Advanced Trigonometry

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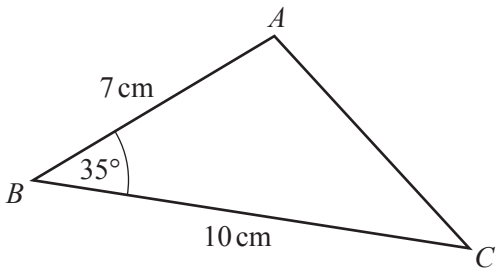
26



NOT TO SCALE

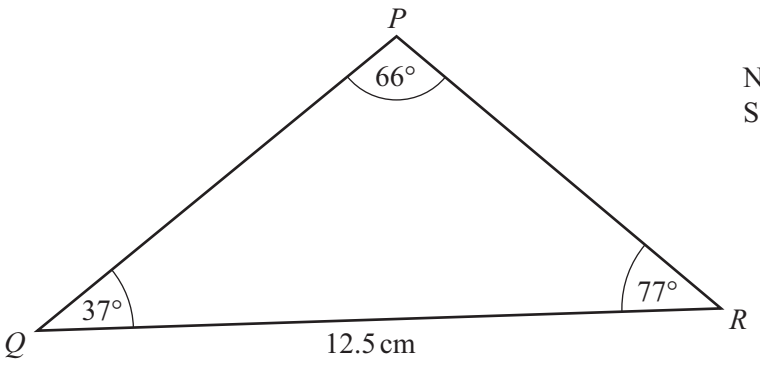
(a) Calculate the area of triangle *ABC*.

..... cm^2 [2]

(b) Calculate the length of *AC*.

AC = ... cm [4]

14



NOT TO SCALE

Calculate *PR*.

Answer PR = ... cm [3]

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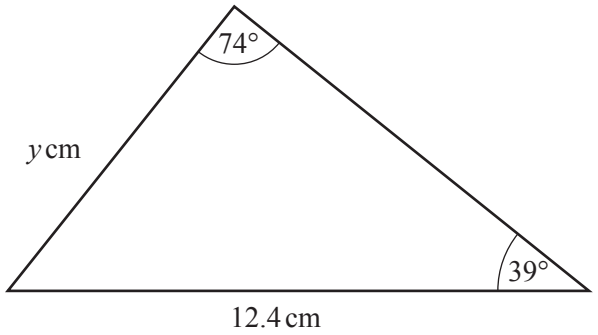
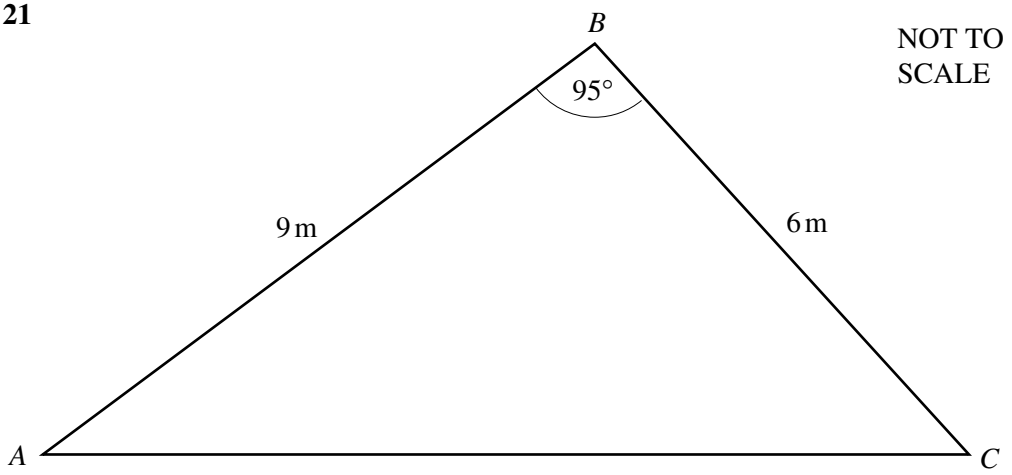


NOT TO SCALE

Calculate the value of y.

