InkPhysics

QUESTION WORKBOOK

SHM systems: pendulums and springs

Periodic motion · Year 13

AQA 3.6.1.3 · CIE 17.1, 17.2 · OCR A 5.3.1, 5.3.2

10 questions · 30 marks

PRINT EDITION

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SECTION A · Warm-up

A1 State the equation for the period of a mass–spring system, defining each symbol. [2]

A2 Calculate the period of a simple pendulum of length 1.0 m ($g = 9.81\ \text{m s}^{-2}$). [2]

A3 State how the kinetic energy and potential energy of an oscillator vary during one oscillation. [2]

SECTION B · Standard

B1 A 0.50 kg mass on a spring of spring constant 200 N m^{-1} oscillates with SHM. Calculate the period. [3]

B2 Calculate the length of a simple pendulum that has a period of 2.0 s ($g = 9.81\ m\ s^{-2}$). [3]

B3 A 0.20 kg mass on a spring oscillates with a period of 0.80 s. Calculate (a) the spring constant and (b) the frequency of oscillation. [4]

B4 A mass on a spring ($k = 50\ N\ m^{-1}$) oscillates with an amplitude of 0.10 m. Calculate the total energy of the oscillation. [3]

SECTION C · Stretch

C1 A simple pendulum of length 1.0 m is taken to the Moon, where g = 1.62 m s^{-2}. Calculate its period there and compare it with its period on Earth (2.0 s). [4]

C2 A 0.30 kg mass on a spring of spring constant 120 N m^{-1} oscillates with an amplitude of 0.050 m. Calculate its maximum speed. [4]

C3 Describe the effect of damping on an oscillation. [3]