

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

Question 1

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]

Question 3

(a) Given that θ 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

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

[2 marks]

Question 5

Show that

$$\sin^2 \theta (\sec^2 \theta + \operatorname{cosec}^2 \theta) \equiv \sec^2 \theta.$$

[4 marks]**Question 6**

(i) Use the quotient rule to show that

$$\frac{d}{dx} [\operatorname{cosec} x] = \frac{-\cos x}{\sin^2 x}.$$

(ii) Hence show that

$$\frac{d}{dx} [\operatorname{cosec} x] = -\cot x \operatorname{cosec} x.$$

[5 marks]

Question 7

Show that

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

[3 marks]**Question 8**

Prove the identity

$$2 \operatorname{cosec} 2x \cot x \equiv \operatorname{cosec}^2 x, \quad x \neq \frac{k\pi}{2}.$$

[5 marks]

Question 9

(a) Find the value of

(i) $\arccos(\cos(150^\circ))$

(ii) $\arcsin(\sin(210^\circ))$

[2 marks]

Question 9

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

[2 marks]

Question 10

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]