S6 PURE MATHEMATICS 2-2-99

Trigonometry **Show all working clearly**

1) In each case express the trigonometrical ratio in terms of an acute angle.
(Examples: $\sin 200^\circ = -\sin 20^\circ$, $\cos 300^\circ = \cos 60^\circ$.)

a) $\sin 250^\circ$	d) $\sin 132^\circ$	g) $\sin(-75^\circ)$	j) $\sin 346^\circ$
b) $\cos 250^\circ$	e) $\cos 132^\circ$	h) $\cos(-75^\circ)$	k) $\cos 346^\circ$
c) $\tan 250^\circ$	f) $\tan 132^\circ$	i) $\tan(-75^\circ)$	l) $\tan 346^\circ$

[24]

2) Express the following angles in radians:

a) 300°	d) 315°	g) 600°	j) 720°
b) 60°	e) 225°	h) 15°	k) 135°
c) 120°	f) 30°	i) 330°	l) 270°

[12]

3) Express the following angles in degrees:

a) 2π	d) $\frac{5\pi}{6}$	g) $\frac{5\pi}{4}$	j) $\frac{5\pi}{3}$
b) $\frac{\pi}{4}$	e) $\frac{7\pi}{6}$	h) $\frac{3\pi}{2}$	k) $\frac{2\pi}{9}$
c) $\frac{3\pi}{4}$	f) $\frac{5\pi}{3}$	i) $\frac{2\pi}{3}$	l) $\frac{\pi}{12}$

[12]

4) Find all solutions between 0° and 360° of the following equations:

a) $\sin\theta = \frac{1}{2}$	d) $\tan\theta = \sqrt{3}$	g) $\sin^2\theta = \frac{3}{4}$	j) $\sin\theta = -1$
b) $\sin\theta = 0$	e) $\sin 2\theta = -\frac{1}{\sqrt{2}}$	h) $\tan\theta = 1$	k) $\sin 5\theta = \frac{1}{2}$
c) $\cos\theta = -\frac{1}{2}$	f) $\cos 3\theta = 0$	i) $\tan 2\theta = -\sqrt{3}$	l) $\cos 5\theta = -1$

[24]

5) Draw neat, clearly labelled sketch graphs of the following for $0^\circ \le x \le 360^\circ$:

a) $y = \cos 2x$
b) $y = 5 + \sin x$
c) $y = \sin(x - 45^\circ)$
d) $y = 1 + \cos 3x$

[12]

6) a) Make a table of values and draw an accurate graph of $y = \sin^2 x$.
b) Draw a clear labelled sketch of the graph of $y = 1 - \cos 2x$.
c) Draw an intellegent conclusion. **[12]**

7) Prove that for all angles θ, $\sin^2\theta + \cos^2\theta = 1$. **[4]**

8) Given that $\cos\phi = \frac{5}{13}$ and ϕ is acute, find the exact values of $\sin\phi$ and $\tan\phi$. **[4]**

9) Given that $\sin\psi = \frac{2}{7}$ and ψ is obtuse, find, as surds the values of $\cos\psi$ and $\tan\psi$. **[4]**