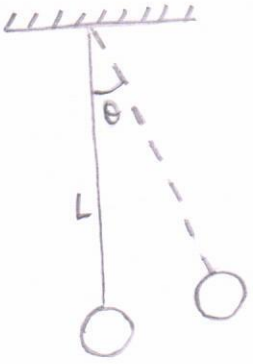
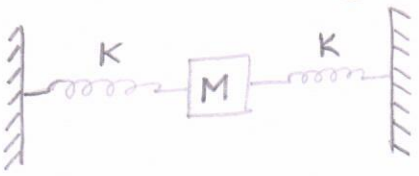
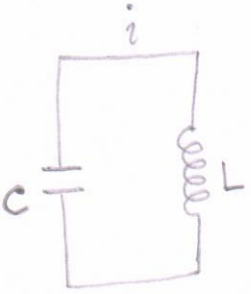
- Simple harmonic oscillations



Simple pendulum



Block of mass M oscillating between two rigid walls. K is spring constant



oscillating current in LC circuit.

For all these systems (and many more)*, equation of motion is of the form,

$$\frac{d^2x}{dt^2} + \omega^2 x = 0. \qquad (1)$$

This follows from | − Restoring force ∝ displacement | (Hooke's law)

For simple pendulum, $\omega^2 = g/L$.

For mass & spring, $\omega^2 = \frac{K}{M}$. For LCR circuit, $\omega^2 = \frac{1}{LC}$

$\omega \rightarrow$ Frequency of oscillation.

Equation (1) represents the equation of motion for all linear systems displaying oscillatory dynamics, if there is no and damping.

Equation (1) is 2nd order, linear differential equation.

Properties: (a) It has 2 independent solutions,

* See the books by Crawford and H.J. Pain.