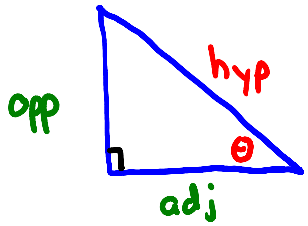
4.3 Right Triangle Trig

Monday, March 16, 2015
10:53 AM



θ is an acute ∠ of a Rt △.

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

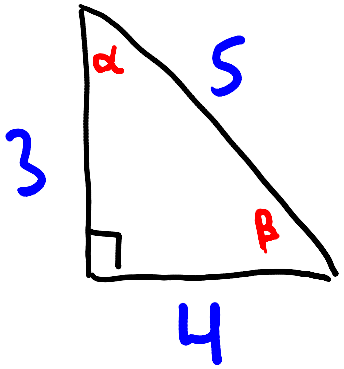
$\csc\theta = \frac{hyp}{opp}$ $\sec\theta = \frac{hyp}{adj}$ $\cot\theta = \frac{adj}{opp}$

Reciprocals of top 3 functions

You can use Rt △ trig to solve for any missing sides or ∠ measures.

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

Ex. 1 Write the trig ratios for ∠α and ∠β

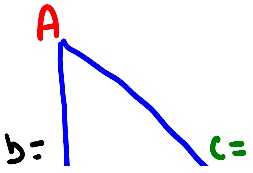


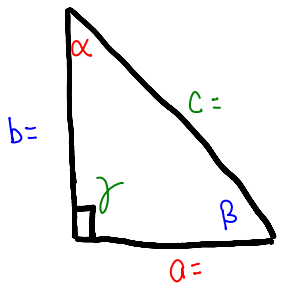
α

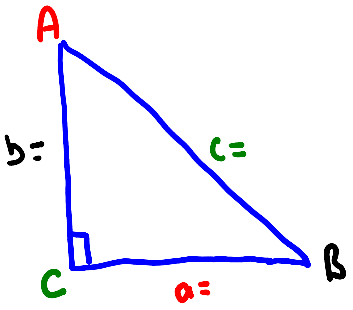
$\sin\alpha = 4/5$
$\cos\alpha = 3/5$
$\tan\alpha = 4/3$
$\csc\alpha = 5/4$
$\sec\alpha = 5/3$
$\cot\alpha = 3/4$

β

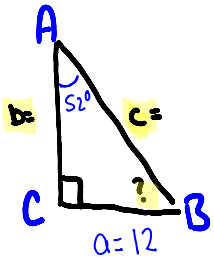
$\sin\beta = 3/5$
$\cos\beta = 4/5$
$\tan\beta = 3/4$
$\csc\beta = 5/3$
$\sec\beta = 5/4$
$\cot\beta = 4/3$







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



$m\angle B$

$90° - 52°$

$38°$

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

* Use the info given to solve!

Side c

$\sin 52° = \frac{12}{c}$

$c \sin 52° = 12$

$c = \frac{12}{\sin 52°}$

$c \approx 15.23$

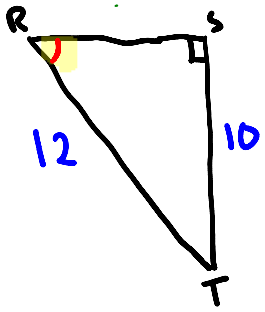
Side b

$\tan 52° = \frac{12}{b}$

$b = \frac{12}{\tan 52°}$

$b \approx 9.39$

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



$m\angle R$

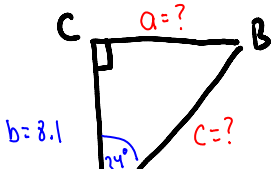
$\sin R = \frac{10}{12}$

2nd Sin → $\sin^{-1}(10/12)$

$R \approx 56.4°$

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

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



$m\angle B$

$90° - 34° = 56°$

side c

$\cos 34 = \frac{3.1}{c}$

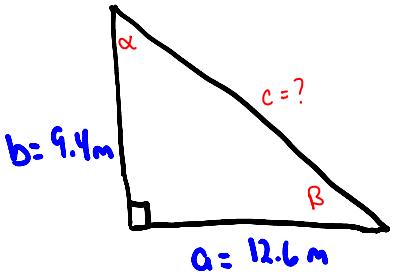
$c \approx 9.77$ in

side a

$\tan 34 = \frac{a}{3.1}$

$a \approx 5.46$ in

Ex. 5 Solve the Rt Δ.



