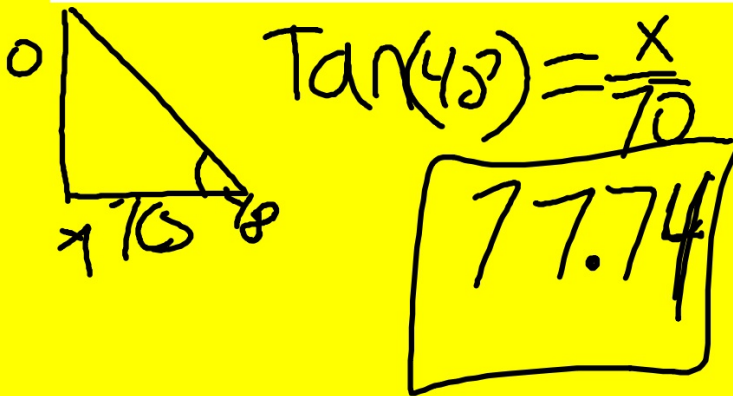


## Journal Entry

Dontre is trying to predict the height of a building. He knows he is 70 feet away from the building looking up at a 48-degree angle. Estimate the height of the building.



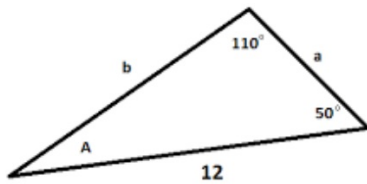
$$\tan(48^\circ) = \frac{x}{70}$$

$$\boxed{77.74}$$

## 4.2 Non-Right Triangles using the Law of Sines!

## Non-Right Triangle Trigonometry

### Law of Sines



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

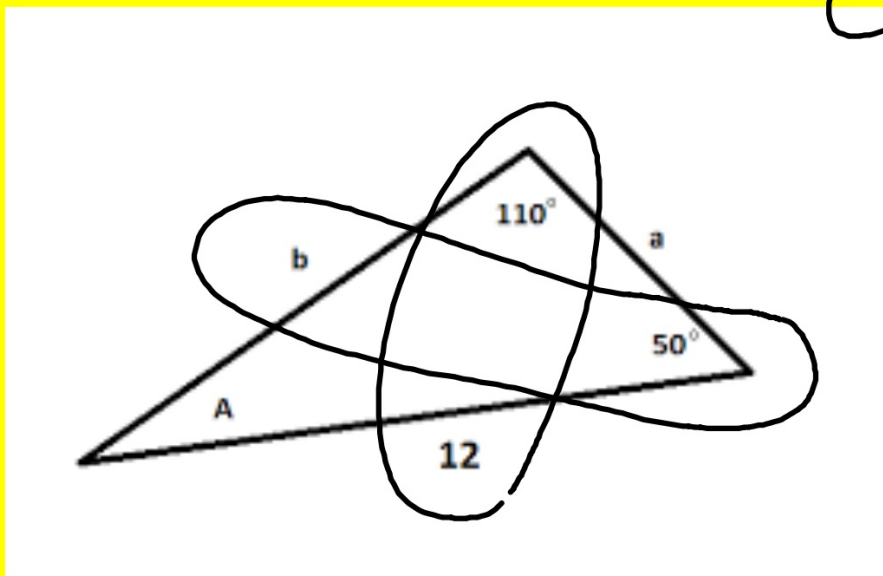
### Law of Cosines

<b>Case I</b>	<p>A triangle with two sides of length 52 and 16, and an included angle of <math>15^\circ</math>. The third side is marked with a red question mark.</p>
<b>Know</b> 2 sides included angle	
<b>Our goal</b> 3rd side	
<b>Case II</b>	<p>A triangle with three sides of length 32, 24, and 37. The angle opposite the side of length 37 is marked with a red question mark.</p>
<b>Know</b> 3 sides	
<b>Our goal</b> any angle	
	<small>www.mathwarehouse.com</small>

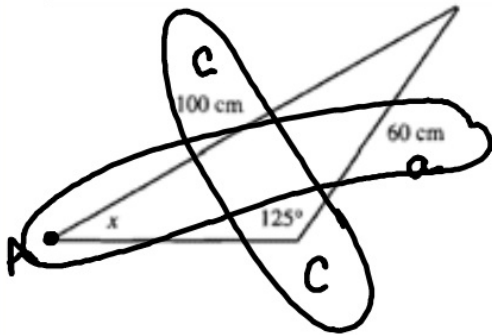
# Law of Sines

"Ambiguous Case"  
2 pairs!

