1. Given ΔABC, with lengths shown in the diagram below, find the length of the line segment [CD].

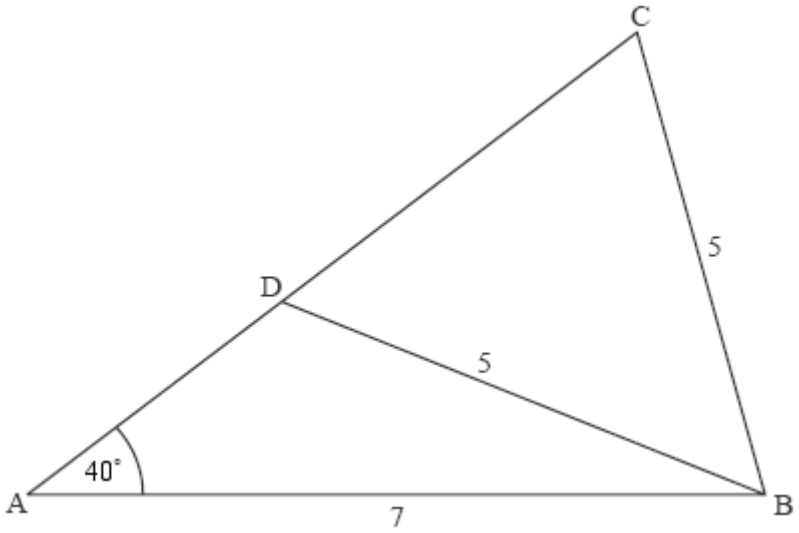


diagram not to scale

(Total 5 marks)

2. In the right circular cone below, O is the centre of the base which has radius 6 cm. The points B and C are on the circumference of the base of the cone. The height AO of the cone is 8 cm and the angle $B\hat{O}C$ is 60°.

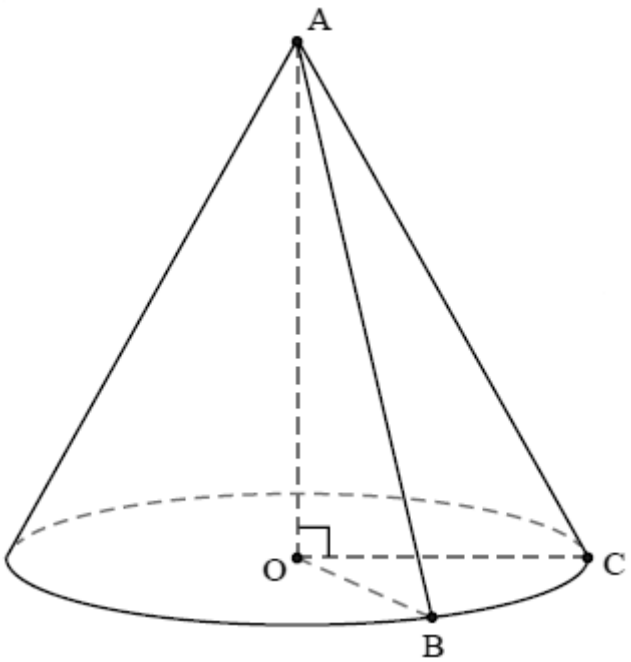


diagram not to scale

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

(Total 6 marks)

3. Consider the triangle ABC where $B\hat{A}C = 70°$, AB = 8 cm and AC = 7 cm. The point D on the side BC is such that $\frac{BD}{DC} = 2$.

Determine the length of AD.

(Total 6 marks)

4. Triangle ABC has AB = 5cm, BC = 6 cm and area 10 cm^2.

(a) Find $\sin \hat{B}$.

(2)

(b) **Hence**, find the two possible values of AC, giving your answers correct to two decimal places.

(4)

(Total 6 marks)

5. A triangle has sides of length $(n^2 + n + 1)$, $(2n + 1)$ and $(n^2 - 1)$ where $n > 1$.

(a) Explain why the side $(n^2 + n + 1)$ must be the longest side of the triangle.

(3)

(b) Show that the largest angle, θ, of the triangle is 120°.

(5)

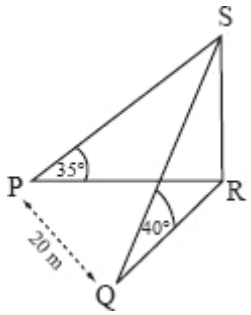
(Total 8 marks)

6. In triangle ABC, AB = 9 cm, AC =12 cm, and $\hat{B}$ is twice the size of $\hat{C}$.

Find the cosine of $\hat{C}$.

(Total 5 marks)

7.



The above three dimensional diagram shows the points P and Q which are respectively west and south-west of the base R of a vertical flagpole RS on horizontal ground. The angles of elevation of the top S of the flagpole from P and Q are respectively 35° and 40°, and PQ = 20 m.

Determine the height of the flagpole.

(Total 8 marks)

8. Consider triangle ABC with $\hat{BAC} = 37.8°$, AB = 8.75 and BC = 6.

Find AC.

(Total 7 marks)

9. In a triangle ABC, $\hat{A} = 35°$, BC = 4 cm and AC = 6.5 cm. Find the possible values of $\hat{B}$ and the corresponding values of AB.

(Total 7 marks)

10. The lengths of the sides of a triangle ABC are $x - 2$, x and $x + 2$. The largest angle is 120°.

(a) Find the value of x.

(6)

(b) Show that the area of the triangle is $\frac{15\sqrt{3}}{4}$.

(3)

(c) Find $\sin A + \sin B + \sin C$ giving your answer in the form $\frac{p\sqrt{q}}{r}$ where $p, q, r \in \mathbb{Z}$.

(4)

(Total 13 marks)

11. A farmer owns a triangular field ABC. The side [AC] is 104 m, the side [AB] is 65 m and the angle between these two sides is 60°.

(a) Calculate the length of the third side of the field.

(3)

(b) Find the area of the field in the form $p\sqrt{3}$, where p is an integer.

(3)

Let D be a point on [BC] such that [AD] bisects the 60° angle. The farmer divides the field into two parts by constructing a straight fence [AD] of length x metres.

(c) (i) Show that the area o the smaller part is given by $\frac{65x}{4}$ and find an expression for the area of the larger part.

(ii) Hence, find the value of x in the form $q\sqrt{3}$, where q is an integer.

(8)

(d) Prove that $\frac{\text{BD}}{\text{DC}} = \frac{5}{8}$.

(6)
(Total 20 marks)