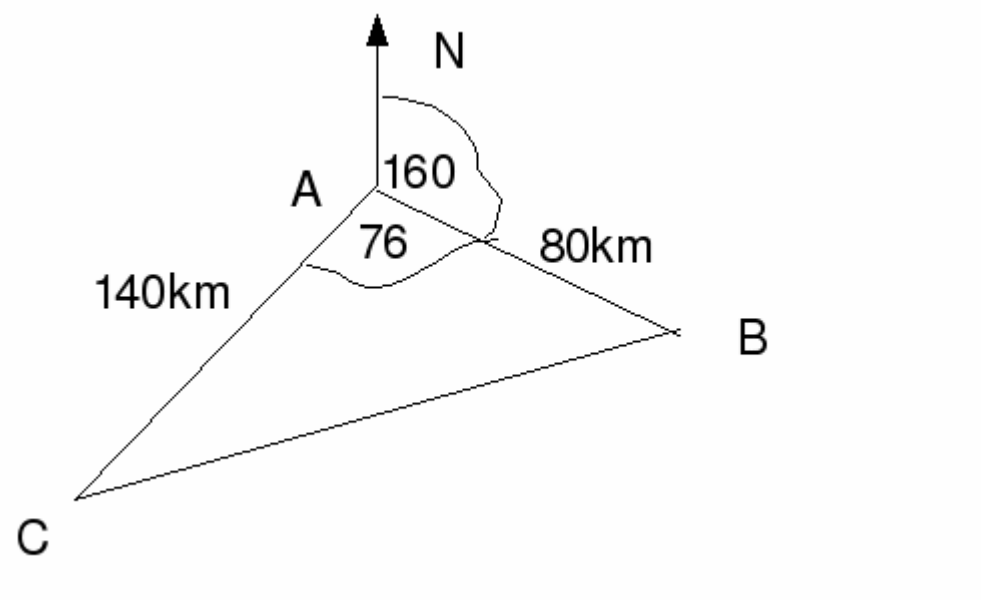
Bearings

Bearings involve using trigonometry, generally the cosine or sine rules:

Cosine Rule: $a^2 = b^2 + c^2 - 2\text{bc} * cosA$

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



For the above diagram, find

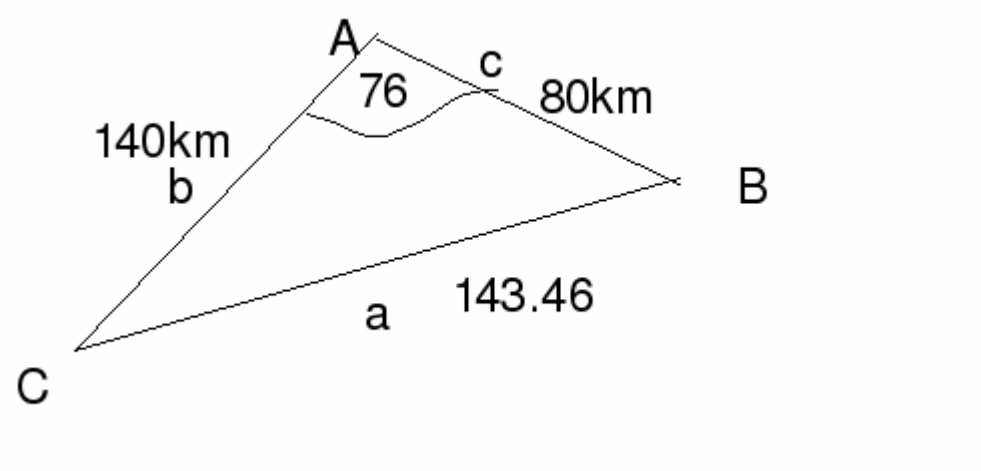
a)The distance BC

b)The bearing of A from B and the bearing of B from C.

