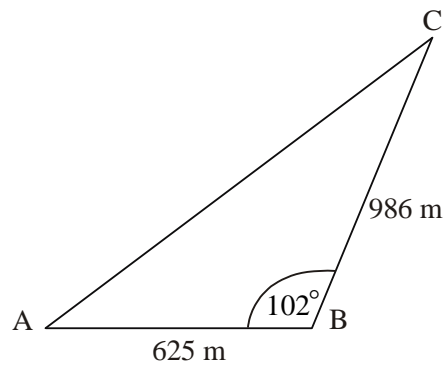# cos/sine rule questions studies

105 min

109 marks

1. 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.
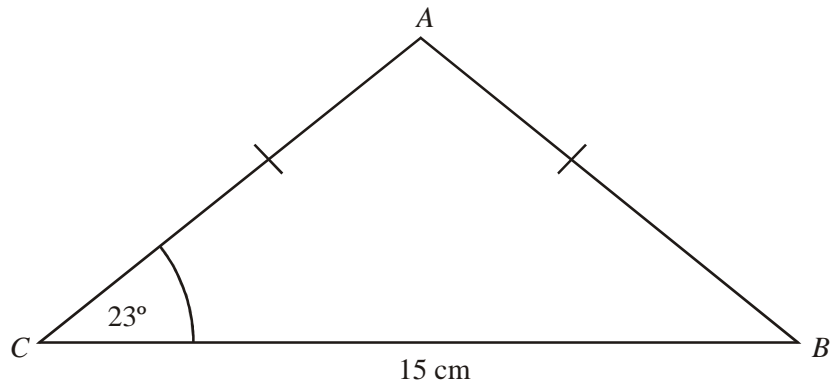

(a) Find the distance between A and C.

(3)

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

(3)
(Total 6 marks)

2. In the diagram, triangle ABC is isosceles. $AB = AC$, $CB = 15$ cm and angle ACB is $23°$.

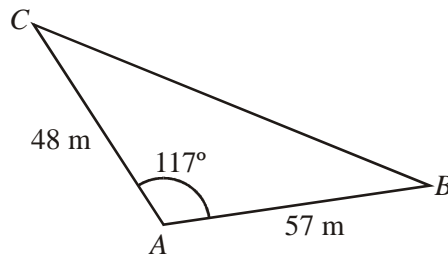*diagram not to scale*

Find

(a)   the size of angle CAB;

(b)   the length of AB.

(Total 4 marks)

3. The diagram shows the plan of a playground with dimensions as shown.
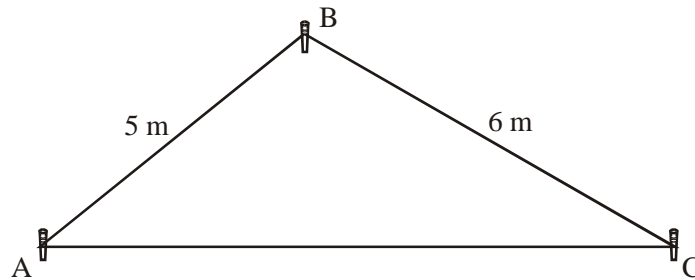

Calculate

(a)   the length BC;

(b)   the area of triangle ABC.

(Total 4 marks)

4. A gardener pegs out a rope, 19 metres long, to form a triangular flower bed as shown in this diagram.

Diagram not to scale

Calculate

(a)   the size of the angle BAC;

(3)

(b)   the area of the flower bed.

