New Identities

$$\sin^2 x + \cos^2 x = 1$$

There are just two new identities you need to know:

Dividing by $\cos^2 x$:

Dividing by $\sin^2 x$:

"Prove that $1 + \tan^2 x \equiv \sec^2 x$."

$$\sin^2 x + \cos^2 x \equiv 1$$

$$\frac{\sin^2 x}{\cos^2 x} + \frac{\cos^2 x}{\cos^2 x} \equiv \frac{1}{\cos^2 x}$$

$$\tan^2 x + 1 \equiv \sec^2 x$$

Examples

[Textbook] Prove that $cosec^4\, \theta - \cot^4 \theta = \frac{1+\cos^2 \theta}{1-\cos^2 \theta}$

Solve the equation $4\, cosec^2\theta - 9 = \cot \theta$ in the interval $0 \leq \theta \leq 360°$

This is just like in AS; if you had say a mixture of $\sin \theta$, $\sin^2 \theta$, $\cos^2 \theta$: you'd change the $\cos^2 \theta$ to $1 - \sin^2 \theta$ in order to get a quadratic in terms of sin.

Test Your Understanding

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6. (ii) Solve, for $0 \leq \theta < 2\pi$, the equation

$$3\sec^2\theta + 3\sec\theta = 2\tan^2\theta$$

You must show all your working. Give your answers in terms of π.

(6)

$$3\sec^2\theta + 3\sec\theta = 2(\sec^2\theta - 1)$$

Q

Solve, for $0 \leq x < 2\pi$, the equation

$$2cosec^2 x + \cot x = 5$$

giving your solutions to 3sf.