**'2017 Examination Package' -
Trial Examination 5 of 9**

STUDENT NUMBER

Letter

Figures								
Words								

PHYSICS
Units 3&4 – Written examination
(TSSM's 2012 trial exam updated for the current study design)

Reading Time: 15 minutes
Writing Time: 2 hour and 30 minutes

QUESTION & ANSWER BOOK
Structure of Book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	18	18	110
			Total 130

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, and rulers, up to A3 page (double sided) of pre written notes and an approved **scientific calculator**.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape, graphics calculators.

Materials supplied
- Question and answer book of 40 pages (including a multiple choice answer sheet for **Section B)**.
- Formula Sheet.

Instructions
- Print your name in the space provided on the top of this page.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION A – Multiple Choice Questions

Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple choice questions.
Choose the response that is **correct** and that **best answers** the question.
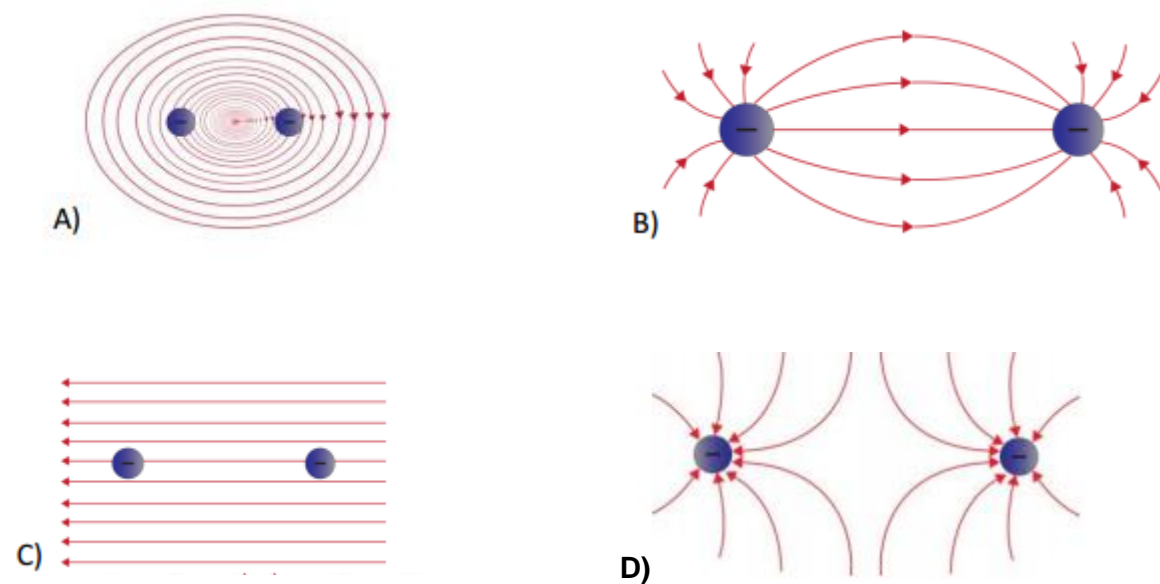A correct answer **scores** 1; an incorrect answer scores 0.
Marks will not be deducted for incorrect answers.
Unless indicated the diagrams in this book are **not** drawn to scale.
Tke the value of g to be 9.8 m s^{-2}

Question 1

Which of the following represents the electric field due to the combination of two negative charges?

A)

B)

C)

D)

Question 2

Compare the Graviational Field and the Electric Field produced by a proton.

A. The Gravitational Field is the same strength as the Electric Field.
B. The Electric Field is stronger and in the same direction as the Gravitational Field.
C. The Electric Field is stronger and in the opposite direction to the Graviational Field.
D. The Gravitational Field is stronger and is in the same direction as the Electric Field.

Question 3

Magentism is similar to electricity but different from gravity because magentism and electricity

A. Depend on charge.
B. Depend on mass.
C. Can attract and repel.
D. All three.

SECTION A – continued

Question 4

Which is the direction of a magnetic force acting on a current carrying wire placed in a magnetic field?

    A. Along the magentic field.
    B. Along the electric current.
    C. Perpenicular to the magnetic field.
    D. Opposite to the magnetic field.

An electron travels at 1.2×10^7 m s^{-1} through a magnetic field as shown in Figure 1.
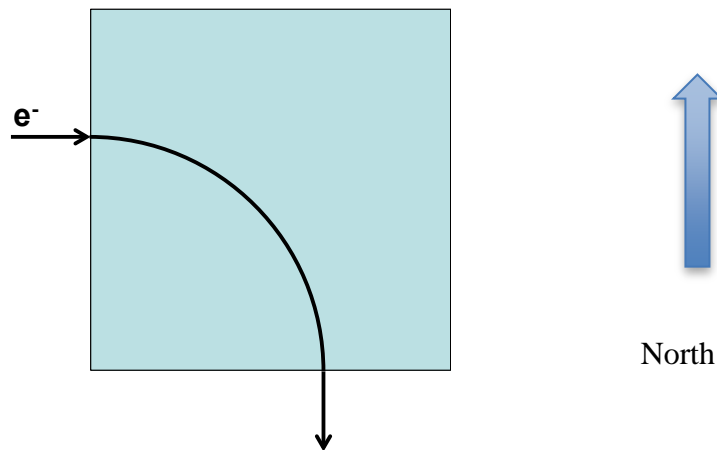The electron experiences a force of 1.9×10^{-13} N and moves in a curved path.

Figure 1

Question 5

Which of the following describes the direction of the magnetic field?

A. South to North.
B. West to East.
C. Into the page.
D. Out of the page.

Question 6

In an experiment the variable that is manipulated is called the

A. Dependent variable.
B. Measurement variable.
C. Independent variable.
D. Changeable variable.

Question 7
Which of the following is **NOT** true when writing an hypothesis?

A. It is testable.
B. It is an if/then statement.
C. It is a prediciton.
D. Is should restate the question.

Question 8
Consider an object sitting stationary on an incline plane with an adjustable slope. As the incline is made steeper, the normal force acting on the object:

A. Increases
B. Decreases
C. Stays the same
D. Changes in some way that is not specified above.

Question 9
A 1500 kg car travels at a constant speed of 22.0 m s^{-1} around a circular track of radius 85m. Which of the following is true concering the car?

A. The velocity of the car is also constant
B. Any instataneous velocity vector for this car will point to the centre of the circular track.
C. The acceleration vector is a tangent to the circle at all times
D. None of the above

Question 10
Newton's First Law of Motion is sometimes called the "Law of Inertia". What is 'inertia'?

A. Inertia is just another name for weight.
B. It's the name used to the force that keeps a planet in circular orbit around the sun.
C. It's the tendency of an object to stay in a constant state of rest or uniform motion.
D. Inertia is the force that keeps an object at rest if it is already at rest.

