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A LEVEL MATHS

(34) Addition Formulae $\sin(A \pm B)$ & $\cos(A \pm B)$

WORKING AT D/E

(1) Using the formula book, prove each of the following identities:

(a) $\sin(90^o - x) \equiv \cos x$

(b) $\cos(90^o - x) \equiv \sin x$

(c) $\sin(30^o + x) \equiv \frac{1}{2}\cos x + \frac{\sqrt{3}}{2}\sin x$

(2) Cyril is trying to find the expansion for $\tan(45^o + x)$

He writes:

$$\tan(45^o + x) = \tan 45^o + \tan x$$
$$= 1 + \tan x$$

(a) Explain what he has done wrong.

(b) Use the formula book to find the correct expansion for $\tan(45^o + x)$

(3) Show that $\cos(\pi + x)$ can be written as $-\cos x$ by using the addition formulae in the formula book.

WORKING AT B/C

(1) Write $\frac{\sqrt{2}}{2}\sin x + \frac{\sqrt{2}}{2}\cos x$ in the form:

(a) $\sin(A + B)$

(b) $\cos(A - B)$

(2) (a) Write down the expansion of $\sin(A + B)$

(b) Write down the expansion of $\cos(A + B)$

(c) Using your answers to part (a) and (b), show that that $\tan(A + B) \equiv \frac{\tan A + \tan B}{1 - \tan A \tan B}$

(3) Given that $\cos(A - B) \equiv -\sin B$, where A is a reflex angle, find the value of A in radians.

WORKING AT A*/A

(1) Given that $p\sin\left(\frac{\pi}{2} + x\right) = q\cos\left(\frac{\pi}{2} + x\right)$, write an expression for $\cot x$ in terms of the constants p and q.

(2) Given that $4\sin(x - y) = \cos(x + y)$, show that $\tan x = \frac{4\tan y + 1}{4 + \tan y}$

(3) Write $-\sin A$ in the form $\cos(A + B)$ where $0 < B \leq \pi$.