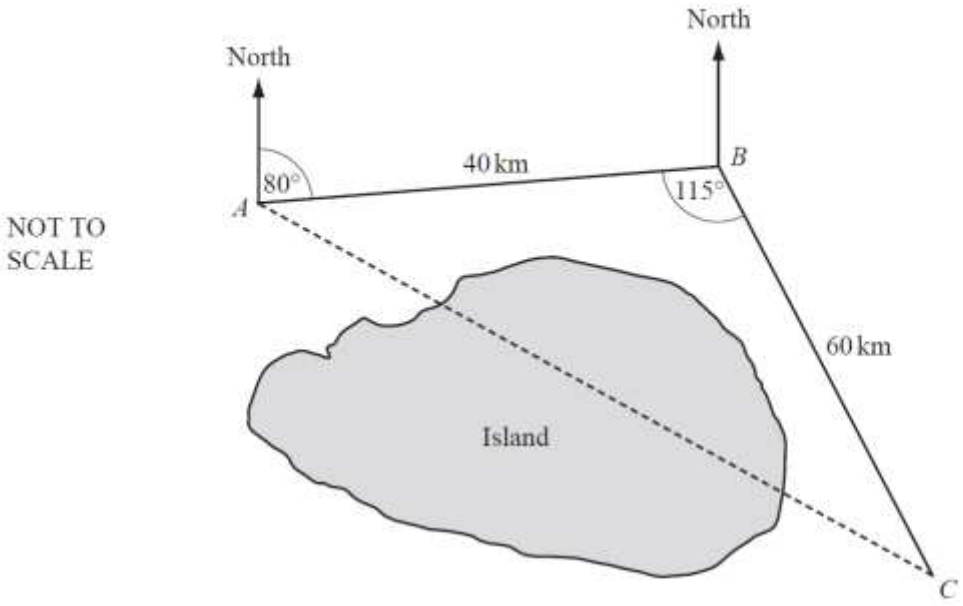
NON-RIGHT ANGLED TRIGONOMETRY

ANGLES OF ELEVATION & DEPRESSION

1.



To avoid an island, a ship travels 40 kilometres from A to B and then 60 kilometres from B to C.

The bearing of B from A is 080° and angle ABC is 115°.

(a) The ship leaves A at 11 55.

It travels at an average speed of 35 km / h.

Calculate, to the nearest minute, the time it arrives at C. [3]

(b) Find the bearing of

(i) A from B, [1]

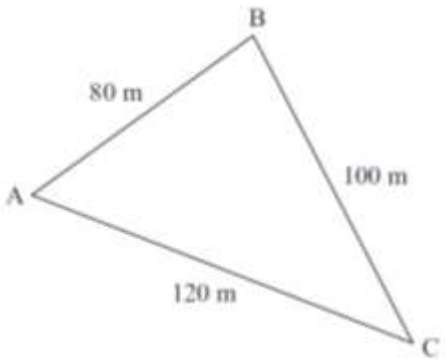
(ii) C from B. [1]

(c) Calculate the straight line distance AC. [4]

(d) Calculate angle BAC. [3]

(e) Calculate how far C is **east** of A. [3]

2. In a fitness exercise, students run across a field from A to B, then from B to C and then from C to A.



a A student runs from A to B in 10 seconds. Calculate his speed in

i metres/second **ii** kilometres/hour

b Another student runs from A to B in 10.5 seconds, from B to C in 13 seconds and from C to A at a *speed* of 8.5 m/s. Calculate her overall average speed in metres/second.

c Showing all your working, calculate angle BAC.

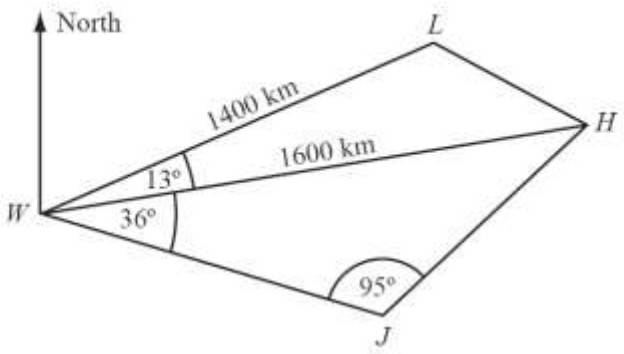
d The bearing of B from A is 062°. Calculate

i the bearing of C from A **ii** the bearing of A from C

e There is a vertical flag pole at A. Find the height of the pole if the angle of elevation from C to the top of the pole is 35°

f There is another vertical pole at B which is 125m high. Find the angle of depression from the top of the pole at B to the top of the pole at A .

3.



NOT TO SCALE

The diagram shows the positions of four cities in Africa, Windhoek (W), Johannesburg (J), Harari (H) and Lusaka (L).
$WL = 1400$ km and $WH = 1600$ km.
Angle $LWH = 13°$, angle $HWJ = 36°$ and angle $WJH = 95°$.

(a) Calculate the distance LH. [4]

(b) Calculate the distance WJ. [4]

(c) Calculate the area of quadrilateral $WJHL$. [3]

(d) The bearing of Lusaka from Windhoek is 060°.
Calculate the bearing of

(i) Harari from Windhoek, [1]

(ii) Windhoek from Johannesburg. [1]

(e) On a map the distance between Windhoek and Harari is 8 cm.
Calculate the scale of the map in the form $1:n$. [2]

(f) Calculate the shortest distance from L to WH *(the shortest distance would be a perpendicular from L to WH)*