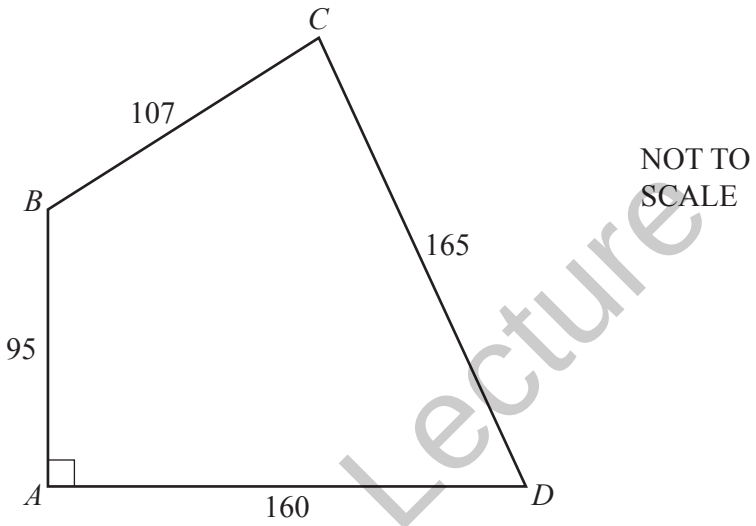
Name:

Section:

Trigonometry Worksheet

1



ABCD is the floor plan of an exhibition hall with dimensions shown in metres.
Points *A*, *B*, *C* and *D* all lie on the same horizontal plane.

(a) Calculate angle *BCD*.

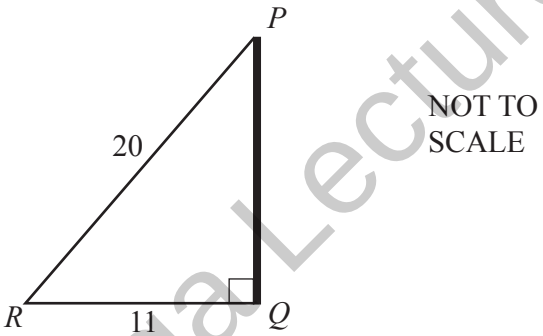
BCD = ... [4]

(b) A light is attached to the ceiling vertically above B.
The angle of elevation of the light from C is 8.2°.

Calculate the angle of elevation of the light from A.

..... [4]

2

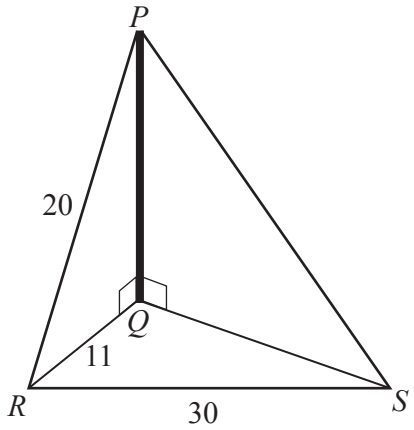


PQ is a vertical pole.
A rope is attached from the top of the pole, P, to a point on the ground, R.
$PR = 20\,\text{m}$, $RQ = 11\,\text{m}$ and $R\hat{Q}P = 90°$.

(a) Show that $PQ = 16.70\,\text{m}$, correct to 2 decimal places.

[2]

(b)

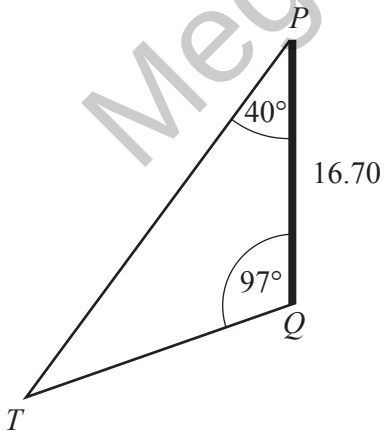


A second rope is attached from P to a point S.
$P\hat{Q}S = 90°$ and $RS = 30\,\text{m}$.
The angle of elevation of P from S is 36°.

Calculate $R\hat{Q}S$.

$R\hat{Q}S =$ ..... [5]

(c)

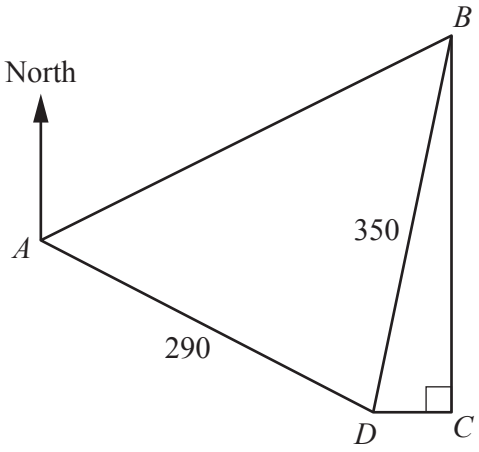


NOT TO SCALE

A third rope is attached from P to a point T.
$T\hat{P}Q = 40°$ and $P\hat{Q}T = 97°$.

Calculate PT.

3



NOT TO SCALE

ABCD is a field on horizontal ground.

The bearing of *B* from *A* is 070°.
The bearing of *D* from *A* is 125°.
C is due south of *B* and due east of *D*.
AD = 290 m and *BD* = 350 m.

