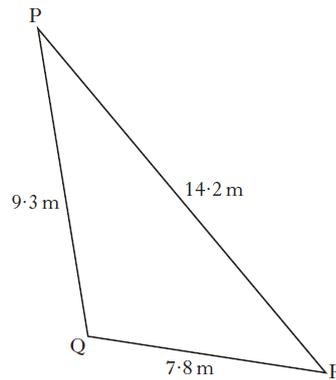


SINE RULE, COSINE RULE & AREA OF A TRIANGLE PAST PAPER QUESTIONS

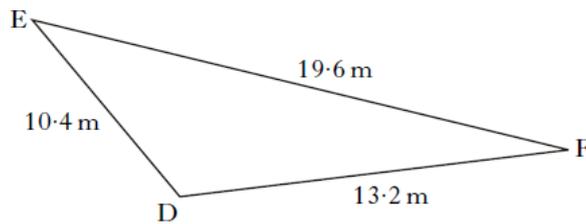
Calculator Questions

1. Triangle PQR is shown opposite
Calculate the size of angle QPR.



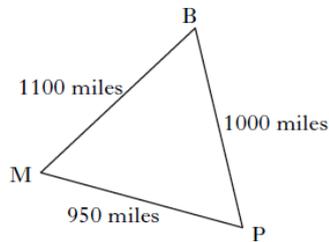
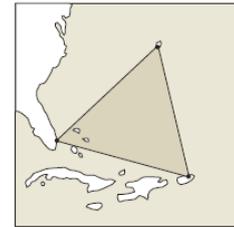
3

2. Triangle DEF is shown below.
It has sides of length 10.4 metres, 13.2 metres and 19.6 metres.
Calculate the size of angle EDF.



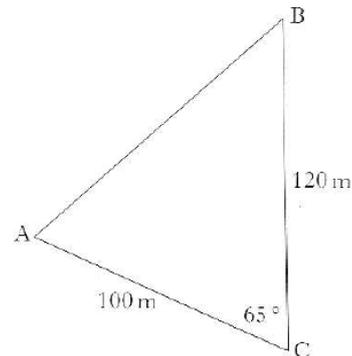
3

3. The Bermuda triangle is an area in the Atlantic Ocean where many planes and ships have mysteriously disappeared.
Its vertices are at Bermuda (B), Miami (M) and Puerto Rico (P).
Calculate the size of angle BPM.



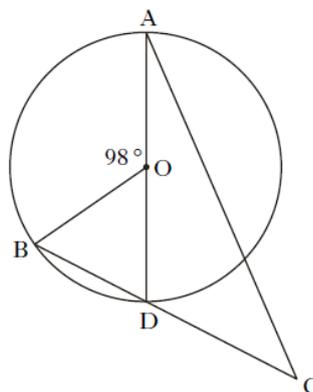
3

4. The sketch shows a triangle, ABC.
Calculate the area of the triangle.



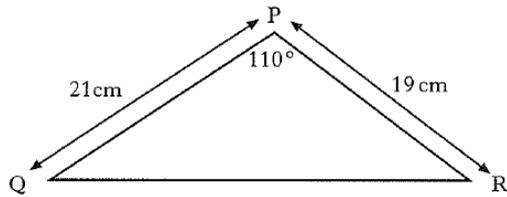
2

5. AD is a diameter of a circle, centre O.
B is a point on the circumference of the circle.
The chord BD is extended to a point C, outside the circle.
Angle BOA = 98° .
DC = 9 centimetres. The radius of the circle is 7 centimetres.
Calculate the length of AC.



5

6. Calculate the area of triangle PQR.

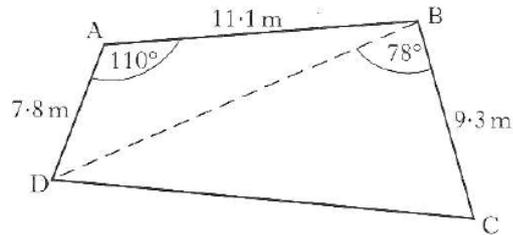


4

7. A garden, in the shape of a quadrilateral, is represented in the diagram opposite.

Calculate:

- a) the length of the diagonal BD.
b) the area of the garden.

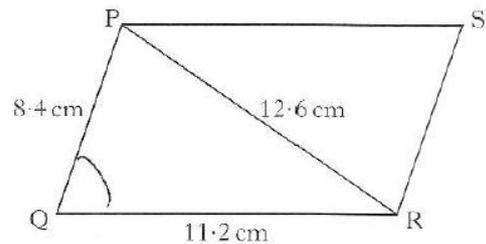


3

4

8. The sketch shows a parallelogram, PQRS.

- a) Calculate the size of angle PQR.
b) Calculate the area of the parallelogram.



