SYDNEY GRAMMAR SCHOOL

2022
ANNUAL EXAMINATION

PHYSICS
Form V

STRUCTURE OF PAPER

Section I: Multiple Choice (14 marks)

Answer all questions on the Multiple-Choice Answer Sheet.

Section II: Extended Response (76 marks)

Answer all parts of the questions in the spaces provided in the Examination Paper.

Board approved calculators may be used

EXAMINATION

Date: Friday 2nd September 8.40am
Duration: 2 hours
Marks: 90

CHECKLIST

In the stapled bundle each boy should have the following:

- Examination sections
- 1 sheet extra writing paper
- Data and Formula Sheets
- Multiple-Choice Answer Sheet

EXAM INSTRUCTIONS

Remove the centre staple and hand in all parts of the examination in a neat bundle.

WRITE YOUR **CANDIDATE NUMBER** IN THE SPACE PROVIDED AT THE TOP OF EACH SEPARATE SECTION.

There is a Data/Formula sheet included at the end of the paper.

Responses requiring more writing space should be clearly be marked **CONTINUED**. Additional extra writing space is provided at the end of the exam. When the response is continued on extra writing paper it should clearly indicate the question number.

Authors: PCK, ILM, DGB, SRW, AAH. Master in charge: ILM

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SECTION I: MULTIPLE CHOICE

Attempt ALL Questions
Use the Multiple-Choice Answer Sheet.

1 A ball is thrown vertically upwards. As it passes its highest point, which of the following quantities will change sign?

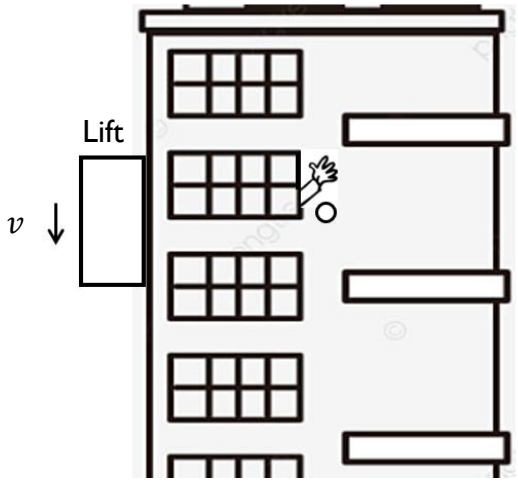
(A) Displacement

(B) Velocity

(C) Acceleration

(D) Force

2 A lift is moving down the side of a building at constant speed v. As it passes a window, a ball is dropped from rest.



Just after the ball is released, the velocity of the lift relative to the ball will be

(A) Downwards and decreasing in magnitude.

(B) Downwards and increasing in magnitude.

(C) Upwards and decreasing in magnitude.

(D) Upwards and increasing in magnitude.

3 A train accelerates uniformly from rest at a rate of 0.28 m s^{-2} over a distance of 400 m. What time did it take to cover that distance?

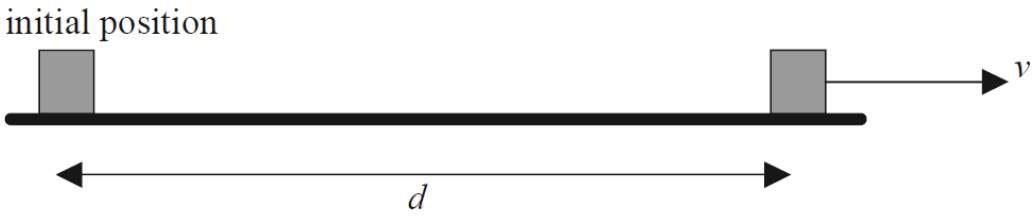
(A) 38 s

(B) 53 s

(C) 56 s

(D) 112 s

4 A box is accelerated from rest at a constant rate. When it is a distance d from its initial position it is moving with a velocity v.



When it was a distance $\frac{d}{2}$ from its initial position its velocity was

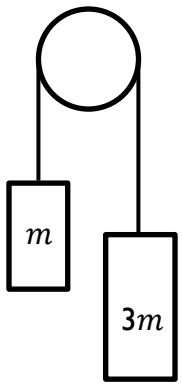
(A) $\frac{v}{4}$

(B) $\frac{v}{2\sqrt{2}}$

(C) $\frac{v}{2}$

(D) $\frac{v}{\sqrt{2}}$

5 The diagram shows two masses joined by a lightweight string over a pulley.



What is the magnitude of the acceleration of the system?

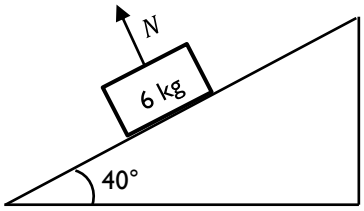
(A) 0.5 m s^{-2}

(B) 4.9 m s^{-2}

(C) 6.5 m s^{-2}

(D) 9.8 m s^{-2}

6 The diagram shows a stationary 6 kg block on a ramp.



What is the magnitude of the normal force on the block?

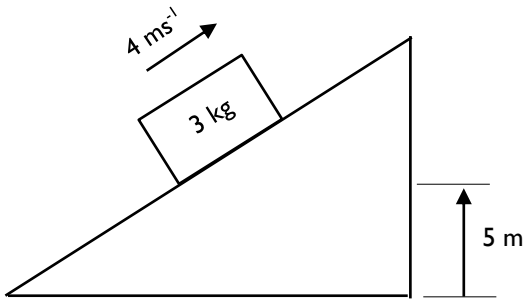
(A) 4.6 N

(B) 37.8 N

(C) 45.0 N

(D) 58.8 N

7 A block is on a frictionless slope, initially 5 m vertically above the ground. It is given an initial velocity of 4 m s^{-1} and slides up the slope before eventually stopping and returning down the slope until it reaches the bottom.



What is the velocity of the block when it reaches the bottom?

