1. Triangle ABC is such that AC is 7 cm, angle $A\hat{B}C$ is 65° and angle $A\hat{C}B$ is 30°.

(a) Sketch the triangle writing in the side length and angles.

(1)

(b) Calculate the length of AB.

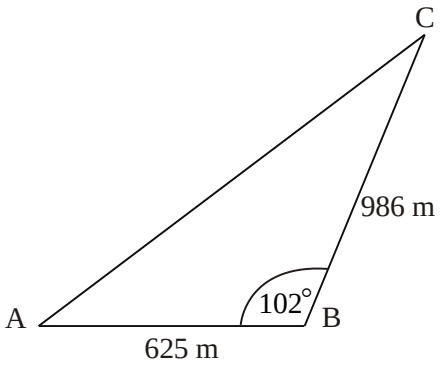
(2)

(c) Find the area of triangle ABC.

(3)
(Total 6 marks)

2. On a map three schools A, B and C are situated as shown in the diagram.

Schools A and B are 625 metres apart.
Angle $A\hat{B}C$ = 102° and BC = 986 metres.



(a) Find the distance between A and C.

(3)

(b) Find the size of angle $B\hat{A}C$.

(3)
(Total 6 marks)

3. Amir needs to construct an isosceles triangle ABC whose area is 100 cm^2.
The equal sides, AB and BC, are 20 cm long.

(a) Angle $A\hat{B}C$ is acute. Show that the angle $A\hat{B}C$ is 30°.

(2)

(b) Find the length of AC.

(3)
(Total 5 marks)

4. The diagram shows triangle ABC in which angle $B\hat{A}C = 30°$, BC = 6.7 cm and AC = 13.4 cm.

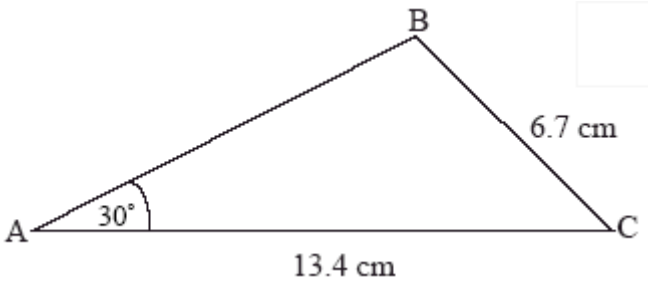


diagram not to scale

(a) Calculate the size of angle $A\hat{C}B$.

(4)

Nadia makes an accurate drawing of triangle ABC. She measures angle $B\hat{A}C$ and finds it to be 29°.

(b) Calculate the percentage error in Nadia's measurement of angle $B\hat{A}C$.

(2)
(Total 6 marks)

5. In triangle ABC, AB = 3.9 cm, BC = 4.8 cm and angle $A\hat{B}C = 82°$.

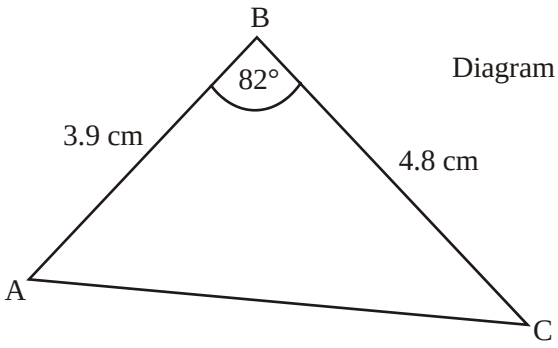


Diagram not to scale

(a) Calculate the length of AC.

(3)

(b) Calculate the size of angle $A\hat{C}B$.

(3)
(Total 6 marks)

6. The diagram shows a triangle ABC in which AC = 17 cm. M is the midpoint of AC. Triangle ABM is equilateral.

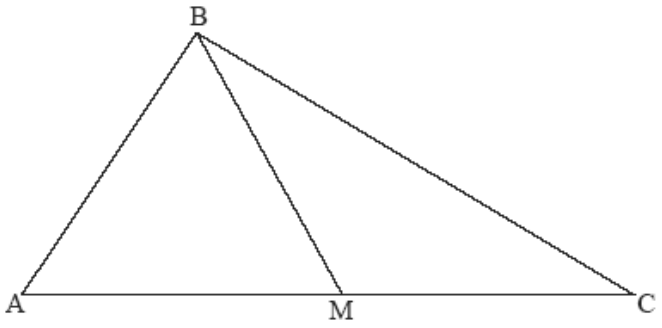


diagram not to scale

(a) Write down

(i) the length of BM in cm;

(ii) the size of angle BMC;

(iii) the size of angle MCB.

