

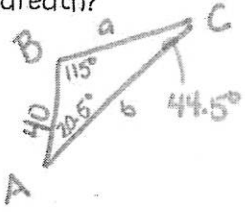
Precalculus

Applications - Sec 6.1

Name Key

For each of the following draw a diagram to represent the situation and solve.

1. Two lighthouses at points A and B are 40 kilometers apart. Each has visual contact with a freighter at point C. If the $m\angle CAB = 20.5^\circ$ and $m\angle CBA = 115^\circ$, how far is the freighter from A to the nearest hundredth?

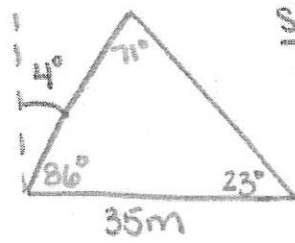


$$\frac{\sin 115^\circ}{b} = \frac{\sin 44.5^\circ}{40}$$

$$b = 51.72 \text{ km}$$

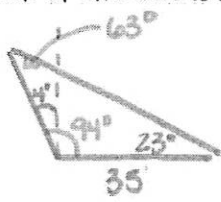
51.72 km

2. Because of prevailing winds, a tree grew so that it was leaning 4° from the vertical. At a point 35 meters from the tree, the angle of elevation to the top of the tree is 23° . Find the height h of the tree to the nearest tenth of a meter.



$$\frac{\sin 71^\circ}{35} = \frac{\sin 23^\circ}{l}$$

$$l = 14.46 \text{ km}$$

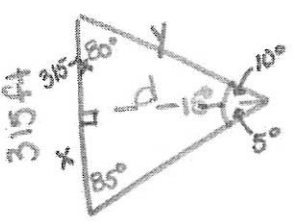


$$\frac{\sin 63^\circ}{35} = \frac{\sin 23^\circ}{l}$$

$$l = 15.35 \text{ km}$$

14.5 or 15.4 km

3. A surveyor has the job that requires that she measure the distance across the Rio Grande Gorge in northern New Mexico. Standing at one side of the ridge, she measures the angle formed by the edge of the ridge and the line of sight to a tree on the other side of the ridge. She then walks along the ridge 315 feet and measured the angle formed by the edge of the ridge and the line of sight to the same tree. If the first angle is 80° and the second angle is 85° , find the distance across the gorge to the nearest foot.



$$\frac{\sin 15^\circ}{315} = \frac{\sin 85^\circ}{y}$$

$$y = 1212.44 \text{ ft}$$

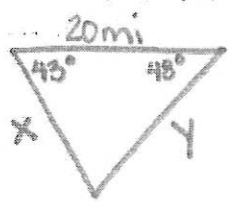
$$\sin 80^\circ = \frac{d}{1212.44}$$

$$d = 1212.44 \sin 80^\circ$$

$$d = 1194 \text{ ft}$$

1194 ft

4. Two radar stations that are 20 miles apart located an unidentified plane that vanished ^{from} their screens at the same time. The first station indicated that the position of the plane made an angle of 43° with the line between the stations. The second station indicated that it made an angle of 48° with the same line. To the nearest tenth of a mile, how far is each station from the point where they lost contact with the plane?



$$\frac{\sin 89^\circ}{20} = \frac{\sin 48^\circ}{x} = \frac{\sin 43^\circ}{y}$$

$$x = \frac{20 \sin 48^\circ}{\sin 89^\circ}$$

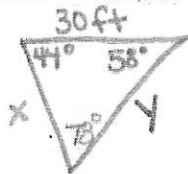
$$y = \frac{20 \sin 43^\circ}{\sin 89^\circ}$$

$$x = 14.87 \text{ mi}$$

$$y = 13.64 \text{ mi}$$

14.9 mi, 13.6 mi

5. Yana is planting a triangular garden. She wants to put a fence around it. The length of one side of the garden is 30 feet. If the angles at each end of this side are 44° and 58° , find the length of the fence need to enclose the garden to the nearest tenth of a foot.



$$\frac{\sin 78^\circ}{30} = \frac{\sin 44^\circ}{y} = \frac{\sin 58^\circ}{x}$$

$$\underline{77.3 \text{ ft}}$$

$$x + y = \frac{30 \sin 58^\circ}{\sin 78^\circ} + \frac{30 \sin 44^\circ}{\sin 78^\circ} = 26.01 + 21.31 = 47.32$$

6. Amelia is flying an airplane due east. To avoid a severe thunderstorm, she finds it necessary to change her course. She turns her plane 23° towards the north and flies 55 miles. Then she makes another turn of 120° and heads back toward her original course. How far must Amelia fly after her second turn to return to her original course? How many miles did she add to her original flight course by taking the detour? Round answers to the nearest tenth.



$$\frac{\sin 37^\circ}{55} = \frac{\sin 23^\circ}{x}$$

$$\frac{\sin 120^\circ}{y} = \frac{\sin 37^\circ}{55}$$

$$55 + 35.7 = 90.7$$

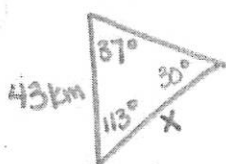
$x = 35.7 \text{ mi}$
together back
to orig course

$$y = 79.2 \text{ mi}$$

$$90.7 - 79.15 =$$

11.6 mi
added to
course

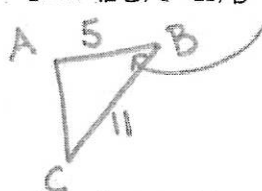
7. A ship is sighted from two radar stations 43 kilometers apart. The angle between the line segment joining the two stations and the radar beam of the first station is 37° . The angle between the line segment joining the two stations and the radar beam of the second station is 113° . How far is the ship from the second station to the nearest tenth of a kilometer?



$$\frac{\sin 30^\circ}{43} = \frac{\sin 37^\circ}{x}$$

$$\underline{51.8 \text{ km}}$$

8. In $\triangle ABC$, $a = 11$, $B = 50^\circ 5'$, and $c = 5$. Find the area of the triangle to the nearest tenth.



$$K = \frac{1}{2} (5)(11) \sin 50.08^\circ$$

$$\underline{21.1}$$

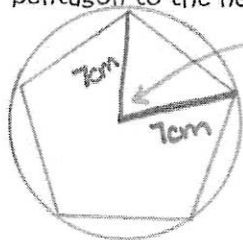
9. The adjacent sides of a parallelogram measure 8 cm and 12 cm, and one angle measures 60° . Find the area of the parallelogram to the nearest tenth.



$$K = 2 \left[\frac{1}{2} (8)(12) \sin 60^\circ \right]$$

$$\underline{83.1 \text{ cm}^2}$$

9. A regular pentagon is inscribed in a circle whose radius measures 7 cm. Find the area of the regular pentagon to the nearest tenth.



$$\frac{360^\circ}{5} = 72^\circ$$

$$K = 5 \left[\frac{1}{2} (7)(7) \sin 72^\circ \right]$$

$$\underline{116.5 \text{ cm}^2}$$

