Class:	Candidate Name:	Candidate Index Number:

EDGEFIELD SECONDARY SCHOOL
2022 PRELIMINARY EXAMINATION
Secondary 4/5

O Syllabus

SCIENCE (PHYSICS, CHEMISTRY) **5076/01**

Paper 1 Multiple choice **Aug 2022**

Additional Materials: OTAS

1 hour

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the box above and the OTAS sheet.
Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.

There are **forty** questions on this 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.

Read the instructions on the Answer Sheet very carefully.

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 16.
A copy of the Periodic Table is printed on page 17.
The use of an approved scientific calculator is expected, where appropriate.

FOR EXAMINER'S USE	
TOTAL	**/ 40**

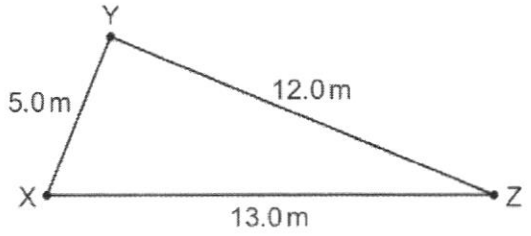
My target grade/mark: _____

_____
Parent's Signature

This document consists of **17** printed pages and 1 blank page.

[Turn over

1 Paths are laid as shown between X, Y and Z.

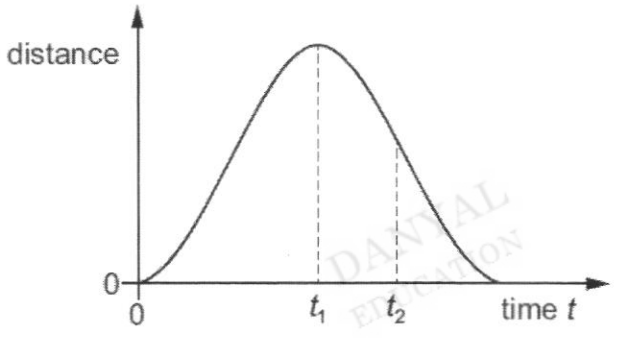


A person walks along the paths from X to Y to Z and then back to X.

What is the value of the total displacement and of the total distance travelled?

	total displacement / m	total distance travelled / m
A	0	0
B	0	30
C	30	0
D	30	30

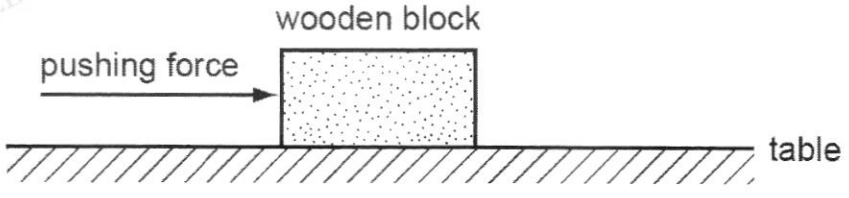
2 A train sets off from a station at time t = 0. The graph shows how the distance between the train and the station varies with time.



Which statement about the motion of the train between t_1 and t_2 is correct?

A Its speed is decreasing and it is moving away from the station.
B Its speed is decreasing and it is moving towards the station.
C Its speed is increasing and it is moving away from the station.
D Its speed is increasing and it is moving towards the station.

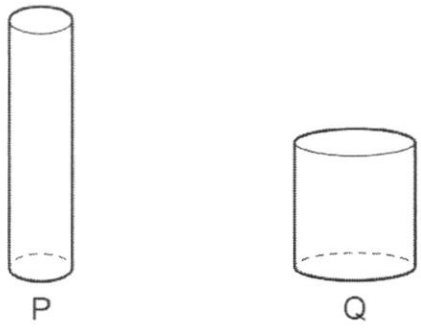
3 A wooden block is pushed across a table at constant speed.



Which statement is correct?

A The frictional force increases as the block moves at constant speed.
B The frictional force is equal and opposite to the pushing force.
C The frictional force is greater than the pushing force.
D The frictional force is less than the pushing force.

4 Two cylinders P and Q are made of copper.

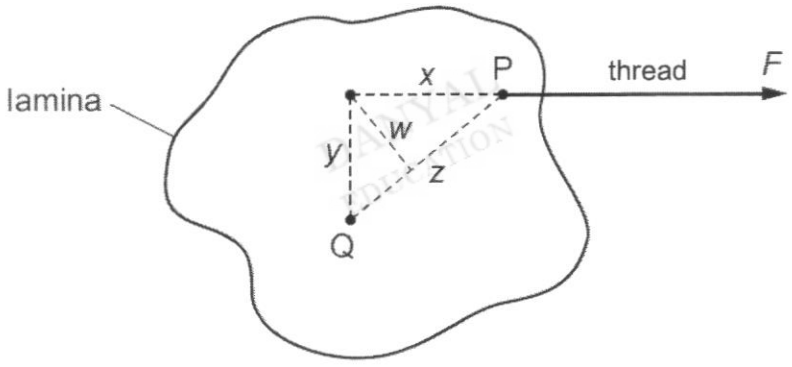


The height of P is twice that height of Q. The diameter of P is half the diameter of Q.

Which statement is correct?

A The density of cylinder P is four times that of cylinder Q.
B The density of cylinder P is twice that of cylinder Q.
C The density of cylinder P is equal to that of cylinder Q.
D The density of cylinder P is half that of cylinder Q.

5 A length of thread is attached to a lamina at point P, as shown in the diagram.



The lamina is free to rotate about point Q.

The tension in the thread is *F*.

What is the moment of *F* about Q?

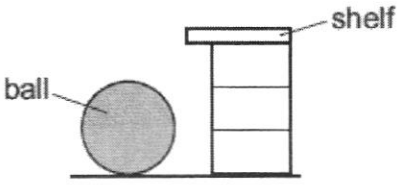
A *Fw* **B** *Fx* **C** *Fy* **D** *Fz*

6 A weightlifter picks up a stone ball and places it on a shelf.

Each lift takes the same time.

Which situation requires the greatest power?

