TANJONG KATONG GIRLS' SCHOOL
PRELIMINARY EXAMINATION 2019
SECONDARY FOUR

6091/01 **PHYSICS**
Paper 1 Multiple Choice

WEDNESDAY **4 SEP 2019** **1 hour**

Additional materials: OMR answer sheet

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, class and index number on the OMR Answer Sheet.

There are **forty** questions in 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 OMR Answer Sheet.

Take gravitational field strength to be 10 N/kg unless stated otherwise in the question.

Read the instructions on the OMR Answer Sheet very carefully.

At the end of the examination, hand in the OMR Answer Sheet.

INFORMATION FOR CANDIDATES

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.

Answer **ALL** the questions in this paper on the OMR sheet provided.

1 Which of the following is a good estimate for the thickness of a fingernail?

A 1 dm **B** 1 cm **C** 1 mm **D** 1 μm

2 A student intends to determine the volume of a copper pipe which spans several metres long. The pipe has a uniform cross-sectional area. The external diameter of the copper pipe is estimated to be 5 cm.

Which pair of instruments will allow him to measure the necessary dimensions accurately?

A vernier calipers and tape

B micrometre screw gauge and tape

C vernier calipers and rule

D micrometre screw gauge and vernier calipers

3 Three forces 3 N, 4 N and 8 N act on an object. Which of the following cannot be the resultant force acting on the object?

A 0 N **B** 1 N **C** 8 N **D** 14 N

4 A racing car is fitted with an on-board computer which can record the distance travelled by the car for every one second. The computer starts recording when the car passes the starting line and moves along a straight line.

Which set of data shows that the car is accelerating during the next 2 seconds?

A

Time / s	Distance / m
0	0
1	100
2	200

B

Time / s	Distance / m
0	0
1	90
2	180

C

Time / s	Distance / m
0	0
1	100
2	180

D

Time / s	Distance / m
0	0
1	80
2	190

5 The diagram shows a person using a rope to pull a block on a rough surface to the right. The block moves at a constant speed.

Which pair of forces is a pair of action and reaction force?

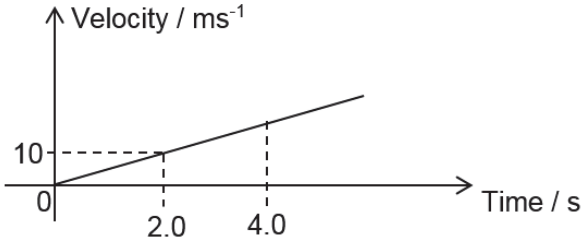
A Frictional force acting on the block by the ground and the pulling force on the block

B The pulling force on the block and the tension force experienced by the rope

C The weight of the block and the normal reaction force acting on the block by the ground

D The frictional force acting on the person by the ground and the frictional force acting on the block by the ground

6 The diagram shows the velocity-time graph of a car. The total resistive force acting on the car is 1000 N. The mass of the car is 1000 kg.



What is the resultant force acting on the car at t = 4.0 s?

A 0 N **B** 4000 N **C** 5000 N **D** 6000 N

7 An astronaut lands on a planet where the acceleration of free-fall at its surface is greater than that on Earth. Which of the following will be the same as that on Earth?

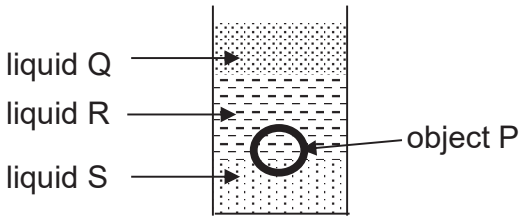
A The weight of the astronaut

B The period of oscillation of a simple pendulum

C The height reached by the astronaut when he jumps with the same initial velocity

D The acceleration of a block when being pushed horizontally by the same force on a smooth surface

8 A circular object P is lowered into a cylinder which contains 3 different layers of immiscible liquids. The diagram shows the position of object P in the cylinder.



Which of the following correctly shows the densities of the substances arranged in increasing order?

