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A LEVEL MATHS

(39) Proving Trigonometric Identities

WORKING AT D/E

(1) Using the formula book, prove that $\cos(x-90)-\cos(x+90) \equiv 2\sin x$

(2) Prove $\frac{\sin 2A}{2\cos^2 A} \equiv \tan A$

(3) Show that $\frac{\cos 4A+1}{2} \equiv \cos^2 2A$

WORKING AT B/C

(1) (a) Prove that $\frac{1}{2}\sec x \sin 2x \equiv \sin x$

(b) Hence, solve the equation $\frac{1}{2}\sec y \sin 2y = \cos y$, $0 < y < 360^o$

(2) (a) Prove that $\operatorname{cosec} 2A \cos 2A \equiv \cot 2A$

(b) Hence, solve $\operatorname{cosec} 2x \cos 2x = \sqrt{3}$, $0 \leq x \leq 2\pi$, giving your answers as multiples of π.

(3) Prove that $\left(\frac{2\sin x\ cosx}{2\cos^2 x-1}\right)^2 \equiv \sec^2 2\,x - 1$

WORKING AT A*/A

(1) Given that $\cos(2x+y)=0$, show that $\tan y = \cot 2x$

(2) Solve the equation $2\sin\frac{\theta}{2}\cos\frac{\theta}{2} = 1,\ 0 < x < 2\pi$, giving your answers in exact form.

(3) (a) Prove that $(\cos 2x + \sin 2x)^2 \equiv 1 + \sin 4x$

(b) Hence, or otherwise, solve the equation $(\cos 2x + \sin 2x)^2 = 2\operatorname{cosec} 4x\,,\quad 0 < x < 360^o$