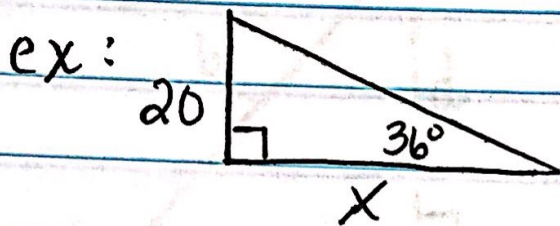
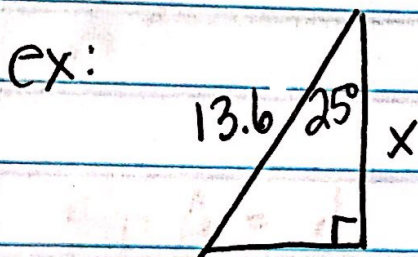


# Unit 3E: Law of Sine & Cosine

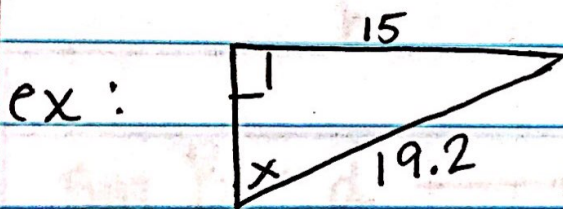
recall:  $\sin \theta = \frac{\text{opp}}{\text{hyp}}$     $\cos \theta = \frac{\text{adj}}{\text{hyp}}$     $\tan \theta = \frac{\text{opp}}{\text{adj}}$



$$\frac{\tan 36^\circ}{1} = \frac{20}{x} \quad x \approx 27.5$$



$$\cos 25^\circ = \frac{x}{13.6} \quad x \approx 12.3$$

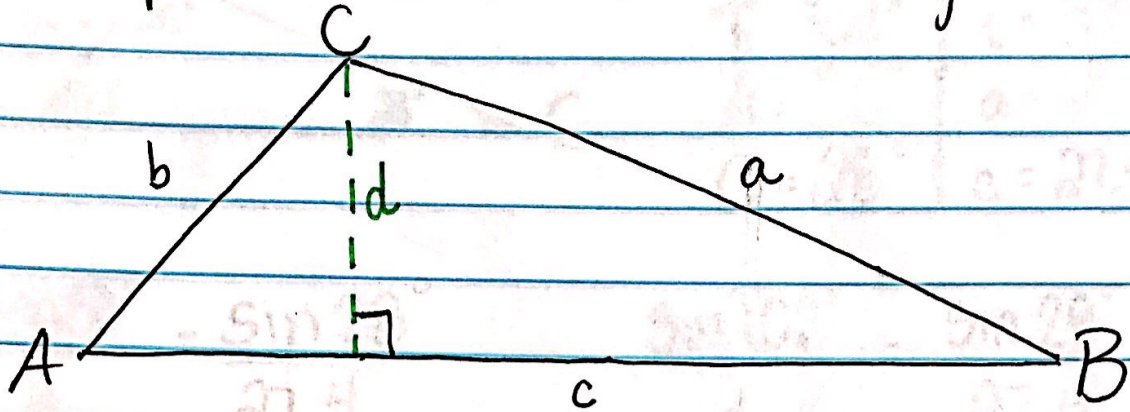


$$\sin x = \frac{15}{19.2} \quad x = \sin^{-1}\left(\frac{15}{19.2}\right)$$

$$x \approx 51.4^\circ$$

# Oblique Triangle Trig

Oblique  $\Delta$  - a  $\Delta$  with no right angles



$$\sin A = \frac{d}{b} \longrightarrow d = b \sin A$$

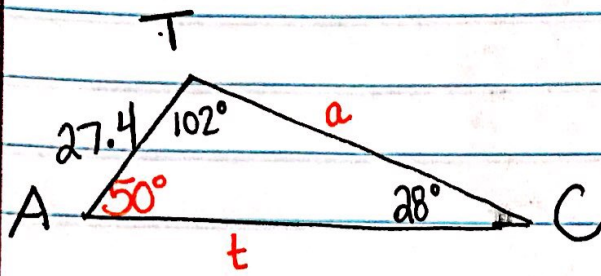
$$\sin B = \frac{d}{a} \longrightarrow d = a \sin B$$

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

Law of Sines :  $\frac{\sin A}{a} = \frac{\sin B}{b}$



# Solve the Triangle



Angles	Sides
$T = 102^\circ$	$t = 57.1$
$A = 50^\circ$	$a = 44.7$
$C = 28^\circ$	$c = 27.4$

$$\frac{\sin 50^\circ}{a} = \frac{\sin 28^\circ}{27.4}$$

$$a \approx 44.7$$

$$\frac{\sin 102^\circ}{t} = \frac{\sin 28^\circ}{27.4}$$

$$t \approx 57.1$$

Sometimes there are 2 possible  $\Delta$ 's.

ex:  $\Delta TLB$  m  $\angle L = 30^\circ$   $t = 8$   $l = 5$

Angles	Sides		Angles	Sides
$T = 53.1^\circ$	$t = 8$	and possibly	$T = 126.9^\circ$	$t = 8$
$L = 30^\circ$	$l = 5$		$L = 30^\circ$	$l = 5$
$B = 96.9^\circ$	$b = 9.9$		$B = 23.1^\circ$	$b = 3.9$

$$\frac{\sin 30^\circ}{5} = \frac{\sin T}{8}$$

$$T \approx 53.1^\circ$$

$$\text{and } T = 180^\circ - 53.1^\circ = 126.9^\circ$$

$$\frac{\sin 30^\circ}{5} = \frac{\sin 96.9^\circ}{b}$$

$$b = 9.9$$

$$\text{and } \frac{\sin 30^\circ}{5} = \frac{\sin 23.1^\circ}{b}$$

$$b = 3.9$$



ex:  $\triangle DNC$   $m\angle D = 12^\circ$   $d = 11$   $w = 6$

Angles	Sides
$D = 12^\circ$	$d = 11$
$W = 6.5^\circ$	$w = 6$
$C = 161.5^\circ$	$c = 16.8$

and  
possibly

Angles	Sides
$D = 12^\circ$	$d = 11$
$W = 173.5^\circ$	$w = 6$
$C = -5.5^\circ$	$c =$

$$\frac{\sin 12^\circ}{11} = \frac{\sin W}{6}$$

$$W = 6.5^\circ \quad \text{and} \quad W = 180^\circ - 6.5^\circ = 173.5^\circ$$

$$\frac{\sin 12^\circ}{11} = \frac{\sin 161.5^\circ}{c}$$
$$c = 16.8$$