

Affix label with Candidate Code Number here.

If no label, enter candidate number if known, or name here.



--	--	--

(Supervisor's use only)

No. 262/1

NEW ZEALAND QUALIFICATIONS AUTHORITY

Mana Tohu Matauranga o Aotearoa

University Entrance, Bursaries and Scholarships Examination

PHYSICS: 1998

ANSWER BOOKLET

INSTRUCTIONS

All answers are to be written in this Answer Booklet.

Answer **ALL** questions.

The spaces provided are a guide to the length of your answers, but it is **NOT** essential to use all the space available.

A list of formulae is given on page 17 of this booklet and may be detached along the perforation for use during the examination.

If you need more space for any answer, ask the Supervisor for extra paper. Answers on extra paper should be clearly numbered. Write your candidate code number on all extra sheets used. Attach the extra sheets at the appropriate places in this booklet. Write the number of extra sheets used in the box at the top of the back flap of this booklet. Write NIL if you have used none.

Answer spaces for each part begin on the following pages:

Mechanics	page 2
Electromagnetism	page 7
Waves	page 12
Atomic and Nuclear	page 15

INSTRUCTIONS FOR ANSWERING ALL QUESTIONS:

To receive full marks for numerical questions:

- working should be clearly set out
- answers must be accompanied by the correct units
- answers must have an appropriate number of significant figures.

For "describe" or "explain" questions, answers must be written as complete sentences.

Check that this booklet contains pages 2 – 17 in the correct order.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

© New Zealand Qualifications Authority, 1998

All rights reserved. No part of this publication may be reproduced by any means without the prior permission of the New Zealand Qualifications Authority.

(Turn over

MECHANICS

(52 marks; 62 minutes)

THE RECORD PLAYER

QUESTION ONE: ROTATIONAL MOTION (11 marks)

(a) _____

 _____ (2 marks)

(b) _____

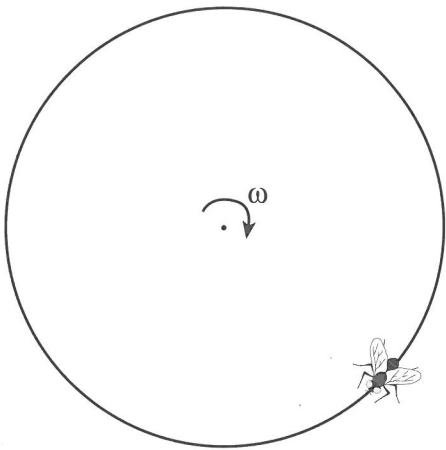
 angle turned through = _____ (2 marks)

(c) _____

 linear speed = _____ (2 marks)

(d) _____
 _____ (1 mark)

(e)



(i) _____ (1 mark)

(ii) force = _____ (1 mark)

(f) _____

 time to stop = _____ (2 marks)

Q1

11

QUESTION TWO: TORQUES AND ANGULAR MOMENTUM (12 marks)

(a) _____

_____ (2 marks)

(b) _____
_____ angular acceleration = _____ (2 marks)

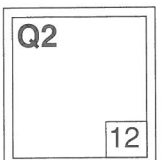
(c) _____
_____ (2 marks)

(d) _____
_____ rotational inertia = _____ (2 marks)

(e) _____
_____ angular momentum = _____ (2 marks)

(f) (i) quantity conserved = _____ (1 mark)

(ii) _____ (1 mark)