A



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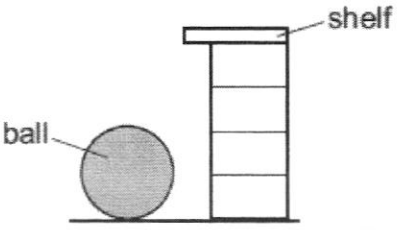

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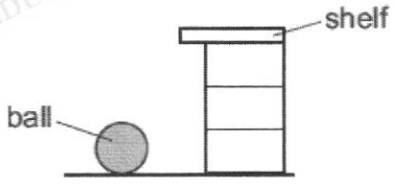
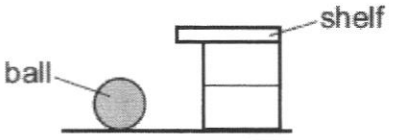


D



7 A rectangular block of metal has weight 6.0 N and measures 3.0 cm x 4.0 cm x 5.0 cm.

What is the smallest pressure that it can exert when resting on a horizontal surface?

A 0.10 N / cm^2 **B** 0.30 N / cm^2 **C** 0.40 N / cm^2 **D** 0.50 N / cm^2

8 Which statement about water is correct?

A At the boiling point, water vapour molecules have the same kinetic energy as liquid water molecules.
B Evaporation occurs only at boiling point.
C Water molecules become heavier when water freezes.
D Water molecules lose all of their kinetic energy when water freezes.

9 The diagram shows the inside of a refrigerator.

When the refrigerator is first switched on, what happens to the air near the cooling unit?

	air molecules	density of the air
A	become smaller	decreases
B	become smaller	increases
C	move closer together	decreases
D	move closer together	increases

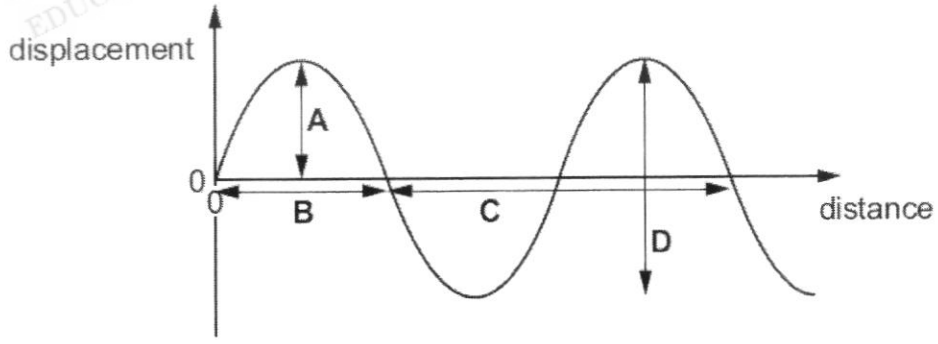
10 The temperature of the water in four beakers are different and areas of the surfaces of the water are also different.

In which beaker is the rate of evaporation of the water greatest?

	temperature of water / °C	surface area of water / cm^2
A	20	50
B	20	100
C	25	50
D	25	100

11 The diagram shows the displacement-distance graph of the particles in a wave.

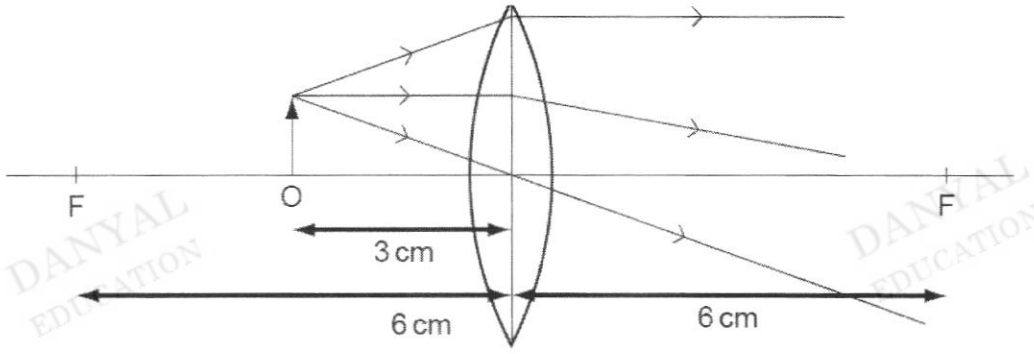
Which value is multiplied by the frequency to give the speed of the wave.



12 Which statement about radio waves is correct?

A Radio waves are sound waves.
B Radio waves are used to kill cancerous cells.
C Radio waves are used in television communications.
D Radio waves have frequencies higher than those of visible light.

13 The diagram shows an object O placed 3 cm away from a converging lens of focal length 6 cm.



What type of image is produced?

A real, erect and diminished
B real, inverted and magnified
C virtual, erect and magnified
D virtual, inverted and diminished

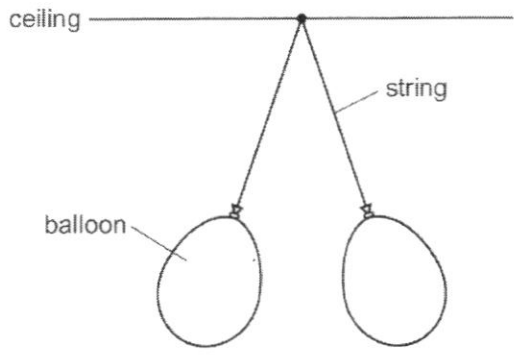
14 A longitudinal wave passes along a spring. The coils of the spring vibrate from side to side.

The diagram shows the positions of the coils at one particular time.

Which positions are one wavelength apart?

A W and X **B** W and Z **C** X and Z **D** Y and Z

15 Two balloons are suspended from the ceiling by string and have moved apart as shown.



Which statement is correct?

A One is charged and the other is uncharged.
B They are uncharged.
C They have like charges.
D They have unlike charges.

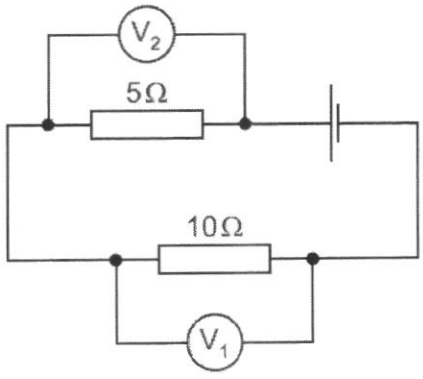
16 A wire of length 0.50 m and cross-sectional area 1.0×10^{-6} m^2 has a resistance of 0.75 Ω.

Another wire of the same material has a length of 2.0 m and a cross-sectional area of 0.50×10^{-6} m^2.

What is the resistance of the longer wire?

A 0.094 Ω **B** 0.38 Ω **C** 1.5 Ω **D** 6.0 Ω

17 Two resistors are connected in a circuit as shown.



The reading on the voltmeter V_1 is 2V.

Which statement is correct?