(3)

(b) Calculate the length of BC in cm.

(3)
(Total 6 marks)

7. In the diagram, AD = 4 m, AB = 9 m, BC = 10 m, $B\hat{D}A = 90°$ and $D\hat{B}C = 100°$.

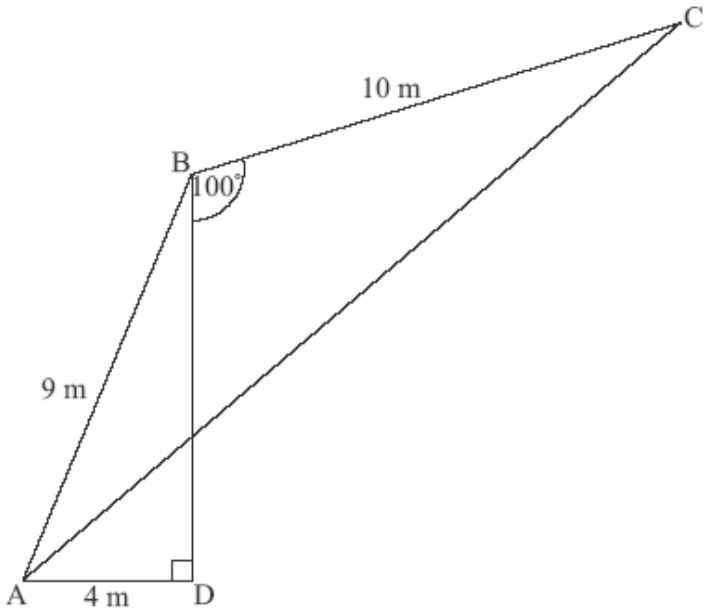


diagram not to scale

(a) Calculate the size of $A\hat{B}C$.

(3)

(b) Calculate the length of AC.

(3)
(Total 6 marks)

8. The figure shows a triangular area in a park surrounded by the paths AB, BC and CA, where AB = 400 m, $A\hat{B}C = 50°$ and $B\hat{C}A = 30°$.

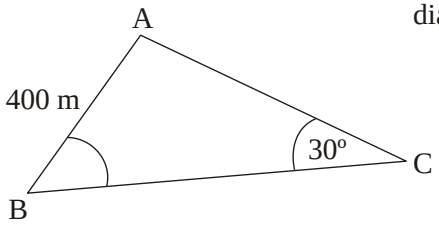


diagram not to scale

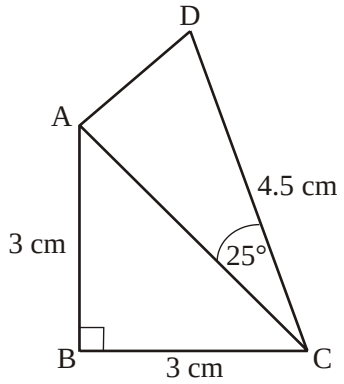
(a) Find the length of AC using the above information.

Diana goes along these three paths in the park at an average speed of 1.8 m s^{-1}.

(b) Given that BC = 788m, calculate how many minutes she takes to walk once around the park.

(Total 6 marks)

9.



In the diagram, AB = BC = 3 cm, DC = 4.5 cm, angle $A\hat{B}C = 90°$ and angle $A\hat{C}D = 25°$.

(a) Calculate the length of AC.

(b) Calculate the area of triangle ACD.

(c) Calculate the area of quadrilateral ABCD.

otal 8 marks)

10. Pauline owns a piece of land ABCD in the shape of a quadrilateral. The length of BC is 190 m, the length of CD is 120 m, the length of AD is 70 m, the size of angle BCD is 75° and the size of angle BAD is 115°.

