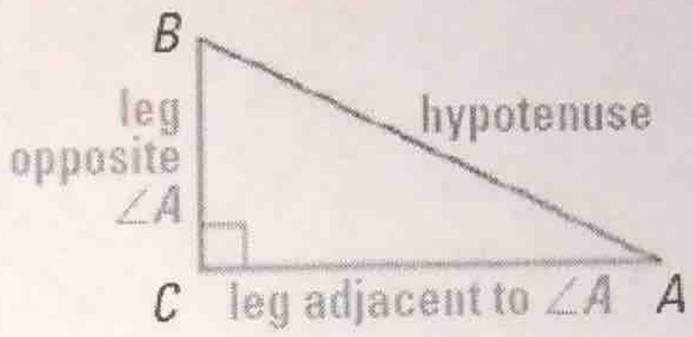
7.6 Apply the Sine and Cosine Ratios

KEY CONCEPT *For Your Notebook*

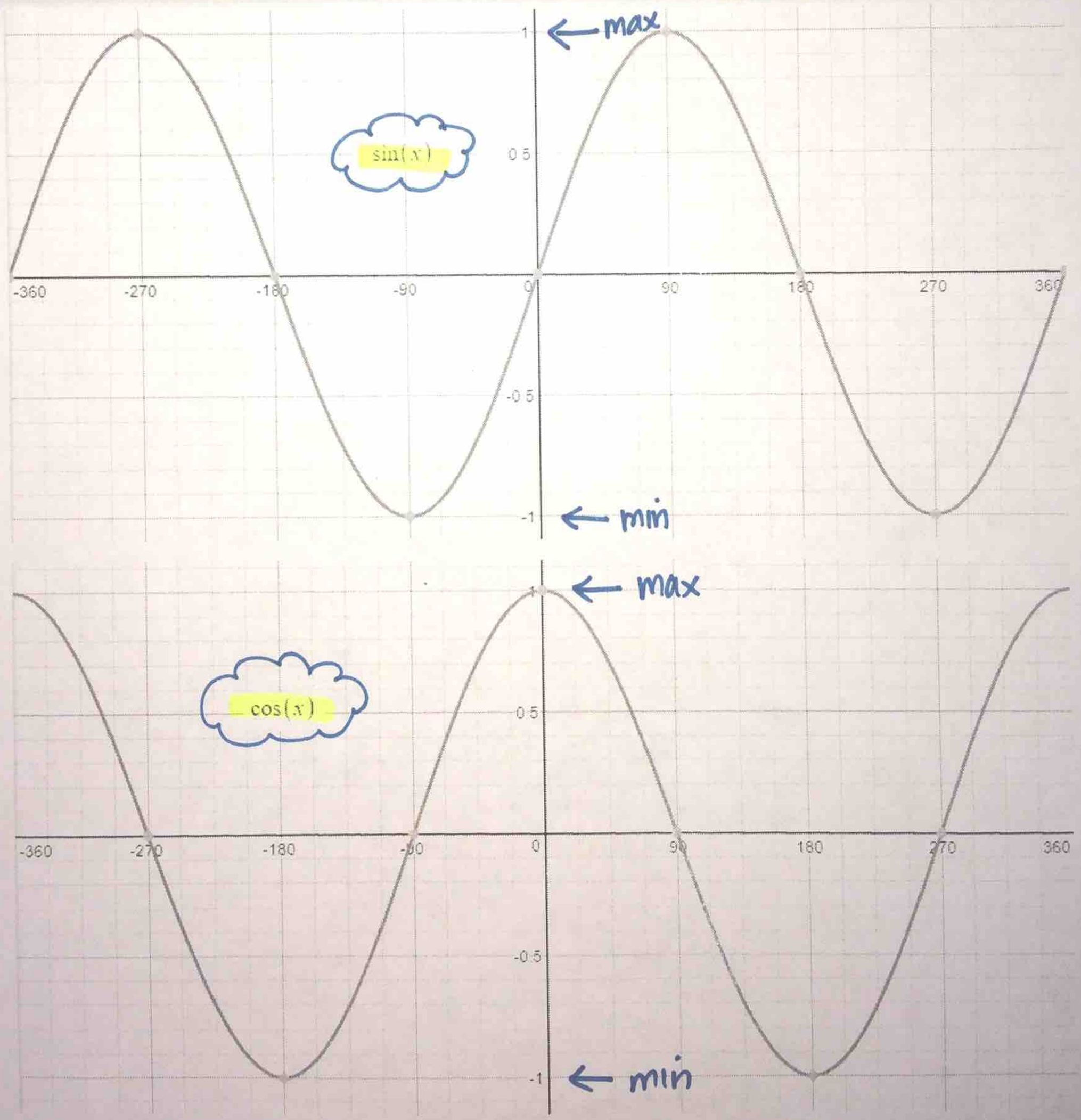
Sine and Cosine Ratios

Let $\triangle ABC$ be a right triangle with acute $\angle A$. The sine of $\angle A$ and cosine of $\angle A$ (written $\sin A$ and $\cos A$) are defined as follows:

