Calculator Worksheet

Further Trigonometry

IGCSE PAST PAPERS

Name :

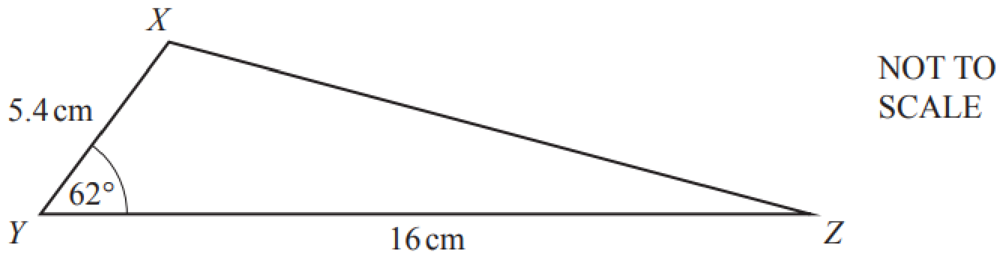
Class :

CAMBRIDGE International Education

Cambridge International School

1.

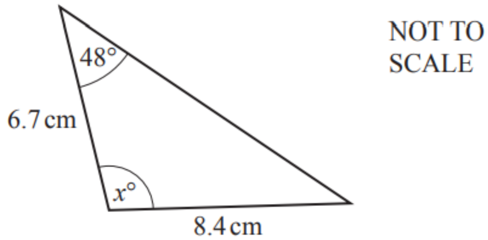
(a)



Show that the area of triangle XYZ is 38.1 cm^2, correct to 1 decimal place.

Answer(a)

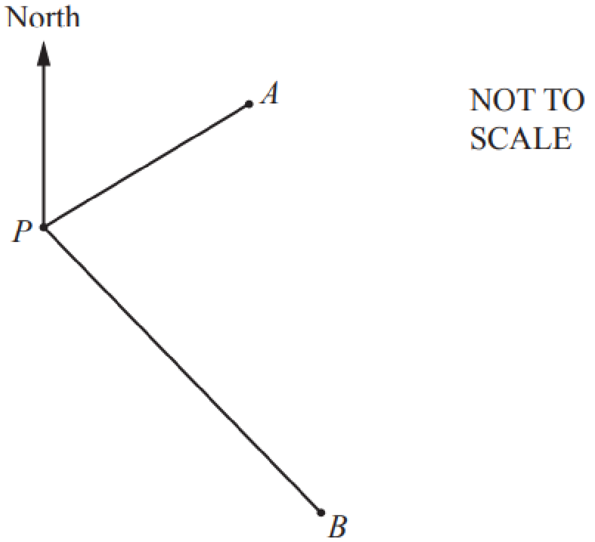
(b)



Calculate the value of x.

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

(c)

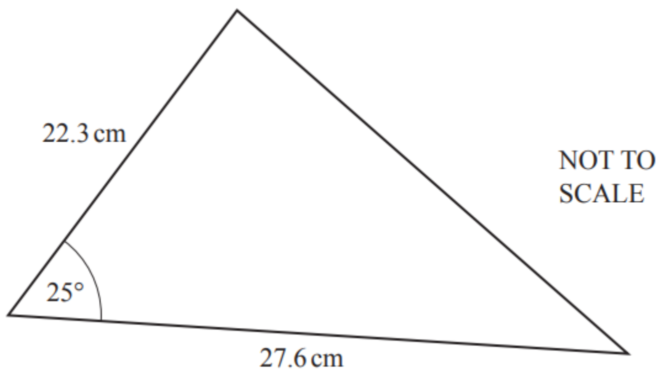


Ship A is 180 kilometres from port P on a bearing of 063°.
Ship B is 245 kilometres from P on a bearing of 146°.

Calculate AB, the distance between the two ships.