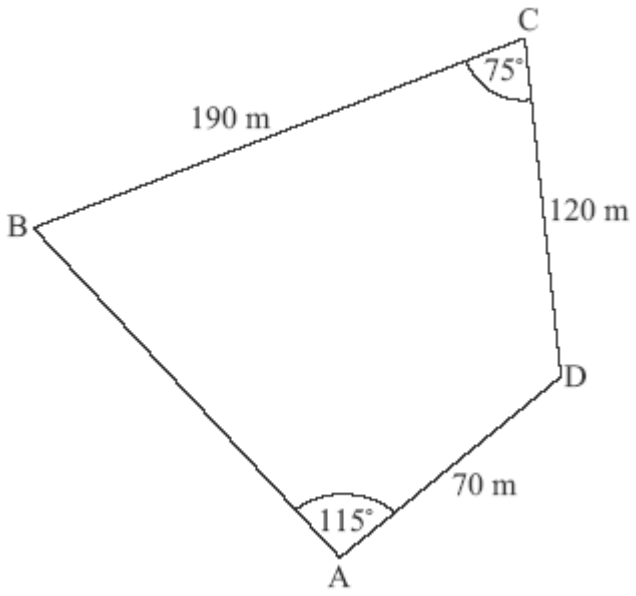


diagram not to scale

Pauline decides to sell the triangular portion of land ABD. She first builds a straight fence from B to D.

(a) Calculate the length of the fence.

(3)

The fence costs 17 USD per metre to build.

(b) Calculate the cost of building the fence. Give your answer correct to the nearest USD.

(2)

(c) Show that the size of angle ABD is 18.8°, correct to three significant figures.

(3)

(d) Calculate the area of triangle ABD.

(4)

She sells the land for 120 USD per square metre.

(e) Calculate the value of the land that Pauline sells. Give your answer correct to the nearest USD.

(2)

Pauline invests 300 000 USD from the sale of the land in a bank that pays compound interest compounded annually.

(f) Find the interest rate that the bank pays so that the investment will double in value in 15 years.

(4)

(Total 18 marks)

11. The diagram represents a small, triangular field, ABC, with BC = 25 m, angle BAC = 55° and angle ACB = 75°.

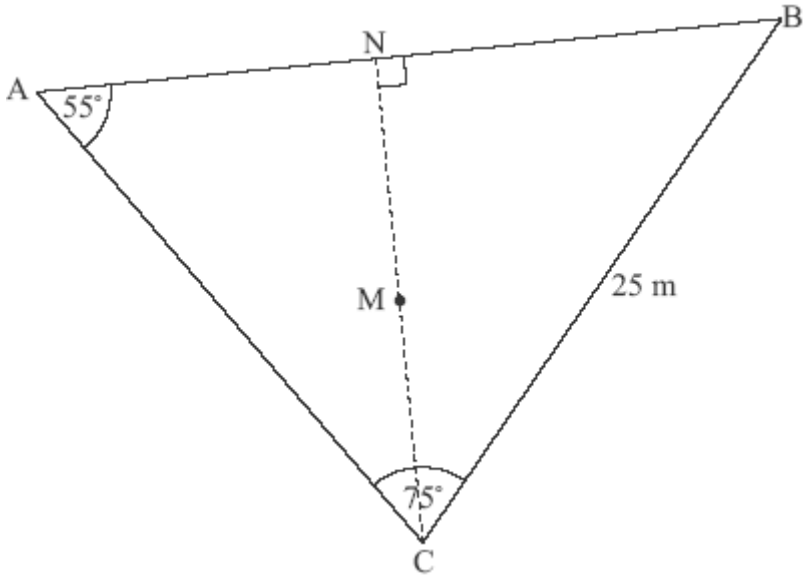


diagram not to scale

(a) Write down the size of angle ABC.

(1)

(b) Calculate the length of AC.

(3)

(c) Calculate the area of the field ABC.

(3)

N is the point on AB such that CN is perpendicular to AB. M is the midpoint of CN.

(d) Calculate the length of NM.

(3)

A goat is attached to one end of a rope of length 7 m. The other end of the rope is attached to the point M.

(e) Decide whether the goat can reach point P, the midpoint of CB. Justify your answer.

