Name: ……( ) Class: Sec ……..

St. Gabriel's Secondary School

2025 'O' Preliminary Examination

Subject	**:**	**Science(Physics/Chemistry)**
Paper	**:**	**5086/01**
Level/Stream	**:**	**Sec 4E/5N/4NA(OOS)**
Duration	**:**	**1 hour**
Date	**:**	**29 August 2025**

Additional material(s): *Multiple Choice Answer Sheet*

READ THESE INSTRUCTIONS FIRST

Write your class, register number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.

There are **forty** questions in this question paper. Answer **all** questions. For each question, there are four possible answers: **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

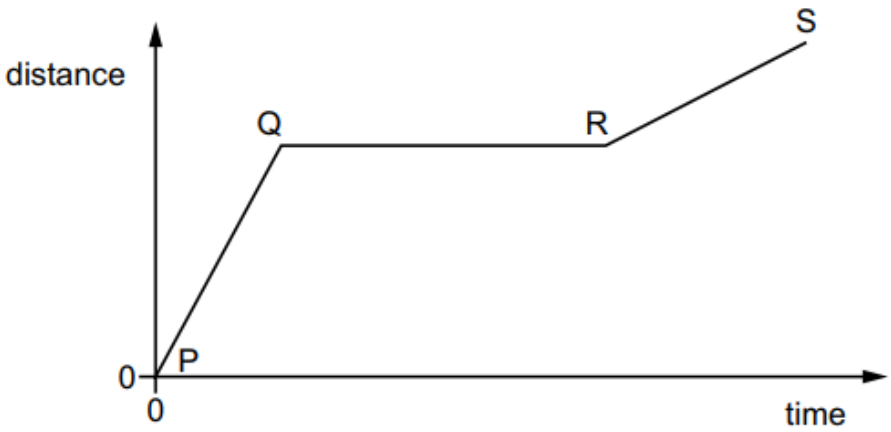
A copy of the Data Sheet is printed on page 18.
A copy of the Periodic Table is printed on page 19.

The use of an approved scientific calculator is expected, where appropriate.

1 Which derived SI unit is represented correctly with its basic SI units?

	derived SI unit	basic SI units
A	Hz	$\frac{1}{s}$
B	J	$\frac{kg\ m^2}{s^3}$
C	Ω	$\frac{kg\ m^2}{s^2\ A^2}$
D	Pa	$\frac{N}{m}$

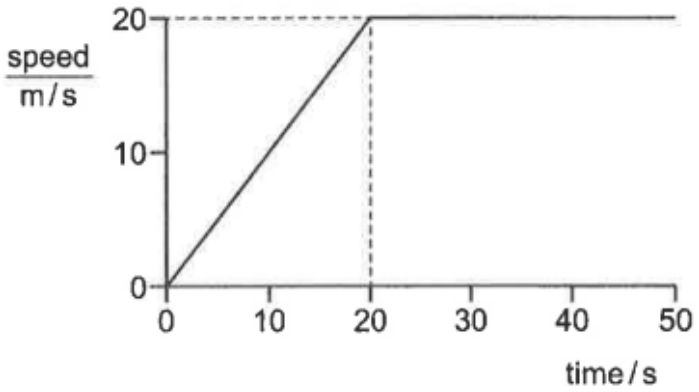
2 The graph shows how the distance travelled by a vehicle changes with time.



Which row describes the speed of the vehicle in each section of the graph?

	P to Q	Q to R	R to S
A	constant	zero	constant
B	constant	zero	decreasing
C	increasing	constant	decreasing
D	increasing	constant	increasing

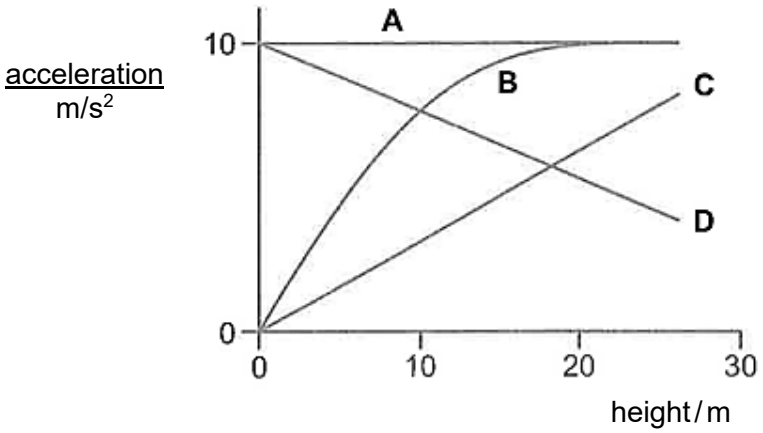
3 A speed-time graph of an object moving in a straight line is shown.



What is the average speed of this object for 50 s?

A 10 m/s **B** 15 m/s **C** 16 m/s **D** 20 m/s

4 Which graph shows the acceleration of free-fall for an object at different heights above the surface of the Earth?



5 A car accelerates along a straight road and then moves at a constant speed. Finally, the car slows down to rest.

When are the forces on the car balanced?

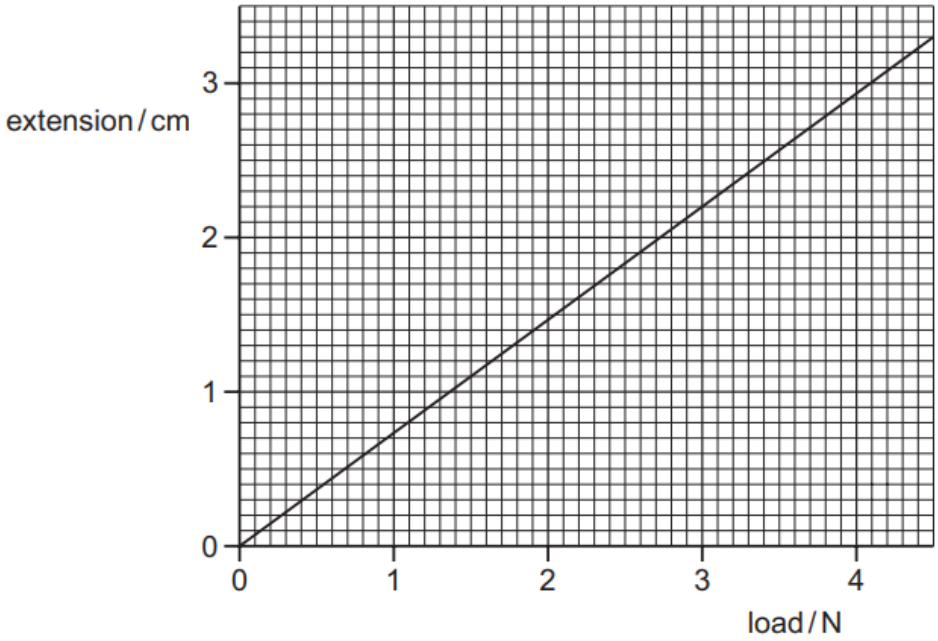
A when it accelerates and when it has constant speed

