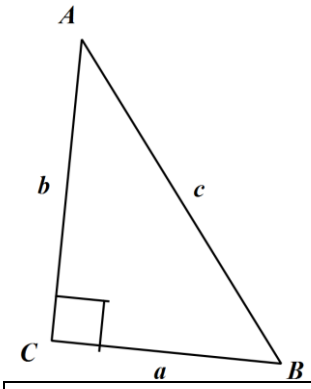
7.6

Date: 2/6/24

Objective: I can use right triangle trig, law of sines and law of cosines in real-world situations.

A. Right Triangle Reminders



1. Right triangle trigonometric functions:

to find side

$\sin\theta = \frac{o}{h}$ SOH

$\cos\theta = \frac{a}{h}$ CAH

$\tan\theta = \frac{o}{a}$ TOA

2. How to solve for a side if given 2 sides:

Pythag thm

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

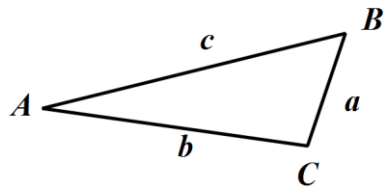
3. How to find an angle: inverse trig

$\sin^{-1}\left(\frac{o}{h}\right) = \theta$

$\cos^{-1}\left(\frac{a}{h}\right) = \theta$

$\tan^{-1}\left(\frac{o}{a}\right) = \theta$

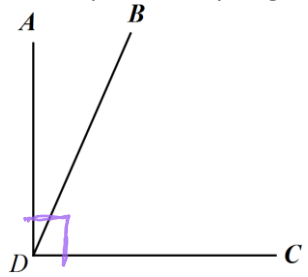
B. Information on all triangles



1. Triangle Sum Theorem:

angles add to 180°

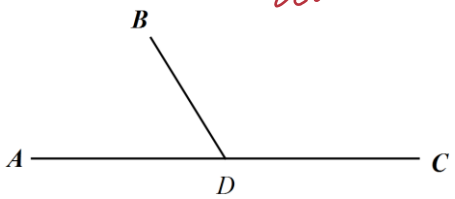
2. Complementary Angles:



add to 90°

3. Supplementary Angles:

add to 180°



4. How to solve if given AAS, ASA, ASS:

law of sines

$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

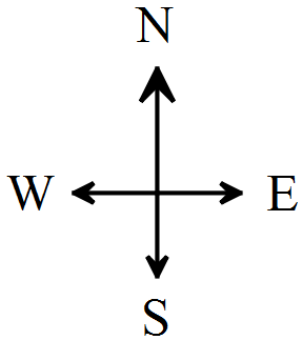
5. How to solve if given SAS, SSS:

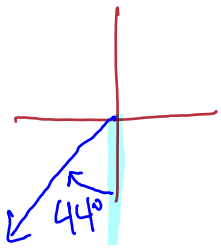
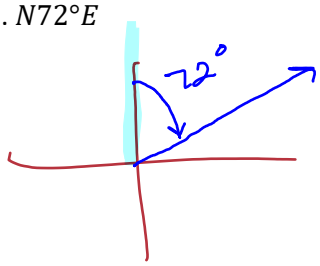
law of cosines

$a^2 = b^2 + c^2 - 2bc\cos A$

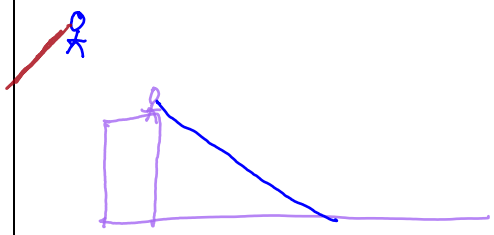
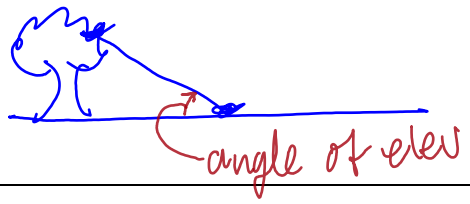
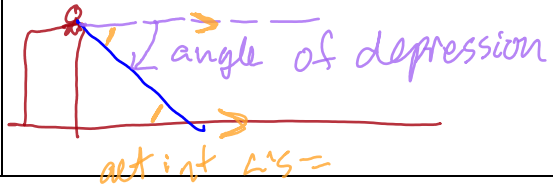
C. Directions

