NEW TOWN SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2024
Secondary 4 Express

NAME

CLASS

PHYSICS ...]/02

Paper ... 024

... minutes

Candidate ... 0800 – 0845

Additional M...

ANSWERS

- 1m for wrong sf (MAX -1m)
- 1m for wrong unit
Max – 8 mks

READ THESE ...

Write your name ... on all the work you hand in.
Write in dark blue ... both sides of the paper.
Do not use staples ... ps, highlighters, glue or correction fluid.

Section A (70 marks)
Answer **all** questions.

Section B (10 marks)
Answer any **one** question.

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 Marker's Use	
Section A	
Section B	
Total	

Section A (70 marks)
Answer **all** the questions in the spaces provided.

1 A man stands at the edge of a vertical cliff and he projects a stone vertically upwards. The stone reached its greatest height, fell past the man and hit the bottom of the cliff.

The motion of the stone is represented by the velocity-time graph shown in Fig. 1.1.

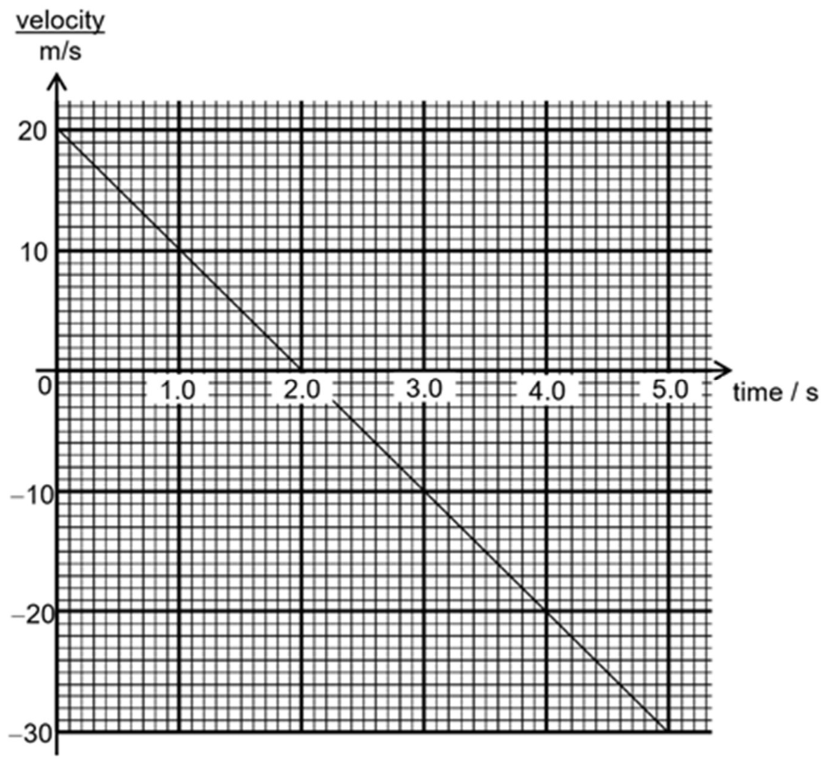


Fig. 1.1

(a) Explain how Fig. 1.1 shows that air resistance has negligible effect (C) on the motion of the stone.

Stone has a constant acceleration (E) indicating free-fall acceleration (R). OR
Graph has a constant gradient indicating free-fall acceleration. [1]

-Accept: a= $10 m/s^2$ which is acceleration due to gravity
-Majority wrote 'constant acceleration/ gradient' (E) without the (R)

(b) Based on the data shown in Fig. 1.1, determine the greatest height achieved by the stone.

Greatest height = area under v-t graph (first 2.0 s)
= ½(2.0)(20) [1]
= 20 m [1]

Most did well

greatest height = ……………………… [2]
[Total: 3 marks]

2 Fig. 2.1 shows the vertical forces acting on a weather balloon just after lift-off.

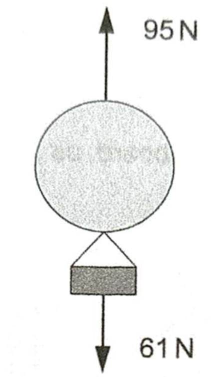


Fig. 2.1

The balloon experiences an upward force of 95 N. The total weight of the balloon and its contents is 61 N.

(a) Determine the total mass of the balloon and its contents.
The gravitational field strength *g* is 10 N/kg

(F) m = W / g
(S) = 61/ 10
(AU) = 6.1 kg [1]

total mass = ……………………… [1]

(b) Calculate the initial vertical acceleration of the balloon.
F_{net} = 95 – 61 = 34 N
a = F_{net} / m
= 34/ 6.1
=5.57 m/s^2 [1]

acceleration = ……………………… [1]

(c) As the balloon rises, it experiences air resistance. The upward force remains at 95 N.
Explain, in terms of forces acting, why the balloon will reach a constant speed.

As air resistance increases, the **total downward forces equal the upward force**. When resultant force acting on the balloon is zero [1], acceleration of the balloon will be zero based on Newton's 2nd law F = ma [1]. Hence the balloon will reach a constant speed.

-Majority cannot equate the balanced forces correctly/ stated the wrong Newton law
-Common mistakes: upward force = air resistance, forgetting the weight [2]
Air resistance = weight, which both are acting downwards
Newton 1st law was stated

[Total: 4 marks]

3 Fig. 3.1 shows a sphere of weight 6.5 N suspended by a wire from point X.
The sphere is pulled to one side by a horizontal force F so that the wire makes an angle of 30° with the vertical.

