

**WARM UP - Check HW - Rt Triangle Trig WS**

- 1.)  $x = 78.80$  ft
- 2.)  $x = 19.7$  km
- 3.)  $x = 184.3$  ft
- 4.)  $x = 78.5$
- 5.) pole =  $127.2$  ft
- 6.)  $x = 85.4$  ft
- 7.) Object 2,
- 8.)  $x = 30$
- 9.) The sides of the triangle form an isosceles triangle so the angle of elevation is  $45$
- 10.)  $302.71$  ft
- 11.)  $47.64$  ft
- 12.) height to tower:  $96.5$  ft  
distance between cars  $182.6$  ft
- 13.)  $x = 44.7$  m
- 14.) angle of elevation is  $30$
- 15.) pole =  $45$  ft

## 14.4 Area and the Law of Sines

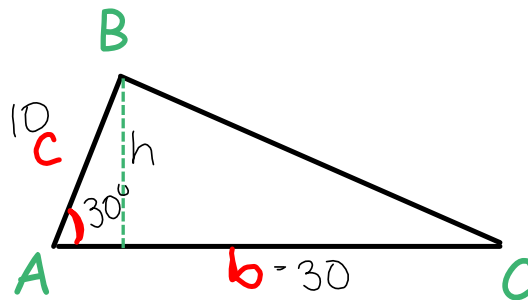
Suppose you want to find the area of this triangle, but you only know  $m\angle A$  and length  $b$  and  $c$ . How would you find the height?

$$A = \frac{bh}{2}$$

$$\sin 30 = \frac{h}{10}$$

$$10 \cdot \sin 30 = h$$

$$A = \frac{30 \cdot 10 \cdot \sin 30}{2}$$

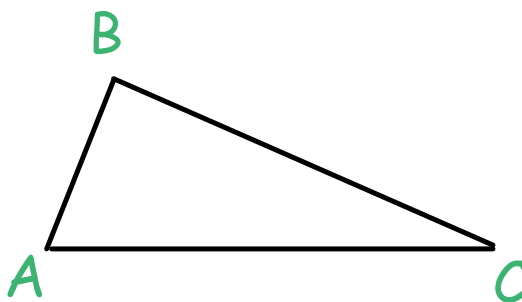


**AREA of a TRIANGLE given SAS**

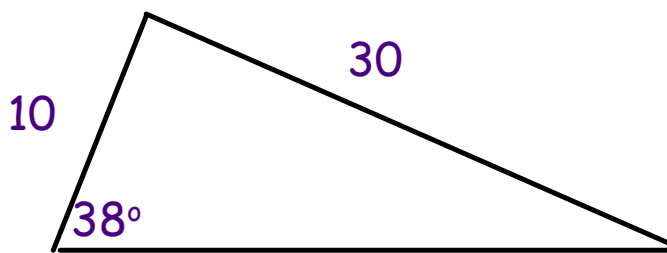
$$\text{Area} = \frac{bc(\sin A)}{2}$$

or 
$$\frac{ac(\sin B)}{2}$$

or 
$$\frac{ab(\sin C)}{2}$$



4) Find the area of this triangle, to the nearest hundredth.



$$\frac{(\sin 38) \cdot 10 \cdot 24}{2} = 73.88 \text{un}^2$$

AREA =

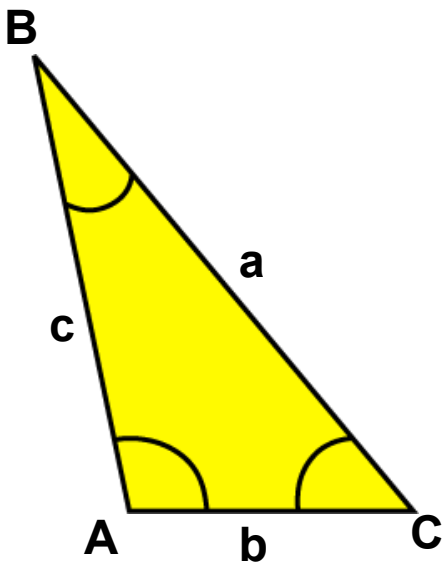
Using the three equations for the area of a triangle we can derive the

### Law of Sines

$$\left( \frac{\cancel{2}bc(\sin A)}{\cancel{2}abc} = \frac{\cancel{2}ac(\sin B)}{\cancel{2}abc} = \frac{\cancel{2}ab(\sin C)}{\cancel{2}abc} \right)$$

$$\frac{2}{abc}$$

## Law of Sines

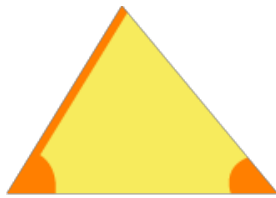


$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

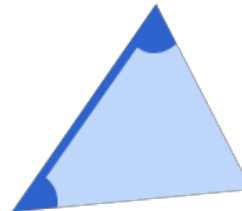
HINT

The Law of Sines can be used when the following are given:

- two angles and a side (AAS or ASA)



