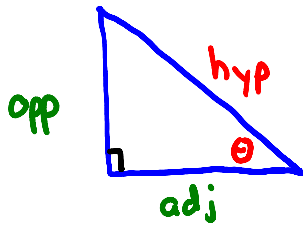


4.3 Right Triangle Trig

Monday, March 16, 2015
10:53 AM



θ is an acute \angle of a Rt Δ .

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \cos \theta = \frac{\text{adj}}{\text{hyp}} \quad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

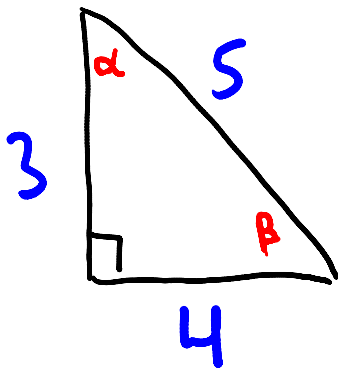
$$\csc \theta = \frac{\text{hyp}}{\text{opp}} \quad \sec \theta = \frac{\text{hyp}}{\text{adj}} \quad \cot \theta = \frac{\text{adj}}{\text{opp}}$$

Reciprocals of top 3 functions

You can use Rt Δ trig to solve for any missing sides or \angle measures

* If not stated, the side lengths you should round to the hundredths and the \angle measure round to the tenths.

Ex. 1 Write the trig ratios for $\angle \alpha$ and $\angle \beta$



α

$$\sin \alpha = \frac{4}{5}$$

$$\cos \alpha = \frac{3}{5}$$

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

$$\csc \alpha = \frac{5}{4}$$

$$\sec \alpha = \frac{5}{3}$$

$$\cot \alpha = \frac{3}{4}$$

β

$$\sin \beta = \frac{3}{5}$$

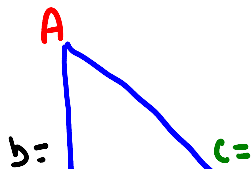
$$\cos \beta = \frac{4}{5}$$

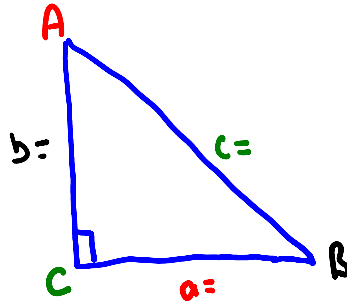
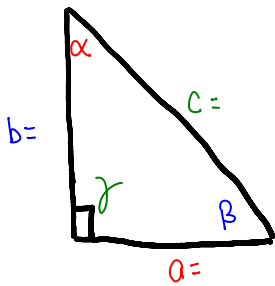
$$\tan \beta = \frac{3}{4}$$

$$\csc \beta = \frac{5}{3}$$

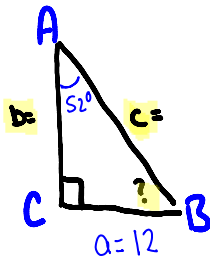
$$\sec \beta = \frac{5}{4}$$

$$\cot \beta = \frac{4}{3}$$





Ex. 2 Solve the right $\triangle ABC$ when: $m\angle A = 52^\circ$, $\overline{CB} = 12$ and $\angle C$ is the right angle.



$$\frac{m\angle B}{90^\circ - 52^\circ} = 38^\circ$$

* You must make sure you are in the correct mode!

* Use the info given to solve!

$$\frac{\text{Side } c}{\sin 52^\circ} = \frac{12}{c}$$

$$\frac{\text{Side } b}{\tan 52^\circ} = \frac{12}{b}$$

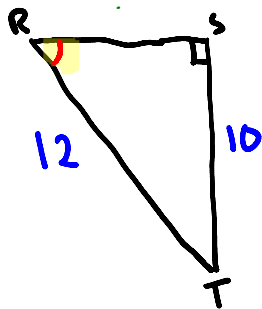
$$c \sin 52^\circ = 12$$

$$b = \frac{12}{\tan 52^\circ}$$

$$c = \frac{12}{\sin 52^\circ} \quad c \approx 15.23$$

$$b \approx 9.38$$

Ex. 3 In $\triangle RST$, determine the measure of $\angle R$.