A liquid Q, object P, liquid R, liquid S

B liquid Q, liquid R, object P, liquid S

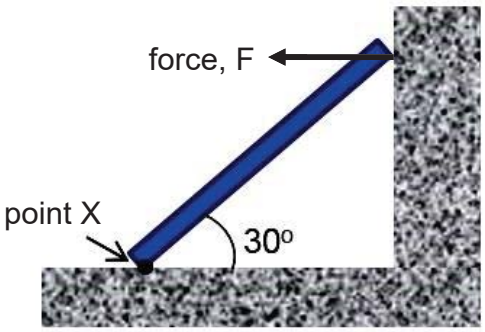
C liquid S , liquid R, object P, liquid Q

D liquid S, object P, liquid R, liquid Q

9 The diagram shows a stationary uniform ladder leaning against a smooth wall and making an angle of 30^o with the ground at point X.

The wall exerts a horizontal force F on the ladder. The weight of the ladder is 500 N.

What is the magnitude of the force F?



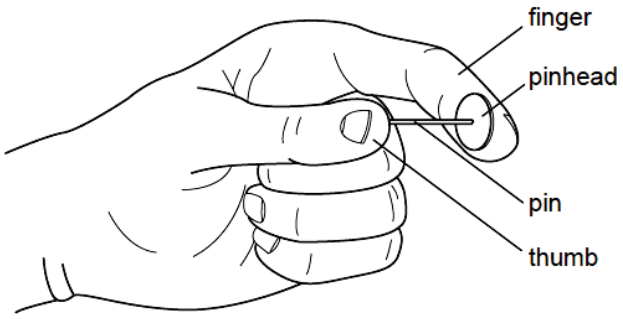
A 144 N **B** 250 N **C** 433 N **D** 500 N

10 The diagram shows a bottle being filled up with water.

What happens to the stability and the centre of the gravity of the bottle (with water) as the bottle is filled with water?

	Stability	**Centre of Gravity**
A	become less stable	centre of gravity is raised
B	become less stable	centre of gravity is lowered
C	become more stable	centre of gravity is raised
D	become more stable	centre of gravity is lowered

11 The diagram shows a pin being squeezed between a finger and the thumb.



Which statement is correct?

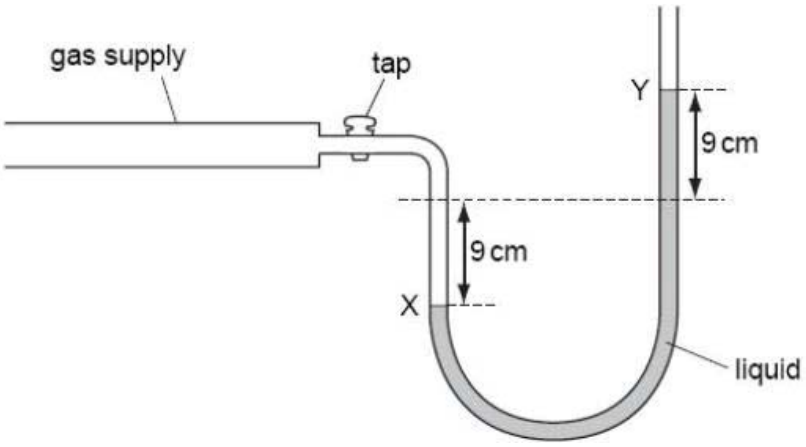
A The force of the pin is larger on the finger than on the thumb.

B The force of the pin is larger on the thumb than on the finger.

C The pressure of the pin is larger on the finger than on the thumb.

D The pressure of the pin is larger on the thumb than on the finger.

