

Warm Up

Find the missing side and angles.



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

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

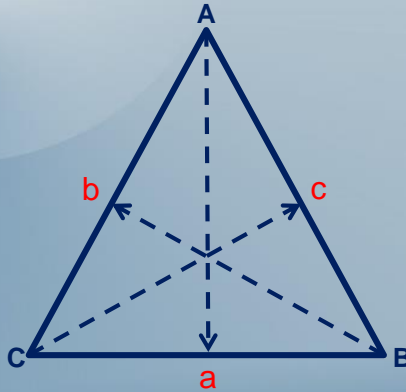
$$\angle CBA = \tan^{-1}\left(\frac{4}{2}\right) \approx 63.4^\circ$$

Lesson 16

Trigonometry – Sine Law

Sine Law

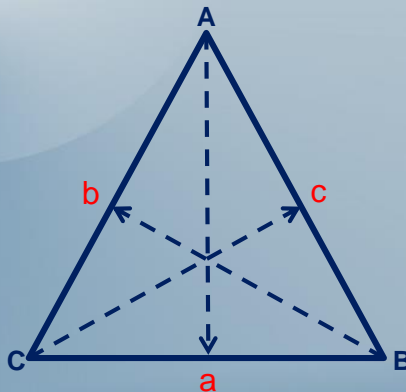
The sides in a triangle are directly proportional to the Sine of the opposite angles to these sides.



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

Sine Law

Only two proportions are used at a time.



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

or

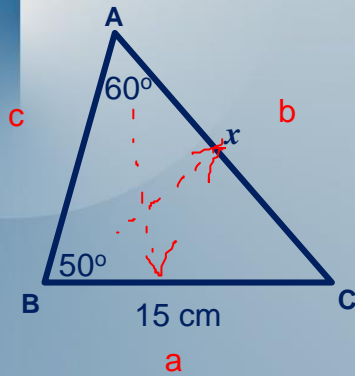
$$\frac{a}{\sin A} = \frac{c}{\sin C}$$

or

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

Example 1

Find $m\overline{AC}$.



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

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

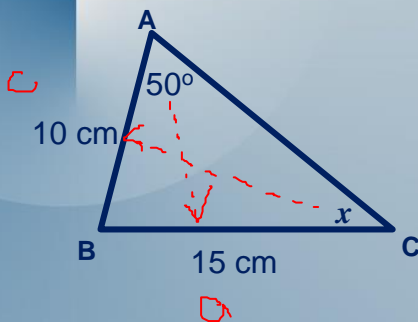
$$15\sin(50) = x\sin(60)$$

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

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

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

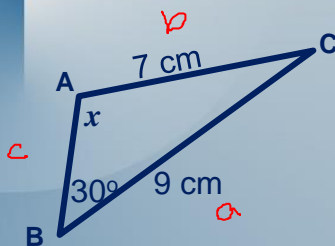
Fill in the following chart.

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 $\angle BAC$.



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

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

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

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

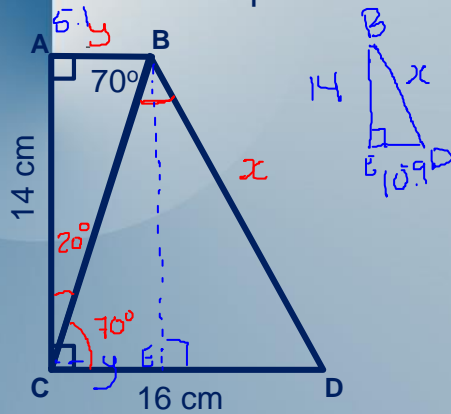
$$\sin(x) = \frac{9 \sin(30)}{7}$$

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

$$x = 40^\circ$$

Example 4

What is the perimeter of the trapezoid? *+ the area*



Homework

Textbook Vol 2

P. 109 #2

P. 112 #13