B when it accelerates and when it slows down

C when it has constant speed and when it is at rest

D when it slows down and when it is at rest

6 The extension–load graph for a spring is shown. The unstretched length of the spring is 17.0 cm.

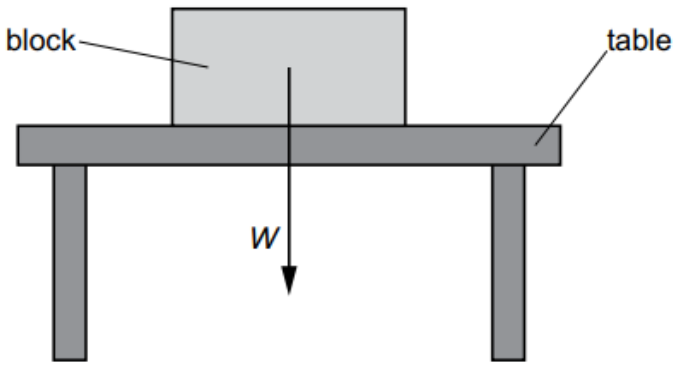


When an object is suspended from the spring, the length of the spring is 19.2 cm.

What is the weight of the object?

A 1.4 N **B** 1.6 N **C** 2.6 N **D** 3.0 N

7 A block of weight *W* is at rest on a table.



Force *F* and force *W* are an action-reaction pair of forces.

Which describes force *F*?

A The downward normal force that the table exerts on the block.

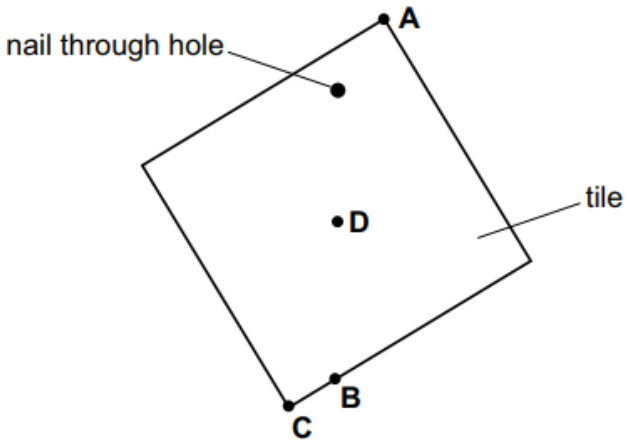
B The force that the block exerts on the Earth towards the block.

C The gravitational force that the Earth exerts on the table.

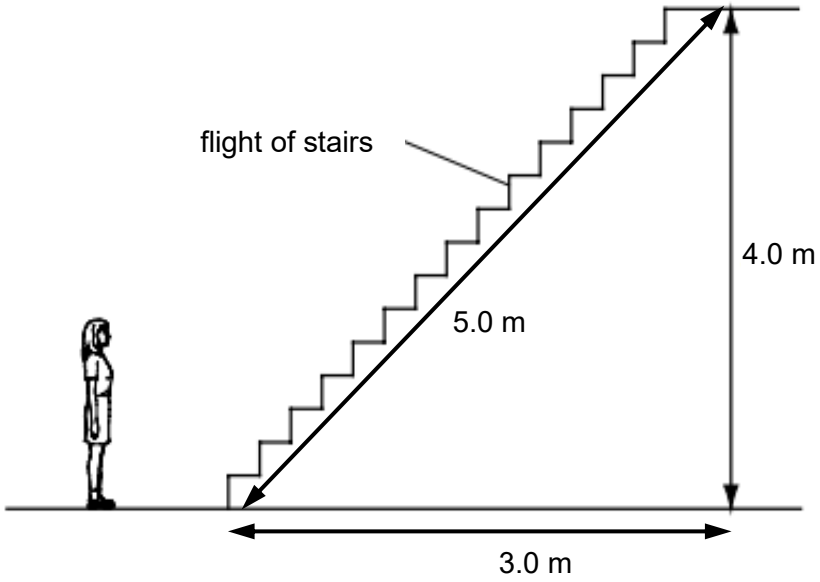
D The upward contact force that the table exerts on the block.

8 A hole is made in a square tile of uniform thickness. The diagram shows the tile hanging loosely on a nail.

Where is the centre of gravity of the tile?



9 A girl of weight 500 N runs up a flight of stairs in 10 s. The flight of stairs has a horizontal distance of 3.0 m, a vertical distance of 4.0 m, and a diagonal distance of 5.0 m.



What is the average useful power developed by the girl?

A 150 W **B** 200 W **C** 250 W **D** 600 W

10 A parachutist opens his parachute and falls to Earth at constant speed.

What is the main energy transfer taking place as he falls?

A kinetic store to gravitational potential store of energy

B kinetic store to internal store of energy

C gravitational potential store to kinetic store of energy

D gravitational potential store to internal store of energy

11 According to the kinetic theory, matter is made up of very small particles in a constant state of motion.

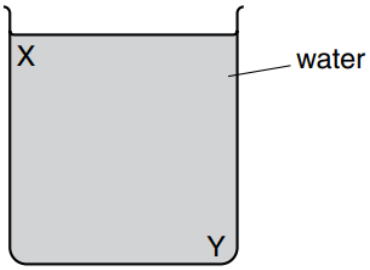
Which row best describes the particle behaviour in the liquid state?

	forces between particles	motion of particles
A	strong	move randomly at high speed
B	strong	slide over each other
C	strong	vibrate around a fixed position
D	weak	move randomly at high speed

12 Which statement describes what happens when iodine solidifies?

A There is a transfer of energy and a change in temperature.
B There is a transfer of energy but no change in temperature.
C There is no transfer of energy and no change in temperature.
D There is no transfer of energy but there is a change in temperature.

13 A beaker contains water at room temperature.



Which action sets up a convection current in the water?

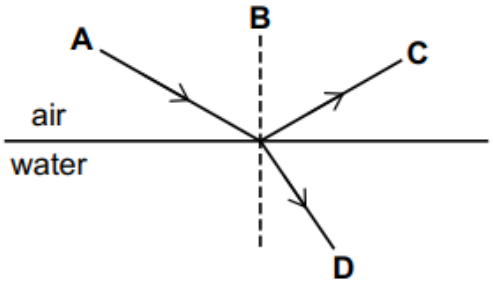
A cooling the water at X
B cooling the water at Y
C stirring the water at X
D stirring the water at Y

