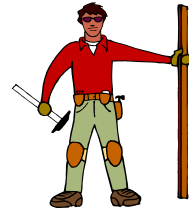


# MATHEMATICS

## Level Two



### Engineering ideas

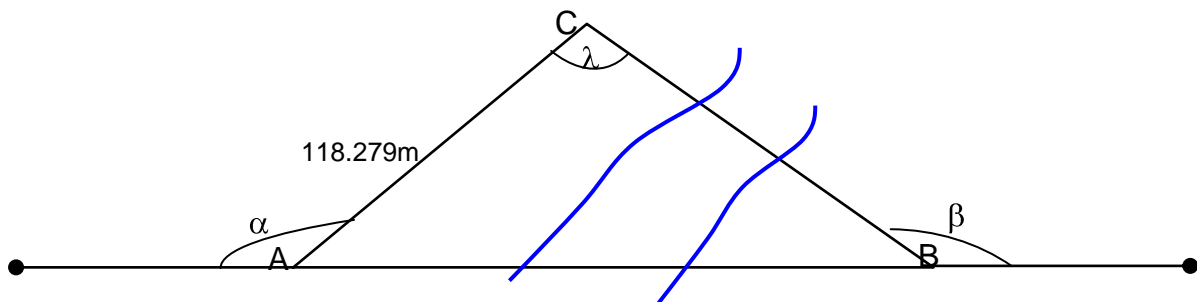
When setting out an engineering baseline for construction on a new sports stadium, Chandler measured an angle from the zenith (the point vertically above him) of  $111^{\circ}26'00''$  and a slope distance of 148.61m. The height of his instrument was 1.42m and elevation at ground level was 252.924m. The staff that Joey was holding was read at 1.49m

1. Draw a diagram to illustrate the above situation
2. Calculate the horizontal distance
3. Calculate the elevation at the foot of Joey's staff

Later in the week Chandler and Joey went out on another job. They completed a closed traverse from A to B to C to D then back to A (i.e. you start and end on the same point). The following bearings were measured:

$$\begin{aligned}AB &= 61^{\circ}27' \\BC &= 138^{\circ}31' \\CD &= 196^{\circ}20' \\DA &= 296^{\circ}41'\end{aligned}$$

4. Compute the interior angles and provide a geometric check on your work.
5. Ross wishes to determine the distance AB. He can't measure it directly because of scrub so instead he measures other quantities.



If  $\alpha$ ,  $\lambda$  and  $\beta$  are equal to  $114^{\circ}48'$ ,  $51^{\circ}46'$ , and  $117^{\circ}10'$  respectively, complete the following problems.

- a) Calculate the interior angles of the triangle
- b) Calculate the error in the angles. (Hint: a triangle should add to  $180^{\circ}$ )
- c) Distribute this error evenly over the angles.
- d) Calculate the distance of AB.