**(Turn over**

**QUESTION THREE: SIMPLE HARMONIC MOTION (14 marks)**

$$g = 9.8 \text{ m s}^{-2}$$

- (a) _____

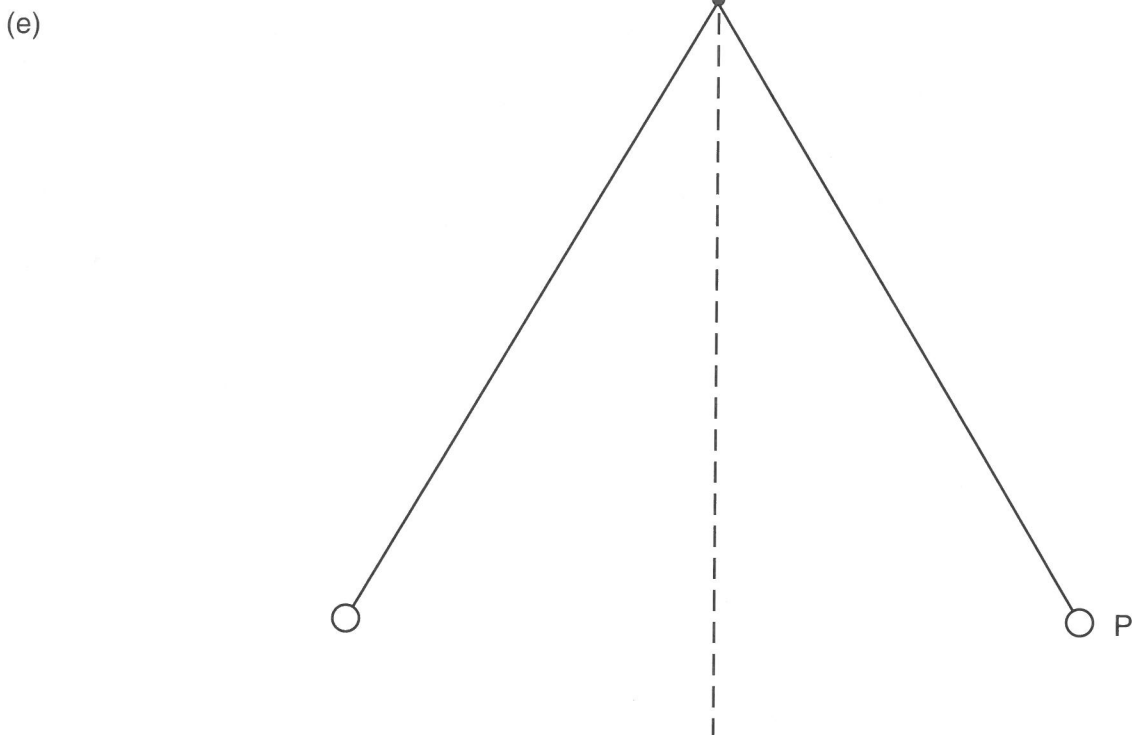
length = _____ (3 marks)

- (b) _____

_____ (2 marks)

- (c) _____
_____ (2 marks)

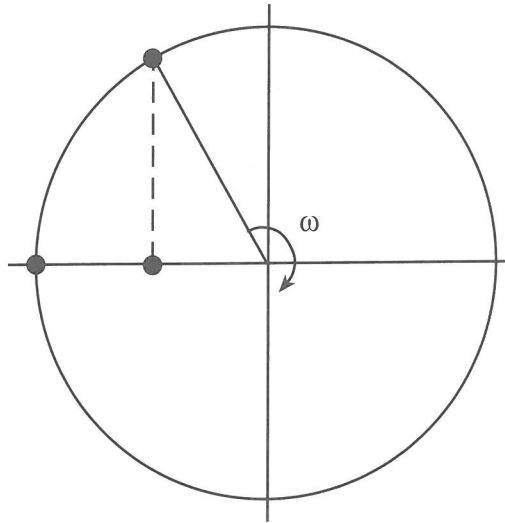
- (d) _____ (1 mark)



(1 mark)

(f) _____ (1 mark)

(g) _____ energy _____ energy (1 mark)



(h) _____

_____ (3 marks)



QUESTION FOUR: GRAVITY (15 marks)

(a) (i) _____

force = _____ (2 marks)

(ii) _____

_____ (2 marks)

(b) (i) _____

centripetal acceleration = _____ (2 marks)

(ii) _____

_____ (3 marks)

(c) (i) _____
_____ (2 marks)

(ii) _____

_____ (2 marks)

(iii) _____

radius = _____ (2 marks)

Q4
15

ELECTROMAGNETISM

(47 marks; 56 minutes)