For Examiner's Use

21



NOT TO SCALE

The triangular area *ABC* is part of Henri's garden.
AB = 9 m, *BC* = 6 m and angle *ABC* = 95 °.
Henri puts a fence along *AC* and plants vegetables in the triangular area *ABC*.
Calculate

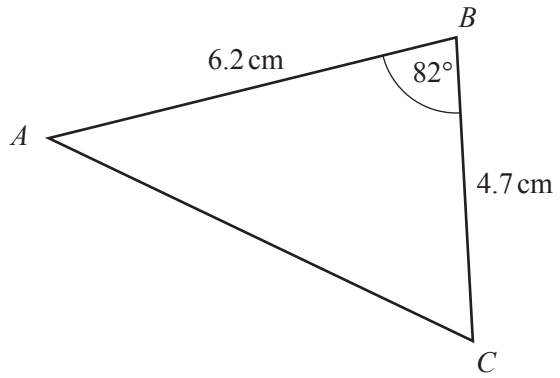
(a) the length of the fence *AC*,

Answer (a) AC = ... m [3]

(b) the area for vegetables.

Answer (b) ..... m^2 [2]

21 (a)

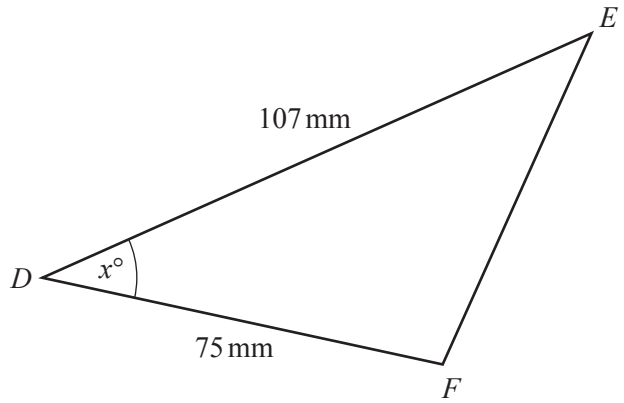


NOT TO SCALE

Calculate the area of triangle *ABC*.

..... cm^2 [2]

(b)



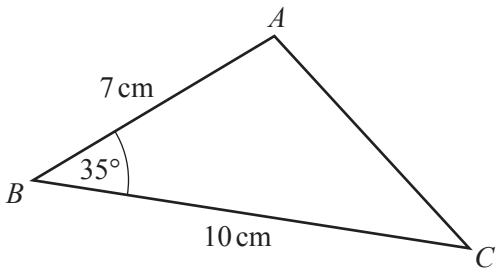
NOT TO SCALE

The area of triangle *DEF* is 2050 mm^2.

Work out the value of x.

x = ... [2]

26



NOT TO SCALE

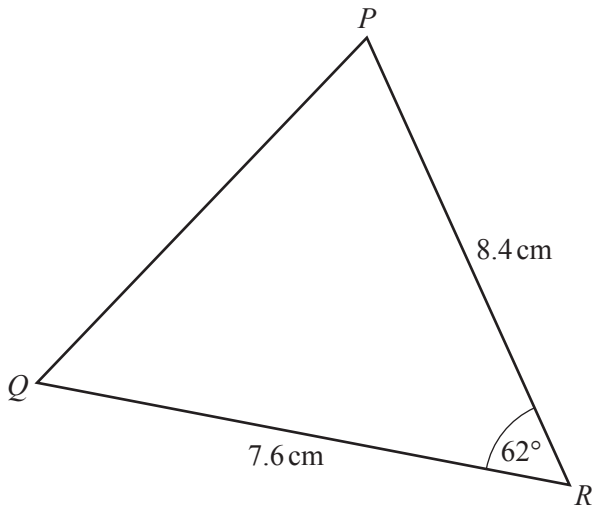
(a) Calculate the area of triangle *ABC*.

..... cm^2 [2]

(b) Calculate the length of *AC*.

AC = ... cm [4]

7 **(a)**



NOT TO SCALE

In the triangle PQR, $QR = 7.6$ cm and $PR = 8.4$ cm.
Angle $QRP = 62°$.

