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number if known, or name here.

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(Supervisor's use only)



No. 262/1

New Zealand Qualifications Authority

University Entrance and Bursaries Examination, incorporating
The National Bank of New Zealand Ltd Scholarships

PHYSICS: 1995

ANSWER BOOKLET

INSTRUCTIONS

All answers are to be written in this Answer Booklet.

All questions should be answered.

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

If you need more space for any answer, ask the Supervisor for extra paper. Answers on extra paper should be clearly numbered. Write your code number on all extra sheets used. Tie 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
Wave Motion	page 9
Electromagnetism	page 12
Photons, Atoms and Nuclei	page 16

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, and
- expressed to an appropriate number of significant figures.

Written answers to "describe" or "explain" questions must be 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

The following formulae may be of use to you:

$$\Delta p = Ft$$

$$\omega = \omega_0 + \alpha t$$

$$\theta = \omega_0 t + \frac{1}{2} \alpha t^2$$

$$\omega^2 = \omega_0^2 + 2\alpha\theta$$

$$v = r\omega$$

$$d = r\theta$$

$$a = r\alpha$$

$$y = A \sin(\omega t + \phi)$$

$$v = A\omega \cos(\omega t + \phi)$$

$$a = -A\omega^2 \sin(\omega t + \phi)$$

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

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

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

$$X_L = \omega L$$

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

MECHANICS

(56 marks; 63 minutes)

SAFETY ON THE ROAD

QUESTION ONE: A HEAD-ON COLLISION (13 marks)

(a) _____

change in momentum = _____ (2 marks)

direction is: _____ (1 mark)

(b) _____

average force = _____ (2 marks)

(c) _____

time = _____ (2 marks)

(d) _____

_____ (2 marks)

(e) _____

force = _____ (2 marks)

(f) _____

_____ (2 marks)

P2
5

P3
8

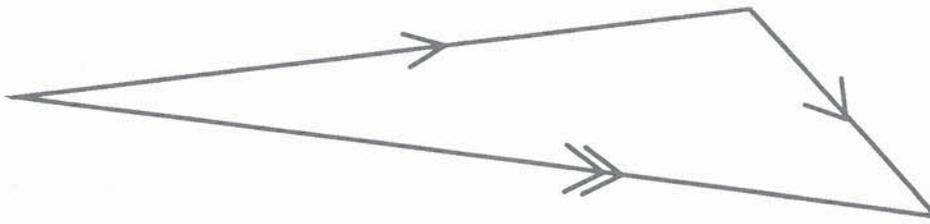
Q1
13

(Turn over

QUESTION TWO: A GLANCING COLLISION (19 marks)

The Collision:

(a)



(4 marks)

(b)

(2 marks)

The Wheel:

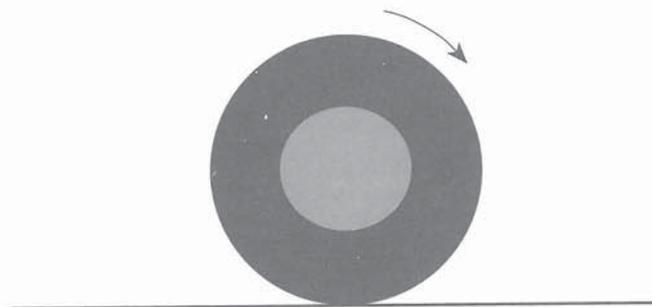
(c)

(2 marks)

(d)

rotational inertia = _____ (2 marks)

(e) (i)



(1 mark)

(ii) _____

(1 mark)

The Skid:

(f) _____

average angular deceleration = _____ (3 marks)

(g) _____

(2 marks)

(h) _____

(2 marks)

P4
12

P5
7

Q2
19

(Turn over

QUESTION THREE: STOPPING DISTANCES (10 marks)

(a) independent variable: _____ (1 mark)

dependent variable: _____ (1 mark)

