Eduqas Physics – Component 1

Module 6: Vibrations

This topic covers the physical and mathematical treatment of undamped simple harmonic motion. It investigates the energy interchanges which occur during simple harmonic motion.

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	**2**	**3**	**4**
The definition of simple harmonic motion as a statement in words				
$a=-\omega^2 x$ as a mathematical defining equation of simple harmonic motion				
The graphical representation of the variation of acceleration with displacement during simple harmonic motion				
$x=A\cos(\omega t+\varepsilon)$ as a solution to $-\omega^2 x$				
The terms frequency, period, amplitude and phase				
Period as $1/f$ or $2\pi/\omega$				
$v=-A\sin(\omega t+\varepsilon)$ for the velocity during simple harmonic motion				
The graphical representation of the changes in displacement and velocity with time during simple harmonic motion				
The equation $T = 2\pi\sqrt{\dfrac{m}{k}}$ for the period of a system having stiffness (force per unit extension) k and mass m				
The equation $T = 2\pi\sqrt{\dfrac{l}{g}}$ for the period of a simple pendulum				
The graphical representation of the interchange between kinetic energy and potential energy during undamped simple harmonic motion, and perform simple calculations on energy changes				
Free oscillations and the effect of damping in real systems				
Practical examples of damped oscillations				

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
The importance of critical damping in appropriate cases such as vehicle suspensions				
Forced oscillations and resonance, and to describe practical examples				
The variation of the amplitude of a forced oscillation with driving frequency and that increased damping broadens the resonance curve				
Circumstances when resonance is useful for example, circuit tuning, microwave cooking and other circumstances in which it should be avoided for example, bridge design				
SPECIFIED PRACTICAL WORK				
Measurement of g with a pendulum				
Investigation of the damping of a spring				