THE TELEVISION SET

QUESTION FIVE: ELECTRONS (12 marks)

(a) (i) _____
 current = _____ (1 mark)

(ii) _____

 _____ (2 marks)

(b) (i) _____

 resistance = _____ (2 marks)

(ii) _____

 current = _____ (2 marks)

(iii) _____
 voltage = _____ (2 marks)

(c) (i) _____

 _____ (2 marks)

(ii) _____

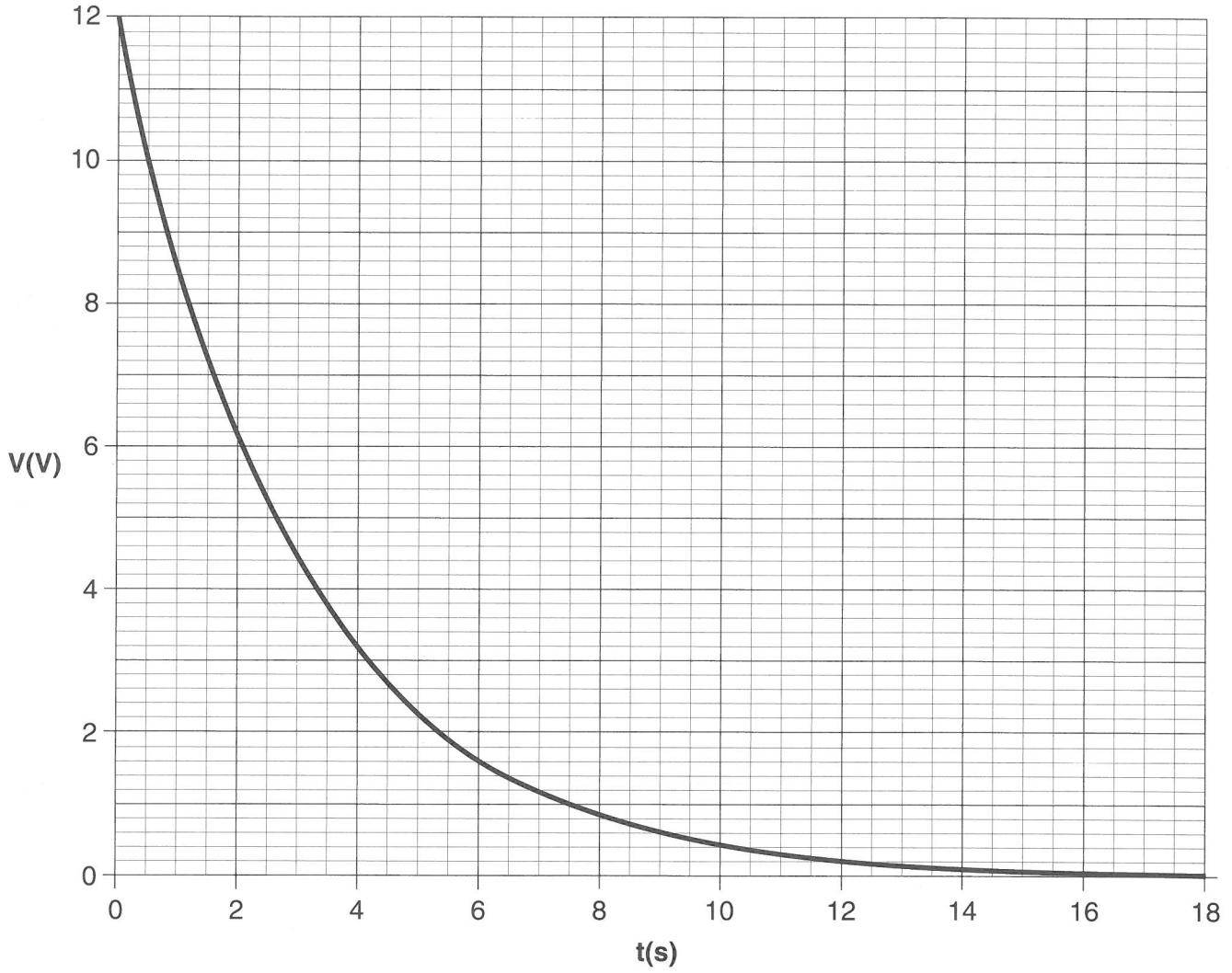
 velocity = _____ (1 mark)

