A surveyor measures the angle of elevation to the top of Mount Williams to be 15°. She then moves in a straight line to be 100 feet closer to the mountain. The angle of elevation is now 18°. How high is Mount Williams?

The initial problem here is that we have two variables, $x$ and $y$. It seems like we need $y$ to find $x$ and we need $x$ to find $y$. What we are going to do is develop two equations, both with $x$ and $y$ in them, and then use the method of substitution to eliminate one of the variables:

\[
\tan 15° = \frac{y}{x + 100}, \quad \tan 18° = \frac{y}{x}
\]

Notice that $y = x \tan 18°$ from the second equation. Now plug this into the first equation (so now we have the entire equation in terms of $y$, so we can solve for $y$):

\[
\tan 15° = \frac{x \tan 18°}{x + 100} \Rightarrow (x + 100) \tan 15° = x \tan 18° \Rightarrow x \tan 15° + 100 \tan 15° = x \tan 18°
\]

\[
\Rightarrow x \tan 15° - x \tan 18° = -100 \tan 15° \Rightarrow x(\tan 15° - \tan 18°) = -100 \tan 15°
\]

\[
\Rightarrow x = \frac{-100 \tan 15°}{\tan 15° - \tan 18°} \approx 470.33 \text{ feet}.
\]

Now that we have $x$, we just substitute this value back into the second equation, and solve for $y$:

\[
\tan 18° = \frac{y}{470.33} \Rightarrow 470.33 \tan 18° = y \Rightarrow y = 152.82 \text{ feet}.
\]

So Mount Williams is 152.82 feet high.