(2)

(Total 5 marks)

5. In the diagram, AD = 4 m, AB = 9 m, BC = 10 m, $\hat{BDA} = 90°$ and $\hat{DBC} = 100°$.
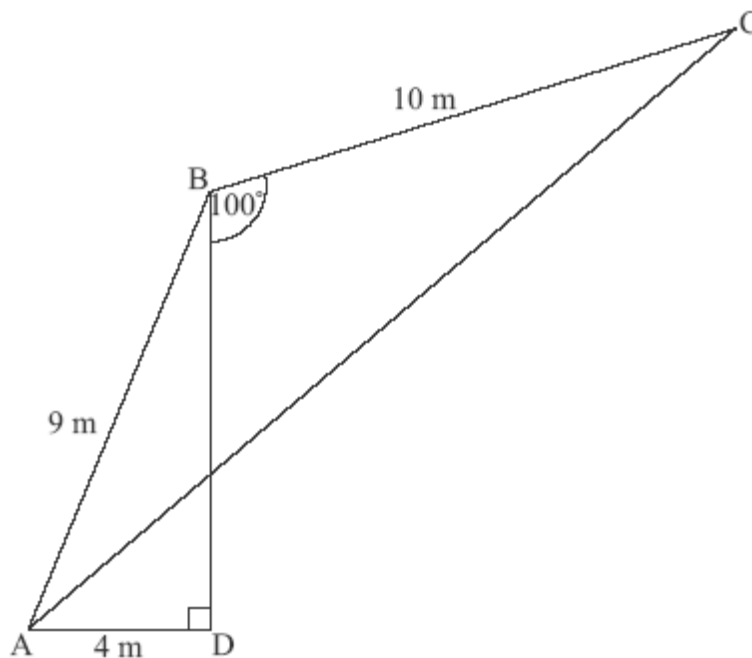

diagram not to scale

(a)   Calculate the size of AB̂C .

(3)

(b)   Calculate the length of AC.

(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.
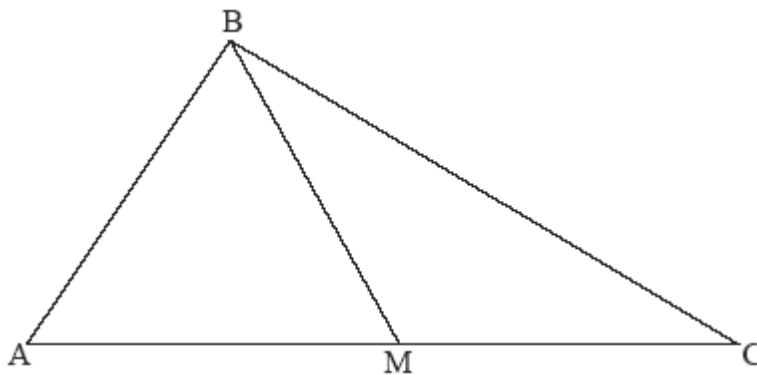

diagram not to scale

(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. The base of a prism is a **regular hexagon**. The centre of the hexagon is O and the length of OA is 15 cm.
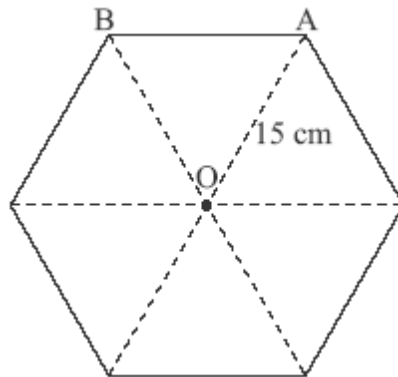

diagram not to scale

(a)   Write down the size of angle AOB.

(1)

(b)   Find the area of the triangle AOB.

(3)

The height of the prism is 20 cm.

(c)   Find the volume of the prism.