(5)

(Total 15 marks)

12. The diagram shows triangle ABC. Point C has coordinates (4, 7) and the equation of the line AB is $x + 2y = 8$.

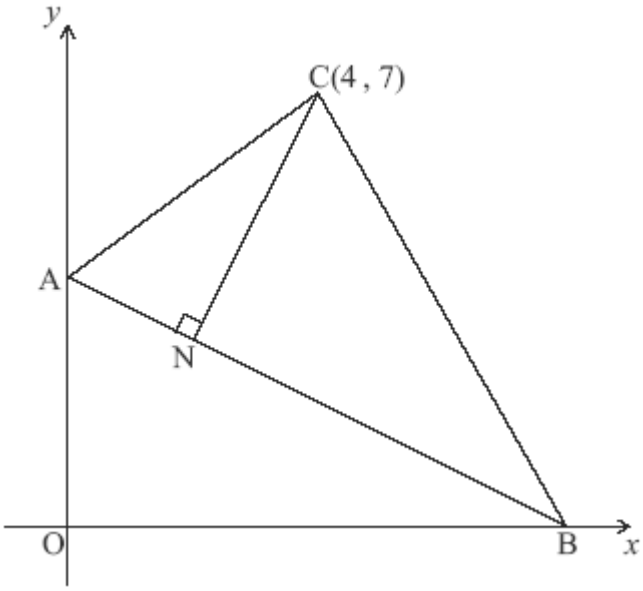


diagram not to scale

(a) Find the coordinates of

(i) A;

(ii) B.

(2)

(b) Show that the distance between A and B is 8.94 correct to 3 significant figures.

(2)

N lies on the line AB. The line CN is perpendicular to the line AB.

(c) Find

(i) the gradient of CN ;

(ii) the equation of CN.

(5)

(d) Calculate the coordinates of N.

(3)

It is known that AC = 5 and BC = 8.06.

(e) Calculate the size of angle ACB.

(3)

(f) Calculate the area of triangle ACB.

(3)

(Total 18 marks)

13. In the diagram below A , B and C represent three villages and the line segments AB, BC and CA represent the roads joining them. The lengths of AC and CB are 10 km and 8 km respectively and the size of the angle between them is 150°.

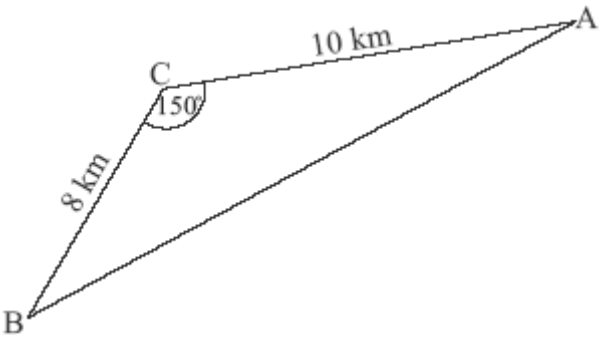


diagram not to scale

(a) Find the length of the road AB.

(3)

(b) Find the size of the angle CAB.

(3)

Village D is halfway between A and B. A new road perpendicular to AB and passing through D is built. Let T be the point where this road cuts AC. This information is shown in the diagram below.

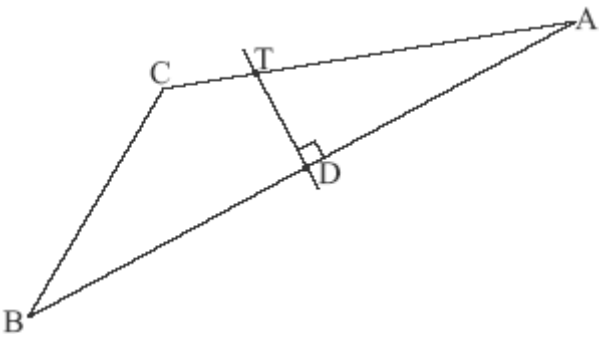


diagram not to scale

(c) Write down the distance from A to D.

(1)

(d) Show that the distance from D to T is 2.06 km correct to three significant figures.

(2)

A bus starts and ends its journey at A taking the route AD to DT to TA.

(e) Find the total distance for this journey.

(3)

The average speed of the bus while it is moving on the road is 70 km h^{-1}.
The bus stops for 5 **minutes** at each of D and T.

(f) Estimate the time taken by the bus to complete its journey. Give your answer correct to the nearest minute.

(4)
(Total 16 marks)

14. The quadrilateral ABCD shown below represents a sandbox. AB and BC have the same length. AD is 9 m long and CD is 4.2 m long. Angles $A\hat{D}C$ and $A\hat{B}C$ are 95° and 130° respectively.