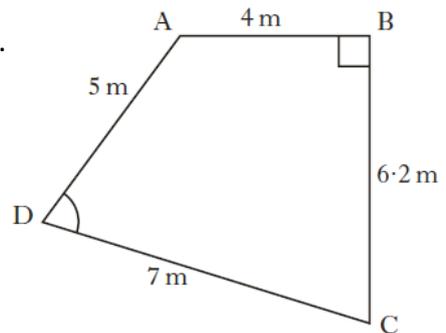
3

3

9. Quadrilateral ABCD with angle ABC = 90° is shown opposite.

- AB = 4 metres
- BC = 6.2 metres
- CD = 7 metres
- AD = 5 metres

- a) Calculate the length of AC.
b) Calculate the size of angle ADC.



2

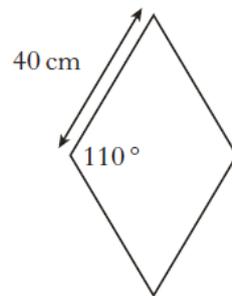
4

10. Paving stones are in the shape of a rhombus.

The side of each rhombus is 40 cm long.

The obtuse angle is 110°.

Find the area of one paving stone.



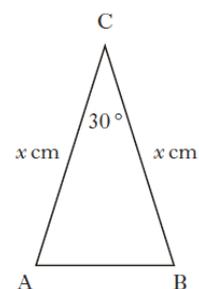
4

11. ABC is an isosceles triangle with angle ACB = 30°.

AC = BC = x centimetres.

The area of triangle ABC is 9 square centimetres.

Calculate the value of x .



3

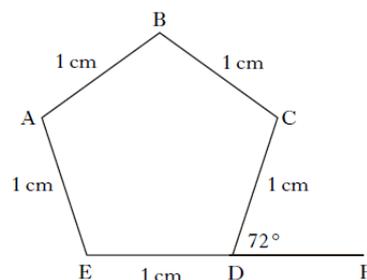
12. ABCDE is a regular pentagon with each side 1 cm.

Angle CDF is 72°.

EDF is a straight line.

a) Write down the size of angle ABC.

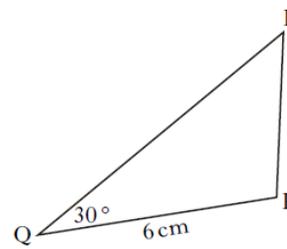
b) Calculate the length of AC.



1

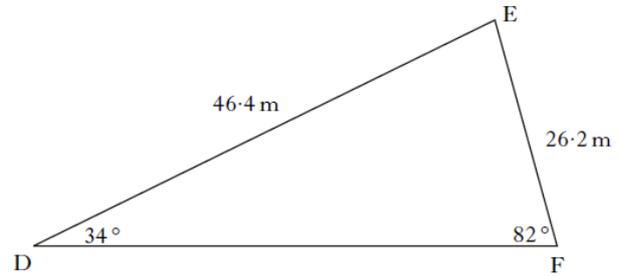
3

13. In triangle PQR:
- QR = 6 centimetres
 - angle PQR = 30°
 - area of triangle PQR = 15 square centimetres.
- Calculate the length of PQ.



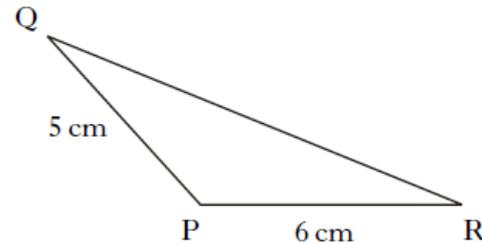
3

14. As part of their training, footballers run around a triangular circuit DEF.
- $\angle EDF = 34^\circ$
 - $\angle DFE = 82^\circ$
 - DE = 46.4 metres
 - EF = 26.2 metres
- How many **complete** circuits must they run to cover **at least** 1000 metres?



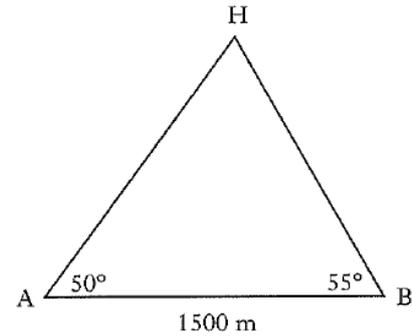
4

15. In triangle PQR:
- PQ = 5 centimetres
 - PR = 6 centimetres
 - area of triangle PQR = 12 cm
 - angle QPR is **obtuse**.
- Calculate the size of angle QPR.



