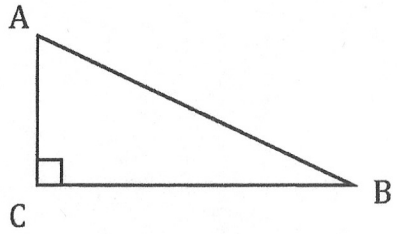
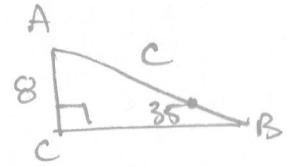
Solving Right Triangles with Trig Ratios



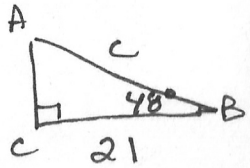
Examples

1) If $B = 35°$ and $b = 8$, find $c =$ 13.9



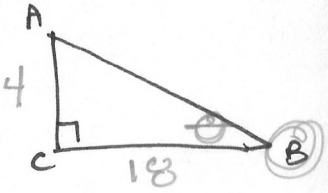
$\sin 35° = \frac{8}{c}$ $\quad c = \frac{8}{\sin 35}$

2) If $a = 21$ and $B = 48°$, find $c =$ 31.4



$\cos 48° = \frac{21}{c}$ $\quad c = \frac{21}{\cos 48}$

3) If $b = 14$ and $a = 18$, find $B =$ 38°



$\tan\theta = \frac{14}{18}$ $\quad \tan^{-1}\left(\frac{14}{18}\right)$

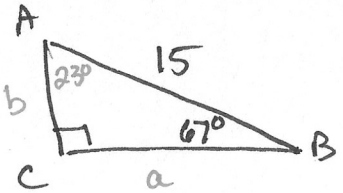
Solve the Right Triangle

↪ means find all missing values

4) $c = 15$ and $B = 67°$

90-67

A = 23°	a = 5.9
B = 67°	b = 13.8
C = 90°	c = 15

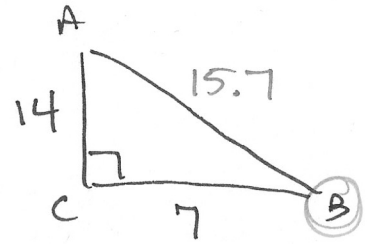


$15^2 - (13.8)^2$ $\quad \sin 67 = \frac{b}{15}$ $\quad \cos 67 = \frac{a}{15}$

5) $a = 7$ and $b = 14$

90-63

A = 27°	a = 7
B = 63°	b = 14
C = 90°	c = 15.7



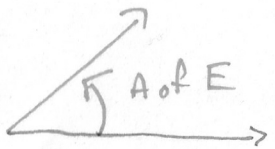
$14^2 + 7^2$

$\sin B = \frac{14}{15.7}$

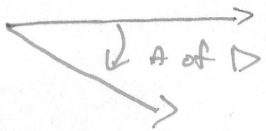
$B = \sin^{-1}\left(\frac{14}{15.7}\right)$

Angle of Elevation vs Angle of Depression

∠ of elevation: the angle created by going upward from a horizontal line.



∠ of Depression: the angle created by going downward from a horizontal line.



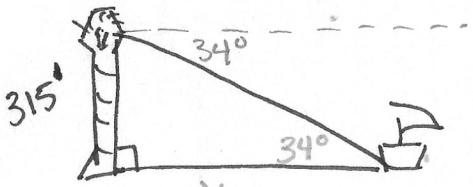
Word Problems

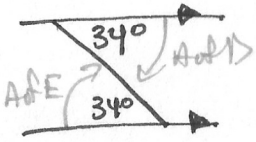
6) At a point on the ground 65 feet from the foot of a tree, the angle of elevation to the top of tree is 27°. Find the height of the tree.

$\tan 27° = \frac{x}{65}$

$x = 33.1$ ft

7) From the top of a lighthouse 315 feet high, the angle of depression ~~of~~ to a boat is 34°. Find the distance from the boat to the bottom of the lighthouse. The lighthouse is built at sea level.





$x = 467$ ft

$\tan 34° = \frac{315}{x}$

$x = \frac{315}{\tan 34}$

8) A cliff is 112 meters above the sea level. From the cliff, the angle of depression to a boat is 13°. To the nearest meter, how far is the boat from the base of the cliff.