Calculate

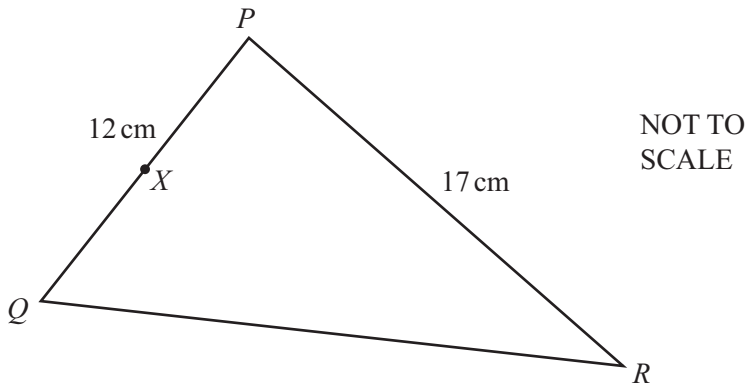
(i) PQ,

Answer(a)(i) PQ = ... cm [4]

(ii) the area of triangle PQR.

Answer(a)(ii) ..... cm^2 [2]

3 **(a)**



The diagram shows triangle PQR with $PQ = 12$ cm and $PR = 17$ cm.
The area of triangle PQR is 97 cm^2 and angle QPR is acute.

(i) Calculate angle QPR.

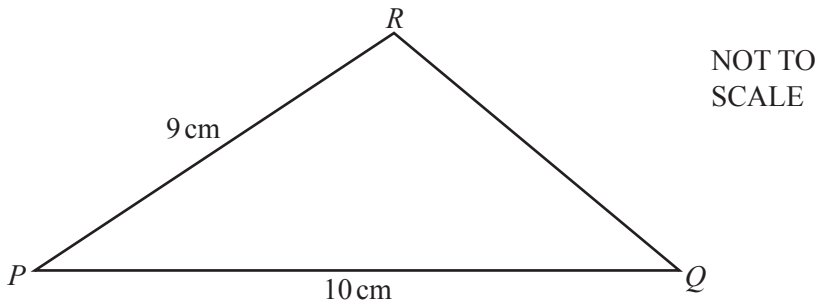
Answer(a)(i) Angle QPR = ... [3]

(ii) The midpoint of PQ is X.

Use the cosine rule to calculate the length of XR.

Answer(a)(ii) XR = ... cm [4]

20

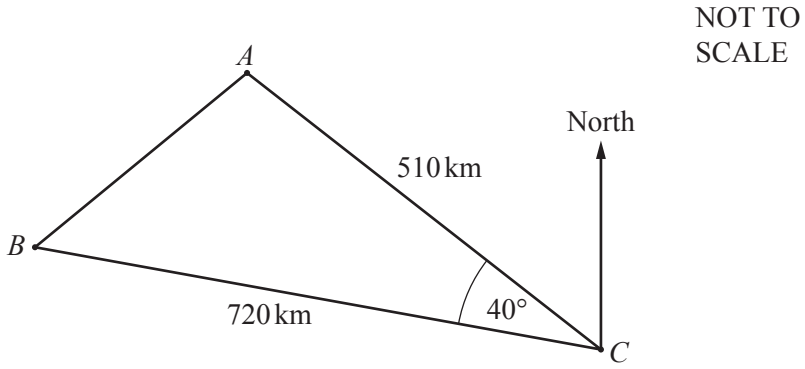


The area of triangle PQR is $38.5\,\text{cm}^2$.

Calculate the length QR.

Answer QR = ... cm [6]

5



A plane flies from A to C and then from C to B.
$AC = 510$ km and $CB = 720$ km.
The bearing of C from A is 135° and angle $ACB = 40°$.

(a) Find the bearing of

(i) B from C,

..... [2]

(ii) C from B.