12 The diagram shows the levels X and Y in a liquid manometer with the gas tap open.

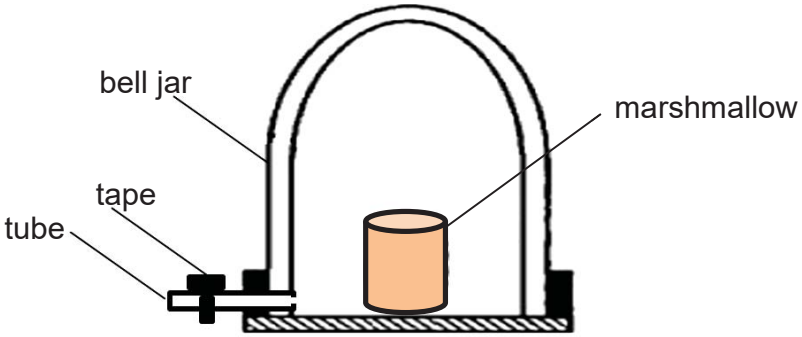


The gas supply is now replaced by a new gas supply which has a pressure that is 2 cm of the liquid above the previous gas supply.

What will be the new difference in height between level X and Y?

A 16 cm **B** 18 cm **C** 20 cm **D** 22 cm

13 The diagram shows a marshmallow placed inside a bell jar with the tap closed.



The pressure of the gas in the bell jar is half of the atmospheric pressure.

The tap is then opened and the air from the surrounding rushes in through the tube.

What happens to the size of the marshmallow and the gas pressure in the marshmallow?

	Size of marshmallow	Gas pressure in marshmallow
A	decreases	increases
B	decreases	decreases
C	increases	increases
D	increases	decreases

14 To calibrate a liquid-in-glass thermometer without using another thermometer, fixed point(s) will be required.

Which statement is correct?

A Only one fixed point is required.

B Both a lower fixed point and an upper fixed point are required.

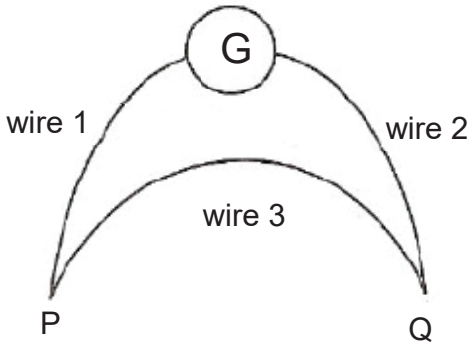
C Any temperature above the melting point of liquid can be used as fixed points.

D The melting point and boiling point of the liquid in the thermometer are always the fixed points.

15 A resistance thermometer has a resistance value of 20 Ω and 80 Ω when the temperature is 10 °C and 90 °C respectively. What will be the expected temperature if the resistance of the thermometer is 100 Ω?

A 90 °C **B** 107 °C **C** 117 °C **D** 133 °C

16 The diagram shows a thermocouple connected to a galvanometer. Two ends of the wires are placed in junction P and Q respectively.



However, the galvanometer does not show any deflection.

Which of the following **is not** a possible reason for the observation?

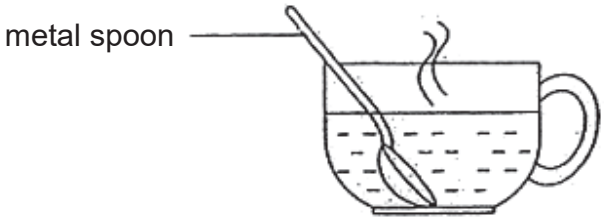
A Wire 1 and wire 2 are made of the same material.

B Wire 1 and wire 3 are made of the same material.

C Both junctions P and Q have same temperature.

D The galvanometer is not sensitive enough to detect the current.

17 The diagram shows a metal spoon in a cup of hot water.



Why does the top end of the metal spoon becomes hot after a while?

A Heat transfers from the hot water to the top of metal spoon by radiation.

B Heat transfers from the hot water to the top of metal spoon by convection.

C Heat transfers from the surrounding air to the top of metal spoon by conduction.

D Heat transfers from the hot water to the top of metal spoon by conduction.

18 A solid object with a mass of 5.0 kg is heated from 30 °C to 40 °C. The heat capacity of the object is 500 J K^{-1}. Which expression gives the amount of thermal energy required to raise the temperature of this object?