Question 11
According to the law of refraction, light passing from air into glass will cause the light to:

A. Bend away from the normal.
B. Bend towards the normal.
C. Completely reflect off the glass and back into the air.
D. Maintain its orginal course through the glass.

Question 12
When a police car with its siren on moves towards a listener, the sound of the siren seems relatively.

A. Low pitched
B. High Pitched
C. No change
D. Normal

Question 13
What are the implications of Heisenberg's 'uncertainty principle'?

A. That because we know from quantum physics that certainty in observation is impossible, all previous (traditional) scientfic findings must be considered uncertain
B. That obtaining precise and simultaneous measurements of both position and momentum of subatomic particles is impossible.
C. That modern physics has dispensed the Newtonian approach to science that, ironically, continued to be imitated by other scientific fields.
D. That traditional assumptions of scientific method are essentially obsolete.

Question 14
Which of Einstein's postulates completely contradicted classical physics?

A. The first, because classical physics dictates that velocity and other laws of physics are different in an intertial reference frame.
B. The first, because Einstein contended that laws of physics should not apply to electromagnetic radiation.
C. The second, because it held that the velocity of anything depended on the frame of reference in which it was measured.
D. The second, because it held that the velocity of anything was independent of the frame of reference in which it was measured.

Question 15
Standing waves in open pipe come about as a result of:

A. Reflection and superposition.
B. Reflection and diffraction.
C. Superposition and diffraction.
D. Reflection and refraction.

Questions 16 and 17 refer to the following information

A particular 1.2 m organ pipe can be modelled as open at one end only.
Sound travels at 340 m s^{-1} in the vicinity of the pipe.

Question 16
Which of the following would be closest to the value of the fundamental resonant frequency?

A. 71 Hz
B. 142 Hz
C. 283 Hz
D. 35 Hz

Question 17
If the pipe is now altered to be open at both ends, what would be the effect on the fundamental frequency?

A. No change in the frequency as the length remains constant.
B. Increase in frequency to 283 Hz.
C. Decrease in frequency to 71 Hz.
D. Increase in frequency to 142 Hz.

Questions 18 to 20 refer to the following information

Consider the transformer depicted in Figure 2. The primary coil is operating at 250 V AC RMS with 400 turns. The secondary coil carries 40 A RMS and has a power output of 400 W.
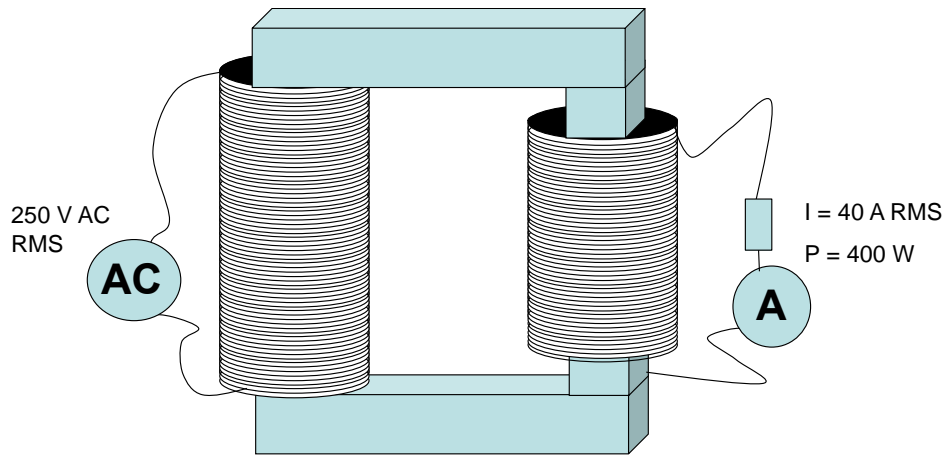

250 V AC
RMS

AC

I = 40 A RMS

P = 400 W

A

Figure 2

Question 18
Which of the following is closest to the V_{peak} in the primary coil?

A. 500 V
B. 177 V
C. 354 V
D. 707 V

Question 19
Which of the following best matches the turns ratio (primary : secondary)?

A. 1 : 25
B. 25 : 1
C. 16 : 400
D. 400 : 160

Question 20
Which of the following best approximates I_{RMS} in the primary coil?

A. 1.6 A
B. 1000 A
C. 40 A
D. 16 A

END OF SECTION A
TURN OVER

SECTION B

Instructions for Section B

Answer **all** questions in the spaces provided. Write using blue or black pen
Where an answer box is provided, write your full answer in the box.
If an answer box has a unit provided in it, give your answer in that unit.
In questions where more than one mark is available, appropriate working **must** be shown.
Unless indicated the diagrams in this book are **not** drawn to scale.
Tke the value of *g* to be 9.8 m s^{-2}

Question 1 (7 marks)
Chris the rocket scientist is analysing the behaviour of a satellite which is orbiting Mars.
Table 1 shows some relevant data about Mars and the satellite.

Data: G = 6.67 x 10^{-11} N m^2 kg^{-2}

Table 1 – Mars & Satellite Data

Mass of Mars (kg)	Mass of Satellite (kg)	Radius of Mars (m)	Radius of Mars orbit (m)	Period of satellite orbit (s)	Period of Mars revolution (s)	Period of Mars rotation (s)
6.37×10^{23}	1.40×10^3	3.43×10^6	2.28×10^{11}	8.45×10^3	5.94×10^7	8.85×10^4

    a. Determine the value of the gravitational field strength on the surface of Mars.

2 marks

_____

_____

_____

N kg^{-1}

    b. Determine the altitude of the satellite's orbit (measured from the surface of Mars).

3 marks

_____

_____

m

c. Determine the kinetic energy of the satellite whilst it is in orbit. 2 marks

_____

_____

J

Question 2 (7 marks)

A particle accelerator increases the speed of protons by accelerating them between a pair of metal plates, **A** and **B,** connected to a power supply as shown in Figure 1. (Mass of the proton $= 1.67 \times 10^{-26}$ kg)
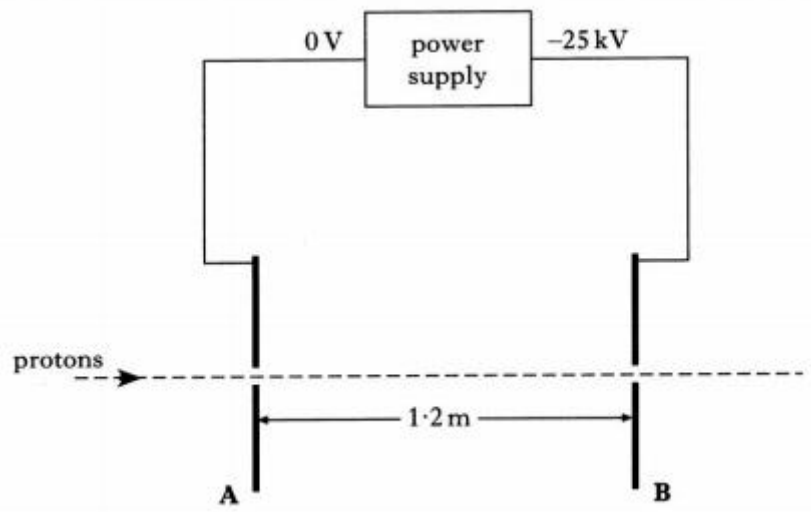

