Lesson 4

A-Level Pure Mathematics : Year 2
Trigonometric Identities

4.1 Homework

Any solution based entirely on graphical
or numerical methods is not acceptable
Marks Available : 40

Question 1

Here is a table of exact trigonometric values that most mathematicians know "off by heart";

Exact values table:

	$0°$	$30°$	$45°$	$60°$	$90°$
$\sin\theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	Not Defined

Show, using the formula for $\sin(A-B)$ and the table of exact trigonometric values that

$$\sin 15° = \frac{\sqrt{6} - \sqrt{2}}{4}$$

Remember to start, LHS =

[5 marks]

Question 2

(a) Write down the exact value of **(i)** $\sin 45°$

(ii) $\cos 45°$

[2 marks]

(b) On one graph sketch the curves of $y = \sin x$ and $y = \cos x$ for $0° \leqslant x \leqslant 360°$

[2 marks]

(c) Use the fact that $\sin 45° = \cos 45°$ to prove that

$$\sin (\theta + 45°) = \cos (\theta - 45°)$$

[5 marks]

Question 3

Prove that, $\frac{\cos A}{\sin B} - \frac{\sin A}{\cos B} = \frac{\cos\,(A + B)}{\sin B \cos B}$

[5 marks]

Question 4

Prove that;

$$\cos(A + B)\cos(A - B) = \cos^2 A - \sin^2 B$$

[5 marks]

Question 5

Prove that, $\frac{1 - \cos 2\theta}{\sin 2\theta} = \tan \theta$

[5 marks]

Question 6

Prove that;

$$2\cos^3\theta\sin\theta + 2\sin^3\theta\cos\theta = \sin 2\theta$$

[5 marks]

Question 7

Prove that, $\frac{\sin 3\theta}{\sin \theta} - \frac{\cos 3\theta}{\cos \theta} = 2$

[6 marks]