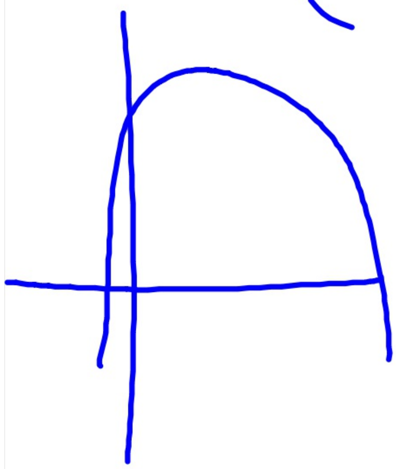
$h(t) = -16(t+1)(t-4)$

~~$0 = -16$~~ $\quad 0 = t+1 \quad 0 = t-4$

$-1 = t \quad 4 = t$

$(-1, 0) \quad (4, 0)$

seconds height



The football will hit the ground after 4 seconds.

(d) $h(t) = -16t^2 + 48t + 64$

Vertex $(1.5, 100)$ maximum

seconds height

$x = \frac{-b}{2a}$ $x = 1.5$ $h(1.5) = -16(1.5)^2 + 48(1.5) + 64$

$x = \frac{-48}{2(-16)}$ $h(1.5) = 100$

$x = \frac{-48}{-32}$

The football reaches a maximum height of 100 ft at 1.5 seconds.

(e) $f(x) = a(x-h)^2 + k$

$h(t) = a(t-h)^2 + k$

$a = -16$

$h = 1.5$

$k = 100$

$$\boxed{h(t) = -16(t-1.5)^2 + 100}$$