Figure 1

The potential difference between **A** and **B** is 25 kV

a. Show that the kinetic energy gained by the proton between plates **A** and **B** is 4.0×10^{-15} J. 2 marks

_____

_____

_____

J

b. The kinetic energy of a proton at plates **A** is 1.3×10^{-16} J. Calculate the velocity of the proton reaching plate **B.**   3 marks

_____

_____

_____

	m s^{-1}

c. The plates are seperated by a distance of 1.2 m. Calculate the force produced by the particle accelerator on a proton as it travels between plates **A** and **B.**

_____

_____

_____

	N

Question 3 (7 marks)

A U-shaped copper wire is fed through a piece of paper as shown in Figure 2 (plan view) and Figure 3 (side view). Current flows through the wire from A to B.
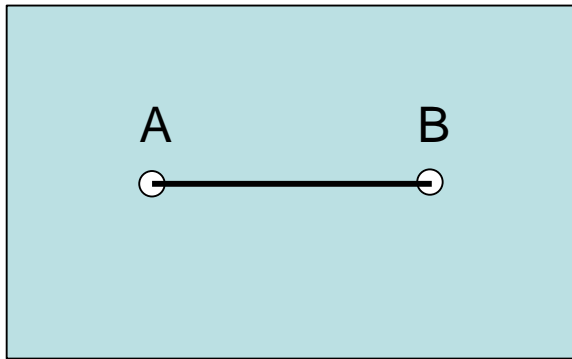
Plan View

A   B
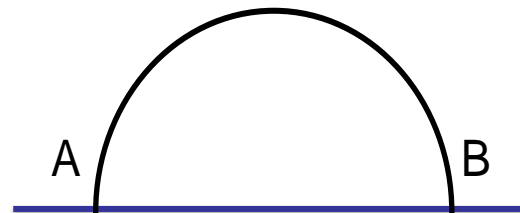
Figure 2

Side View

A   B

Figure 3

a. Show four field lines on Figure 1 to indicate the direction of the field in the plane of the piece of paper. 2 marks

A second piece of wire is now positioned above the loop, carrying a current of 0.2 A in the direction shown. The second piece of wire is subjected to a field of strength 0.3 T due to the loop and 9 cm can be assumed to be affected by the field.
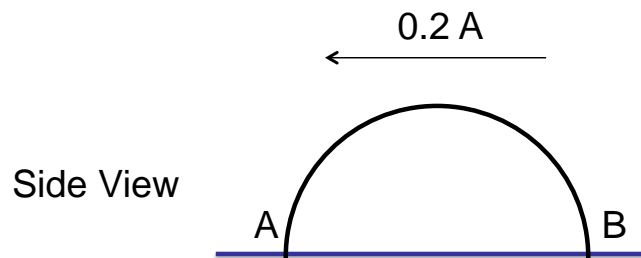
0.2 A

Side View

A   B

Figure 4

b. Determine the magnitude and direction of the magnetic force acting on the second piece of current carrying wire. 3 marks

_____

_____

_____

	N		Direction:

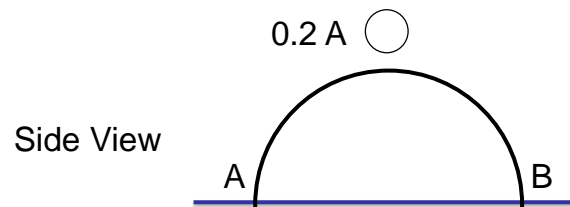The second piece of wire is now rotated 90° so that its current is directed into the page, as shown in Figure 5.

0.2 A

Side View

A   B

Figure 5

c. Determine the magnitude and direction of the magnetic force acting on the wire.
2 marks

_____

_____

_____

	N		Direction:

Question 4 (6 marks)

A basic motor is shown in Figure 6. It consists of a copper coil of 25 loops, with 0.04 m side lengths. In the position shown, side AB experiences a force of 1.3 N downwards. The magnetic field provided by the permanent magnets is 0.25 T.
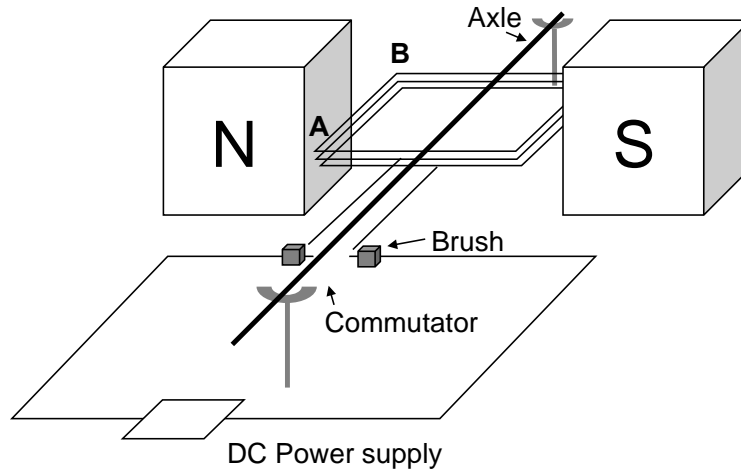

Figure 6

a. Determine the size and direction of the current through side AB.   2 + 1 = 3 marks

_____

_____

_____

A	Direction:	

The motor shown in Figure 6 is clearly incomplete and requires a commutator to function effectively.

b. Using Figure 6 as a template, sketch a basic commutator, clearly showing the orientation required for effective motor operation.   1 mark

c. Explain the role of a commutator in allowing a motor to function correctly. 2 marks

_____

_____

_____

Question 5 (5 marks)