(2)
(Total 6 marks)

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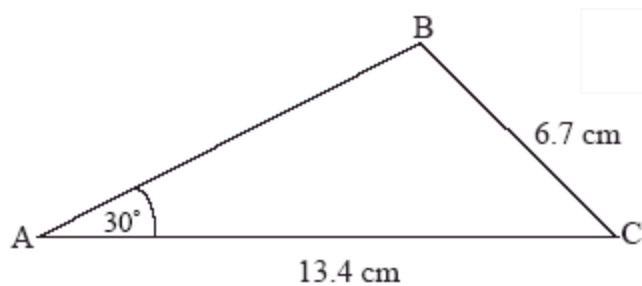

diagram not to scale

(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)

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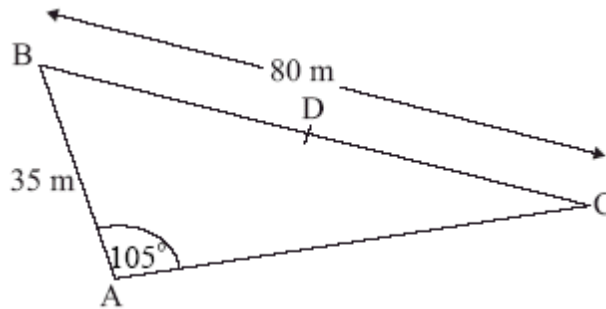AB = 35 m, BC = 80 m and $B\hat{A}C$ =105°, and D is the midpoint of BC.

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)

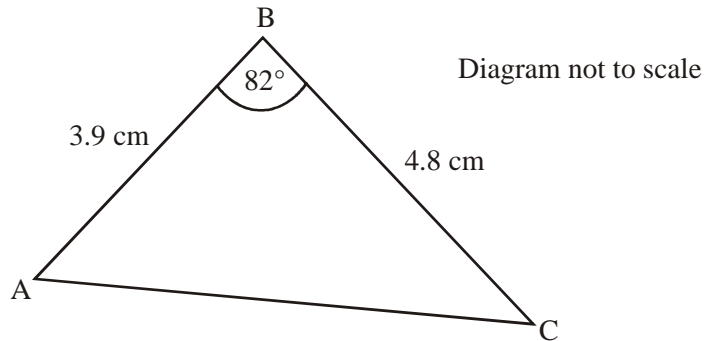(d)   The farmer pays 802.50 USD for the fence. Find the cost per metre.

(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)

10.   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)

11.   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)

12. 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 AB̂C is acute. Show that the angle AB̂C is 30°.

(2)

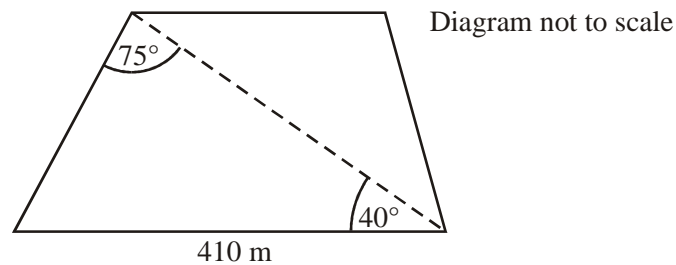(b) Find the length of AC.

(3)
(Total 5 marks)

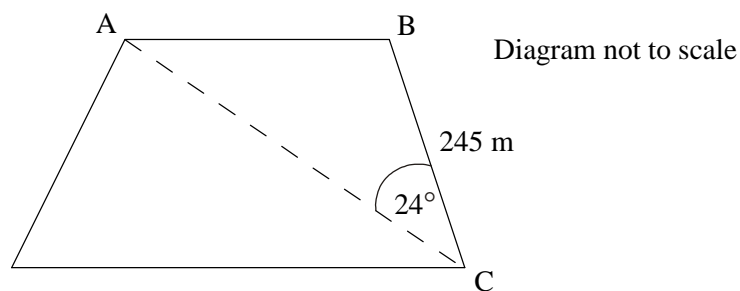**13.** (a) A farmer wants to construct a new fence across a field. The plan is shown below. The new fence is indicated by a dotted line.

Diagram not to scale

75°

40°

410 m

Calculate the length of the fence.

