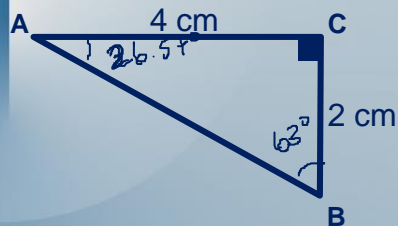


## Warm Up

Find the missing side and angles.



$$\overline{BC} = \sqrt{2^2 + 4^2} = 4.5$$

$$\angle CAB = \tan^{-1}\left(\frac{2}{4}\right) \approx 26.6^\circ$$

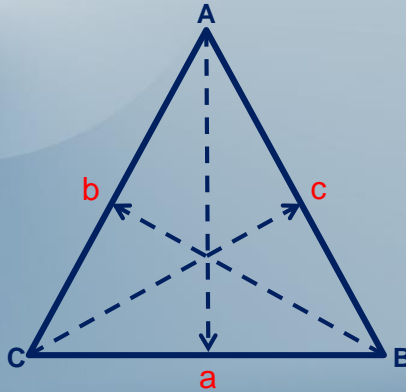
$$\angle CBA = \tan^{-1}\left(\frac{4}{2}\right) \approx 63.4^\circ$$

## Lesson 35

### Trigonometry – Sine Law

## Sine Law

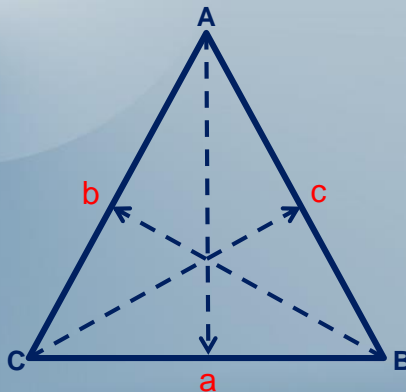
The sides in a triangle are directly proportional to the Sine of the opposite angles to these sides.



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

## Sine Law

Only two proportions are used at a time.



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

or

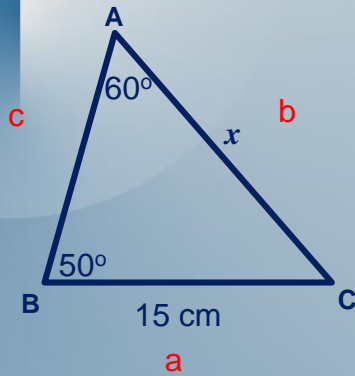
$$\frac{a}{\sin A} = \frac{c}{\sin C}$$

or

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

## Example 1

Find  $m\overline{AC}$ .



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

$$\frac{15}{\sin(60)} = \frac{x}{\sin(50)}$$

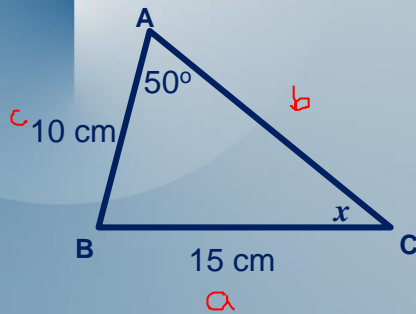
$$15\sin(50) = x\sin(60)$$

$$\frac{15\sin(50)}{\sin(60)} = x$$

$$x \approx 13.27\text{ cm}$$

## Example 2

Find  $\angle ACB$ .



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

$$\frac{15}{\sin(50)} = \frac{10}{\sin(x)}$$

$$15\sin(x) = 10\sin(50)$$

$$\sin(x) = \frac{10\sin(50)}{15}$$

$$x = \sin^{-1}\left(\frac{10\sin(50)}{15}\right)$$

$$x = \sin^{-1}(0.5107)$$

$$x \approx 30.7^\circ$$

## Sine Law

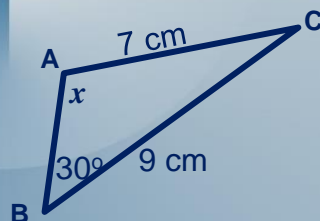
Fill in the following chart.

Sin 30°	0.5	$\frac{1}{2}$
Sin 45°	0.7071	$\frac{\sqrt{2}}{2}$
Sin 60°	0.8660	$\frac{\sqrt{3}}{2}$
Sin 120°	0.8660	$\frac{\sqrt{3}}{2}$
Sin 135°	0.7071	$\frac{\sqrt{2}}{2}$
Sin 150°	0.5	$\frac{1}{2}$

$$\therefore \sin(x) = \sin(180 - x)$$

## Example 3

Find  $\angle BAC$ .



$$\therefore \angle BAC = 180 - 40 = 140^\circ$$

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

$$\frac{9}{\sin(x)} = \frac{7}{\sin(30)}$$

$$9\sin(30) = 7\sin(x)$$

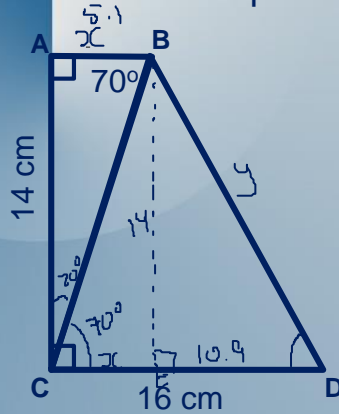
$$\sin(x) = \frac{9\sin(30)}{7}$$

$$x = \sin^{-1}\left(\frac{9\sin(30)}{7}\right)$$

$$x = 40^\circ$$

## Example 4

What is the perimeter of the trapezoid?



$$P = 52.82 \text{ cm}$$

$$AB: \frac{\tan 70^\circ}{1} = \frac{14}{x}$$

$$14 = x \tan 70^\circ$$

$$x = \frac{14}{\tan 70^\circ} = 5.1$$

$$BD: \sqrt{14^2 + 10.9^2} = 17.74$$

## Homework

P. 241 #1 - 6

P. 242 #7 - 8