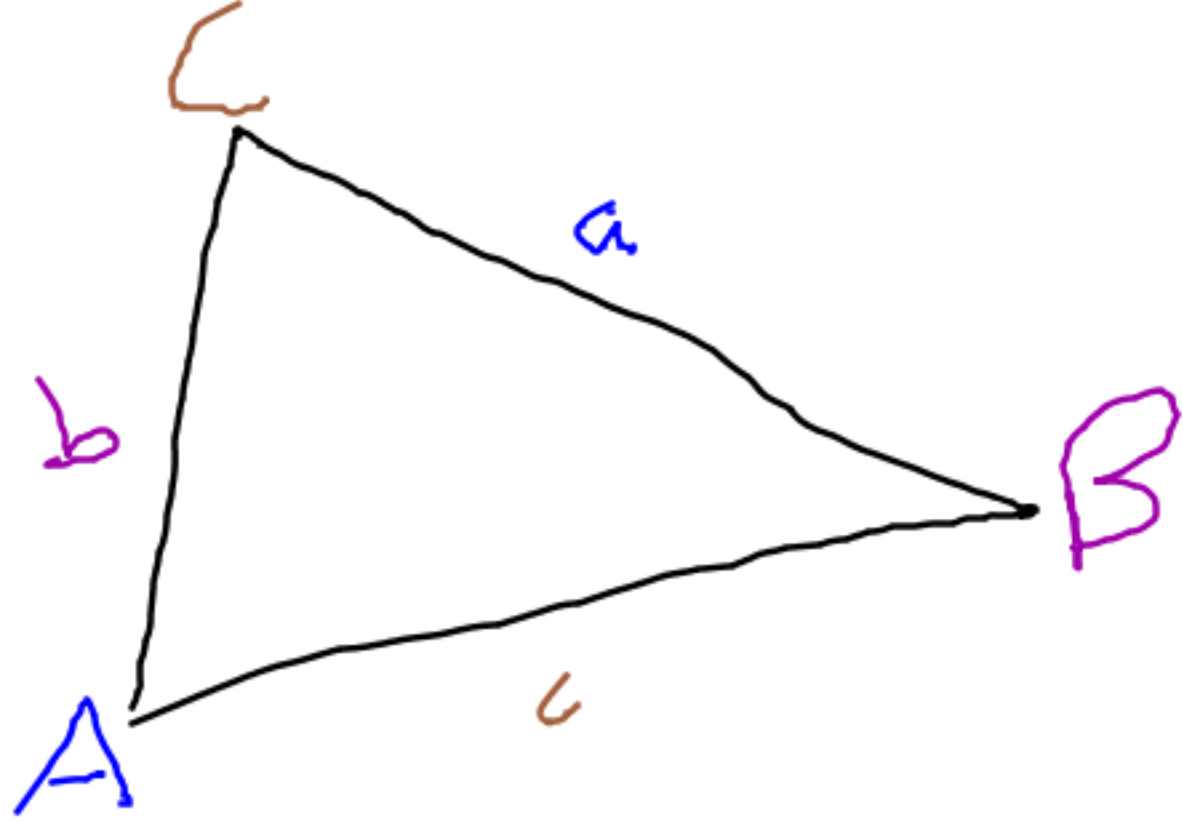
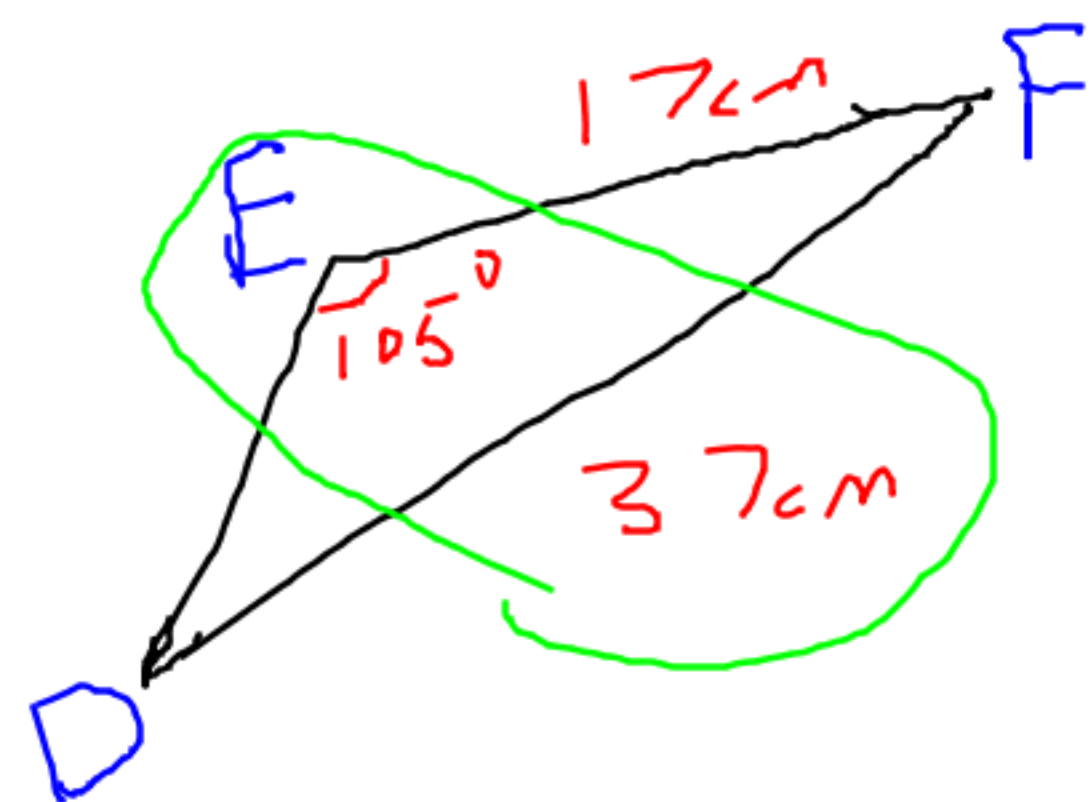