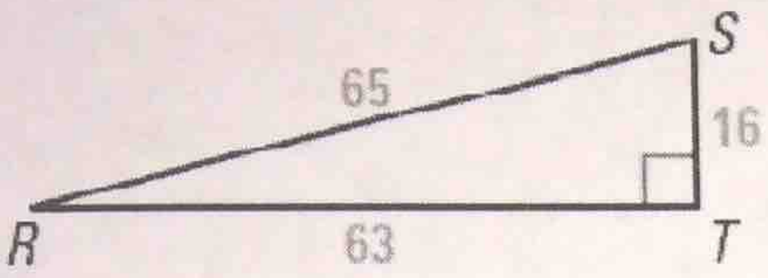


$$\sin A = \frac{\text{length of leg opposite } \angle A}{\text{length of hypotenuse}} = \frac{BC}{AB}$$

$$\cos A = \frac{\text{length of leg adjacent to } \angle A}{\text{length of hypotenuse}} = \frac{AC}{AB}$$



Ex 1: Find sine and cosine of S and R. Write each answer as a fraction and as a decimal rounded to four places.



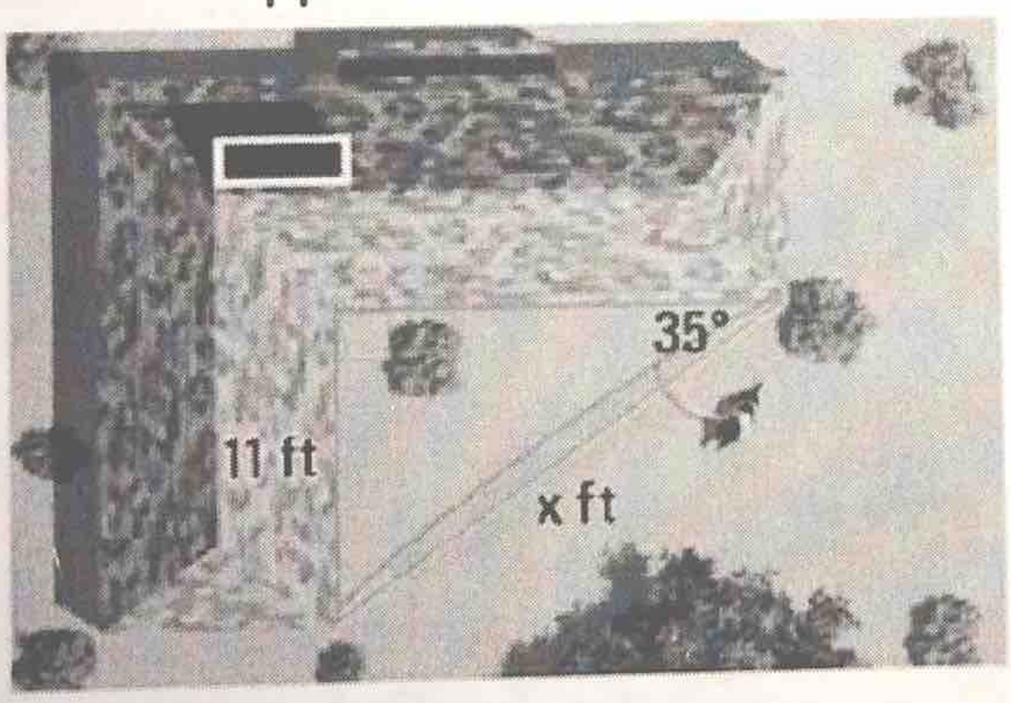
$\sin S = \frac{63}{65}$ ≈ 0.9692

$\cos S = \frac{16}{65}$ ≈ 0.2462

$\sin R = \frac{16}{65}$ ≈ 0.2462

$\cos R = \frac{63}{65}$ ≈ 0.9692

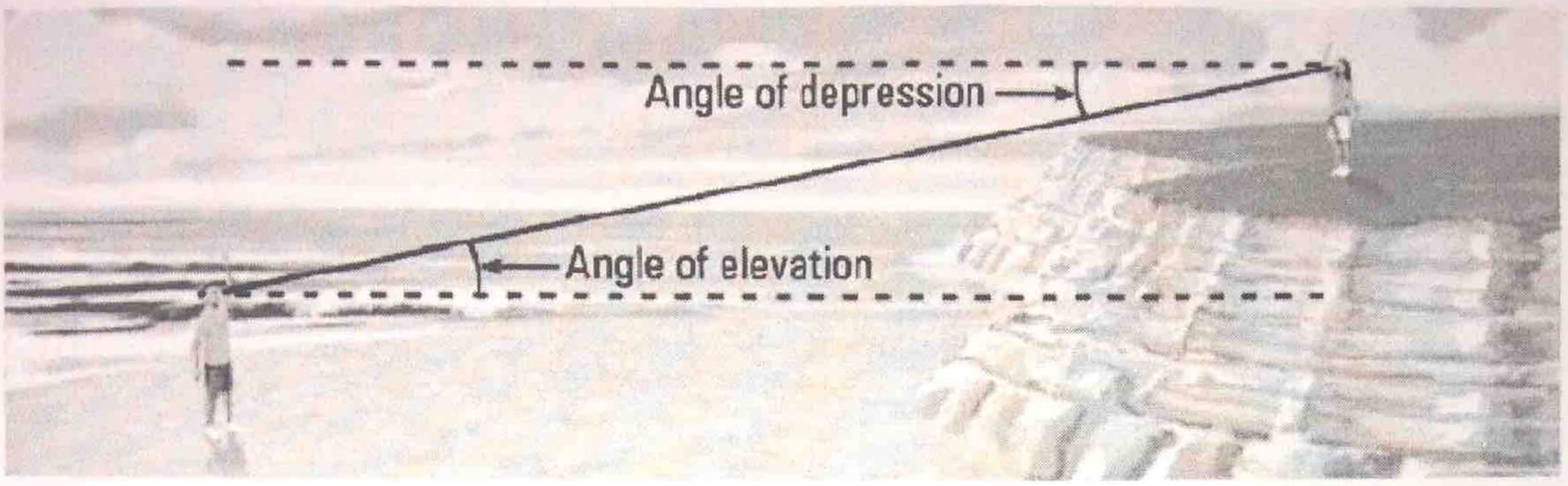
Ex 2: You want to string cable to make a dog run from 2 corners of a building, as shown in the diagram. Write and solve a proportion using a trigonometric ratio to approximate the length of the cable you need.



