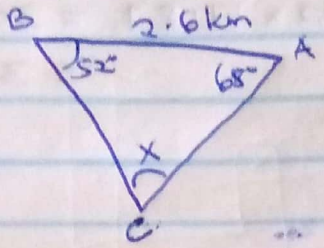
UNIT 7 : TRIGONOMETRY

1.



Angle $x = 180 - (52+68)$

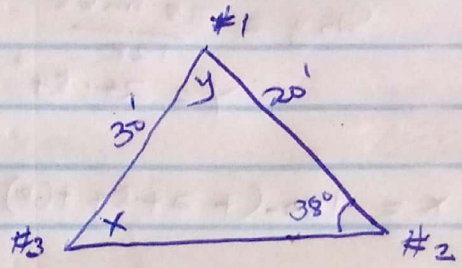
$x = 60$

By sine rule

$$\frac{2.6}{\sin 60} = \frac{AC}{\sin 52}$$

$$\Rightarrow AC = \frac{2.6 \sin 52}{\sin 60} = 2.365 = 2.4 \text{ km}$$

2.



By sine rule

$$\frac{20}{\sin x} = \frac{30}{\sin 38}$$

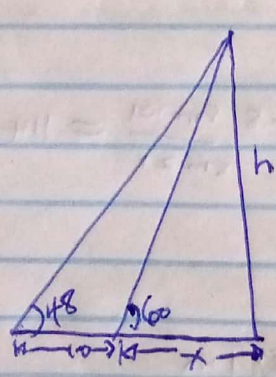
$$\sin x = \frac{20}{30} \sin 38$$

$$x = 24.23^\circ$$

$\angle y = 180 - (38 + x)$

$= 180 - (38 + 24.23) = 117.77$

3



$$\tan 48 = \frac{h}{10+x} \quad \text{---(i)}$$

$$\tan 60 = \frac{h}{x} \quad \text{---(ii)}$$

OA / AH

$$1.1106 = \frac{h}{10+x} \Rightarrow h = 11.106 + 1.1106x \quad \text{---(iii)}$$

$$1.732 = \frac{h}{x}$$

$$h = 1.732x \quad \text{---(iv)}$$

equating (iii) and (iv) $\quad 1.732x = 11.106 + 1.1106x$

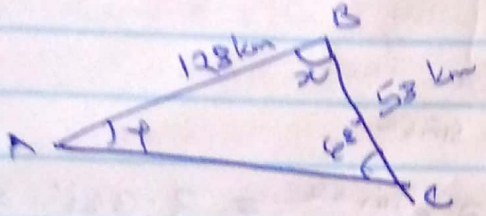
$$x = 17.87$$

4 $1.732 = h/x$

$h = 1.732x = 1.732 \times 17.87 = 30.96$

$= 31\,m$

(11)



By sine rule to get $\angle y$ $\quad \frac{58}{\sin y} = \frac{128}{\sin 68}$

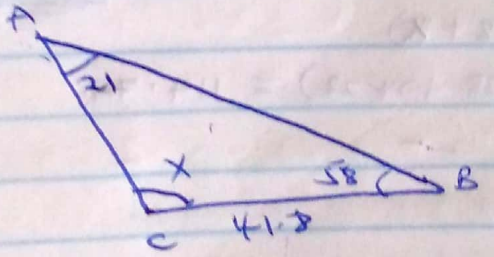
$\sin y = \frac{58 \sin 68}{128}$

$y = 24.84°$

$\angle ABC = x = 180 - (+24.84 + 68) = 87.15$

$= 87°$

5



$\angle x = 180 - (21 + 58)$

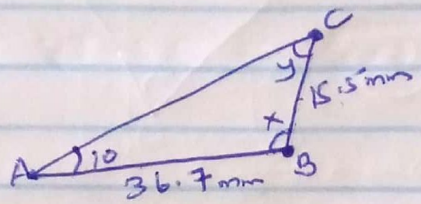
$= 101°$

$\frac{AB}{\sin 101} = \frac{41.8}{\sin 21} \Rightarrow AB = 41.8 \frac{\sin 101}{\sin 21} = 114.5\,m$

$\frac{AC}{\sin 58} = \frac{41.8}{\sin 21}$

$AC = 41.8 \frac{\sin 58}{\sin 21} = 98.9\,m$

6.