Q5

12

(Turn over

QUESTION SIX: CAPACITORS (14 marks)



(a) _____

_____ (2 marks)

(b) _____

capacitance = _____ (2 marks)

(c) _____

_____ (2 marks)

(d)

charge = _____ (2 marks)

(e)

total capacitance = _____ (2 marks)

(f)

voltage = _____ (2 marks)

(g)

total energy = _____ (2 marks)

Q6

14

(Turn over



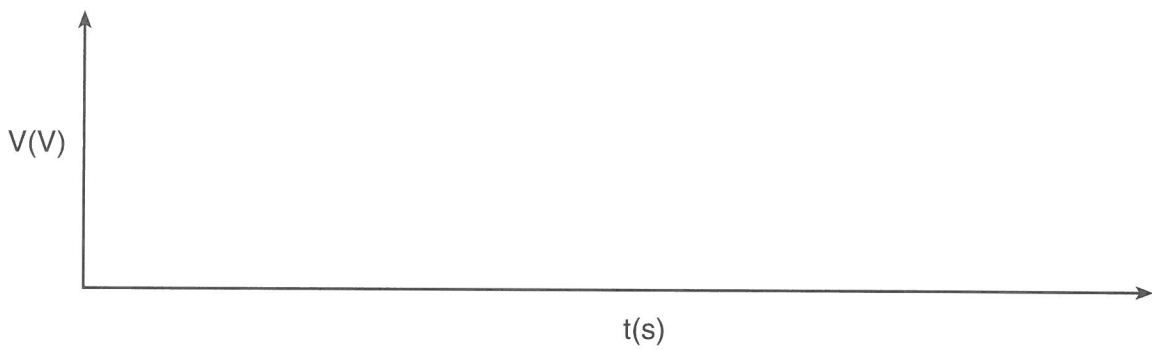
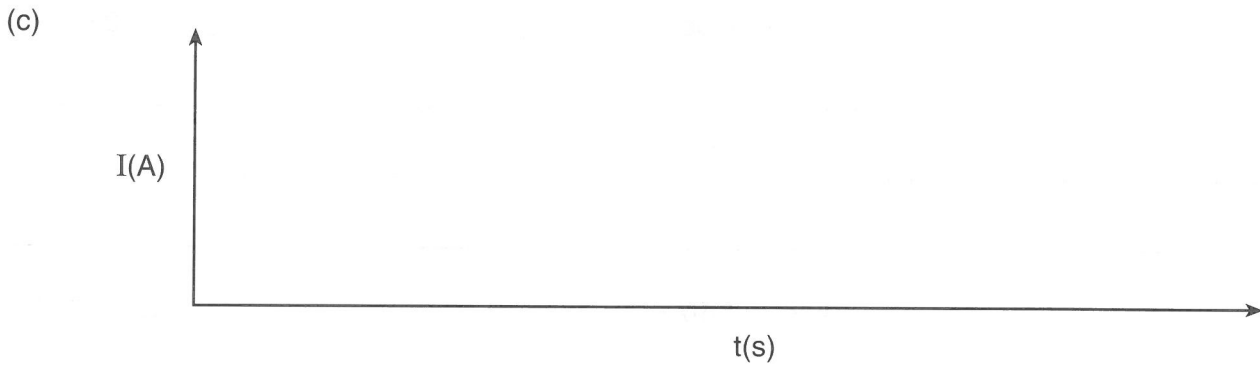
QUESTION SEVEN: INDUCTANCE (10 marks)

(a) _____

inductance = _____ (2 marks)

(b) _____

energy = _____ (2 marks)



(5 marks)