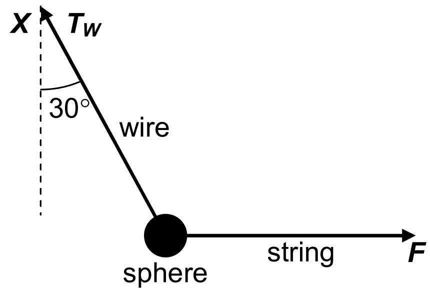


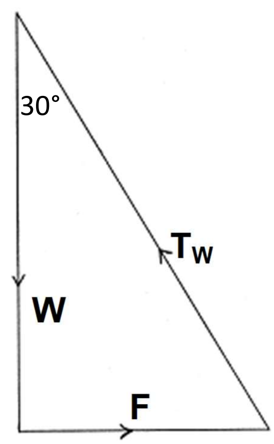
Fig. 3.1 (not to scale)

Use a scale of 1.0 cm to represent 0.50 N, draw a scale diagram in the space below to determine the magnitude of

(a) the tension (T_W) in the wire,

(b) the horizontal force F.

Diagram = right-angled triangle and all forces must be correctly labelled and in correct direction. [1]



Most did well

T_W = (7.5 ± 0.1) N [1]
F = (3.7 ± 0.1) N [1] [3]
[Total: 3 marks]

4 Fig 4.1 shows a sphygmanometer, a device used to measure blood pressure of a patient using mercury in a manometer.

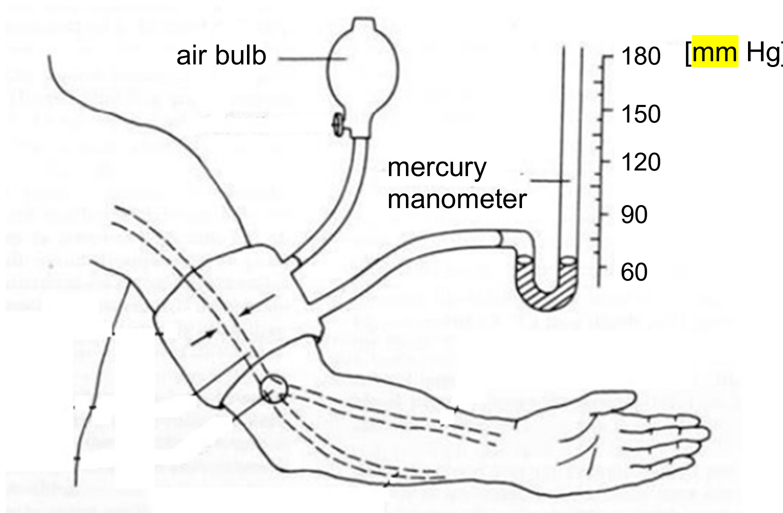


Fig. 4.1

Fig 4.2 shows an enlarged view of the manometer after the doctor has depressed the air bulb that is connected to the sphygmanometer.
The right arm of the manometer is open and exposed to atmospheric pressure.

P is the air pressure that is equal to the blood pressure of the patient.
P_0 = atmospheric pressure = 1.01×10^5 Pa.

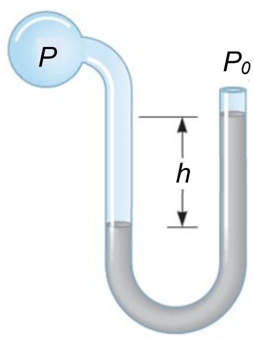


Fig 4.2

(a) The doctor observes that h = 115 mm. Calculate the blood pressure of the patient. Assume the density of mercury to be 13600 kg/m^3.

Blood pressure $P = P_0 + hpg$

$= (1.01 \times 10^5) + (115 \times 10^{-3})(1.36 \times 10^4)(10)$ [1 for equating $P = P_0 + hpg$]

$= 1.17 \times 10^5$ Pa / 117 000 Pa [1]

-Many did not convert mm to m / give 3 sf

pressure = ……………………… [2]

(b) The doctor proceeds to draw a liquid vaccine from a bottle.
Fig 4.3 shows a syringe with the vaccine in it.

The syringe has a piston A with cross-section area 0.80 cm^2 and a nozzle B with a cross sectional area of 0.13 cm^2.

The liquid pressure of the vaccine is 1.31×10^5 Pa.

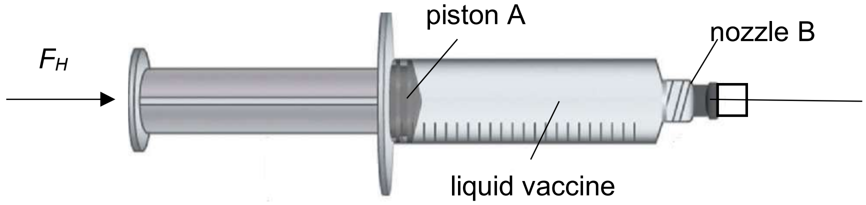


Fig 4.3

Calculate the force F_H required to just push in piston A.
Assume atmospheric pressure = 1.01×10^5 Pa.

$F_H + P_{atm}A = P_{liquid}A$ [1] correct eqn
$F_H + (1.01 \times 10^5)(0.80 \times 10^{-4}) = (1.31 \times 10^5)(0.80 \times 10^{-4})$
$F_H = 2.4$ N [1]

[award 1m if student omits $P_{atm}A$ in the eqn and gives $F_H = 10.5$ N]
[award 1m if student states the right eqn but converts the area wrongly]

-Majority could not attempt this qn.

Force F_H = ………………… [2]

(c) Explain, without calculation, how the magnitudes of the force at the piston A, F_A differs from the force at the nozzle B, F_B.

Since $P_A = P_B$ [1] due to Pascal's Law
$F_A/A_A = F_B/A_B$
Since $A_A > A_B$, [1]
$F_A > F_N$.

-Majority cannot answer well.
-Some can give right explanation but state F_A is smaller. [2]

[Total: 6 marks]

5 Fig. 5.1 shows a roller coaster of weight 5000 N and initially at rest at a height of 15.0 m above the ground.
It is then released from rest and it rolls along the track for 50.0 m before it comes to a momentary rest at point X which is 11.0 m above the ground.
The track feels warm after the roller coaster rolled past it.