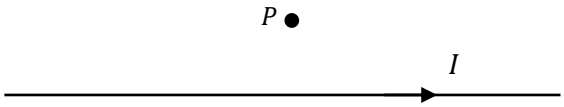
(A) 10.7 m s^{-1}

(B) 12.1 m s^{-1}

(C) 24 m s^{-1}

(D) 114 m s^{-1}

8 A wire curries a current as shown.



If a compass was placed at point P, the compass needle would point

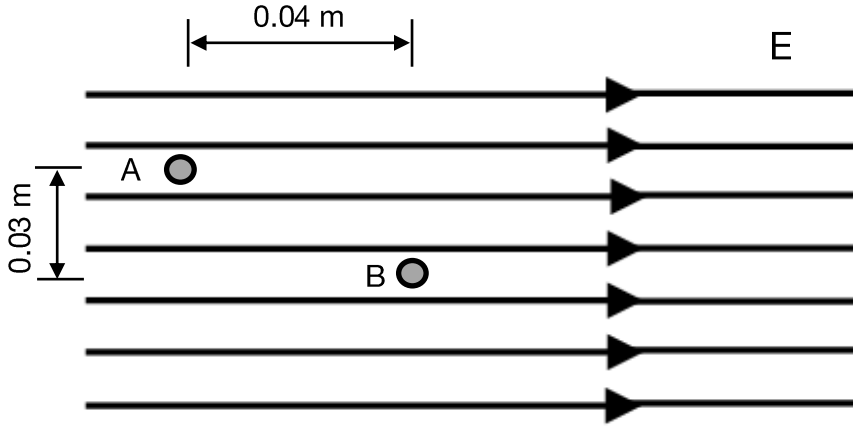
(A) to the left.

(B) to the right.

(C) into the page.

(D) out of the page.

9 A charge of 7.0×10^{-6} C is moved from position A to position B within a uniform electric field of strength 2000 N C^{-1}.



What will be the change in energy of the charge?

(A) 2.8×10^{-4} J

(B) 4.2×10^{-4} J

(C) 5.6×10^{-4} J

(D) 7.0×10^{-4} J

10 A radio wave of frequency 300 MHz would have a wavelength of

(A) 0.1 m

(B) 1.0 m

(C) 10 m

(D) 1.0×10^{6} m

11 A light ray that has a wavelength of 600 nm in air travels from the air into glass with refractive index of 1.5.

Determine the frequency of the light ray in the glass.

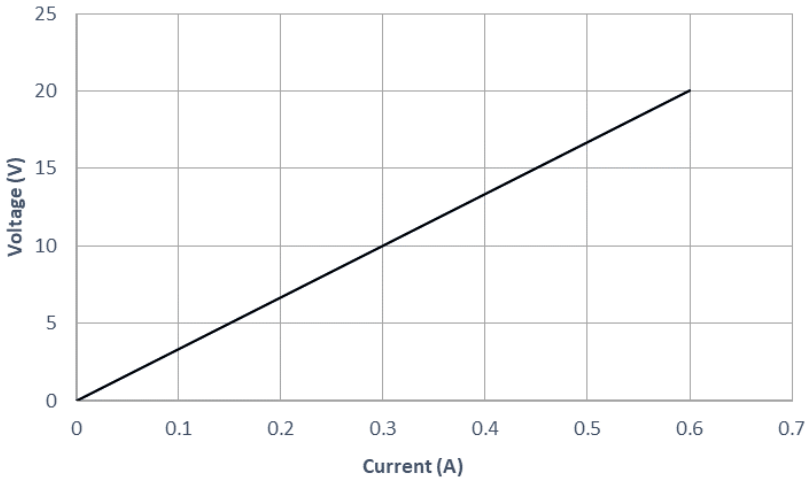
(A) 3.3×10^{11} Hz

(B) 5.0×10^{11} Hz

(C) 3.3×10^{14} Hz

(D) 5.0×10^{14} Hz

12 The graph below shows the voltage-current characteristics of a resistor.



Calculate the resistance of the resistor.

(A) 0.03 Ω

(B) 12 Ω

(C) 20 Ω

(D) 33 Ω

13 When X identical resistors are wired in series, their total resistance is 64 times bigger than when they are wired in parallel. How many resistors are there?

(A) 4

(B) 8

(C) 16

(D) 64

14 In a particle accelerator, bunches of high-speed protons travel around a ring, forming a current of 0.58 amps. If there are 3.12×10^{7} bunches passing per second, how many protons are in each bunch?

(A) 1.2×10^{11}

(B) 1.8×10^{11}

(C) 3.6×10^{18}

(D) 3.4×10^{26}

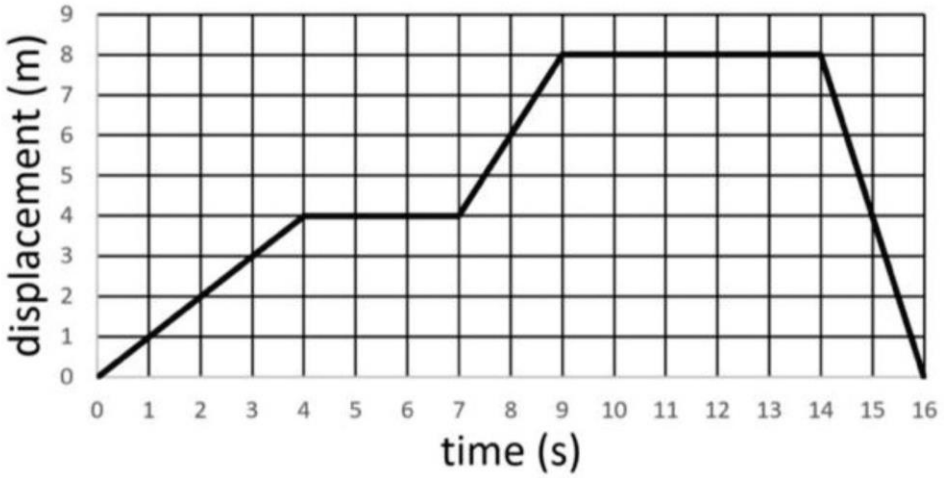
SECTION II: Part A (19 Marks)

Answer the questions in the spaces provided.
Show all relevant working in questions involving calculations.

CANDIDATE NUMBER

Question 15 (3 marks) **Marks**

The graph below shows the displacement of a remote-controlled car as it moves along a straight line.



(a) What is the total distance traveled by the car?

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..... **1**

(b) What is the maximum speed of the car?

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..... **1**

(c) What is the average velocity of the car between 0 and 14 s?