(b) other variable 1: _____

_____ (2 marks)

other variable 2: _____

_____ (2 marks)

(c) _____

_____ (2 marks)

(d) _____

_____ (2 marks)

Q3

OSCILLATIONS**QUESTION FOUR: SIMPLE HARMONIC MOTION OF AN ELECTRON (14 marks)**

(a) _____

amplitude = _____ (2 marks)

(b) _____

absolute uncertainty = _____ (2 marks)

(c) _____

percentage uncertainty = _____ (2 marks)

(d)



electron path

(2 marks)

(e) _____

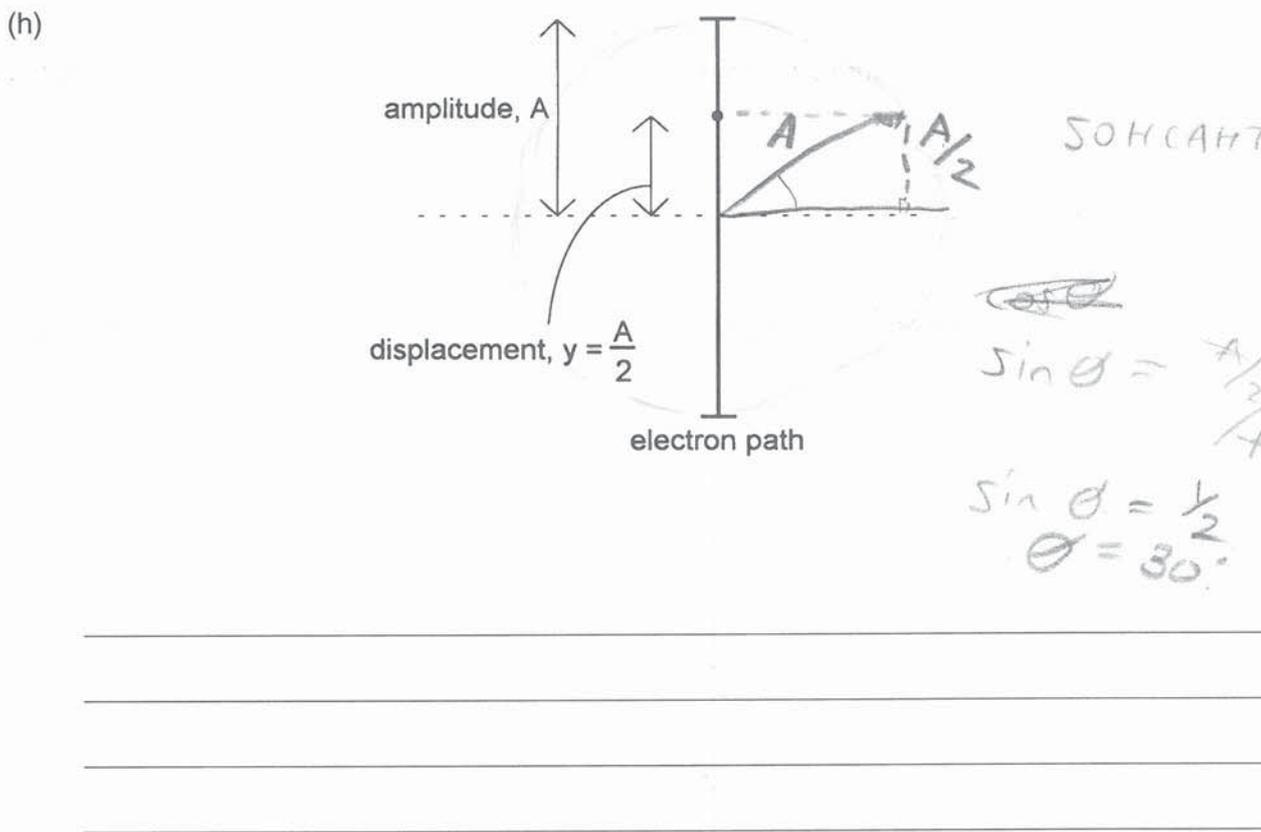
(1 mark)

(f) _____

(1 mark)

(g) _____

(1 mark)



angle = _____

(3 marks)

P7
8

P8
6

Q4
14

WAVE MOTION

(32 marks; 36 minutes)

