

Solving Right Triangles

01/08/16

Triangle Sum theorem

the sum of the measure of the angles in a triangle is 180°

Pythagorean Theorem

In a right triangle with legs a , b and hypotenuse c , $a^2 + b^2 = c^2$

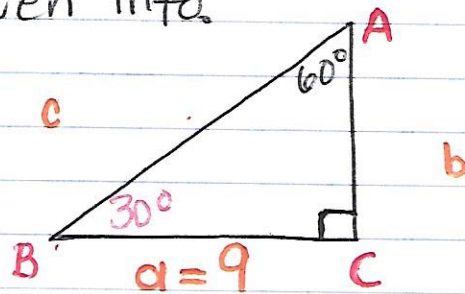
Angle & side

Ex 1

Solve for all sides and angles with the given info.

Angles-Capitalized

Sides-lowe case



$\angle A = 60^\circ$ $a = 9$
 $\angle B = 30^\circ$ $b = 5.19$
 $\angle C = 90^\circ$ $c = 10.39$

$\angle B$

$180 - 60^\circ - 90^\circ$

$\angle B = 30^\circ$

side b

$\tan 30^\circ = \frac{\text{opp}}{\text{adj}}$

$(a) \tan 30^\circ = \frac{b}{9}$

$5.1962 \approx b$

side C

$\sin 60^\circ = \frac{\text{opp}}{\text{hyp}}$

$(c) \sin 60^\circ = \frac{9}{c}$

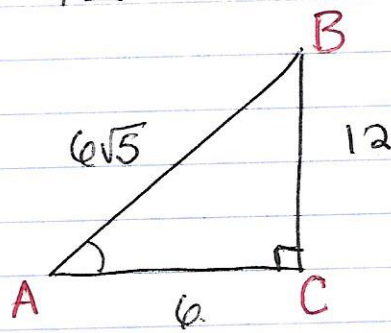
$c \cdot \frac{\sin 60^\circ}{\sin 60^\circ} = \frac{9}{\sin 60^\circ}$

$c \approx 10.3923$

Ex 2

a = 12 b = 6

2 sides



$\angle A = 63.4342^\circ$	$a = 12$
$\angle B = 26.5651^\circ$	$b = 6$
$\angle C = 90^\circ$	$c = 6\sqrt{5}$

Side C

$$a^2 + b^2 = c^2$$

$$12^2 + 6^2 = c^2$$

$$\sqrt{180} = c$$

$$\sqrt{36 \cdot 5} = \sqrt{c^2}$$

$$6\sqrt{5} = c$$

$\angle A$

$$\tan A = \frac{\text{opp}}{\text{adj.}}$$

$$\tan A = \frac{12}{6}$$

$$\tan A = 2$$

$$A = \tan^{-1}(2)$$

$$\angle A = 63.4349^\circ$$

$\angle B$

$$180^\circ = 90^\circ$$

$$+ 63.434^\circ$$

$$+ \angle C$$

$$\angle B = 26.565^\circ$$

Angle of
Elevation

Angle of
Depression

Side C

$$a^2 + b^2 = c^2$$

$$12^2 + 6^2 = c^2$$

$$\sqrt{180} = c$$

LA

$$\tan A = \frac{\text{opp}}{\text{adj}}$$

LB

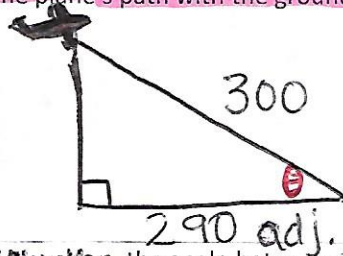
$$180^\circ = 90^\circ$$

$$+ 63.4349$$

$$+ 26$$

$$= 26.5651$$

A pilot starts descending toward an airport when they are a horizontal distance from the airport of 290 miles. If the plane travels 300 miles on its descent, what is the angle of the plane's path with the ground?

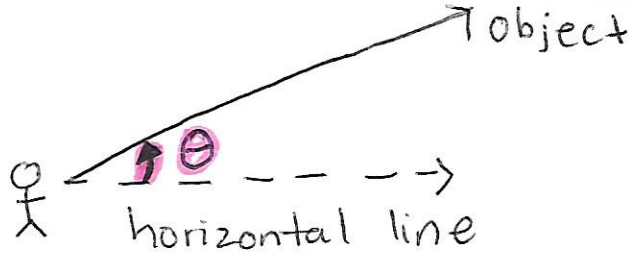


$$\cos \theta = \frac{290}{300}$$

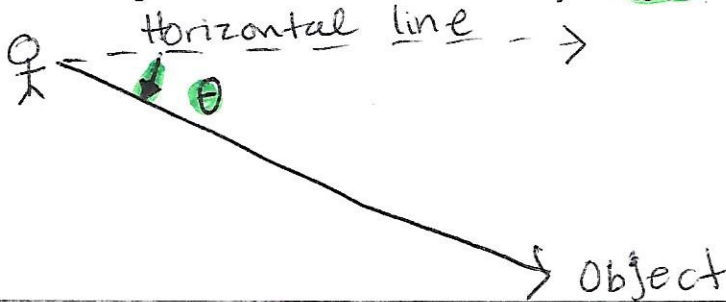
$$\theta = \cos^{-1}\left(\frac{290}{300}\right)$$

$$\theta = 14.8351^\circ$$

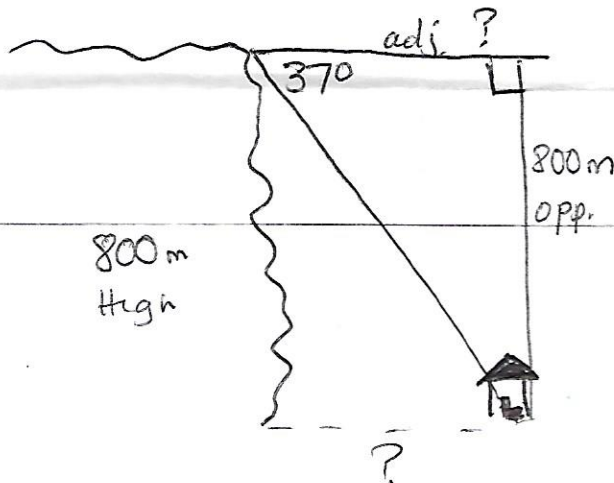
Angle of Elevation - the angle between the horizontal line and object is **above** the horizontal line.



Angle of Depression - the angle between the horizontal line and object is **below** the horizontal line.



The angle of Depression from the top of a cliff, 800m high, to the base of a log cabin is 37° . How far is the cabin from the foot of the cliff?



$$\tan 37^\circ = \frac{800}{?}$$

$$? = \frac{800}{\tan 37^\circ}$$

$$? = 1061.64\text{m}$$