14 Which waves produce compressions as they travel through the air?

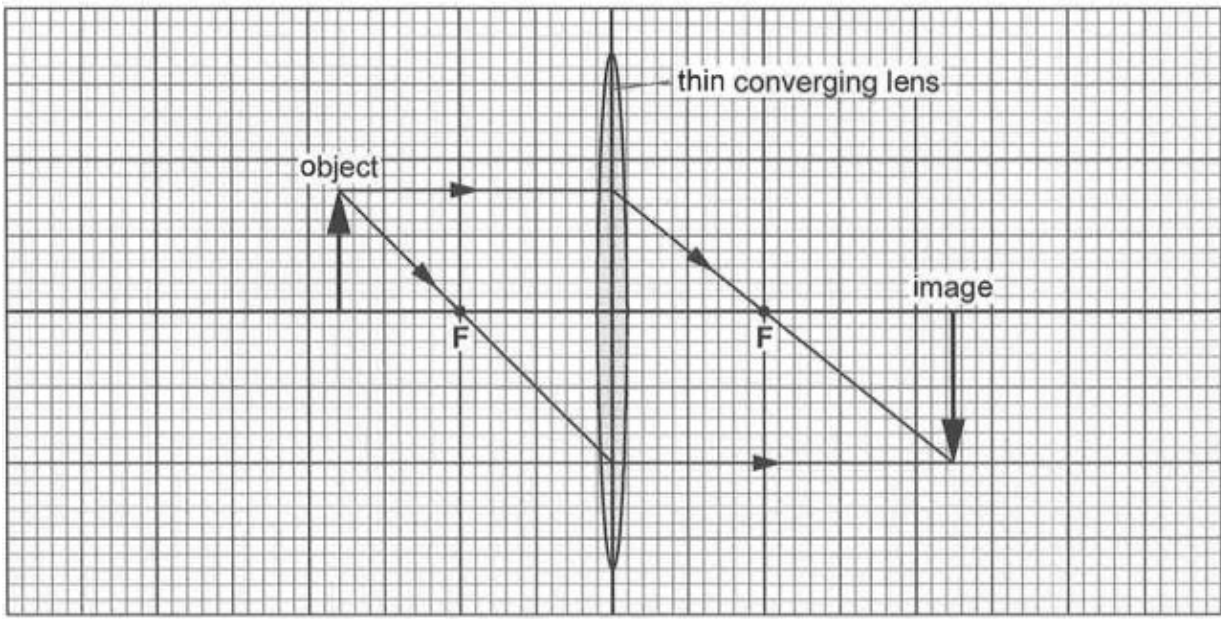
A light waves
B microwaves
C radio waves
D ultrasound waves

15 A ray of light in air is incident on the surface of water. Some light is reflected and some light is refracted.

Which line represents the reflected ray?



16 An object of height 16.0 cm is placed 36.0 cm in front of a thin converging lens. Some light rays are shown travelling from the top of the object to form the top of the image on the opposite side of the lens. Each principal focus is labelled F.



What are the three characteristics of this image?

A real, upright, enlarged

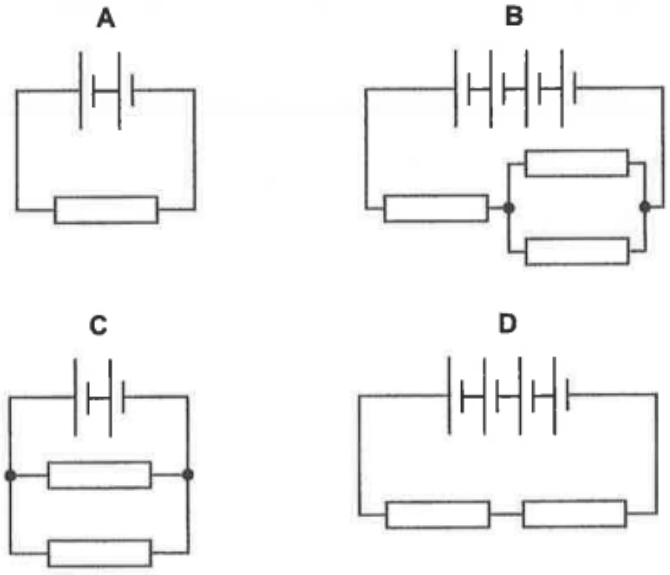
B real, inverted, enlarged

C virtual, upright, diminished

D virtual, inverted, diminished

17 The circuits contain a number of identical cells and a number of identical resistors.

In which circuit is the current in the cells the highest?



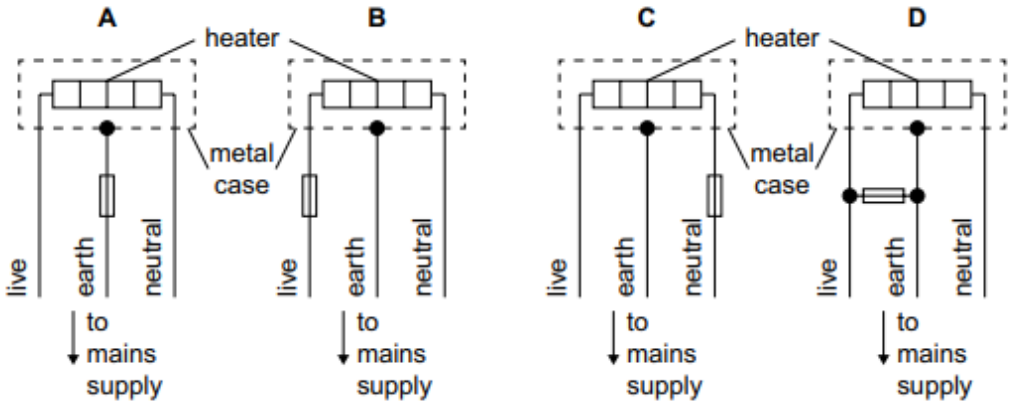
18 A wire of length 2.0 m and cross-sectional area 0.50 x 10^{-6} m^2 has a resistance of 1.2 Ω.

Another wire of the same material has a length of 0.50 m and a cross-sectional area of 1.0 x 10^{-6} m^2.

What is the resistance of the shorter wire?

A 0.15 Ω **B** 0.60 Ω **C** 2.4 Ω **D** 9.6 Ω

19 In which circuit is the fuse connected in the correct position?



20 An electrical appliance has a power rating of 0.60 kW. The cost of electricity is 22 cents / kWh.

What is the cost of using the electrical appliance for 2 hours?

A 13 cents **B** 18 cents **C** 26 cents **D** 27 cents

Name: ……( ) Class: Sec ……..

St. Gabriel's Secondary School

2025 'O' Preliminary Examination

Subject : Science(Physics)
Paper : 5086/02
Level/Stream : Sec 4E/5N/4NAOOS
Duration : 1 hour 15 minutes
Date : 25 August 2025

Additional material : Nil

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class in the spaces provided above in this page.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A:
Answer **all** questions. The total mark for this section is 55 marks.

Section B:
Answer **one** questions. The total mark for this section is 10 marks.

Candidates are reminded that **all** quantitative answers should include appropriate units.
The use of an approved scientific calculator is expected, where appropriate.
Candidates are advised to show all their working in a clear and orderly manner, as more marks are awarded for sound use of Physics than for correct answers.

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

For Examiners Use:	
Section A	/55
Section B	/10
Total	/65

This question paper consists of **17** printed pages.

Section A

Answer **all** the questions in this section.

