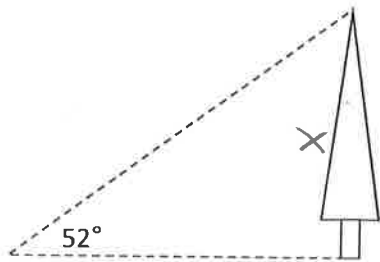


Trigonometry Word Problems

THESE ARE TRICKY
BUT BE PERSISTANT



1. A fir tree is located on Vancouver Island. The **angle of elevation** measured by an observer who is **85m from the base of the tree** is 52° . How tall is the tree to the nearest meter?



85m

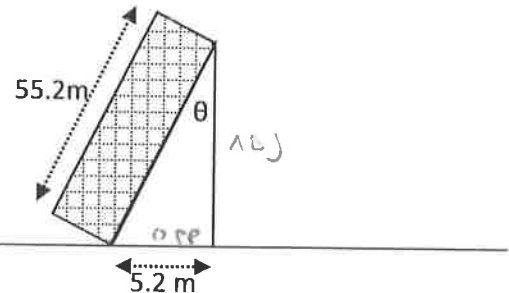
$$\tan 52^\circ = \frac{\text{OPP}}{\text{ADJ}}$$

$$\tan 52^\circ = \frac{x}{85}$$

$$(85) \tan 52^\circ = x$$

$$x = 109 \text{ m}$$

2. The following diagram shows the approximate measurements for the Leaning Tower of Pisa.



BOTH
RIGHT
TRIANGLES

SOH CAH
TOA

Find the angle θ to the nearest degree that the tower makes with the vertical.

$$\sin \theta = \frac{\text{OPP}}{\text{HYP}}$$

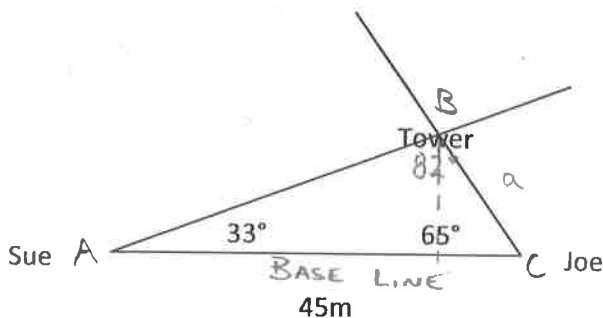
$$\sin \theta = \frac{5.2}{55.2}$$

$$\sin \theta = 0.0942$$

2ND SIN⁻¹

$$\theta = 5.4^\circ$$

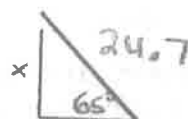
3. Sue and Joe are 45m from each other. Sue sees a distant tower at an angle of 33° from Joe. Joe sees the same tower at 65° from Sue. How far is the tower from Joe? How far is it from the baseline?



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

$$\frac{\sin 82^\circ}{45} = \frac{\sin 33^\circ}{a}$$

$$a = 24.7 \text{ m}$$

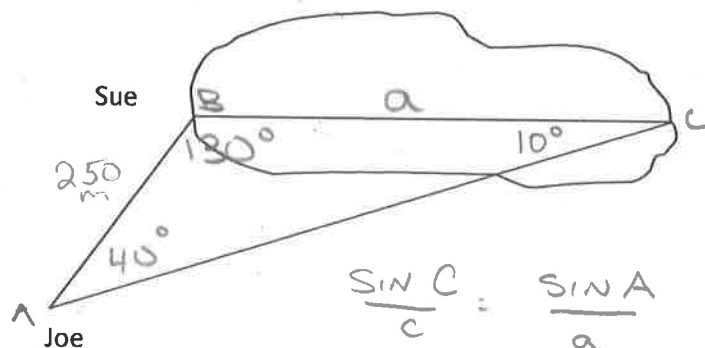


$$\sin 65^\circ = \frac{\text{OPP}}{\text{HYP}}$$

$$\sin 65^\circ = \frac{x}{24.7}$$

$$x = 22.4 \text{ m}$$

4. Sue stands on the edge of a lake and sees the end as being 130° from Joe. Joe sees the same end of the lake as being 40° from Sue. Sue and Joe are 250 m apart. How wide is the lake?