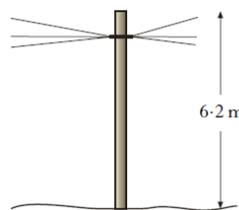
4

16. A helicopter, at point H, hovers between two aircraft carriers at points A and B which are 1500m apart.
- From carrier A, the angle of elevation of the helicopter is 50° .
- From carrier B, the angle of elevation of the helicopter is 55° .
- Calculate the distance from the helicopter to the nearer carrier.

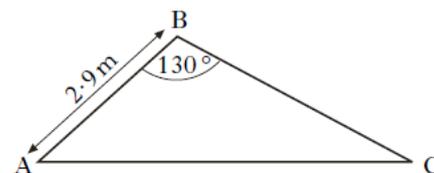
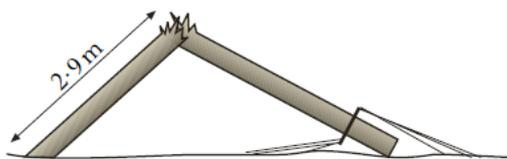


4

17. A telegraph pole is 6.2 metres high.



The wind blows the pole over into the position as shown below.

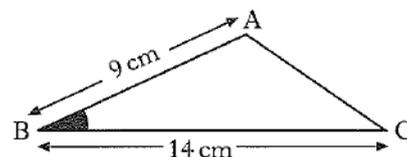


AB is 2.9 metres and angle ABC is 130° .

Calculate the length of AC.

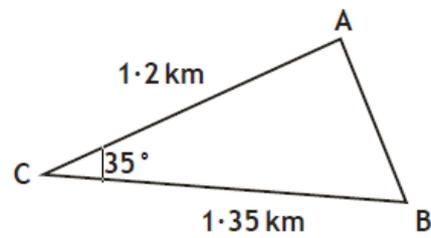
4

18. The area of triangle ABC is 38 cm^2 .
- AB is 9 cm and BC is 14 cm.
- Calculate the size of angle ABC.



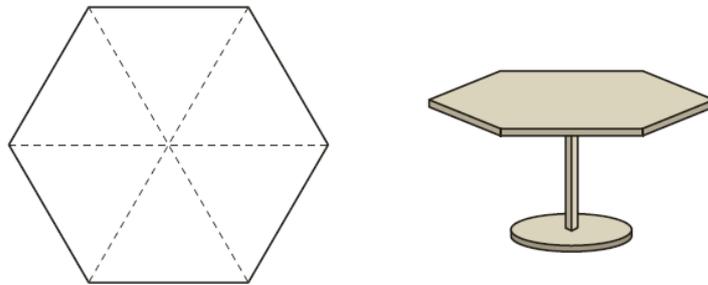
4

19. Triangle ABC is shown below.
Calculate the length of AB.



3

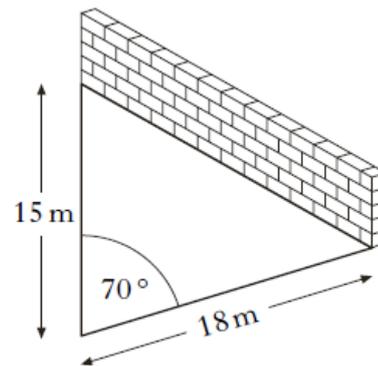
20. The top of a table is in the shape of a regular hexagon.
The three diagonals of the hexagon which are shown as dotted lines in the diagram below each have length 40 centimetres.



Calculate the area of the top of the table.