(d) _____

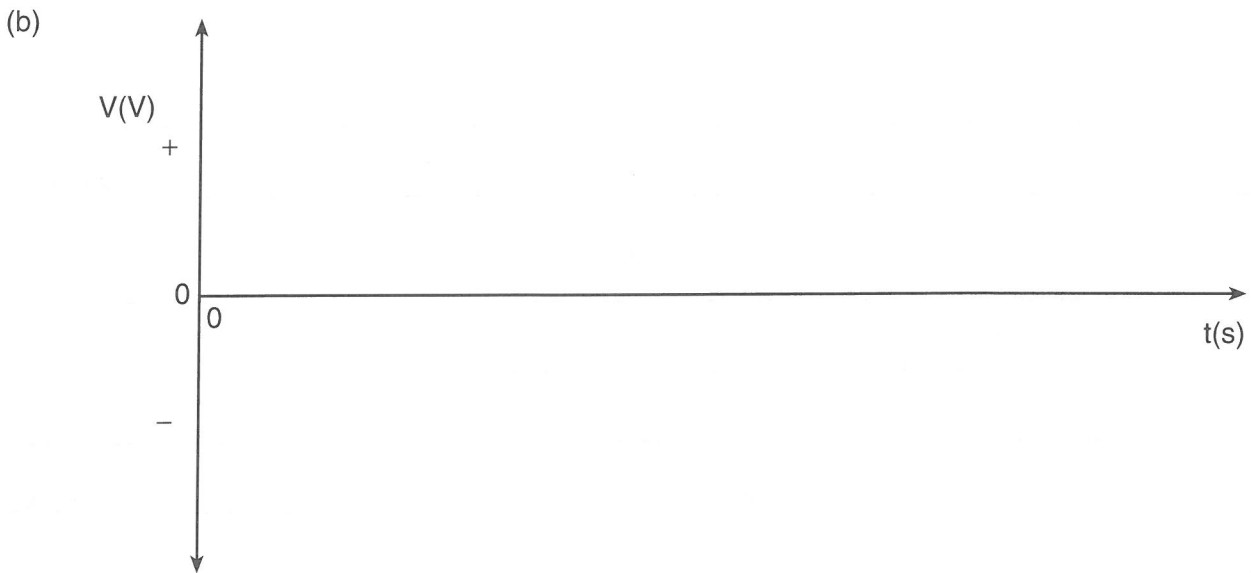
voltage = _____ (1 mark)

Q7
10

QUESTION EIGHT: AC ELECTRICITY (11 marks)

(a) _____

number of turns = _____ (2 marks)



(3 marks)

(c) (i) _____

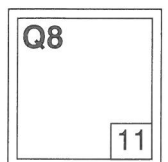
inductive reactance = _____ (2 marks)

(ii) _____

impedance = _____ (2 marks)

(iii) _____

current = _____ (2 marks)



(Turn over)

WAVES

(30 marks; 36 minutes)

THE PEN-WHISTLE**QUESTION NINE: SOUND (14 marks)**

(a)

(2 marks)

(b)

frequency = _____ (2 marks)

(c)

velocity = _____ (3 marks)

(d)

length = _____ (3 marks)

(e)

(1 mark)

(f)

(2 marks)

(g)

(1 mark)

**QUESTION TEN: RADIO AND LIGHT (16 marks)**

(a) _____

wavelength = _____ (2 marks)

(b) _____

frequency = _____ (2 marks)

(c) _____
_____ (2 marks)

(d) _____

first bright fringe distance = _____ (3 marks)

(e) _____ (1 mark)

(f) (i) _____

angle = _____ (2 marks)

(ii) _____

spread radius = _____ (2 marks)

(g) _____

_____ (2 marks)

ATOMIC AND NUCLEAR

(23 marks; 26 minutes)

QUESTION ELEVEN: ATOMS (12 marks)

(a) (i) _____

_____ (3 marks)

(ii) _____

number of photons per second = _____ (2 marks)

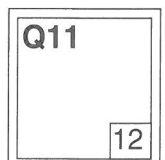
(b) n _____
h _____ (2 marks)

