Worksheet: Oscillations

IGCSE · Class 11 · Physics · 10 questions · 31 marks

Name: _____ Date: _____ Score: _____ / 31

Q1. A particle's acceleration and displacement are related by a = -5x (SI units). Is this SHM? If so, find the angular frequency. *[2 marks]*

Q2. A particle completes 20 oscillations in 4 seconds. Find its frequency and period. *[2 marks]*

Q3. Classify each as periodic or non-periodic: (a) sin(omega t), (b) e^(-t). *[2 marks]*

Q4. A particle executes SHM with angular frequency omega = 2 rad/s. At t = 0, its displacement is 3 cm and its velocity is -8 cm/s. Find the amplitude and phase constant using x(t) = A cos(omega t + phi). *[3 marks]*

Q5. A particle executes SHM: x(t) = 4 cos(2t + pi/6) cm. Find its velocity and acceleration at t = pi/6 s. *[3 marks]*

Q6. A 0.5 kg mass attached to a spring oscillates with a period of 0.2 pi s. Find the spring constant. *[3 marks]*

Q7. A particle of mass 2 kg executing SHM has total energy 16 J and amplitude 0.4 m. Find the force constant k, and the kinetic energy when the displacement is 0.2 m. *[3 marks]*

Q8. Find the length of a simple pendulum whose period is exactly 4 s on Earth's surface (g = 9.8 m/s^2). *[3 marks]*

Q9. A simple pendulum of length 1.0 m is taken to the Moon, where g = 1.7 m/s^2. (a) Find its period on the Moon. (b) By what factor does the period change compared to Earth (g = 9.8 m/s^2)? *[5 marks]*

Q10. Two identical springs, each of spring constant k, are connected in series and attached to a mass m at the free end, with the other end of the combination fixed to a wall. Find the period of oscillation. *[5 marks]*