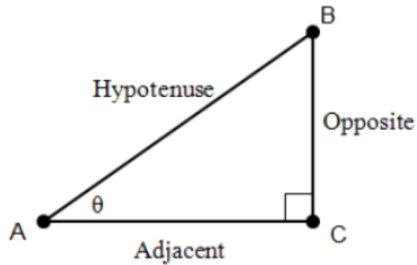# Math 3 - Trigonometry in Real Life Notes

In this section, we will combine everything we know about trig functions to solve real world problems. Review all the formulas you have learned so far:

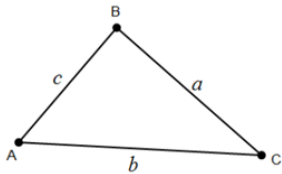Given a Right Triangle ΔABC, recall your right triangle trig ratios:

$$\textbf{sine }(\theta) = \sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\textbf{cosine }(\theta) = \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\textbf{tangent }(\theta) = \tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

Given ΔABC that is not a right triangle:

Area of a Triangle	**Law of Sines**	**Law of Cosines**
$\text{Area} = \dfrac{1}{2}bc(\sin A)$ $\text{Area} = \dfrac{1}{2}ac(\sin B)$ $\text{Area} = \dfrac{1}{2}ab(\sin C)$	$\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$ $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$	$a^2 = b^2 + c^2 - 2bc\cos A$ $b^2 = a^2 + c^2 - 2ac\cos B$ $c^2 = a^2 + b^2 - 2ab\cos C$

Other helpful bits of information to recall

- Complimentary angles add up to 90⁰ (form a right angle)
- Supplementary angles add up to 180⁰ (form a straight angle or straight line)
- **ALL** triangles' 3 interior angles add up to 180⁰
- Word problems are **ALWAYS** easier when you draw and label a picture

Examples:

1. Two airplanes leave an airport at the same time on different runways. One flies on a bearing of N57°E (57° east of north) at 320 miles per hour. The other airplane flies on a bearing of S23°E (23° east of south) at 310 miles per hour. How far apart will the airplanes be after 1.5 hours?

2. Two ships leave a harbor at the same time. One ship travels on a bearing of N14°E at 12 miles per hour. The other ship travels on a bearing of S74°W at 9 miles per hour. To the nearest tenth of a mile, how far apart will the ships be after three hours?

3. Two observers are 450 feet apart on opposite sides of a flagpole. The angles of elevation from the observers to the top of the pole are 23^0 and 25^0. Find the height of the flagpole to the nearest foot.

4. The FCC is attempting to locate an illegal radio station. It sets up two monitoring stations, A and B, with station B 30 miles east of station A. Station A measures the illegal signal from the radio station as coming from a direction of 42^0 east of north. Station B measures the signal as coming from a point 40^0 west of north. How far is the illegal radio station from monitoring stations A and B?