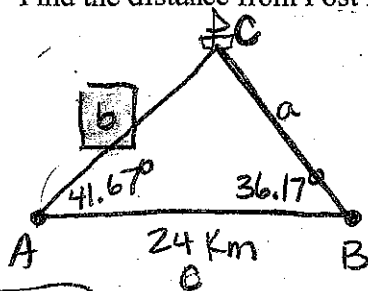


Draw a picture and solve.

**Example 1:** A boat in distress at sea is sighted from two coast guard observation posts, A and B, on the shore. The angle at post A formed by lines of sight to post B and the boat is  $41.67^\circ$ . The angle at post B formed by the lines of sight to post A and the boat is  $36.17^\circ$ . The distance from Post A to Post B is 24 km. Find the distance from Post A to the boat.



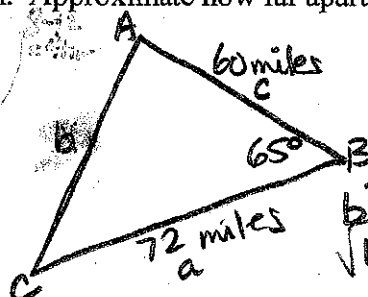
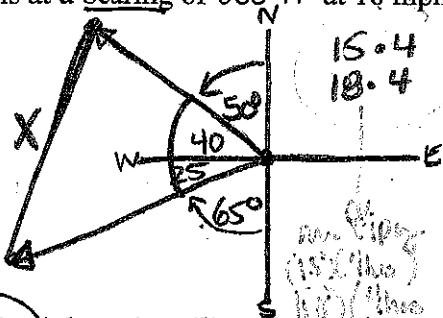
$A = 41.67$  ~~WAW~~  
 $B = 36.17$   $b =$      
 $C = 102.16$   $c = 24$

$$\frac{\sin 102.16}{24} = \frac{\sin 36.17}{b}$$

$$\frac{b \sin 102.16}{\sin 102.16} = \frac{24 \sin 36.17}{\sin 102.16}$$

$b = 14.5 \text{ km}$

**Example 2:** Two ships leave a port at 8:00 AM. One travels at a bearing of  $N50^\circ W$  at 15 mph and the other travels at a bearing of  $S65^\circ W$  at 18 mph. Approximate how far apart they are at noon that day.



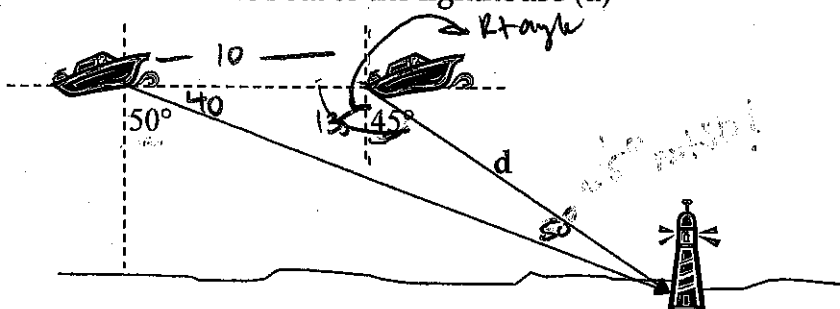
$A =$      $a = 72$   
 $B = 65$   $b =$      
 $C =$      $c = 60$

$$b^2 = 72^2 + 60^2 - 2(72)(60)\cos 65$$

$$\sqrt{b^2} = \sqrt{5132.58}$$

$b = 71.64 \text{ miles}$

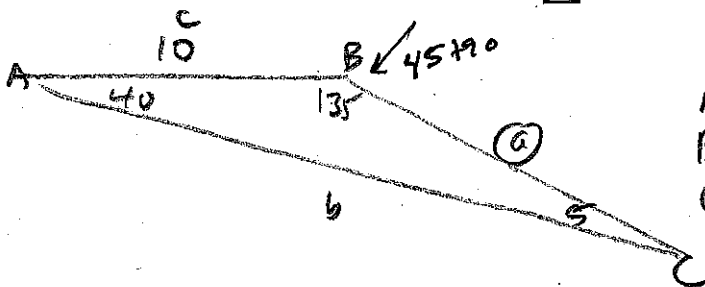
**Example 3:** A boat is sailing due east parallel to the shoreline. At a given time the bearing to the lighthouse is  $S 50^\circ E$ . The boat travels 10 miles and the bearing is now  $S 45^\circ E$ . Find the distance from the boat to the lighthouse (d)



$$\frac{\sin 5}{10} = \frac{\sin 40}{a}$$

$$\frac{a \sin 5}{\sin 5} = \frac{10 \sin 40}{\sin 5}$$

$a = 73.8 \text{ miles}$



$A = 40$   $a =$      
 $B = 135$  ~~WAW~~  
 $C = 5$   $c = 10$

Draw a picture and solve.