5.5] The Sine law



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

Solve $\triangle DEF$



$$\begin{aligned}\angle D &= 26^\circ & d &= 17 \\ \angle E &= 105^\circ & e &= 37 \\ \angle F &= 49^\circ & f &= 28.9\end{aligned}$$

$$\frac{\sin D}{17} = \frac{\sin 105}{37}$$

$$D = \sin^{-1}\left(\frac{17 \sin(105)}{37}\right)$$

$$D = 26^\circ$$

$$\angle F = 180 - 105 - 26$$

$$\angle F = 49^\circ$$

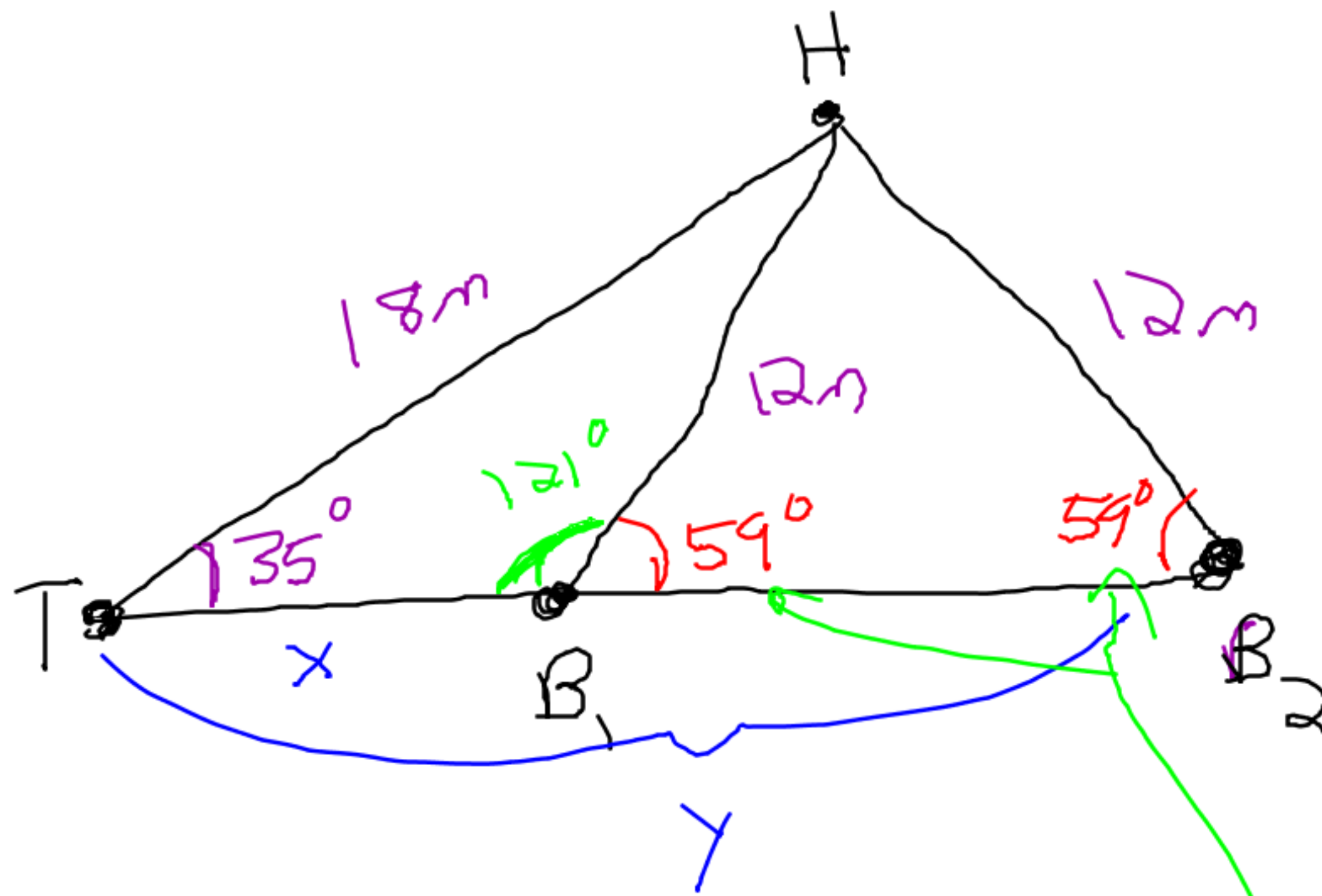
$$\frac{f}{\sin 49} = \frac{37}{\sin 105}$$

