

MATHEMATICS

Level Two

Mountains

Task A

A typical surveying problem is how to measure the distance between two points (A and D) when you cannot see between them. If the following measurements were made: -

Angle AEB = $45^{\circ}12'37'' = \alpha$

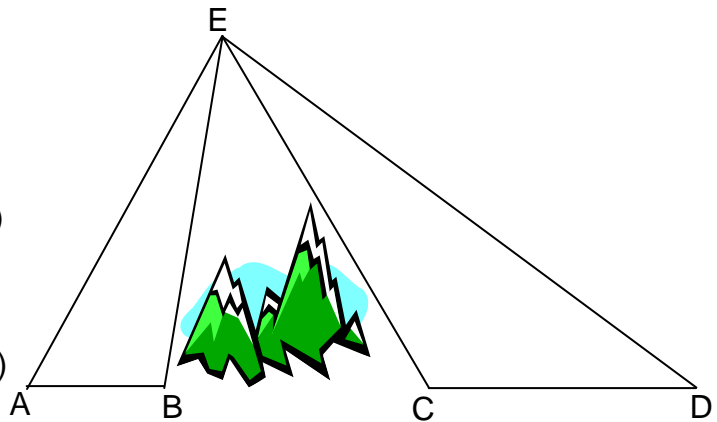
Angle BEC = $38^{\circ}25'48'' = \beta$

Angle CED = $54^{\circ}33'28'' = \lambda$

Length AB = 436.325m (label it x)

Length BC = ? (label it y)

Length of CD = 542.8m (label it z)



(Note: - Assume that A, B, C, and D are all on the same straight line)

Work through the following question to find the length of BC. Let the Line BC = y and label the rest of the diagram with what you know.

- 1) In algebraic form, write a formula to compute the distance EB using the triangle EAB. (*Hint: what rules can you use for these triangles?*)
- 2) Write another formula to find EC using the ECA triangle.
- 3) Using these results, write an equation for EB/EC (the fraction between EB and EC)
- 4) Repeat questions 1-3 for $\triangle EBD$ and $\triangle ECD$ deriving formulas for the same lengths EB and EC, and finally an equation for $EB \div EC$, the fraction.
- 5) Rearrange the equations to solve for y and hence find the distance BC
- 6) What is the length of the baseline AD?