1 **(a)** Table 1.1 shows some units that may be used to measure physical quantities.

Table 1.1

physical quantity	unit
pressure	newton per metre squared (N/m^2)
resistivity	
	coulomb volt (CV)

Complete Table 1.1 to show the corresponding physical quantity or unit (with symbol) that is missing. The first one has been done for you.

[2]

(b) Circle the number below that is equal to 1.0 μm in Mm.

1.0×10^{-12} 1.0×10^{-9} 1.0×10^{5} 1.0×10^{10}

[1]

[Total: 3]

2 Fig. 2.1 shows a 600 kg rocket-powered sled travelling along a straight track. The sled is used to test components before they are sent into space.

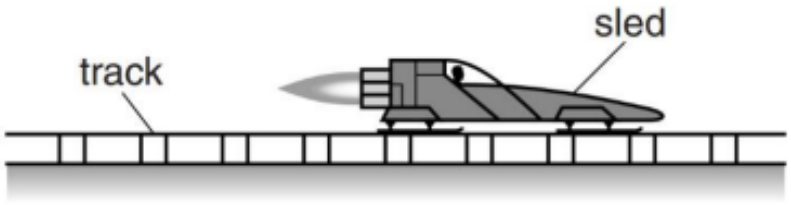


Fig. 2.1

Fig. 2.2 is the speed-time graph for the sled from time t = 0 s.

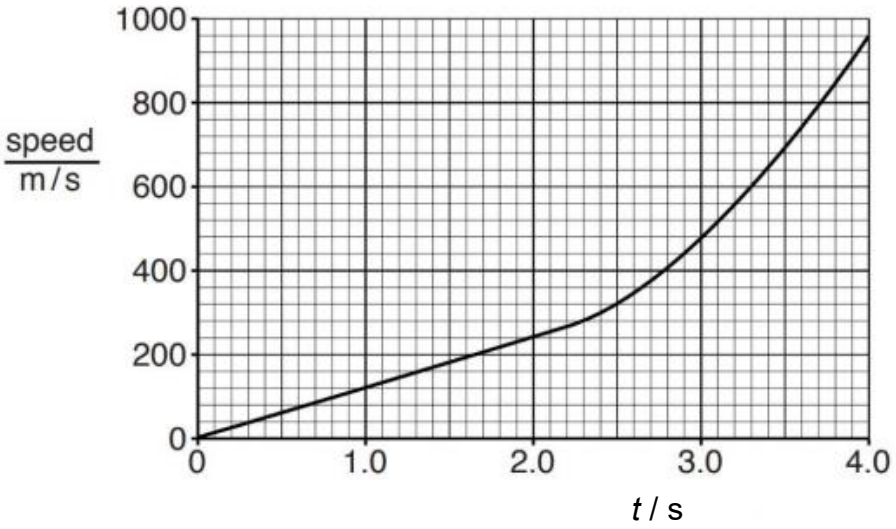


Fig. 2.2

(a) Describe fully the speed of the rocket-powered sled for the first 4.0 s.

……

……

…… [2]

(b) Determine the distance travelled by the sled between t = 1.0 s and t = 2.0 s.

distance = ……..…….... m [2]

(c) Calculate the acceleration at t = 1.5 s.

acceleration = ……..…….... m/s^2 [2]

[Total: 6]

3 Fig. 3.1 shows a small brick hanging from a newton meter.

The same brick and newton meter area used in the apparatus shown in Fig. 3.2. The metre rule is pivoted at its centre and is balanced. The reading on the newton meter is not shown.

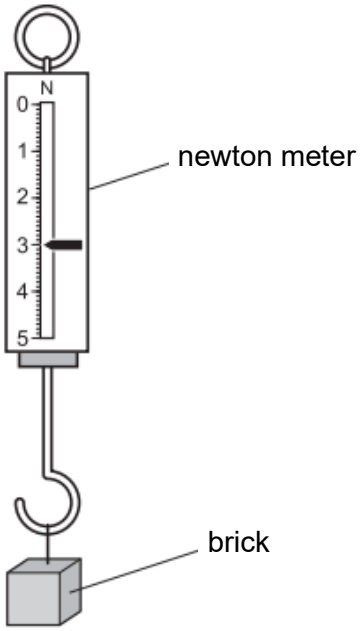


Fig. 3.1

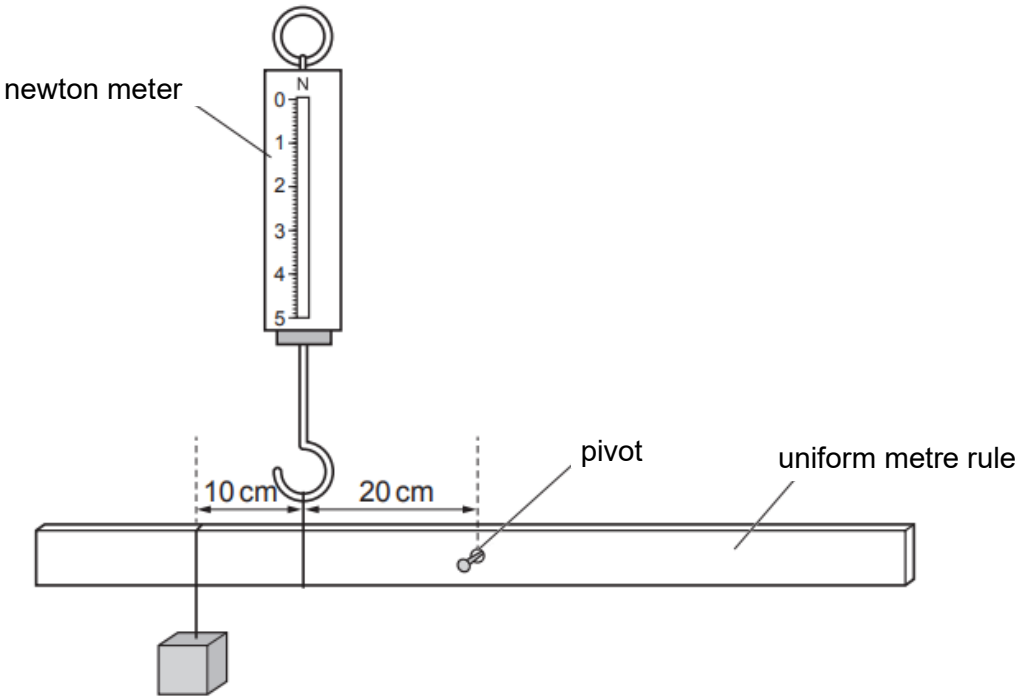


Fig. 3.2

(a) State the *principle of moments* for a body in equilibrium.