(a) Calculate the bearing of *D* from *B*.

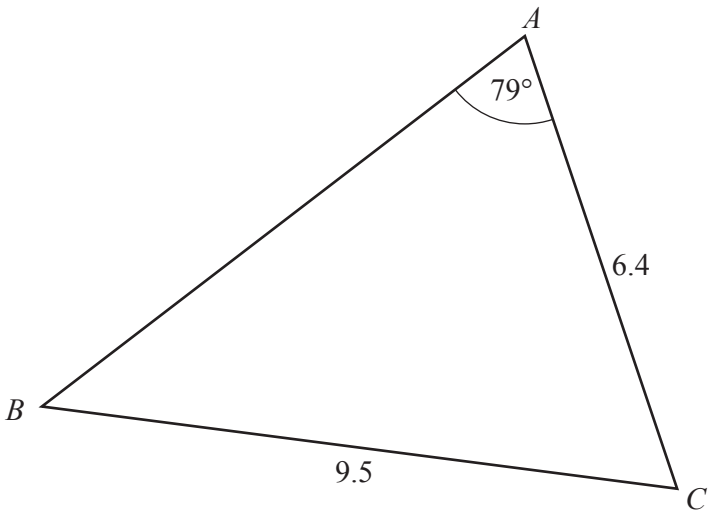
..... [4]

(b) A vertical mast is positioned at D.
The angle of elevation of the top of the mast from A is 10°.

Calculate the angle of elevation of the top of the mast from C.

..... [5]

4



NOT TO SCALE

In triangle ABC, $AC = 6.4\,\text{cm}$, $BC = 9.5\,\text{cm}$ and $B\hat{A}C = 79°$.

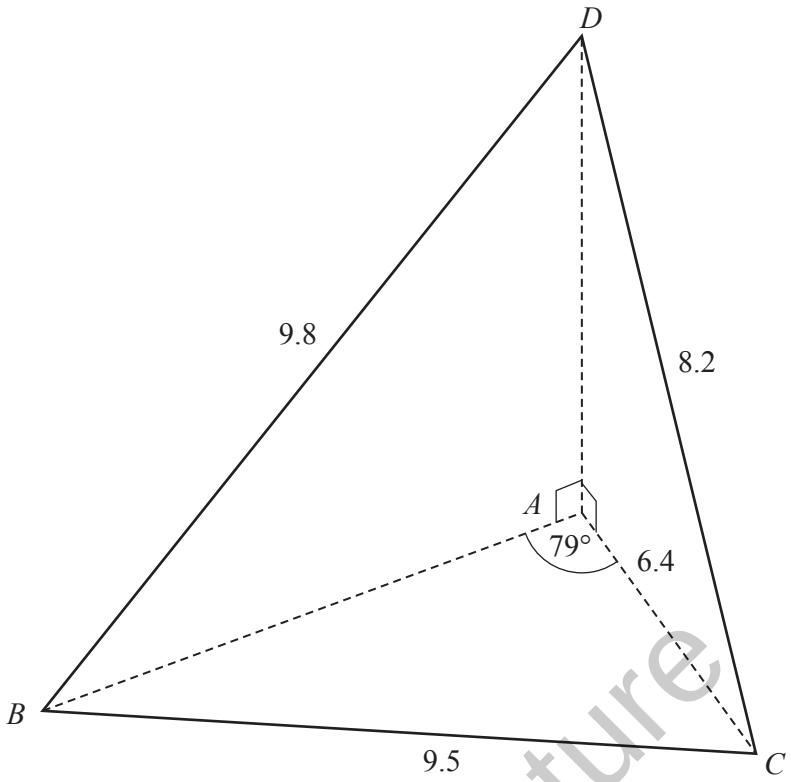
(a) (i) Calculate $A\hat{B}C$.

$A\hat{B}C =$ ..... [3]

(ii) Calculate the area of triangle ABC.

..... cm^2 [3]

(b)



The same triangle ABC forms the horizontal base of a pyramid $ABCD$.
$BD = 9.8$ cm and $CD = 8.2$ cm.
$B\hat{A}D = C\hat{A}D = 90°$.

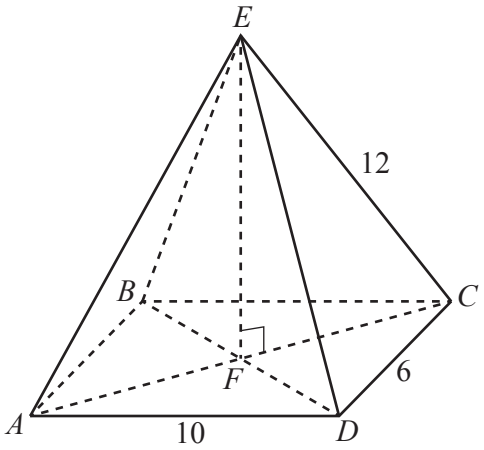
(i) Calculate $B\hat{D}C$.

$B\hat{D}C =$ ..... [3]

(ii) Calculate the angle of elevation of D from C.

..... [2]

5 **[Volume of pyramid = $\frac{1}{3}$ × base area × height]**



ABCDE is a rectangular-based pyramid.
AC and *BD* intersect at *F*.
EF is perpendicular to *FC*.

AD = 10 cm, *DC* = 6 cm and *EC* = 12 cm.