$$\frac{15.5}{\sin 10} = \frac{36.7}{\sin y}$$

$$\sin y = \frac{36.7 \sin 10}{15.5}$$

$$y = 24.28^\circ$$

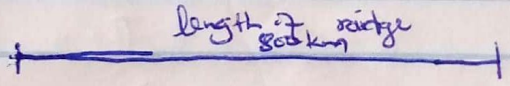
$$= 24^\circ$$

$$x = 180 - (24 + 10) = 146^\circ$$

$$\frac{AC}{\sin x} = \frac{15.5}{\sin 10}$$

$$AC = \frac{15.5 \sin 146}{\sin 10} = 49.9\,m$$

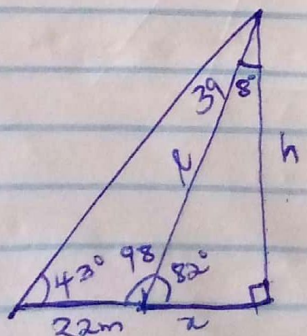
7. length = 800 km



Most economical thing to do is leave a supply of fuel at a distance of 500 km from the start, travel back to the start and refill and start the journey afresh, when 500 km are over it will refill and finish the remaining 300 km

Total distance = (500 × 3) + 300 = 1800 km

8.



$$\tan 82 = \frac{h}{x}$$

$$7.115 = \frac{h}{x} \Rightarrow h = 7.115x \quad \text{--- (i)}$$

$$\tan 43 = \frac{h}{22 + x} \Rightarrow h = 20.52 + 0.932x \quad \text{--- (ii)}$$

$$7.115x = 20.52 + 0.932x$$

$$x = 3.32$$

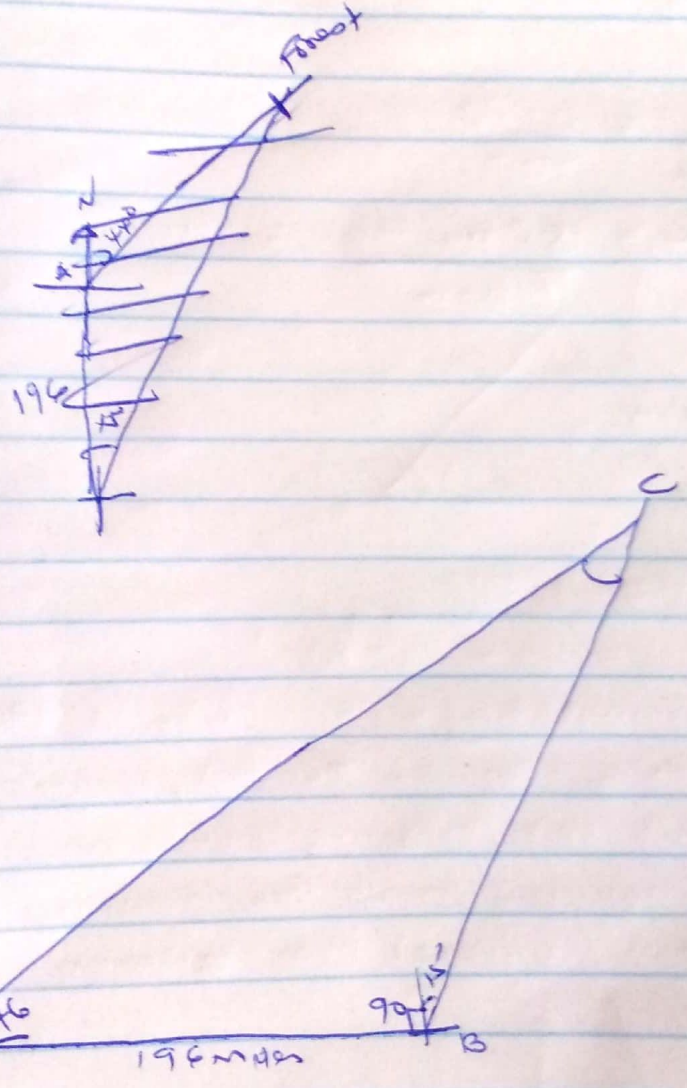
$$h = 23.62$$

length of the pole = l

$$l = \sqrt{x^2 + h^2}$$

$$l = \sqrt{3.32^2 + 23.62^2} = 23.85 = 23.9\ m$$

9.



$\angle ACB = 180 - (46 + 90 + 15) = 29°$

Sine rule $\frac{196}{\sin 29} = \frac{AC}{\sin 15}$

$$AC = 196 \frac{\sin 15}{\sin 29} = 390.5 \text{ miles}$$