James is experimenting with a solenoid circuit and a suspended permanent magnet, as shown in Figure 7. The switch in the solenoid circuit is initially open, so no current flows through the solenoid.
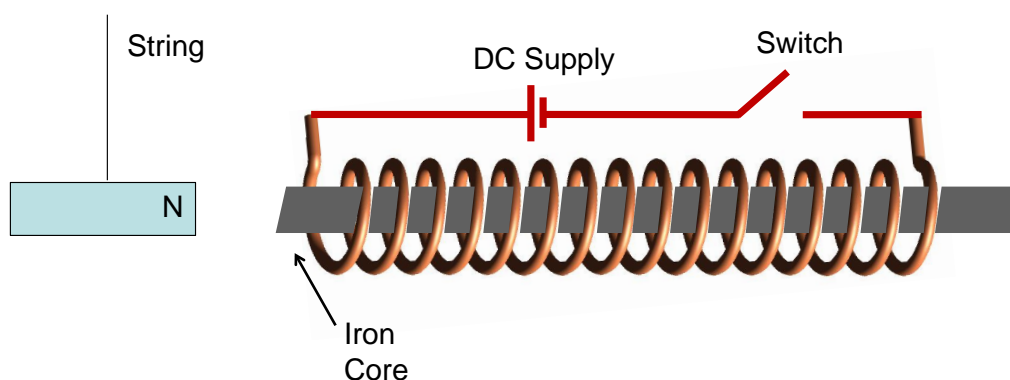
Figure 7

James now closes the switch.

a. Which of the following best describes the observations that James would make of the suspended magnet when the switch is closed?   2 marks

   A. The magnet would be repelled and would stay hanging so that the string is slightly away from vertical.
   B. The magnet would be attracted and would stay hanging so that the string is slightly away from vertical.
   C. The magnet would be initially attracted, then return so that the string is again hanging vertically.
   D. The magnet would be initially repelled, then return so that the string is again hanging vertically.
   E. The magnet would not move at all.

James now replaces the battery in the circuit with a small load resistor, as shown in Figure 8.
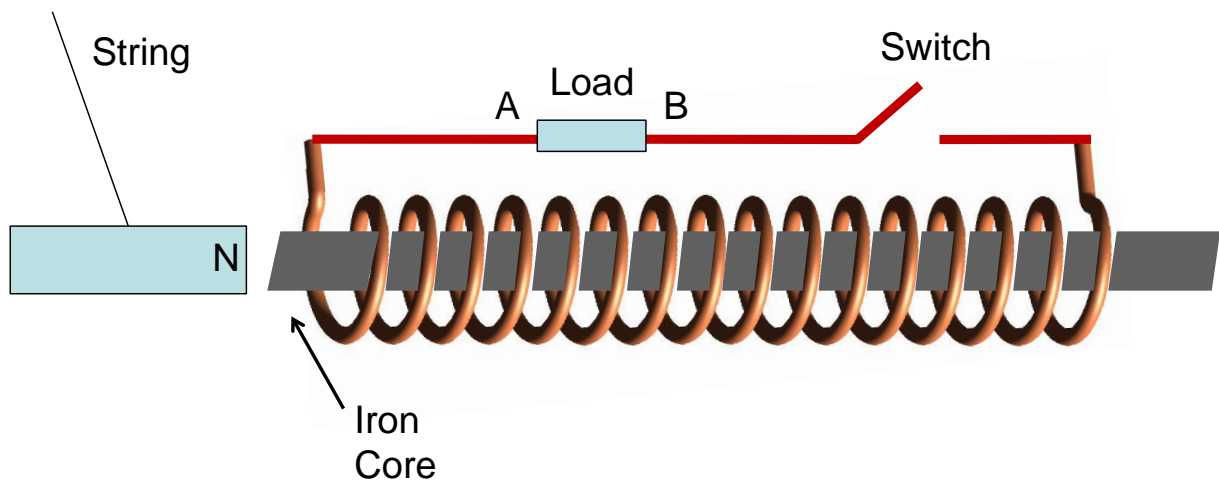

Figure 8

James moves the hanging magnet towards the solenoid quite rapidly with the switch closed.

b. Explain the likely effect of the move on the load resistor, referring specifically to Lenz's Law. 3 marks

_____

_____

_____

_____

Question 6 (12 marks)

An engineer is modelling a supply system for a remote factory, which received power from a small generator located some distance from the site. The simplified circuit diagram is shown in Figure 9. The total resistance of the transmission cables is 2 Ω.
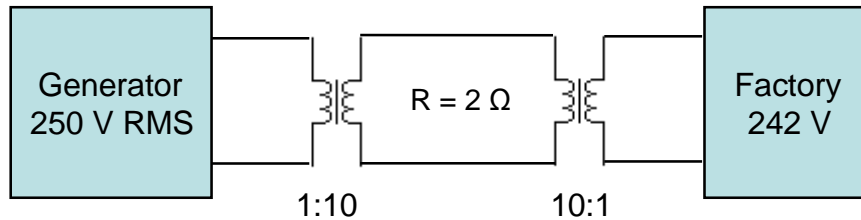

Figure 9

    a. Determine the voltage drop across the transmission lines, V_{drop}.   2 marks

_____

_____

_____

V

There are 1200 turns on the primary side of the step-up transformer.

    b. Determine the turns required on the secondary side of the step-up transformer. 1 mark

_____

_____

_____

turns

c. Determine the power being generated at the generator site, prior to the step-up transformer. 2 marks

_____

_____

_____

W

d. Determine the peak-to-peak current that would be observed at the generator site.
2 marks

_____

_____

_____

A

e. Determine the percentage power efficiency of the system. 2 marks

_____

_____

_____

%

f. Explain how and why you would alter the turns ratio to improve the power efficiency of the system. 3 marks

_____

_____

_____

_____

Question 7 (8 marks)
Consider a simplified generator, as shown in Figure 9. The central coil is square, with a side edge of 5 cm, and consists of 10 loops. The magnetic field provided by the permanent magnets is 0.4 T.
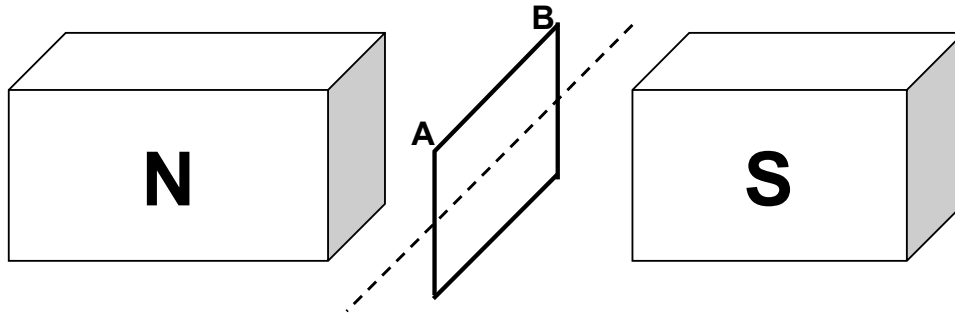

Figure 10

    a. Determine the flux through the coil when it is in a vertical position as shown in Figure-9.   2 marks