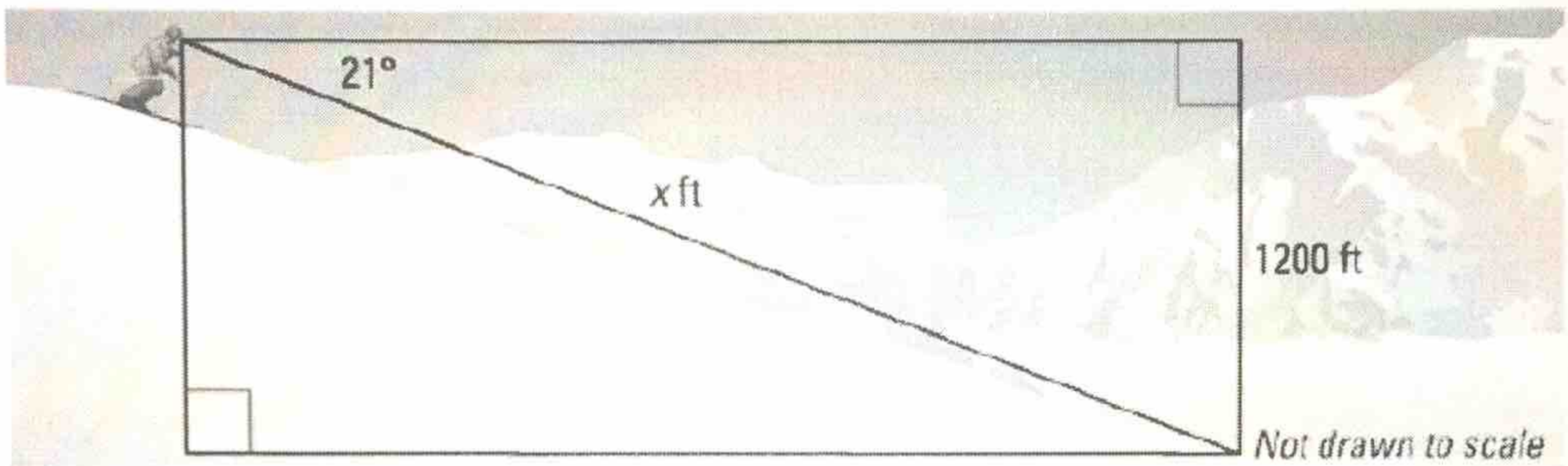
$\sin 35° = \frac{11}{x}$

$\frac{x \sin 35°}{\sin 35°} = \frac{11}{\sin 35°}$

$x \approx 19.2$ ft



Ex 3: You are skiing on a mountain with an altitude of 1200 meters. The angle of depression is 21°. About how far do you ski down the mountain?



$\sin 21° = \frac{1200}{x}$

$x \frac{\sin 21°}{\sin 21°} = \frac{1200}{\sin 21°}$

$x \approx 3348 \text{ m}$

Ex 4: You want to build a skateboard ramp with a length of 14 feet and an angle of elevation of 26°. You need to find the height and length of the base of the ramp.

$\sin 26° = \frac{x}{14}$

$x = 14 \sin 26°$

$x \approx 6.1 \text{ ft}$

height ≈ 6.1 ft

$\cos 26° = \frac{y}{14}$

$y = 14 \cos 26°$

$y \approx 12.6$

length ≈ 12.6 ft