SAMPEL PERCUMA

Skema Jawapan Trial STPM Fizik Semester 3

Set penuh: Kertas Percubaan STPM

Semester 3 · 10 subjek (2024)

Sampel ini: 4 muka surat. Set penuh ada:

- 2 fail PDF
- Semester 1: kertas percubaan (trial) negeri, subjek yang dipilih + skema
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Sampel bermula di muka surat sebelah

12 In the Bohr model of hydrogen, the radius of the electron orbit in the $n = 2$ state is four times that of the radius in the $n = 1$ state. What is $\frac{\text{speed of the electron in the } n = 2 \text{ state}}{\text{speed of the electron in the } n = 1 \text{ state}}$?

A $\frac{1}{4}$ **B** $\frac{1}{2}$ **C** 2 **D** 4

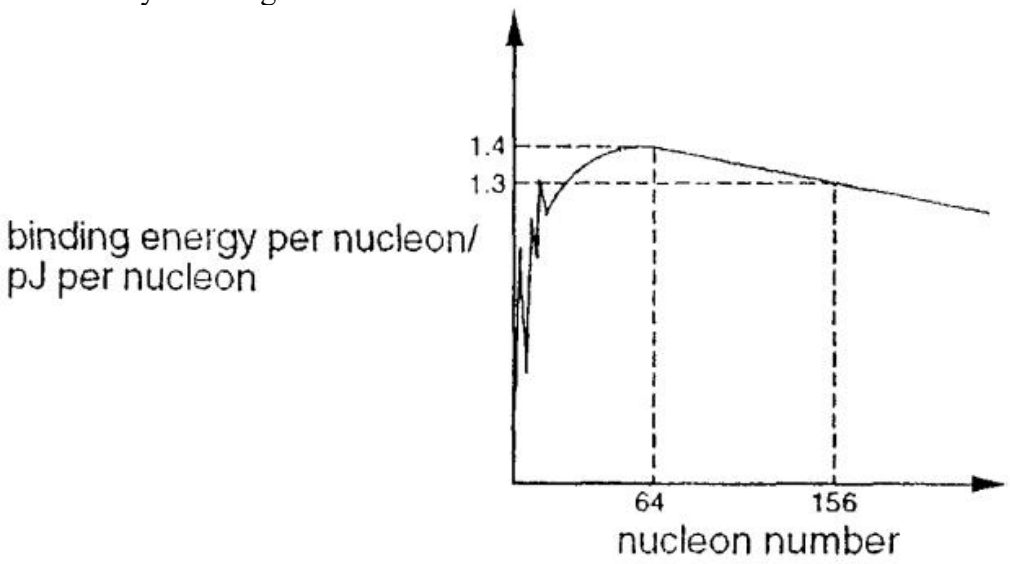
13 Light of frequency f is incident on a metallic surface of work function W. Photoelectrons with a maximum kinetic energy E_{max} are emitted. The frequency of the incident light is changed to $2f$. What is true about the maximum kinetic energy and the work function?

	Maximum kinetic energy	*Work function*
A	Less than $2E_{max}$	Unchanged
B	Less than $2E_{max}$	Greater than W
C	Greater than $2E_{max}$	Unchanged
D	Greater than $2E_{max}$	Greater than W

14 The half-life of a certain radioactive element is such that $\frac{7}{8}$ of a given quantity decays in 12 days. What fraction remains undecayed after 24 days?

A 0 **B** $\frac{1}{128}$ **C** $\frac{1}{64}$ **D** $\frac{1}{32}$

15 The graph shows how the binding energy per nucleon varies with the nucleon number for naturally occuring nuclides.



What is the total binding energy of the nuclide ${}^{156}_{64}\text{Gd}$?

A 83 pJ **B** 90 pJ **C** 203 pJ **D** 218 pJ

Section B [15 *marks*]
Answer **all** *questions*.

16 A progressive wave is represented by the $y = 2.0\sin(\pi t + \pi x)$ equation where y and x are in centimeters and t in seconds.

(a) Determine

(i) the direction of wave motion, [1]

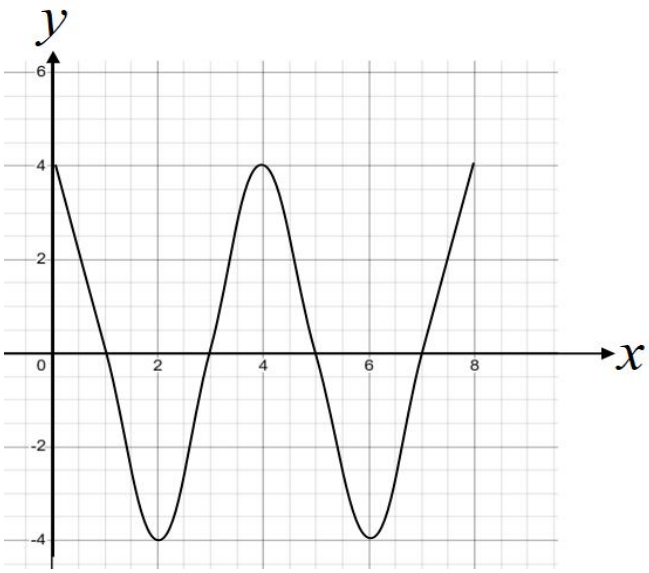
(ii) the wavelength, [1]

(iii) the frequency, [1]

(iv) the speed of the wave. [1]

(b) Sketch the displacement against time graph for the particle at $x = 1.5\lambda$ in a range of $0 \le t \le 2T$. [3]

17 (a) The propagation of sound waves in air in the positive-x direction from a source at an instant is represented by the graph of displacement, y, against distance, x, below.



