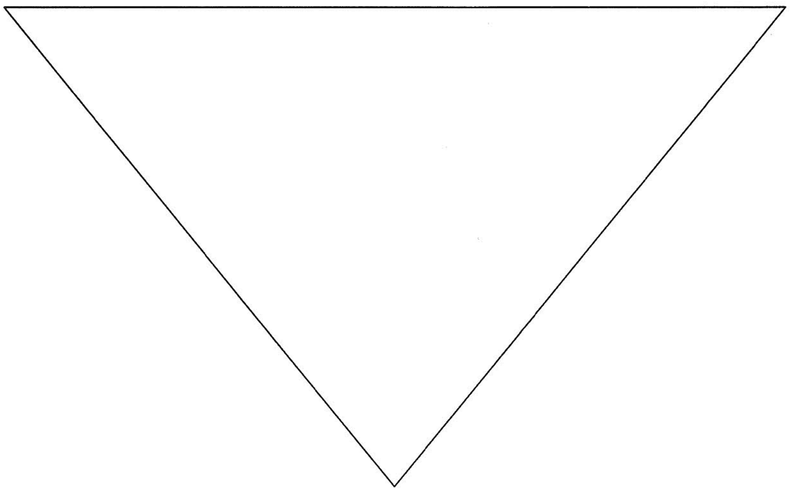
LAW OF SINES

- **If none of the angles of a triangle is a right angle, the triangle is called oblique.**
- **To solve an oblique triangle means to find the lengths of its sides and the measurements of its angles.**
- **The Law of Sines is used to solve triangles:**

<u>LAW OF SINES</u>

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



Example#1
Given 2 angles and 1 side, find the missing angle and sides:

$$m\angle B = 78°, m\angle C = 80°, b = 17$$

Example#2

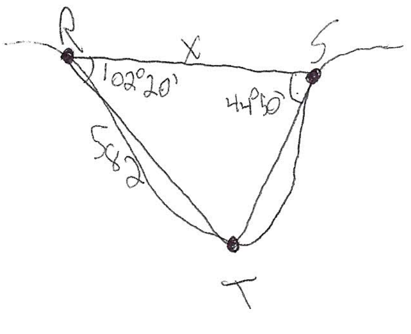
Given 1 angle and 2 sides, find the missing angles and side:

$b=96,\ c=45,\ m\angle B=49^\circ$

Use the Law of Sines and the Law of Cosines to answer the following application problems.

1. To find the distance AB across a river, a distance BC=354m is measured off on one side of the river. It is found that $m\angle BCA = 15°20'$ and $m\angle BAC = 52°30'$. Find AB.

2. To determine the distance RS across a deep canyon, Joanna measures a distance to the bottom of the canyon TR=582 yds. She can see the bottom of the canyon at a $102°20'$ angle of depression. Joanna also measured the angle of depression from the other side of the canyon which is $44°50'$. Find distance RS across the canyon.



$160-\left(102+\frac{20}{60}\right)-\left(44+\frac{50}{60}\right)$

$32°50'$

$$\frac{\sin(32°50')}{X} = \frac{\sin(44°50')}{582}$$

X = 447.6 yards

Trigonometry
Law of Sines and Cosines/ Area of a Triangle

Name Austen Gumber

LAW OF SINES

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

Solve for all the missing sides and angles in each triangle.
Round answers to 4 significant digits.

1. $m\angle B = 78°,\ m\angle C = 80°,\ b = 17$

2. $a = 30,\ m\angle A = 90°,\ m\angle B = 60°$

3. $a = 29,\ m\angle A = 40°,\ m\angle B = 101°$

4. $b = 12,\ m\angle B = 60°,\ m\angle C = 60°$

5. $b = 96,\ c = 45,\ m\angle B = 49°$

6. $b = 8,\ c = 9,\ m\angle C = 65°$

7. $b = 5,\ c = 12,\ m\angle C = 39°$

APPLICATIONS OF LAW OF SINES NAME Austen Grimber

Draw a picture to represent each situation and solve using Law of Sines.

1. Juan and Pierre are standing at the seashore 10 miles apart. The coastline is a straight line between them. Both can see the same ship in the water. The angle between the coastline and the line between the ship and Juan is 35 degrees. The angle between the coastline and the line between the ship and Pierre is 45 degrees. How far is the ship from Juan?

2. Jack is on one side of a 200-foot-wide canyon and Jill is on the other. Jack can see a trail guide at the bottom of the canyon at a $68°15'$ angle of depression while Jill sees him at a $65°40'$ angle of depression. How far is Jack from the trail guide?

3. Airplane A is flying directly toward the airport which is 20 miles away. The pilot notices airplane B 45 degrees to her right. Airplane B is also flying directly toward the airport. The pilot of airplane B calculates that airplane A is 50 degrees to his left. Based on that information, how far is airplane B from the airport?

4. The bearing of a lighthouse from a ship was found to be $N37°E$. After the ship sailed 2.5 miles due south, the bearing from the ship's new location to the lighthouse was $N25°E$. Find the distance between the ship and the lighthouse at each location. (Hint draw a picture. Use the fact that there are $180°$ in a straight line to find an angle measure inside the triangle.)