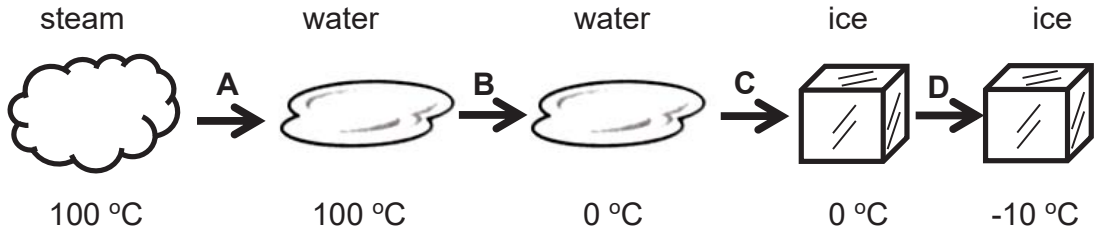
A 500 x 10

B 5.0 x 500 x 10

C 500 x (273 + 10)

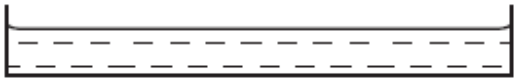
D 5.0 x 500 x (273 + 10)

19 The diagram shows the change of state of matter for 1 kg of steam into ice.



Which stage **A**, **B**, **C** or **D** involves the specific latent heat of vaporisation?

20 A student is investigating the rate of evaporation of water.



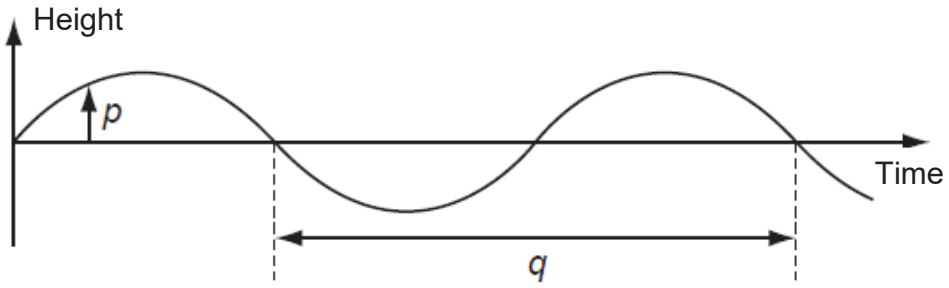
The student can change the following:

1. the depth of the water;
2. the atmospheric pressure;
3. the temperature of the water.

How many of these changes, if any, would alter the rate at which evaporation occurs?

A 0 **B** 1 **C** 2 **D** 3

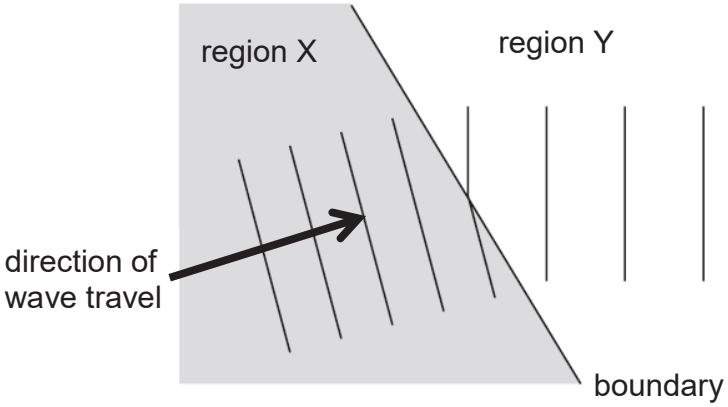
21 The graph shows how the height of a water surface at a point in a harbour varies with time as waves pass the point.



What are *p* and *q*?

	p	*q*
A	displacement	period
B	displacement	wavelength
C	amplitude	period
D	amplitude	wavelength

22 A ripple tank is used to demonstrate refraction of plane water waves.



Which statement is true?