Sketch a graph to show the variation of changing pressure Δp with distance x of the air molecule at the same instant (amplitude of Δp can be ignored). [3]

(b) A point source of sound produces air vibration of amplitude 2.0×10^{-9} m at a distance of 5.0 m away. The threshold amplitude for hearing is 1.1×10^{-11} m.

(i) Calculate the sound intensity level at that position. [3]

(ii) Determine the minimum distance from the source at which the sound could not be heard. [2]

Section C [30 *marks*]
Answer **two** *questions only.*
You may answer all questions, **but** *only the first* **two** *answers will be marked. Write the answers on the answer sheets provided. Begin each answer on a new page of the answer sheet.*

18 (*a*) Explain the term, *simple harmonic motion*. [2]

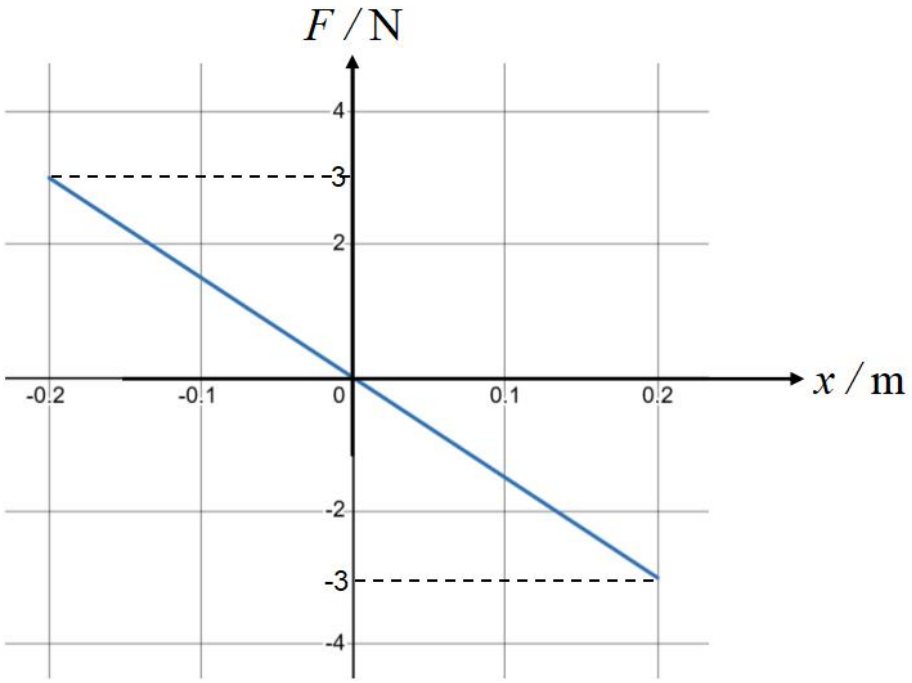
(*b*) (i) Given that the velocity v of a body of mass m undergoing simple harmonic motion is given by

$$v = \pm\omega\sqrt{A^2 - x^2}$$

where ω is the angular velocity, A is the amplitude. Find the kinetic energy of the body in terms of its displacent x, ω and A. [2]

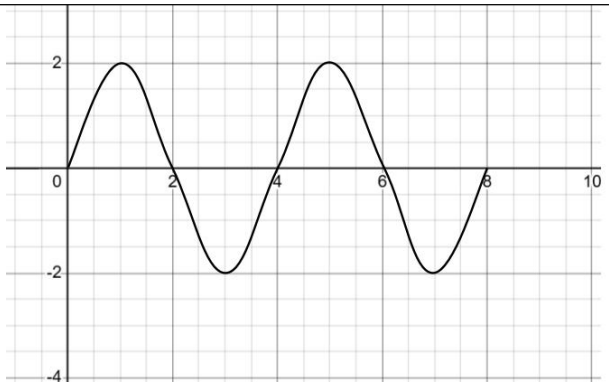
(ii) Sketch graphs, using the same horizontal axis, to show how the velocity and the kinetic energy vary with the displacement of a body undergoing simple harmonic motion. [3]

(*c*) A body of mass 0.15 kg moves with simple harmonic motion in a straight line. The relation between the force F acting on the body and its displacement x, over a complete oscillation, is shown in the figure below.



Find
(i) the amplitude of the motion, [1]
(ii) its period, [3]
(iii) the maximum speed of the body. [2]

(*d*) State whether it is possible for damped oscillation to occur while a system is in resonance condition. Give your reason. [2]

17	(a)	 1 - labelled axes 1 - correct label on x-axis 1 - correct shape (+ sine)	3
	(b)(i)	$\beta = 10 \lg \frac{I}{I_0}$ $= 10 \lg \frac{kA^2}{kA_o^2}$ $\therefore \beta = 10 \lg \frac{A^2}{A_o^2} = 10 \lg \left(\frac{2 \times 10^{-9}}{1.1 \times 10^{-11}}\right)^2$ $= 4.52$ dB	1 1 1
	(b)(ii)	$I \propto \frac{1}{r^2}$ and $I \propto A^2$ $\therefore A \propto \frac{1}{r}$ $\frac{A}{A_o} = \frac{r_o}{r}$ $r_o = \left(\frac{2 \times 10^{-9}}{1.1 \times 10^{-11}}\right) \times 5$ $r_o = 909$ m	1 1
		Total	**8**

TAMAT SAMPEL

Suka sampel ini?

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