Answer(c) .... km [5]

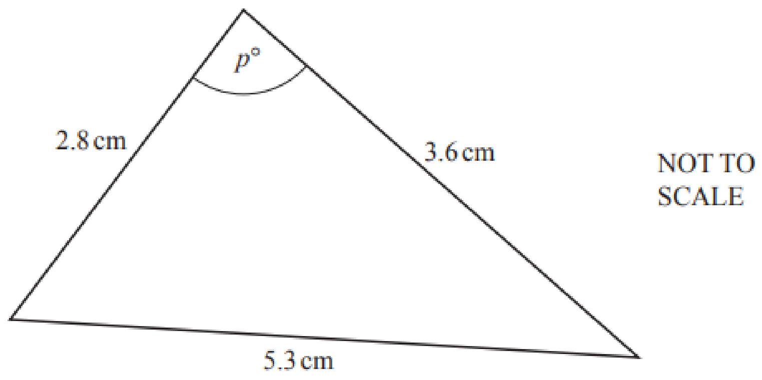
2.



Calculate the area of this triangle.

.... cm^2 [2]

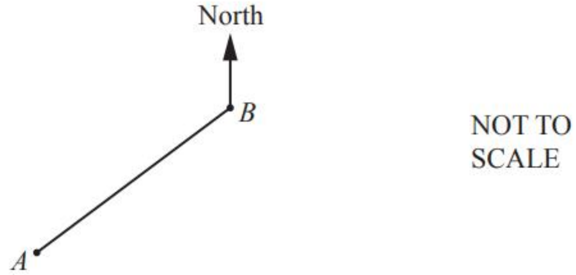
3.



Find the value of p.

p = ... [4]

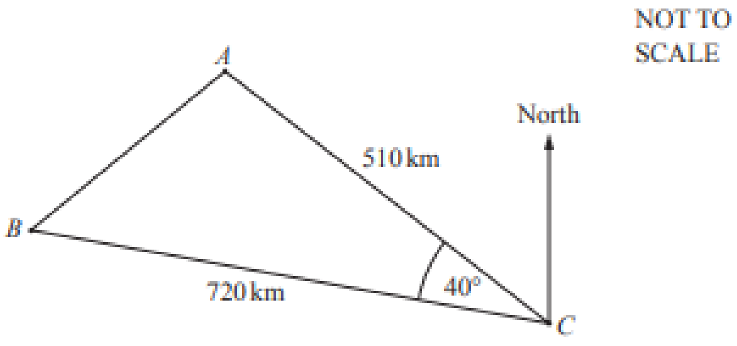
4.



The bearing of A from B is 227°.

Find the bearing of B from A.

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]

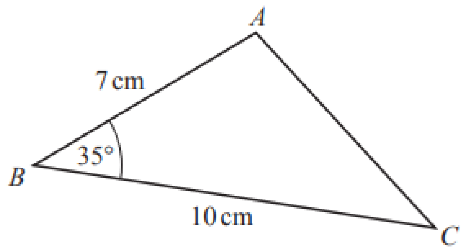
(b) Calculate AB and show that it rounds to 464.7 km, correct to 1 decimal place.

[4]

(c) Calculate angle ABC.

Angle ABC = ... [3]

6.



NOT TO SCALE

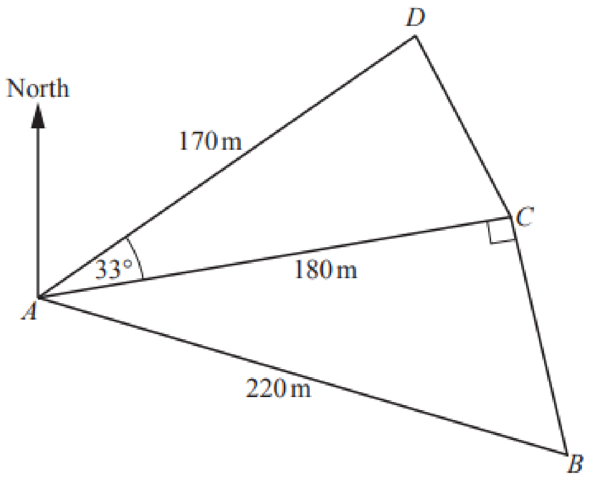
(a) Calculate the area of triangle *ABC*.

