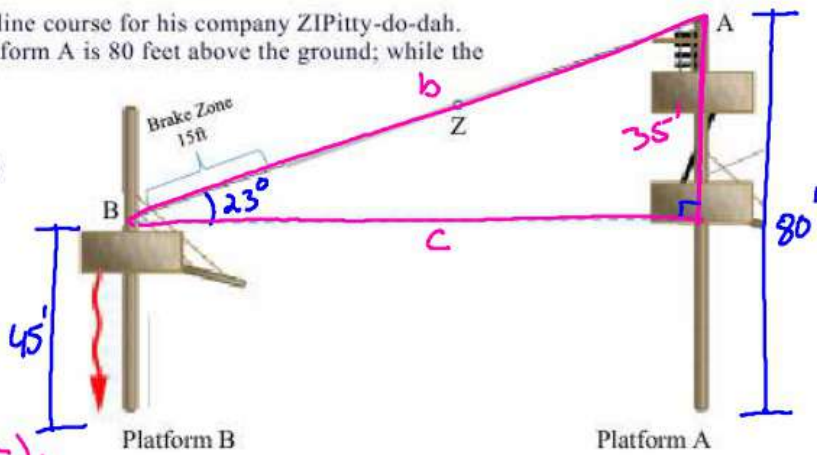


→ 2 decimal places

Please, if necessary, round all answers to the nearest hundredth.

1. Remus is drawing up plans for new zip line course for his company ZIPitty-do-dah. The anchor point for the zip line on platform A is 80 feet above the ground; while the anchor point for platform B is 45 feet above the ground. The angle of elevation from line of sight at anchor point B is 23° . (image is not to scale)



- a. Determine the vertical drop from anchor point A to anchor point B.

$$80' - 45' = 35'$$

- b. Determine how much wire will be needed to connect anchor point A to anchor point B.

$$b(\sin 23^\circ) = \left(\frac{35}{b}\right)b$$

$$b \sin 23 = 35$$

$$b = \frac{35}{\sin 23} = 89.58'$$

- c. Determine how far apart the two platforms are.

$$\tan 23^\circ = \frac{35}{c}$$

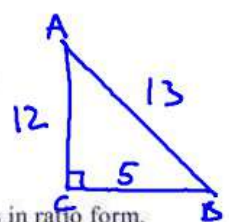
$$c \tan 23 = 35$$

$$c = \frac{35}{\tan 23^\circ} = 82.45 \text{ ft}$$

2. Triangle ACB is a right triangle with side $BC = 5$ and hypotenuse $AB = 13$.

- a. Compute the length of side AC .

$$b^2 + 5^2 = 13^2$$



- b. Without using your calculator, find the following. Express your answers in ratio form.

$$\tan A = \frac{5}{12}$$

$$\cos A = \frac{12}{13}$$

$$\sin A = \frac{5}{13}$$

$$\tan B = \frac{12}{5}$$

$$\cos B = \frac{5}{13}$$

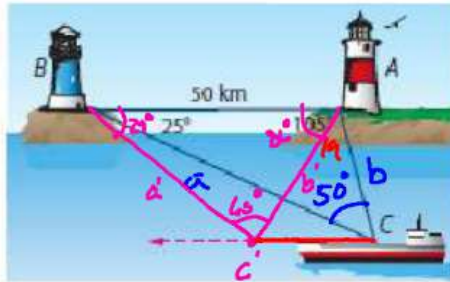
$$\sin B = \frac{12}{13}$$

- c. Find the measure of angle B.

$$\tan^{-1}\left(\frac{12}{5}\right) = \cos^{-1}\left(\frac{5}{13}\right) = \sin^{-1}\left(\frac{12}{13}\right)$$

$$67.38^\circ$$

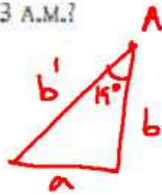
3. Two lighthouses A and B are 50 km apart. At 2 A.M., a freighter moving parallel to line AB is sighted at point C as shown in the diagram below.



From A	From B
a) $\frac{50}{\sin 50} = \frac{b}{\sin 25}$	$\frac{50}{\sin 50} = \frac{a}{\sin 105}$
$b = \frac{50 \sin 25}{\sin 50}$	$a = \frac{50 \sin 105}{\sin 50}$
$= 27.58 \text{ km}$	$= 63.05 \text{ km}$

- a. How far is the freighter from lighthouse B? From lighthouse A?
 b. At 3 A.M., the angle at A is 86° . The angle at B is 29° . How far is the freighter from lighthouse B? From lighthouse A?
 c. How far has the freighter moved in the hour between 2 A.M. and 3 A.M.?

