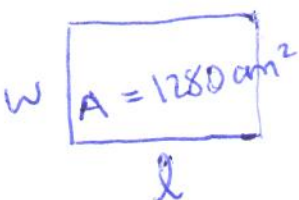


## 5.14 Applications of Quadratics SOLN

**Ex 7:** Your company is designing a steel frame in the shape of a rectangle. The Area is  $1,280 \text{ cm}^2$ . The length is 5 times the width. Calculate the dimensions of the frame.



$$A = l \cdot w$$

$$\begin{cases} l \cdot w = 1280 & (1) \\ l = 5w & (2) \end{cases}$$

Can Also solve using Quadratic Formula:

Substitution: <sup>(1)</sup>  $(5w)w = 1280$   
 $5w^2 = 1280$   
 $w^2 = 256$

$$w^2 - 256 = 0$$

$$(w+16)(w-16) = 0$$

$$w = \cancel{-16}, 16$$

can't have negative width

$$5w^2 - 1280 = 0$$

$$a = 5$$

$$b = 0$$

$$c = -1280$$

$$\dots \quad \begin{matrix} w = 16 \\ l = 80 \end{matrix}$$

$$\Rightarrow w = 16 \text{ cm} \rightarrow \begin{matrix} l = 5w \\ l = 5(16) = 80 \text{ cm} \end{matrix}$$

HW #3:

If an object is propelled upward from a height of  $h$  feet at an initial velocity of  $v$  feet per second, then its height  $S$  after  $t$  seconds is given by the equation  $S = -16t^2 + vt + h$ , where  $S$  is in feet. If the object is propelled from a height of 12 feet with an initial velocity of 96 feet per second, its height  $S$  is given by the equation  $S = -16t^2 + 96t + 12$ .

After how many seconds is the height 120 feet?

$$S = 120. \text{ Solve for time, } t.$$

$$S = -16t^2 + 96t + 12$$

$$120 = -16t^2 + 96t + 12$$

$$\begin{array}{r} -120 \\ \hline 0 = -16t^2 + 96t - 108 \end{array}$$

$$0 = -16t^2 + 96t - 108 \rightarrow \text{use Quadratic Formula}$$

$$a = -16$$

$$b = 96$$

$$c = -108$$

$$t = \frac{-96 \pm \sqrt{(96)^2 - 4(-16)(-108)}}{2(-16)}$$

$$t = 1.5, 4.5$$