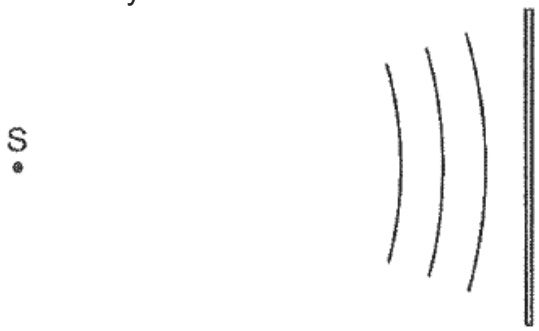
A Region X is deeper than region Y and the direction of wave travel bends towards the normal at the boundary.

B Region X is deeper than region Y and the direction of wave travel bends away from the normal at the boundary.

C Region X is shallower than region Y and the direction of wave travel bends towards the normal at the boundary.

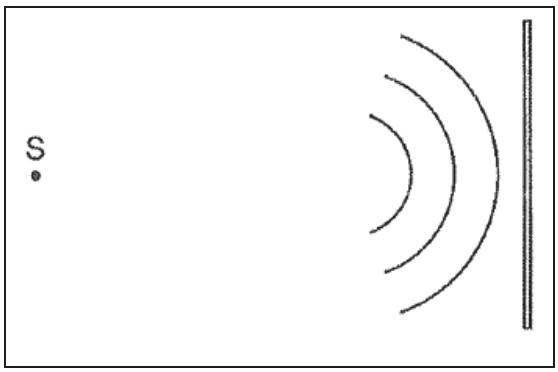
D Region X is shallower than region Y and the direction of wave travel bends away from the normal at the boundary.

23 The diagram represents circular wavefronts coming from point S. The wavefronts are about to strike a solid boundary.

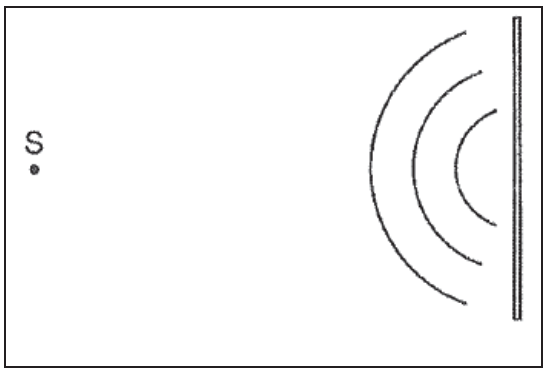


Which diagram correctly shows the reflected wavefronts?