……..……..……

……..……..……

……..……..….. [2]

(b) State the weight of the brick from Fig. 3.1, hence determine the reading on the newton meter shown in Fig. 3.2.

weight of brick = ……... N [1]

reading on newton meter = ……... N [2]

[Total: 5]

4 Fig. 4.1 shows a car going up a hill on a sunny day.

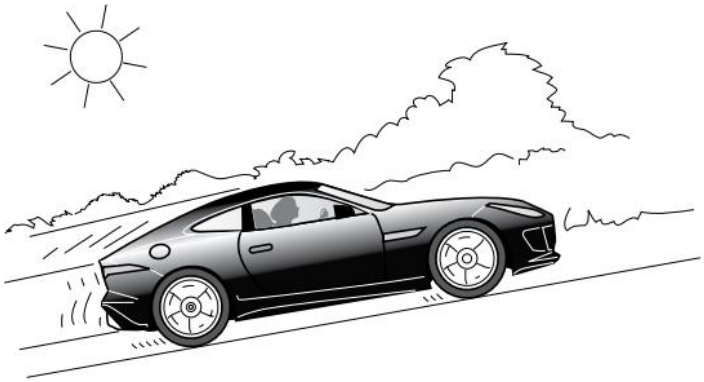


Fig. 4.1

(a) The front wheels of the car are attached to the motor and turn in a clockwise rotation.

Fig. 4.2 shows one of the two front wheels.

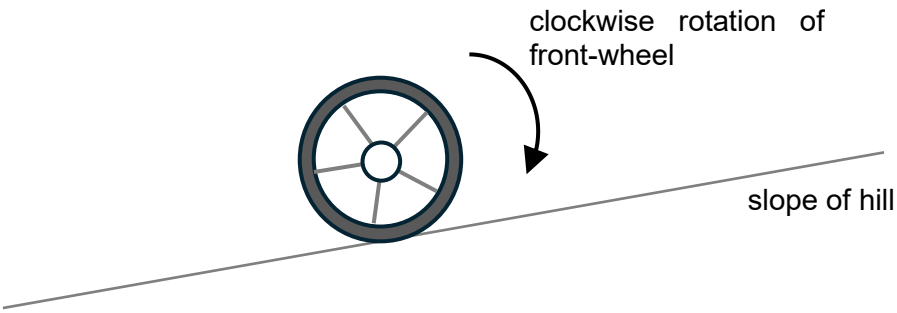


Fig. 4.2

On Fig. 4.2, draw and label all the forces on this front wheel. [3]

(b) When the work done by the motor of the car is 110 kJ, it moves the car from rest vertically higher by 2.5 m as shown in Fig. 4.3.

The mass of the car is 800 kg.

The gravitational field strength g = 10 N/kg.

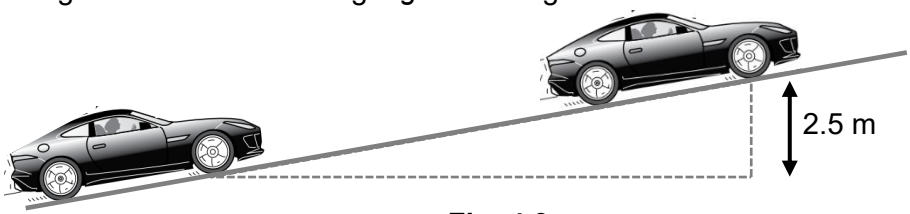


Fig. 4.3

(i) Determine the gain in energy in the gravitational potential store in kJ.

energy in gravitational potential store = ……... kJ [2]

(ii) Determine the gain in energy in the kinetic store in kJ if no energy is lost.

energy in kinetic store = ……..……... kJ [1]

(iii) Hence, determine the speed of the car at the highest point.

speed = ……..……... m/s [2]

[Total: 8]

5 Fig. 5.1 shows a cylindrical copper kettle that contains cold water.

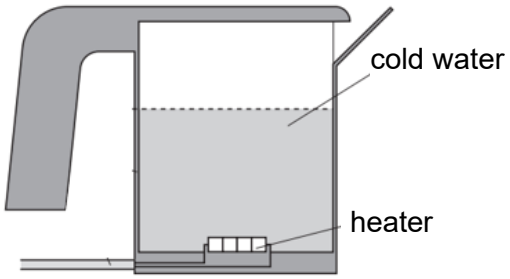


Fig. 5.1

The cold water is heated by the electric heater at the base until it boils.

(a) Explain, in terms of molecules and energy, why the water expands as its temperature increases.

……..……

……..……

……..……

.

……..……... [2]

(b) Describe the change to the arrangement and motion of the molecules as the water boils.

……..……

……..……

……..……

……..……..……. [2]

[Total: 4]

6 Fig. 6.1 shows part of an electrical circuit.

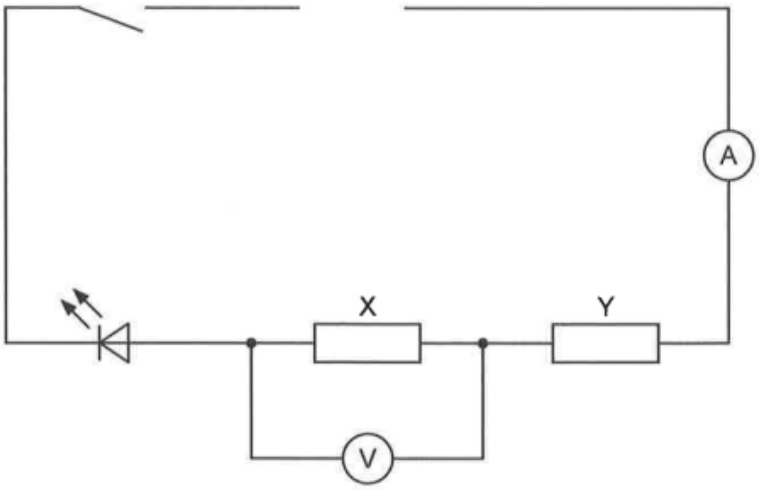


Fig. 6.1

Two cells, each of electromotive force (e.m.f.) 1.50 V, are joined together to make a battery.

The battery is connected to the circuit.

The student closes the switch and records the ammeter and voltmeter reading:

ammeter reading = 0.033 A

voltmeter reading = 1.98 V

The potential difference across the LED is 0.69 V.

(a) On Fig. 6.1, draw the two cells to complete the circuit. [1]

(b) Calculate

(i) the resistance of resistor X,

resistance of X = ……..... Ω [1]

(ii) the resistance of resistor Y,

resistance of Y = ……..... Ω [1]

(iii) the power dissipated by resistor X,

power of X = ……... W [1]

(iv) the charge passing through the battery in 1.0 minutes,

charge through battery = ……... C [2]

(v) the total work done by the battery in 1.0 minutes.

work done = ……... J [1]

[Total: 7]

7 **(a)** The insulation of the neutral wire was damaged, and the neutral wire touched the metal parts of the casing of the electric iron.

Describe the hazard when the electric iron is switched on and state the safety device that will be activated.

……

……

…… [2]

(b) Fig. 7.1 shows the essential working parts of the hairdryer.

Fig. 7.2 shows the electrical connection of the two heaters and the fan in the hairdryer to its two-pin plug. The hairdryer does not have an earth wire.

