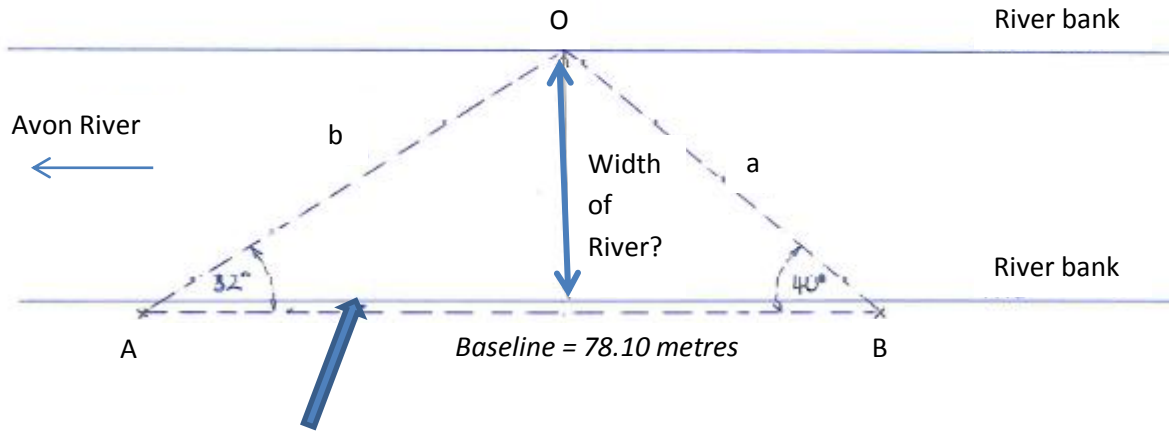
Surveying - Answers	Curriculum Area: Mathematics and Statistics, Level 5-6	Strand: Geometry and Measurement
Achievement Objectives:	*Apply trigonometric ratios and Pythagoras' theorem in two dimensions*	
Learning Intention:	Apply laws of trigonometry to find the location of a set point	

A surveyor marks 2 positions on one side of the Avon River, a metre off the bank, measures 78.10 metres between them, then sets up a theodolite at each position and measures the angles at A & B to 0.

Question; What is the width of the of the Avon River at Point 0?



Baseline is 1 metre off the river bank

Angle A = 32 degrees
Angle B = 40 degrees

[Use the sine rule to find the unknown sides of the triangle]

Show your working here:

Answer

- Angle at opposite bank is $180° - 32° - 40° = 108°$.
- Using sine rule, unknown sides of triangle are: $\frac{78.10}{\sin 108°} = \frac{a}{\sin 32°} = \frac{b}{\sin 40°}$

$a = \sin 32° \times \frac{78.10}{\sin 108°} = 43.52\text{m}$

$b = \sin 40° \times \frac{78.10}{\sin 108°} = 52.79\text{m}$

- Perpendicular distance from baseline to opposite bank $= 52.79 \times \sin 32° = 27.97$
  or $43.52 \times \sin 40° = 27.97$
- Width of river is $27.97 - 1 = 26.97$ metres