Candidate Name	Centre Number	Candidate Number

For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

PHYSICS 6032/2

PAPER 2

SPECIMEN PAPER **1 hour 30 minutes**

Candidates answer on the question paper.
Additional materials:
Electronic calculator and/or Mathematical tables

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.
For numerical answers, **all** working should be shown.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

This specimen paper consists of 13 printed pages and 3 blank pages.

Copyright: Zimbabwe School Examinations Council, Specimen Paper.
©ZIMSEC SPECIMEN PAPER

[Turn over

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

DATA

speed of light in free space	$c = 3.00 \times 10^{8} ms^{-1}$
permeability of free space	$\mu_o = 4\pi \times 10^{-7} Hm^{-1}$
permittivity of free space	$\varepsilon_0 = 8.85 \times 10^{-12} Fm^{-1}$ $(1/4\pi\varepsilon_0 = 8.99 \times 10^{9} mF^{-1})$
elementary charge	$e = 1.60 \times 10^{-19} C$
the Planck constant	$h = 6.63 \times 10^{-34} Js$
unified atomic mass unit	$1 u = 1.66 \times 10^{-27} kg$
rest mass of electron	$m_e = 9.11 \times 10^{-31} kg$
rest mass of proton	$m_p = 1.67 \times 10^{-27} kg$
molar gas constant	$R = 8.31 JK^{-1}mol^{-1}$
the Avogadro constant	$N_A = 6.02 \times 10^{23} mol^{-1}$
the Boltzmann constant	$k = 1.38 \times 10^{-23} JK^{-1}$
gravitational constant	$G = 6.67 \times 10^{-11} Nm^2kg^{-2}$
acceleration of free fall	$g = 9.81 ms^{-2}$

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

FORMULAE

uniformly accelerated motion	$s = ut + \frac{1}{2}at^2$
	$v^2 = u^2 + 2as$
work done on/by a gas	$W = p\,\Delta V$
gravitational potential	$\phi = -Gm/r$
hydrostatic pressure	$p = \rho gh$
pressure of an ideal gas	$p = \frac{1}{3}\frac{Nm}{V} < c^2 >$
simple harmonic motion	$a = -\omega^2 x$
velocity of particle in s.h.m.	$v = v_o \cos \omega t$
	$v = \pm\omega\sqrt{(x_o^2 - x^2)}$
Doppler effect	$f_o = \frac{f_s v}{v \pm v_s}$
Attenuation of x-rays	$I = I_o e^{-\mu x}$
electric potential	$V = \frac{Q}{4\pi\varepsilon_0 r}$
capacitors in series	$1/C = 1/C_1 + 1/C_2 + \ldots$
capacitors in parallel	$C = C_1 + C_2 + \ldots$
energy of charged capacitor	$W = \frac{1}{2}QV$
electric current	$I = Anvq$
resistors in series	$R = R_1 + R_2 + \ldots$
resistors in parallel	$1/R = 1/R_1 + 1/R_2 + \ldots$
Hall voltage	$V_H = \frac{BI}{ntq}$
alternating current/voltage	$x = x_o \sin\omega t$
radioactive decay	$x = x_o \exp(-\lambda t)$
decay constant	$\lambda = \frac{0.693}{t_{\frac{1}{2}}}$

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

For Examiner's Use

1 **(a)** Define angular velocity.

_____

_____ [1]

(b) A body is moving in a circular path of radius, r, at constant linear velocity, v, angular velocity,ω, and period T.

Deduce an expression connecting v, r and T.

_____

_____ [1]

(c) **Fig. 1.1** shows a 0.6 kg stone tied to one end of a string whirled in a vertical of circle of radius 0.4 m at a constant rate of 12.0 turns per minute.