A The current in the 5 Ω resistor is greater than the current in the 10 Ω resistor.
B The current in the 10 Ω resistor is 20 A.
C The electromotive force of the cell is 3 V.
D The reading of the voltmeter V_2 is 4 V.

18 In a household electrical circuit, why are fuses and switches always placed in the live lead?

A A break in the live wire cuts off the appliance from the voltage supply.
B A break in the neutral wire would not stop current in the circuit.
C The live wire carries a greater current.
D The neutral wire carries no current.

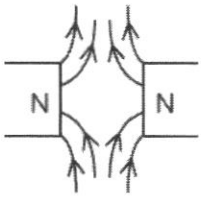
19 Five electrical appliances are connected to the same socket and there is a very large current.

Why is this dangerous?

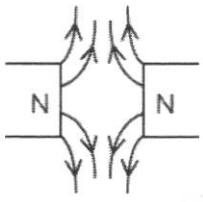
A The fuses blow in the appliances.
B There is a greater risk of an electrical shock.
C There is overheating in each appliance.
D There is overheating in the socket.

20 Which diagram shows the magnetic field pattern in the region between the N-poles of the two bar magnets?

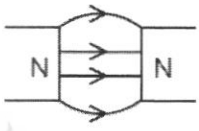
A



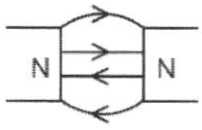
B



C



D



Class:	Candidate Name:	Candidate Index Number:

EDGEFIELD SECONDARY SCHOOL
2022 PRELIMINARY EXAMINATION
Secondary 4/5

O Syllabus

SCIENCE (PHYSICS) **5076/02**

Paper 2 **Aug 2022**

Candidates answer on the Question Paper.
No additional materials are required **1 hour 15 minutes**

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the box above.
Write in dark blue or black ink.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

Section A
Answer **all** questions.

Section B
Answer any **two** questions.
Write your answers in the spaces provided on the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.
Acceleration due to gravity, g, is assumed to be 10 m/s^2 unless otherwise stated.

FOR EXAMINER'S USE	
SECTION A	/45
SECTION B	/20
TOTAL	/ 65

My target grade/mark: _____

_____
Parent's Signature

This document consists of **20** printed pages

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Section A

Answer **all** the questions in the spaces provided.

1 A microphone in a recording studio has a weight W of 5.0 N.

(a) The microphone is suspended from the ceiling by a cord attached to a small ring. Fig. 1.1 shows the microphone pulled to one side and kept stationary by a horizontal thread.

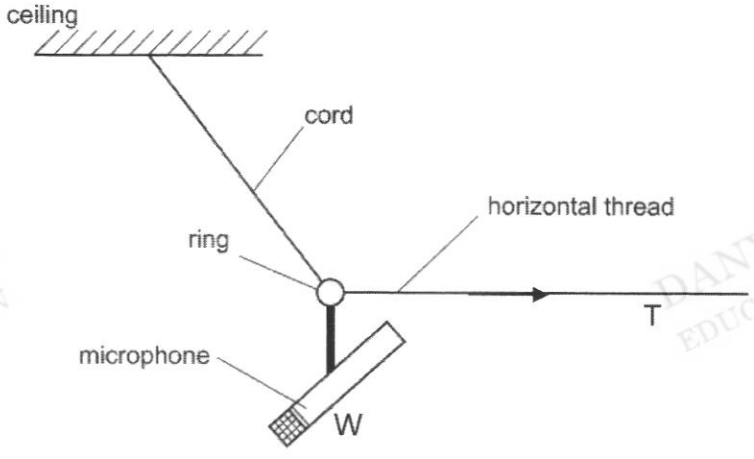


Fig. 1.1 (not to scale)

The tension T in the horizontal thread is 8.0 N.

Determine graphically the magnitude and the direction, relative to the vertical, of the resultant of forces W and T.

magnitude of resultant force = ... N [2]

direction of resultant force = ... [1]

(b) State how the magnitude and direction of the resultant in **(a)** compares with the force on the ring due to the tension in the cord.

(1) magnitude : .....

(2) direction of force on the ring by the cord compared to resultant in **(a)**

..... [1]

2 Fig. 2.1 shows an early water-powered device used to raise a heavy load. The heavy load rests on piston B.

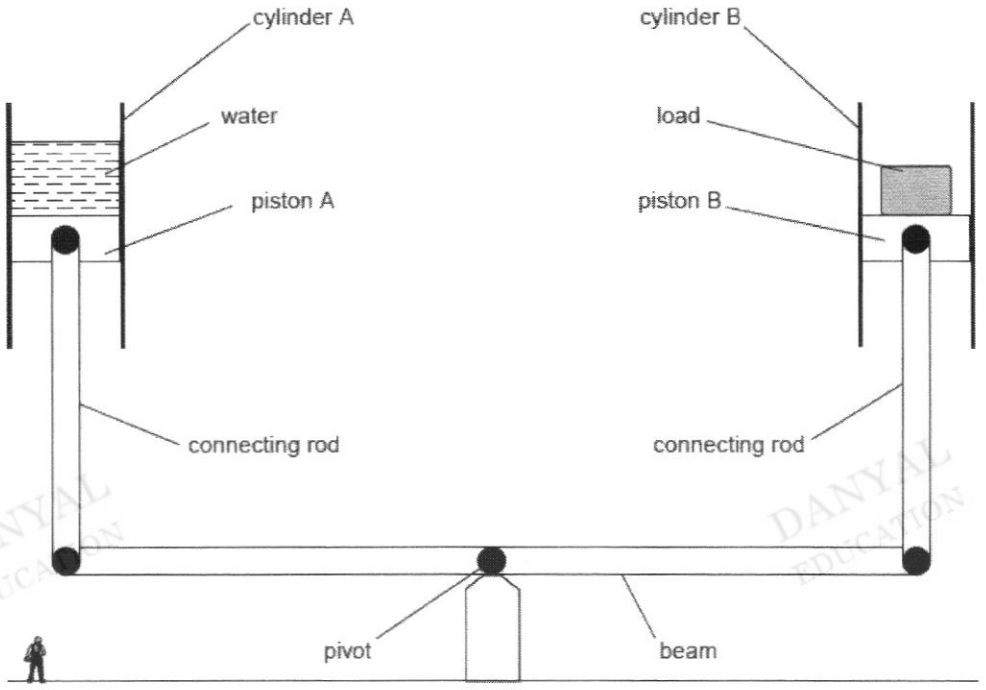


Fig. 2.1

Initially, a large weight of water in cylinder A pushes piston A down. This causes the left-hand end of the beam to move down and the right-hand end of the beam to move up. Piston B rises, lifting the heavy load.