..... [2]

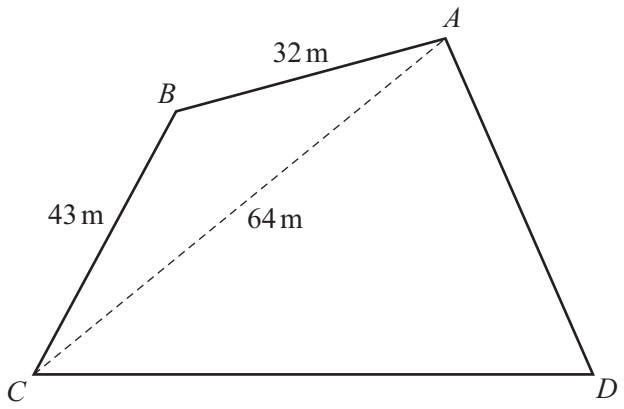
(b) Calculate AB and show that it rounds to 464.7 km, correct to 1 decimal place.

[4]

(c) Calculate angle ABC.

Angle ABC = ... [3]

2



NOT TO SCALE

For Examiner's Use

The diagram represents a field in the shape of a quadrilateral *ABCD*.
AB = 32 m, *BC* = 43 m and *AC* = 64 m.

(a) **(i)** Show clearly that angle *CAB* = 37.0° correct to one decimal place.

Answer(a)(i)

[4]

(ii) Calculate the area of the triangle *ABC*.

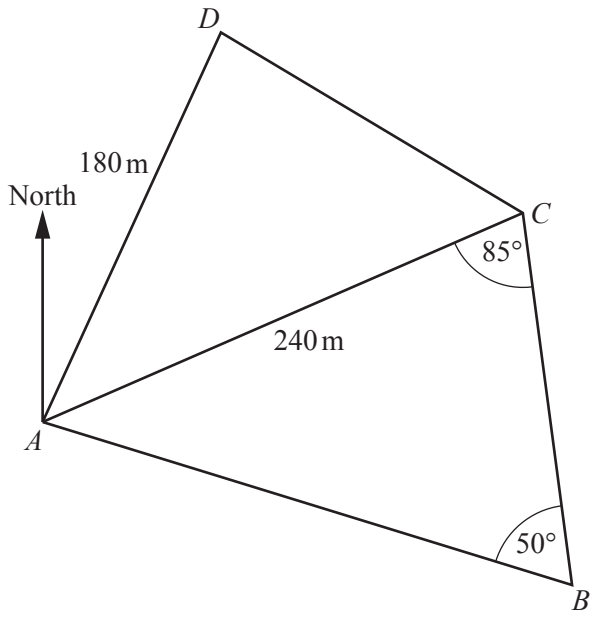
Answer(a)(ii) ..... m^2 [2]

(b) *CD* = 70 m and angle *DAC* = 55°.

Calculate the perimeter of the whole field *ABCD*.

Answer(b) ..... m [6]

3



NOT TO SCALE

The diagram shows a field, *ABCD*.
AD = 180 m and *AC* = 240 m.
Angle *ABC* = 50° and angle *ACB* = 85°.

(a) Use the sine rule to calculate *AB*.

AB = ... m [3]

(b) The area of triangle *ACD* = 12 000 m^2.

Show that angle *CAD* = 33.75°, correct to 2 decimal places.

[3]

(c) Calculate *BD*.

BD = ... m [5]

(d) The bearing of *D* from *A* is 030°.