(a) Show that *EF* = 10.5 cm, correct to 1 decimal place.

[4]

(b) Find the volume of the pyramid.

..... cm^3 [2]

(c) Calculate $D\hat{E}C$.

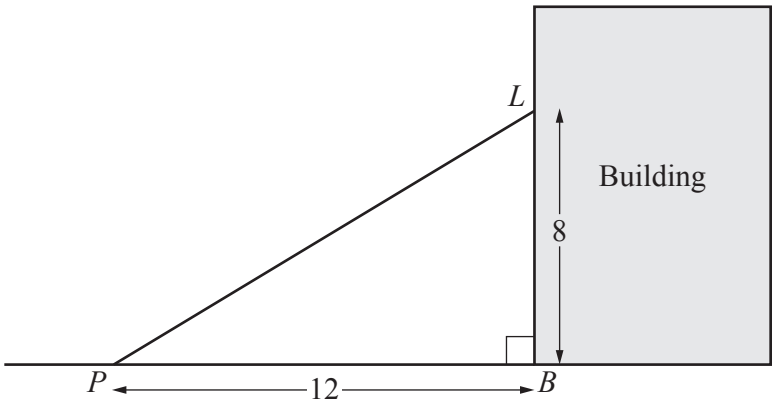
$D\hat{E}C =$ ..... [3]

(d) Calculate the area of triangle DEC.

..... cm^2 [2]

6 A light, L, is fixed on a building 8 m above the base, B, of the building.

(a)



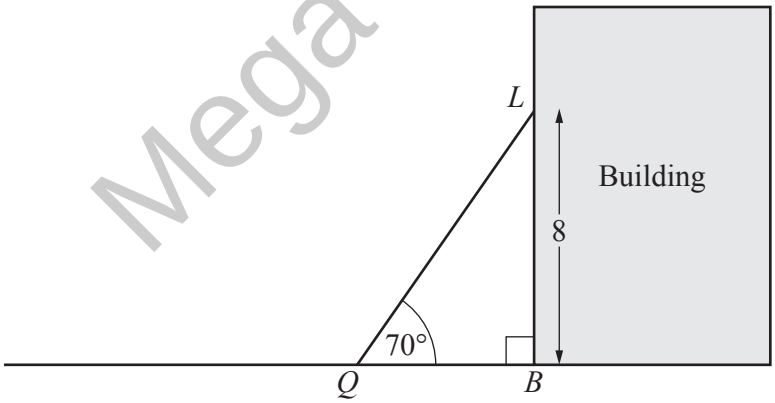
NOT TO SCALE

A point, P, is on the horizontal ground 12 m from B.

Calculate the angle of elevation of L from P.

..... [2]

(b)



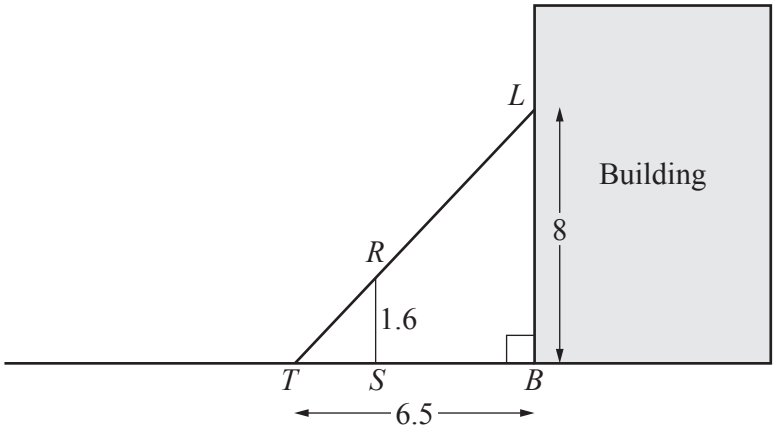
NOT TO SCALE

A ladder is placed on the ground at Q to reach the light, L.
The ladder makes an angle of 70° with the ground.

Calculate QL.

$QL =$ ..... m [2]

(c)



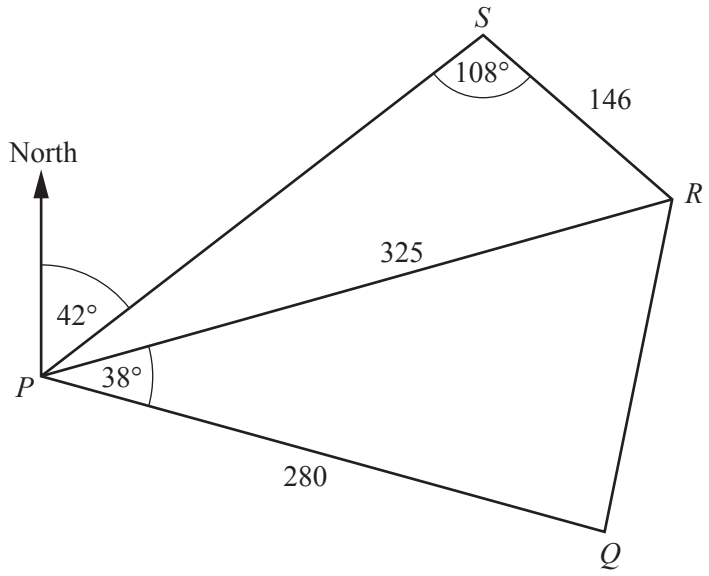
NOT TO SCALE

A vertical pole, *RS*, of length 1.6 m is placed touching the horizontal ground. The light produces a shadow, *TS*, of the pole on the horizontal ground. *LRT* is a straight line and $TB = 6.5$ m.