(5)

(b) The fence creates two sections of land. Find the area of the smaller section of land ABC, given the additional information shown below.
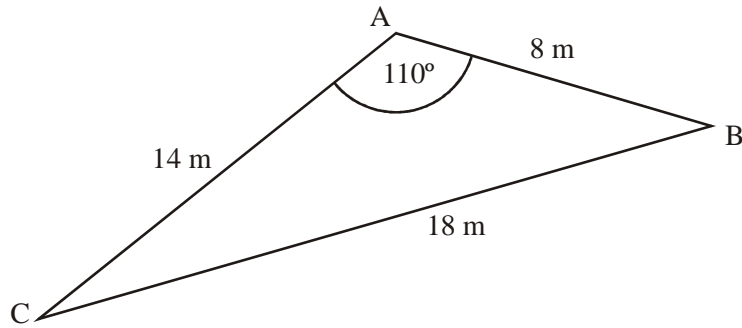

A   B   Diagram not to scale

245 m

24°

C

(3)
(Total 8 marks)

14. The following diagram shows a triangle ABC. AB = 8 m, AC = 14 m, BC = 18 m, and
$\hat{BAC} = 110°$.

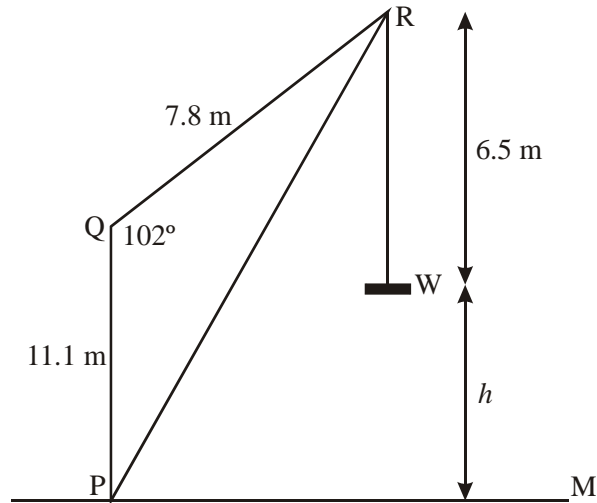**Diagram not to scale**

Calculate

(a)   the area of triangle ABC;

(b)   the size of angle $\hat{ACB}$.

(Total 4 marks)

15. The diagram below shows a crane PQR that carries a flat box W. (PQ) is vertical, and the floor (PM) is horizontal.

Diagram not to scale

Given that PQ = 11.1m, QR = 7.8 m, $P\hat{Q}R = 102°$ and RW = 6.5 m, calculate

(a)   PR;

(2)

(b)   angle $P\hat{R}Q$;

(2)

(c)   the height, h, of W above (PM).

(3)

(Total 7 marks)

16. The diagram below shows a field ABCD with a fence BD crossing it. AB = 15 m, AD = 20 m and angle $B\hat{A}D = 110°$. BC = 22 m and angle $B\hat{D}C = 30°$.
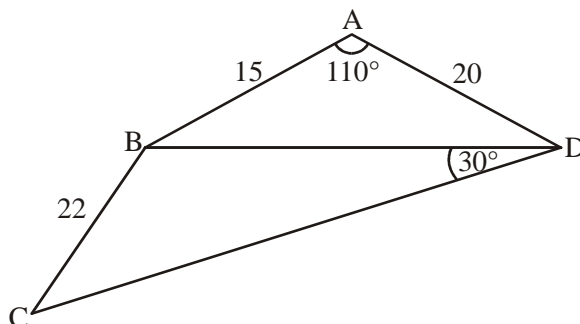

diagram not to scale

(a) Calculate the length of BD.

(3)

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

(3)

One student gave the answer to (a) "correct to 1 significant figure" and used this answer to calculate the size of angle $B\hat{C}D$.

(c) Write down the length of BD correct to 1 significant figure.

(1)

(d) Find the size of angle $B\hat{C}D$ that the student calculated, **giving your answer correct to 1 decimal place**.

(2)

(e) Hence find the percentage error in his answer for angle $B\hat{C}D$.

(3)
(Total 12 marks)