

TRIGONOMETRY (Q 4 & 5, PAPER 2)

2006

4 (a) Write down the values of A for which $\cos A = \frac{1}{2}$, where $0^\circ \leq A \leq 360^\circ$.

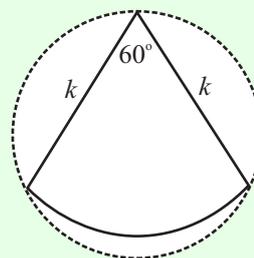
4 (b) (i) Express $\sin(3x + 60^\circ) - \sin x$ as a product of sine and cosine.

(ii) Find all the solutions of the equation $\sin(3x + 60^\circ) - \sin x = 0$, where $0^\circ \leq A \leq 360^\circ$.

4 (c) The diagram shows a sector (solid line) circumscribed by a circle (dashed line).

(i) Find the radius of the circle in terms of k .

(ii) Show that the circle encloses an area which is double that of the sector.



5 (a) (i) Copy and complete the table below for $f: x \rightarrow \tan^{-1} x$, giving the values for $f(x)$ in terms of π .

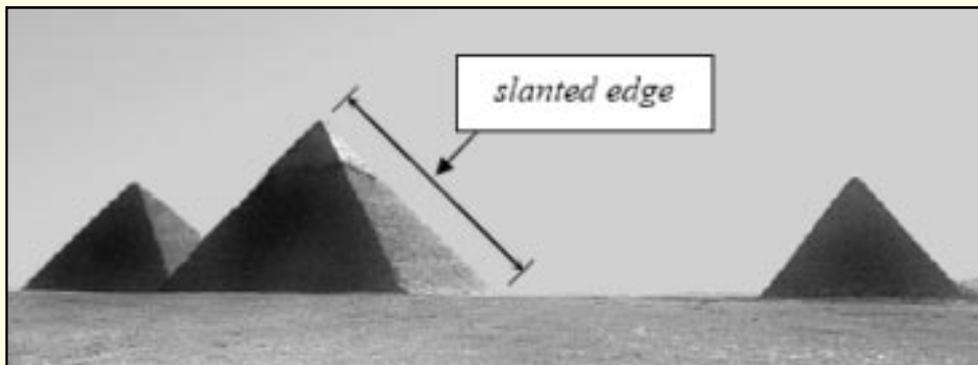
x	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$
$f(x)$						$\frac{\pi}{4}$	

(ii) Draw a graph of $y = f(x)$ in the domain $-2 \leq x \leq 2$, scaling the y -axis in terms of π .

(iii) Draw the two horizontal asymptotes of the graph.

(iv) For some values of $k \in \mathbf{R}$, but not all values, $\tan^{-1}(\tan k) = k$. State the range of values of k for which $\tan^{-1}(\tan k) = k$. Show, by means of an example, what happens outside the range.

5 (b) The great pyramid at Giza in Egypt has a square base and four triangular faces. The base of the pyramid is of side 230 metres and the pyramid is 146 metres high. The top of the pyramid is directly above the centre of the base.



- (i) Calculate the length of one of the slanted edges, correct to the nearest metre.
- (ii) Calculate, correct to two significant figures, the total area of the four triangular faces of the pyramid (assuming they are smooth flat surfaces).

ANSWERS

4 (a) $60^\circ, 300^\circ$

4 (b) (i) $2 \cos(2x + 30^\circ) \sin(x + 30^\circ)$ (ii) $30^\circ, 120^\circ, 150^\circ, 210^\circ, 300^\circ, 330^\circ$

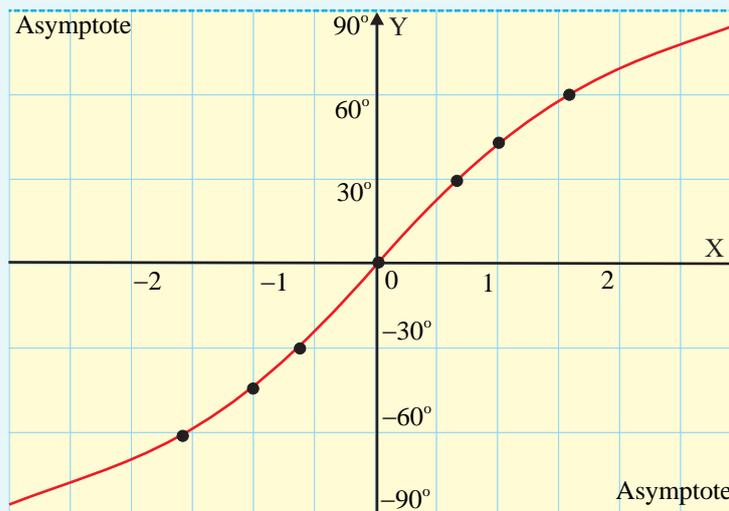
4 (c) (i) $r = \frac{k}{\sqrt{3}}$

5 (a) (i)

x	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$
$f(x)$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$

5 (a) (ii)

5 (a) (iii)



5 (a) (iv) $-\frac{\pi}{2} \leq k \leq \frac{\pi}{2}$ **Ex.** $\tan^{-1}(\tan 120^\circ) = -60^\circ$

5 (b) (i) 219 m

5 (b) (ii) 86,000 m²