b) $\frac{50}{\sin 65} = \frac{b'}{\sin 29}$	b) $\frac{50}{\sin 65} = \frac{a'}{\sin 86}$
$b' = \frac{50 \sin 29}{\sin 65}$	$a' = \frac{50 \sin 86}{\sin 65}$
$= 26.75 \text{ km}$	$= 55.03 \text{ km}$

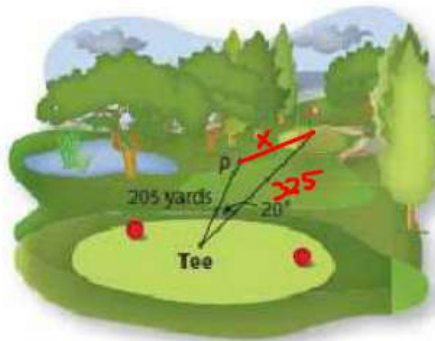


$$a^2 = b^2 + b'^2 - 2(b)(b') \cos A$$

$$= (27.58)^2 + (26.75)^2 - 2(27.58)(26.75) \cos 19$$

$$9 \text{ km}$$

4. The ninth hole at Duffy's Golf Club is 325 yards down a straight fairway. In his first round of golf for the season, Andy tees off and hooks the ball 20° to the left of the line from the tee to the hole. The ball stops 205 yards from the tee at point P, as shown in the figure.



$$x^2 = 325^2 + 205^2 - 2(325)(205) \cos 20^\circ$$

$$x^2 = 22435.96$$

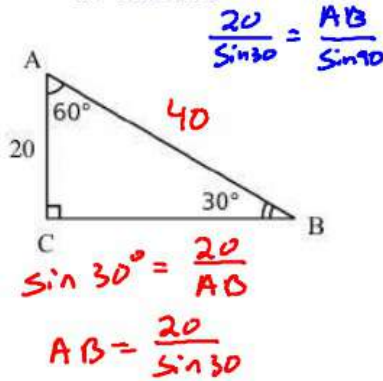
$$= \underline{149.79 \text{ yds}}$$

- a. How far is his ball from the hole (marked by the flag)?
 b. To decide which club to use on his next shot, Andy knows he hits an average of 135–145 yards with a five iron; with a four iron, he hits 145–155 yards; and with a three iron, he hits 155–165 yards. Which of these clubs would be his best choice?

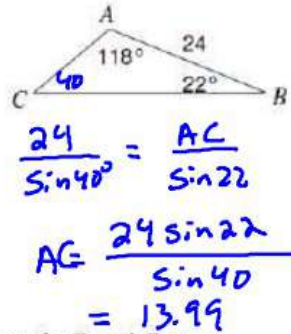
4-Iron

5. Use the triangles below to find the missing side length.

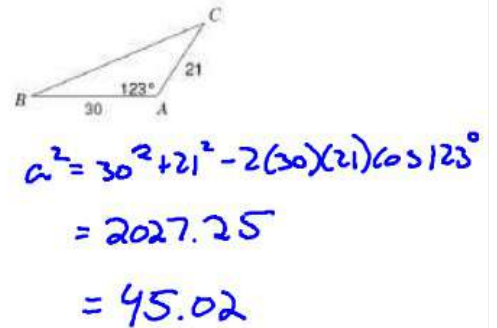
a. Find AB.



b. Find AC

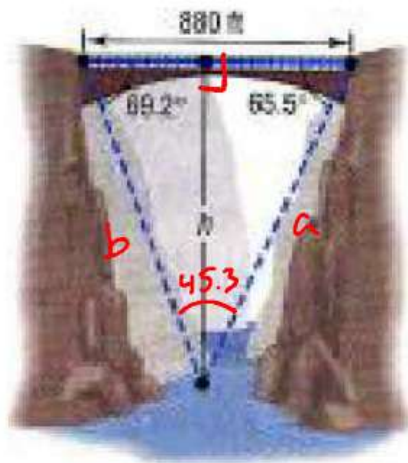


c. Find BC



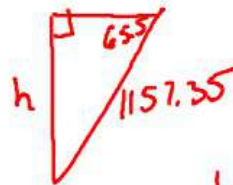
Finding the Height of the Bridge over the Royal Gorge:

The highest bridge in the world is the bridge over the Royal Gorge of the Arkansas River in Colorado. Sightings to the same point at water level is directly under the bridge are taken from each side of the 880 foot-long bridge, as indicated in the figure. How high is the bridge?



$$\frac{a}{\sin 69.2} = \frac{880}{\sin 45.3}$$

$$a = 1157.35$$



$$\sin 65.5 = \frac{h}{1157.35}$$

$$\frac{b}{\sin 65.5} = \frac{880}{\sin 45.3}$$

$$b = 1126.57$$



$$\sin 69.2 = \frac{h}{1126.57}$$