Maths Rules

Year 1 Trigonometric Identities

Section A

1. Prove that
$$(\sin\theta + \cos\theta)^2 \equiv 1 + 2\sin\theta\cos\theta$$

2. Show that the equation
$$5\cos^2 x + 3\sin^2 x + \cos x = 4$$
can be rewritten in the form
$$2\cos^2 x + \cos x - 1 = 0$$

3. Write
$$\frac{1 - \cos^2(2x)}{1 - \sin^2(2x)}$$
in terms of $\tan(2x)$.

4. Show that
$$\frac{1}{\tan x + 1} \equiv \frac{\cos x}{\sin x + \cos x}$$

5. Show that
$$\frac{\sin x}{\sin x + \cos x} + \frac{\cos x}{\sin x - \cos x} \equiv \frac{1}{\sin^2 x - \cos^2 x}$$

Section B

1. Show that
$$\frac{\sin^4 x - \cos^4 x}{\cos - \sin x} \equiv -(\sin x + \cos x)$$

2. Show that
$$\frac{\sin(3x)}{\tan(3x)} - \frac{\tan(3x)}{\sin(3x)} \equiv -\sin(3x)\tan(3x)$$

3. (a) Write $\cos\theta$ in terms of $\sin\theta$.
   (b) Hence, or otherwise, write $\tan\theta$ in terms of $\sin\theta$ only.

4. Given that $3\sin^2\theta + 2\cos^2\theta = 7\sin\theta\cos\theta$, show that $\tan\theta = \frac{1}{3}$ or $\tan\theta = 2$.