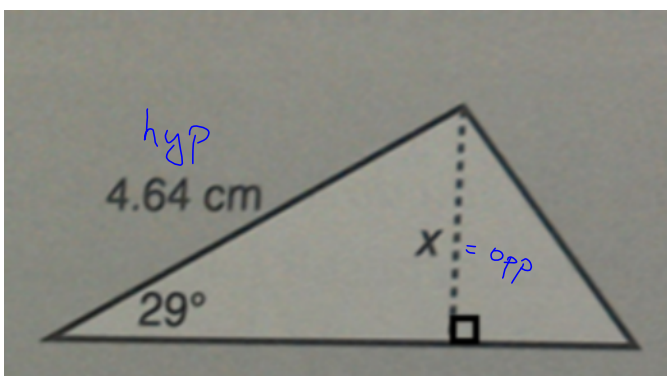


# That's Non-right!

## Learning Goal

### Minds on Math

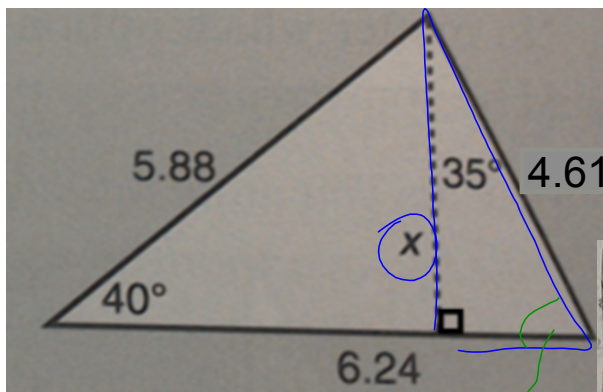
How would you solve for the height,  $x$ ? Describe.



$$\sin 29^\circ = \frac{x}{4.64}$$
$$4.64 \sin 29^\circ = x$$
$$2.2 = x$$

## Problem

Solve for the height,  $x$ , in two ways.



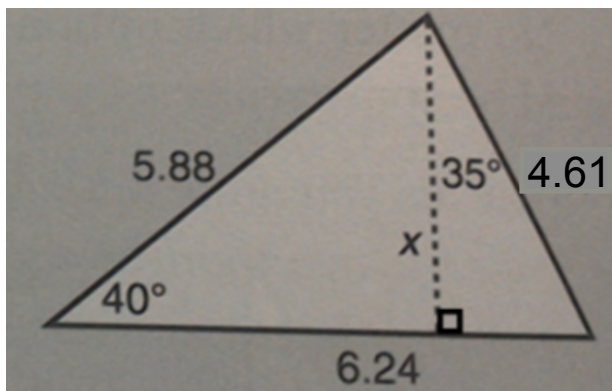
ways.

$$\sin 40 = \frac{x}{5.88}$$
$$5.88 \sin 40 = x$$

$$\cos 55 = \frac{x}{4.61}$$
$$4.61 \cos 55 = x$$
$$4.61 \times 0.8192 = x$$
$$x = 3.77$$

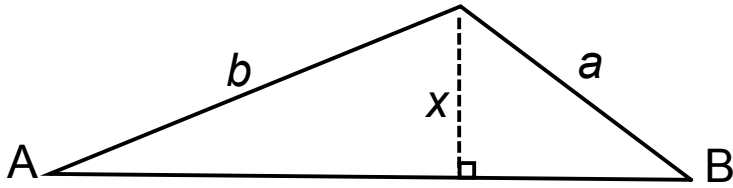
$$\sin 55 = \frac{x}{4.61}$$
$$4.61 \sin 55 = 3.77$$

## Problem: Your Solutions



## Developing the Sine Law

Write two, different expressions that represent the height,  $x$ , of triangle ABC.



$$\sin A = \frac{x}{b}$$

$$b \sin A = x$$

$$\sin B = \frac{x}{a}$$

$$a \sin B = x$$

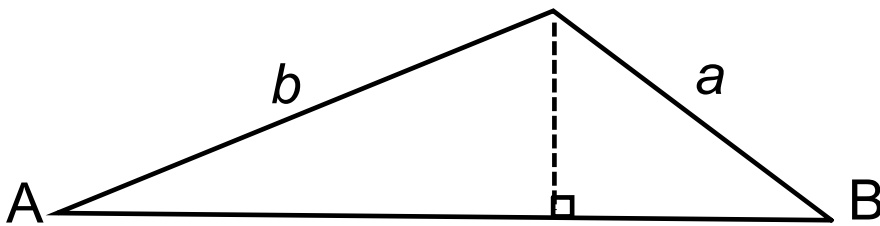
$$b \sin A = a \sin B$$
$$\frac{b \sin A}{b a} = \frac{a \sin B}{a b}$$

SINE  
LAW?

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

## The Sine Law

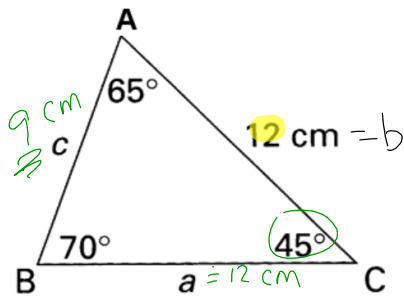
In any non-right triangle, ...



## Example 1: Using the Sine Law

Missing Sides

Determine the missing lengths to the nearest cm.



$a = ? = 11.6$	$A = 65^\circ$
$b = 12$	$B = 70^\circ$
$c = ?$	$C = 45^\circ$

← Given

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

$$\frac{\sin 70^\circ}{12} = \frac{\sin 45^\circ}{c}$$

$$c \sin 70^\circ = 12 \sin 45^\circ$$

$$c = \frac{12 \sin 45^\circ}{\sin 70^\circ}$$

$$\therefore c \approx 9 \text{ cm}$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} \quad \frac{12}{12} = 1$$

$$\frac{\sin 65^\circ}{a} = \frac{\sin 70^\circ}{12}$$

$$a \sin 70^\circ = 12 \sin 65^\circ$$

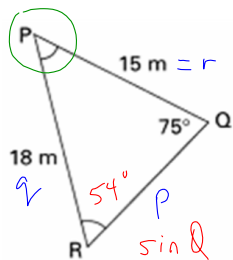
$$a = \frac{12 \sin 65^\circ}{\sin 70^\circ}$$

$$a \approx 11.6$$

## Example 2: Using the Sine Law

Missing Angles

Determine the missing angles to the nearest degree.



$p = ?$	$P = ?$
$q = 18$	$Q = 75^\circ$
$r = 15$	$R = 54^\circ$

$$180^\circ - 75^\circ - 53.6^\circ \approx 51^\circ$$

$$\frac{\sin Q}{q} = \frac{\sin R}{r}$$

$$\frac{\sin 75^\circ}{18} = \frac{\sin R}{15}$$

$$15 \sin 75^\circ = 18 \sin R$$

$$\frac{15 \sin 75^\circ}{18} = \sin R$$

$$\sin^{-1} \left( \frac{15 \sin 75^\circ}{18} \right) = R \quad (\text{Use } \sin^{-1})$$

$$53.6^\circ \approx R$$

$$54^\circ \approx R$$

## *Practice*

### **MBF 3C:**

p32 #3, 8, 9

### **MAP 4C:**

pp. 102-103 #7, 10, 14