Find the bearing of

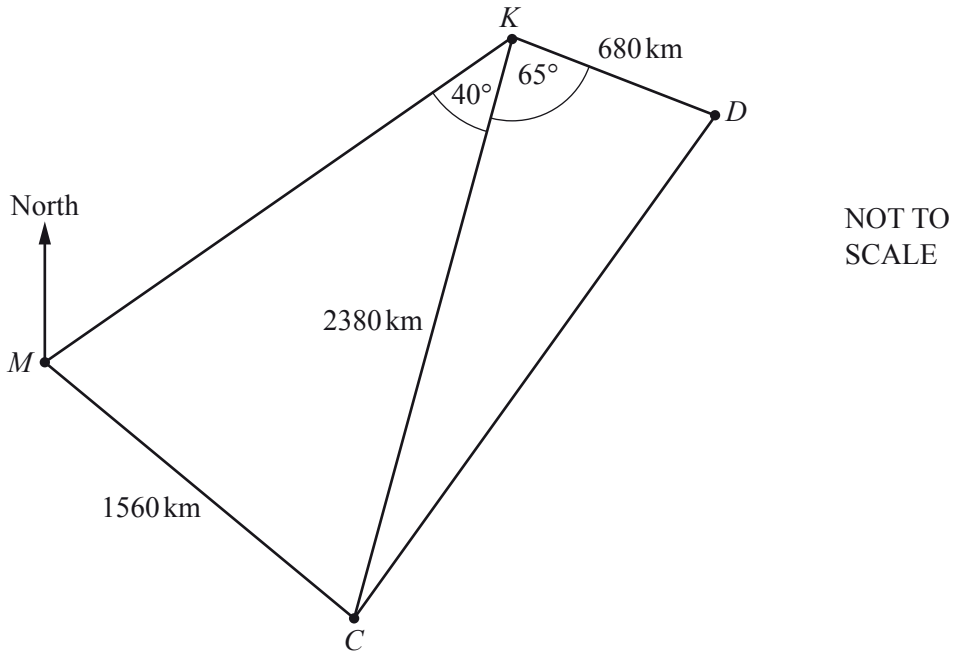
(i) *B* from *A*,

..... [1]

(ii) *A* from *B*.

..... [2]

5



The diagram shows some distances between Mumbai (M), Kathmandu (K), Dhaka (D) and Colombo (C).

(a) Angle $CKD = 65°$.

Use the cosine rule to calculate the distance CD.

Answer(a) CD = ... km [4]

(b) Angle $MKC = 40°$.

Use the sine rule to calculate the acute angle KMC.

Answer(b) Angle KMC = ... [3]

(c) The bearing of K from M is 050°.

Find the bearing of M from C.

Answer(c) ..... [2]

(d) A plane from Colombo to Mumbai leaves at 21 15 and the journey takes 2 hours 24 minutes.

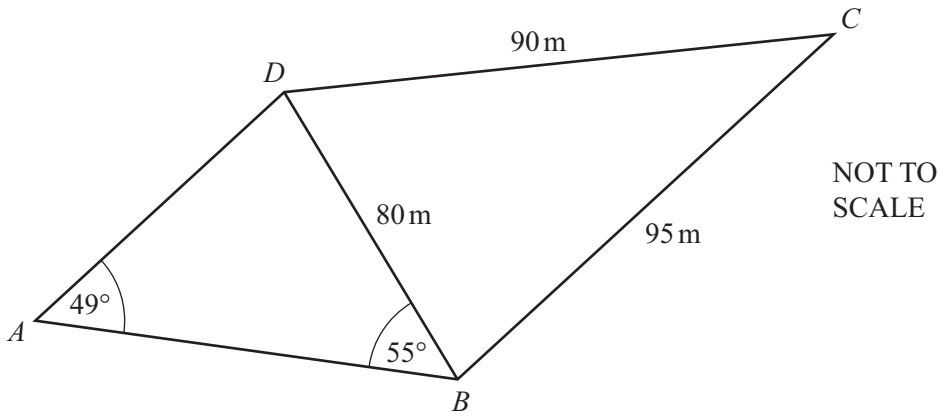
(i) Find the time the plane arrives at Mumbai.

Answer(d)(i) ..... [1]

(ii) Calculate the average speed of the plane.

Answer(d)(ii) ..... km/h [2]

3



The diagram shows a quadrilateral *ABCD*.
Angle *BAD* = 49° and angle *ABD* = 55°.
BD = 80 m, *BC* = 95 m and *CD* = 90 m.

(a) Use the sine rule to calculate the length of *AD*.

Answer(a) AD = ... m [3]

(b) Use the cosine rule to calculate angle *BCD*.

Answer(b) Angle *BCD* = ... [4]

(c) Calculate the area of the quadrilateral *ABCD*.