(a) The weight of water in cylinder A is 80 kN.

Calculate the mass of water in cylinder A.

mass of water = ... kg [1]

(b) The density of water is 1000 kg / m^3.

Calculate the volume of water in cylinder A.

volume of water = ... m^3 [1]

(c) Piston A moves down a distance of 4.0 m.

Calculate the gravitational potential energy lost by the water.

gravitational potential energy = ... J [1]

(d) The heavy load lifted by piston B gains 96 kJ of gravitational potential energy.

Given that efficiency = [useful output energy / total input energy] x 100%

Calculate the efficiency of the device in percentage.

efficiency = ... % [1]

3 Fig. 3.1 shows a wooden bench of weight 2000 N.

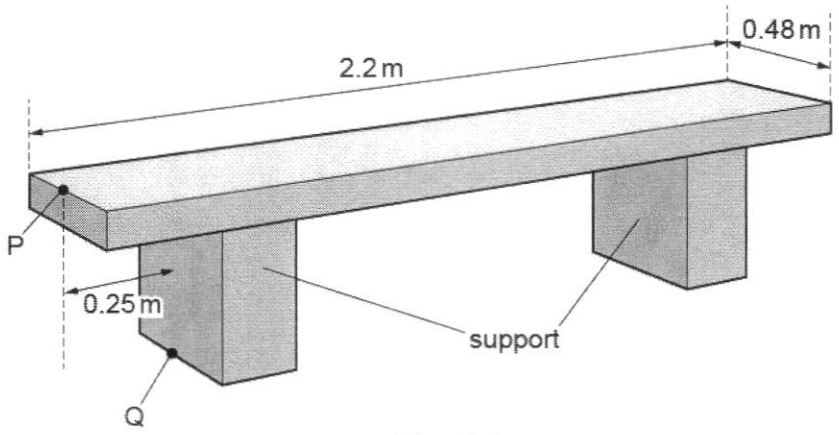


Fig. 3.1

(a) Each of the two supports has an area of 0.040 m^2 in contact with the ground.

Calculate the pressure on the ground due to the bench.

pressure = ... Pa [2]

(b) Given that the wood used to make the bench is uniform with same density.

Explain why this wooden bench is stable and will not topple?

.....

.....

.....[1]

(c) There is a force exerted vertically downwards from point P shown in Fig. 3.1.

Calculate the maximum force that can be exerted vertically downwards at P without the bench rotating about the point Q shown in Fig. 3.1.

maximum force = ... N [2]

4 Fig 4.1 shows a water wave passing a floating log. The log is stationary.

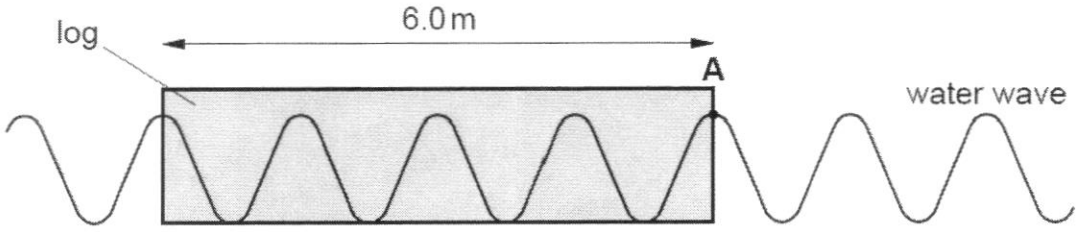


Fig. 4.1

The log is 6.0 m long and 5 complete waves take 10 seconds to pass point A.

Determine

(a) the wavelength of the water waves,

wavelength = ... m [1]

(b) The period of the water waves,

period = ... s [1]

(c) the frequency of the water waves,

frequency = ... Hz [1]

(d) the speed of the water waves.

speed = ... m / s [1]

5 Fig 5.1 shows a light ray in air, incident on the side of a rectangular glass block at an angle of 60°.

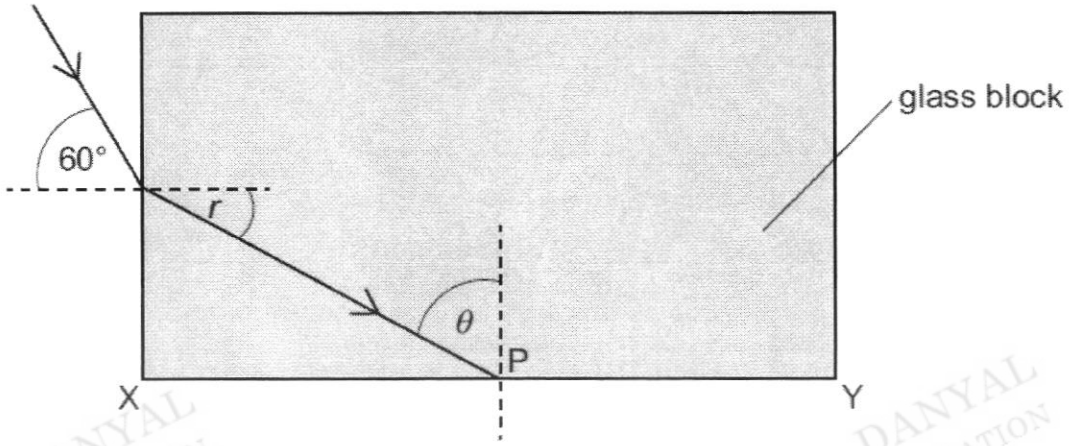


Fig. 5.1

The refractive index of the glass is 1.5. The light travels in the glass and is incident on side XY at P.

(a) State a similarity and a difference between light and sound waves.

similarity :

.....

..... [1]

difference : .....

..... [1]

(b) At the point where the light enters the glass, the angle of refraction is *r*.

Calculate angle *r*.

r = ...° [1]

(c) **(i)** Calculate the critical angle *c* for light travelling in the block.

critical angle *c* = ...° [1]

(ii) At P, the angle Θ between the ray and the normal is given by $\Theta = 90^{o} - r$.

State and explain what happens to the light when it is incident on side XY.

.....

.....

..... [2]

(d) Given the speed of light in the air is 3.0×10^{8} m / s.

