Lesson 38 Applications of Quadratic Equations

1. A baseball is thrown into the air and its height (h), in feet, can be modeled by the equation $h = -7t^2 + 34t + 5$, where t represents time in seconds.

   How many seconds will it take for the baseball to hit the ground ($h = 0$) after it is thrown into the air?

   $h=0 \quad h = -7t^2 + 34t + 5$

   $0 = -7t^2 + 34t + 5$

   $0 = -7t^2 - t + 35t + 5$

   $= -t(7t+1) + 5(7t+1)$

   $0 = (-t+5)(7t+1)$

   $-t+5=0 \quad 7t+1=0$

   $+t \quad +t \quad -1 \quad -1$

   $5 = t \quad \frac{7t}{7} = \frac{-1}{7}$

   $t = -\frac{1}{7}$ ✗

   -35: $-1, +35$; $5, 7$

   Answer $t = 5$ seconds

2. Suppose a football player kicks a ball and the height (h) of the football in feet can be modeled by the equation $h = -8t^2 + vt + c$, where t is the time in seconds after the ball is kicked, v is the initial upward velocity, and c is the starting height.

   Write an equation that can be used to find the height (h) of the ball after t seconds if the initial upward velocity is 15 ft/sec and the starting height is 2 ft.

   $h = -8t^2 + vt + c$

   $v = 15$

   $h = c = 2$

   Answer $h = -8t^2 + 15t + 2$

   If the ball is not touched, how long will it take for the ball to reach the ground?

   $h=0 \quad -8(2)$

   $0 = -8t^2 + 15t + 2$

   $0 = -8t^2 - t + 16t + 2$

   $0 = -t(8t+1) + 2(8t+1)$

   $0 = (-t+2)(8t+1)$

   $-t+2=0 \quad 8t+1=0$

   $+t \quad +t \quad -1 \quad -1$

   $2 = t \quad \frac{8t}{8} = \frac{-1}{8}$

   $t = -\frac{1}{8}$ ✗

   -16: $-1, +16$; $2, 8$; $4, 4$

   Answer $t = 2$ seconds