.... cm^2 [2]

(b) Calculate the length of *AC*.

AC = ... cm [4]

7.



NOT TO SCALE

The diagram shows five straight footpaths in a park.
$AB = 220$ m, $AC = 180$ m and $AD = 170$ m.
Angle $ACB = 90°$ and angle $DAC = 33°$.

(a) Calculate BC.

$BC =$ .... m [3]

(b) Calculate CD.

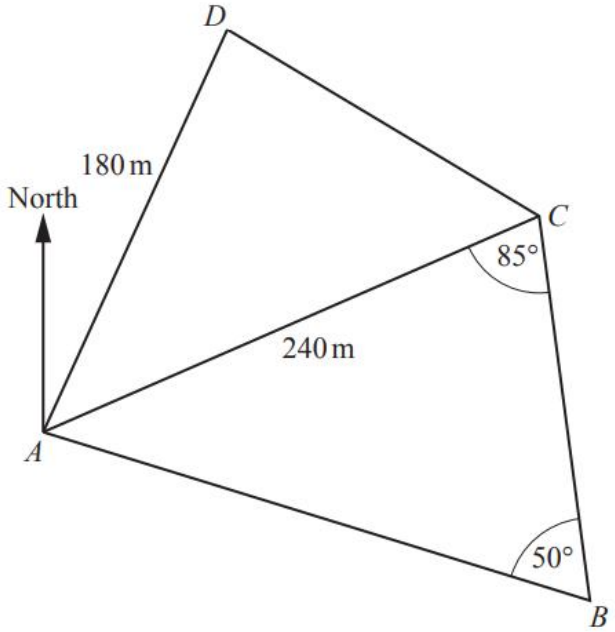
(c) Calculate the shortest distance from D to AC.

(d) The bearing of D from A is 047°.

Calculate the bearing of B from A.

(e) Calculate the area of the quadrilateral $ABCD$.

8.



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*.

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

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

(c) Calculate *BD*.

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

Find the bearing of

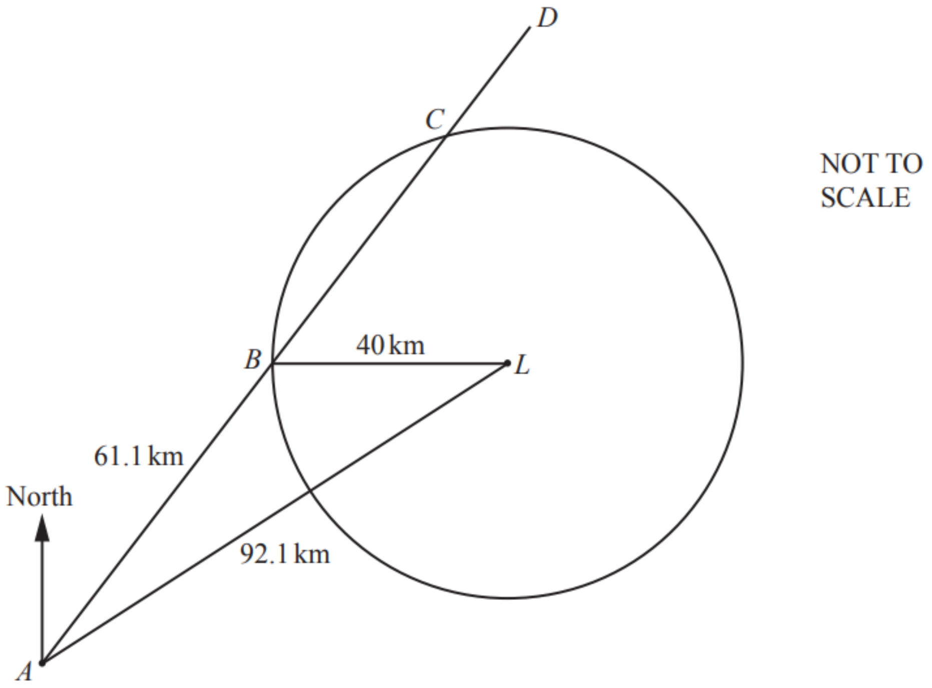
(i) *B* from *A*,

.... [1]

(ii) *A* from *B*.

