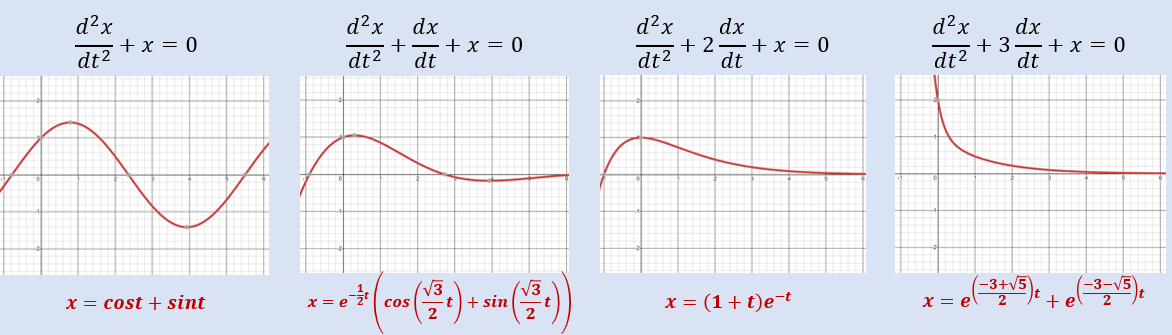
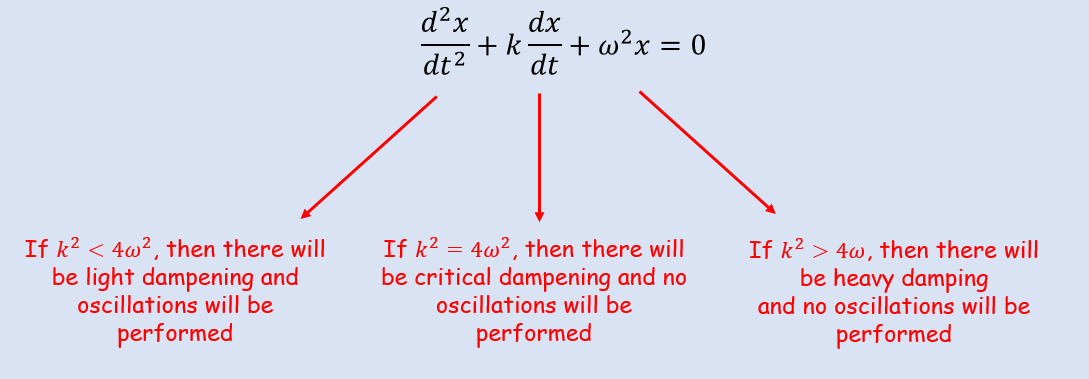
**8C Part 1 Damped Harmonic Motion**





1. A particle of mass 0.5kg moves in a horizontal straight line. At time seconds, the displacement of from a fixed point , on the line is and the velocity of is . A force of magnitude acts on in the direction . The particle is also subject to a resistance of magnitude . When , and is moving in the direction of increasing with speed .
2. Show that
3. Find the value of when
4. A particle hangs freely in equilibrium attached to one end of a light elastic string. The other end of the string is attached to a fixed point . The particle is pulled down and held at rest in a container of liquid which exerts a resistance on the motion on . is then released from rest. While the string remains taut and the particle in the liquid, the motion can be modelled using the equation:

Where is a positive real constant.

Find the general solution to the differential equation and state the type of damping the particle is subject to.

1. One end of a light elastic spring is attached to a fixed point . A particle is attached to the other end and hangs in equilibrium vertically below . The particle is pulled vertically down from its equilibrium position and released from rest. A resistance proportional to the speed of acts on .

The equation of motion of is given as:

Where is a positive real constant and is the displacement of from its equilibrium position.

1. Find the general solution to the differential equation.
2. Find the period of the motion