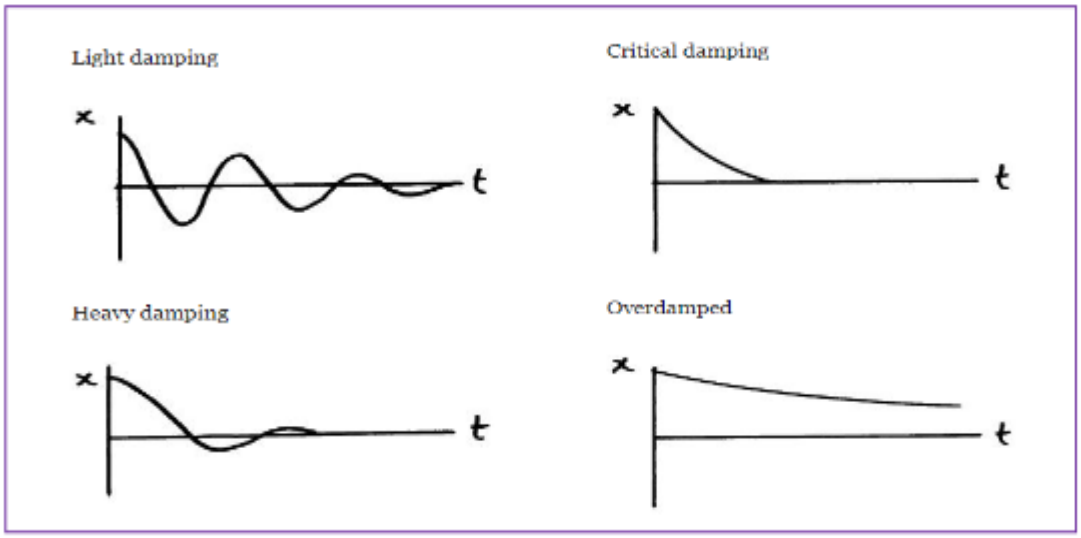
PENANG SANGAM HIGH SCHOOL

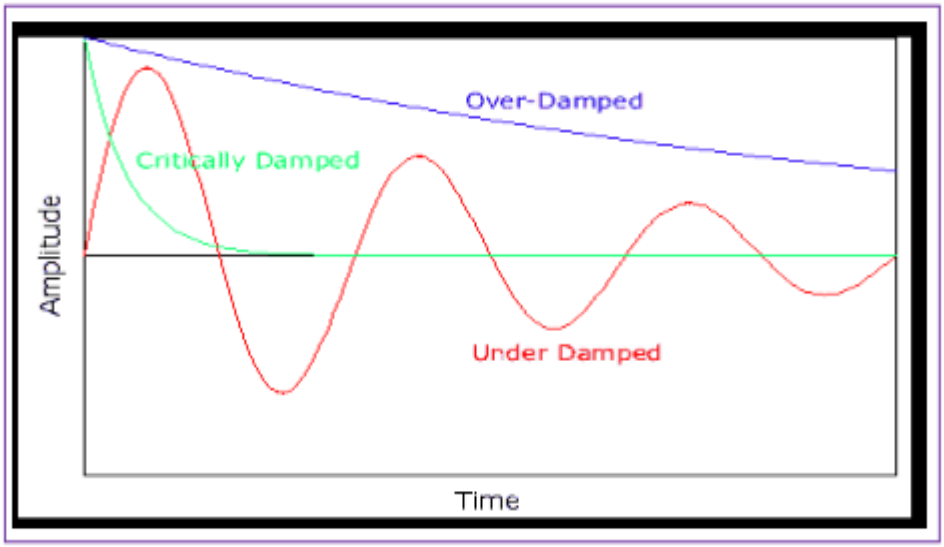
WEEK 15 **LESSON NOTES**

PHYSICS – Y13

STRAND 2: OSCILLATORY MOTION : SIMPLE HARMONIC MOTION

SUB-STRAND: Energy in a Simple Harmonic Motion.
CONTENT LEARNING OUTCOME: to determine the Kinetic, Potential and Total Energy.





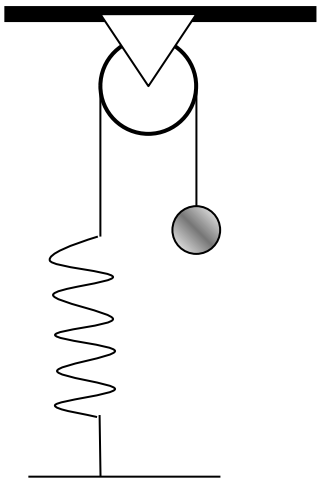
Damped- progressively reduce the amplitude of (an oscillation or vibration).
Resonance - is a phenomenon in which a vibrating system or external force drives another system to oscillate with greater amplitude at specific frequencies.
Overdamped- A system is called over damped, if the system shows tendencies to achieve equilibrium without oscillating. Or you can say is very much firm damping. This system does not show any oscillations while coming to equilibrium.
Critically damped- Here system shows the tendencies to come to equilibrium as quickly as possible without damping. Like automatic door and window closer mechanisms, they promptly come to original positions without showing any further oscillations.

1. A pendulum of length 1.2 m oscillates with amplitude of 0.2 m.
   a. What is the period of the pendulum?
   b. Find the velocity at the mid point of the swing.
   c. If the mass of the pendulum bob is doubled, calculate the new period.

a)	b)	c)

4. A 3 kg mass is fastened to a light spring that passes over a pulley. The pulley is frictionless and its inertia can be neglected.

The mass is released from rest when the spring is unstretched. The mass drops 10 cm before coming to rest. The mass then vibrates with an amplitude of 5 cm.



(a) Find the force constant of the spring.
(b) Find the period of vibration of spring.
(c) Calculate the velocity of the mass when it is 5 cm below the starting point.
(d) Write an equation for the vibration of the mass.

a)	b)

c)	d)

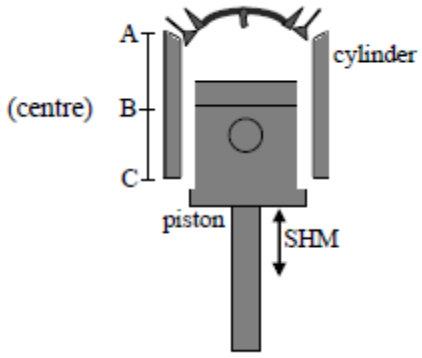
FSFE: 2014

1. An object undergoing simple harmonic motion (SHM) has its displacement x, at time t seconds given by the equation:

$$x = 0.5 \text{ Cos } (4\pi t + \frac{\pi}{4})$$

(i) Determine the amplitude and its initial phase angle. **(1 mark)**
(ii) Calculate T, the period of the motion. **(1 mark)**
(iii) Calculate the maximum speed. **(1 mark)**

2. The piston inside a car cylinder oscillates up and down in simple harmonic motion, as shown, at 6 000 cycles per minute. It travels up and down through a total distance of 24 cm for each cycle.



(i) What is the amplitude of the piston's motion? **(1 mark)**
(ii) Calculate the motion's angular frequency. **(1 mark)**
(iii) At what position does the piston have maximum acceleration? **(1 mark)**
(iv) Calculate the maximum acceleration of the piston. **(1 mark)**