$$f = \frac{37 \sin(49)}{\sin(105)} = 28.9$$

Ambiguous Case

A hot air balloon is coming in for a landing. Tim and Brenda are helping to bring it down with ropes.

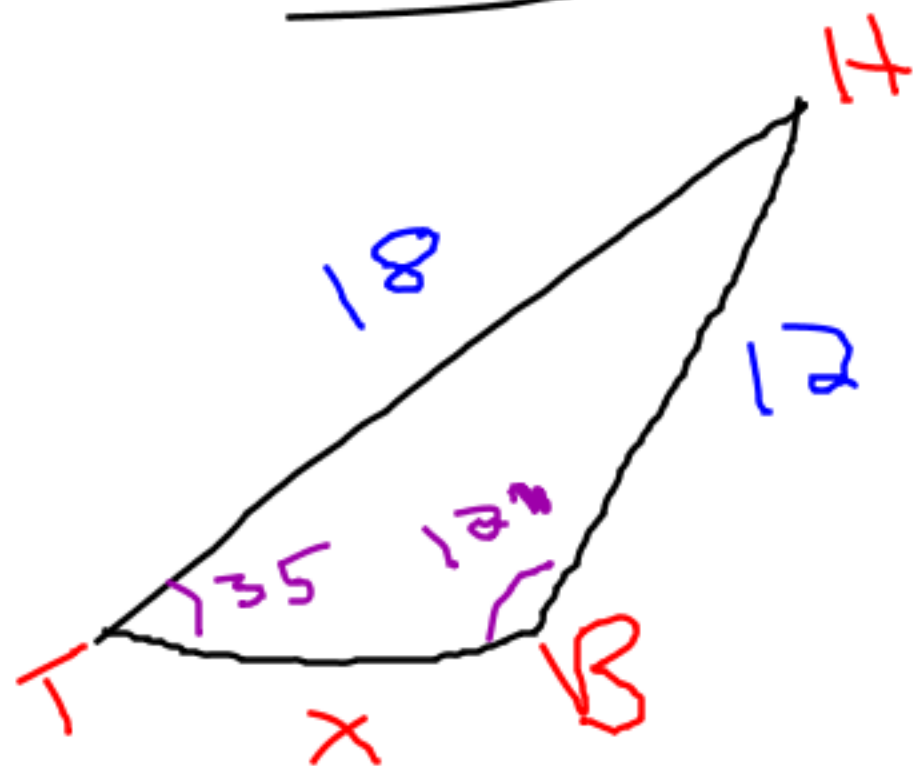
Tim has a rope of 18m and Brenda a rope of 12m. Tim is holding his rope at an angle of elevation of 35° . How far apart are Tim and Brenda?



