

**TRIGONOMETRY (Q 4 & 5, PAPER 2)**

**1997**

- 4 (a) Find the value for  $\theta$  for which

$$\tan \theta = -\frac{1}{\sqrt{3}}$$

where  $0^\circ \leq \theta \leq 180^\circ$ .

- (b) In a triangle  $pqr$ ,  $|\angle pqr| = 30^\circ$ ,  $|qr| = 15$  and  $|rp| = 5\sqrt{3}$ .

Find two values for  $|\angle qpr|$  and sketch the two resulting triangles.

Calculate the ratio of the areas of the two triangles.

- (c) Show, using the formula for  $\sin(A + B)$ , that  
 $\sin 2A = 2\sin A \cos A$ .

Using the tables on page 9, or otherwise, show that

$$\sin 3A = 3\sin A - 4\sin^3 A.$$

Use the result for  $\sin 3A$ , or otherwise, to show that

$$\sin 3\left(A - \frac{\pi}{2}\right) = 4\cos^3 A - 3\cos A.$$

- 5 (a) Evaluate  $\lim_{x \rightarrow 0} \frac{\sin 3x}{x}$ .

- (b) (i) Express  $\sin 5x + \sin 3x$  as a product of sine and cosine.

- (ii) Find all the solutions of the equation

$$\sin 5x + \sin 3x = 0$$

in the domain  $0^\circ \leq \theta \leq 180^\circ$ .

- (c) A triangle has sides of length  $a$ ,  $b$ , and  $c$  with  $A$  being the angle opposite the side of length  $a$ .

Derive a formula for  $a^2$  in terms of  $b$ ,  $c$  and  $A$ .

When  $90^\circ < A < 180^\circ$  prove that

$$a^2 > b^2 + c^2.$$

**ANSWERS**

- 4 (a)  $150^\circ$

(b)  $60^\circ, 120^\circ; 2:1$

- 5 (a) 3

(b)(i)  $2\sin 4x \cos x$  (ii)  $0^\circ, 45^\circ, 90^\circ, 135^\circ, 180^\circ$