4

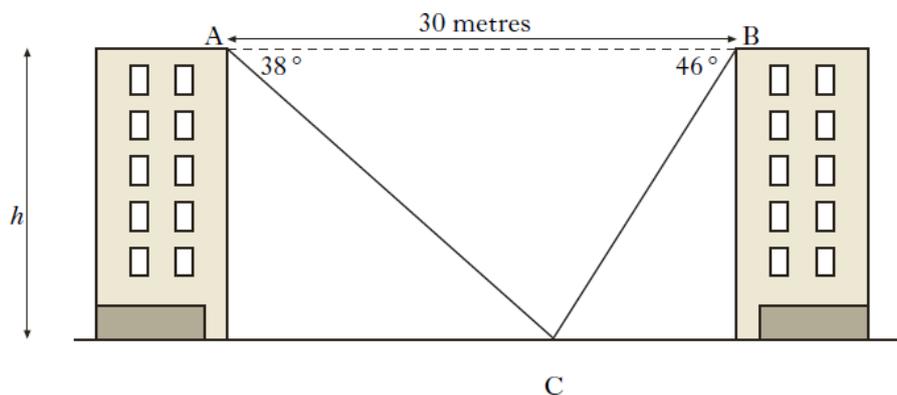
21. A farmer builds a sheep-pen using two lengths of fencing and a wall.
The two lengths of fencing are 15 m and 18 m long.
a) Calculate the area of the sheep-pen, when the angle between the fencing is 70°.
b) What angle between the fencing would give the farmer the largest possible area?



3

1

22. The diagram shows two blocks of flats of equal height.



A and B represent points on the top of the flats and C represents a point on the ground between them.

To calculate the height, h , of each block of flats, a surveyor measures the angles of depression from A and B to C.

From A, the angle of depression is 38°.

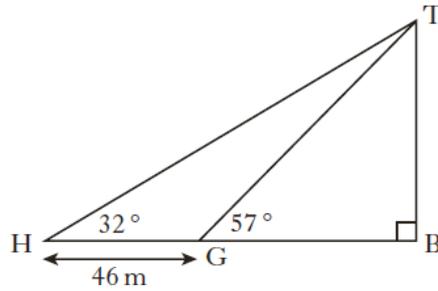
From B, the angle of depression is 46°.

The distance AB is 30 metres.

Calculate the height, h , in metres.

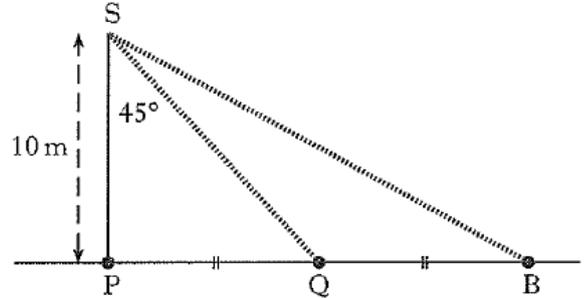
5

23. In triangle THB:
- angle TBH = 90°
 - angle THB = 32° .
- G is a point on HB.
- angle TGB = 57°
 - GH = 46 metres.
- Calculate the length of TB.



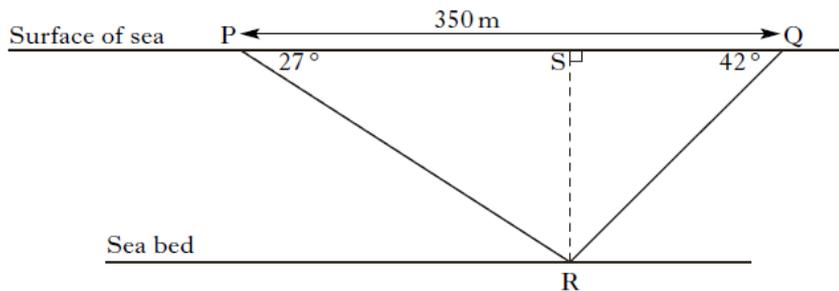
4

24. The diagram shows a spotlight at point S, mounted 10m directly above a point P at the front edge of a stage.
- The spotlight swings 45° from the vertical to illuminate another point Q, also at the front of the stage.
- Through how many more degrees must the spotlight swing to illuminate a point B, where Q is the mid-point of PB?



5

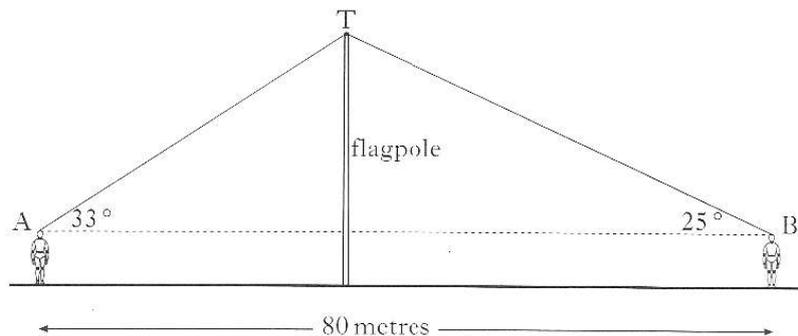
25. Two ships have located a wreck on the sea bed.
- In the diagram below, the points P and Q represent the two ships and the point R represents the wreck.



