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A LEVEL MATHS

(35) Applying the Addition Formulae in Trig

WORKING AT D/E

(1) Using the formula book with $A = 45^o$ and $B = 30^o$ show that the exact value of $\sin(75^o)$ is $\dfrac{\sqrt{2}+\sqrt{6}}{4}$.

(2) Use the formula book to write
$\cos 60 \cos 45 + \sin 60 \sin 45$ in the form $\cos P$
where P is an acute angle.

(3) (a) Using the formula book, show that

$$\tan 15^0 = \frac{1 - \dfrac{1}{\sqrt{3}}}{1 + \dfrac{1}{\sqrt{3}}}$$

(b) Hence, without a calculator, show that
$$\tan 15^o = 2 - \sqrt{3}$$

WORKING AT B/C

(1) Using the expansion of $\cos(A + B)$ show that

$$\cos\left(\frac{5\pi}{12}\right) = \frac{\sqrt{6}-\sqrt{2}}{4}$$

(2) Write $\dfrac{1+\sqrt{3}}{1-\sqrt{3}}$ in the form $\tan P$, $\dfrac{\pi}{2} < P < \pi$

(3) Given that $\cos A = \dfrac{1}{3}$ and $\cos B = \dfrac{1}{6}$ where A and B are both acute angles, show that:

(a) $\sin A = \dfrac{2\sqrt{2}}{3}$

(b) $\sin B = \dfrac{\sqrt{35}}{6}$

(c) $\cos(A + B) = \dfrac{1-2\sqrt{70}}{18}$

(d) $\sin(A + B) = \dfrac{2\sqrt{2}+\sqrt{35}}{18}$

(e) Using a calculator, show that $\tan(A + B) = -0.556$ correct to 3 significant figures.

WORKING AT A*/A

(1) Given that $\tan A = p$ and $\tan B = q$ where A is an acute angle and B is a reflex angle, show that

$$\cos(A + B) = \frac{1-pq}{\left(\sqrt{1+p^2}\right)\left(\sqrt{1+q^2}\right)}$$

(2) Given that $\sin A = 0.8$ and $\cos B = 0.6$, where A is an obtuse angle and B is a reflex angle, show that $\cot(A + B) = \dfrac{7}{24}$