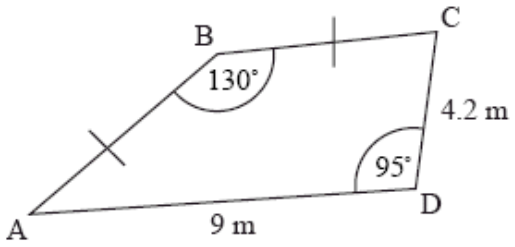


diagram not to scale

(a) Find the length of AC.

(3)

(b) (i) Write down the size of angle $B\hat{C}A$.

(ii) Calculate the length of AB.

(4)

(c) Show that the area of the sandbox is 31.1 m^2 correct to 3 s.f.

(4)

The sandbox is a prism. Its edges are 40 cm high. The sand occupies one third of the volume of the sandbox.

(d) Calculate the volume of sand in the sandbox.

(3)
(Total 14 marks)

15. A farmer has a triangular field, ABC, as shown in the diagram.
AB = 35 m, BC = 80 m and $B\hat{A}C$ =105°, and D is the midpoint of BC.

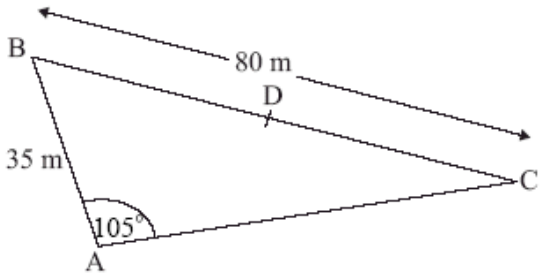


diagram not to scale

(a) Find the size of $B\hat{C}A$.

(3)

(b) Calculate the length of AD.

(5)

The farmer wants to build a fence around ABD.

(c) Calculate the total length of the fence.

(2)

(d) The farmer pays 802.50 USD for the fence. Find the cost per metre.

(2)

(e) Calculate the area of the triangle ABD.

(3)

(f) A layer of earth 3 cm thick is removed from ABD. Find the volume removed in cubic metres.

(3)

(Total 18 marks)

16. A path goes around a forest so that it forms the three sides of a triangle. The lengths of two sides are 550 m and 290 m. These two sides meet at an angle of 115°.
A diagram is shown below.

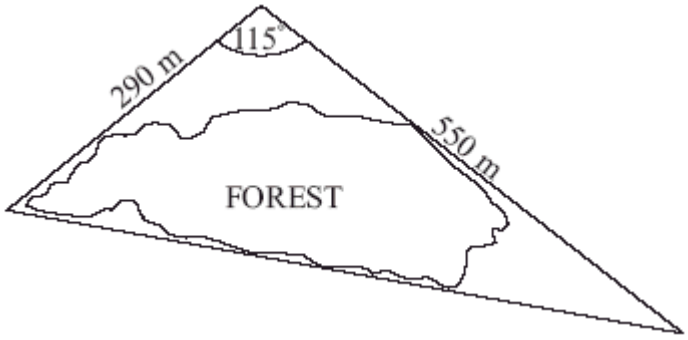


diagram not to scale

(a) Calculate the length of the third side of the triangle. Give your answer correct to the nearest 10 m.

(4)

(b) Calculate the area enclosed by the path that goes around the forest.

(3)

Inside the forest a second path forms the three sides of another triangle named ABC.
Angle $B\hat{A}C$ is 53°, AC is 180 m and BC is 230 m.

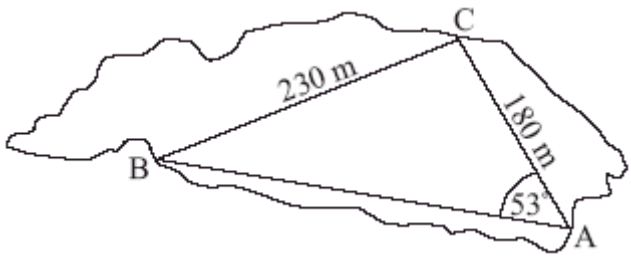


diagram not to scale

(c) Calculate the size of angle $A\hat{C}B$.

(4)

(Total 11 marks)