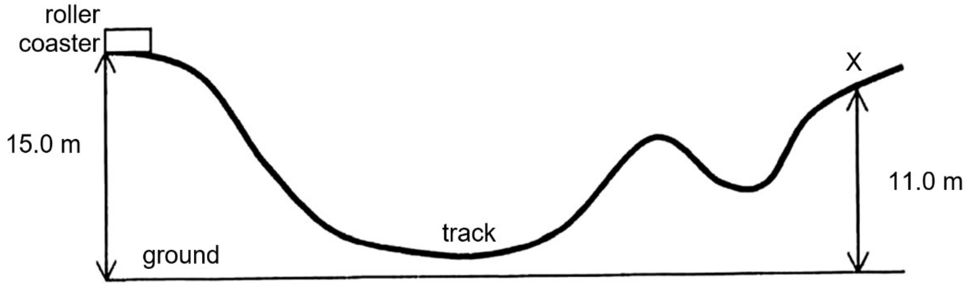


Fig. 5.1

(a) Ignoring loss of energy to the surroundings through other means, determine the work done against friction as it rolls from its initial rest position to point X.

Work done against friction = difference in GPE between initial position and at X
= mg(Δh)
= (5000)(15.0 – 11.0) [1]
= 20 000 J [1]

[award 1m if GPE at first and at X are correct]
-Many state WD against friction = F x d = 5000 x 50 but F = 5000N is not a frictional force.
-Some did not realise weight = mg in the formula and used m= 5000

work done against friction = ………………………….. [2]

(b) Determine the frictional force (assumed constant throughout) that acts between the roller coaster and the track.

Work done against friction = friction (F) × s
20 000 = F × 50.0 (allow ecf from c) [1]
F = 400 N [1] allow ecf

frictional force = ………………………….. [2]

(c) A motor (not shown in Fig. 5.1) was used to raise the roller coaster from ground level to its initial rest position 15 m above ground level.
Given that the motor takes 30 s to do so, what is the power dissipated by the motor? (Ignore energy lost to the surroundings as heat or sound).

Gain in GPE of roller coaster = mgh
= (5000)(15.0)
= 75 000 J

Power = work done / time
= 75 000 / 30 [1]
= 2500 W [1]

-Well attempted

Power = ………………………… [2]
[Total: 6 marks]

6 **(a)** Table 6.1 shows the wavelength of four electromagnetic waves.

Type of wave	wavelength
infrared wave	0.18 mm
A	0.5 μm
B	10 cm
C	1100 m

Table 6.1

Which of the waves, A, B or C, is visible light? Visible light has a wavelength shorter than IR

A [1] [1]

(b) A television station broadcasts its programmes at 5×10^3 kHz.

(i) Name the electromagnetic wave used for television broadcast.
radiowaves [1]

(ii) Calculate the wavelength of the wave.

$$\lambda = \frac{v}{f} = \frac{3\times10^8}{5\times10^6}$$ [1]

$$\lambda = 60m$$
[1]

6a, b well attempted

Wavelength = ………………………… [2]

(c) Stars emit all types of electromagnetic waves. Telescopes that monitor X-rays are mounted on satellites in space.

Suggest why would an X-ray telescope based on Earth not be able to detect X-rays emitted from distant stars.

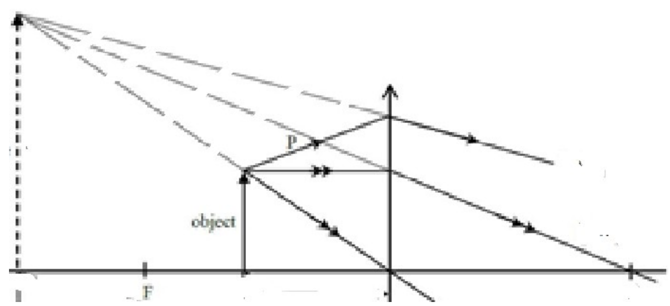
x-rays are absorbed by the atmosphere [1]

/ energy from x-ray dissipate into the surroundings [1]

Only 1 student answered this qn well and scored.

[Total: 5 marks]

7 Fig. 7.1 shows an object placed in front of a converging lens.



Rays through centre/ray through F [1]
Correct I: [1]
Correct path for P: [1]
No arrows/no dotted lines: -[1] max

Fig. 7.1

(a) On Fig. 7.1, draw two rays from the top of the object to locate and label the position of the image I. Hence complete the path for ray P. [3]

Many drew I with solid lines when I is virtual/ only marked I without drawing I as an upright image

(b) Describe two changes to the new image if the object is shifted closer to the lens.

Becomes smaller, closer to the lens [1] [1]

-Reject: Image is closer/ further from object
-Majority did not score. Most state image will be larger.

[Total: 4 marks]

8 Fig. 8.1 shows a solenoid connected to a battery. A bar magnet is placed on the left of the solenoid.

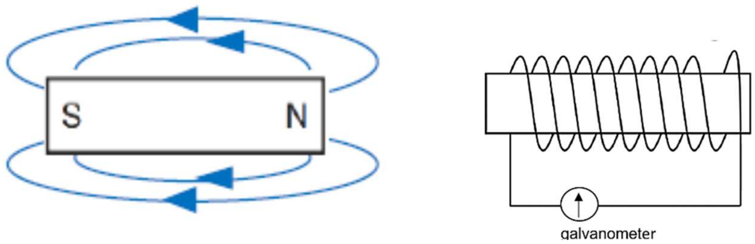


Fig. 8.1

(a) Draw in Fig. 9.1 the magnetic field around the stationary bar magnet. [2]

[1] magnetic field lines

Reject: if the lines cross each other

[1] correct arrows

Quite a handful draw arrow in wrong dir

(b) The bar magnet moves to the right, towards the solenoid.
State the direction of deflection of the galvanometer and give a reason for this.

Galvanometer will deflect to the right. [1]
By Lenz's Law, a North pole will be induced on the left of the solenoid to oppose the motion of the bar magnet. [1] [2]

-Most can state Lenz's law and right-hand grip rule in their answer.
-Some state ' deflect downwards/ opposite dir'/ a south pole induced on left side of solenoid

[Total: 4 marks]

9 A student builds a motor which consists of a coil ABCD, two metal rings and two magnets. The two ends of the coil are soldered to the two metal rings as shown in Fig. 9.1.