.... [2]

9.



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]

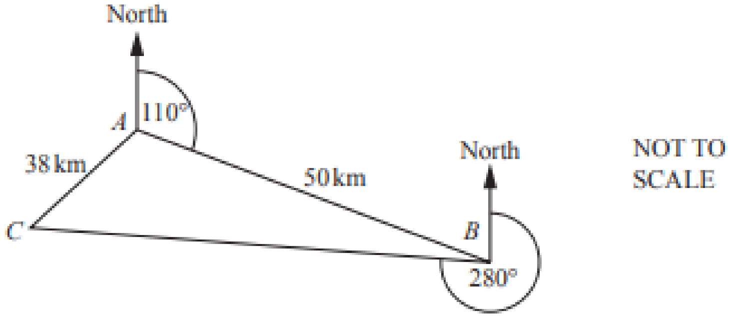
(c) The ship sails at a speed of 28 km/h.

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]

10.

(a)



A, *B* and *C* are three towns.
The bearing of *B* from *A* is 110°.
The bearing of *C* from *B* is 280°.
$AC = 38$ km and $AB = 50$ km.

(i) Find the bearing of *A* from *B*.

.... [2]

(ii) Calculate angle *BAC*.

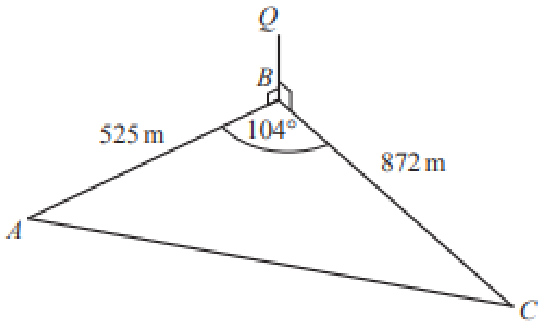
Angle *BAC* = ... [5]

(iii) A road is built from *A* to join the straight road *BC*.

Calculate the shortest possible length of this new road.

.... km [3]

11.



NOT TO SCALE

ABC is a triangular field on horizontal ground.
There is a vertical pole BQ at B.
$AB = 525$ m, $BC = 872$ m and angle $ABC = 104°$.

(a) Use the cosine rule to calculate the distance AC.

AC = ... m [4]

(b) The angle of elevation of Q from C is 1.0°.

Showing all your working, calculate the angle of elevation of Q from A.

.... [4]

(c) **(i)** Calculate the area of the field.

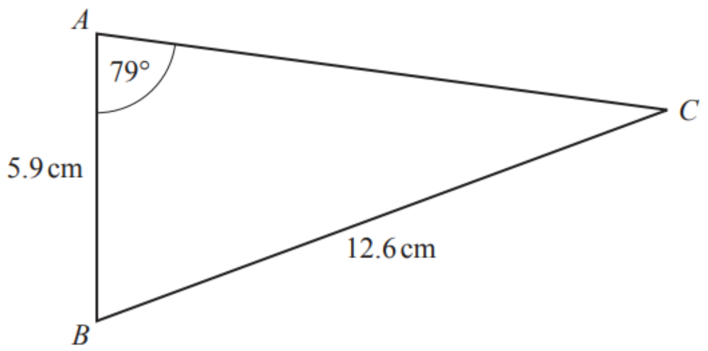
.... m^2 [2]

(ii) The field is drawn on a map with the scale 1 : 20 000.

