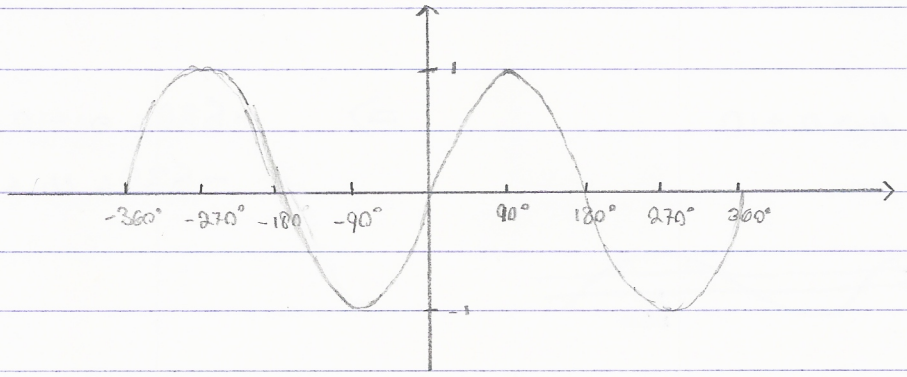
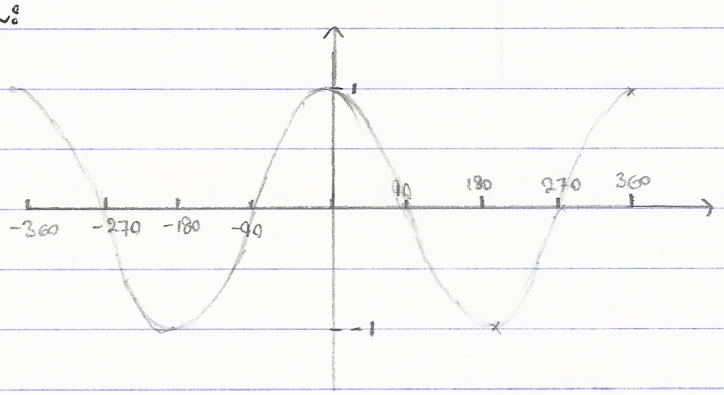
Trigonometry

Graphs

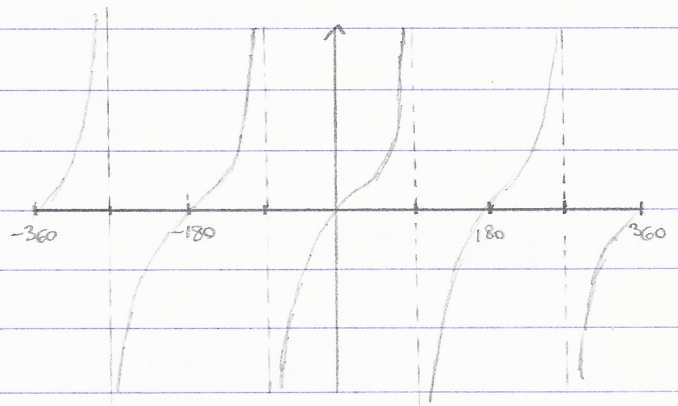
- Sin graph:



- Cos graph:



- Tan graph:



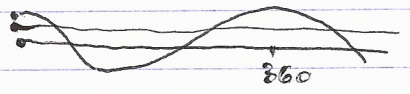
asymptotes where $\cos x = 0$

Example I $2\cos(\alpha + 10^\circ) = \sqrt{3}$ in range $-540^\circ \leq \alpha \leq 360^\circ$

$\cos(\alpha + 10^\circ) = \sqrt{3}/2$

Let $u = \alpha + 10$ $\Rightarrow$ $-530 \leq \alpha + 10 \leq 370$

$-530 \leq u \leq 370$



$\cos u = \sqrt{3}/2 \Rightarrow u = 30^\circ$ or -30°

add & take 360° to both of these

$\Rightarrow u = 30, -330, -30, -390, 330$

$\Rightarrow \alpha = 20, 320, -40, -340, -400$

Example II $\sin^2\alpha + 2\sin\alpha - 2 = 0$

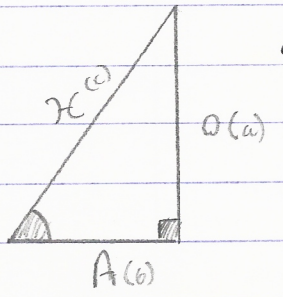
Let $u = \sin\alpha$ $\Rightarrow$ $u^2 + 2u - 2 = 0$ $\Rightarrow$ $u = -1 \pm \sqrt{3}$

discard $-1 - \sqrt{3}$ $\because < -1$

$\sin^{-1}(-1 + \sqrt{3}) = 47.05^\circ, 132.94^\circ$

Identities $\sin^2\theta + \cos^2\theta = 1$ & $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$

Proofs



$\sin\theta = O/H$, $\cos\theta = A/H$, $\tan\theta = O/A$

$$\frac{\sin\theta}{\cos\theta} = \frac{O/H}{A/H} = \frac{O\cancel{H}}{A\cancel{H}} = \frac{O}{A} = \tan\theta$$

$a^2 + b^2 = c^2$ $\Rightarrow$ $\frac{a^2}{c^2} + \frac{b^2}{c^2} = \frac{c^2}{c^2} = 1$