Calculate *TS*.

TS = ... m [2]

7



NOT TO SCALE

A field is in the shape of a quadrilateral $PQRS$.
A path crosses the field from P to R.
$PQ = 280$ m, $RS = 146$ m and $PR = 325$ m.
S is on a bearing of 042° from P, $P\hat{S}R = 108°$ and $R\hat{P}Q = 38°$.

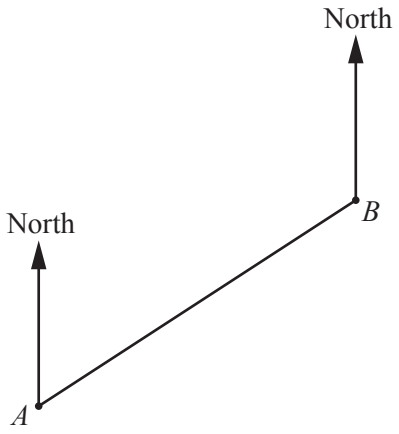
(a) Calculate the bearing of R from P.

..... [4]

(b) (i) Show that $QR = 202$ m, correct to the nearest metre.

[3]

8



The diagram shows the positions of two boats, A and B, drawn to a scale of $1 : m$.
The actual distance between the two boats is 4 km.

(a) Find m, giving your answer correct to 1 significant figure.

$m =$ ..... [2]

(b) Measure the bearing of A from B.

..... [1]

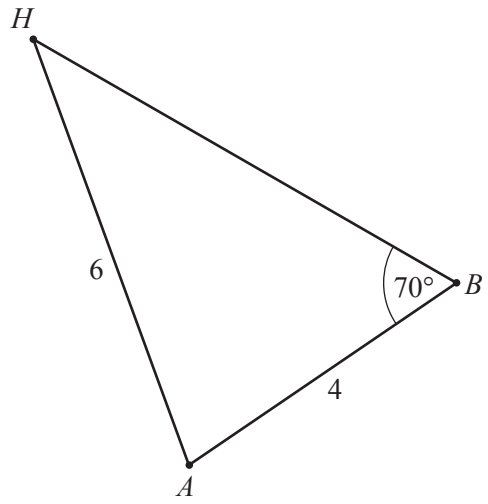
(c) A third boat is positioned at C.
C is on a bearing of 120° from A and on a bearing of 195° from B.

Find and label C on the diagram. [2]

(d) Find, by measurement, the actual distance in kilometres from A to C.

..... km [2]

(e)



NOT TO SCALE

The diagram shows the positions of the boats, A and B, and a harbour, H.
$AB = 4$ km, $AH = 6$ km and $A\hat{B}H = 70°$.

(i) Calculate $A\hat{H}B$.

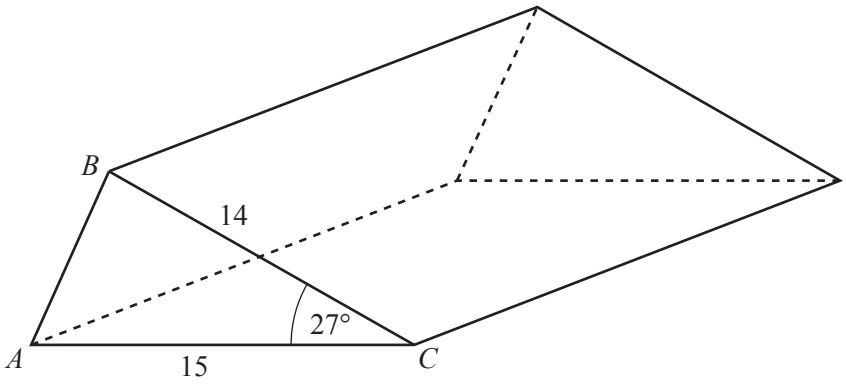
$A\hat{H}B =$ ..... [3]

(ii) The boat at A travels in a straight line to the harbour at H.
The average speed of the boat is p km/h.
It takes 12 minutes 20 seconds for the boat to travel from A to H.

Calculate p.

$p =$ ..... [3]

9



The diagram shows a triangular prism.
$AC = 15$ cm, $BC = 14$ cm and angle $ACB = 27°$.

(a) Calculate AB.

$AB =$ ..... cm [3]

(b) The length of the prism is p cm and the volume of the prism is 1000 cm^3.

Calculate p.

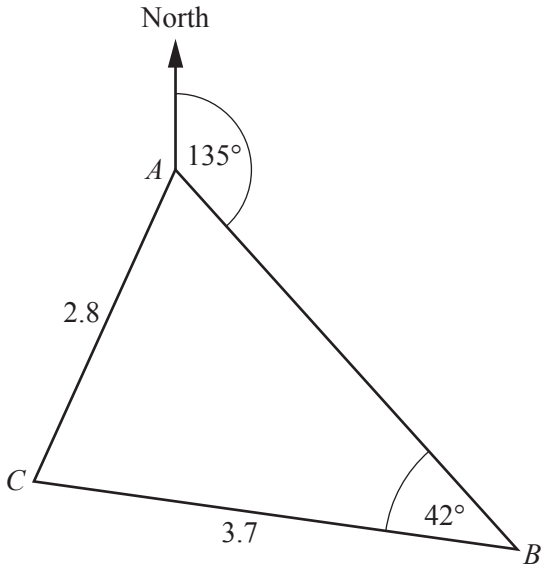
$p =$ ..... [3]

(c) The prism is to be packed in a carton.
The carton is a cuboid of size 15 cm by p cm by h cm.