QUESTION FIVE: THE DIDGERIDOO (17 marks)

(a)



(2 marks)

(b)

(1 mark)

(c)

wavelength =

(2 marks)

(d)



(1 mark)

(e)

frequency =

(3 marks)

(f)

(2 marks)



(g) _____

(2 marks)

(h) _____

(2 marks)

(i) speed, v , represents: _____

speed, v' , represents: _____

(2 marks)

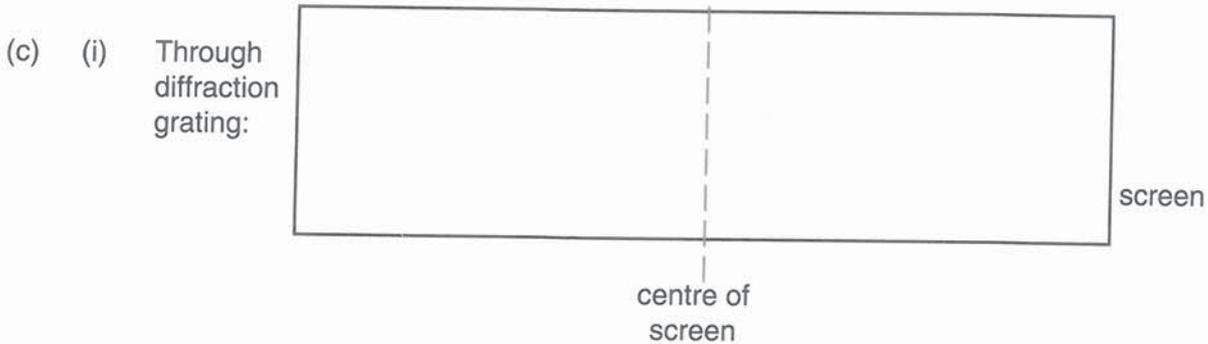
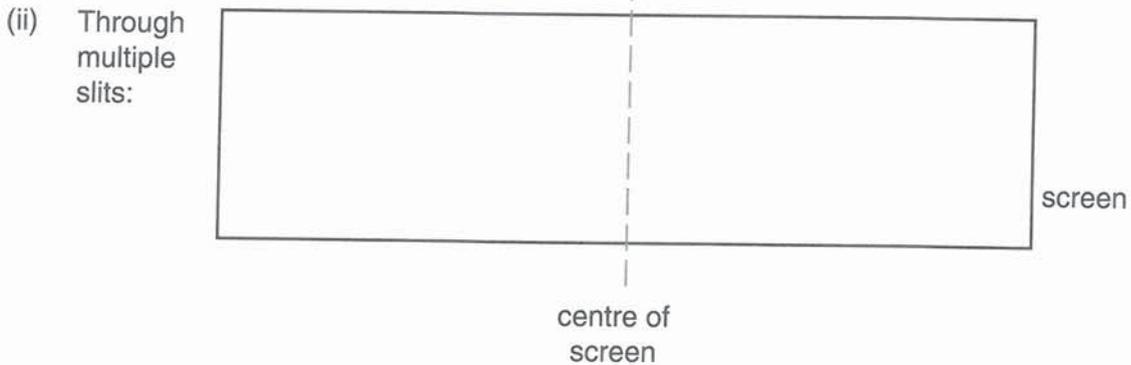
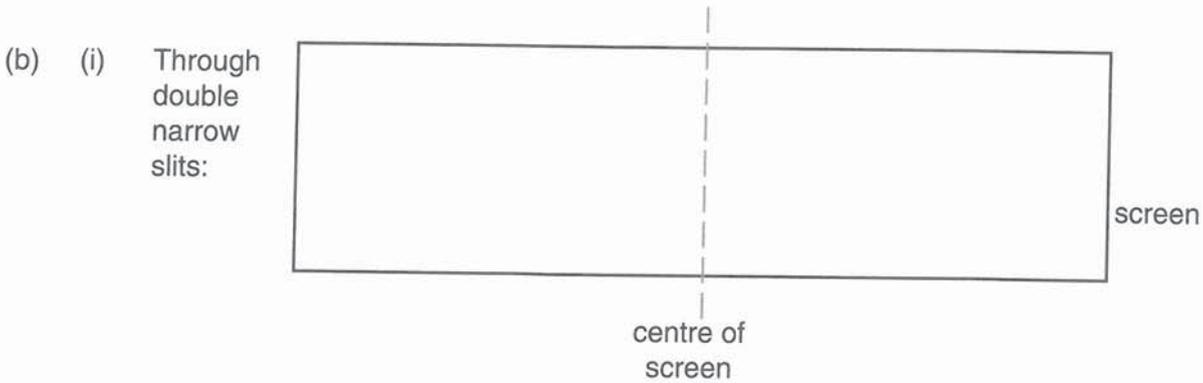
P9
11

