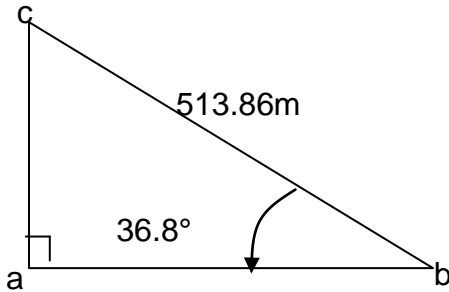


MATHEMATICS ANSWERS

Level One

“Surveying” the River Width

1.



$$\frac{ca}{513.86} = \sin(36.8)$$

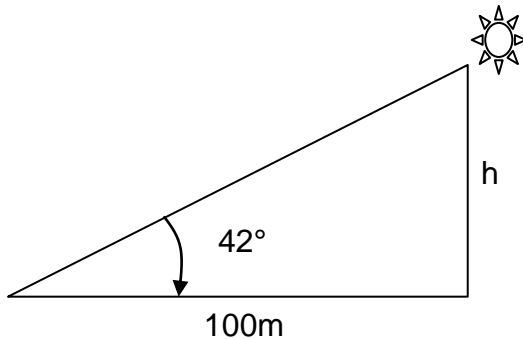
$$ca = 307.81 \text{ m}$$

$$\therefore \text{Width} = 305.81 \text{ m}$$

$$ab = \sqrt{(513.86)^2 - (307.81)^2}$$

$$ab = 411.46 \text{ m}$$

2.

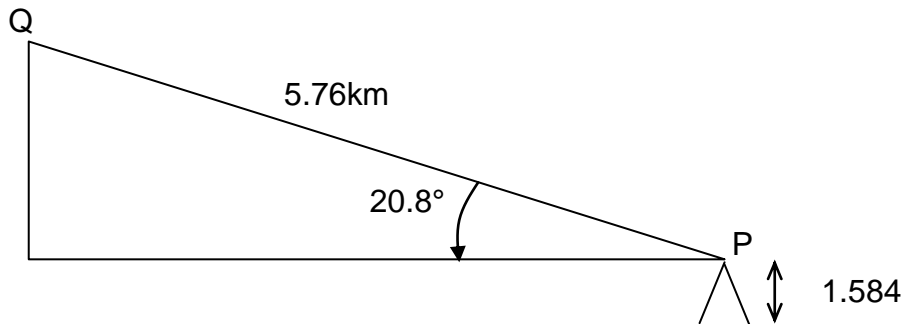


$$h = \tan 42^\circ \times 100$$

$$h = 99.04 \text{ m}$$

You would need to add the instrument height to get the true elevation of the tower.

3. As shown in the diagram below:



$$\begin{aligned} \text{Mountain height} &= \sin(20.8^\circ) \times 5.76 + 1.584 \\ &= 2045.416 + 1.584 \\ &= 2047 \text{ m} \end{aligned}$$

Use Pythagoras theorem to calculate that the instrument is set up 5384m away

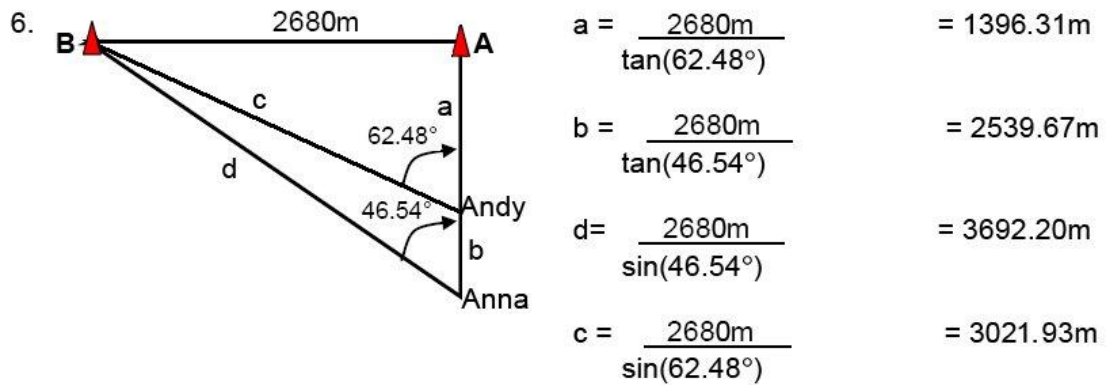
4. $\tan^{-1}(60/25) = 67.38^\circ$

5.

a. 39.81°

b. 90°

c. On the equator but really anywhere between the Tropic of Capricorn and the Tropic of Cancer, depending upon the time of the year.



So answers to 6:

a) as labelled in the diagram above

b) lengths $b - a = 1143.36\text{m}$

c) Andy's distance to A = 1396.31m and to B = 3021.93m

d) Anna's distance to A = 2539.67m and to B = 3692.20m