

# 2.4 Trigonometric Proof

# **Question Paper**

Course	Edexcel IAL Maths: Pure 3
Section	2. Trigonometry
Topic	2.4 Trigonometric Proof
Difficulty	Easy

Time allowed: 40

Score: /37

Percentage: /100

Show that

$$\cot \theta \equiv \frac{\cos \theta}{\sin \theta}.$$

[2 marks]

#### **Question 2**

(a) Use the identity

$$\cos(A+B) \equiv \cos A \cos B - \sin A \sin B$$

to show that

$$\cos 2A \equiv \cos^2 A - \sin^2 A.$$

[2 marks]

#### **Question 2**

(b) Show by counter-example that

$$\cos 2\theta \not\equiv \cos \theta + \cos \theta$$
.

[3 marks]

(a) Given that  $\theta$  is small and measured in radians, use an appropriate approximation to show that

$$3\sin\theta - 2\cos\theta \approx \theta^2 + 3\theta - 2$$
.

[3 marks]

#### **Question 3**

(b) Use the result in part (a) to find an approximation to  $3\sin(0.2)-2\cos(0.2)$ .

[1 mark]

#### **Question 4**

Prove the identity

$$\frac{\sin 2\theta}{2\sin \theta} \equiv \cos \theta, \qquad \theta \neq k\pi.$$

[2 marks]

Show that

$$\sin^2\theta(\sec^2\theta + \csc^2\theta) \equiv \sec^2\theta.$$

[4 marks]

#### **Question 6**

(i) Use the quotient rule to show that

$$\frac{\mathrm{d}}{\mathrm{d}x}[\csc x] = \frac{-\cos x}{\sin^2 x}.$$

(ii) Hence show that

$$\frac{\mathrm{d}}{\mathrm{d}x}[\csc x] = -\cot x \csc x.$$

[5 marks]

Show that

$$3\sin 2\theta - 2\sin \theta \equiv 2\sin \theta (3\cos \theta - 1).$$

[3 marks]

# **Question 8**

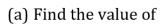
Prove the identity

$$2\csc 2x \cot x \equiv \csc^2 x, \qquad x \neq \frac{k\pi}{2}.$$

[5 marks]

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- (i) arccos(cos(150°))
- (ii) arcsin(sin(210°))

[2 marks]

#### **Question 9**

(b) Explain why the answer to part (a) (ii) is not 210°.

[2 marks]

Use the identity

$$R\sin(\theta + \alpha) \equiv R\cos\alpha\sin\theta + R\sin\alpha\cos\theta$$

to show that

$$4\sin\left(\theta + \frac{\pi}{4}\right) \equiv 2\sqrt{2}(\sin\theta + \cos\theta).$$

[3 marks]