Calculate the smallest possible value of h.

$h =$ ..... [2]

10



A yacht sails the triangular route shown.
The bearing of B from A is 135°.
$BC = 3.7$ km, $AC = 2.8$ km and $A\hat{B}C = 42°$.

(a) Show that $C\hat{A}B = 62.2°$, correct to 1 decimal place.

[3]

(b) Find the bearing of A from C.

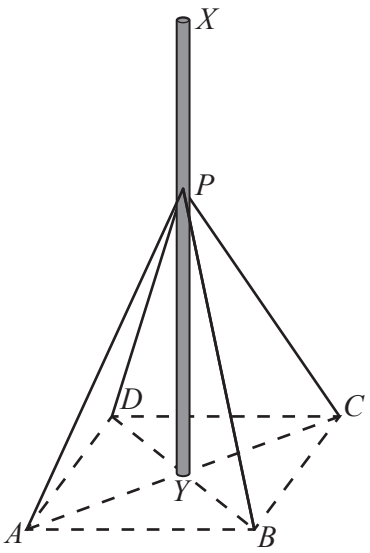
Answer ..... [2]

(c) The yacht sails from A to B to C to A.

Calculate the total length of the route.

Answer ..... km [4]

11



A vertical mast, XY, is positioned on horizontal ground.
The mast is supported by four cables attached to the mast at P and to the ground at points A, B, C and D.
Y is the centre of the square $ABCD$.
$PY = 7.50\,\text{m}$.

(a) Given that $AB = 3.65\,\text{m}$, show that $AY = 2.58\,\text{m}$ correct to 3 significant figures.

[3]

(b) Calculate the length of one of the cables used to support the mast.

Answer ..... m [2]

(c) Calculate $A\hat{P}B$.

Answer ..... [3]

(d) The angle of elevation of X from A is 77.0°.

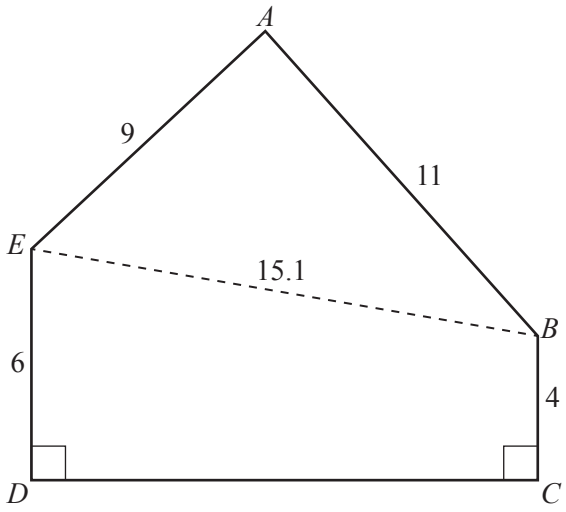
(i) Calculate the height, XY of the mast.

Answer ..... m [2]

(ii) Calculate the angle of elevation of X from the midpoint of AB.

Answer ..... [2]

12



ABCDE is the cross-section of a building.
All the lengths are given in metres.

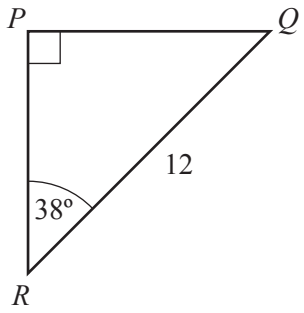
(a) Calculate *DC*.

..... m [3]

(b) Calculate angle *EAB*.

..... [3]

13



Triangle PQR has a right angle at P, angle $PRQ = 38°$ and $RQ = 12\,\text{cm}$.

(a) Calculate PQ.

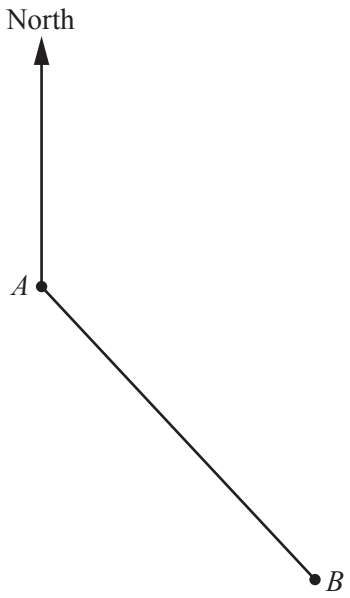
Answer ..... cm [2]

(b) S is a point such that angle PRS is a right angle and $QS = 10\,\text{cm}$.

Calculate the two possible values of angle QSR.

Answer ..... or ..... [4]

14 The diagram shows the position of two villages A and B.



(a) Measure the bearing of B from A.