Answer(c) ..... m^2 [3]

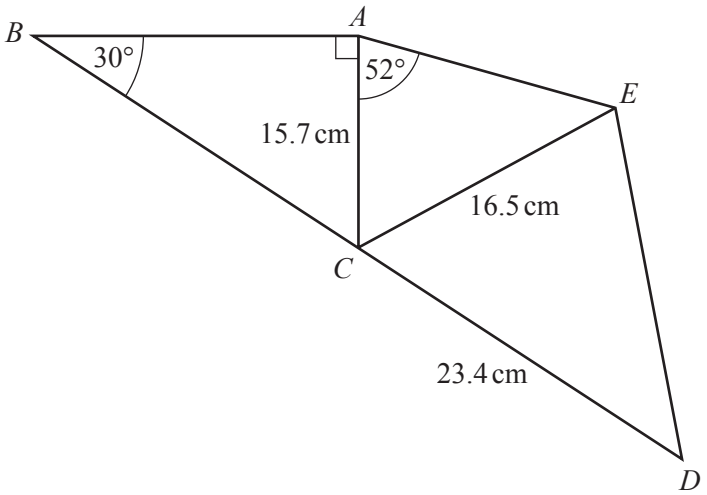
(d) The quadrilateral represents a field.
Corn seeds are sown across the whole field at a cost of \$3250 per hectare.

Calculate the cost of the corn seeds used.
1 hectare = 10 000 m^2

Answer(d) \$ ..... [3]

For Examiner's Use

6



NOT TO SCALE

In the diagram, *BCD* is a straight line and *ABDE* is a quadrilateral.
Angle *BAC* = 90°, angle *ABC* = 30° and angle *CAE* = 52°.
AC = 15.7 cm, *CE* = 16.5 cm and *CD* = 23.4 cm.

(a) Calculate *BC*.

Answer(a) BC = ... cm [3]

(b) Use the sine rule to calculate angle *AEC*.
Show that it rounds to 48.57°, correct to 2 decimal places.

Answer(b)

[3]

For Examiner's Use

(c) **(i)** Show that angle $ECD = 40.6°$, correct to 1 decimal place.

Answer(c)(i)

[2]

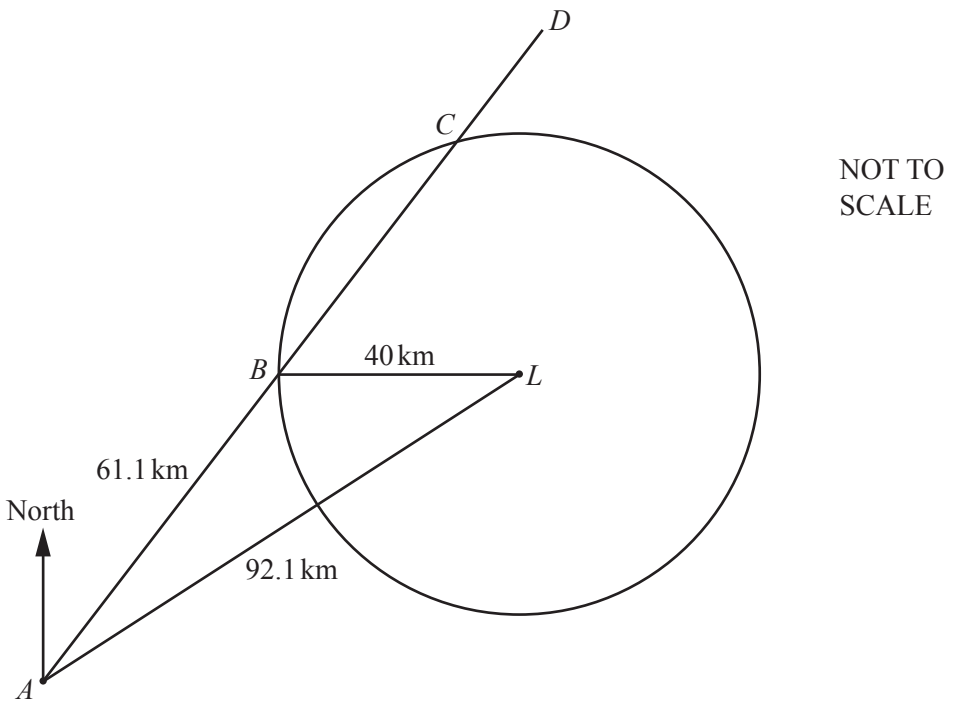
(ii) Calculate DE.