_____

_____

_____

Wb

The coil is now rotated at 5 Hz and the emf and flux are analysed. Figure 11 shows a graph of flux over time.
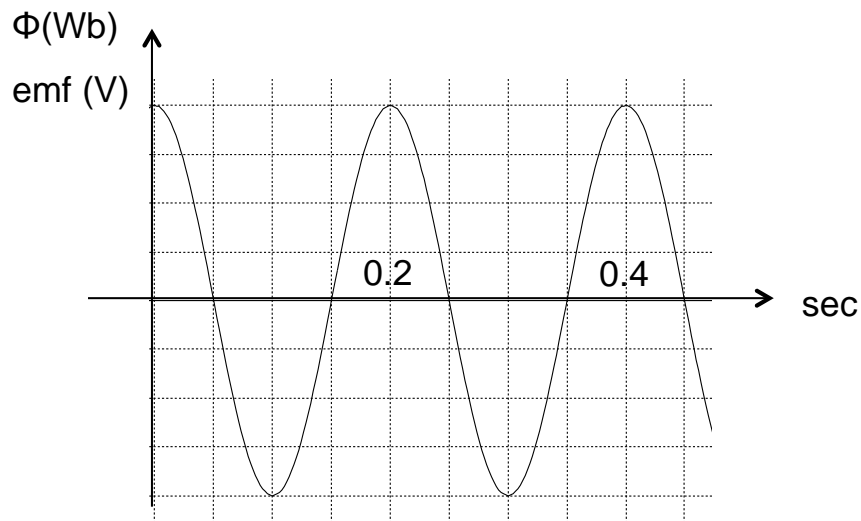

Figure 11

    b. Using the axes provided in Figure 11, sketch a graph of emf in the coil over the same time period. Do not attempt to label the scale of the vertical axis. Label this plot as "Question 7b".   2 marks

The rate of rotation of the coil is now halved, the magnetic field doubled and the coil is replaced by one with 5 loops.

    c. Using the axes provided in Figure 11, sketch a graph of emf over the same time period for this new, slower rotation. Do not attempt to label the scale of the vertical axis. Label this plot as "Question 7c".   2 marks

d. Briefly explain the difference between the voltage outputs that would be observed over an external load if **slip rings** or a **commutator** were used in a generator such as that shown in Figure 10.   2 marks

_____

_____

_____

_____

Question 8 (4 marks)

A stunt man is re-enacting the famous scene where a worker is lifted off the ground by a falling crate of bricks. Figure 12 shows a simplified version of the situation, with the mass of the man (80 kg) and the crate (110 kg) as labelled. You may ignore air resistance and the mass of the connecting cable.
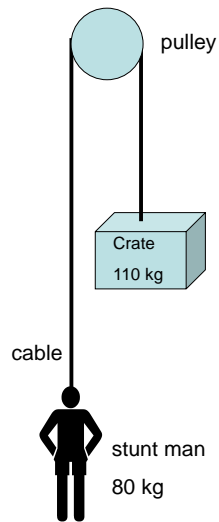

Figure 12

    a. Determine the magnitude of the acceleration on the stunt man.   2 marks

_____

_____

_____

m s^{-2}

b. Determine the size of the tension in the cable that attaches the stuntman to the crate of bricks. 2 marks

_____

_____

_____

	N

Question 9 (5 marks)

A rider is attempting a dramatic jump, launching from a ramp and attempting to land on top of a nearby building, as shown in Figure 15. The rider leaves the ramp at 21 m s^{-1} and at an angle of 30° to the horizontal. You may ignore air resistance in your calculations.

Figure 15

    a. Determine the maximum height (above the ground) reached by the rider. 2 marks

_____

_____

_____

	m

b. Determine whether the rider will land on the roof or hit the vertical wall of the building. Use a calculation to support your answer. 3 marks

_____

_____

_____

_____

Question 10 (6 marks)
Einstein developed two postulates of special relativity

a. State his two postulates. 2 marks

i.

_____

_____

ii.

_____

_____

Observer Bill, who is on a train moving with speed $0.6c$, waves to Julie who is on a platform at four second intervals as measured in Bill's frame of reference.
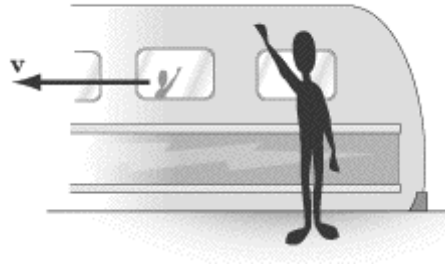

Figure 16

b. What is the Lorentz factor?

2 marks

_____

_____

_____

c. How long will Julie measure between waves?   2 marks

_____

_____

_____

| m s^{-1} |

Question 11 (6 marks)

As a rocket is moving past Earth, an Earthling measures its length to be 325 m, while the captain on board radios that her rocket's length is 1150 m.

    a. How fast is the rocket moving relative to Earth?   2 marks

_____

_____

_____

m s^{-1}

    b. What is the total energy of a 75.0 kg crewman as measured by

        i.   an observer at rest in the rocket   2 marks

_____

_____

_____

J

        ii.   an observer at rest on Earth?   2 marks

_____

_____

_____

J

Question 12 (5 marks)

Marcus and David are debating the physics of two collisions. Figure 17 depicts a head on collision between two cars, each of mass 1100 kg, travelling at 20 m s^{-1} in opposite directions. Figure 18 depicts a single car collision, where a vehicle of mass 1100 kg travels at 40 m s^{-1} into a solid wall. In both collisions, Car A comes to rest in 0.2 sec.

David claims that Car A will experience the same force and damage in both collisions as the relative velocity of Car A to B is also 40 m s^{-1}. Marcus claims that Car A will experience a greater force and damage in Collision 2 as it is travelling faster.
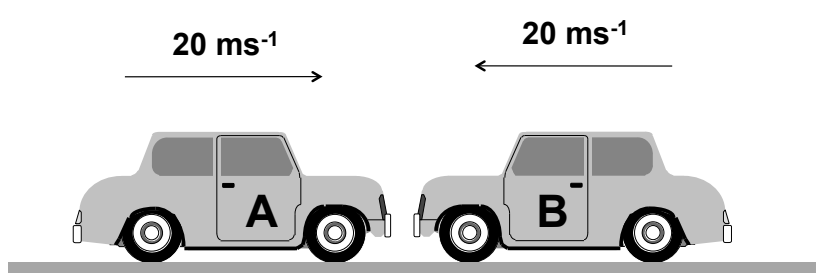
20 ms^{-1} 20 ms^{-1} 40 ms^{-1}

A   B   A

Figure 17: Collision 1   **Figure 18: Collision 2**
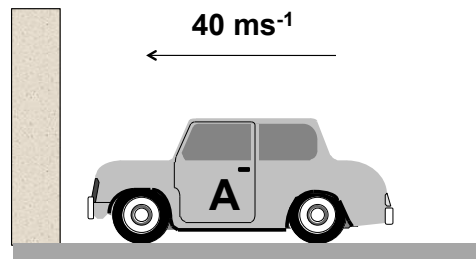
    a. Which collision would cause Car A to suffer most damage? Explain your answer with the aid of a calculation.   3 marks

b. State whether the Collision 2 is isolated and justify your answer. 2 marks

Question 13 (5 marks)

