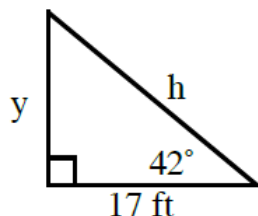


### Example 1

Use trigonometric ratios to find the lengths of each of the missing sides of the triangle below.



The length of the adjacent side with respect to the  $42^\circ$  angle is 17 ft. To find the length  $y$ , use the tangent because  $y$  is the opposite side and we know the adjacent side.

$$\begin{aligned}\tan 42^\circ &= \frac{y}{17} \\ 17 \tan 42^\circ &= y \\ 15.307 \text{ ft} &\approx y\end{aligned}$$

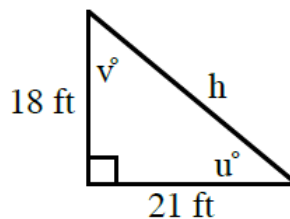
The length of  $y$  is approximately 15.31 feet. To find the length  $h$ , use the cosine ratio (adjacent and hypotenuse).

$$\begin{aligned}\cos 42^\circ &= \frac{17}{h} \\ h \cos 42^\circ &= 17 \\ h &= \frac{17}{\cos 42^\circ} \approx 22.876 \text{ ft}\end{aligned}$$

The hypotenuse is approximately 22.9 feet long.

### Example 2

Use trigonometric ratios to find the size of each angle and the missing length in the triangle below.



To find  $m\angle u$ , use the tangent ratio because you know the opposite (18 ft) and the adjacent (21 ft) sides.

$$\begin{aligned}\tan u^\circ &= \frac{18}{21} \\ m\angle u^\circ &= \tan^{-1} \frac{18}{21} \approx 40.601^\circ\end{aligned}$$

The measure of angle  $u$  is approximately  $40.6^\circ$ . By subtraction we know that  $m\angle v \approx 49.4^\circ$ .

Use the sine ratio for  $m\angle u$  and the opposite side and hypotenuse.

$$\begin{aligned}\sin 40.6^\circ &= \frac{18}{h} \\ h \sin 40.6^\circ &= 18 \\ h &= \frac{18}{\sin 40.6^\circ} \approx 27.659 \text{ ft}\end{aligned}$$

The hypotenuse is approximately 27.7 feet long.