Answer(c)(ii) $DE =$ ..... cm [4]

(d) Calculate the area of the quadrilateral $ABDE$.

Answer(d) ..... cm^2 [4]

6



The diagram shows the position of a port, A, and a lighthouse, L.
The circle, centre L and radius 40 km, shows the region where the light from the lighthouse can be seen.
The straight line, $ABCD$, represents the course taken by a ship after leaving the port.
When the ship reaches position B it is due west of the lighthouse.

$AL = 92.1$ km, $AB = 61.1$ km and $BL = 40$ km.

(a) Use the cosine rule to show that angle $ABL = 130.1°$, correct to 1 decimal place.

[4]

(b) Calculate the bearing of the lighthouse, L, from the port, A.

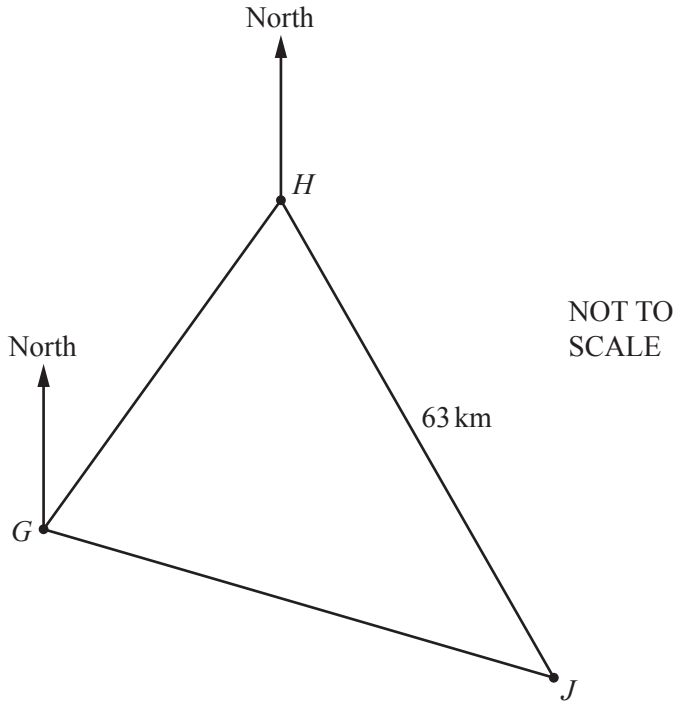
..... [4]

(c) The ship sails at a speed of 28 km/h.

Calculate the length of time for which the light from the lighthouse can be seen from the ship.
Give your answer correct to the nearest minute.

..... h ..... min [5]

(b)

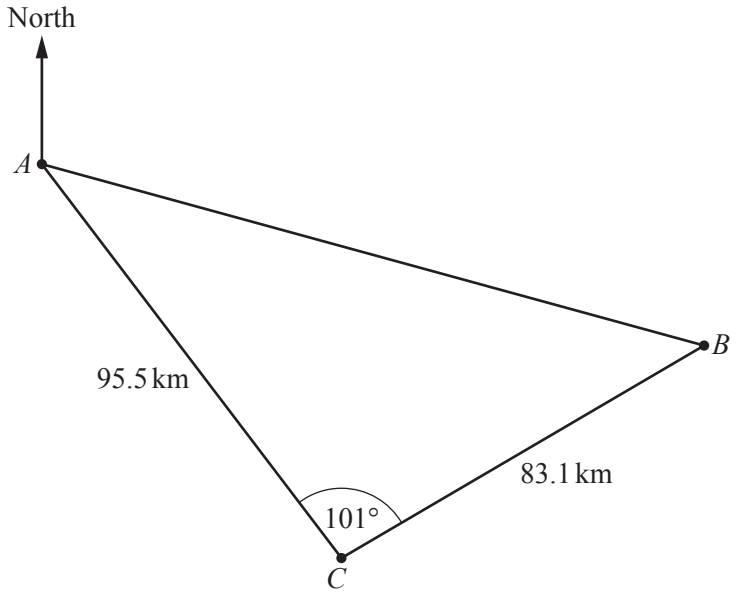


The diagram shows the positions of three small islands *G*, *H* and *J*.
The bearing of *H* from *G* is 045°.
The bearing of *J* from *G* is 126°.
The bearing of *J* from *H* is 164°.
The distance *HJ* is 63 km.