Calculate the area of the field on the map in cm^2.

.... cm^2 [2]

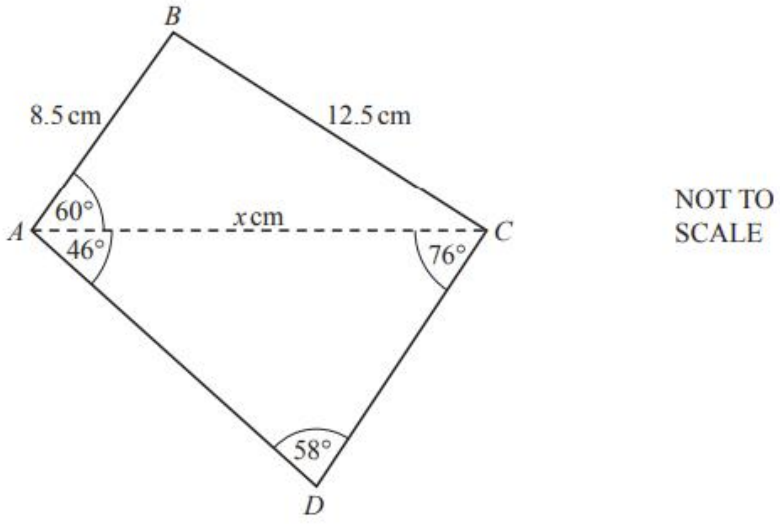
12.



NOT TO SCALE

Calculate angle ABC.

13.



The diagram shows a quadrilateral *ABCD*.

(a) The length of *AC* is x cm.

Use the cosine rule in triangle *ABC* to show that $2x^2 - 17x - 168 = 0$.

[4]

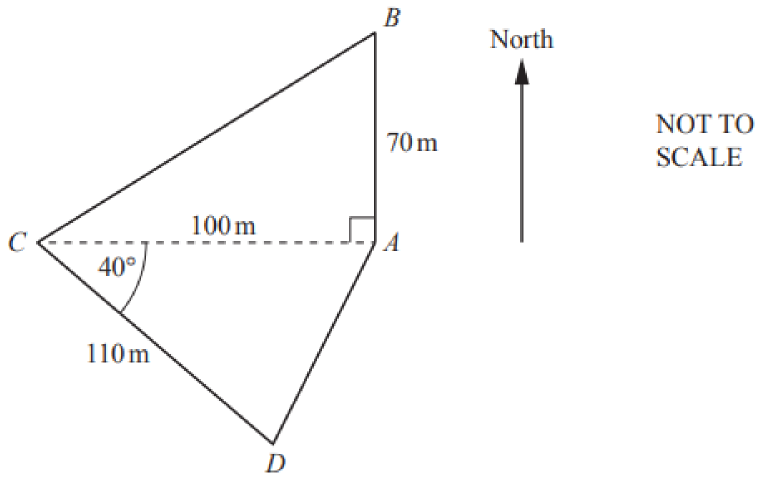
(b) Solve the equation $2x^2 - 17x - 168 = 0$.
Show all your working and give your answers correct to 2 decimal places.

(c) Use the sine rule to calculate the length of *CD*.

CD = ... cm [3]

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

14.



The diagram shows a field *ABCD*.

(a) Calculate the area of the field *ABCD*.

....m^2 [3]

(b) Calculate the perimeter of the field *ABCD*.

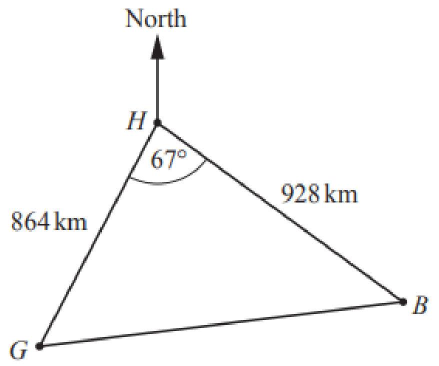
(c) Calculate the shortest distance from *A* to *CD*.

