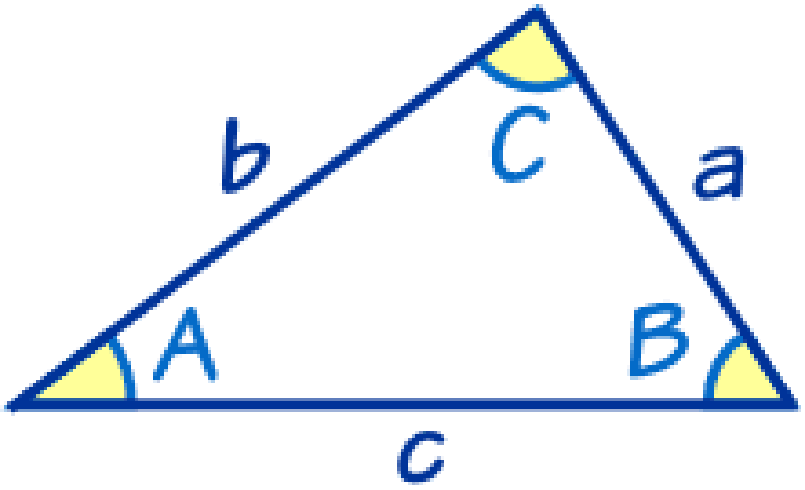
5.6 Sine Law

Given ΔABC:



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

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

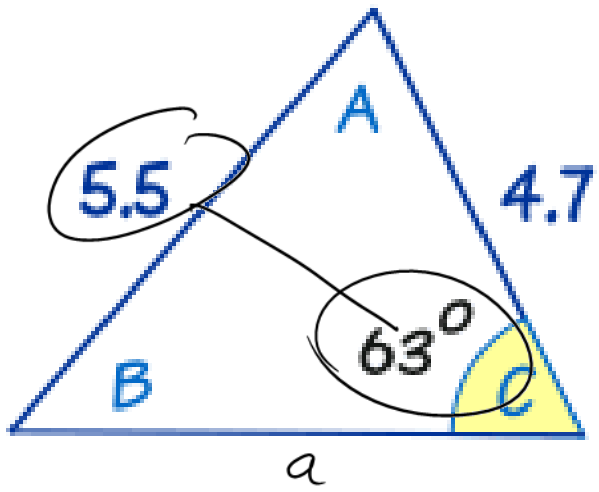
The Three Bears Theorem

- the largest angle is paired with the largest side
- the smallest angle is paired with the smallest side.

Tip - always put the unknown (the thing you are looking for) in the numerator (the top)

→ everything

Solve ΔABC:



All 3 angles add up to 180°

$\angle A = 67°$ $\quad a = 5.7$

$\angle B = 50°$ $\quad b = 4.7$

$\angle C = 63°$ $\quad c = 5.5$

① $\angle B$

$$\frac{\sin B}{4.7} = \frac{\sin 63}{5.5}$$

$$\sin B = \frac{4.7 \sin 63}{5.5}$$

$$B = \sin^{-1}\left(\frac{4.7 \sin 63}{5.5}\right) = 50°$$

② $\angle A = 180 - 50 - 63$

$\angle A = 67°$

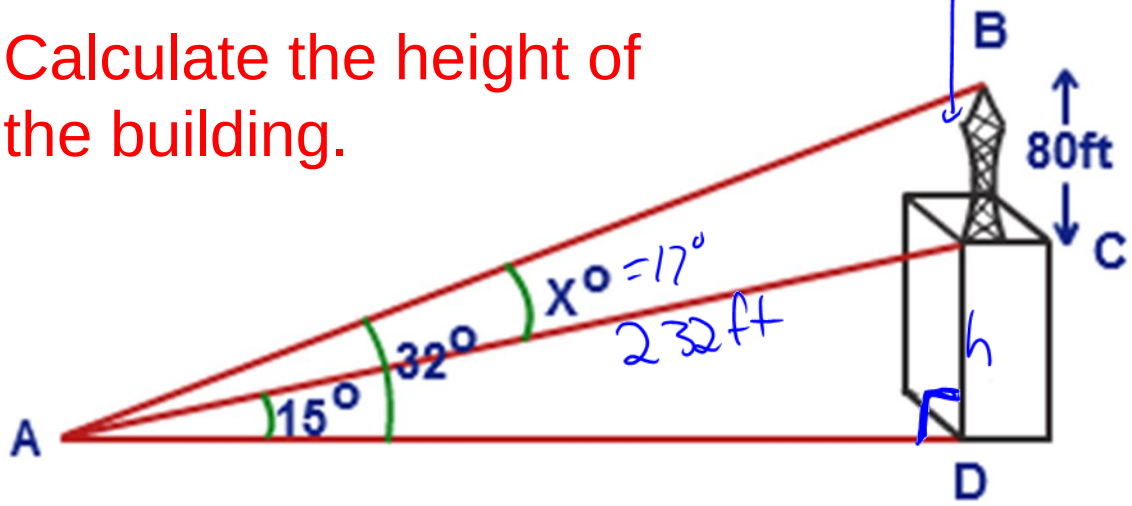
③ side a

$$\frac{a}{\sin 67} = \frac{5.5}{\sin 63}$$

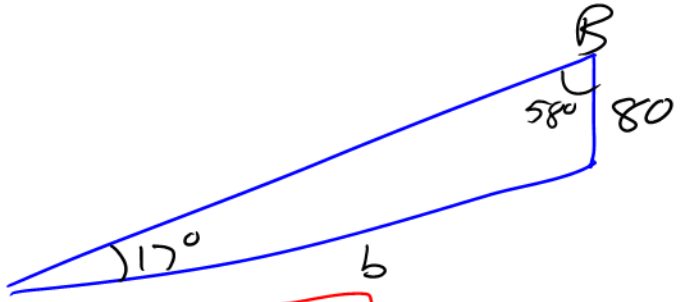
$$a = \frac{5.5 \sin 67}{\sin 63}$$

$a = 5.7$

Calculate the height of the building.