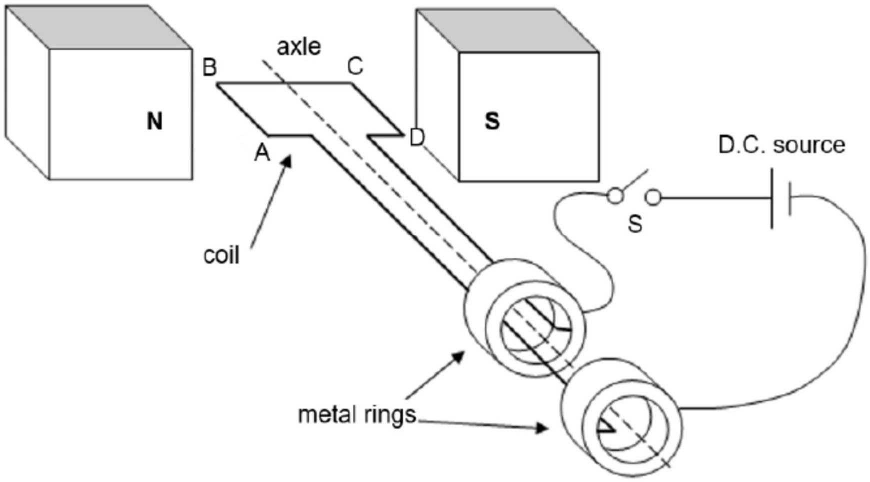


Fig. 9.1

(a) Fig. 11.2 shows the front view of the design of the motor.
On Fig. 11.2, draw the direction of the force acting on the sides AB and CD of the coil when switch S is closed. [1]

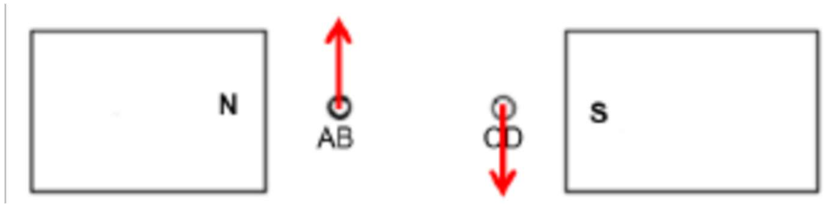


Fig. 9.2

(b) There is a fault with the design of this motor set up by the student.
Explain what is wrong with the set up.

The coil rotates clockwise and after passing the vertical position it rotates anti-clockwise. The coil will oscillate about the vertical position. [1]

[1]

[Accept: no split ring commutator to reverse dir of current every half revolution.]

(c) State a solution and explain briefly how it can help to rectify the motor's design.
The ends of the coil should be connected to a split ring commutator. [1]
The commutator will reverse the direction of the current in the coil every half a revolution. [1]
This enables the coil to rotate clockwise continuously.

[Accept: allows full revolution as the split rings reverse current in coil changing the direction of force every half revolution.]
-Majority states split rings, missing ' commutator'/
'ensure smooth rotation'/ 'rotates in one direction' without writing the function of the commutator

[2]

[Total: 4 marks]

10 **(a)** Fig.10.1 shows a transformer.

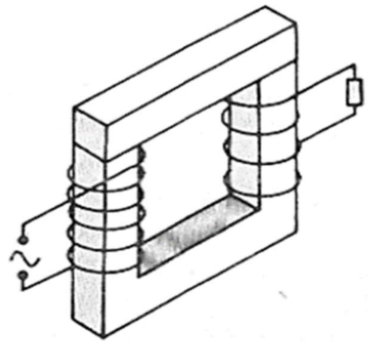


Fig. 10.1

The primary coil has 250 turns and the secondary coil has 150 turns.

Given that the primary coil is connected to a 230 V a.c. mains and that the primary current and the secondary current are 3.00 A and 4.00 A respectively, calculate

(i) the secondary voltage, Vs ,

Vs/Vp = Ns/Np
Vs = 150/250 x 230 [1]
= 138 V [1]

Many use $VI_p = VI_s$, which is applicable only if transformer is 100% efficient

Vs = ... [2]

(i) the efficiency of the transformer.

Efficiency = P_{output} / P_{input} x 100%
= 4 x 138/ 3x 230 x 100% [1]
= 80.0% [1]

Many used wrong formula, efficiency /= V_o / V_i x 100%

efficiency = ... [2]

(b) Transformers are often used during the transmission of power from power stations to houses.
In the transmission of power over a longer distance using cables, explain the need to step up voltage along the transmission cables.

Reduce the current flowing in the cables so that power loss due to ohmic heating ($P = I^2 R$) can be reduced.

[1]

-Reject: Reduce power loss
-A handful wrote prevent overheating in cables

[Total: 5 marks]

11 In a laboratory at a nuclear power station, a radiation detector is connected to a computer. The readings recorded are displayed on the computer screen. The detector is switched on.

Ten minutes later, at time t = 10 minutes, a small sample of radioactive material is removed from a nuclear reactor and placed near to the detector.
Readings are recorded for a further 40 minutes.
Fig. 11.1 shows the display on the computer screen.