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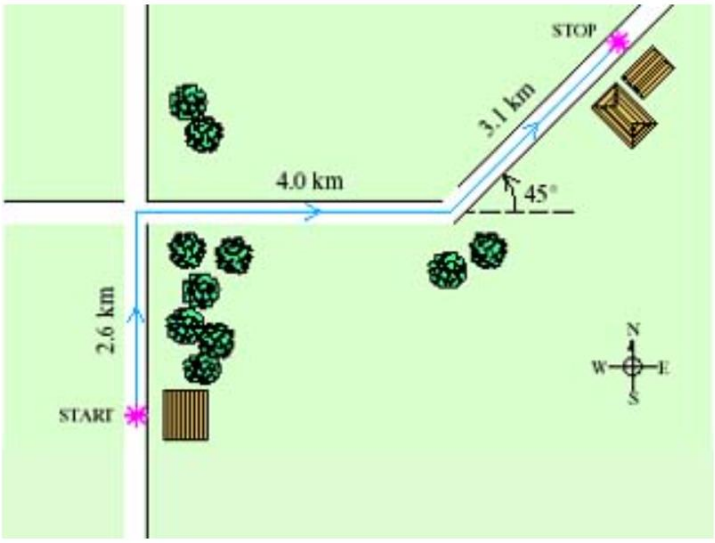
..... **1**

Question 16 (4 marks) **Marks**

A car drives from one house to another along the path shown below.



(a) If the trip takes 20 minutes, calculate the average speed of the car.

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(b) Calculate the displacement of the car from its starting point (magnitude and direction).

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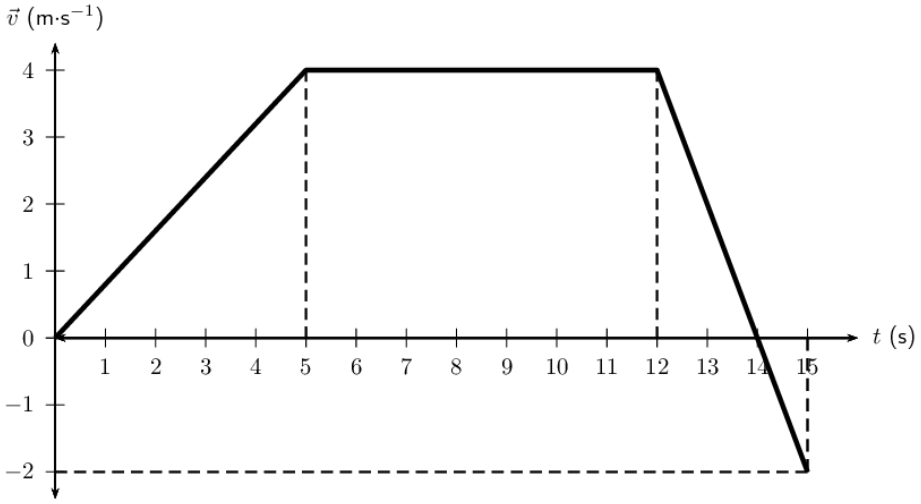
Question 17 (4 marks) **Marks**

A cyclist is moving along a straight road, initially heading west. The graph of his velocity as a function of time is shown.



(a) Identify a time at which the bike was stationary.

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(b) Calculate the magnitude of the maximum acceleration.

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..... **1**

(c) Calculate the displacement after 15 s.

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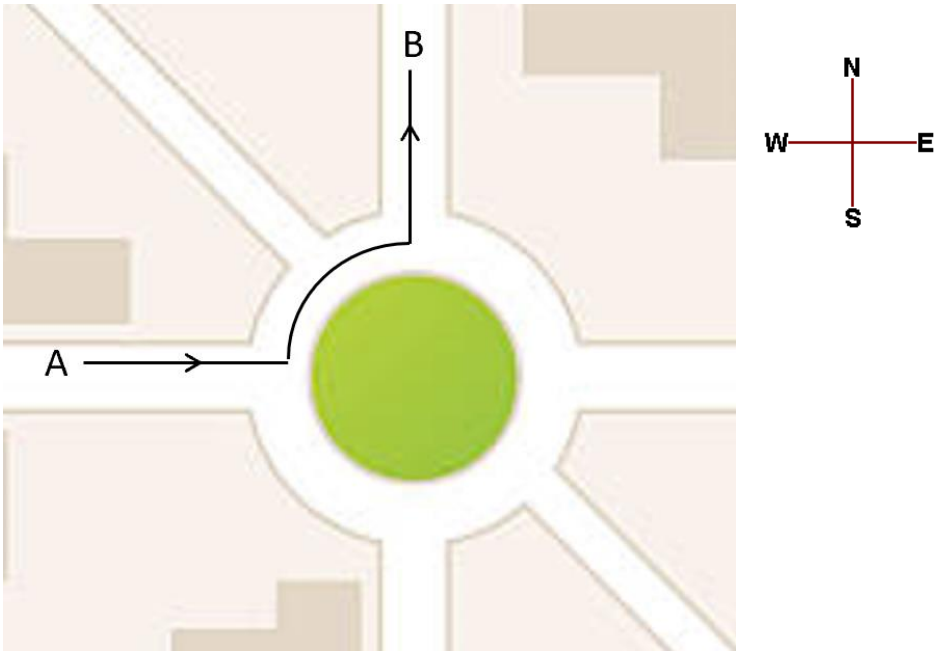
Question 18 (3 marks) **Marks**

A car uses a roundabout to make a left turn, following the path shown below. The circular section of the car's path has a radius of 16 m and the car maintains a constant speed from A to B.



(a) If the car takes 4.6 s to complete the circular section of the road, calculate its speed.

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(b) Calculate the change in velocity from A to B (magnitude and direction).

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Question 19 (5 marks) **Marks**

A plane accelerates from rest down a runway that is 2000 m long. It can accelerate at 3 m s^{-2} and decelerate at 2 m s^{-2}.

There is a point of no return when the plane cannot stop before the end of the runway if it fails to take off.

(a) On the axes below, sketch a velocity-time graph for the situation where the plane fails to take off but uses the entire length of the runway (no numerical values required).

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(b) Calculate the maximum speed reached by the plane in that situation.

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Section II extra writing space

If you use this space, clearly indicate which question you are answering.

Do NOT write in this area.