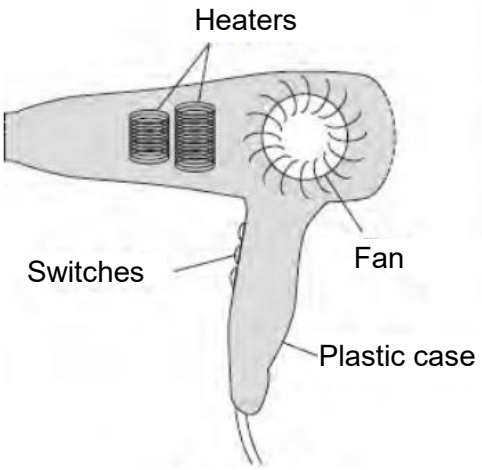


Fig. 7.1

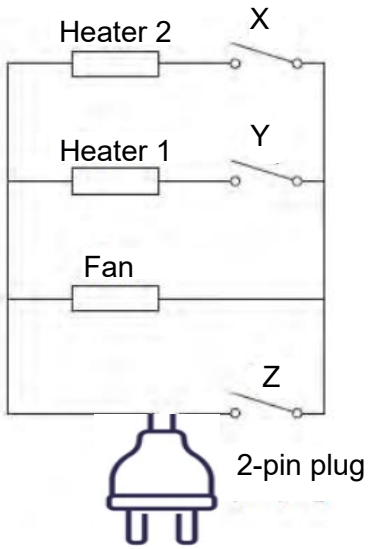


Fig. 7.2

(i) State and explain how the hairdryer can keep the user safe without the earth wire.

……

……

…… [2]

(ii) Heater 1 has a resistance of 10 Ω and Heater 2 has a resistance of 20 Ω.

Four different hairdryer wind temperatures, “cold”, “low heat”, “medium heat” and “high heat”, can be selected by switching on different combinations of switches X, Y, and Z.

State the switch combinations to select

cold wind …… [1]

medium heat …… [1]

[Total: 6]

8 Fig. 8.1 shows part of a simple d.c. electric motor.

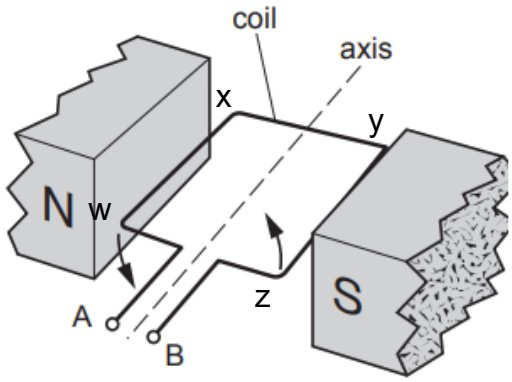


Fig. 8.1

The motor is connected to a battery with the positive terminal of the battery connected to terminal A.

(a) Explain why the rectangular coil turns in the direction shown.

……

……

……

……

……

…… [3]

(b) The turning effect is increased when the coil is wound around a soft-iron cylinder.

(i) Explain why this happens.

……

……

…… [2]

(ii) Suggest **one** other way to increase the turning effect of the motor.

……

…… [1]

[Total: 6]

9 Iodine-131 and Technetium-99m are two commonly used radioactive isotopes in nuclear medicine.

Iodine-131 decays to Xenon-131 and the half-life of Iodine-131 is 8 days. Xenon-131 is stable and does not undergo radioactive decay.

Technetium-99m decays to Technetium-99 and the half-life of Technetium-99m is 6 h.

(a) Another isotope of iodine has the nuclide notation $^{129}_{53}I$.

(i) State the nucleon number of Iodine-131.

nucleon number = ……..……... [1]

(ii) State the number of neutrons, protons and electrons in Iodine-131.

neutron = ……..……...

proton = ……..……...

electron = ……..……...
[2]

(b) A sample of 64 g of Iodine-131 decays over 24 days.

Table 9.1 shows some of the masses of Iodine-131 and Xenon-131 from the sample on Day 8, 16, and 24.

Table 9.1

Day	8	16	24
mass of Iodine-131 (g)	32		
mass of Xenon-131 (g)	32		

(i) Complete the table to show the rest of the masses. [2]

(ii) Determine the number of days after the start for 2 g of Iodine-131 to be left from the sample.

number of days passed = ……..……... [2]

(c) Table 9.2 shows the measured count rate of Technetium-99m, in the hospital laboratory with an unknown background count rate, over 18 hours.

Table 9.2

time (h)	0	6	12	18
measured count rate (counts / min)	136	88	64	52

Determine the background count rate in the hospital laboratory.

background count rate = ……..……... counts / min [2]

(d) Suggest a reason why Technetium-99m is considered better than Iodine-131 for medical imaging.

……..……..…….

…..……..…….. [1]

[Total: 10]

Section B

Answer **one** question in this section.

10 Fig. 10.1 shows a dolphin using echolocation to determine the position and distance of the shoal of fish.

Fig. 10.2 shows the displacement-distance graph of a sound wave emitted by a dolphin in water.

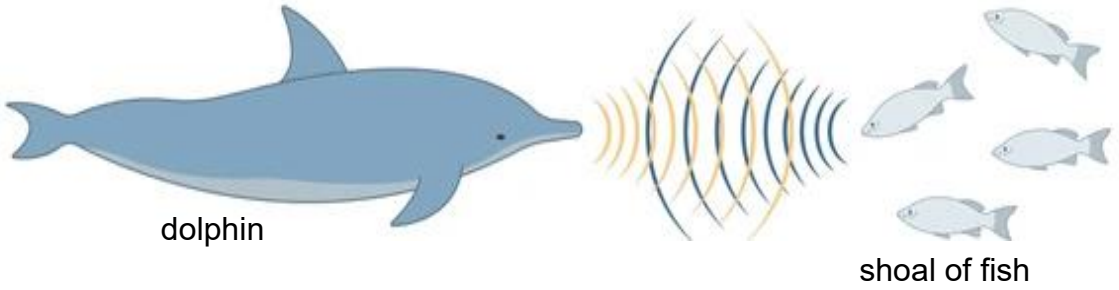


Fig. 10.1

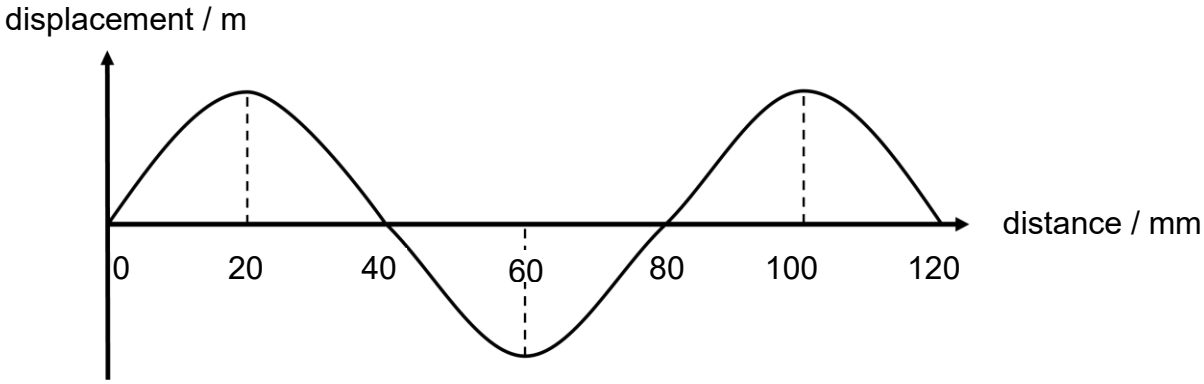


Fig. 10.2

(a) Describe how the sound wave emitted by the dolphin propagates through water.