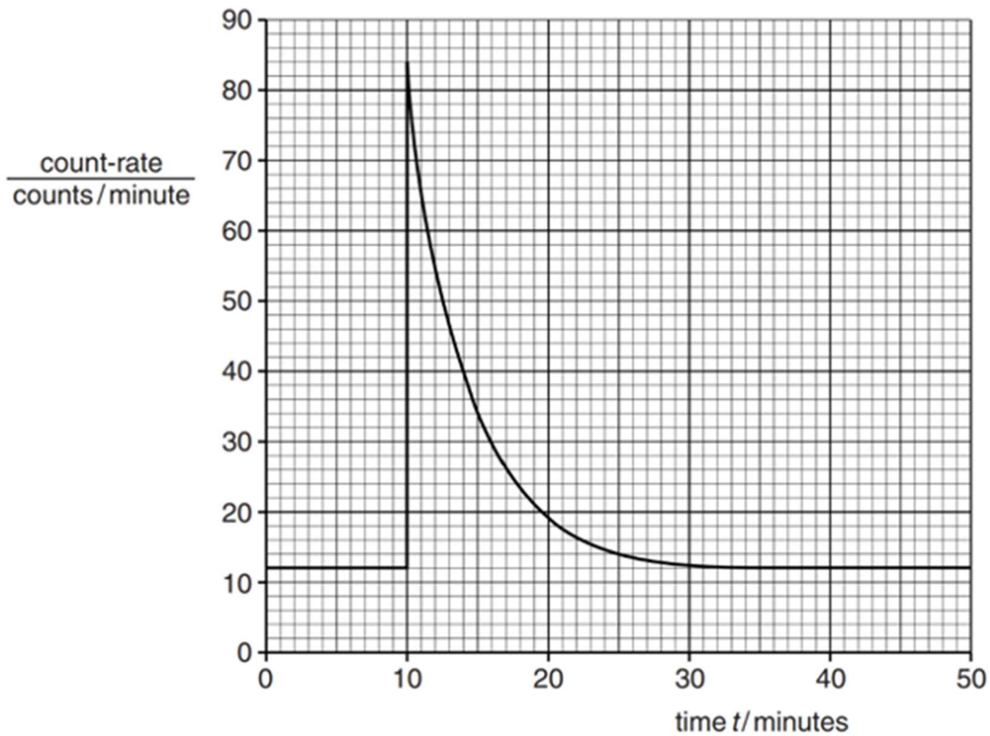


Fig. 11.1

(a) Use the graph to determine the background count rate in the laboratory.

background count rate = 12 counts/min [1]

Unit is missing for many

(b) Suggest one source of this background radiation.

Radiation from rocks, ground, building materials, radon gas, radiation from space, the sun's cosmic rays or nuclear waste (Any one) [1]

Many wrote 'computers'/ 'nuclear reactors' [1]

(c) Using Fig. 11.1, determine the count rate due to the radioactive sample at the following times.

(i) t = 10 minutes,

count rate = 84 – 12
= 72 counts/min

[Accept : cpm]
-Missing units/ wrong units
-Many did not subtract the background count rate

count rate = ………………………………….. [1]

(ii) t = 19 minutes.

count rate = 21 – 12
= 9 counts/min [1]

count rate = ………………………………….. [1]

(d) Using your answers in (c), calculate the half-life of the radioactive sample.

Let n be the number of half-lives.
$9 = 72 \times \left(\frac{1}{2}\right)^n$
$2^n = 8$
$n = 3$ [1]
Time interval for 3 half-lives = 19 – 10 = 9.0 minutes
Half-life = $\frac{9.0}{3}$ = 3.0 minutes [1]

-Majority cld not score due to wrong values from part c

count rate = ………………………….. [2]

[Total: 6 marks]

12 **(a)** Fig. 12.1 shows part of a household electrical installation where an electric kettle is used to heat the water.

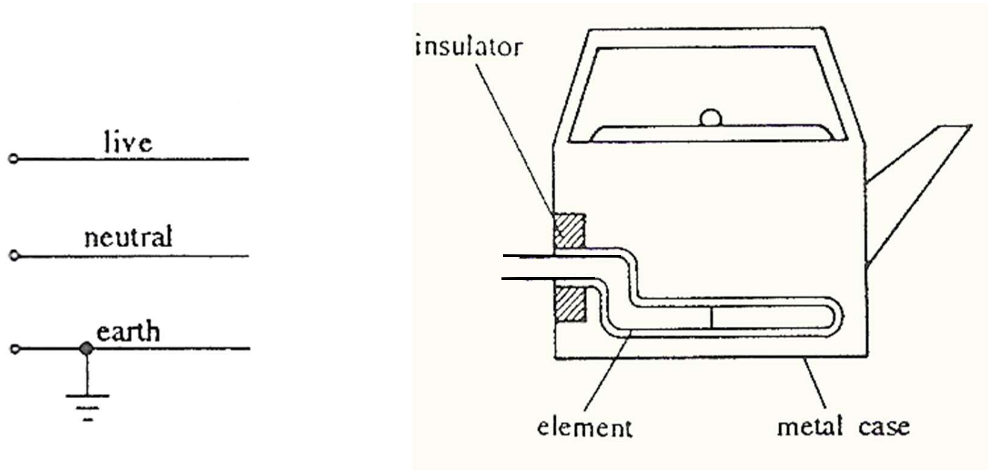


Fig. 12.1

(i) On Fig 12.1, complete the electric circuit by connecting the live, neutral and earth wires to the electric kettle.
Include a fuse and a switch in the circuit diagram. [3]

Live wire has a fuse and switch on it, connected to the upper wire, all drawn correctly. [1]
Neutral wire connected to the lower wire [1]
Earth wire connected to the casing [1]

-Well attempted qn but a handful cld not draw symbol for fuse

The electric kettle is rated 240 V, 2.5 kW.
Calculate

(ii) the operating current for the kettle;

I = P/V
= 2500/240
= 10.4 A [1]

current = ... [1]

(iii) the total energy used in 6 hours;

Energy E = P x t
= [kW] x [h] **OR** E = 2500 x 6 x 60 x 60
= 2.5 x 6 = <u>5.4×10^7 J</u>
= <u>15 kWh</u> [1]

-Many are confused with the units hence wrong unit stated

total energy = ... [1]

(iii) the cost of electricity at the rate 30 cents per kWh for a week if the kettle is used for 6 hours a day.

Cost = 15 x 30 x 7 [1] cost for a day
= 3150 cents / $31.50 [1]

-Those who used J for total energy in ii had difficulty in the calculation.

Cost = ………………………….. [2]

(b) Fig. 12.2 shows a relay used to switch on a car headlamp.