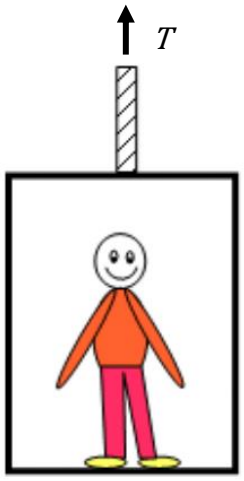
SECTION II: Part B (15 Marks)

Answer the questions in the spaces provided.
Show all relevant working in questions involving calculations.

CANDIDATE NUMBER							

Question 20 (3 marks) **Marks**

A 70 kg man is standing in a lift of mass 800 kg, as shown. The lift is accelerating upwards at 1.5 m s^{-2}.



(a) Determine the magnitude of the normal force of the lift on the man.

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(b) Determine the magnitude of the tension T in the lift rope.

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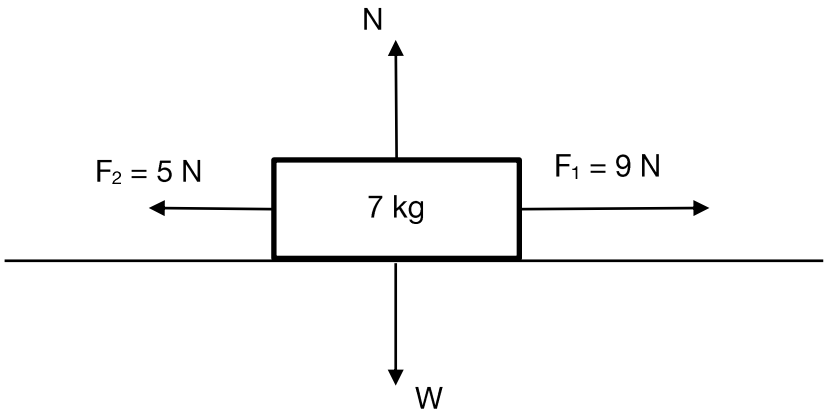
Question 21 (5 marks) **Marks**

A 7 kg object is pulled by an applied force $F_1 = 9$ N and moves to the right. There is a friction force $F_2 = 5$ N acting against its direction of motion.



(a) Determine the magnitude of the normal force on the block.

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(b) Determine the acceleration of the block.

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(c) Determine the coefficient of kinetic friction between the block and the surface.

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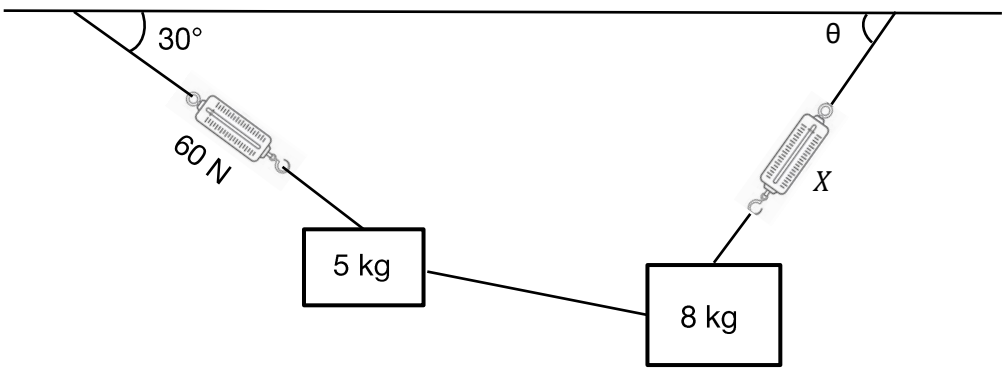
Question 22 (4 marks) **Marks**

Two masses are suspended at rest from a ceiling by two spring balances, one of which has unknown tension X. The masses are attached together as pictured below.



(a) Determine the horizontal component of the 60 N force.

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(b) Determine the angle θ.

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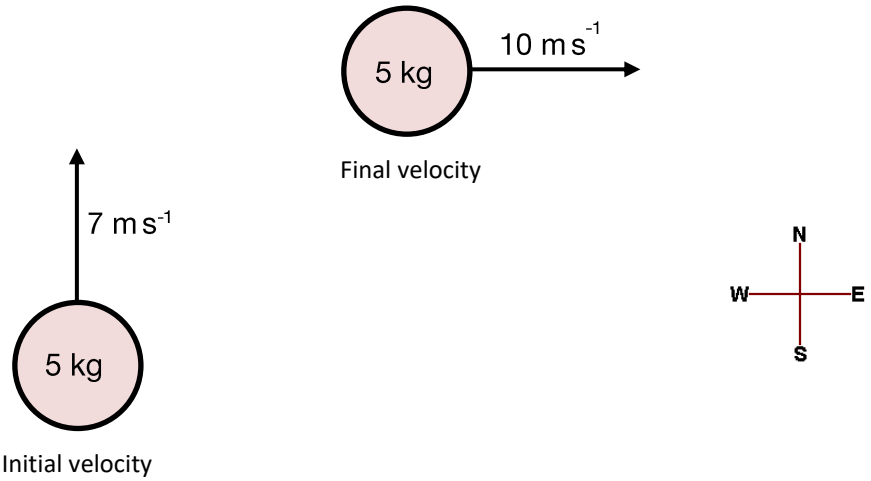
Question 23 (3 marks) **Marks**

A 5 kg object is travelling initially north at 7 $m\,s^{-1}$ when a constant force is applied to it for 4 seconds.

After 4 seconds the object is travelling at 10 $m\,s^{-1}$ east.



Calculate the magnitude and direction of the force that is required to change the object's motion as described.

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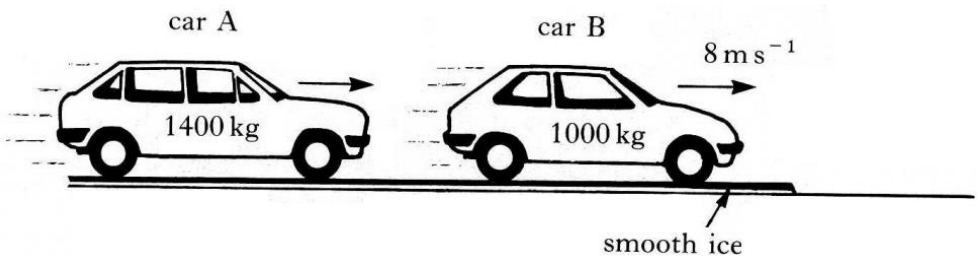
SECTION II: Part C (15 Marks)

Answer the questions in the spaces provided.
Show all relevant working in questions involving calculations.