- The angle of depression of R from P is 27° .
- The angle of depression of R from Q is 42° .
- The distance PQ is 350 metres.
- Calculate QS, the distance ship Q has to travel to be directly above the wreck.

5

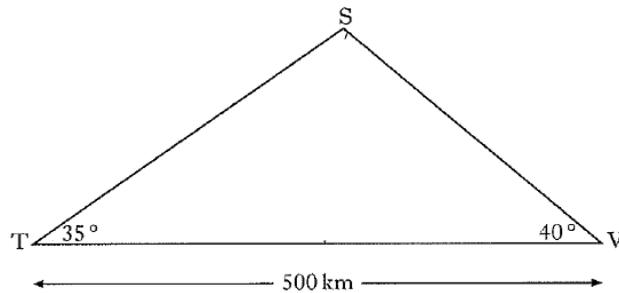
26. The diagram shows two positions of a surveyor as he views the top of a flagpole.



- From position A, the angle of elevation to T at the top of the flagpole is 33° .
- From position B, the angle of elevation to T at the top of the flagpole is 25° .
- The distance AB is 80m and the height of the surveyor to eye level is 1.6m.
- Find the height of the flagpole.

6

27. A TV signal is sent from a transmitter T, via a satellite S, to a village V, as shown in the diagram. The village is 500 km from the transmitter.



The signal is sent out at an angle of 35° and is received in the village at an angle of 40° . Calculate the height of the satellite above the ground.

5

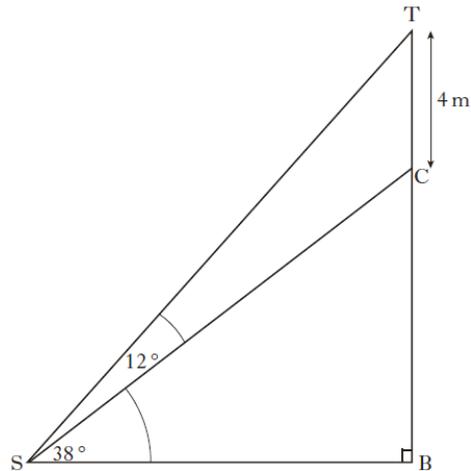
28. A tree surgeon is asked to reduce the height of a tree.

In the diagram below TB represents the original height of the tree and C is the point where the cut is to be made.

The tree surgeon will reduce the height of the tree by 4 m.

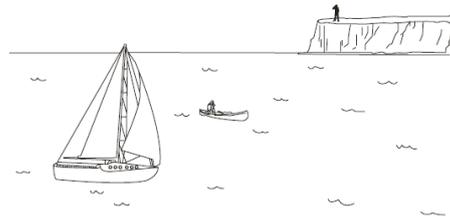
Angle TSC = 12° and angle BSC = 38° .

Calculate the height of the tree after it has been cut.

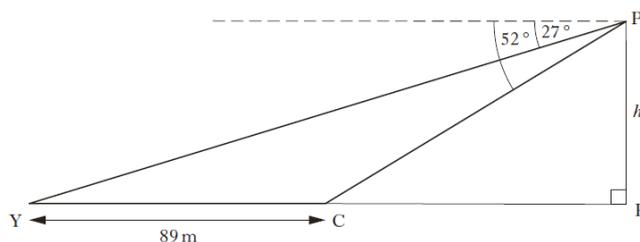


5

29. A yacht and a canoe can be seen from a clifftop.



In the diagram below, Y and C represent the positions of the yacht and the canoe.



From a point P on the clifftop:

- the angle of depression of the yacht is 27° ;
- the angle of depression of the canoe is 52° .

The distance between the yacht and the canoe is 89 metres.

Calculate the height, h , metres, of the cliff.

5

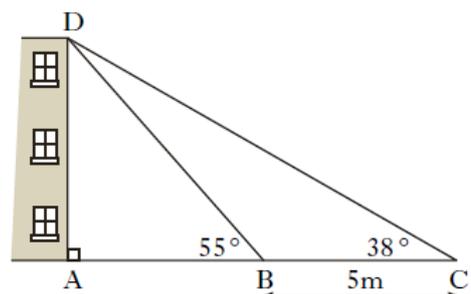
30. For reasons of safety, a building is supported by two wooden struts, represented by DB and DC in the diagram opposite.

Angle ABD = 55° .

Angle BCD = 38° .

BC is 5 metres.

