

Section 7.5: Apply the Tangent Ratio

Essential Question:

How can you find a leg of a right triangle when you know the other leg and one acute angle?

VOCABULARY:

Trigonometric Ratio

A ratio (fraction) of the lengths of two sides in a right triangle

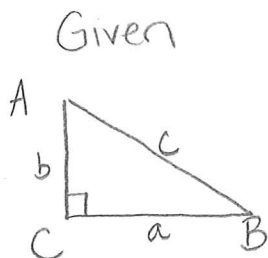
Tangent (tan)

In a right Δ , the tangent is the ratio of the leg lengths

Key Concept: Tangent Ratio

In a right triangle, the tangent (tan) of an acute angle is equal to the ratio of the length of the opposite side to the length of the adjacent side.

* $\angle A$ and $\angle B$ are acute \angle 's

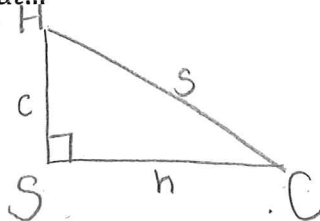


Given

$$\left. \begin{aligned} \tan A &= \frac{a}{b} \\ \tan B &= \frac{b}{a} \end{aligned} \right\} \tan \theta = \frac{\text{opp.}}{\text{adj.}}$$

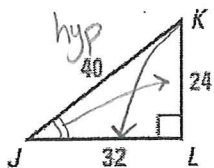
A1. Sketch ΔCHS such that...

$$\tan C = \frac{HS}{CS} \begin{matrix} \text{opposite} \\ \text{adjacent} \end{matrix}$$



A2. Find $\tan J$ and $\tan K$.

Write each answer as a simplified fraction and as a decimal rounded to the nearest hundredth.



$$\tan J = \frac{24}{32} \div 8$$

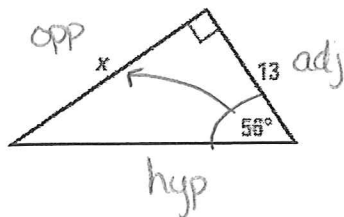
$$\boxed{\tan J = \frac{3}{4} = .75}$$

$$\tan K = \frac{32}{24} \div 8$$

$$\boxed{\tan K = \frac{4}{3} = 1.33}$$

A3. Find the value of x . Round to the nearest hundredth.

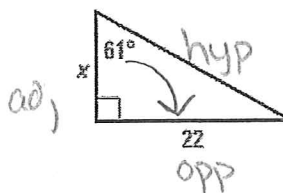
a.



$$\frac{\tan 56^\circ}{1} = \frac{x}{13}$$

$$x = \frac{13(\tan 56^\circ)}{1} = \boxed{19.27 \text{ un}}$$

b.



$$\frac{\tan 61^\circ}{1} = \frac{22}{x}$$

$$x = \frac{1(22)}{\tan 61^\circ} = \boxed{12.19 \text{ un}}$$

A4. Using the diagram, find the distance between you and your friend.

1st $\frac{\tan 42^\circ}{1} = \frac{780}{y}$

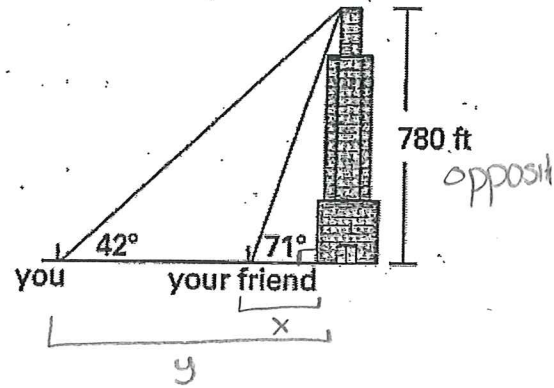
2nd $\frac{\tan 71^\circ}{1} = \frac{780}{x}$

$y = \frac{1(780)}{\tan 42^\circ}$

$x = \frac{1(780)}{\tan 71^\circ}$

$y = 866.28$

$x = 268.58$

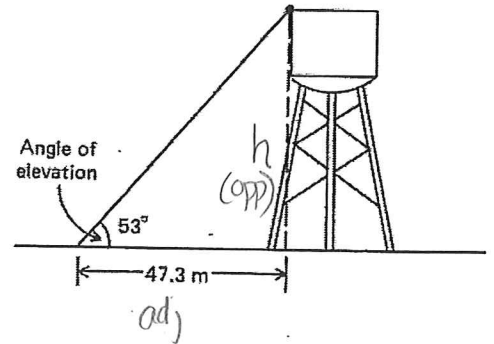


3rd Distance = $y - x = 866.28 - 268.58$
 $= 597.7$ feet

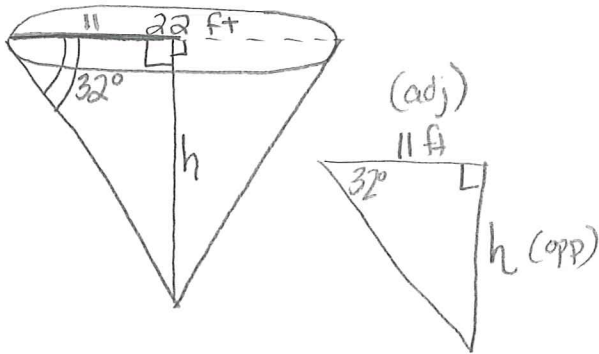
A5. Find the water tower's height indirectly due to your fear of heights.

$\frac{\tan 53^\circ}{1} = \frac{h}{47.3}$

$h = \frac{47.3 (\tan 53^\circ)}{1} = 62.77$ m



A6. Road salt is stored in a cone-shaped pile. The pile has a diameter of 22 ft and slope of 32°, find the height of the pile.



$\frac{\tan 32^\circ}{1} = \frac{h}{11}$

$h = \frac{11 (\tan 32^\circ)}{1}$

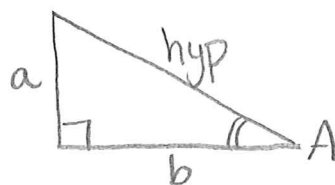
$h = 6.87$ feet

Section 7.5 Summary:

If you are given an acute angle and one leg of a right triangle you can find the length of the other leg by using the

tangent ratio.

$\tan(\text{angle}) = \frac{\text{opposite side}}{\text{adjacent side}}$



$\tan(A) = \frac{a}{b}$