Jim the cat sits in an open cart, which is travelling at 10 m s^{-1}. Jim's mass is 9 kg. Consider the moment in time where Jim is at the crest of a circular hill with radius of 40 m, as shown in Figure 19.
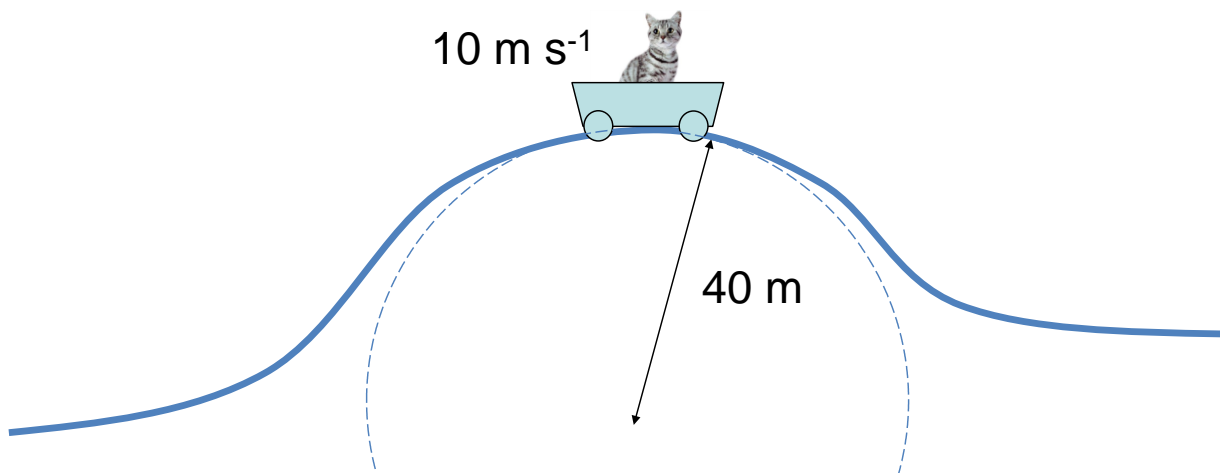

Figure 19

a. Determine Jim's apparent weight at the top of the crest. 3 marks

_____

_____

_____

	N

b. Explain whether Jim would feel heavier or lighter as he moves over the crest of the hill. 2 marks

_____

_____

_____

Question 14 (9 marks)
In an experiment to verify Snell's Law, a student recorded the data shown in Table 2. The students have access to a Hodson Light Box and a glass block. The angle of incidence was measured as the light enters the block and the angle of refraction within the block from the initial incident ray

i^0	30	40	50	55	60	65	70
r^0	19	26	30	33	36	38	40

a. Draw a labelled diagram of the apparatus used. On your diagram indicate an angle i and its corresponding angle r 2 marks

b. Which variable in this experiement is the dependent and which is the independent? 2 marks

i. Dependent

_____

ii. Independent

_____

c. Using the recorded data draw a suitable graph and explain how your graph verifies Snell's law. 3 marks

sin r
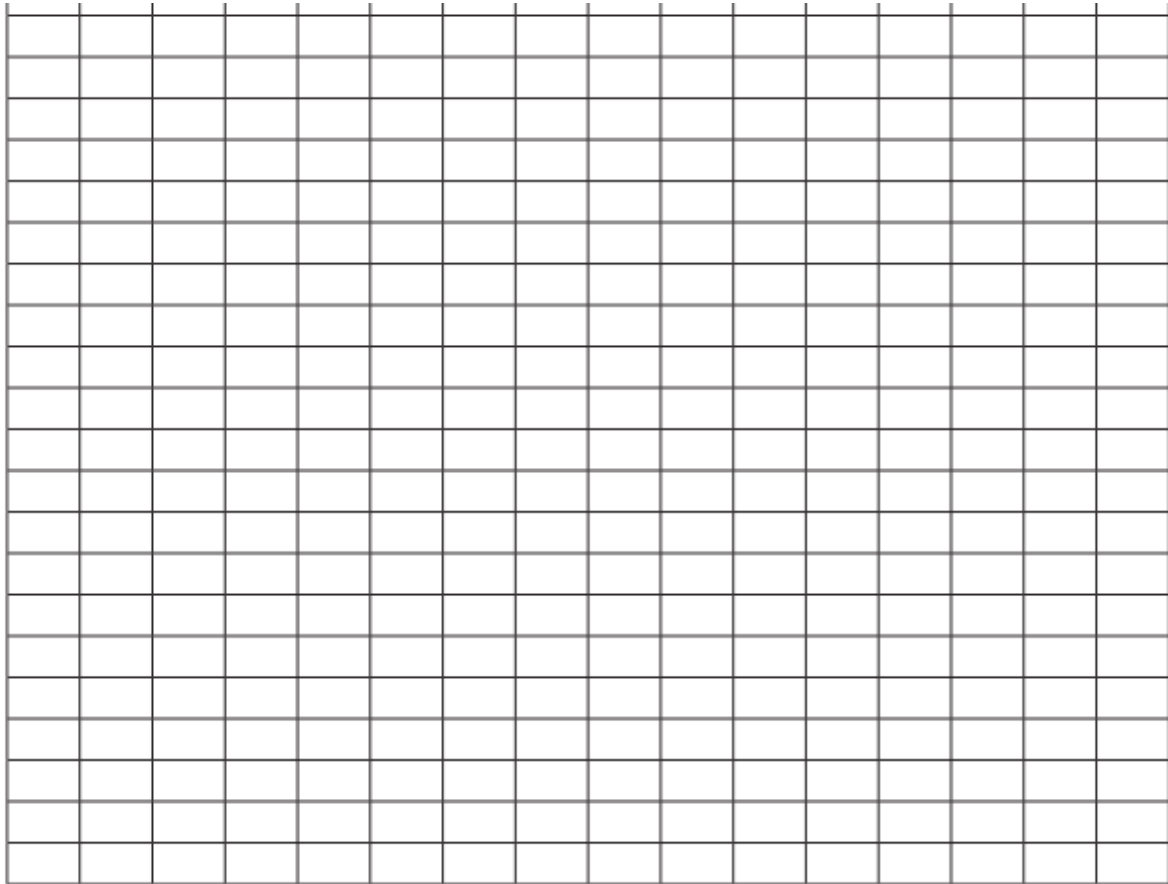
sin i

_____

_____

d. By referring to the data as represented in your graph, explain what kind of error was most prevalent in recording of the data – a random or systematic error? 2 marks

_____

_____

_____

Question 15 (6 marks)

A green laser of wavelength 510 nm is directed through a pair of narrow slits to generate a distinct pattern on a screen as depicted in Figure 1.