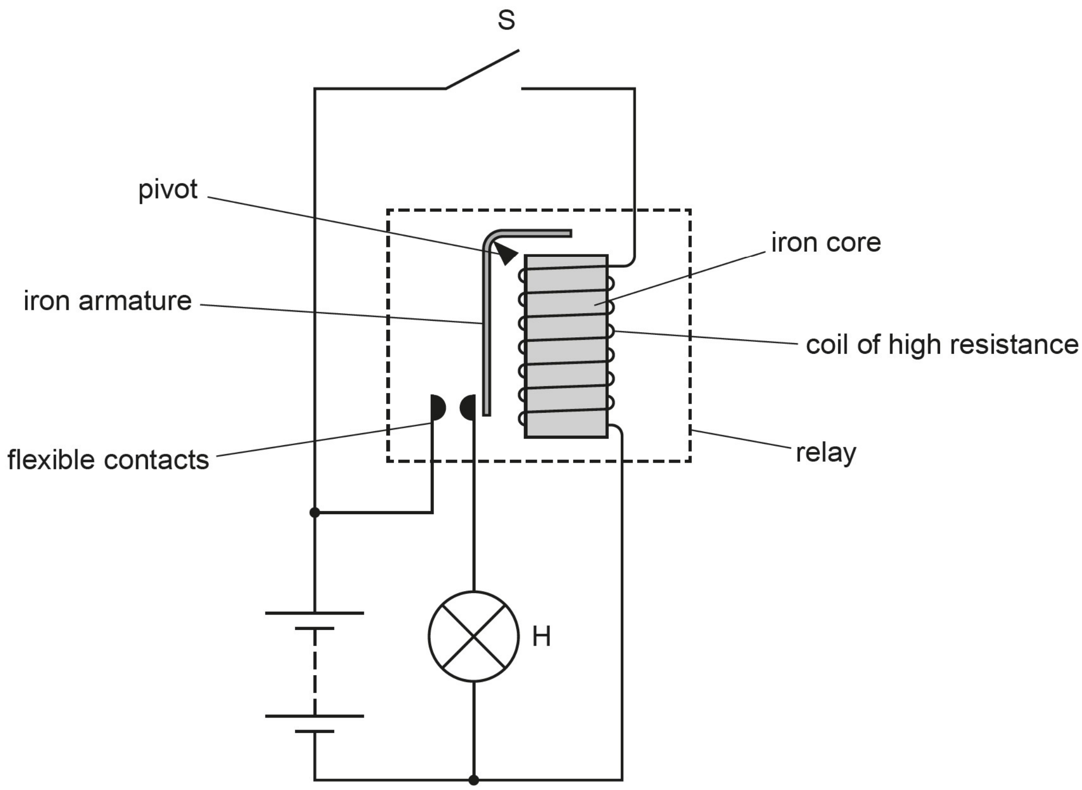


Fig. 12.2

Explain why headlamp H lights up when switch S is closed.

When switch S is closed, the current flows through the wire and the coil around the iron core. Iron core becomes an electromagnet. [1]

The electromagnet attracts the iron armature at its top end. [1]

The iron armature pushes the flexible contacts closed, allowing current to flow through H in a parallel connection, so H lights up. [1]

Well answered for majority.

[3]

13 Fig. 13.1 shows a vacuum flask cooker. It comprises of an outer pot and an inner pot.

The inner pot is a single-layered steel container with a shiny and silvery exterior.
The outer pot is a double-layered steel container with vacuum in between the layers.
Both pots come with their own lids. The inner pot can fit into the outer pot.

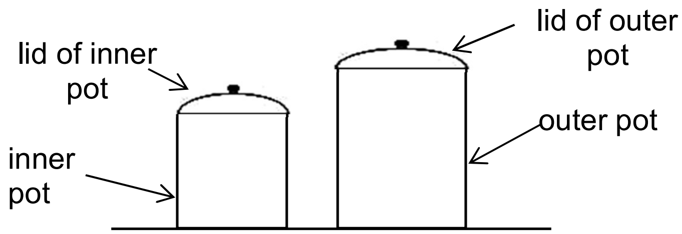


Fig. 13.1

Student A used the vacuum cooker to cook some soup by doing the following:

- The soup was placed into the inner pot over an electric stove.
- The stove is set at high power setting and the soup was cooked for 20 minutes.
- The inner pot, containing the soup, was transferred immediately into the outer pot.
- The outer pot was then covered up with lid and left alone for 3 hours.
- The inner pot containing the soup was taken out of the outer pot and over the electric heater again. The soup was cooked at high power setting for 2 minutes.

Student B is not impressed by student A's way of cooking the soup.
He devised his own way of cooking the same mass of soup by doing the following:

- The soup was placed into the inner pot over an electric stove.
- The stove is set at high power setting and the soup was cooked for 20 minutes.
- The stove is then set at low power setting and the soup was cooked for 100 minutes.

Other details pertaining to the electric stove and the soup are shown in Table 14.2.

Table 13.2

power rating of electric stove (high power setting)	2.2 kW
power rating of electric stove (low power setting)	1.1 kW
mass of soup	4.0 kg
specific heat capacity of soup	4400 $Jkg^{-1}{}^{\circ}C^{-1}$
temperature of soup (before inner pot is placed inside outer pot)	97.0 °C
temperature of soup (after 3 hours)	85.0 °C

(a) Explain what is meant by *the specific heat capacity of the soup is 4400 $Jkg^{-1}\,°C^{-1}$*.

4400 J of thermal energy is needed to raise the temperature of 1 kg of soup by 1 °C [1]
Many cld answer well

(b) Determine the rate of heat loss from the soup when it was placed inside the outer pot for 3 hours. Express your answer in SI units.

$Q = mc\Delta\theta$
$= (4.0)(4400)(97.0 – 85.0)$
$= 211200$ J [1]

Thus, rate of heat loss = Amt of energy lost / time
= 211200 J / 10800 s
= 19.6 J/s [1]
(accept 20 J/s ← 2 s.f.) (unit: accept "W")

-Many states heat loss = change in temp/ time
-J/h is not SI unit

rate of heat loss = ………………………….. [2]

(c) Explain how the inner pot keep the soup warm when it was placed inside the outer pot for 3 hours.