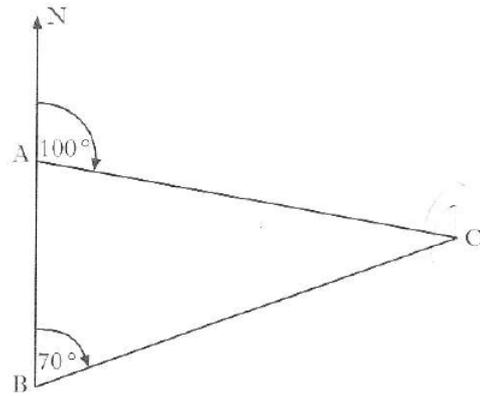
Calculate the height of the building represented by AD.



5

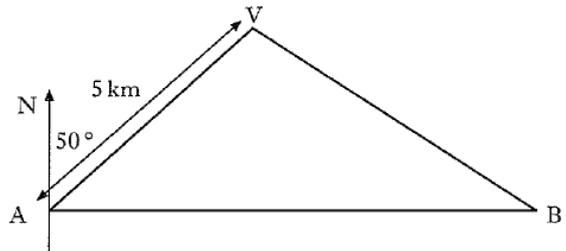
Bearings Questions (with a calculator)

1. The diagram opposite shows the position of three campsites A, B and C.
 Alan sets off from campsite A on a bearing of 100° at an average speed of 5.6 km per hour.
 At the same time Bob sets off from campsite B on a bearing of 070° .
 After 3 hours they both arrive at campsite C.
 Who has the faster average speed and by how much?



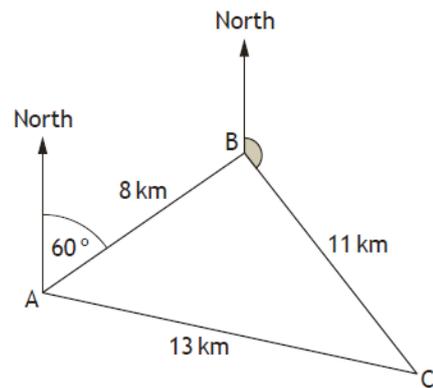
5

2. David walks on a bearing of 050° from hostel A to a viewpoint V, 5 km away.
 Hostel B is due east of hostel A.
 Susie walk on a bearing of 294° from hostel B to the same viewpoint.
 Calculate the length of AB, the distance between the 2 hostels.



5

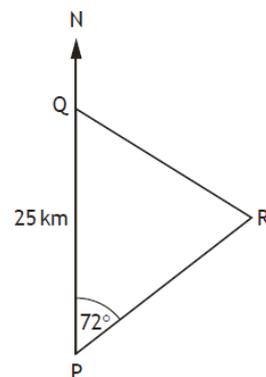
3. In a race, boats sail round three buoys represented by A, B, and C in the diagram below.
 B is 8 kilometres from A on a bearing of 060° .
 C is 11 kilometres from B.
 A is 13 kilometres from C.
 a) Calculate the size of angle ABC.
 b) Hence find the size of the shaded angle.



3

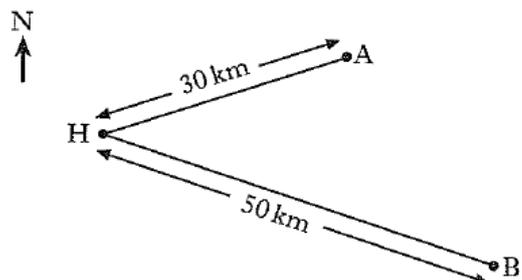
2

4. In the diagram below P, Q and R represent the positions of Portlee, Queenstown and Rushton respectively.
 Portlee is 25 kilometres due South of Queenstown.
 From Portlee, the bearing of Rushton is 072° .
 From Queenstown, the bearing of Rushton is 128° .
 Calculate the distance between Portlee and Rushton.



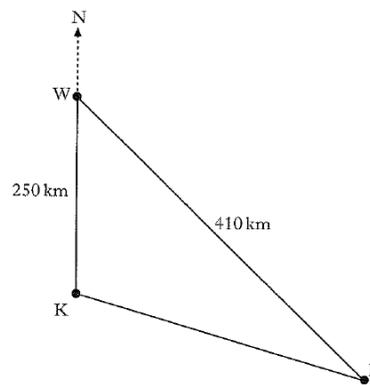
4

5. Two yachts leave from harbour H.
 Yacht A sails on a bearing of 072° for 30 km and stops.
 Yacht B sails on a bearing of 140° for 50 km and stops.
 How far apart are the two yachts when they have both stopped?