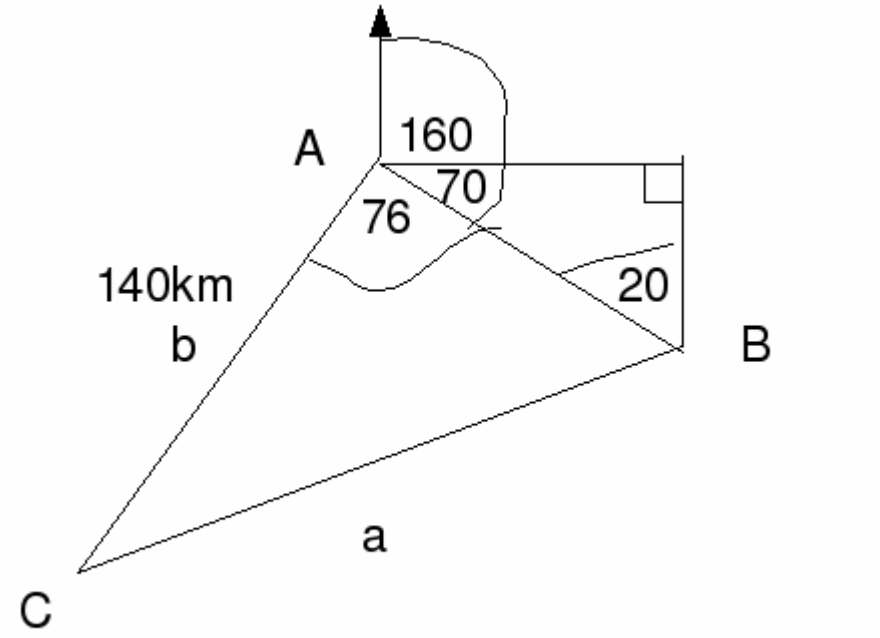
a)Label the triangle as above, with sides labelled by little letters opposite angles labelled by big letters.

$BC^2 = a^2 = b^2 + c^2 - 2\text{bc} * cosA = 140^2 + 80^2 - 2 * 140 * 80 * cos76 = 20581$

so $BC = a = \sqrt{20580} = 143.46\text{km}.$



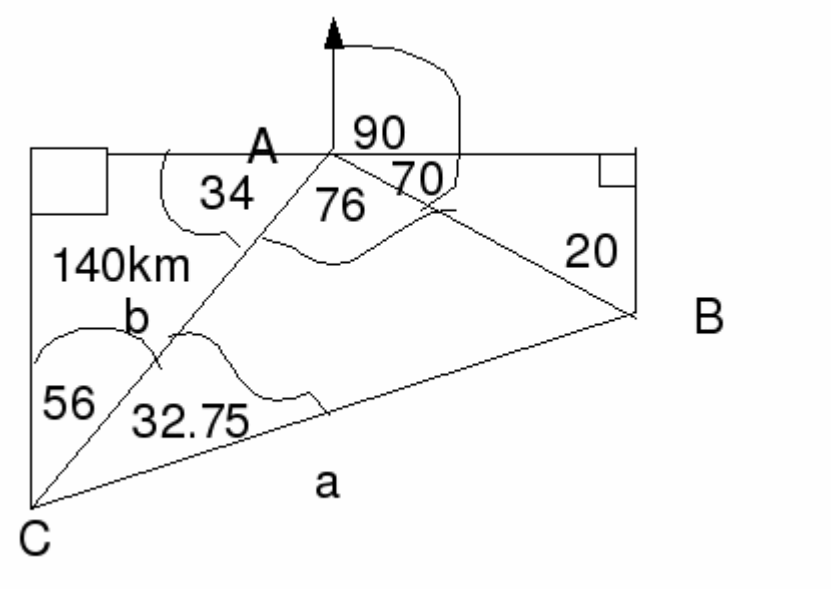
b)



We draw a right angled triangle between A and B. Construct a right angled triangle at A and a horizontal line starting from A to the right. The internal angles of the right angled triangle are 70 and 20 degrees. Hence the bearing of A from B is 360-20=340 degrees.

To find the bearing of B from C, use the Sine Rule to find C.

$$\frac{c}{\sin C}=\frac{a}{\sin A}\rightarrow sinC=\frac{c*\sin A}{a}=\frac{80*sin76}{143.46}=0.5411\rightarrow C=\sin^{-1}(0.5411)=32.76\ degrees.$$



Construct the right angled triangle as shown, with the angles at C then the bearing is 56+32.75=88.75 degrees.