(d) *B* is due north of *A*.

Find the bearing of *C* from *B*.

15.

The diagram shows the positions of three cities, Geneva (G), Budapest (B) and Hamburg (H).



NOT TO SCALE

(a) A plane flies from Geneva to Hamburg.
The flight takes 2 hours 20 minutes.

Calculate the average speed in kilometres per hour.

.... km/h [2]

(b) Use the cosine rule to calculate the distance from Geneva to Budapest.

.... km [4]

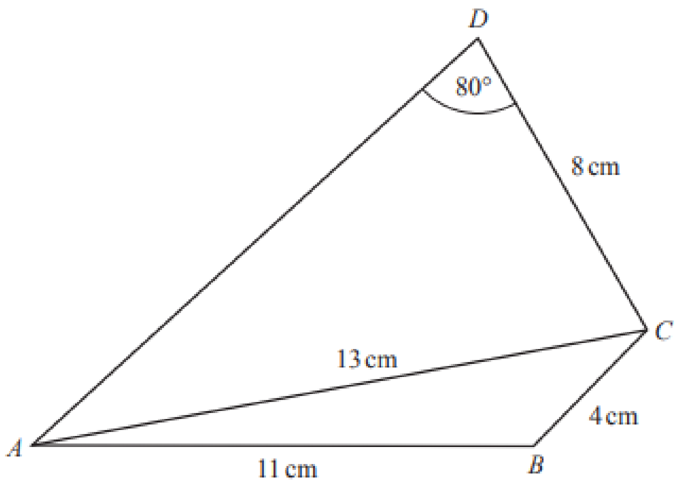
(c) The bearing of Budapest from Hamburg is 133°.

(i) Find the bearing of Hamburg from Budapest.

.... [2]

(ii) Calculate the bearing of Budapest from Geneva.

16.



NOT TO SCALE

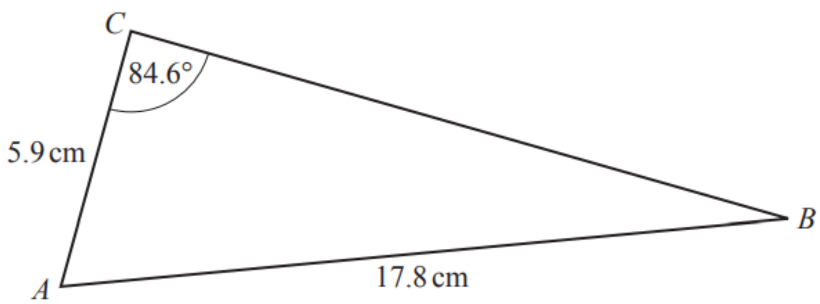
(a) Calculate angle ACB.

Angle ACB = ... [4]

(b) Calculate angle ACD.

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

17.

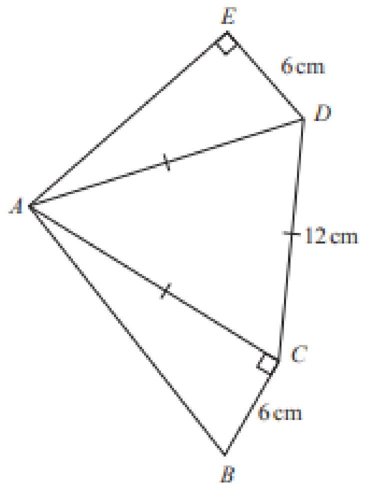


NOT TO SCALE

Use the sine rule to find angle ABC.

18.

(a)



NOT TO SCALE

In the pentagon $ABCDE$, angle ACB = angle $AED = 90°$.
Triangle ACD is equilateral with side length 12 cm.
$DE = BC = 6$ cm.

(i) Calculate angle BAE.

Angle BAE = ... [4]

(ii) Calculate AB.