(c) _____

_____ (3 marks)

(d) _____

_____ (2 marks)

**(Turn over**

**QUESTION TWELVE: NUCLEAR (11 marks)**

(a) $a =$ _____ (1 mark)

(b) $\gamma =$ _____ (1 mark)

(c) $b =$ _____ (1 mark)

(d) $X =$ _____ (1 mark)

(e) Substance B is curve: _____ (1 mark)

(f) _____
_____ (1 mark)

(g) _____

_____ (1 mark)

(h) _____

_____ (2 marks)

(i) _____

mass = _____ (2 marks)

Q12

11

The following formulae may be of use to you:

$$F_g = \frac{GMm}{r^2}$$

$$F_c = \frac{mv^2}{r}$$

$$\Delta p = Ft$$

$$\omega = 2\pi f$$

$$d = r\theta$$

$$v = r\omega$$

$$a = r\alpha$$

$$F = ma$$

$$\omega = \frac{\Delta\theta}{\Delta t}$$

$$\alpha = \frac{\Delta\omega}{\Delta t}$$

$$L = I\omega$$

$$L = mvr_{\perp}$$

$$\tau = I\alpha$$

$$\tau = Fr$$

$$E_{K(\text{ROT})} = \frac{1}{2}I\omega^2$$

$$E_{K(\text{LIN})} = \frac{1}{2}mv^2$$

$$\omega = \omega_i + \alpha t$$

$$\omega^2 = \omega_i^2 + 2\alpha\theta$$

$$\theta = \frac{(\omega_i + \omega)t}{2}$$

$$\theta = \omega_i t + \frac{1}{2}\alpha t^2$$

$$T = 2\pi\sqrt{\frac{\ell}{g}}$$

$$T = 2\pi\sqrt{\frac{m}{k}}$$

$$E = \frac{1}{2}kA^2$$

$$a = -\omega^2 y$$

$$y = A \sin \omega t,$$

$$v = A\omega \cos \omega t,$$

$$a = -A\omega^2 \sin \omega t$$

$$\Delta E = Vq$$

$$V = Ed$$

$$Q = CV$$

$$C_{\text{TOT}} = C_1 + C_2$$

$$\frac{1}{C_{\text{TOT}}} = \frac{1}{C_1} + \frac{1}{C_2}$$

$$E = \frac{1}{2}QV$$

$$C = \frac{\epsilon_0 \epsilon_r A}{d}$$

$$\tau = RC$$

$$\frac{1}{R_{\text{TOT}}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$R_{\text{TOT}} = R_1 + R_2$$

$$y = A \cos \omega t$$

$$v = -A\omega \sin \omega t$$

$$a = -A\omega^2 \cos \omega t$$

$$\phi = BA$$

$$\epsilon = BAN\omega \sin \omega t$$

$$\epsilon = -\frac{\Delta\phi}{\Delta t}$$

$$\epsilon = -L \frac{\Delta I}{\Delta t}$$

$$\epsilon = -M \frac{\Delta I}{\Delta t}$$

$$\frac{N_p}{N_s} = \frac{V_p}{V_s}$$

$$E = \frac{1}{2}LI^2$$

$$\tau = \frac{L}{R}$$

$$I = I_{\text{MAX}} \sin \omega t$$

$$V = V_{\text{MAX}} \sin \omega t$$

$$I_{\text{MAX}} = \sqrt{2}I_{\text{rms}}$$

$$V_{\text{MAX}} = \sqrt{2}V_{\text{rms}}$$

$$X_C = \frac{1}{\omega C}$$

$$X_L = \omega L$$

$$V = IZ$$

$$n\lambda = \frac{dx}{L}$$

$$n\lambda = d \sin \theta$$

$$f = |f_1 - f_2|$$

$$f' = f \frac{V_w}{V_w \pm V_s}$$

$$E = hf$$

$$hf = \phi + E_K$$

$$E = mc^2$$

$$E_n = -\frac{hcR}{n^2}$$

$$\Delta E = |E_1 - E_2|$$

$$v = f\lambda$$

$$f = \frac{1}{T}$$