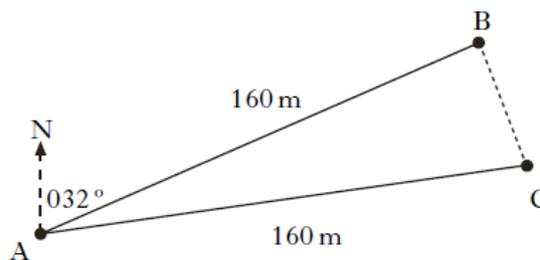
4

6. Three radio masts, Kangaroo (K), Wallaby (W) and Possum (P) are situated in the Australian outback. Kangaroo is 250km due south of Wallaby. Wallaby is 410 km from Possum. Possum is on a bearing of 130° from Kangaroo. Calculate the bearing of Possum from Wallaby.



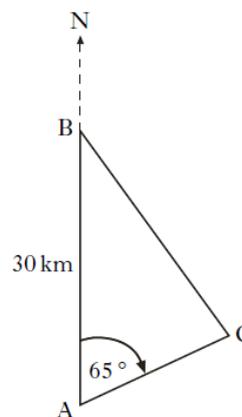
4

7. Jane is taking part in an orienteering competition. She should have run 160 metres from A to B on a bearing of 032° . However, she actually ran 160 metres from A to C on a bearing of 052° .
- Write down the size of angle BAC.
 - Calculate the length of BC.
 - What is the bearing from C to B?



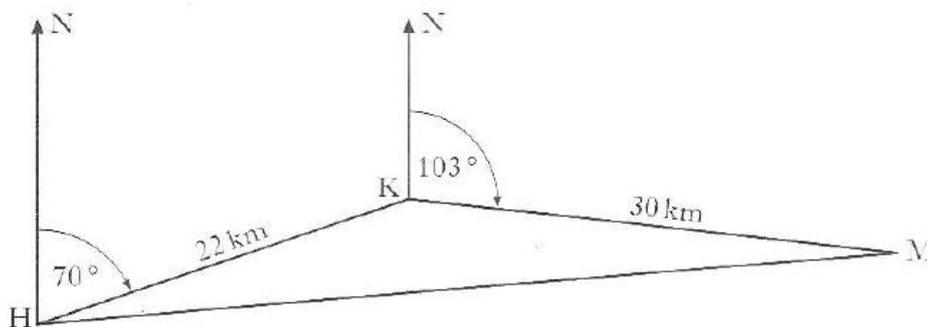
1
3
2

8. Brunton is 30 kilometres due North of Appleton. From Appleton, the bearing of Carlton is 065° . From Brunton, the bearing of Carlton is 153° . Calculate the distance between Brunton and Carlton.



4

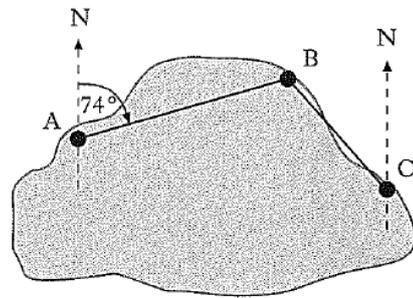
9. In the diagram below the three towns, Holton, Kilter and Malbrigg are represented by the points H, K and M.



A helicopter flies from Holton for 22 km on a bearing of 070° to Kilter. It then flies from Kilter for 30 km on a bearing of 103° to Malbrigg. The helicopter then returns directly to Holton.

- Calculate the size of angle HKM. 1
 - Calculate the total distance travelled by the helicopter. 3
- A climber is reported missing somewhere in the triangle represented by HKM in the diagram. Calculate the area of this triangle. 2

10. a) There are three mooring points A, B and C on Lake Sorling.
From A, the bearing of B is 074° .
From C, the bearing of B is 310° .
Calculate the size of angle ABC.



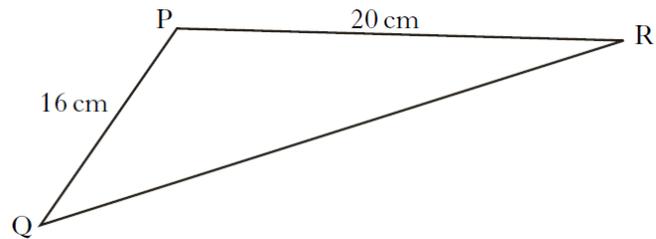
2

- b) B is 230m from A and 110m from C.
Calculate the direct distance from A to C. Give your answer to 3 significant figures.