CANDIDATE NUMBER							

Question 24 (5 marks) **Marks**

Two cars travelling in the same direction but at different speeds, skid on a patch of smooth ice, as shown below.



Car A, of mass 1400 kg, skids straight into the back of Car B, of mass 1000 kg. Immediately before the impact, Car B is moving with a speed of 8 m s^{-1}. The two cars become entangled after the impact and continue to move in the same straight line.

Immediately after the impact, the speed of the entangled cars is 15 m s^{-1}.

(a) Determine the momentum of Car B just before the collision.

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(b) Determine the speed of Car A just before the collision.

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(c) After the collision, the cars leave the patch of ice and continue skidding along the rough road. They come to rest in a distance of 20 m after leaving the ice. Calculate the magnitude of the average frictional force acting on the cars as they come to rest.

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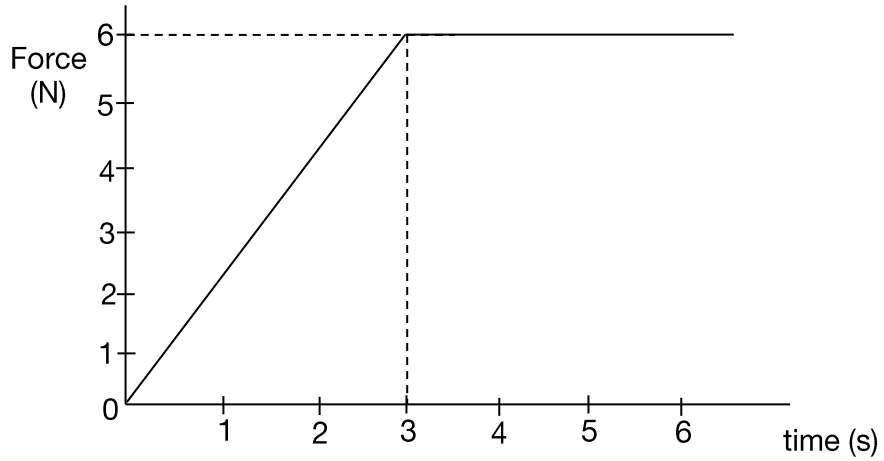
Question 25 (4 marks) **Marks**

The graph below shows how the force on a 2.4 kg object varies with time. The object's velocity was initially 10 m s^{-1} **east** and the force was applied in a **westerly** direction.



(a) Calculate the object's change in momentum during the first 3 seconds (magnitude and direction).

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(b) Determine the time at which the object is at rest.

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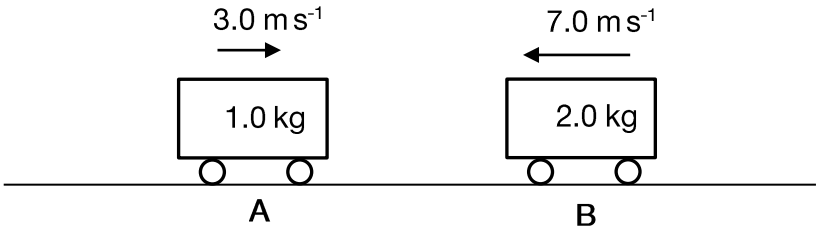
Question 26 (3 marks) **Marks**

Trolley A of mass 1.0 kg is moving with a velocity of 3.0 m s^{-1} towards the right. It collides with trolley B of mass 2.0 kg moving left with a velocity of 7.0 m s^{-1}.



If the collision is perfectly elastic, what is the final velocity of the trolley A?

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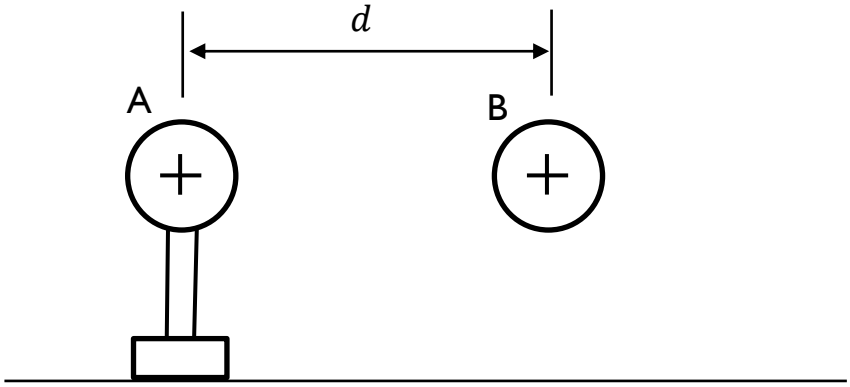
Question 27 (3 marks) **Marks**

A positively charged particle A is fixed on a stand. Another positive charge B is held a distance d away it, as shown. Assume no external forces act on the particles.



At $t = 0$, particle B is released. Describe what changes will subsequently occur to the motion of particle B and the force between the particles, and justify your answer.

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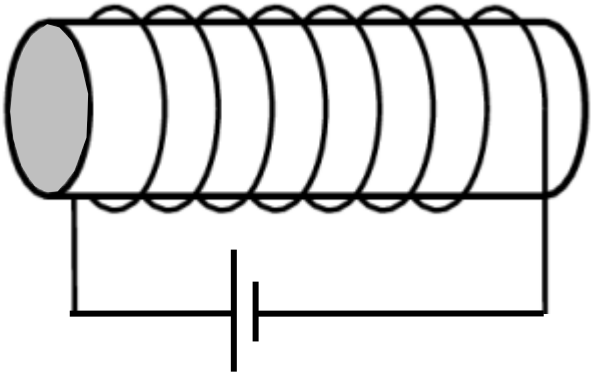
SECTION II: Part D (15 Marks)

Answer the questions in the spaces provided.
Show all relevant working in questions involving calculations.

CANDIDATE NUMBER							

Question 28 (3 marks) **Marks**

A coil of wire is wrapped around a hollow cardboard tube, as shown. A power supply is connected to the coil and the current creates an electromagnet.



The coil carries a current of 6 A and has a length of 15 cm, with 40 turns of wire.

(a) Determine the strength of the magnetic field inside the coil.

