

To SOLVE a quadratic word problem by factoring...

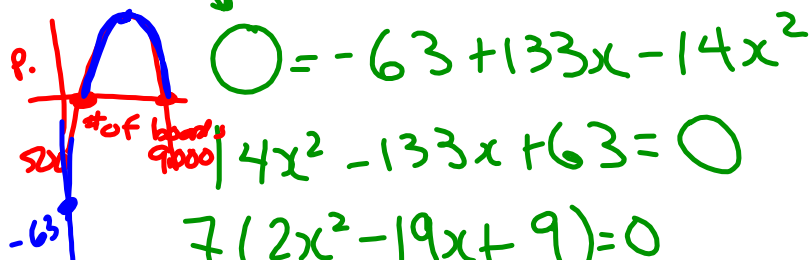
1. Rewrite the equation in standard form (ie. $ax^2 + bx + c = 0$).
2. Factor the quadratic.
3. Solve each factor as a linear equation (ie. Let each factor equal zero and then solve - Lesson 2). These values are your solutions to the quadratic equation.
4. Interpret the solutions in the context of the question. It may be that both *roots* don't make sense – only one does!

Example 1:

The profit of a skateboard company can be modelled by the function

$P(x) = -63 + 133x - 14x^2$, where $P(x)$ is the profit in thousands of dollars and x is the number of skateboards sold, also in thousands. Determine when the company will break even and when the company is profitable.

$$\rightarrow P(x) = 0$$



$$0 = -63 + 133x - 14x^2$$

$$14x^2 - 133x + 63 = 0$$

$$7(2x^2 - 19x + 9) = 0$$

$$7(2x-1)(x-9) = 0$$

$$\begin{aligned} 2x-1 &= 0 \\ 2x &= 1 \\ x &= \frac{1}{2} \end{aligned}$$

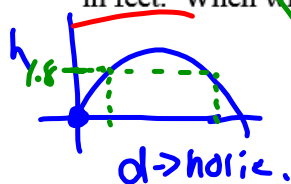
$$\begin{aligned} x-9 &= 0 \\ x &= 9 \end{aligned}$$

$$\begin{aligned} x = \frac{1}{2} &\rightarrow 500 \text{ skabks.} \\ x = 9 &\rightarrow 9000 \text{ skabks.} \end{aligned}$$

\therefore it will break even when producing 500 or 9000 skateboards. And they are profitable if they sell between 500 and 9000 boards.

Example 2:

The path a dolphin travels when it rises above the ocean's surface can be modelled by the function $h(d) = -0.2d^2 + 2d$, where $h(d)$ is the height of the dolphin above the water's surface and d is the horizontal distance from the point where the dolphin broke the water's surface, both in feet. When will the dolphin reach a height of 1.8 feet?



$$1.8 = -0.2d^2 + 2d$$

$$0.2d^2 - 2d + 1.8 = 0$$

$$0.2(d^2 - 10d + 9) = 0$$

$$0.2(d-1)(d-9) = 0$$

$$\begin{aligned} d-1 &= 0 \\ d &= 1 \end{aligned}$$

$$\begin{aligned} d-9 &= 0 \\ d &= 9 \end{aligned}$$

$$\frac{-2}{0.2} = -10$$

\therefore at 1 foot and 9 feet from where the dolphin jumped it is at a height of 1.8m.

Homework: Pg. 162 #8 – 14