……

……

……

……

…….. [2]

(b) Speed of sound in water is 1500 m / s. The dolphin heard the echo from the shoal of fish 2.0 s after it emitted the sound.

(i) Determine the frequency of this sound wave in kHz.

frequency = ……... kHz [3]

(ii) Determine the distance of the shoal of fish from the dolphin

distance = ……... m [2]

(c) Radio waves is a type of electromagnetic wave that can be used in underwater communications. The speed of radio waves underwater is 225000 km / s.

(i) State the speed of radio waves in vacuum.

……..…... [1]

(ii) State the respective name and **one** use of a component from the electromagnetic spectrum that has the next shorter and longer wavelength than visible light in Table 10.1.

Table 10.1

	name of component	use of component
next shorter wavelength		
next longer wavelength		

[2]

[Total: 10]

11 Fig. 11.1 shows a cuboid gold block with a mass of 1.54 kg and the dimensions stated.

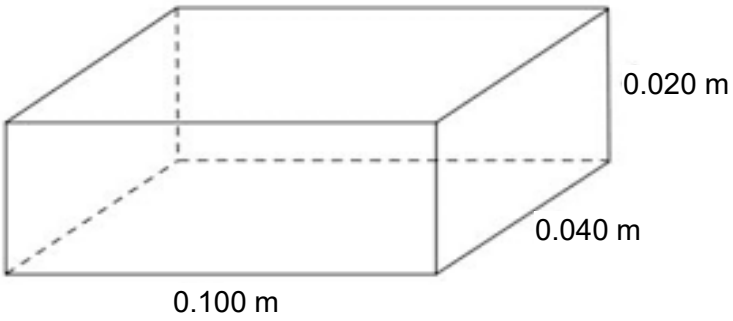


Fig. 11.1

(a) Goldsmiths use a variety of methods to test the purity of gold. One of these methods is by comparing the density of the sample to pure gold which has a density of 19.3 g / cm^3. The gravitational field strength *g* is 10 N / kg.

(i) Determine the density of the cuboid gold block in Fig. 11.1 in g / cm^3.

density =…….... g / cm^3 [3]

(ii) State and explain if this cuboid gold block is pure gold.

……

……

……

…….. [2]

(b) The cuboid gold block is placed with its largest face on a horizontal flat wooden board.

(i) Determine the weight of this cuboid gold block.

weight =…….. N [1]

(ii) Determine the pressure exerted on the wooden board by the gold block.

pressure =……... N / m^2 [2]

(c) Fig. 11.2 shows an ice cube on a gold block and a similar ice cube on a wood block. The dimensions of both the gold and wood block are the same.

Fig 11.2

Explain why the ice cube on the gold block melts faster than that on the wooden block.

……..…….……..…….

……..…….……..……

……..…….……

……..……... [2]

[Total: 10]

End of Paper

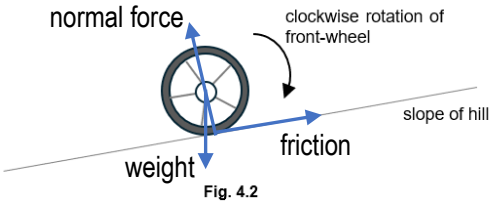
Paper 1 [20 marks] Answer **all** the questions.

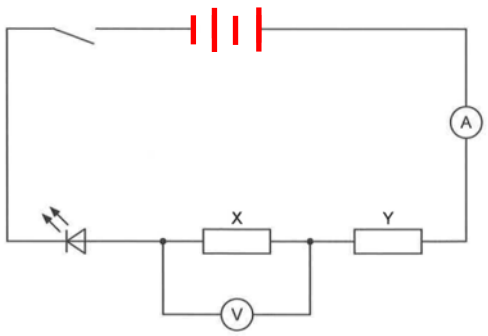
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
A	**A**	**C**	**A**	**C**	**D**	**B**	**D**	**B**	**D**
Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
B	**B**	**A**	**D**	**C**	**B**	**C**	**A**	**B**	**C**

Paper 2 Section A [45 marks]

2 or 3 s.f. expected. Penalise for all others, maximum once per question number.

Qn	Answer	Marks	Marker's Report
1a	ohm metre (Ωm) work done	B1 B1	
1b	1.0×10^{-12}	B1	
2a	Speed increase at a constant rate from 0 to 2.0 s Increase at an increasing rate from 2.0 to 4.0 s	B1 B1	
2b	Area under the speed-time graph = ½ (duration) (initial speed + final speed) = ½ (2.0 – 1.0) (120 + 240) **= 180 m**	 M1 A1	
2c	$a = \frac{v-u}{t}$ $= \frac{240-0}{2.0}$ **= 120 m/s²** *Any other working that applies finding gradient from graph.*	M1 A1	
3a	In equilibrium, the **sum** of **clockwise moments equals** the **sum** of **anticlockwise moments** about the **same pivot**. Clockwise moments, anticlockwise moments sum, equals, same pivot	 B1 B1	
3b	3.0 N Anticlockwise moment = clockwise moment $F_1 \times d_1 = F_2 \times d_2$ $3.0 \times 30 = F_2 \times 20$ **F_2 = 4.5 N**	C1 M1 A1	

Qn	Answer	Marks	Marker's Report
4a	 Fig. 4.2 **Each force must fulfil** **1. Direction** **2. Point to start the force from** **3. Label** **B1 for each force with the 3 points fulfilled per force**	B1 B1 B1	
4bi	GPE = mgh = 800 (10) (2.5) = 20 000 J **= 20 kJ**	M1 A1	
4bii	KE = 110 – 20 **= 90 kJ** *No working is necessitated for credit*	 A1	
4biii	KE = ½ m v^2 90 kJ = ½ (800) v^2 90 000 = ½ (800) v^2 v^2 = 225 **v = 15 m/s**	M1 A1	
5a	As the water molecules **gain internal kinetic energy (OR gain energy in the internal kinetic store)**, they **slide faster and further** away from each other.	B1 B1	