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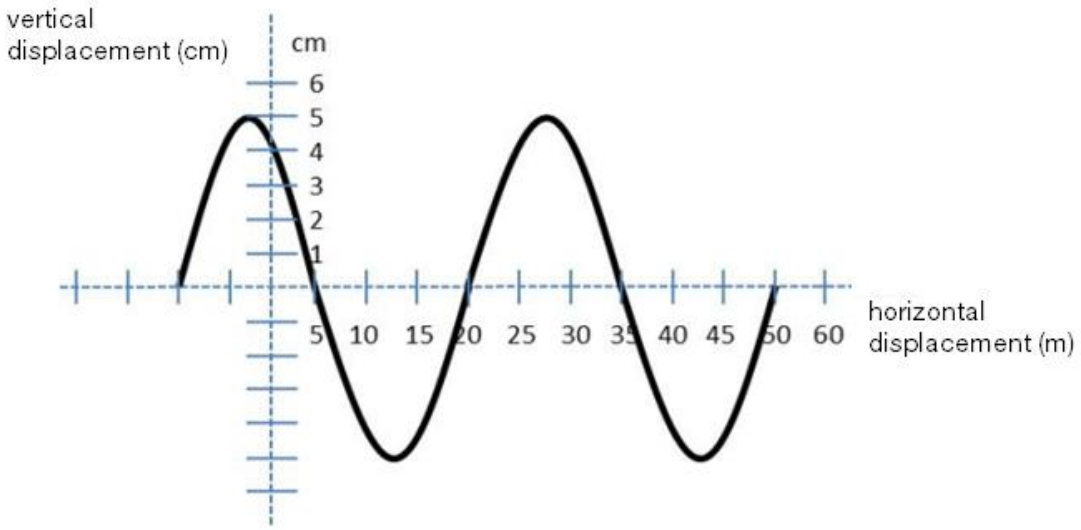
(b) Indicate on the diagram the position of the North pole of the electromagnet. **1**

Question 29 (4 marks) **Marks**

The graph below shows vertical displacement versus horizontal displacement for a wave travelling to the right at a speed of 10 m s^{-1}.



From the information in the graph, determine:

(a) the wavelength of the wave.

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(b) the amplitude of the wave.

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(c) the period of the wave.

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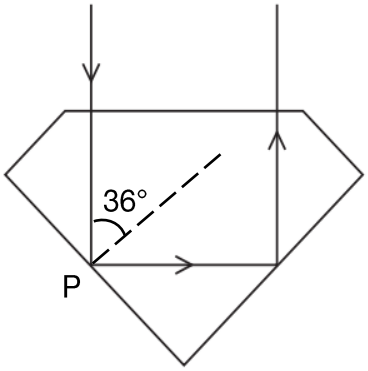
Question 30 (4 marks) **Marks**

A ray of light enters a gemstone as shown below. It reflects twice within the stone, then exits.



(a) Show that the refractive index of the stone must be at least 1.7. Justify your answer.

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(b) Assuming that the refractive index of the gemstone is 1.8, determine the speed of the light within the stone.

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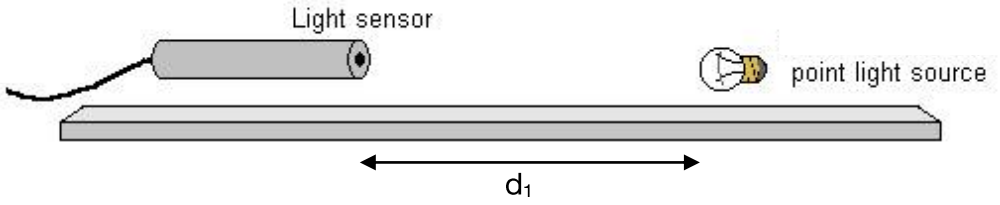
Question 31 (2 marks) **Marks**

A light sensor which measures the intensity of light is placed a distance d_1 = 15 cm from a point light source. If the intensity at that distance is 2.0 W m^{-2}, determine the distance d_2 at which the intensity will be 1.5 W m^{-2}.



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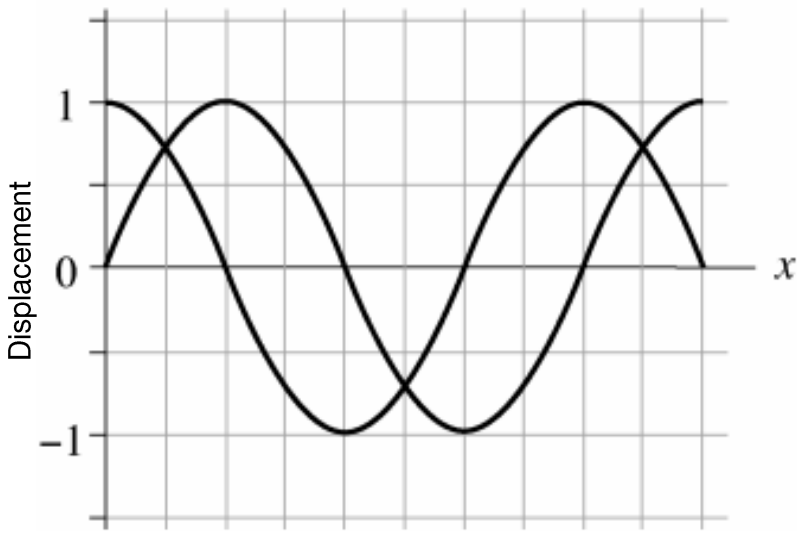
Question 32 (2 marks)

Two waves are depicted on the graph below. Draw on the graph the superposition of the two waves.



2

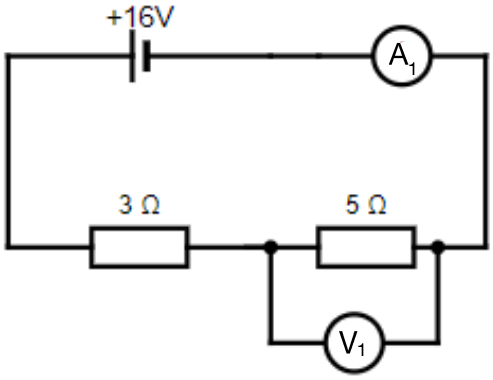
SECTION II: Part E (12 Marks)

Answer the questions in the spaces provided.
Show all relevant working in questions involving calculations.

CANDIDATE NUMBER							

Question 33 (2 marks) **Marks**

Calculate the readings on the ammeter and voltmeter in the circuit below.