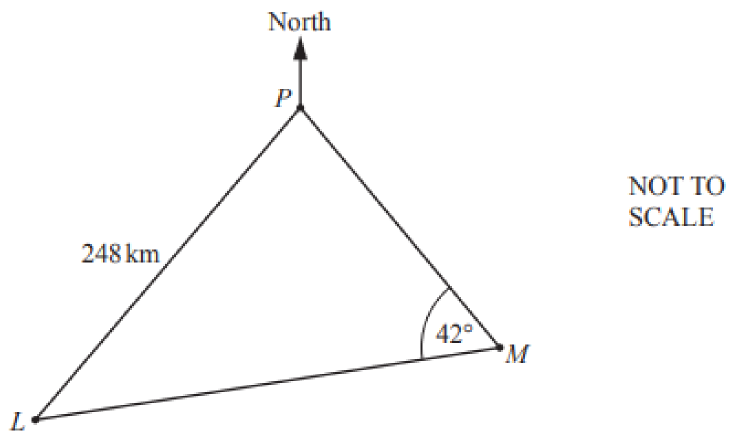
AB = ... cm [2]

(iii) Calculate AE.

(iv) Calculate the area of the pentagon.

.... cm² [4]

19.



The diagram shows two ports, L and P, and a buoy, M.
The bearing of L from P is 201° and $LP = 248$ km.
The bearing of M from P is 127°.
Angle $PML = 42°$.

(a) Use the sine rule to calculate LM.

$LM =$ .... km [4]

(b) A ship sails directly from L to P.

(i) Calculate the shortest distance from M to LP.

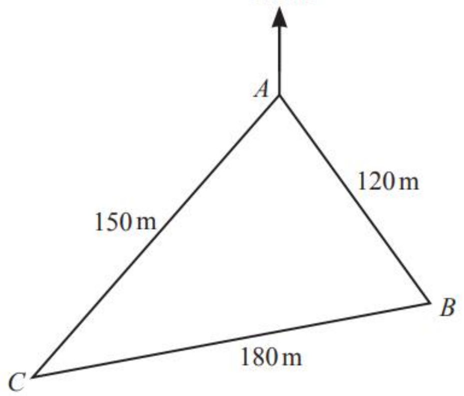
.... km [3]

(ii) The ship leaves L at 2045 and travels at a speed of 40 km/h.

Calculate the time the next day that the ship arrives at P.

.... [3]

20.



NOT TO SCALE

The diagram shows a triangular field, ABC, on horizontal ground.

(a) Olav runs from A to B at a constant speed of 4 m/s and then from B to C at a constant speed of 3 m/s.
He then runs at a constant speed from C to A.
His average speed for the whole journey is 3.6 m/s.

Calculate his speed when he runs from C to A.

(b) Use the cosine rule to find angle BAC.

(c) The bearing of C from A is 210°.

(i) Find the bearing of B from A.

.... [1]

(ii) Find the bearing of A from B.

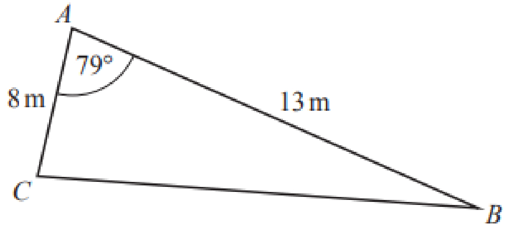
.... [2]

(d) D is the point on AC that is nearest to B.

Calculate the distance from D to A.

21.

(a)



NOT TO SCALE

The diagram shows triangle *ABC*.

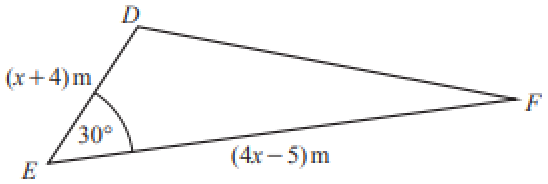
(i) Use the cosine rule to calculate *BC*.