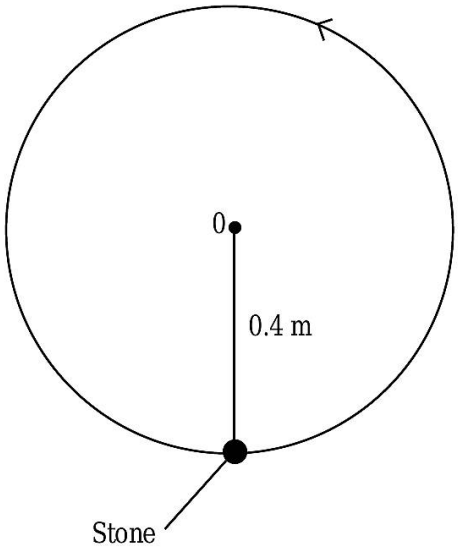


Fig. 1.1

(i) Show on **Fig. 1.1**, the direction of linear velocity v and centripetal acceleration, a.

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

(ii) Calculate the centripetal acceleration.

For Examiner's Use

centripetal acceleration = _____

(iii) Label a point Q where the stone would be when the string is most likely to break.

_____

_____

(iv) Determine the tension in the string at Q.

Tension = _____ [6]

(d) Explain why passengers experience a normal reaction less than their weight when the vehicle goes over the top of a curved bridge.

_____

_____

_____

_____ [2]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

For Examiner's Use

2 **(a)** Define gravitational potential.

_____

_____

_____ [2]

(b) A stone of mass, m, has gravitational potential energy, E_p, at a point, X, in a gravitational field of potential ϕ.

Write an expression for gravitational potential ϕ in terms of m and E_p.

_____

_____[1]

(c) For an isolated spherical planet of radius R, the value of ϕ at its surface is -6.3×10^7 Jkg^{-1}.

Calculate the change in gravitational potential energy for a 1.4 kg stone moving towards the planet from a distance of 6R to 3R.

Change in gravitational p.e = _____ [3]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

3. **Fig. 3.1** shows a ray incident on a glass-air boundary. The glass-air and air-glass boundaries are parallel to each other.

For Examiner's Use

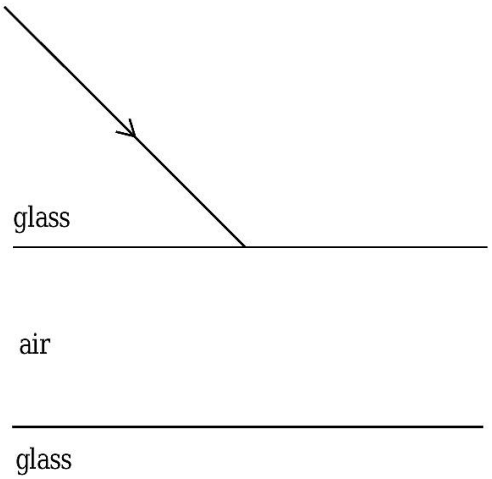


Fig. 3.1

(a) **(i)** Complete the path of the ray as it passes through the air into glass.

(ii) Determine the angle to the horizontal at which the ray emerges from air entering glass if the angle of incidence in glass is 40°.

[5]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

(b) Derive the equation $n = \frac{1}{sinc}$.

For Examiner's Use

[1]

4. **Fig. 4.1(a)** and **Fig 4.1(b)** shows an X-ray beam from an anode target.

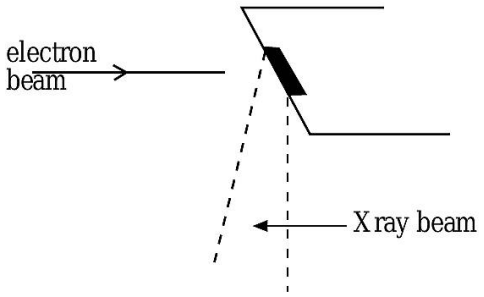


Fig.4.1(a)

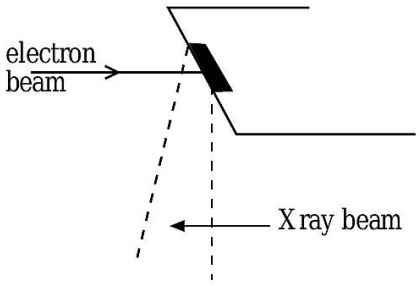


Fig 4.1(b)

(a) **(i)** State the figure which shows the X-ray beam preferred in X-ray imaging.

