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A LEVEL MATHS

(56) Using Identities to Solve Trig Equations

WORKING AT D/E

(1) Show that the only solutions to the equation

$$\sin(x) = \cos(x), \quad 0 < x < 360$$

are $x = 45^o$ and $x = 225^o$

(2) (a) Using the identity $\sin^2 A + \cos^2 A \equiv 1$, show that $\cos^2 x + \sin x = 1$ can be written as $\sin x\,(\sin x - 1) = 0$
(b) Hence, find the 4 solutions to the equation $\cos^2 x + \sin x = 1, \qquad 0 \le x \le 360$

(3) (a) Show that $2\sin^2 x - 5\sin x - 3 = 0$ can be written as $(A\sin x + B)(\sin x + C) = 0$ where A, B and C are integers to be found.
(b) Hence, find the 2 solutions to the equation $2\sin^2 x - 5\sin x - 3 = 0$, for $0 \le x \le 360$

WORKING AT B/C

(1) (a) Show that equation

$$8\sin^2 x - 10\cos x - 1 = 0$$

can be written as

$$(4\cos x + 7)(2\cos x - 1) = 0$$

(a) Hence, find the solutions to the equation $8\sin^2 x - 10\cos x - 1 = 0, \qquad 0 < x < 360$

(2) Solve the equation $3\tan^2 A - 2\tan A = 1$ in the interval $-180 < A < 180$ giving your answers to 1 decimal place where appropriate.

(3) Find the 5 solutions to the equation

$$\tan x = 2\sin x$$

in the interval $0 \le x \le 360$

WORKING AT A*/A

(1) (a) Solve the equation $\sin(\theta - 20) = \sin(\theta)$, $0 < \theta < 360$
(b) Solve the equation $\frac{1+\sin^2 4\theta}{\sin 4\theta} = 2$, in the interval $-180 < \theta < 180$

(2) Show that there are no solutions to the equation $8\sin^2 x - 22\cos x - 23 = 0$ when $x \in R$

(3) (a) Prove $\cos^2 A + (1 + \sin A)^2 \equiv 2(1 + \sin A)$
(b) Hence, solve the equation $\cos^2 2x + (1 + \sin 2x)^2 = 0, \qquad -180 < x < 180$