Calculate the speed of light in the glass block.

speed of light in glass = ... m / s [1]

6 A plastic rod is rubbed with a cloth and becomes negatively charged as shown in Fig. 6.1.

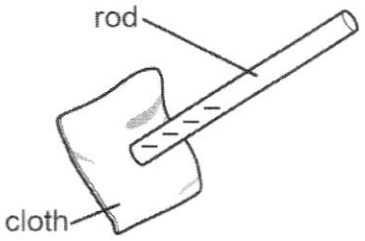


Fig. 6.1

(a) Explain how the rod becomes negatively charged when rubbed with a cloth.

.....

..... [2]

(b) An uncharged metal-coated sphere hangs from an insulating thread. The negatively-charged rod is brought near the sphere. The sphere is attracted to the rod, as shown in Fig. 6.1.

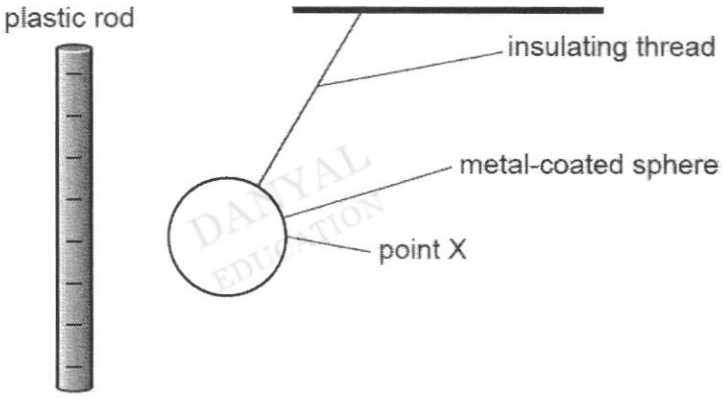


Fig. 6.2

(i) Draw on Fig. 6.2 how charge is distributed on the sphere when the negatively-charged rod is near. [1]

(ii) Describe and explain why the uncharged sphere is attracted to the negatively-charged rod.

.....

.....

..... [2]

(c) With the charged rod still close to the sphere, point X on the metal-coated sphere is earthed by connecting the sphere with a copper wire to the ground.

Describe and explain what happens to the charges in the metal-coated sphere as it is earthed and what is the net charge on the sphere.

.....

.....

..... [2]

7 A student sets up the circuit shown in Fig. 7.1.

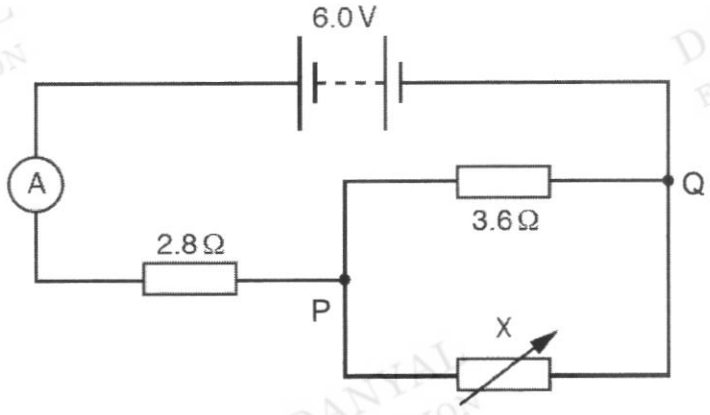


Fig. 7.1

The electromotive force (e.m.f) of the battery is 6.0 V.

(a) The resistance of the variable resistor X is set to 1.8 Ω

Determine

(i) the total resistance of the circuit,

resistance = ... Ω [2]

(ii) the current measured by the ammeter.

current = ... A [2]

(b) The resistance of X is increased.

Explain why the p.d. across the 2.8 Ω resistor changes.

.....

.....

..... [2]

(c) A a piece of copper wire of negligible resistance is connected to point P and Q. Determine the current measured by the ammeter.

current = ... A [1]

8 Fig. 8.1 is the view from above a small compass on a laboratory bench.

Fig. 8.1

Fig. 8.2 is the view from above of a stationary magnet on the same laboratory bench with three small compasses placed around the magnet.

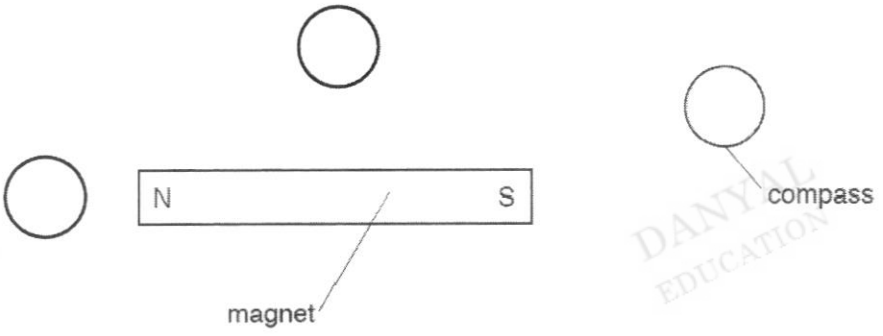


Fig. 8.2

(a) State the material from which the compass needle in Fig. 8.1 is made.

..... [1]

(b) On Fig. 8.2, the compasses are placed within the magnetic field of the magnet. Sketch the positions of the compass needles. [2]

(c) An unmagnetized iron bar PQ is placed near to the magnet on the laboratory bench.

Fig. 8.3 shows the two poles of the magnet and PQ.

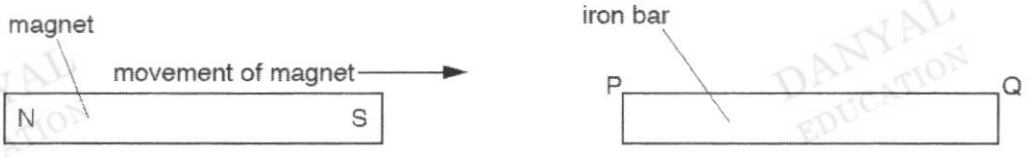


Fig. 8.3

The iron bar is initially at rest and the magnet is moved to the right very slowly. When the magnet is at a short distance from the iron bar, the iron bar moves very quickly to the left towards it.

Explain why the iron bar is attracted to the magnet.

.....

.....