- NON  
RIGHT  
- "2 pairs"



Ex 1: Solving for a missing      of a non-right triangle



① set up:

$$\frac{\sin(x)}{60} = \frac{\sin(125)}{100}$$

② Cross multiply:

$$100 \sin(x) = 60 \sin(125)$$

$$\sin(x) = \frac{60 \sin(125)}{100}$$

③ solve  
for  
variable:

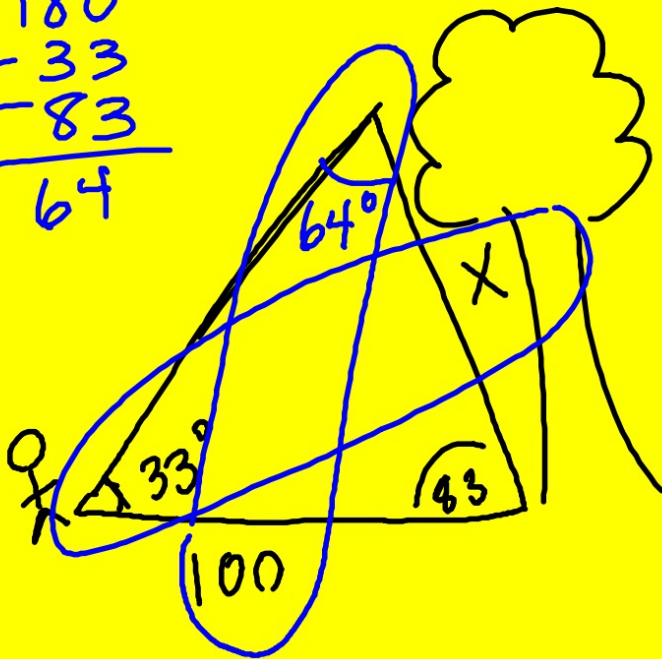
$$\sin^{-1}\left(\frac{60 \sin(125)}{100}\right) = x$$

$$29.4^\circ = x$$

Ex 2: Solving for a missing side of a non-right triangle

Anthony wants to measure the height of a tree. He walks exactly 100 feet from the base of the tree and looks up. The angle from the ground to the top of the tree is  $33^\circ$ . This particular tree grows at an angle of  $83^\circ$  with respect to the ground rather than vertically ( $90^\circ$ ). How tall is the tree?

$$\begin{array}{r} 180 \\ - 33 \\ - 83 \\ \hline 64 \end{array}$$

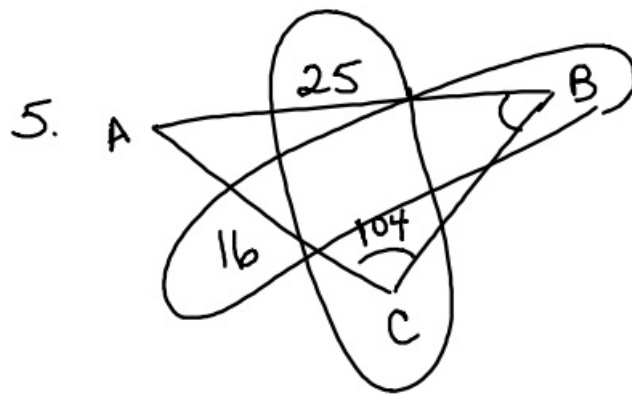


$$\frac{\sin(33)}{X} = \frac{\sin(64)}{100}$$

$$100 \sin(33) = X \cdot \sin(64)$$

$$\frac{100 \sin(33)}{\sin(64)} = X$$

$$\boxed{60.6 = X}$$



$$\frac{\sin(104)}{25} = \frac{\sin(B)}{16}$$

$$16 \sin(104) = 25 \sin(B)$$

$$\frac{16 \sin(104)}{25} = \sin(B)$$

$$\sin^{-1}\left(\frac{16 \sin(104)}{25}\right) = B$$

$$\boxed{38.4^\circ = B}$$

Team Task:

SIDE e:

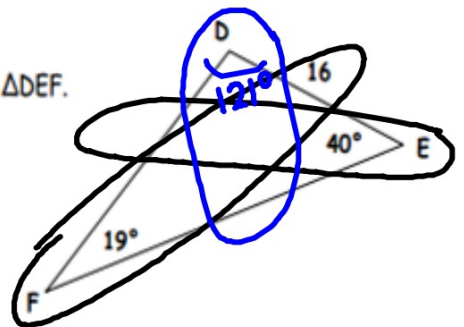
$$\frac{\sin(19)}{16} = \frac{\sin(40)}{e}$$

$$e \sin(19) = 16 \sin(40)$$

$$e = \frac{16 \sin(40)}{\sin(19)}$$

$$e = 31.58$$

Find the perimeter of  $\triangle DEF$ .



SIDE d:

$$\frac{\sin(19)}{16} = \frac{\sin(121)}{d}$$

$$d = \frac{16 \sin(121)}{\sin(19)} = 42.1$$

$$= 89.72 \text{ or } 90$$



## 4.2 Review Sheet

- > Analyze Law of Sines
- > Complete all problems
- > Ask 3 before me!

**VOTE!** <https://www.ncschoolheroes.com/?eid=2016770>

Finished early?

- makeup work
- missing projects
- test corrections
- midterm STUDY GUIDE!