side c

$(12.6)^2 + (9.4)^2 = c^2$

$c^2 = 247.12$

$c \approx 15.72$ m

m∠α

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

$\tan^{-1}(12.6/9.4)$

$\alpha = 53.3^\circ$

m∠β

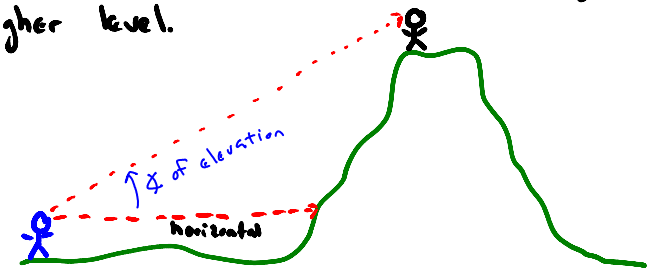
$\tan\beta = \frac{9.4}{12.6}$

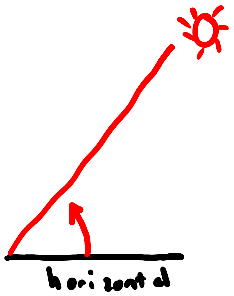
$\tan^{-1}(9.4/12.6)$

$\beta \approx 36.7^\circ$

Angle of Elevation

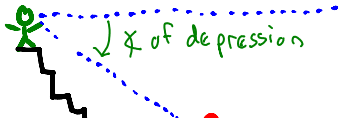
Is the angle between a horizontal line and the line of sight of an observer to an object at a higher level.

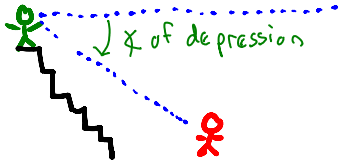




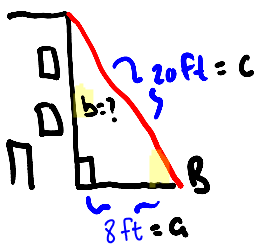
Angle of Depression

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

$(8)^2 + b^2 = (20)^2$

$b^2 = 336$

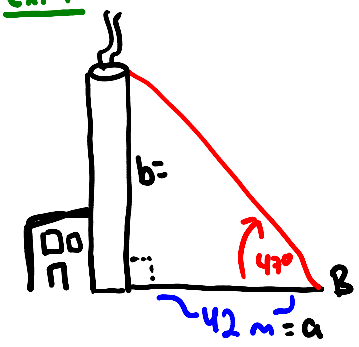
$b \approx 18.33$ ft

m∠B

$\cos B = \frac{8}{20}$

$B = 66.4°$

Ex. 7

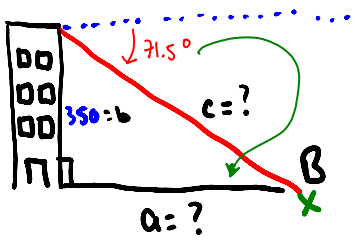


Side b

$\tan 47° = \frac{b}{42}$

$b \approx 45.04$ m

Ex. 8



alternate interior angles

Side c

$\sin 71.5° = \frac{350}{c}$

$c = \frac{350}{\sin 71.5°}$

$c \approx 369.07$ ft

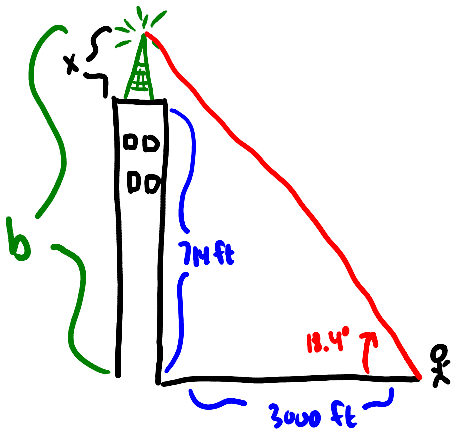
Side a

$\tan 71.5° = \frac{350}{a}$

$a = \frac{350}{\tan 71.5}$

$a \approx 117.11$ ft

Ex. 9



$\tan 18.4 = \frac{b}{3000}$

$b = 3000 \tan 18.4$

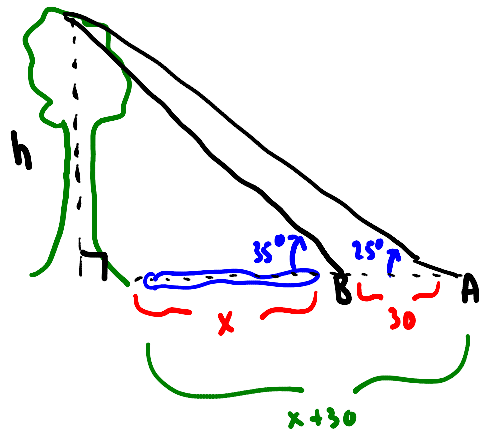
$b \approx 997.97$ ft

TV Tower

$997.97 - 714$

283.97 ft

Ex. 10



$\tan 35° = \frac{h}{x}$ $\quad \tan 25° = \frac{h}{x+30}$

$x \tan 35° = h$ $\quad h = (x+30)\tan 25$

$x \tan 35 = x \tan 25 + 30 \tan 25$

$-x \tan 25 \quad -x \tan 25$

$x \tan 35 - x \tan 25 = 30 \tan 25$

$x(\tan 35 - \tan 25) = 30 \tan 25$

$x = \frac{30 \tan 25}{(\tan 35 - \tan 25)}$

$x \approx 59.81$ m

$59.81 \tan 35 = h$

$h \approx 41.88$ m