Proving Trigonometric Identities

Specification: AQA 7357: E8, E6, E5 · Edexcel 9MA0: 5.8, 5.6, 5.5

HOMEWORK Consolidation

1 Prove that $\cos 2x + 2\sin^2 x \equiv 1$.
AQA E8, E5 · Edexcel 5.8, 5.5

2 Prove that $\operatorname{cosec} x \sec x - \cot x \equiv \tan x$.
AQA E8, E5 · Edexcel 5.8, 5.5

3 Prove that $1 - \tan^2 x \equiv \cos 2x \sec^2 x$.
AQA E8, E5 · Edexcel 5.8, 5.5

4 Prove that $\dfrac{\sin 4x}{\sin 2x} \equiv 2\cos 2x$.
AQA E8, E5 · Edexcel 5.8, 5.5

5 Prove that $2\sin^2 \dfrac{x}{2} + \cos x \equiv 1$.
AQA E8, E5 · Edexcel 5.8, 5.5

6 Disprove: $\sin 2x \equiv 2\sin x$.
AQA E8, E5 · Edexcel 5.8, 5.5

7 Prove that $\sin(x + \frac{\pi}{4})\cos(x + \frac{\pi}{4}) \equiv \frac{1}{2}\cos 2x$.
AQA E8, E5 · Edexcel 5.8, 5.5

8 Prove that $\cos 3x + \cos x \equiv 2\cos x \cos 2x$.
AQA E8, E5 · Edexcel 5.8, 5.5

9 Prove that $\tan(x + 45°)\tan(x - 45°) \equiv -1$, where both sides are defined.
AQA E8, E5 · Edexcel 5.8, 5.5

10 Prove that $\dfrac{\cos x + \sin x}{\cos x - \sin x} - \dfrac{\cos x - \sin x}{\cos x + \sin x} \equiv 2\tan 2x$.
AQA E8, E5 · Edexcel 5.8, 5.5

11 *AQA-style*.
(a) Prove that $\dfrac{1 + \sin 2x}{\cos 2x} \equiv \dfrac{1 + \tan x}{1 - \tan x}$. [4 marks]
(b) Hence show that $\dfrac{1 + \sin 2x}{\cos 2x} \equiv \tan(x + 45°)$. [2 marks]
AQA E8, E5 · Edexcel 5.8, 5.5 · AQA-style

12 *Edexcel-style*.
(a) Prove that $\cos 3\theta \equiv 4\cos^3\theta - 3\cos\theta$. [4 marks]
(b) Hence solve $8\cos^3\theta - 6\cos\theta = 1$ for $0° \le \theta < 360°$. [3 marks]
AQA E8, E5 · Edexcel 5.8, 5.5, AQA E7 · Edexcel-style