Trig Functions and Identities 2

1) **(i)** Solve the equation $3\sin x + 4\cos x = 0$ for $0° < x < 360°$. [3]

(ii) Solve the equation $6\cos y + 6\sec y = 13$ for $0° < y < 360°$. [5]

2) **(a)** Prove that $\dfrac{1}{1-\sin x} - \dfrac{1}{1+\sin x} = 2\tan x \sec x$. [3]

(b) An acute angle x is such that $\sin x = p$. Given that $\sin 2x = 2\sin x \cos x$, find an expression, in terms of p, for cosec $2x$. [3]

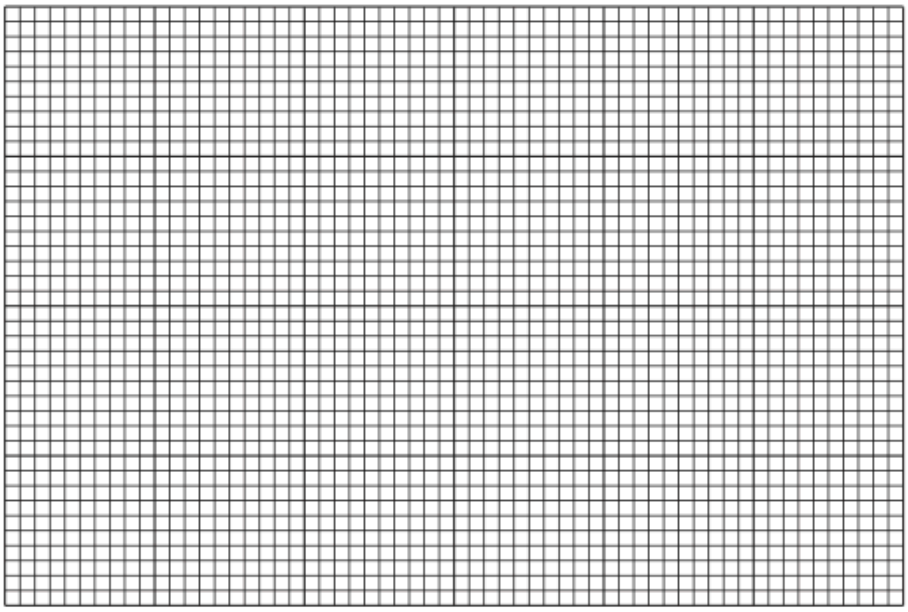
3) Show that $\dfrac{1}{\tan\theta + \cot\theta} = \sin\theta\cos\theta$. [3]

4) Express $\sqrt{\dfrac{1-\cos^2\theta}{4\sec^2\theta - 4}}$ in the form $k\cos\theta$, where k is a constant to be found. [4]

5) **(a)** Given that $\tan x = p$, find an expression, in terms of p, for $\text{cosec}^2 x$. [3]

(b) Prove that $(1+\sec\theta)(1-\cos\theta) = \sin\theta\tan\theta$. [4]

6) **(i)** On the grid below, draw on the same axes, for $0° \leqslant x \leqslant 180°$, the graphs of $y = \sin x$ and $y = 1 + \cos 2x$. [3]



(ii) State the number of roots of the equation $\sin x = 1 + \cos 2x$ for $0° \leqslant x \leqslant 180°$. [1]

(iii) Without extending your graphs state the number of roots of the equation $\sin x = 1 + \cos 2x$ for $0° \leqslant x \leqslant 360°$. [1]

7) **(i)** Solve $4\cot\frac{1}{2}x = 1$, for $0° < x < 360°$. [3]

(ii) Solve $3(1 - \tan y \cos y) = 5\cos^2 y - 2$, for $0° < y < 360°$. [5]

8) **(i)** Sketch, on the same set of axes, the graphs of $y = \cos x$ and $y = \sin 2x$ for $0° \leqslant x \leqslant 180°$. [2]

(ii) Hence write down the number of solutions of the equation $\sin 2x - \cos x = 0$ for $0° \leqslant x \leqslant 180°$. [1]

9) Show that $\dfrac{\cos x}{1 - \sin x} + \dfrac{\cos x}{1 + \sin x} = 2\sec x$. [4]