.....[1]

9 Fig 9.1 shows a horizontal, current carrying wire PQ in the gap between the permanent magnet.

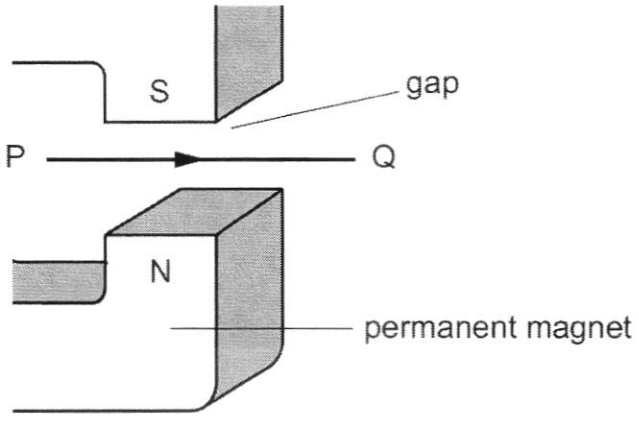


Fig. 9.1

(a) There is a magnetic field in the gap between the N pole and the S pole.

The current in PQ is from left to right.

Indicate on Fig 9.1, with an arrow, the direction of the force acting on the wire PQ. [1]

(b) State the effect on wire PQ of increasing the strength of the magnetic field in the gap by using stronger magnet.

.....

..... [1]

(c) State one modification that can be made to reverse the direction of the force.

.....

..... [1]

Section B

Answer any **two** questions from this section in the spaces provided.

10 When a car driver sees an emergency ahead, he applies the brakes. During his reaction time the car travels at a steady speed and covers a distance known as the thinking distance. The braking distance is the distance travelled by the car after the brakes are applied.

Fig. 10.1 shows the speed-time graph of the car.

The driver sees the emergency at time t = 0.
The total mass of the car is 800 kg.

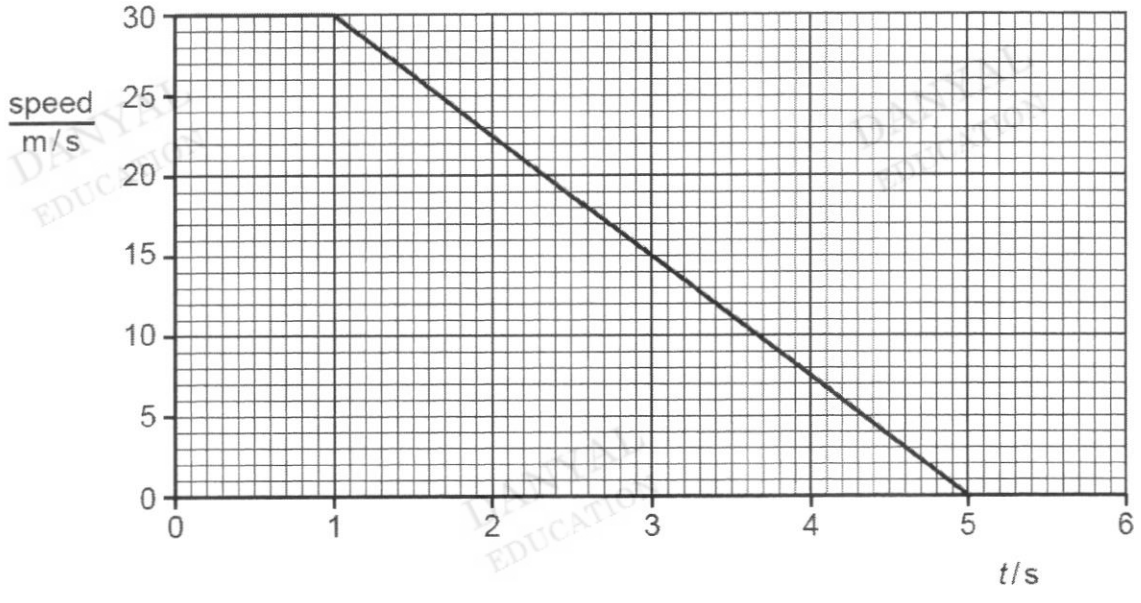


Fig. 10.1

(a) State the energy change that occurs as the car brakes.

..... [1]

(b) Determine

(i) the thinking distance,

thinking distance = ... m [1]

(ii) the braking distance,

braking distance = ... m [1]

(iii) the total stopping distance,

stopping distance = ... m [1]

(iv) the deceleration of the car during braking,

deceleration = ... m s^{-2} [2]

(v) the force provided by the brakes.

force = ... N [2]

(c) Using ideas about friction and deceleration, state and explain how the braking distance is affected by

(i) using new tyres rather than badly worn tyres,

.....

..... [1]

(ii) the car carrying a heavy load of passengers.

.....

.....

..... [1]

11 A student places a small electrical heater inside a cup of water, as shown in Fig. 11.1.

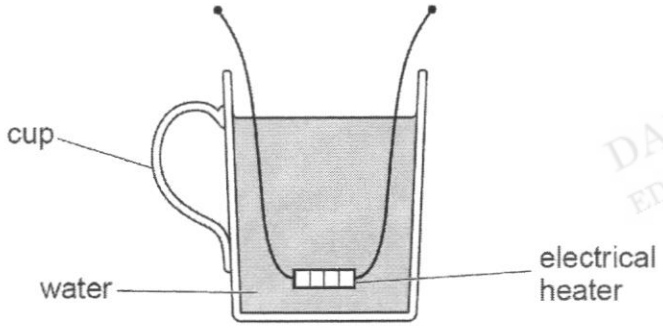


Fig. 11.1

(a) The student determines the electrical power of the heater

On the space above the cup in Fig. 11.1, draw the electrical circuit that the student uses. Include an *ammeter* to measure the current through the heater, a *voltmeter* to measure the potential difference across the heater and a *power supply*. [2]

(b) The voltage of the power supply is 12 V and the current is 4.2 A.

(i) Calculate the electrical power input to the heater.

power = ... W [1]

(ii) Calculate the energy input to the heater in 120 minutes. Give your answer in kWh.

energy = ... kWh [2]

(iii) Given that the cost per unit of electrical energy is \$0.28. Calculate the cost of operating this heater for 120 minutes.

cost = ... [1]

(c) During heating, the students notices that some water evaporates from the cup.

(i) Describe, using ideas about molecules of water, what happens during evaporation.

.....

.....

..... [1]

(ii) The student finds that the amount of evaporation increases when the temperature of the water is higher.

State one other factor that increases the amount of evaporation.

..... [1]

(d) The student turns off the power supply and the water cools.

Describe and explain how convection in the air causes the water to cool.

.....

.....

..... [2]

12 Fig. 12.1 shows an alarm system in which the switch is shown closed.

The top circuit is arranged so that the electromagnet is positioned over the soft iron contact.