**AAS**



**ASA**

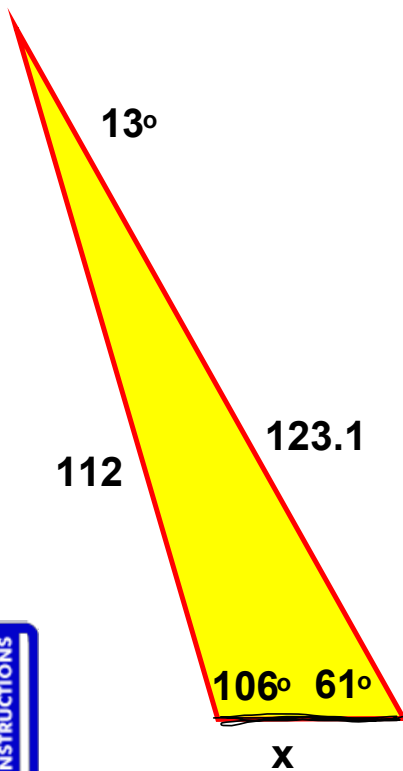
- two sides and a non-included angle (SSA)



**SSA**



Use the law of sines to find a missing side



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

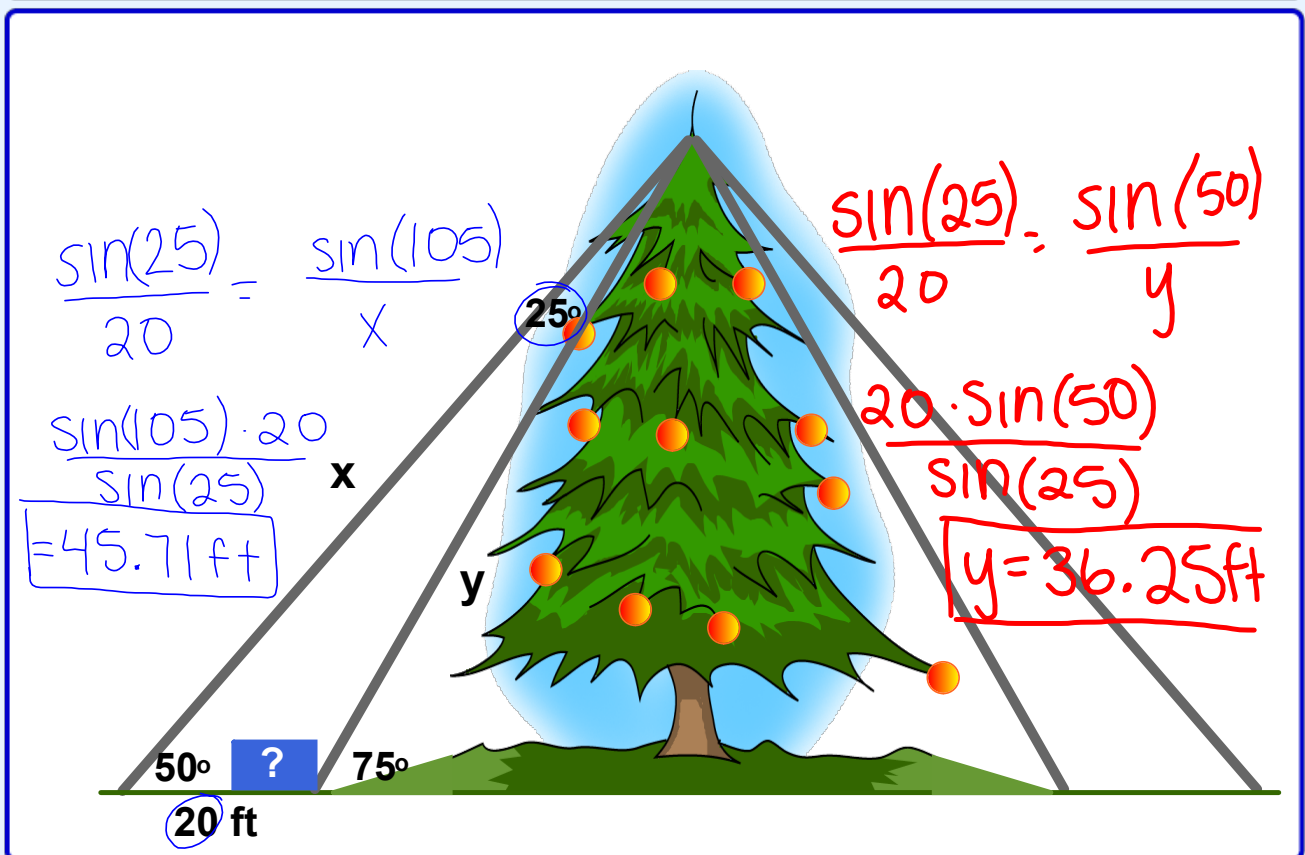
$$\frac{\sin(61)}{112} = \frac{\sin(13)}{X}$$

