

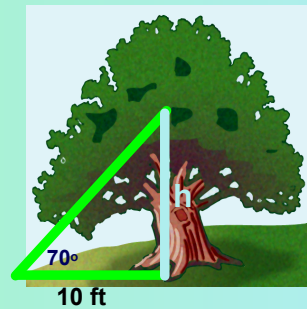
7.5 Apply the Tangent Ratio

Before You used congruent or similar triangles for indirect measurement.

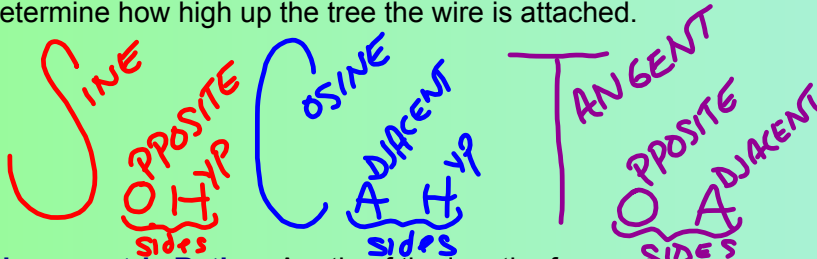
Now You will use the tangent ratio for indirect measurement.

Why? So you can find the height of a roller coaster, as in Ex. 32.

A wire supports a tree. The wire is staked into the ground 10 feet from the tree and it forms an angle of 70° with the tree.



In this lesson you will learn how to use the tangent ratio to determine how high up the tree the wire is attached.



Trigonometric Ratio: A ratio of the length of THE SIDES in a RIGHT triangle.

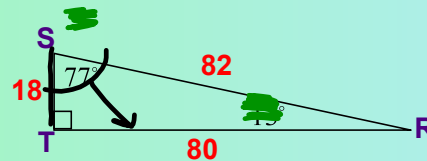
TANGENT RATIO: $\tan A = \frac{\text{Opposite}}{\text{Adjacent}}$

EXAMPLE 1: Finding Tangent Ratios

Find $\tan S$ and $\tan R$.

$\tan S = \frac{80}{18}$

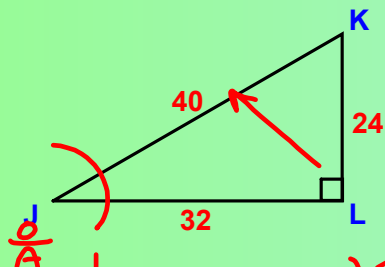
$\tan S = \frac{40}{9}$



Suppose: "S"
 Inverse $\tan^{-1}(\frac{40}{9}) \approx 77^\circ$ Angle Measure

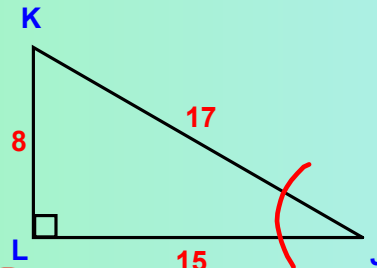
Guided Practice.

Find $\tan J$ and $\tan K$.



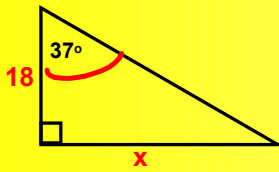
$\tan J = \frac{24}{32}$

$\tan J = \frac{3}{4}$



$\tan J = \frac{8}{15}$

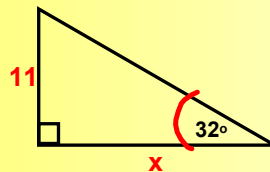
EXAMPLE 2: Find leg lengths.



$$18 \cdot \tan 37 = \frac{x}{18} \cdot 18$$

$$\boxed{18 \tan 37} = x$$

$$13.6 \approx x$$



$$x \cdot \tan 32 = \frac{11}{x} \cdot x$$

$$\frac{x \tan 32}{\tan 32} = \frac{11}{\tan 32}$$

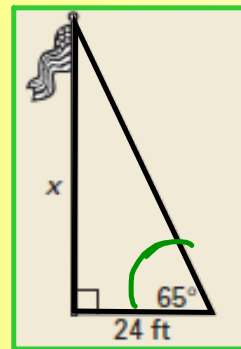
$$x \approx 17.6$$

EXAMPLE 3: Estimate heights using the tangents.

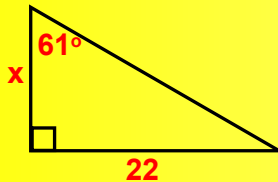
Find the height of the flagpole to the nearest foot.

$$24 \cdot \tan 65 = \frac{x}{24} \cdot 24$$

$$51.5' \approx x$$



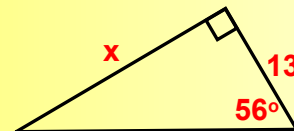
Guided Practice. Find the value of x. Round to the nearest tenth.



$$x \cdot \tan 61 = \frac{22}{x} \cdot x$$

$$\frac{x \tan 61}{\tan 61} = \frac{22}{\tan 61}$$

$$x \approx 12.2$$



$$13 \tan 56 = \frac{x}{13} \cdot 13$$

$$13 \tan 56 = x$$

$$19.3 \approx x$$