Year 2 Pure Chapter 7: Addition Formula - Exam Questions (Total Marks 31)

1. (a) Show that $\tan(45° + \theta) = \dfrac{1 + \tan\theta}{1 - \tan\theta}$ **(2 marks)**

(b) Hence obtain the exact value of tan 105° in the form $a + b\sqrt{3}$, where a and b are integers to be found.

(3 marks)

2. (a) Show that $\sin(\alpha + \beta) + \sin(\alpha - \beta) \equiv 2 \sin \alpha \cos \beta$

(3 marks)

3. (a) Use the identity sin(*A* + *B)* = sin *A* cos *B* + cos *A* sin B to show that

$$2\sin\left(x+\frac{\pi}{3}\right)=\sin x+\sqrt{3}\cos x$$

(2 marks)

(b) Show that the equation $2\sin\left(x+\frac{\pi}{3}\right)=\cos\left(x+\frac{\pi}{6}\right)$

can be written in the form $3\tan x+\sqrt{3}=0$

(3 marks)

(c) Hence, solve the equation

$$2\sin\left(x+\frac{\pi}{3}\right)=\cos\left(x+\frac{\pi}{6}\right)$$

giving all solutions in terms of π in the interval $0 < x < 2\pi$.

(3 marks)

4. (a) Use the identity $\cos(A + B) = \cos A \cos B - \sin A \sin B$

to show that the equation $\cos\left(x + \frac{5\pi}{6}\right) = \sin x$

can be written as $\cos x + \sqrt{3} \sin x = 0$

(2 marks)

(b) Hence solve the equation $\cos\left(x + \frac{5\pi}{6}\right) = \sin x$

giving all solutions, in terms of π, in the interval $0 < x < 2\pi$.

(3 marks)

5) Solve the equation $2 \sin (\Theta + 60)^\circ = \cos (\Theta - 45)^\circ$

giving all solutions in the interval $0 < x < 360^\circ$ **(5 marks)**

6) Prove $\cot(A + B) \equiv \dfrac{\cot A \cot B - 1}{\cot A + \cot B}$

(5 marks)