P10
6

Q5
17

QUESTION SIX: DIFFRACTION (15 marks)

(a) monochromatic means: _____
 _____ (2 marks)



(ii) _____ (1 mark)
 _____ (1 mark)

(iii) _____

 angle = _____ (2 marks)

(d) _____

 _____ (2 marks)

Q6
15

ELECTROMAGNETISM

(48 marks, 54 minutes)

QUESTION SEVEN: RECHARGING A CAR BATTERY (15 marks)

(a) _____

 _____ (2 marks)

(b) _____

 _____ (2 marks)

(c) _____

 energy stored per second = _____ (3 marks)

(d) _____

 _____ (2 marks)

(e) (i) _____
 voltage = _____ (1 mark)

(ii) _____ (1 mark)

(iii) _____ (1 mark)

(f) _____

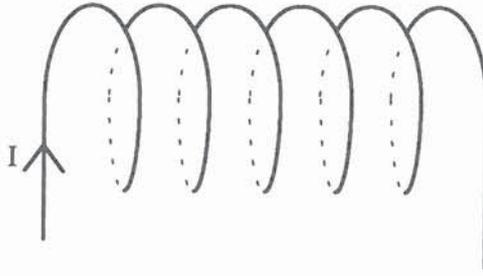
current = _____ (3 marks)

Q7

15

QUESTION NINE: A LOUDSPEAKER CIRCUIT (21 marks)

(a)



(2 marks)

(b)

(2 marks)

(c) direction of the induced voltage is: _____

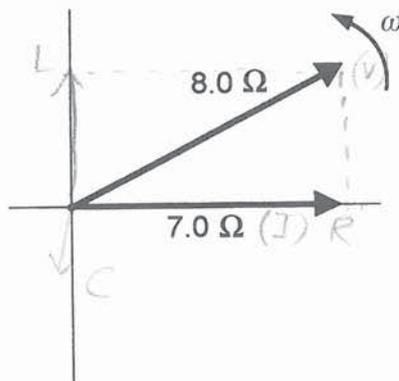
(1 mark)

(d) _____

angular frequency = _____

(2 marks)

(e)



(2 marks)

(f) _____

_____ (2 marks)

(g) unit for inductance: _____ (1 mark)

(h) _____
_____ (1 mark)

(i) _____
_____ (1 mark)

(j) _____

_____ (2 marks)

(k) _____

_____ (3 marks)

(l) _____

_____ (2 marks)

P14
9

P15
12

Q9
21

PHOTONS, ATOMS AND NUCLEI

(24 marks; 27 minutes)

QUESTION TEN: SPECTRA: FLUORESCENT LIGHTS (9 marks)

(a) _____

energy of photons: _____ (3 marks)

(b) _____

(1 mark)

(c) _____

(3 marks)

(d) _____

(2 marks)

Q10

9

QUESTION ELEVEN: THE SUN (15 marks)

(a) (i) _____ (1 mark)

(ii) _____

_____ (2 marks)

(b) (i) _____

_____ (2 marks)

(ii) _____

_____ (2 marks)

(c) _____

sun's power: _____ MW (4 marks)

(d) (i) atomic number is: _____ (1 mark)

mass number is: _____ (1 mark)

(ii) name of unknown particle is: _____ (1 mark)

(iii) _____
_____ (1 mark)