Shiny and silvery exterior is a poor emitter of radiant heat [1] and reduces heat loss by radiation. [1]
Lid prevents heat loss by convection and evaporation (of soup) [1]

[3]

Many wrote about the vacuum layer in the outer pot instead of the lid.

(d) Determine the amount of energy supplied by the stove using student A's method as well as student B's method.
Hence, deduce whose method is more energy efficient.

Energy supplied by electric stove (student A's method):
$(2200)(20 \times 60) + (2200)(2 \times 60) = (2.64 + 0.264)$ MJ = 2.904 MJ = 2.9 MJ (2 s.f.)

Energy supplied by electric stove (student B's method):
$(2200)(20 \times 60) + (1100)(100 \times 60) = 2.64$ MJ + 6.6 MJ = 9.24 MJ = 9.2 MJ (2 s.f.)

Student A's method is more energy efficient.

-Many show confusion in the units when using E (J) = P (W) x t (s)
Vs E (kWh) = P (kW) x t (h)

energy supplied (A's method) = ...

energy supplied (B's method) = ...

whose method is more energy efficient: .... [3]

(e) When cooking water-based food, we must exercise caution not to be scalded by steam. Explain why scalding by steam at 100°C is more severe than being scalded by the same mass of boiling water at 100°C.

Steam condenses to water and transfers latent heat of vaporization to the skin which is more than the thermal energy transferred by hot water to skin (as hot water cools down).

[1]

-Most state ' steam has more energy than boiling water' without explaining why.
-Some confused with latent heat of fusion.

[Total: 10 marks]

Section B (10 marks)

Answer any **one** question in this section.
Write your answers in the spaces provided.

Students who did Qn 15 tend to score higher in this section

14 **(a)** A clarinet contains a thin strip of material, known as the reed.
A musical note is produced when the reed vibrates, causing molecules in the air nearby to vibrate at the same frequency.

Fig. 14.1 shows the clarinet and an audience in a concert room.

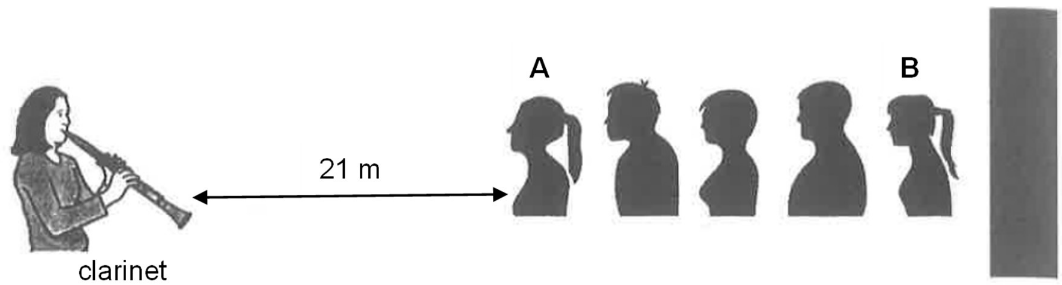


Fig. 14.1

A sound is heard by a listener at A, who is 21 m from the clarinet. The clarinet is making a note of frequency 220 Hz.

(i) Explain how the sound is transmitted from the clarinet to the audience.

When a musical note is produced, the surrounding air particles are displaced/ vibrate parallel to the direction of the sound [1] through a series of compressions and rarefactions [1], and the energy is transferred eventually from particles to particles.

[2]

(ii) Calculate how many vibrations the reed makes before the sound reaches the listener at A. The speed of sound in air is 330 m/s.

Time taken to for sound to reach A
= 21 / 330
= 0.06 s [1]

Period = 1 / 220 = 4.55×10^{-3} s [1]

Complete cycles in 21 m = 0.06/(4.55×10^{-3})
= 14 [1]
OR
$\lambda = v / f$
= 330 / 220 [1]
= 1.5 m [1]

Complete cycles in 21 m = 21 / 1.5
= 14 [1]

-Many cld not show the understanding of wave quantities, period/ wavelength.

-Some work through the calculation for an echo.

number of vibrations = ... [3]

(iii) Another listener at B is further away from the clarinet as shown in Fig. 15.1. She hears a sound of frequency 220 Hz but with a lower amplitude.

Describe, using ideas about the vibration of molecules in air, what is meant by

Badly attempted.

1. a frequency of 220 Hz,

The number of complete vibrations of air molecules in 1 s is 220. [1]

2. a lower amplitude.

The maximum displacement of air molecules from its equilibrium position is smaller. [1]

(b) Line X in Fig. 14.2 represents the position of molecules in the wall of the concert room.

Line Y represents the position of the same molecules at time t as a sound wave passes through the wall.

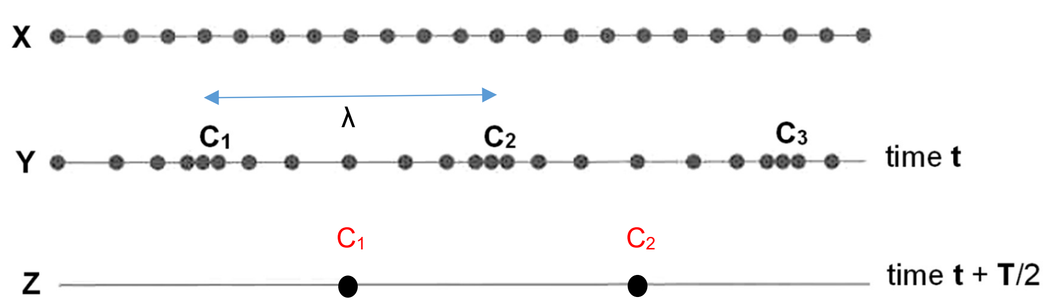


Fig. 14.2

(i) On line Y in Fig. 14.2, mark a distance equal to the wavelength of the sound wave. Label it as λ. [1]

Accept any other answer from compression to next compression or rarefaction to next rarefaction.

