Revision – Trigonometry (Year 12) - 1

1.

Solve each of the following equations, for $0° \leqslant x \leqslant 180°$.

(i) $2\sin^2 x = 1 + \cos x$. [4]

(ii) $\sin 2x = -\cos 2x$. [4]

2.

Solve, for $0 \leq x \leq 180°$, the equation

(*a*) $\sin(x + 10°) = \frac{\sqrt{3}}{2}$,

(4)

(*b*) $\cos 2x = -0.9$, giving your answers to 1 decimal place.

(4)

3.

(*a*) Find all the values of θ, to 1 decimal place, in the interval $0° \leq \theta < 360°$ for which

$$5\sin(\theta + 30°) = 3.$$

(4)

(*b*) Find all the values of θ, to 1 decimal place, in the interval $0° \leq \theta < 360°$ for which

$$\tan^2\theta = 4.$$

(5)

4.

(i) Prove that the equation

$$\sin\theta\tan\theta = \cos\theta + 1$$

can be expressed in the form

$$2\cos^2\theta + \cos\theta - 1 = 0.$$ [3]

(ii) Hence solve the equation

$$\sin\theta\tan\theta = \cos\theta + 1,$$

giving all values of θ between $0°$ and $360°$. [5]

5.

(*a*) Show that the equation

$$5\cos^2 x = 3(1 + \sin x)$$

can be written as

$$5\sin^2 x + 3\sin x - 2 = 0.$$

(2)

(*b*) Hence solve, for $0 \leq x < 360°$, the equation

$$5\cos^2 x = 3(1 + \sin x),$$

giving your answers to 1 decimal place where appropriate.

(5)

6.

(i) Show that the equation

$$\sin x - \cos x = \frac{6\cos x}{\tan x}$$

can be expressed in the form

$$\tan^2 x - \tan x - 6 = 0.$$ **[2]**

(ii) Hence solve the equation $\sin x - \cos x = \frac{6\cos x}{\tan x}$ for $0° \leqslant x \leqslant 360°$. **[4]**

7.

(*a*) Given that $\sin\theta = 5\cos\theta$, find the value of $\tan\theta$.

(1)

(*b*) Hence, or otherwise, find the values of θ in the interval $0 \leq \theta < 360°$ for which

$$\sin\theta = 5\cos\theta,$$

giving your answers to 1 decimal place.

(3)

8.

(i) Show that, when x is an acute angle, $\tan x\sqrt{1 - \sin^2 x} = \sin x$. **[2]**

(ii) Solve $4\sin^2 y = \sin y$ for $0° \leqslant y \leqslant 360°$. **[3]**

9.

(i) Fig. 5 shows the graph of a sine function.

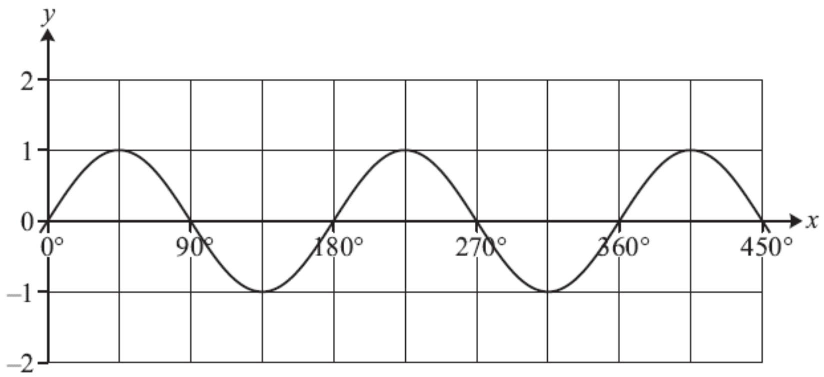
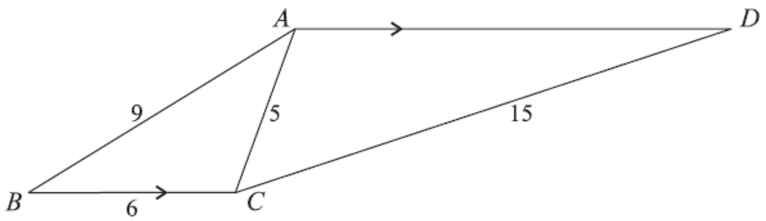


Fig. 5

State the equation of this curve. **[2]**

(ii) Sketch the graph of $y = \sin x - 3$ for $0° \leqslant x \leqslant 450°$. **[2]**

10.

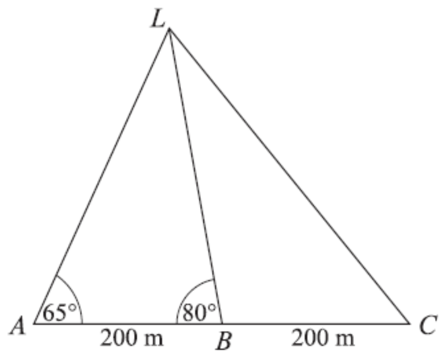


In the diagram, $ABCD$ is a quadrilateral in which AD is parallel to BC. It is given that $AB = 9$, $BC = 6$, $CA = 5$ and $CD = 15$.

(i) Show that $\cos BCA = -\frac{1}{3}$, and hence find the value of $\sin BCA$. [4]

(ii) Find the angle ADC correct to the nearest $0.1°$. [4]

11.

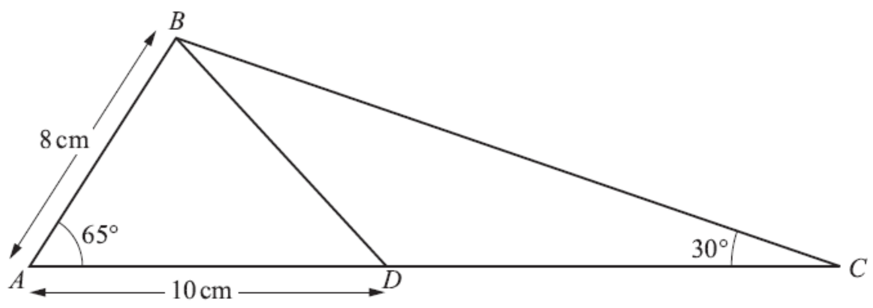


A landmark L is observed by a surveyor from three points A, B and C on a straight horizontal road, where $AB = BC = 200$ m. Angles LAB and LBA are 65° and 80° respectively (see diagram). Calculate

(i) the shortest distance from L to the road, [4]

(ii) the distance LC. [3]

12.



The diagram shows triangle ABC, with $AB = 8$ cm, angle $BAC = 65°$ and angle $BCA = 30°$. The point D is on AC such that $AD = 10$ cm.

(i) Find the area of triangle ABD. **[2]**

(ii) Find the length of BD. **[2]**

(iii) Find the length of BC. **[2]**