4

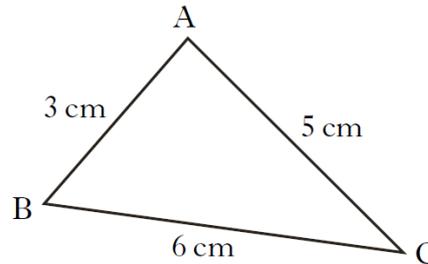
Non-Calculator Questions

1. Triangle PQR is shown opposite
If $\sin P = \frac{1}{4}$, calculate the area
of triangle PQR.



2

2. In triangle ABC, show that $\cos B = \frac{5}{9}$.

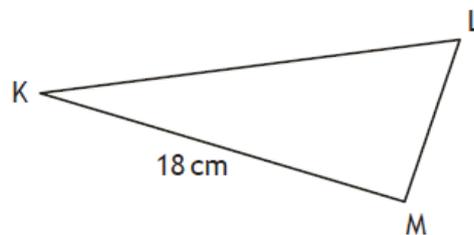


3

3. In triangle KLM

- $KM = 18$ cm
- $\sin K = 0.4$
- $\sin L = 0.9$

Calculate the length of LM.

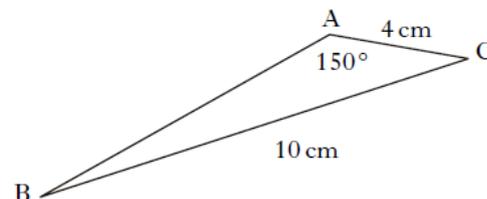


3

4. In triangle ABC

- AC = 4 centimetres
- BC = 10 centimetres
- angle BAC = 150°

Given that $\sin 30^\circ = \frac{1}{2}$, show that $\sin B = \frac{1}{5}$.



4

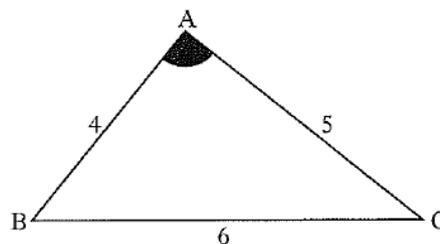
5. In triangle ABC,

AB = 4 units

AC = 5 units

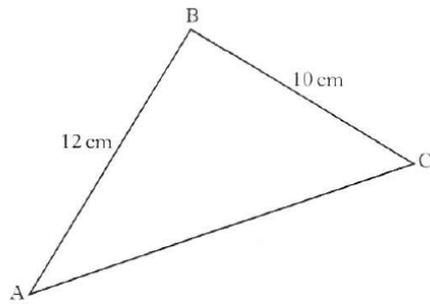
BC = 6 units

Show that $\cos A = \frac{1}{5}$.



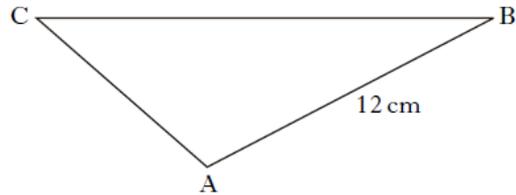
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6. Calculate the area of triangle ABC if $\sin B = \frac{2}{3}$.



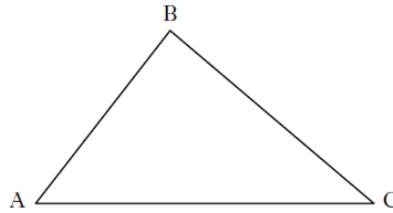
2

7. In triangle ABC, $AB = 12\text{cm}$, $\sin C = \frac{1}{2}$ and $\sin B = \frac{1}{3}$. Find the length of side AC.



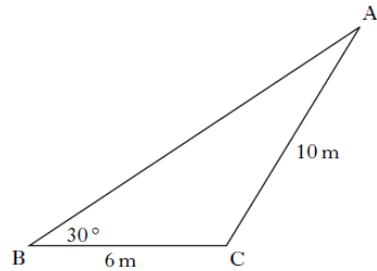
3

8. The area of triangle ABC is 20 cm^2 . $AC = 16\text{cm}$ and $\sin C = \frac{1}{4}$. Calculate the length of BC.



2

9. In triangle ABC:
 • $BC = 6\text{ metres}$
 • $AC = 10\text{ metres}$
 • $\text{angle } ABC = 30^\circ$.
 Given that $\sin 30^\circ = 0.5$, show that $\sin A = 0.3$.



3