\* Must find the largest side first on SSS

1. A piece of sheet metal is to be cut using a blowtorch so that it forms a triangle with the side-lengths of 6 feet, 5 feet, and 9 feet. Find the measures of the angles.

$$\frac{\sin 109.5}{9} = \frac{\sin B}{6}$$



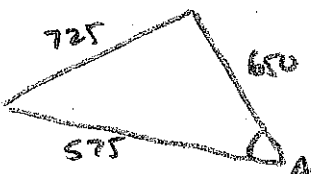
$$9^2 = 6^2 + 6^2 - 2(6)(6)\cos C$$

$$81 = 61 - 60\cos C$$

$$20 = -60\cos C$$

$A = 31.6$   
 $B = 38.9$   
 $C = 109.5$

2. A triangular parcel of ground has sides of lengths 725 feet, 650 feet, 575 feet. Find the measure of the largest angle.



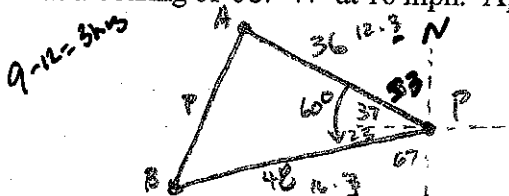
$$725^2 = 650^2 + 575^2 - 2(650)(575)\cos A$$

$$-227500 = -747500\cos A$$

$$.30434 = \cos A$$

$72.3^\circ$

4. Two ships leave a port at 9:00AM. One travels at a bearing of N53°W at 12 mph and the other travels at a bearing of S67°W at 16 mph. Approximate how far apart they are at noon that day.



$$p^2 = 36^2 + 48^2 - 2(36)(48)\cos 60$$

$$p^2 = 1872$$

$$p = 43.3$$

$43.3$  miles

5. Two rangers, one at Station A and one at Station B, observe a fire in the forest. The angle at Station A formed by the lines of sight to Station B and to the fire is 65.23°. The angle at Station B formed by the lines of sight to Station A and to the fire is 56.47°. The stations are 10 km apart.

- a. How far from Station A is the fire?  $9.8$  km  
 b. How far from Station B is the fire?  $10.7$  km



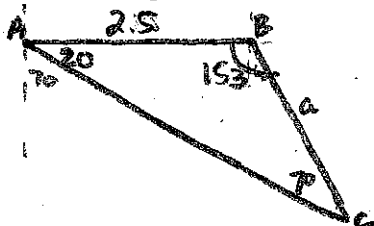
$$\frac{\sin 56.47}{10} = \frac{\sin 65.23}{a}$$

to station B

$$\frac{\sin 65.23}{10} = \frac{\sin 56.47}{b}$$

to station A

6. A boat is sailing due east parallel to the given shoreline at a speed of 10 mph. At a given time the bearing to the lighthouse is S70°E, and 15 minutes later the bearing is S63°E. Find the distance from the boat to the lighthouse.

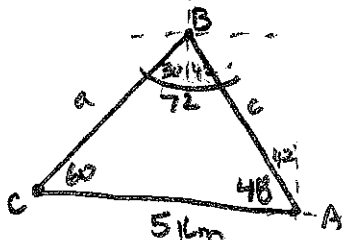


$$\frac{\sin 7^\circ}{2.5} = \frac{\sin 20^\circ}{a}$$

$$\frac{a \sin 7^\circ}{\sin 7^\circ} = \frac{2.5 \sin 20^\circ}{\sin 7^\circ}$$

$7.02$  miles

7. The course for a boat race starts at point A and proceeds in the direction N42°W to point B, then in the direction S30°W to point C, and finally back to A. Point C lies 5 km directly west of point A. Approximate the total distance of the race course.



$$\frac{\sin 72}{5} = \frac{\sin 48}{a}$$

$$a = 3.9$$

$$\frac{\sin 72}{5} = \frac{\sin 60}{c}$$

$$c = 4.6$$

$$3.9 + 4.6 + 5 =$$

$13.5$  km