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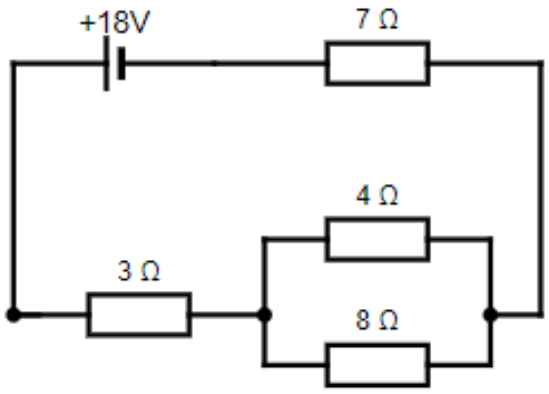
A_1 = ... V_1 = ...

2

Question 34 (5 marks) **Marks**

Consider the circuit shown below.



Calculate:

(a) The total resistance of the circuit.

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(b) The current through the 3 Ω resistor.

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(c) The voltage across the 8 Ω resistor.

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(d) The current through the 4 Ω resistor.

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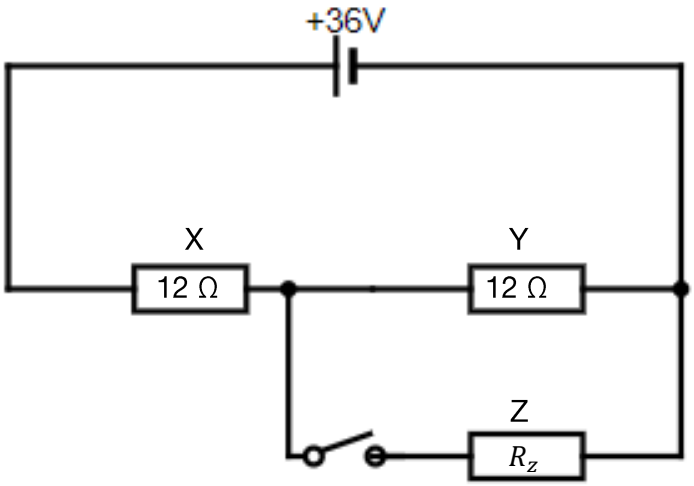
Question 35 (5 marks) **Marks**

Consider the circuit shown below.



(a) Calculate the amount of power used by Resistor X when the switch is open.

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(b) When the switch is closed, the total power consumption **of the whole circuit** increases by a factor of $\frac{5}{3}$. Calculate the resistance R_z of Resistor Z.

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END OF EXAMINATION

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Section II extra writing space

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HIGHER SCHOOL CERTIFICATE
EXAMINATION

Physics

DATA SHEET

Charge on electron, q_e	-1.602×10^{-19} C
Mass of electron, m_e	9.109×10^{-31} kg
Mass of neutron, m_n	1.675×10^{-27} kg
Mass of proton, m_p	1.673×10^{-27} kg
Speed of sound in air	$340\ \text{m s}^{-1}$
Earth's gravitational acceleration, g	$9.8\ \text{m s}^{-2}$
Speed of light, c	$3.00 \times 10^{8}\ \text{m s}^{-1}$
Electric permittivity constant, ε_0	$8.854 \times 10^{-12}\ \text{A}^2\,\text{s}^4\,\text{kg}^{-1}\,\text{m}^{-3}$
Magnetic permeability constant, μ_0	$4\pi \times 10^{-7}\ \text{N A}^{-2}$
Universal gravitational constant, G	$6.67 \times 10^{-11}\ \text{N m}^2\,\text{kg}^{-2}$
Mass of Earth, M_E	6.0×10^{24} kg
Radius of Earth, r_E	6.371×10^{6} m
Planck constant, h	6.626×10^{-34} J s
Rydberg constant, R (hydrogen)	$1.097 \times 10^{7}\ \text{m}^{-1}$
Atomic mass unit, u	1.661×10^{-27} kg $931.5\ \text{MeV}/c^2$
1 eV	1.602×10^{-19} J
Density of water, ρ	$1.00 \times 10^{3}\ \text{kg m}^{-3}$
Specific heat capacity of water	$4.18 \times 10^{3}\ \text{J kg}^{-1}\,\text{K}^{-1}$
Wein's displacement constant, b	$2.898 \times 10^{-3}\ \text{m K}$

FORMULAE SHEET

Motion, forces and gravity

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

$$\Delta U = mg\Delta h$$

$$P = \frac{\Delta E}{\Delta t}$$

$$\sum \frac{1}{2}mv^2_{\text{before}} = \sum \frac{1}{2}mv^2_{\text{after}}$$

$$\Delta \vec{p} = \vec{F}_{\text{net}}\Delta t$$

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

$$\tau = r_{\perp}F = rF\sin\theta$$

$$v = \frac{2\pi r}{T}$$

$$U = -\frac{GMm}{r}$$

$$v = u + at$$

$$\vec{F}_{\text{net}} = m\vec{a}$$

$$W = F_{||}s = Fs\cos\theta$$

$$K = \frac{1}{2}mv^2$$

$$P = F_{||}v = Fv\cos\theta$$

$$\sum m\vec{v}_{\text{before}} = \sum m\vec{v}_{\text{after}}$$

$$a_{\text{c}} = \frac{v^2}{r}$$

$$F_{\text{c}} = \frac{mv^2}{r}$$

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

$$\frac{r^3}{T^2} = \frac{GM}{4\pi^2}$$

Waves and thermodynamics

$$v = f\lambda$$

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

$$d\sin\theta = m\lambda$$

$$n_{\text{x}} = \frac{c}{v_{\text{x}}}$$

$$I = I_{\text{max}}\cos^2\theta$$

$$Q = mc\Delta T$$

$$f_{\text{beat}} = \left| f_2 - f_1 \right|$$

$$f' = f\frac{\left(v_{\text{wave}} + v_{\text{observer}}\right)}{\left(v_{\text{wave}} - v_{\text{source}}\right)}$$