$180 - 90 - 32 = 58°$



$$\frac{b}{\sin 58} = \frac{80}{\sin 17}$$

$$b = \frac{80 \sin 58}{\sin 17}$$

$b = 232\text{ft}$

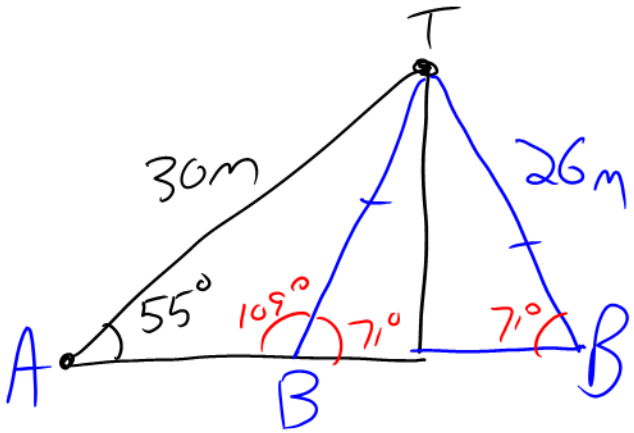
$$\sin 15 = \frac{h}{232}$$

$$232 \sin 15 = h$$

$$60\text{ft} = h$$

A word problem with an issue:

A tower is supported by guy wires. One wire is 30m with an angle of elevation of 55°. Another wire is 26m. How far apart are these two wires?



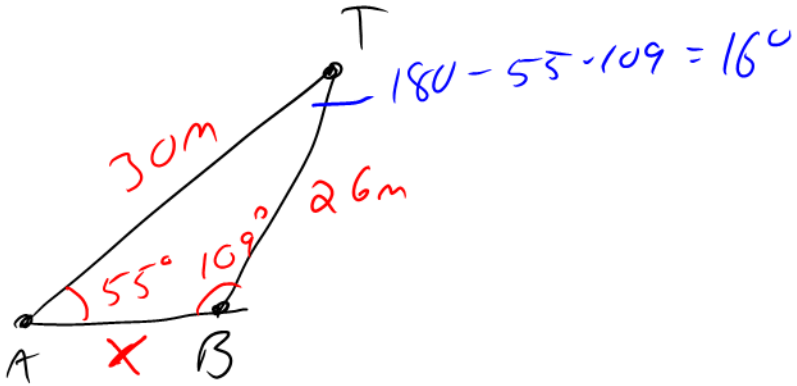
① $\angle B$

$$\frac{\sin B}{30} = \frac{\sin 55}{26}$$

$$B = \sin^{-1}\left(\frac{30 \sin 55}{26}\right)$$

$$B = 71^\circ$$

Same Side

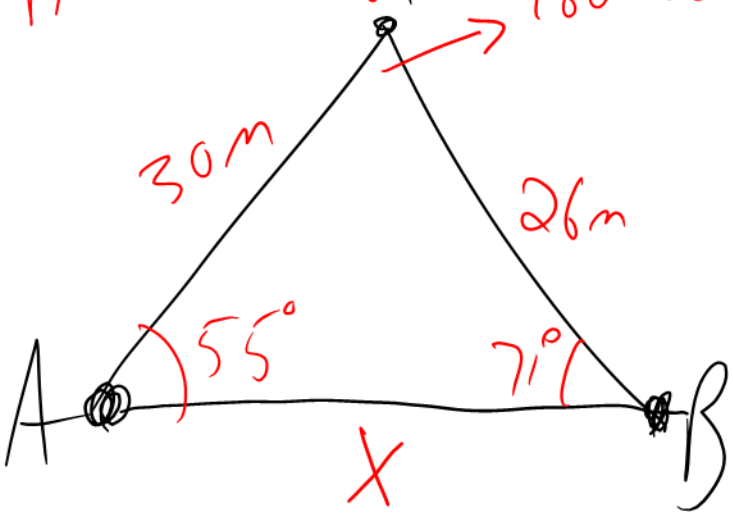


$$\frac{x}{\sin 16} = \frac{30}{\sin 109}$$

$$x = \frac{30 \sin 16}{\sin 109}$$

$$x = 8.7\text{m}$$

opposite sides $\overline{T}$



$180 - 55 - 71 = 54°$

$$\frac{x}{\sin 54} = \frac{30}{\sin 71}$$

$$x = \frac{30 \sin 54}{\sin 71}$$

$$x = 25.7\text{m}$$

Homework: pg 318 # 1, 4, 7, 8, 9

↳ drawn same as 8

↳ answer wrong in both