_____

(ii) Explain your choice in part **(a)(i).**

_____

_____ [2]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

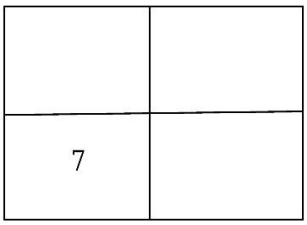
For Examiner's Use

(b) Explain why a patient is given a barium meal before an X-ray image of the stomach is taken.

_____

_____ [3]

The number 7 is written in a voxel as shown.



(c) State what the number 7 represents.

_____

_____ [1]

(d) State the advantage of the image obtained using CT scanning over the image obtained using X-rays.

_____

_____ [1]

5. When a slide wire potentiometer is used to measure the emf of a cell, a balance point cannot be found along the resistance wire.

Explain how a voltmeter may be used to discover the cause of the problem.

_____

_____

_____

_____ [3]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

For Examiner's Use

6. **(a)** State Faraday's law of electromagnetic induction.

_____

_____ [1]

(b) **Fig. 6.1** shows a lump of soft solders at the centre of a coil. The coil is connected to a signal generator.

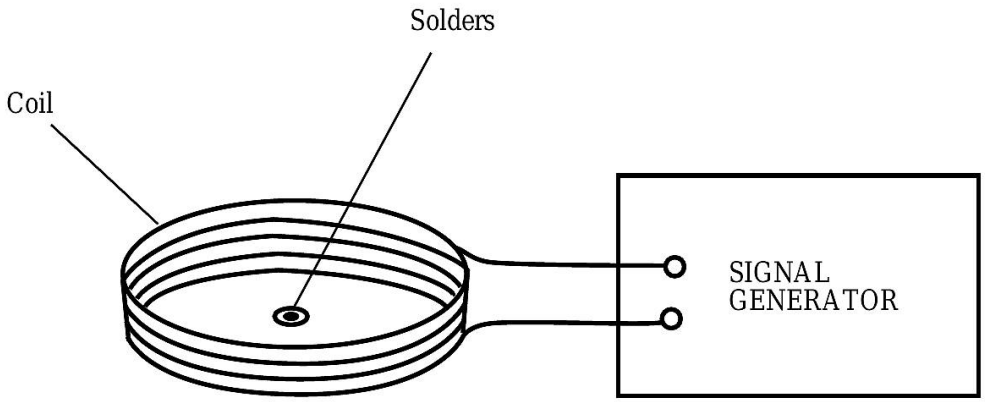


Fig. 6.1

Describe and explain what happens to the solder when the a.c. frequency is increased to a high value.

_____

_____

_____

_____

_____

_____ [5]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

For Examiner's Use

7. **(a)** State **two** devices of modern electronic technology which have improved speed of communication.

_____

_____ [2]

(b) Suggest, with an explanation, an electronic input transducer which can be used in a car to detect that

(i) the seat belt is not fastened,

_____

_____

(ii) headlamps are not switched on,

_____

_____

(iii) the engine requires cooling.

_____

_____ [6]

8. **(a)** Define

(i) Density _____

_____

(ii) Pressure _____

_____ [2]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

(b) Use the definitions you have given in **(a)** to derive the equation $P=\rho gh$ for the pressure, P, at a depth, h, in a fluid of density ρ.

For Examiner's Use

[1]

9. **(a)** Explain why it is much more difficult to reduce the effects of noise when transmitting an analogue signal than when transmitting in digital form.

_____

_____

_____

_____ [2]

(b) **(i)** State **two** advantages of optical fibre cables over copper cables.

_____

_____

_____

(ii) Explain the term attenuation.

_____

_____

(iii) State **one** cause of attenuation in optical fibres.

_____

_____[4]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

(c) **(i)** Distinguish between a geostationary satellite and a polar satellite.

For Examiner's Use

_____

_____

_____

_____

(ii) Give **three** reasons why microwaves are used for satellite communication.

_____

_____

_____ [5]

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

BLANK PAGE

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

BLANK PAGE

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates

BLANK PAGE

revision.fundayi.com | Free ZIMSEC & Cambridge Revision | Share with Classmates