Point C is at the centre of the pattern and Point A is a bright spot in the pattern.
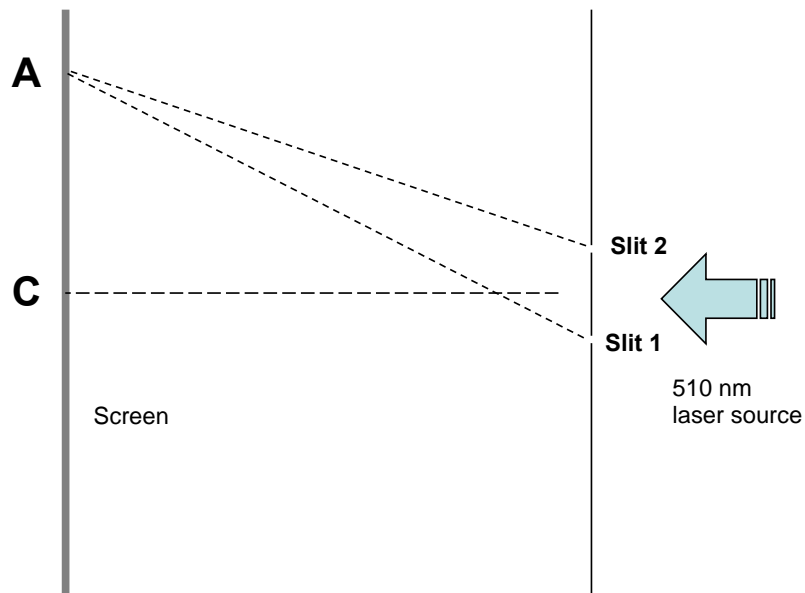

Figure 1

Starting from Point C and moving directly to Point A, two dark bands are crossed.

    a. Determine the value of $S_1A - S_2A$.   2 marks

_____

_____

_____

m

b. **.**Explain how this experiment supports the wave model and not the particle model for light. 2 marks

_____

_____

_____

_____

Slit 1 and Slit 2 are now moved closer together. Point A still represents the third bright band (including the centre band).

c. Which **one or more** of the following is true? 2 marks

A. The path difference $S_1A - S_2A$ increases.
B. The path difference $S_1A - S_2A$ decreases.
C. The path difference $S_1A - S_2A$ remains constant.
D. The subsequent interference pattern would become wider.
E. The subsequent interference pattern would become narrower.
F. The subsequent interference pattern would remain constant.

Question 16 (4 marks)

Figure 2 shows a simplified version of the energy level diagram of an atom.
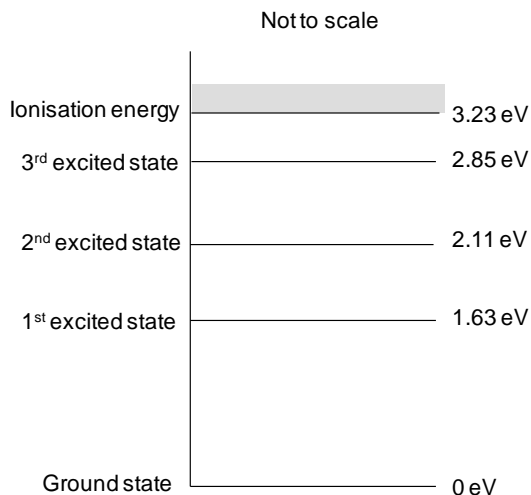An atom begins in its ground state.

Not to scale

Ionisation energy	3.23 eV
3rd excited state	2.85 eV
2nd excited state	2.11 eV
1st excited state	1.63 eV
Ground state	0 eV

Figure 2

a. Determine the wavelength of a photon absorbed during the transition from ground to second excited state. 2 marks

_____

_____

_____

nm

b. Using your understanding of discrete energy levels and the nature and behaviour of electrons within atoms, explain why the atom will not emit a photon of energy 2 eV as it transitions back to the ground state. 2 marks

Question 17 (6 marks)

When directed through a special sample of aluminium foil, both x-rays and electrons can exhibit similar diffraction patterns, as shown in Figure 3.

Figure 3

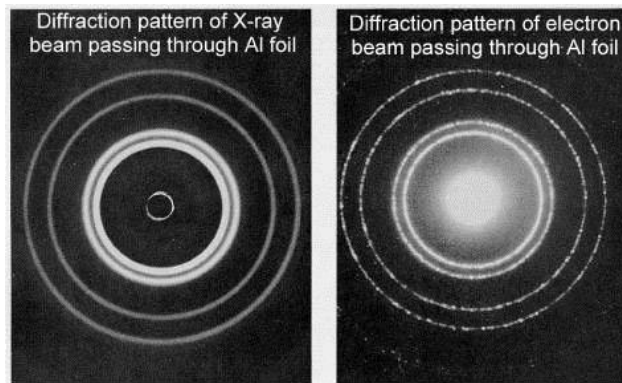   **a.** Explain what this pattern implies about the nature of electrons used in this experiment. Also compare the momentum of the x-rays and electrons.   1 mark

_____

_____

_____

_____

The X-rays used in the diffraction experiment discussed above have energy of 8×10^{-17} J

   b. Determine the wavelength of the X-rays.   2 marks

_____

_____

_____

nm

c. Determine the speed of the electrons used. 2 marks

_____

_____

_____

m s^{-1}

d. Which of the following would best describe the effect on the electron pattern of increasing the accelerating voltage? 1 mark

A. Radius of the pattern would increase.
B. Radius of the pattern would decrease.
C. Radius of the pattern would remain constant.
D. The pattern would become square.

Question 18 (8 marks)

Figure 4 shows a circuit diagram for an experiment into the photoelectric effect.

