

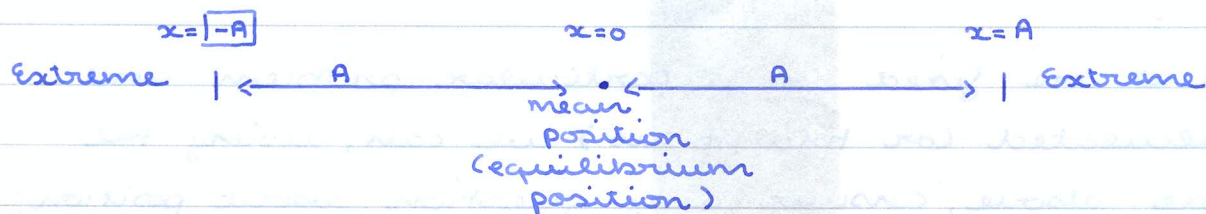
KINEMATICS OF SHM (Dynamics)

SHM is where $\text{accel} = -\omega^2 x$

where x is the displacement of the particle from a mean position and ω is a fixed constant number (determined by the springiness of the elastic (dynamics))

NOTE In SHM the distance travelled by the particle is the same as its displacement from the origin.

In SHM the distance travelled and displacement are distinct (but related) ideas.



POSITION
MAP

x = displacement from $x = 0$ (mean)

$$x = A \sin \omega t$$

displacement from origin at any time t . (When the particle starts at the mean)

POSITION
FORMULA

$$x = A \cos \omega t$$

displacement from mean origin at any time t .
(When the particle starts from the extreme)

E_1
|
 $v = 0$

0
mean
•
 $v = \text{max}$

E_2
|
 $v = 0$

SPEED
MAP

$$v^2 = \omega^2 (A^2 - x^2) \quad \text{links } x, v$$

OR

$$v = A \omega \cos \omega t \quad \text{links } v, t$$

SPEED
FORMULA