$$n_1\sin\theta_1 = n_2\sin\theta_2$$

$$\sin\theta_{\text{c}} = \frac{n_2}{n_1}$$

$$I_1r_1^2 = I_2r_2^2$$

$$\frac{Q}{t} = \frac{kA\Delta T}{d}$$

Electricity and magnetism

$$E = \frac{V}{d}$$

$$V = \frac{\Delta U}{q}$$

$$W = qV$$

$$W = qEd$$

$$B = \frac{\mu_0 I}{2\pi r}$$

$$B = \frac{\mu_0 NI}{L}$$

$$\Phi = B_{||}A = BA\cos\theta$$

$$\varepsilon = -N\frac{\Delta\Phi}{\Delta t}$$

$$\frac{V_\mathrm{p}}{V_\mathrm{s}} = \frac{N_\mathrm{p}}{N_\mathrm{s}}$$

$$\vec{F} = q\vec{E}$$

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

$$I = \frac{q}{t}$$

$$V = IR$$

$$F = qv_\perp B = qvB\sin\theta$$

$$F = lI_\perp B = lIB\sin\theta$$

$$\frac{F}{l} = \frac{\mu_0}{2\pi}\frac{I_1 I_2}{r}$$

$$\tau = nIA_\perp B = nIAB\sin\theta$$

$$V_\mathrm{p} I_\mathrm{p} = V_\mathrm{s} I_\mathrm{s}$$

Quantum, special relativity and nuclear

$$\lambda = \frac{h}{mv}$$

$$K_\mathrm{max} = hf - \phi$$

$$\lambda_\mathrm{max} = \frac{b}{T}$$

$$E = mc^2$$

$$E = hf$$

$$\frac{1}{\lambda} = R\left(\frac{1}{n_\mathrm{f}^2} - \frac{1}{n_\mathrm{i}^2}\right)$$

$$t = \frac{t_0}{\sqrt{\left(1 - \frac{v^2}{c^2}\right)}}$$

$$l = l_0\sqrt{\left(1 - \frac{v^2}{c^2}\right)}$$

$$p_\mathrm{v} = \frac{m_0 v}{\sqrt{\left(1 - \frac{v^2}{c^2}\right)}}$$

$$N_\mathrm{t} = N_0 e^{-\lambda t}$$

$$\lambda = \frac{\ln 2}{t_{\frac{1}{2}}}$$

PERIODIC TABLE OF THE ELEMENTS

1 H 1.008 Hydrogen																	2 He 4.003 Helium
3 Li 6.941 Lithium	4 Be 9.012 Beryllium											5 B 10.81 Boron	6 C 12.01 Carbon	7 N 14.01 Nitrogen	8 O 16.00 Oxygen	9 F 19.00 Fluorine	10 Ne 20.18 Neon
11 Na 22.99 Sodium	12 Mg 24.31 Magnesium											13 Al 26.98 Aluminium	14 Si 28.09 Silicon	15 P 30.97 Phosphorus	16 S 32.07 Sulfur	17 Cl 35.45 Chlorine	18 Ar 39.95 Argon
19 K 39.10 Potassium	20 Ca 40.08 Calcium	21 Sc 44.96 Scandium	22 Ti 47.87 Titanium	23 V 50.94 Vanadium	24 Cr 52.00 Chromium	25 Mn 54.94 Manganese	26 Fe 55.85 Iron	27 Co 58.93 Cobalt	28 Ni 58.69 Nickel	29 Cu 63.55 Copper	30 Zn 65.38 Zinc	31 Ga 69.72 Gallium	32 Ge 72.64 Germanium	33 As 74.92 Arsenic	34 Se 78.96 Selenium	35 Br 79.90 Bromine	36 Kr 83.80 Krypton
37 Rb 85.47 Rubidium	38 Sr 87.61 Strontium	39 Y 88.91 Yttrium	40 Zr 91.22 Zirconium	41 Nb 92.91 Niobium	42 Mo 95.96 Molybdenum	43 Tc Technetium	44 Ru 101.1 Ruthenium	45 Rh 102.9 Rhodium	46 Pd 106.4 Palladium	47 Ag 107.9 Silver	48 Cd 112.4 Cadmium	49 In 114.8 Indium	50 Sn 118.7 Tin	51 Sb 121.8 Antimony	52 Te 127.6 Tellurium	53 I 126.9 Iodine	54 Xe 131.3 Xenon
55 Cs 132.9 Caesium	56 Ba 137.3 Barium	57–71 Lanthanoids	72 Hf 178.5 Hafnium	73 Ta 180.9 Tantalum	74 W 183.9 Tungsten	75 Re 186.2 Rhenium	76 Os 190.2 Osmium	77 Ir 192.2 Iridium	78 Pt 195.1 Platinum	79 Au 197.0 Gold	80 Hg 200.6 Mercury	81 Tl 204.4 Thallium	82 Pb 207.2 Lead	83 Bi 209.0 Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89–103 Actinoids	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson

KEY

Atomic Number	79
Symbol	Au
Standard Atomic Weight	197.0
Name	Gold

Lanthanoids

57 La 138.9 Lanthanum	58 Ce 140.1 Cerium	59 Pr 140.9 Praseodymium	60 Nd 144.2 Neodymium	61 Pm Promethium	62 Sm 150.4 Samarium	63 Eu 152.0 Europium	64 Gd 157.3 Gadolinium	65 Tb 158.9 Terbium	66 Dy 162.5 Dysprosium	67 Ho 164.9 Holmium	68 Er 167.3 Erbium	69 Tm 168.9 Thulium	70 Yb 173.1 Ytterbium	71 Lu 175.0 Lutetium

Actinoids

89 Ac Actinium	90 Th 232.0 Thorium	91 Pa 231.0 Protactinium	92 U 238.0 Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

Standard atomic weights are abridged to four significant figures.

Elements with no reported values in the table have no stable nuclides.

Information on elements with atomic numbers 113 and above is sourced from the International Union of Pure and Applied Chemistry Periodic Table of the Elements (November 2016 version).

The International Union of Pure and Applied Chemistry Periodic Table of the Elements (February 2010 version) is the principal source of all other data. Some data may have been modified.

SYDNEY GRAMMAR SCHOOL

CANDIDATE NUMBER

2022 FORM V ANNUAL EXAMINATION

Physics

Section I - Multiple Choice

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Sample: $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9

A ○ B ● C ○ D ○

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ● B ⊗ C ○ D ○

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word ~~correct~~ and drawing an arrow as follows.

correct

A ⊗ B ⊗ C ○ D ○

Start Here →

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 ○

Back of Multiple-Choice
Answer Sheet