

TRIGONOMETRY (Q 4 & 5, PAPER 2)

2009

4 (a) Show that $(\cos \theta + \sin \theta)^2 + (\cos \theta - \sin \theta)^2 = 2$.

(b) The lengths of the sides of a triangle are 21, 17 and 10.
The smallest angle in the triangle is A .

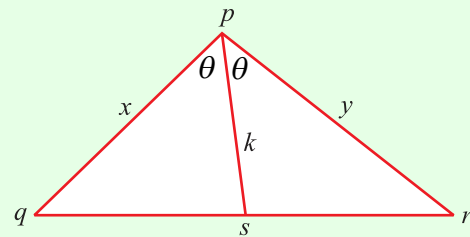
(i) Show that $\cos A = \frac{15}{17}$.

(ii) Without evaluating A , find $\tan \frac{A}{2}$.

(c) The bisector of $\angle qpr$ meets $[qr]$ at s .

$$|\angle qpr| = 2\theta, |pq| = x,$$

$$|pr| = y \text{ and } |ps| = k.$$



(i) Find the area of the triangle pqs in terms of x , k and θ .

(ii) Show that $k = \frac{2xy \cos \theta}{x + y}$.

- 5 (a) Find all the solutions of the equation $\cos^2 x - \cos x = 0$, where $0^\circ \leq x \leq 180^\circ$.
- (b) The function $f : x \rightarrow \sin^{-1} x$ is defined for $-1 \leq x \leq 1$.

(i) Copy and complete the table of values of f below.

x	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1
$f(x)$			$-\frac{\pi}{6}$				

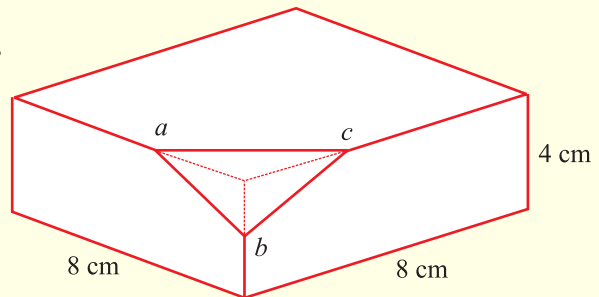
- (ii) Draw the graph of $y = f(x)$ on graph paper, noting that $\frac{\sqrt{3}}{2} \approx 0.87$.
Scale the y-axis in terms of π .
- (iii) State, with reason, whether each of the following statements is true.

A: "If $\sin x_1 = \sin x_2$, then $x_1 = x_2$."

B: "If $\sin^{-1} x_1 = \sin^{-1} x_2$, then $x_1 = x_2$."

- (c) A rectangular block of cheese measures $8 \text{ cm} \times 8 \text{ cm} \times 4 \text{ cm}$.

One corner is cut away from the block, such a way that three of the edges are cut through their midpoints a , b and c . Find the area of the triangular face abc created by the cut.



ANSWERS

4 (b) (ii) $\frac{1}{4}$

(c) (i) $\frac{1}{2} kx \sin \theta$

5 (a) $0^\circ, 90^\circ$

(b) (i)

x	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1
$f(x)$	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$

(iii) A: False; B: True

(c) $4\sqrt{6} \text{ cm}^2$