BC = ... m [4]

(ii) Use the sine rule to calculate angle *ACB*.

Angle *ACB* = ... [3]

(b)



NOT TO SCALE

The area of triangle DEF is $70\,\text{m}^2$.

(i) Show that $4x^2 + 11x - 300 = 0$.

[4]

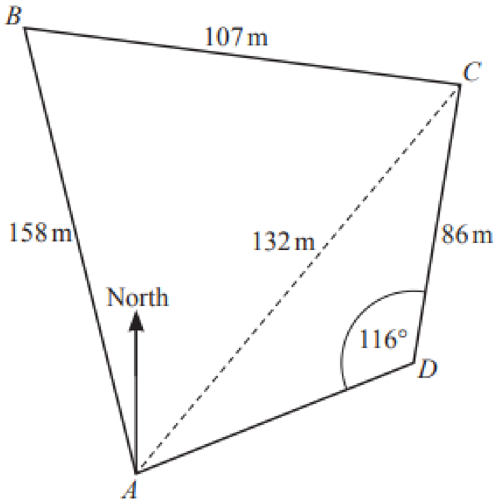
(ii) Use the quadratic formula to solve $4x^2 + 11x - 300 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$x =$ .... or $x =$ .... [4]

(iii) Find the length of DE.

$DE =$ .... m [1]

22.



NOT TO SCALE

The diagram shows a field, *ABCD*, on horizontal ground.

(a) There is a vertical post at *C*.
From *B*, the angle of elevation of the top of the post is 19°.

Find the height of the post.

.... m [2]

(b) Use the cosine rule to find angle *BAC*.

(c) Use the sine rule to find angle *CAD*.

Angle *CAD* = ... [3]

(d) Calculate the area of the field.

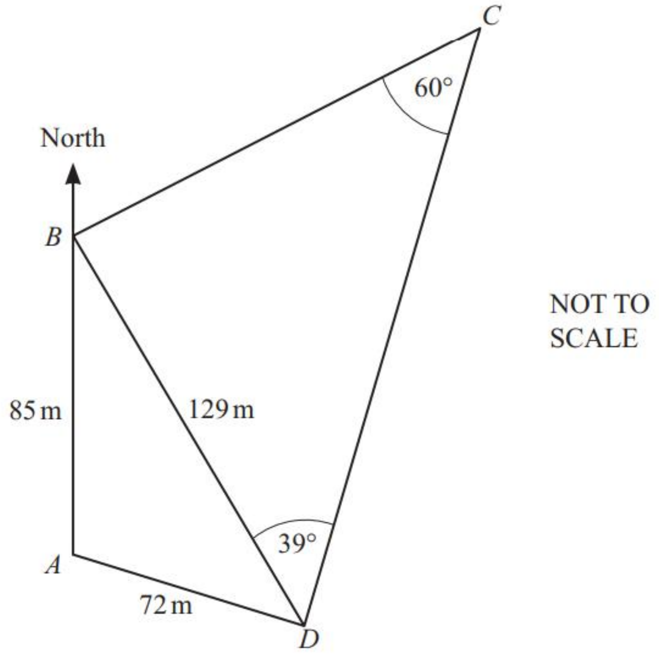
.... m^2 [3]

(e) The bearing of *D* from *A* is 070°.

Find the bearing of *A* from *C*.

23.

(a)



The diagram shows a field, *ABCD* with *B* north of *A*.
BD is a path across the field.
$AB = 85$ m, $AD = 72$ m, $BD = 129$ m, angle $BDC = 39°$ and angle $BCD = 60°$.

(i) Show that angle $CBD = 81°$.

[1]

(ii) Calculate *CD*.

(iii) Show that angle $ABD = 31.6°$, correct to 1 decimal place.

(iv) Find the shortest distance from *A* to *BD*.

.... m [3]

(v) Find the bearing of *B* from *C*.