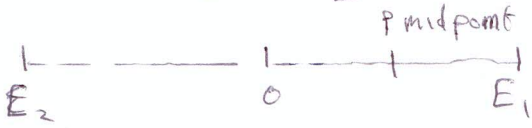
(3) Time



By symmetry, $t_{OE_1} = t_{E_1O} = t_{OE_2} = t_{E_2O} = \frac{1}{4}(T)$

BUT

$t_{OP} \neq t_{PE_1}$ where P is midpoint $[OE_1]$

(4) Starting the clock.

$x = A\sin\omega t$

describes displacement from centre, at a time t where "clock started" ($t=0$) at centre position.

$x = A\cos\omega t$.

describes displacement from centre at a time t where "clock started" ($t=0$) at an extreme position.

x is ALWAYS displacement from centre.

[Drums ticks, EYES CLOSED.]

(5) COMPLEMENTS

Time to travel [OQ]: t_{OQ} — Calculate using $A\sin\omega t$.

Time to travel [QE$_1$]: t_{QE_1} — Calculate using $A\cos\omega t$

or $t_{QE_1} = \frac{T}{4} - t_{OQ}$

Times calculated using Sin are complements to $\frac{T}{4}$ of times calculated by Cos.

(6) Max/Mins

(i) $accel_{max}$ $|a| = \omega^2 x \Rightarrow |a|_{max}$ occurs at $|x|_{max}$.

$a_{max} = \omega^2 A$, OCCURS AT EXTREME.

(ii) $accel_{min}$ $a_{min} = 0$, OCCURS AT MEAN

(iii) Vel_{max} $v^2 = \omega^2(A^2 - x^2) \Rightarrow V_{max}$ occurs at $|x|_{min}$

$V_{max}^2 = \omega^2(A^2 - 0^2) \Rightarrow V_{max} = \omega A$

(iv) Vel_{min}.

$V_{min} = 0 \iff$ AT $x = A$, EXTREME.