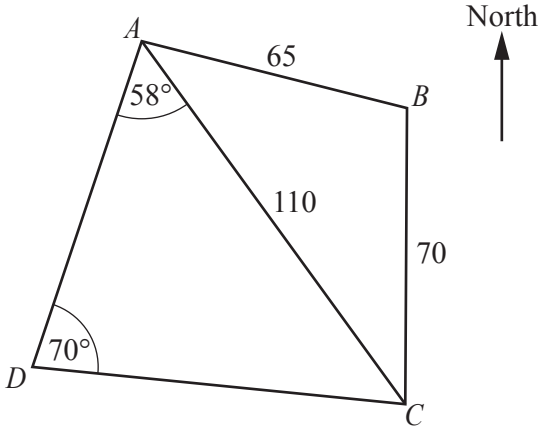
Answer ..... [1]

(b) The bearing of village C from A is 265°.

Work out the bearing of A from C.

Answer ..... [1]

15



ABCD is a level playing field.
$AB = 65$ m, $BC = 70$ m and $CA = 110$ m.
$C\hat{D}A = 70°$, $D\hat{A}C = 58°$ and *C* is due South of *B*.

(a) Calculate the bearing of *A* from *C*.

Answer ..... [4]

(b) Calculate *AD*.

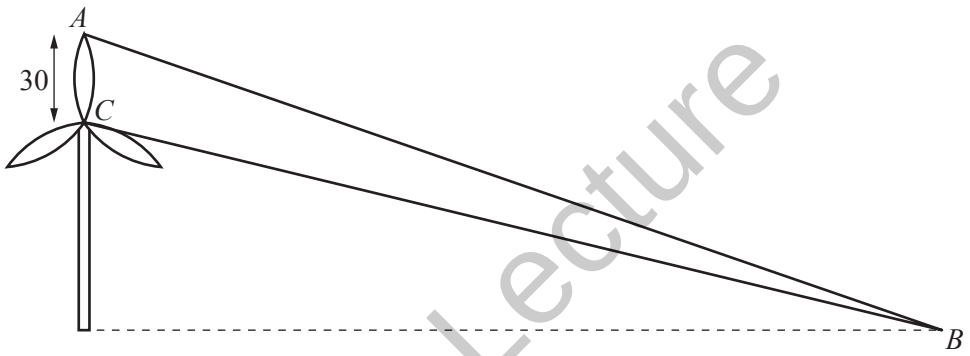
Answer ..... m [3]

(c) There are two vertical trees, *AX* and *CY,* each of height 17 m, one at each end of the path *AC*.

(i) Calculate the angle of elevation of *Y* from *B*.

Answer ..... [2]

16 (a)



The diagram shows a vertical wind turbine with blades 30 m long.
The blades are stationary with the point *A* being the maximum distance possible from the horizontal ground.
The point *B* is such that the angle of elevation of *A* from *B* is 34° and the angle of elevation of the centre of the blades, *C*, from *B* is 25°.

Calculate the distance *AB*.

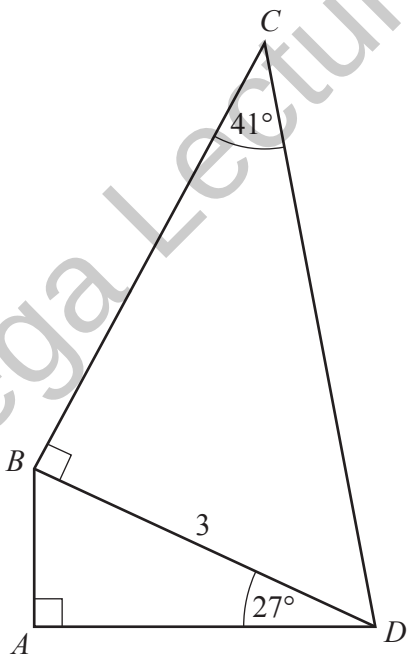
Answer ..... m [3]

(b) A different wind turbine, shown in the diagram on the next page, has the centre of its blades, F, 75 m from the base of the turbine, D.
Point E is on sloping ground, 180 m from F and 130 m from D.

Calculate the angle of depression of E from F.

Answer ..... [4]

17 (a)



In the framework $ABCD$, $BD = 3$ m.
$B\hat{D}A = 27°$, $B\hat{C}D = 41°$. $D\hat{B}C$ and $D\hat{A}B$ are right angles.

(i) Find AD.

Answer ..... m [2]

(ii) Find CD.

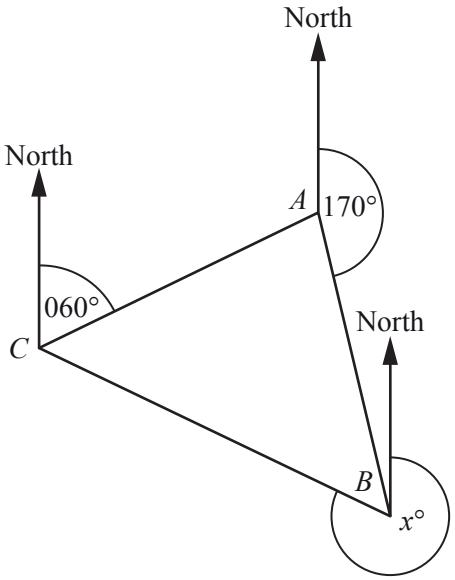
Answer ..... m [3]

(b) In triangle PQR, $PQ = 3$ m and $QR = 5$ m.
The area of triangle $PQR = 6\,\text{m}^2$.