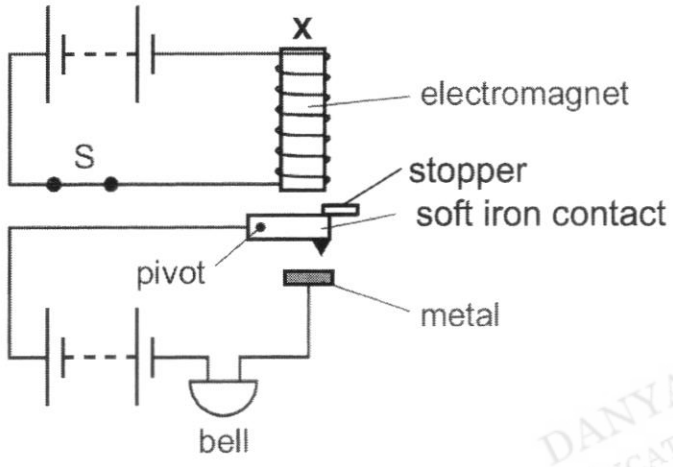


Fig. 12.1

(a) When the switch is closed as shown in Fig. 12.1, indicate the pole at the top of the electromagnet, **X**.

pole at **X** = ... [1]

(b) Describe and explain what happens when the switch S is opened.

.....

.....

..... [2]

(c) If when S is closed and the electromagnet is not strong enough to maintain the position of the iron contact as shown in Fig. 12.1, suggest **one** modification that can be made to the circuit.

.....

..... [1]

(d) Fig. 12.2 shows the enlarged view of the uniform iron contact.

Given that the mass of the iron contact is 100 g.

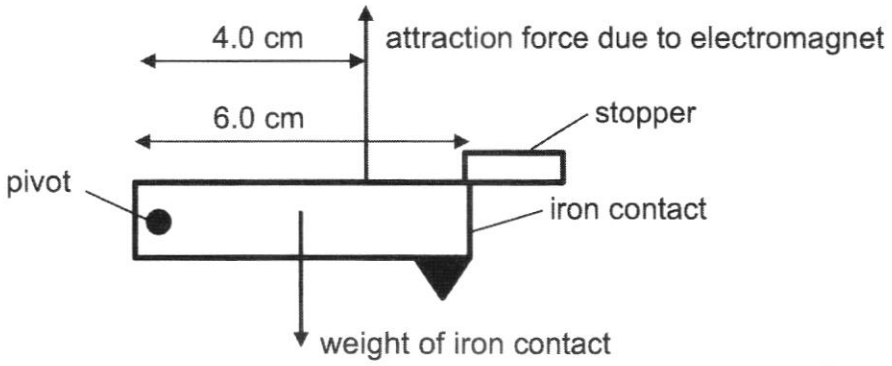


Fig. 12.2

(i) Calculate the weight of the iron contact. Take g = 10 N / kg.

weight = ... [1]

(ii) Indicate with an arrow and label $\mathbf{F_s}$ on Fig. 12.2, the force acting on iron contact by the stopper. [1]

(iii) Given that the attraction force due to the electromagnet is 5.0 N, calculate the force acting on the iron contact by the stopper $\mathbf{F_s}$.

force $\mathbf{F_s}$ = ... [2]

(e) If a technician accidentally replaced the iron contact with a steel contact, will the system work? Explain.

.....

.....

..... [2]

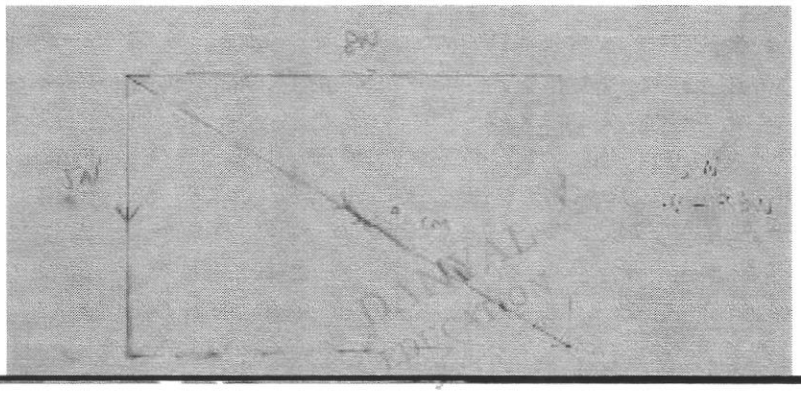
End of paper

Edgefield Secondary School
Sec 4E5N Science Physics 2022
Mid Year Exam Solutions

MCQ [20 marks]

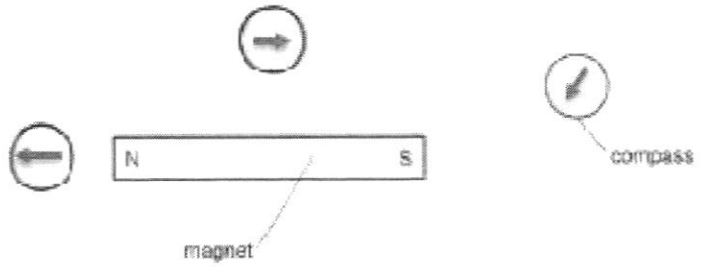
	1	2	3	4	5	6	7	8	9	10
Answer	B	D	B	C	C	B	B	A	D	D
Question	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Answer	C	C	C	D	C	D	C	A	D	B

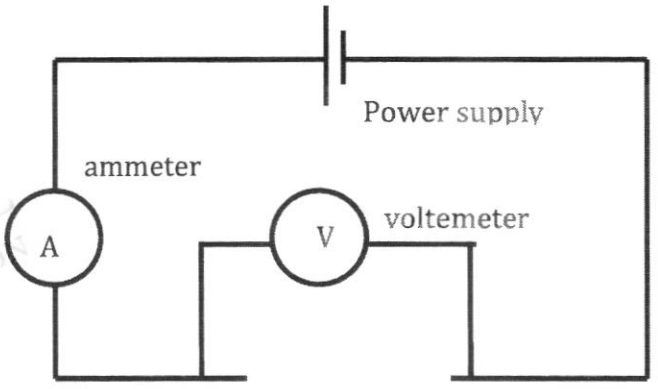
SECTION A [65 marks]

