FURTHER TRIGONOMETRY - CHAPTER REVIEW

1 Simplify: **(a)** $\frac{1-t^2}{1+t^2}$, where $t = \tan\frac{\theta}{2}$ **(b)** $\frac{\tan\theta - \tan\frac{\pi}{6}}{1+\tan\frac{\pi}{6}\tan\theta}$ **(c)** $\frac{\sin 2\theta - \sin\theta}{\cos 2\theta - \cos\theta + 1}$

2 Solve $2\tan 2x - 1 = 0$ for $0° < x < 360°$.

3 Simplify:

(a) $\sin(\theta+\phi)\cos\phi-\cos(\theta+\phi)\sin\phi$ **(b)** $\dfrac{2\tan\frac{\theta}{2}}{1-\tan^2\frac{\theta}{2}}$ **(c)** $\sin x\cos x\cos 2x\cos 4x$

4 **(a)** Show that $\cos(A+B)=\cos A\cos B(1-\tan A\tan B)$.

(b) Suppose that $0<A<\frac{\pi}{2}$ and $0<B<\frac{\pi}{2}$. Show by deduction that if $\tan A\tan B=1$ then $A+B=\frac{\pi}{2}$.

5 Show that: **(a)** $\dfrac{\cos\theta}{1+\sin\theta}=\sec\theta-\tan\theta$ **(b)** $\tan^2\theta=\dfrac{1-\cos 2\theta}{1+\cos 2\theta}$, given that $\cos 2\theta \neq -1$.

6 Use the expansion of $\tan 2A$ to show that the exact value of $\tan 22.5° = \sqrt{2} - 1$. Hence find the exact value of $\tan 11.25°$.

7 Solve the following equations for $0 \leq x \leq \pi$.

(a) $\cos 3x = \cos 2x \cos x$

(b) $\cos 3x + \cos 5x + \cos 7x = 0$

8 Solve for $-\pi \leq x \leq \pi$.

(a) $\cos x - \sin x = 1$ **(b)** $\sin 4x - \sin 2x = 0$ **(c)** $\cos x - \sqrt{3} \sin x = 1$

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a) Show that $tan\,3\theta = \frac{3\,tan\theta - tan^3\theta}{1 - 3\,tan^2\theta}$

b) Using an appropriate substitution, and a), solve $x^3 - 3\sqrt{3}\,x^2 - 3x + \sqrt{3} = 0$

c) Show that $tan\frac{\pi}{9} - tan\frac{2\pi}{9} + tan\frac{4\pi}{9} = 3\sqrt{3}$

d) Show that $tan^2\frac{\pi}{9} + tan^2\frac{2\pi}{9} + tan^2\frac{4\pi}{9} = 33$