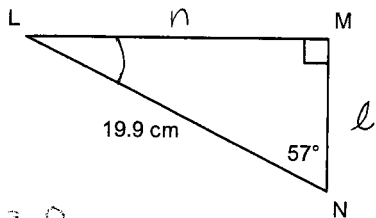


$$180^\circ - (90^\circ + 57^\circ) = 33^\circ$$

## Problems Involving Two Triangles – notes

Recap:

Solve this right triangle. Give the measures to the nearest tenth.



$$\cos \theta = \frac{a}{h}$$

$$\cos 57^\circ = \frac{l}{19.9}$$

$$\sin \theta = \frac{o}{h}$$

$$\sin \angle L = \frac{10.8}{19.9}$$

$$\sin \theta = \frac{o}{h}$$

$$\sin 57^\circ = \frac{n}{19.9}$$

$$19.9 \times \sin 57^\circ = n$$

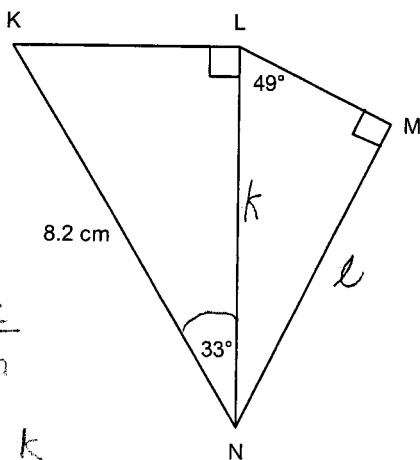
$$16.7 \text{ cm} = n$$

$$l = 19.9 \times \cos 57^\circ$$

$$l = 10.8 \text{ cm}$$

$$\angle L = 32.9^\circ$$

1. Determine the length of MN to the nearest tenth of a centimetre.



$$\sin \theta = \frac{o}{h}$$

$$\sin 49^\circ = \frac{l}{6.9}$$

$$\cos \theta = \frac{a}{h}$$

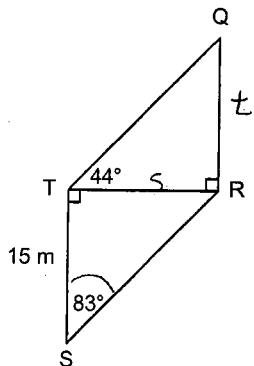
$$\cos 33^\circ = \frac{k}{8.2}$$

$$l = 6.9 \times \sin 49^\circ$$

$$l = 5.2 \text{ cm}$$

$$k = 8.2 \times \cos 33^\circ \quad k = 6.9 \text{ cm}$$

2. Determine the length of QR to the nearest metre.



$$\tan \theta = \frac{o}{a}$$

$$\tan 83^\circ = \frac{s}{15}$$

$$s = 15 \times \tan 83^\circ$$

$$s = 122$$

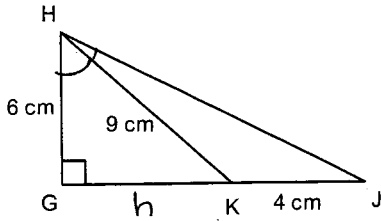
$$\tan \theta = \frac{o}{a}$$

$$\tan 44^\circ = \frac{122}{t}$$

$$t = \frac{122}{\tan 44^\circ}$$

$$t = 126 \text{ m}$$

3. Calculate the measure of  $\angle GHJ$  to the nearest tenth of a degree.



$$\tan \theta = \frac{o}{a}$$

$$\tan \theta = \frac{10.7}{6}$$

$$\angle GHJ = 60.7^\circ$$

$$h^2 + 6^2 = 9^2$$

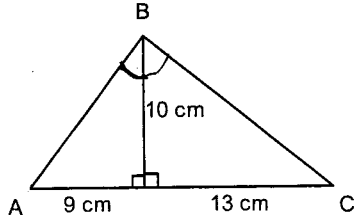
$$h^2 + 36 = 81$$

$$h^2 = \sqrt{45}$$

$$h = 6.7$$

$$6.7 + 4 = 10.7 \text{ cm}$$

4. Calculate the measure of  $\angle ABC$  to the nearest degree.



$$\tan \theta = \frac{o}{a}$$

$$\tan \theta = \frac{o}{a}$$

$$\tan \theta = \frac{9}{10}$$

$$\tan \theta = \frac{13}{10}$$

$$\angle = 41.987^\circ$$

$$\angle = 52.431^\circ$$

$$42^\circ \quad 42^\circ + 52^\circ$$

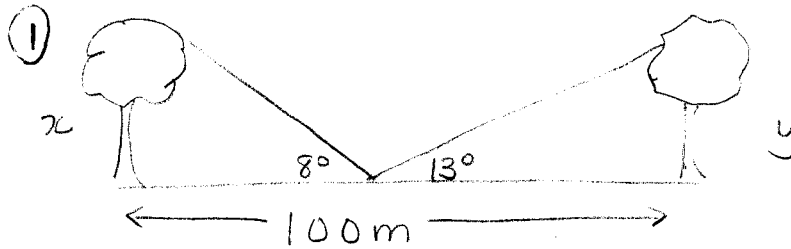
$$41.987 + 52.431$$

$$\angle B = 94^\circ$$

## SOLVING PROBLEMS USING MORE THAN ONE RIGHT TRIANGLE.

### Example 1:

Two trees are 100 m apart. From a point midway between them, the angles of elevation to their tops are  $8^\circ$  and  $13^\circ$ . How much taller is one tree than the other? Answer to the nearest centimetre.