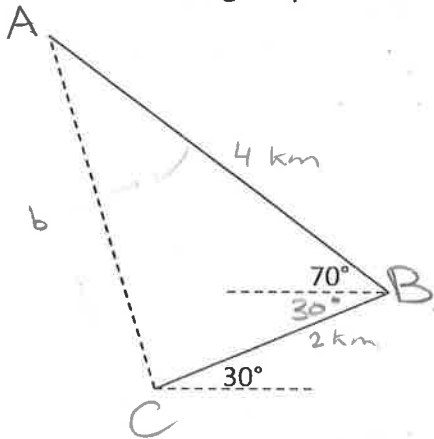
$$\frac{\sin C}{c} = \frac{\sin A}{a}$$

$$\frac{\sin 10^\circ}{250} = \frac{\sin 40^\circ}{a}$$

$$a = 925 \text{ m}$$

N
W E
S

5. A boat goes 30° North of East for 2 km, then turns and goes 70° North of West for 4 km. How far from the original point does it end up?



$$b^2 = a^2 + c^2 - 2ac \cos B$$

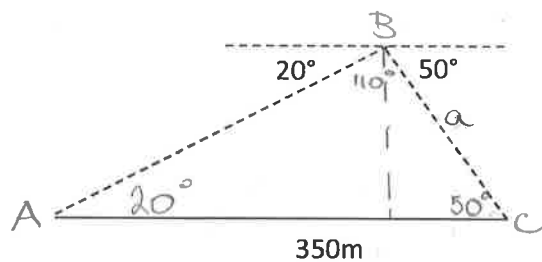
$$b^2 = 2^2 + 4^2 - 2(2)(4) \cos 100$$

$$b^2 = 20 - (-2.778)$$

$$b^2 = 20.778$$

$$b = 4.6 \text{ km}$$

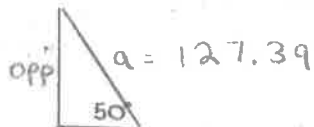
7. You are in a hot air balloon and see Sue at an angle of depression of 50° , and Joe on the other side at an angle of 20° . If Joe and Sue say they are separated by 350m, how high are you?



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

$$\frac{\sin 20}{a} = \frac{\sin 110}{350}$$

$$a = 127.39 \text{ m}$$



SOH CAH TOA

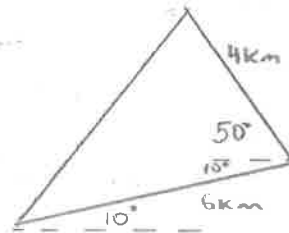
$$\sin 50 = \frac{\text{OPP}}{\text{HYP}}$$

$$\sin 50 = \frac{\text{OPP}}{127.39} \times (127.39)$$

$$\text{OPP} = 97.56 \text{ m}$$

HEIGHT
97.6 m

6. A boat goes 10° North of East for 6 km, then turns and goes 50° North of West for 4 km. How far from original point does it end up? (draw a diagram)



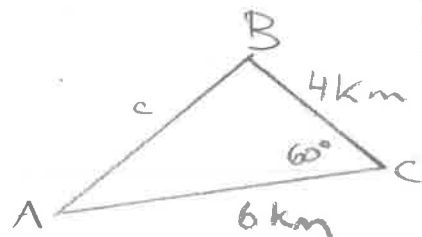
$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = 4^2 + 6^2 - 2(4)(6) \cos 60$$

$$c^2 = 52 - 24$$

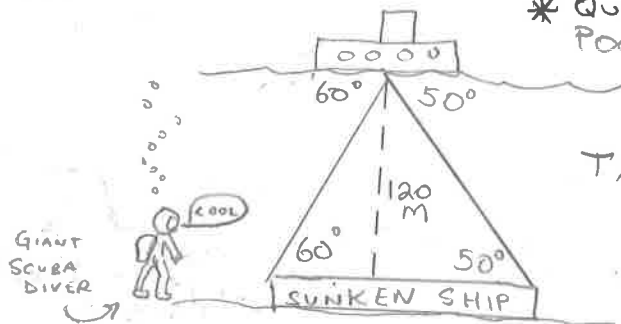
$$c^2 = 28$$

$$c = 5.29 \text{ km}$$



8. You are in a boat and find a submerged wreck of an old boat with sonar. One end has an angle of depression of 60° , and the other has an angle of depression of 50° . If the depth of the water is 120m, how big is the wreck? (draw a diagram).

* QUESTION IS WRITTEN POORLY



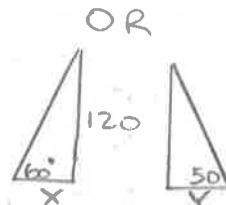
$$\tan 60 = \frac{120}{x}$$

$$x = 69 \text{ m}$$

$$\tan 50 = \frac{120}{y}$$

$$y = 101 \text{ m}$$

$$x + y = 170 \text{ m}$$



Answers: (1) 109m (2) 5.4° (3) joe is 24.7m, base is 22.4m (4) 925m (5) 4.77 km (6) 5.3km (7) 97.6 km (8) 170m