Trigonometry

(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)

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

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

(4)

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

(4)

(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)

(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)

Find all the solutions, in the interval $0 \leq x < 2\pi$, of the equation

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

giving each solution in terms of π.

(6)

(*a*) Sketch, for $0 \leq x \leq 2\pi$, the graph of $y = \sin\left(x + \frac{\pi}{6}\right)$.

(2)

(*b*) Write down the exact coordinates of the points where the graph meets the coordinate axes.

(3)

(*c*) Solve, for $0 \leq x \leq 2\pi$, the equation

$$\sin\left(x + \frac{\pi}{6}\right) = 0.65,$$

giving your answers in radians to 2 decimal places.

(5)

(*a*) Show that the equation

$$3\sin^2\theta - 2\cos^2\theta = 1$$

can be written as

$$5\sin^2\theta = 3.$$

(2)

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

$$3\sin^2\theta - 2\cos^2\theta = 1,$$

giving your answer to 1 decimal place.

(7)

Solve, for $0 \leq x < 360°$,

(*a*) $\sin(x - 20°) = \frac{1}{\sqrt{2}}$,

(4)

(*b*) $\cos 3x = -\frac{1}{2}$.

---

(6)

(*a*) Show that the equation

$$4\sin^2 x + 9\cos x - 6 = 0$$

can be written as

$$4\cos^2 x - 9\cos x + 2 = 0.$$

(2)

(*b*) Hence solve, for $0 \leq x < 720°$,

$$4\sin^2 x + 9\cos x - 6 = 0,$$

giving your answers to 1 decimal place.

(6)

(i) Solve, for $-180° \leq \theta < 180°$,

$$(1 + \tan\theta)(5\sin\theta - 2) = 0.$$

(4)

(ii) Solve, for $0 \leq x < 360°$,

$$4\sin x = 3\tan x.$$

(6)

(*a*) Show that the equation

$$5\sin x = 1 + 2\cos^2 x$$

can be written in the form

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

(2)

(*b*) Solve, for $0 \leq x < 360°$,

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

(4)

(*a*) Given that $5\sin\theta = 2\cos\theta$, find the value of $\tan\theta$.

(1)

(*b*) Solve, for $0 \leq x < 360°$,

$$5\sin 2x = 2\cos 2x,$$

giving your answers to 1 decimal place.

(5)

(*a*) Show that the equation

$$3\sin^2 x + 7\sin x = \cos^2 x - 4$$

can be written in the form

$$4\sin^2 x + 7\sin x + 3 = 0.$$

(2)

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

$$3\sin^2 x + 7\sin x = \cos^2 x - 4$$

giving your answers to 1 decimal place where appropriate.

(5)

(a) Solve for $0 \leq x < 360°$, giving your answers in degrees to 1 decimal place,

$$3 \sin (x + 45°) = 2.$$

(4)

(b) Find, for $0 \leq x < 2\pi$, all the solutions of

$$2 \sin^2 x + 2 = 7\cos x,$$

giving your answers in radians.

You must show clearly how you obtained your answers.

(6)

(a) Solve, for $0 \leq x < 360°$, the equation $\cos (x - 20°) = -0.437$, giving your answers to the nearest degree.

(4)

(b) Find the exact values of θ in the interval $0 \leq \theta < 360°$ for which

$$3 \tan \theta = 2 \cos \theta.$$

(6)