Qn	Answer	Marks	Marker's Report
5b	Liquid water molecules go from being **(I)** arranged **close together** randomly, and **(II) sliding past one another** randomly to **(III) moving at high speeds** randomly, and **(IV) (very) far apart** randomly as gaseous water molecules. **0 – 1 subpoint = 0 m** **2 – 3 subpoints = 1m** **4 subpoints = 2m** *Both the random arrangement and the randomness of motion remain the same between the two states, hence not necessitated*	 B1 B1	
6a	 **Fig. 6.1**	B1	
6bi	V = I R 1.98 = (0.033) R **R = 60 Ω** *No working is necessitated for credit*	 A1	
6bii	$V_Y = V_{total} – V_X$ V_Y = (1.5 x 2) – 1.98 – 0.69 V_Y = 0.33 V V = I R 0.33 = (0.033) R **R = 10 Ω** *No working is necessitated for credit*	 A1	
6biii	P = I V = (0.033) (1.98) = 0.06534 **= 0.065 W or 0.0653 W** *No working is necessitated for credit*	 A1	

Qn	Answer	Marks	Marker's Report
6biv	Q = I t = 0.033 (1.0 x 60) **=1.98 C or 2.0 C**	C1 A1	
6bv	E = QV OR E = Pt = IVt E = 1.98 (3.0) E = 0.033(3.0)(60) **= 5.94 or 5.9 J** *No working is necessitated for credit*	 A1	
7a	The **metal casing can be live** OR There can be a **leak of current into / through the metal casing**. **(Earth leakage) Circuit breaker.** *** Fuse will not work in this case as the leak is from the neutral wire, after the appliance, so current will be at normal working current. It will actually not trigger the circuit breaker either, only the ELCB but we will accept for circuit breaker.*	B1 B1	
7bi	The hairdryer is **double insulated OR the casing is non-metal / non-conductive**. If there is **a fault where there is leak from the appliance to the casing (such as frayed live or neutral wires touching the casing)**, the user is **protected from an electrical shock**.	B1 B1	
7bii	**Z** for cold wind **Y and Z** for medium heat	B1 B1	
8a	Due to Fleming's Left Hand Rule, when the **current is flowing from W to X, magnetic field from N to S, the force on WX is down**. **Current flows from Y to Z, magnetic field remains N to S, force is up on YZ**. The forces form / create an anticlockwise **moment about the axis** as there is a **perpendicular distance from the line of action of force to the pivot at the axis** ** quote of FLHR is not necessitated for credit # partial credit can be given for correct identification of direction of current flow on any part of the coil AND direction of magnetic field	B1 B1 B1	

Qn	Answer	Marks	Marker's Report
8bi	The soft-iron cylinder will **concentrate the magnetic field cutting** (so that greater proportion of the existing / original magnetic field lines will cut) **across the current carrying coil**. **Increasing the force** (moment = force x perpendicular distance from the line of force to pivot (OR moment = F x d) **so moment will increase**.	B1 B1	
8bii	Increase the current in the coil. Increase the number of turns in the coil. ** Any suitable way	B1	
9ai	131	B1	
9aii	neutron = 78 proton = 53 electron = 53 *** any 1 correct for the 1st mark, all 3 for both marks*	B1 B1	
9bi	**Table 9.1** Day: 8 | 16 | 24 mass of Iodine-131 (g): 32 | 16 | 8 mass of Xenon-131 (g): 32 | 48 | 56 *** any 2 correct for the 1st mark, all 4 for both marks*	B1 B1	
9bii	4th half-life = ½ (8) = 4 5th half-life = ½ (4) = 2 (2 x 8 days) + 24 days = 40 days OR 64 x $(½)^n$ = 2 $(½)^n$ = 2 / 64 n = 5 half-lives 8 x 5 = 40 days **40 days**	C1 Either method, or any other possible working A1	

Qn	Answer	Marks	Marker's Report
9c	136 – 88 = 48 decayed So left 48 total original sample count rate = 48 x 2 = 96 background count rate = 136 – 96 **= 40 counts / min** ** *partial credit can be awarded for proof of showing that amount of decay = amount undecayed for each new sample after going through each half-life* <u>Alt data that can arrive at the answer</u> 88 – 64 = 24 64 – 24 = 40 64 – 52 = 12 52 – 12 = 40 136 – 88 = 48 88 – 48 = 40	C1 A1	
9d	Technetium-99m has a very short half-life so it will not remain in the body long.	B1	

Paper 2 Section B [10 marks]

Qn	Answer	Marks	Marker's Report
10a	(I) Water <u>particles</u> (molecules) nearest the dolphin <u>vibrate parallel to the direction</u> of travel of the sound <u>wave</u>, passing on the energy to the next layer of particles (OR by <u>longitudinal waves</u>), (II) Creating alternating <u>regions of compressions and rarefactions</u>. (III) <u>Transferring energy without a transfer of medium</u>. **1m for one or two subpoints.** **2m for all three subpoints.** *<u>Mark for the underlined phrases.</u>*	B1 B1	
10bi	From graph, wavelength λ = 0.080 m v = f x λ 1500 = f x 0.080 f = 18750 Hz ≈ **18.8 kHz or 19 kHz** **3rd mark is for correct conversion to kHz; there are two steps in this working that need conversion which needs to be both correct to have the right answer.** **Penalty of 1m for not presenting in 2 or 3 sf**	C1 C1 A1	
10bii	d = v t = 1500 x 2.0 = 3000 m Distance from the shoal = 3000 / 2 = **1500 m** **OR** 2d = vt d = vt / 2 = (1500)(2.0) / 2 = **1500 m**	C1 A1	
10ci	3.0×10^8 m/s	B1	
10cii	**<u>next shorter wavelength</u>: UV radiation** Sterilisation of equipment Suntanning with uv suntan bed **<u>next longer wavelength</u>: infrared radiation** Thermal scanners / infrared thermometers / Remote controls / Camera auto-focusing / Intruder alarms For cooking using thermal radiation *** any 2 correct for the 1st mark, all 4 for both marks, any valid example*	B1 B1	

Qn	Answer	Marks	Marker's Report
11ai	*Correct conversion of either kg to g* *OR m^3 to cm^3* 1.54 kg = 1540 g vol = 10 x 4.0 x 2.0 = 80 cm^3 d = m / v = 1540 / 80 = 19.25 ≈ **19.3 g/cm^3 or 19 g/cm^3** **Penalty of 1m for not presenting in 2 or 3 sf**	C1 C1 A1	
11aii	Yes. The density is similar as if there are other materials making it impure, the mass for the same volume will not be the same.	C1 A1	
11bi	W = mg = 1.54 x 10 N/kg = 15.4 N or 15 N	 B1	
11bii	P = F/A = 15.4 / (0.100 x 0.040) = 3850 N/m or 3900 N/m	C1 A1	
11c	Gold is a good conductor of thermal energy while wood is a poor conductor of thermal energy. **OR** Gold is a better conductor of thermal energy than wood. **OR** Gold is a better thermal conductor than wood. Energy from the hotter surrounding is absorbed through the gold block faster than through the wood to the ice causing the ice to gain thermal energy faster.	B1 B1	