$$m\angle R$$

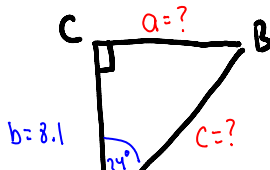
* To find any \angle measure press **2nd** "Trig function"

$$\sin R = \frac{10}{12}$$

$$\boxed{2nd} \quad \boxed{\sin} \rightarrow \sin^{-1}(10/12)$$

$$R \approx 56.4^\circ$$

Ex. 4 Solve for a, c , and $m\angle B$ if $m\angle A$ is 34° and $b = 8.1$ in



$$\frac{m\angle B}{90^\circ - 34^\circ} = 56^\circ$$



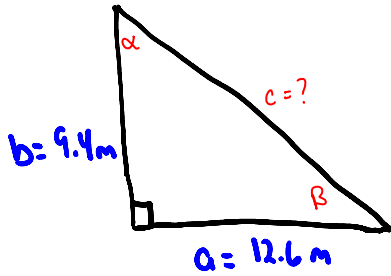
$$\frac{\text{side } c}{\cos 34} = \frac{8.1}{1}$$

$$c \approx 9.77 \text{ in}$$

$$\frac{\text{side } a}{\tan 34} = \frac{8.1}{1}$$

$$a \approx 5.46 \text{ in}$$

Ex. 5 Solve the Rt Δ.



$$\begin{aligned} \frac{\text{side } c}{(12.6)^2 + (9.4)^2 &= c^2 \\ c^2 &= 247.12 \\ c &\approx 15.72 \text{ m} \end{aligned}$$

$$\frac{m \angle \alpha}{\tan \alpha} = \frac{12.6}{9.4}$$

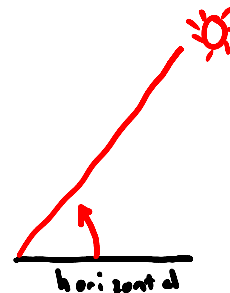
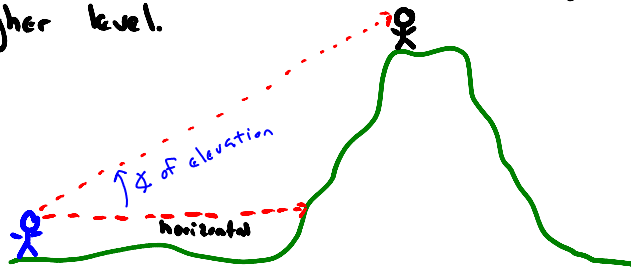
$$\begin{aligned} \tan^{-1}(12.6/9.4) \\ \alpha &\approx 53.3^\circ \end{aligned}$$

$$\frac{m \angle \beta}{\tan \beta} = \frac{9.4}{12.6}$$

$$\begin{aligned} \tan^{-1}(9.4/12.6) \\ \beta &\approx 36.7^\circ \end{aligned}$$

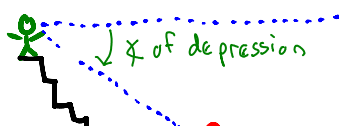
Angle of Elevation

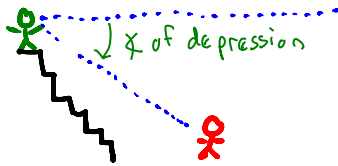
Is the angle between a horizontal line and the line of sight of an observer to an object at a higher level.



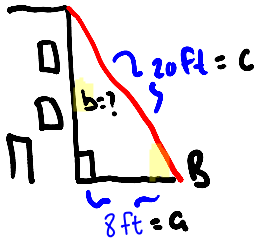
Angle of Depression

The angle between a horizontal line and the line of sight of an observer to an object at a lower level.





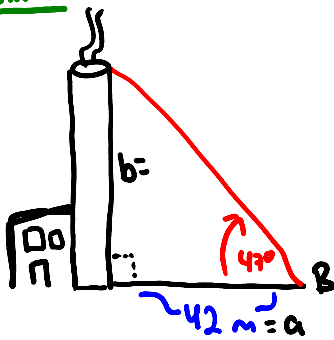
Ex. 6



Side b
 $(8)^2 + b^2 = (20)^2$
 $b^2 = 336$
 $b \approx 18.33 \text{ ft}$

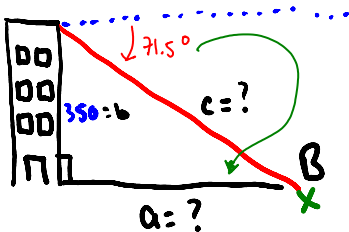
M & B
 $\cos B = \frac{8}{20}$
 $B = 66.4^\circ$

Ex. 7



Side b
 $\tan 47^\circ = \frac{b}{42}$
 $b \approx 45.04 \text{ m}$

Ex. 8



alternate interior angles

Side c
 $\sin 71.5^\circ = \frac{350}{c}$
 $c = \frac{350}{\sin 71.5^\circ}$

Side a
 $\tan 71.5^\circ = \frac{350}{a}$
 $a = \frac{350}{\tan 71.5^\circ}$

$c \approx 369.07 \text{ ft}$

$a \approx 117.11 \text{ ft}$

Ex. 9