$$\frac{\sin(13) \cdot 112}{\sin(61)} = X = 28.81$$

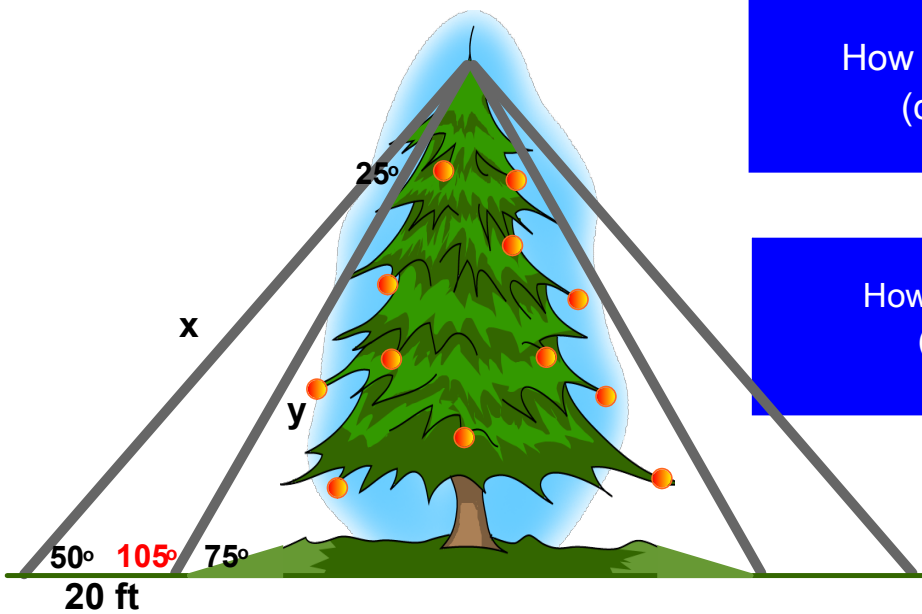
$X =$

INSTRUCTIONS

Use the law of sines to find the length of the ropes



Find the length of the rope

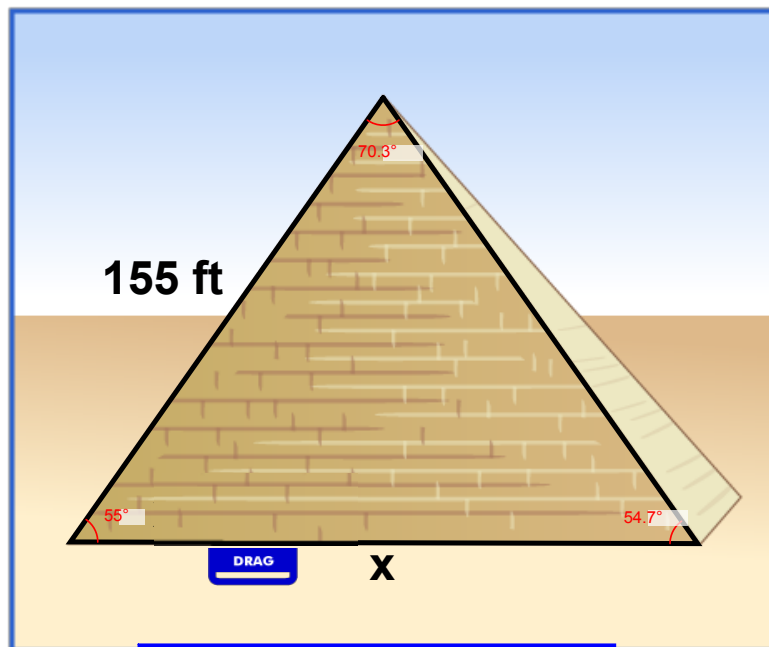


How would you find  $x$ ?  
(click to reveal)

How would you find  $y$ ?  
(click to reveal)

ANSWER

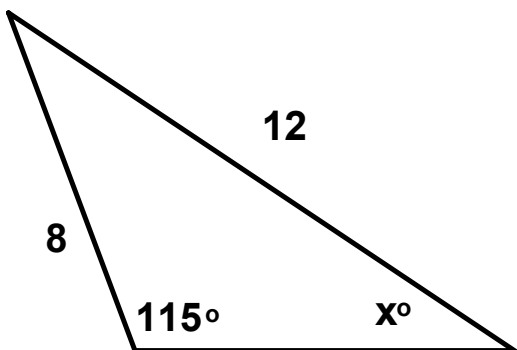
Calculate the base of the pyramid (to the nearest foot)



How would you find  $x$ ?  
(click to reveal)

Use the law of sines to find a missing angle

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



$$\frac{\sin(115)}{12} = \frac{\sin(x)}{8}$$

$$\frac{\sin(115) \cdot 8}{12} = \sin(x)$$

$$\sin^{-1}\left(\frac{\sin(115) \cdot 8}{12}\right) = \sin^{-1}(\sin(x)) \quad x =$$

$$x = 37.17^\circ$$

INSTRUCTIONS

**HW 14.4**  
**p. 803 #1-21 odd and**  
**#27, 29**