For a particular light source, a stopping voltage of 1.9 V is just sufficient to ensure no current is recorded on the ammeter. The work function for the metal plate is known to be 2.5×10^{-19} J
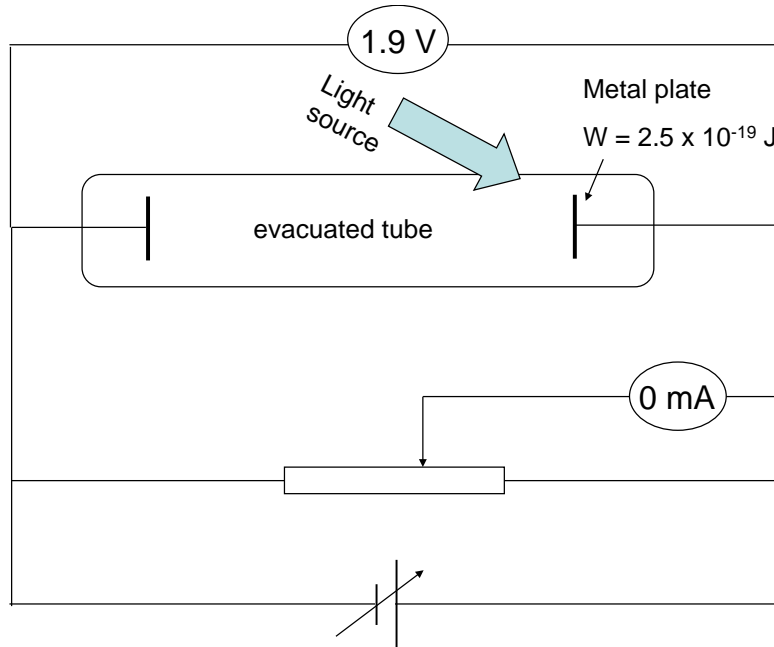
Figure 4

    a. Determine the wavelength of the light source.   2 marks

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_____

nm

    b. Determine the threshold frequency for the experiment.   2 marks

_____

_____

_____

Hz

SECTION B – Question 18 - continued
TURN OVER

c. Explain why the existence of a threshold frequency supports the particle and not the wave model for light. 2 marks

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Figure 5 shows a plot of photocurrent verses applied stopping voltage for the original metal plate included in the photocell.
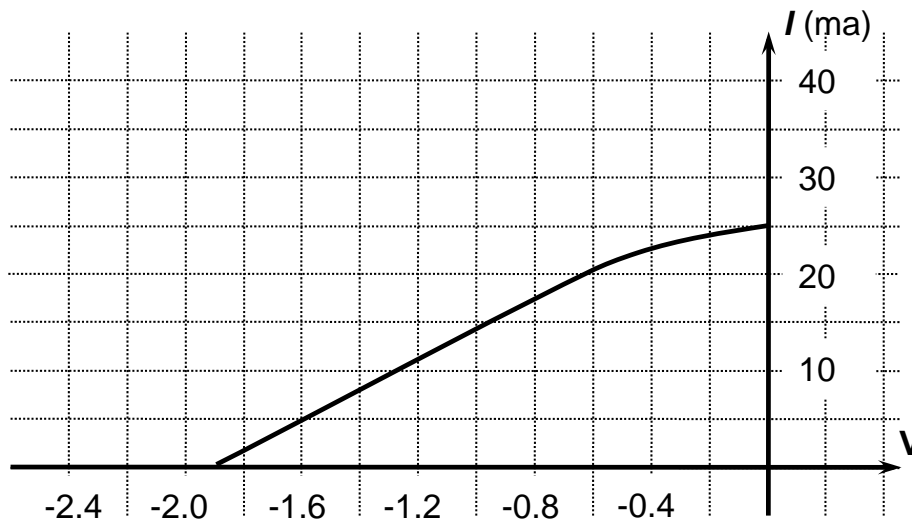

Figure 5

Jamie now replaces the plate with a metal of larger work function.

d. Using Figure 5 as a template, redraw the plot of photocurrent verses stopping voltage for the new metal. 2 marks

END OF QUESTION AND ANSWER BOOK

Data Sheet

1	Velocity, acceleration	$v = \dfrac{\Delta x}{\Delta t}$ $a = \dfrac{\Delta v}{\Delta t}$
2	Equations for constant acceleration	$v = u + at$ $x = ut + \dfrac{1}{2}at^2$ $v^2 = u^2 + 2as$ $x = \dfrac{1}{2}(u + v)t$
3	Newton's second law	$F = ma$
4	Circular motion	$a = \dfrac{v^2}{r} = \dfrac{4\pi^2 r}{T^2}$
5	Hooke's law	$F = -kx$
6	Elastic potential energy	$\dfrac{1}{2}kx^2$
7	Gravitational potential energy near the surface of the earth	mgh
8	Kinetic energy	$\dfrac{1}{2}mv^2$
9	Lorentz factor	$\gamma = \dfrac{1}{\sqrt{1 - \dfrac{v^2}{c^2}}}$
10	Time dilation	$t = t_0 \gamma$
11	Length contraction	$L = L_0 / \gamma$
12	Relativistic mass	$m = m_0 \gamma$
13	Newton's law of universal gravitation	$F = \dfrac{GM_1 M_2}{r^2}$
14	Gravitational field	$g = \dfrac{GM}{r^2}$
15	Transformer action	$\dfrac{V_1}{V_2} = \dfrac{N_1}{N_2}$
16	AC voltage and current	$V_{\text{RMS}} = \dfrac{1}{\sqrt{2}}V_{\text{peak}}$ $\qquad$ $I_{\text{RMS}} = \dfrac{1}{\sqrt{2}}I_{\text{peak}}$
17	Voltage, power	$V = IR$, $P = VI$
18	magnetic force	$F = IlB$

19	electromagnetic induction	emf: $\varepsilon = -N\dfrac{\Delta\phi}{\Delta t}$ flux: $\phi = BA$
20	transmission losses	$V_{\text{drop}} = I_{\text{line}}R_{\text{line}}$ $P_{\text{loss}} = I_{\text{line}}^2 R_{\text{line}}$
21	Snell's Law	$n_1 \sin i = n_2 \sin r$
22	photoelectric effect	$E_{k\max} = hf - W$
23	photon energy	$E = hf$
24	photon momentum	$p = \dfrac{h}{\lambda}$
25	de Broglie wavelength	$\lambda = \dfrac{h}{p}$
26	Planck's constant	$h = 6.63\times10^{-34}$ J s $h = 4.14\times10^{-15}$ eV s
27	Universal gravitational constant	$G = 6.67 \times 10^{-11}$ N m^2 kg^{-2}
28	Mass of Earth	$M_E = 5.98 \times 10^{24}$ kg
29	Radius of Earth	$R_E = 6.37 \times 10^6$ m
30	Mass of the electron	$m_e = 9.1 \times 10^{-31}$ kg
31	Charge on the electron	$q = -1.6 \times 10^{-19}$ C
32	Speed of light	$c = 3.0 \times 10^8$ m s^{-1}
33	energy transformations for electrons in an electron gun (<100 keV)	$\frac{1}{2}mv^2 = eV$
34	radius of electron beam	$r = \dfrac{p}{qB}$
35	force applied to an electron beam	$F = qvB$
36	electric field between charged plates	$E = \dfrac{V}{d}$

Prefix/Units

p = pico = 10^{-12}

n = nano = 10^{-9}

μ = micro = 10^{-6}

m = milli = 10^{-3}

k = kilo = 10^{3}

M = mega = 10^{6}

G = giga = 10^{9}

t = tonne = 10^{3} kg

SECTION A MULTIPLE CHOICE ANSWER SHEET

Answers – Circle ONE of A-D for each of the 20 multiple choice questions.

Question	Answer			
1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D