Find the two possible values of $P\hat{Q}R$.

Answer $P\hat{Q}R$ = ... or ..... [3]

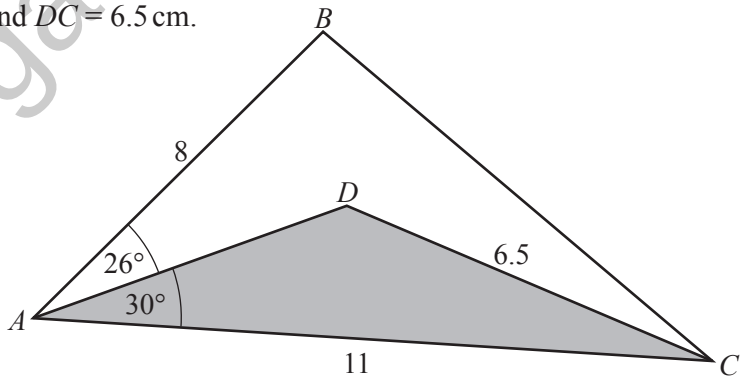
18 In the diagram, the bearing of B from A is 170°.
The bearing of A from C is 060°.
The bearing of C from B is x°.



Given that triangle ABC is isosceles, find the three possible values of x.

Answer $x =$ ..... or ..... or ..... [3]

19 In the diagram, $AB = 8$ cm, $AC = 11$ cm and $DC = 6.5$ cm.
$B\hat{A}D = 26°$ and $D\hat{A}C = 30°$.



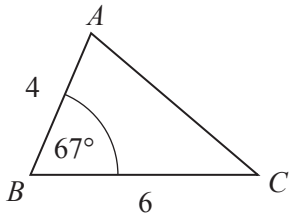
(a) Calculate BC.

Answer ..... cm [4]

(b) Calculate the obtuse angle ADC.

Answer ..... [3]

20 **(a)**

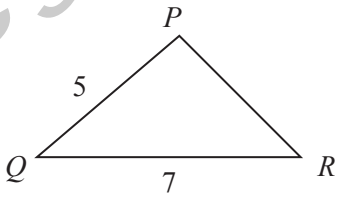


In triangle ABC, $AB = 4$ m, $BC = 6$ m and $A\hat{B}C = 67°$.

(i) Show that the area of triangle ABC is 11.05 m^2 correct to 2 decimal places.

[1]

(ii)

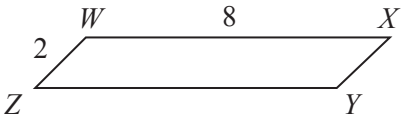


In triangle PQR, $PQ = 5$ m and $QR = 7$ m.
Area of triangle PQR = Area of triangle ABC.

Find the acute angle PQR.

Answer ..... [2]

(iii)

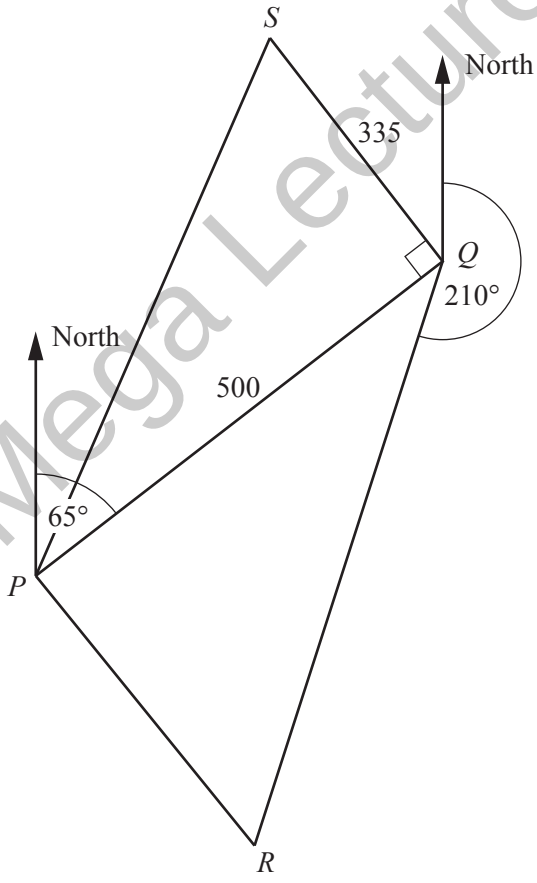


In the parallelogram $WXYZ$, $WX = 8$ m and $WZ = 2$ m.
Area of parallelogram $WXYZ$ = Area of triangle ABC.

Find the obtuse angle ZWX.

Answer ..... [3]

21 The diagram shows the positions, P, Q, R and S, of four hotels.



The bearing of Q from P is 065° and the bearing of R from Q is 210°.
$PQ = 500$ m, $SQ = 335$ m and $P\hat{Q}S = 90°$.

(a) Calculate $P\hat{Q}R$.