(4)  $1200 - 700 = 500\text{cm}$   
One tree is 500cm taller than the other.

(2)  $\tan \theta = \frac{o}{a}$

(3)  $\tan \theta = \frac{o}{a}$

$\tan 8^\circ = \frac{x}{50}$

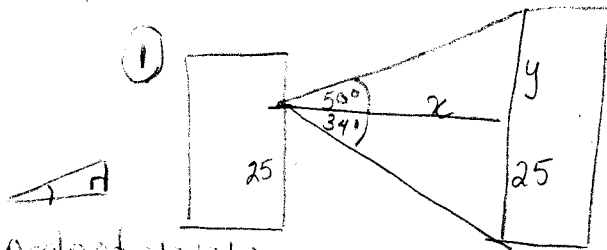
$\tan 13^\circ = \frac{y}{50}$

$x = 50 \times \tan 8^\circ$   
 $x = 7\text{m OR } 700\text{cm}$

$y = 50 \times \tan 13^\circ$   
 $y = 12\text{m OR } 1200\text{cm}$

### Example 2:

The 8<sup>th</sup> floor of an apartment building is 25 m above the ground. From the 8<sup>th</sup> floor, the angle of elevation to the top of another taller building is  $50^\circ$ . The angle of depression to the base of the taller building is  $34^\circ$ . Determine the height of the taller building.



(4)  $25 + 44 = 69\text{m}$   
The taller building is 69m.

(2)  $\tan \theta = \frac{o}{a}$

(3)  $\tan \theta = \frac{o}{a}$

$\tan 34^\circ = \frac{25}{x}$

$\tan 50^\circ = \frac{y}{37\text{m}}$

$x = \frac{25}{\tan 34^\circ}$

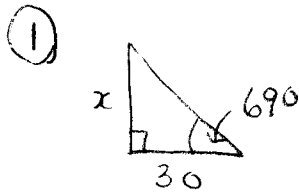
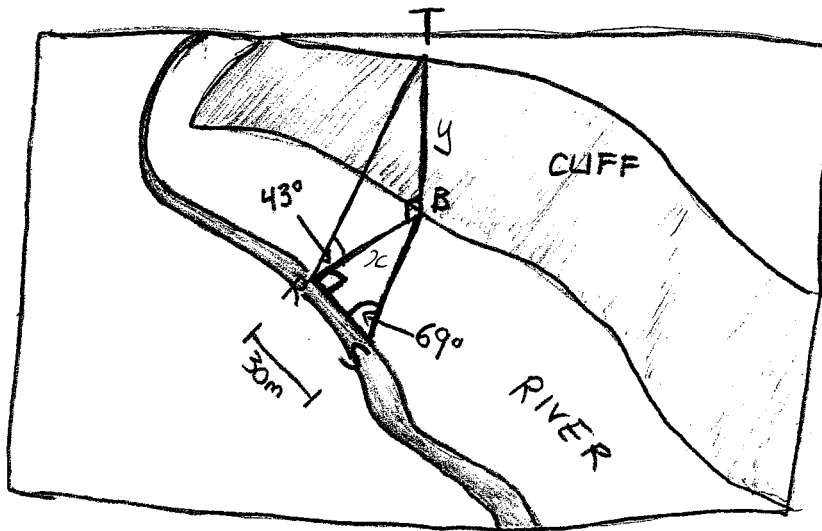
$y = 37\text{m} \times \tan 50^\circ$

$x = 37\text{m}$

$y = 44\text{m}$

**Example 3:**

The PCHS climbing club plans to scale a cliff overlooking a river. To prepare for the climb, a surveyor visited the site and took some measurements to calculate the height of the cliff. From a point R on the shore directly across the river, the angle of elevation to the top of the cliff is  $\angle TRB = 43^\circ$ . From a point S, 30 m down the river,  $\angle BSR = 69^\circ$ . How high is the cliff? Express the answer to the nearest metre.

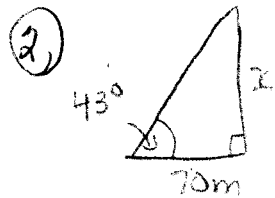


$$\tan \theta = \frac{o}{a}$$

$$\tan 69^\circ = \frac{x}{30}$$

$$x = 30 \times \tan 69^\circ$$

$$x = 78 \text{ m}$$



$$\tan \theta = \frac{o}{a}$$

$$\tan 43^\circ = \frac{y}{70}$$

$$y = 78 \times \tan 43^\circ$$

$$y = 73 \text{ m}$$

The cliff is 73 m