Ex: For $\theta = 5°$, $\theta = 0.08727\,\text{rad}$

so $\theta = 0.08727\,\text{rad}$

$\sin\theta = 0.08716$ So $\sin\theta \sim \theta$ is good to $\sim 0.1\%$

For $\theta = 20°$, $\theta = 0.3491\,\text{rad}$

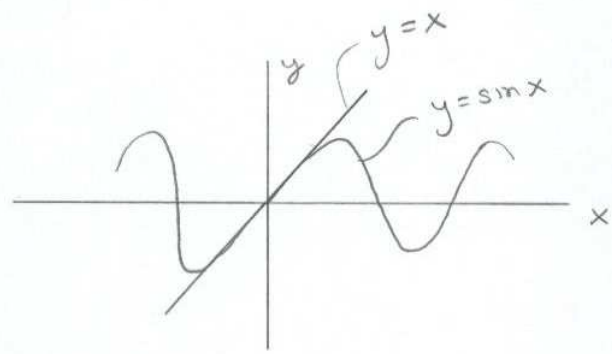
so $\theta = 0.3491\,\text{rad}$

$\sin\theta = 0.3420$ so $\sin\theta \sim \theta$ is good to $\sim 2\%$

$\theta = 45°$, $\sin\theta = \theta$ $\sim 11\%$.

Recall: $y = \sin x$

$\vdots$ $y = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots$



$\therefore$ for small oscillations ($\theta \ll 1\,\text{rad}$) $\sin\theta \approx \theta$!

$$\frac{d^2\theta}{dt^2} = -\omega^2 \sin\theta \quad \text{becomes} \quad \frac{d^2\theta}{dt^2} = -\omega^2\theta \quad \underline{\underline{\text{SHM}}}!$$