Name:

Level 2 Further Maths

Trigonometric Identities

Corbettmaths

Ensure you have: Pencil or pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/more/further-maths/

1. Prove $tan\theta cos\theta \equiv sin\theta$

$$\frac{\sin\theta}{\cos\theta} \times \cos\theta = \frac{\sin\theta\cos\theta}{\cos\theta}$$

$$= \sin\theta$$

QED

(2)

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2. Show that $2 - 2cos^2x$ is equivalent to $2sin^2x$

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

$\therefore \cos^2x = 1 - \sin^2x$

$$2 - 2(1 - \sin^2x)$$

$$2 - 2 + 2\sin^2x$$

$$2\sin^2x$$

QED

(2)

3. Prove $sin^2x - cos^2x \equiv 1 - 2cos^2x$

$(1 - \cos^2 x) - \cos^2 x$

$1 - 2\cos^2 x$

QED

(2)

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4. Prove that $sin\theta - sin\theta cos^2\theta \equiv sin^3\theta$

$\sin\theta - \sin\theta(1 - \sin^2\theta)$

$\sin\theta - \sin\theta + \sin^3\theta$

$= \sin^3\theta$

QED

(3)

4. Prove that $sin^2\theta - cos\theta \sin\theta tan\theta \equiv 0$

$\sin^2\theta - \cos\theta \sin\theta \frac{\sin\theta}{\cos\theta}$

$\sin^2\theta - \sin^2\theta = 0$

QED

(3)

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5. In this question, $cosx \neq 0$

Show that $\frac{1}{cos^2x} - tan^2x$ is equal to 1

$\frac{1}{\cos^2 x} - \frac{\sin^2 x}{\cos^2 x}$

$\frac{1 - \sin^2 x}{\cos^2 x}$

$\frac{\cos^2 x}{\cos^2 x} = 1$

QED

(3)

6. Prove $(sin\theta + cos\theta)^2 + (sin\theta - cos\theta)^2 \equiv 2$

$\sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta + \sin^2\theta - 2\sin\theta\cos\theta + \cos^2\theta$

$2\sin^2\theta + 2\cos^2\theta$

$2(\sin^2\theta + \cos^2\theta)$

$2 \times 1 = 2$

QED

(3)

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7. Prove $\tan\theta\sin\theta + \cos\theta \equiv \frac{1}{\cos\theta}$

LHS $= \frac{\sin\theta}{\cos\theta}\sin\theta + \frac{\cos\theta}{1}$

$= \frac{\sin^2\theta}{\cos\theta} + \frac{\cos^2\theta}{\cos\theta}$

$= \frac{\sin^2\theta + \cos^2\theta}{\cos\theta}$

$= \frac{1}{\cos\theta}$

(3)

8. Prove $\frac{\sqrt{1-\cos^2 x}}{\cos x} \equiv \tan x$

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

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

$\sin x = \sqrt{1-\cos^2 x}$

$\therefore$ LHS

$\frac{\sin x}{\cos x} = \tan x$

QED

(3)

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9. Prove $\frac{1}{\tan\theta} + \tan\theta \equiv \frac{1}{\cos\theta\sin\theta}$

$\frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\cos\theta}$

$\frac{\cos^2\theta}{\sin\theta\cos\theta} + \frac{\sin^2\theta}{\sin\theta\cos\theta}$

$\frac{\cos^2\theta + \sin^2\theta}{\sin\theta\cos\theta}$

$\frac{1}{\sin\theta\cos\theta}$

(3)

$\frac{1}{\cos\theta\sin\theta}$

10. Show that $\frac{cos\theta}{1-cos\theta} - \frac{cos\theta}{1+cos\theta}$ is equivalent to $\frac{2}{tan^2\theta}$

$$\frac{\cos\theta(1+\cos\theta)}{(1-\cos\theta)(1+\cos\theta)} - \frac{\cos\theta(1-\cos\theta)}{(1-\cos\theta)(1+\cos\theta)}$$

$$\frac{\cos\theta + \cos^2\theta}{1-\cos^2\theta} - \frac{\cos\theta - \cos^2\theta}{1-\cos^2\theta}$$

$$\frac{2\cos^2\theta}{\sin^2\theta}$$

$$\frac{2}{\tan^2\theta}$$

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