

Trigonometry

1 It is given that $5 \sin 3\theta^\circ = 2 \cos 3\theta^\circ$.

(i) Show that $\tan 3\theta^\circ = 0.4$. [1]

(ii) Hence find the values of θ , in the interval $0 \leq \theta \leq 180$, for which

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

Give your answers correct to 1 decimal place. [4]

2 (i) Express $3 \cos^2 \theta^\circ - 2 \sin \theta^\circ$ in terms of $\sin \theta^\circ$. [1]

(ii) Hence solve the equation

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

giving all values such that $0 \leq \theta \leq 360$. Where appropriate, give your answers correct to 1 decimal place. [4]

3 (i) Sketch the graph of $y = \tan x^\circ$ for values of x such that $0 \leq x \leq 360$. [2]

(ii) Sketch on a separate diagram the graph of $y = \tan(x - 90)^\circ$ for values of x such that $0 \leq x \leq 360$. [2]

(iii) Solve the equation $\tan(x - 90)^\circ = 1$ for values of x such that $0 \leq x \leq 360$. [2]

4 (i) Show that $\frac{\sin^2 \theta^\circ}{1 - \sin^2 \theta^\circ} \equiv \tan^2 \theta^\circ$. [2]

(ii) Hence or otherwise find the values of θ , in the interval $0 \leq \theta \leq 180$, for which

$$\frac{\sin^2 \theta^\circ}{1 - \sin^2 \theta^\circ} = 1. [2]$$

5 (i) On a single diagram, sketch and label the following graphs for $0 \leq x \leq 360$.

(a) $y = \sin x^\circ$ [1]

(b) $y = \sin 2x^\circ$ [2]

(ii) Write down the number of solutions of the equation $\sin 2x^\circ = c$, given that $0 < c < 1$ and $0 \leq x \leq 360$. [1]

6 (i) Write down the period of $\sin x^\circ$, and hence write down the period of $\sin 6x^\circ$. [2]

(ii) Solve the equation $\sin 6x^\circ = 0.5$, giving all values of x such that $0 \leq x \leq 90$. [4]

(iii) Find the smallest positive solution of the equation $\sin 6x^\circ = -0.5$. [2]