-Most did well.

(ii) Describe how Fig. 14.2 show that sound is a longitudinal wave.

<u>A series of compression or rarefaction</u> can be seen on line Y. [1]

-Many show understanding of longitudinal wave definition.

(iii) Line Y in Fig. 14.2 shows a number of compressions.

The time taken for one complete vibration of a molecule is T.

On line Z in Fig. 14.2, mark the new positions of C1 and C2 at time t + T/2. [1]

-Majority cld not do this qn.
-Failed to understand:
Period is the time taken for the wave to move one wavelength

[Total: 10 marks]

15 A thermistor is part of an electrical set-up shown in Fig. 15.1.
The resistance of R1 is 50 Ω.

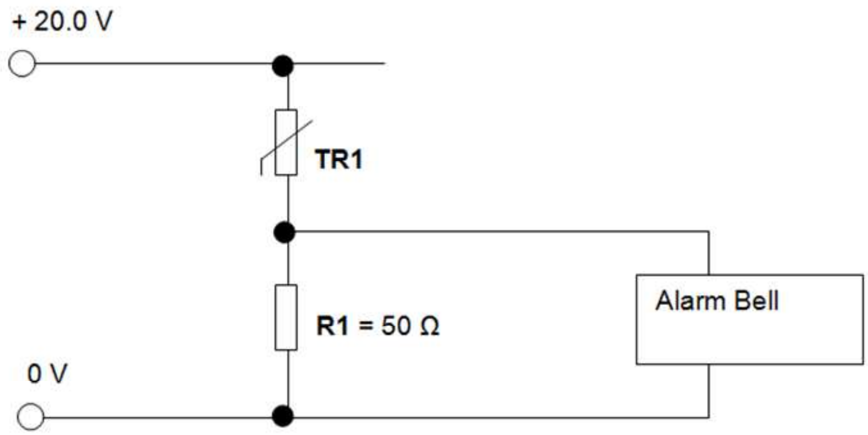


Fig. 15.1

The alarm bell will be activated only when the potential difference across it is 5.0 V and above. Assume that the alarm bell takes in negligible current.

The characteristic of thermistors TR1 and TR2 are shown in Fig.15.2.

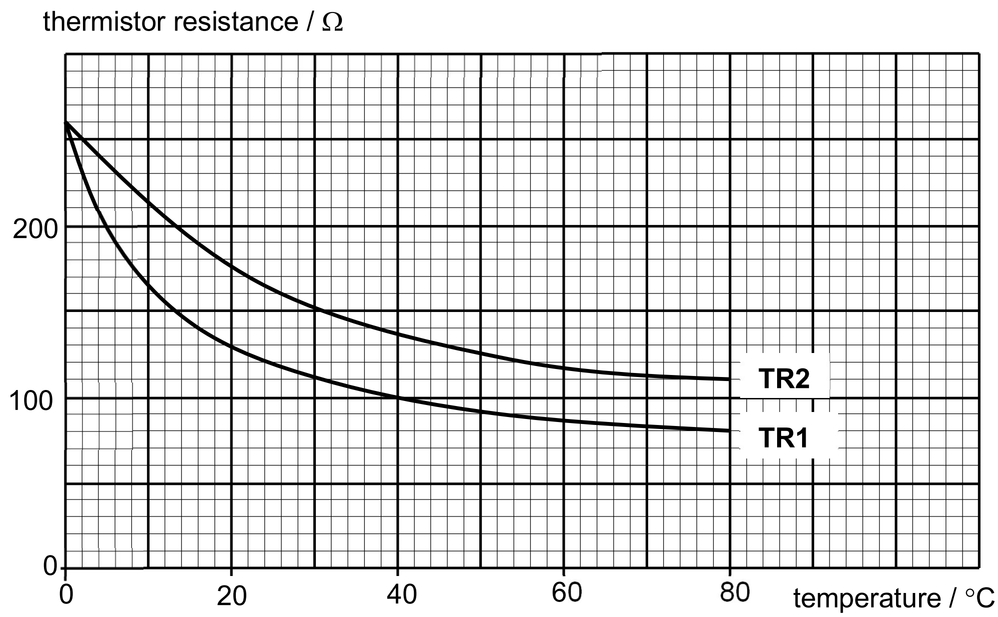


Fig. 15.2

(a) Using Fig. 15.2, describe the relationship between the resistance of the thermistor and temperature.

As temperature increases, resistance decreases at a decreasing rate. [1]

[Accept: resistance is inversely proportional to temperature.]

-Reject: As temp increases, R decreases
: As temp increases, R decreases non-linearly

(b) State the resistance of TR1 when the temperature is 45 °C.
Many did not show working on graph and read wrongly.

resistance of TR1 = 95 Ω [1]

(c) Hence, calculate

(i) the current flowing through TR1 at 45°C,

R_T = 50 + 95 = 145 Ω [1]

I = V ÷ R
= 20 ÷ 145
= 0.138 A [1] Allow ecf from (b)

-Many state I= 20 / 95 which ignores the 2 resistors are in a series ckt.

current flowing through TR1 = ………………………… [2]

(ii) the potential difference across TR1 at 45°C.

V = I x R
= 0.138 x 95 [1]
= 13.1 V [1] Allow ecf from part ci
OR
V = (95 / [95+50]) x 20 V
= 13.1 V

-Many show understanding of a potential divider.
-A handful work out pd across R1.

potential difference across TR1 = ………………………… [2]

(d) Calculate the minimum temperature that will activate the alarm.
I = V / R
= 5 V / 50 Ω
= 0.1 A [1]

Resistance of TR1 = 15 V / 0.1 A = 150 Ω [1]

From graph, temp = 13.0 °C [1]

minimum temperature = ………………………… [3]

(e) The characteristics of another thermistor TR2 is shown in Fig.15.2.

With the same operating condition, predict what will happen to the system if TR1 is replaced by TR2.

The minimum temperature to activate the alarm will increase.

-Many answered this qn wrongly. [1]

[Total: 10 marks]

END OF PAPER