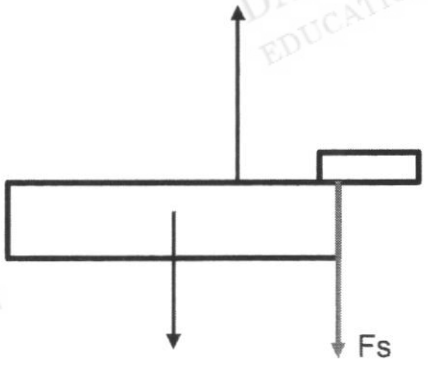
Q No.	Solutions	Marks	Remarks
1a	Scale: 1 cm : 1 N Magnitude of resultant = 9.3 N to 9.6 N Direction of resultant force = 38.7° from 8 N (36 to 40°) OR = 52° from 5N (50 to 53° 	1 1 1	1 m for resultant 1 m for vector diagram
b	1. Magnitude = same constant 2. Opposite to resultant	1	
2a	W = mg 80 000 = m x 10 m = 8000 kg	1	
b	D = m/V 1000 = 8000 / V V = 8.0 m^3	1	
c	Lost in PGE = mgh = 8000 x 10 x 4 = 320 000 J	1	
d	Efficiency = (96 / 320) x 100 = 30%	1	
3a	P = F/A = 2000 / 2(0.040) = 25 000 Pa	2	

b	So that the weight of the bench which acts vertically down from the centre of gravity is within the area of base, so won't topple / will be stable OR So that the CG is within the area of base, so won't topple / will be stable	1	
c	Using POM Ma = Mc P x 0.25 = 2000 x 0.85 P = 6800 N	 1 1	
4a	Wavelength = 6.0 / 4 = 1.5 m	1	
b	Period T = 10 / 5 = 2.0 s	1	
c	f = 1/T = ½ = 0.50 Hz	1	
d	V = f x wavelength = 0.5 x 1.5 = 0.75 m/s	1	
5a	Similar: both carries energy from one place to another / both obey wave equation etc Difference: light is a transverse wave while sound is a longitudinal wave / light can pass through vacuum while sound cannot transmit in vacuum / it requires a medium / speed of light is much faster than sound in air.	1 1	
b	n = sin i/sin r 1.5 = sin 60 / sin r r = 35.26 = 35.3° or 35°	1	
ci	n = 1 / sin c 1.5 = 1 / sin c c = 41.81 = 41.8° or 42°	1	
ii	Total internal reflection occurs. As i > c and light is travelling from an optical denser medium (glass) towards an optical less dense medium (air)	1 1	
d	n = c / v 1.5 = 3.0×10^8 / v v = 2.0×10^8 m/s	1	

6a	Due to charging by friction, there is a transfer of electrons from cloth to rod. The rod gains electrons and have excess electrons, hence net negatively charged.	1 1	
bi	Clear + and – signs on the sphere left and right surface. Left surface is positively charged Right surface is negatively charged Equal no of positive and negative charges	1	
ii	When the negatively rod is brough near the sphere, some electrons in the sphere are repelled to right hand side as like charges repel. The right hand side will be induced negatively while the left hand side will be induced positively. (induction) Since the attraction force due to unlike charges is greater than the repulsion due to like charges, there is a net attraction force, hence sphere is attracted to the rod.	1 1	
c	When the wire is connected to the sphere, the excess electrons on the right hand side will move down the wire into the ground. The sphere will now have net positive charge,	1 1	
7ai	$R = 2.8 + (1/3.6 + 1/1.8)^{-1}$ $= 2.8 + 6/5 = 4.0\ \Omega$	1 1	
ii	$I = V/R = 6.0 / 4.0$ $= 1.5$ A	1 1	
b	As X increases, the total resistance across PQ increases, the total resistance of the circuit increases. Hence current in through 2.8 Ω resistor decreases. As V = IR, hence p.d across it decreases.	1 1	
c	$I = V/R = 6.0 / 2.8 = 2.14$ A	1	

8a	Steel	1	
b		2	
c	Due to magnetic induction, the iron bar becomes an induced magnet and the side P will be induced north. Since unlike poles attract, the iron bar is attracted to the magnet. (since the attraction force due to unlike poles is greater than the repulsion force due to like poles, there is a net attraction force)	1	
9a	Arrow drawn out of paper		
b	Greater force / PQ moves further out	1	
c	Reverse the current by swopping the terminals Reverse the direction of magnetic field by swopping the poles (any one)	1	
	SECTION B [20 marks]		
10a	Kinetic energy of the car to heat and sound energy	1	
bi	Thinking distance = 30 x 1 = 30 m	1	
ii	Braking distance = ½ x 4 x 30 = 60 m	1	
iii	Stopping distance = 60 + 30 = 90 m	1	
iv	$a = (v-u)/t = (0 - 30)/4 = - 7.5\ ms^{-2}$ Deceleration $= 7.5\ ms^{-2}$	1 1	
v	F = ma = 800 x 7.5 = 6000 N	1 1	
ci	New tyres have more friction, so braking force and the deceleration will be greater and car stops in a shorter	1	

	distance.		
ii	With more passengers, there is more mass. F = ma, the deceleration will be smaller, hence longer stopping distance. OR More mass, more interia, so takes a longer distance to stop.	1	
11a		2	
bi	P = IV = 4.2 x 12 = 50.4 W	1	
ii	E = Pt = 0.0504 x 2 hr = 0.1008 kWh = 0.10 kWh	1 1	
iii	Cost = 0.1008 x $0.28 = $0.028224 = $0.028	1	
ci	Water molecules are in random and continuous motion. Those water molecules which at the surface and have enough kinetic energy to break the intermolecular forces is able to escape into the atmosphere.	1	
ii	Motion of air (wind) Higher temperature of water Lower atmosphere pressure Use a cup with bigger exposed surface area.	1	

d	Thermal energy is transferred from the water to the air at the surface. The air around the surface of water gets heated up, expands, becomes less dense and rises. The cooler denser air comes in from the side to replace the rising warm air. This creates a convection current and the water cools down.	1 1	
12a	Pole at X = South pole	1	
b	When the switch is open, current is cut off and the electromagnet demagnetised. The iron contact will fall/rotate clockwise due to its weight. The iron contact will touch the metal and the circuit is closed and the bell rings.	1 1	
c	Increase number of turns in the solenoid. Increase the size of the current through electromagnet by increasing the emf of cells Shift the lower circuit higher / iron contact higher	1	
di	W = mg = 0.1 x 10 = 1.0 N	1	
ii		1	
iii	Ma = Mc 5 x 4.0 = 1 x 3 + Fs x 6 Fs = 2.83 N	2	
e	Steel is a hard magnetic material. When it magnetised by the electromagnet, it retains its magnetism. So when the switch S is open, the iron contact will still be attracted by the electromagnet due to magnetic induction. Hence the bell circuit will still be open and the bell will not ring.	1 1	