Answer ..... [1]

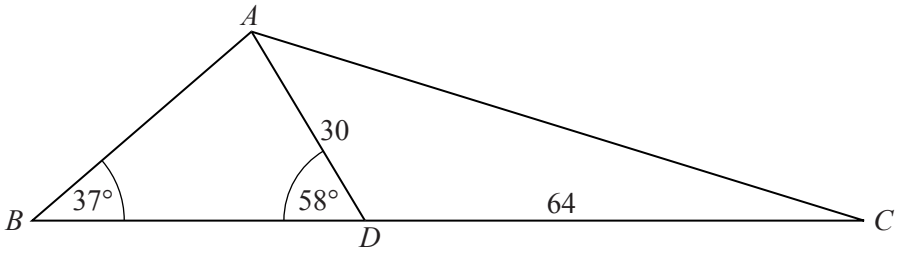
(b) Calculate the shortest distance from P to QR.

Answer..... m [2]

(c) Calculate the bearing of S from P.

Answer ..... [3]

22



A, B, C and D are four points on level ground.
BDC is a straight line.
$AD = 30$ m and $DC = 64$ m.
$A\hat{B}D = 37°$ and $A\hat{D}B = 58°$.

(a) Calculate AB.

Answer

..... m [3]

(b) Calculate AC.

Answer

..... m [4]

(c) Calculate the area of triangle *ADC*.

Answer

..... m^2 [2]

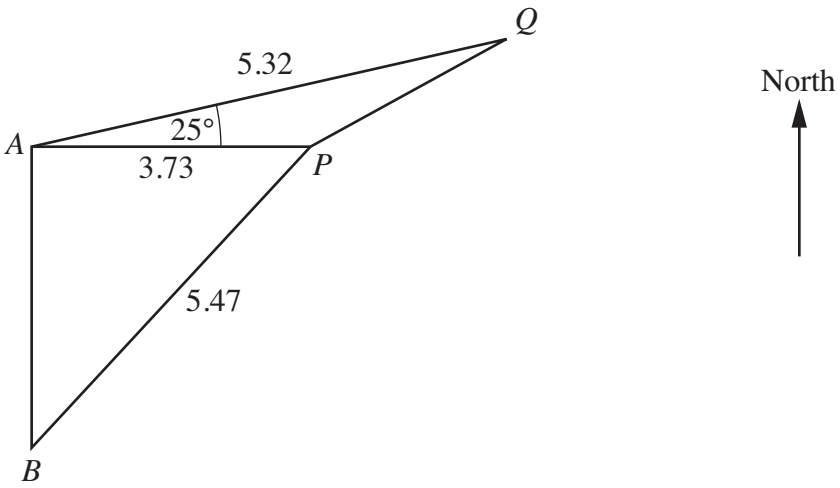
(d) A vertical tower stands at *A*.
P is the point on the line *BC* such that the angle of depression from the top of the tower to the line *BC* is greatest.

Given that this angle of depression is 34°, calculate the height of the tower.

Answer

..... m [3]

23



The diagram shows four points, A, B, P and Q, at sea.
B is due South of A and P is due East of A.
$AP = 3.73$ km, $BP = 5.47$ km, $AQ = 5.32$ km and $P\hat{A}Q = 25°$.

(a) Calculate $A\hat{B}P$.

Answer ..... [2]

(b) Calculate PQ.

Answer ..... km [4]

(c) A boat sailed in a straight line from Q to A.

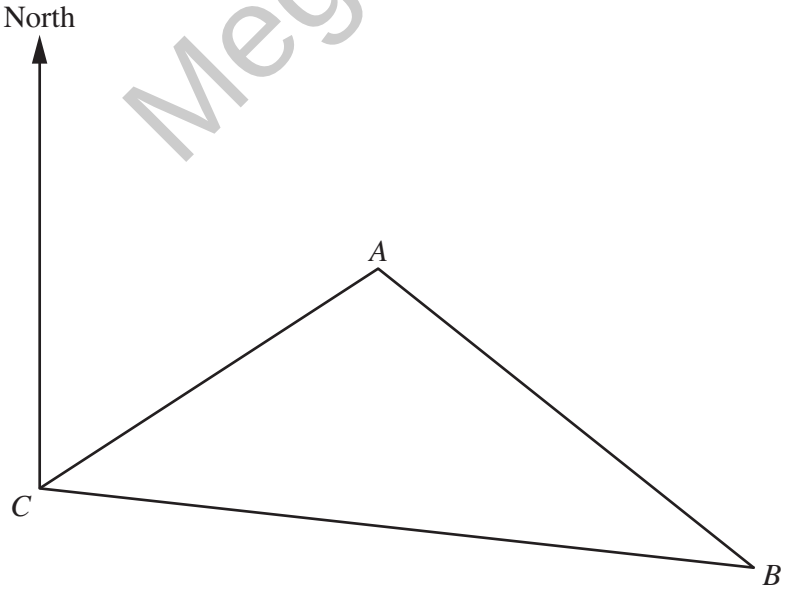
(i) Find the bearing of A from Q.

Answer ..... [1]

(ii) A lighthouse is situated at A.
The top of the lighthouse is 30 m above sea level.
Calculate the angle of depression of the boat from the top of the lighthouse when the boat is 100 m from A.

Answer ..... [2]

24 The scale drawing shows three towns, A, B and C.
The scale of the drawing is 1 cm to 25 km.



(a) Measure the bearing of A from C.

Answer ..... [1]

(b) Find the bearing of C from A.

Answer ..... [1]

(c) Find the actual distance, in kilometres, from B to C.

Answer ..... km [1]