Vocabulary: Bearing, heading, in the direction of



1. $S44°W$	2. $N72°E$
	

D. Descriptions of angles and variables

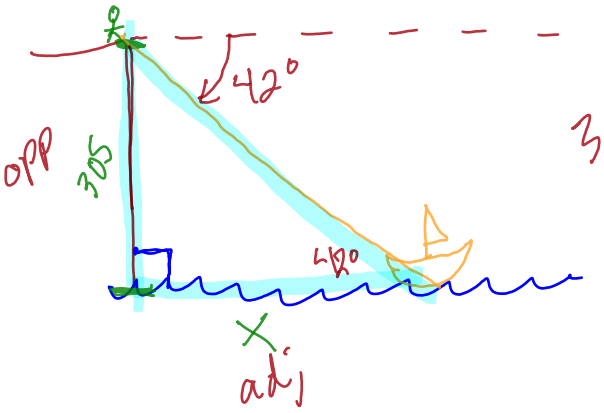
1. Define your variables:	2. Line of sight:
x= question	
3. Angle of Elevation: ground up 	4. Angle of depression: horizon down 

E. DRAW pictures!!!!!!!

Example 1

You are standing on top of a cliff 305 feet above a lake after a hike. The measurement of the angle of depression to a boat on the lake is 42°. How far is the boat from the base of the cliff? =x

x = distance of cliff to boat



$\tan 42^\circ = \frac{305}{x}$

$\frac{\text{calc}}{305} = \tan(42)$

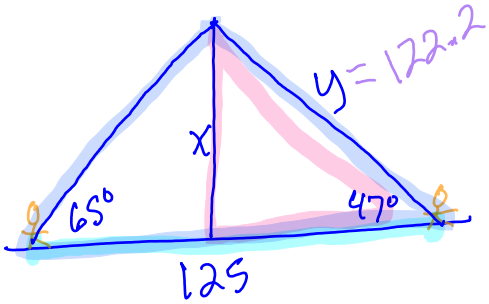
$305\left(\frac{1}{\tan 42^\circ} = \frac{x}{305}\right)$

$x \approx 338.7$ ft

Example 2

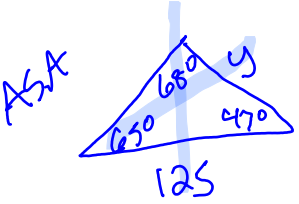
Two tourists are 125 feet apart on opposite sides of a monument. The angles of elevation from the tourists to the top of the monument are 47° and 65°. Find the height of the monument to the nearest foot. =x

y = distance from top of monument to 47° tourist



$\left(\sin 47^\circ = \frac{x}{122.2}\right)122.2$

$x \approx 89$ ft



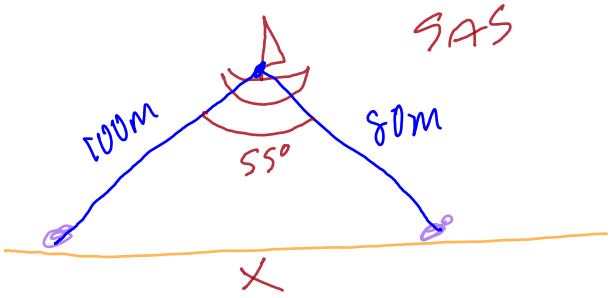
$\left(\frac{125}{\sin 68^\circ} = \frac{y}{\sin 65^\circ}\right)\sin 65^\circ$

$y \approx 122.2$ ft

Example 3

The distances from a boat to two seagulls on the shore are 100m and 80m respectively. If the angle between the two lines of sight is 55°, how far would one seagull have to walk to meet the other seagull?

x = distance between seagulls



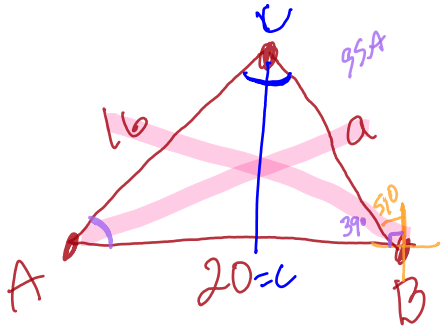
$x = \sqrt{100^2 + 80^2 - 2(100)(80)\cos 55^\circ}$

$x \approx 85.0\text{ m}$

Example 4

Observatory B is 20 miles east of observatory A in the middle of the dessert. A car leaves A and drives 16 miles towards a meteor sighting. At this time, it is sighted from B. If the car is N51°W from observatory B, how far from observatory B is the car? Round your answer to the nearest tenth of a mile.

a



$180° - 39° = 51.9° = A = 89.1°$

$\left(\frac{\sin C}{20} = \frac{\sin 39^\circ}{16}\right) 20$

$\sin^{-1}\left(\frac{20\sin 39^\circ}{16}\right) = C$

$C = 51.9^\circ$

$\left(\frac{a}{\sin 89.1^\circ} = \frac{16}{\sin 39^\circ}\right) \sin 89.1^\circ$

$a \approx 25.4\text{ mi}$