Calculate the distance *GJ*.

Answer(b) *GJ* = ... km [5]

6 The diagram shows the positions of two ships, A and B, and a coastguard station, C.



NOT TO SCALE

(a) Calculate the distance, AB, between the two ships.
Show that it rounds to 138 km, correct to the nearest kilometre.

Answer(a)

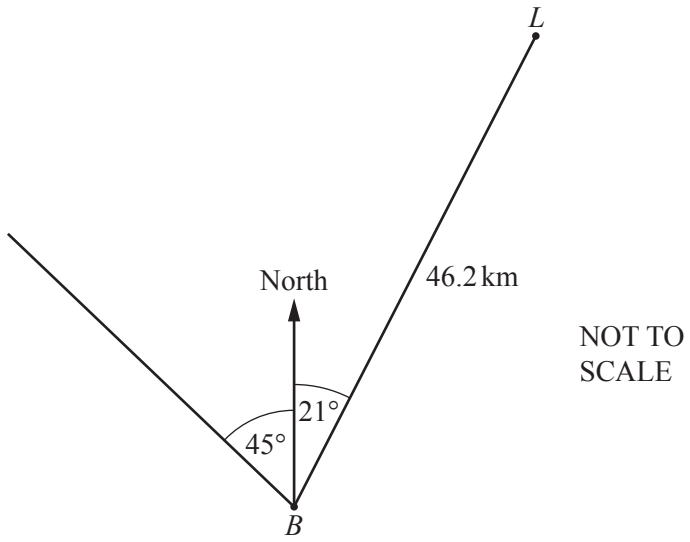
[4]

(b) The bearing of the coastguard station C from ship A is 146°.

Calculate the bearing of ship B from ship A.

Answer(b) ..... [4]

(c)

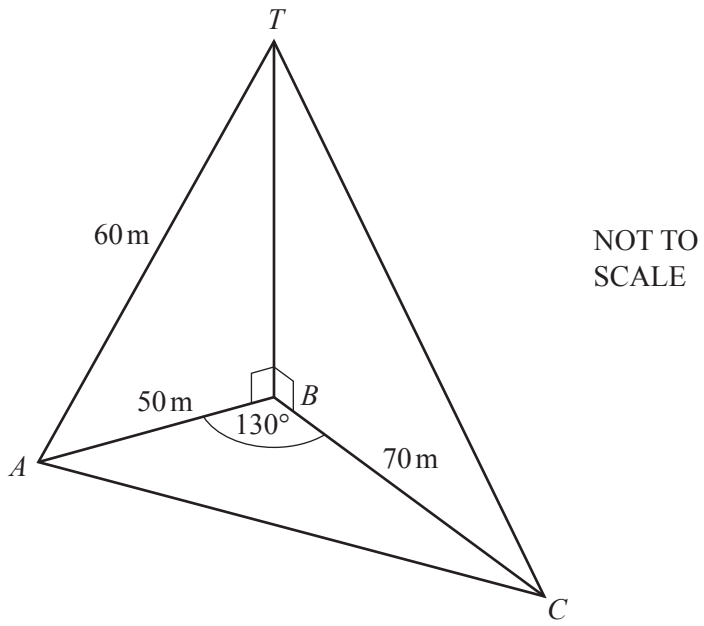


At noon, a lighthouse, L, is 46.2 km from ship B on the bearing 021°.
Ship B sails north west.

Calculate the distance ship B must sail from its position at noon to be at its closest distance to the lighthouse.

Answer(c) ..... km [2]

3 **(a)**



A, *B* and *C* are points on horizontal ground.
BT is a vertical pole.
AT = 60 m, *AB* = 50 m, *BC* = 70 m and angle *ABC* = 130°.

(i) Calculate the angle of elevation of *T* from *C*.

Answer(a)(i) ..... [5]

(ii) Calculate the length *AC*.

Answer(a)(ii) *AC* = ... m [4]

(iii) Calculate the area of triangle *ABC*.

Answer(a)(iii) ..... m^2 [2]