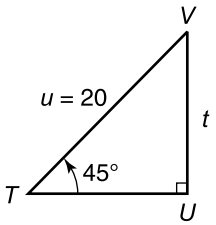
5-4

Study Guide

Applying Trigonometric Functions

Trigonometric functions can be used to solve problems involving right triangles.

Example 1 **If $T = 45°$ and $u = 20$, find t to the nearest tenth.**



From the figure, we know the measures of an angle and the hypotenuse. We want to know the measure of the side opposite the given angle. The sine function relates the side opposite the angle and the hypotenuse.

$\sin T = \frac{t}{u}$ $\quad$ *sin* $= \frac{\textit{side opposite}}{\textit{hypotenuse}}$

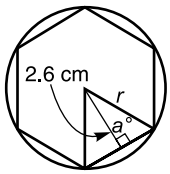
$\sin 45° = \frac{t}{20}$ $\quad$ *Substitute 45° for T and 20 for u.*

$20 \sin 45° = t$ $\quad$ *Multiply each side by 20.*

$14.14213562 \approx t$ $\quad$ *Use a calculator.*

Therefore, t is about 14.1.

Example 2 ***Geometry*** **The apothem of a regular polygon is the measure of a line segment from the center of the polygon to the midpoint of one of its sides. The apothem of a regular hexagon is 2.6 centimeters. Find the radius of the circle circumscribed about the hexagon to the nearest tenth.**



First draw a diagram. Let a be the angle measure formed by a radius and its adjacent apothem. The measure of a is $360° \div 12$ or $30°$. Now we know the measures of an angle and the side adjacent to the angle.

$\cos 30° = \frac{2.6}{r}$ $\quad$ *cos* $= \frac{\textit{side adjacent}}{\textit{hypotenuse}}$

$r \cos 30° = 2.6$ $\quad$ *Multiply each side by r.*

$r = \frac{2.6}{\cos 30°}$ $\quad$ *Divide each side by cos 30°.*

$r \approx 3.0022214$ $\quad$ *Use a calculator.*

Therefore, the radius is about 3.0 centimeters.