$$\frac{\sin B}{18} = \frac{\sin 35}{12}$$

$$B = \sin^{-1}\left(\frac{18 \sin 35}{12}\right) = 59^\circ$$

Same Side



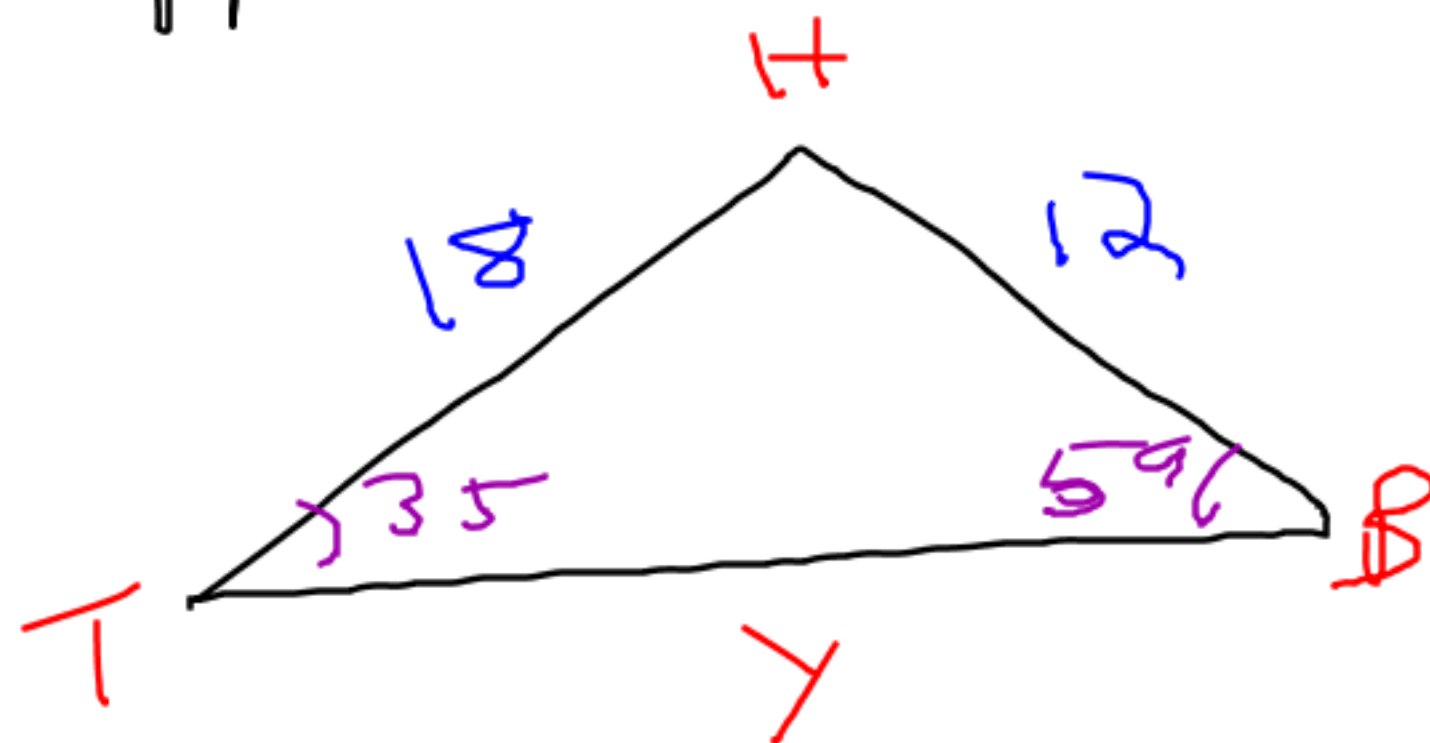
$$\angle H = 180 - 35 - 121$$

$$\angle H = 24^\circ$$

$$\frac{x}{\sin 24} = \frac{12}{\sin 35}$$

$$x = \frac{12 \sin 24}{\sin 35} = 8.5 \text{ m}$$

Opposite sides



$$\angle H = 180 - 35 - 59 = 86^\circ$$

$$\frac{y}{\sin 86} = \frac{12}{\sin 35}$$

$$y = \frac{12 \sin 86}{\sin 35}$$

$$y = 20.1 \text{ m}$$