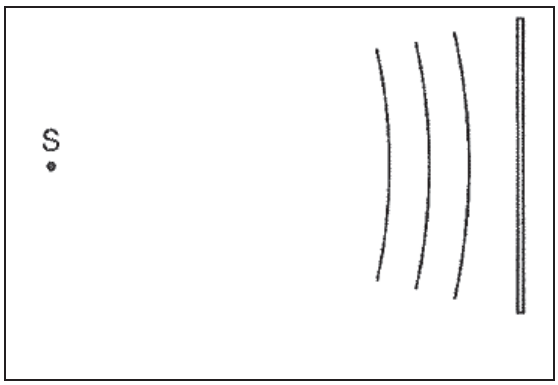
A



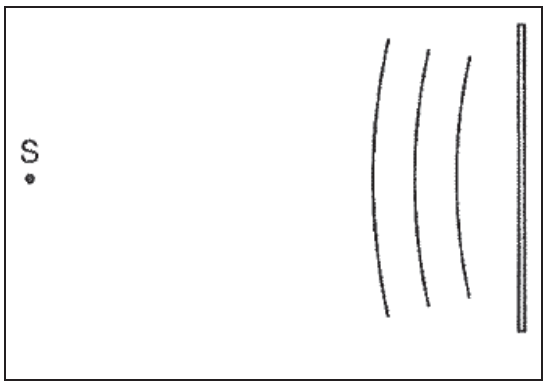
B



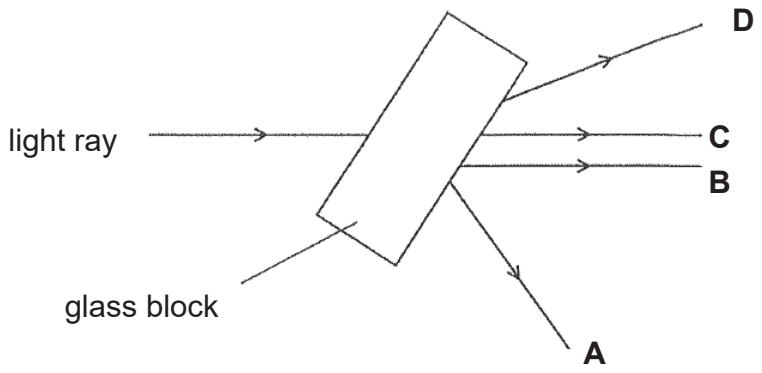
C



D



24 Which line shows the path of light ray after it passes through the glass block?



25 Which coloured light, red or violet, has a higher frequency and which one has a longer wavelength?

	Higher frequency	Longer wavelength
A	violet	violet
B	violet	red
C	red	violet
D	red	red

26 The diagram shows a contactless payment system which involves the consumers tapping their credit cards or debit cards on the card reader to make their payment. In the process, a particular electromagnetic wave will be sent between the card and the card reader.

What is likely to be this electromagnetic wave?

A Radio wave

B Ultrasound

C Ultra-violet radiation

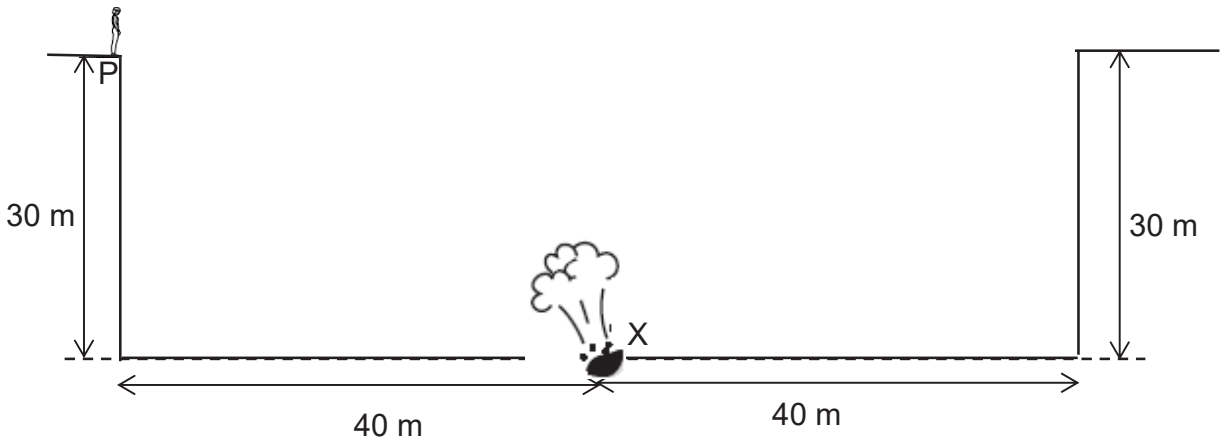
D X-ray

27 A person strikes a tuning fork near a wall.

What will happen to the frequency and speed of the sound as it travels from air and through the wall?

	Frequency	Speed of Sound
A	increases	increases
B	decreases	decreases
C	unchanged	decreases
D	unchanged	increases

28 The diagram shows an engineer standing at P overlooking an explosion at X.

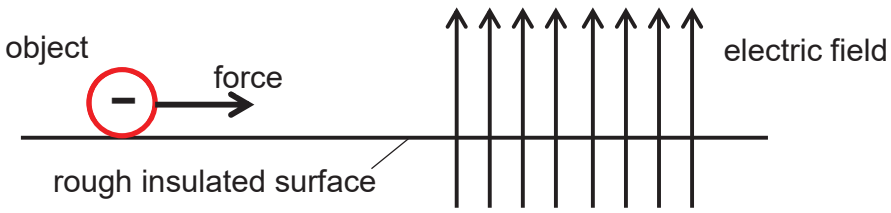


After the explosion, she hears two bangs. The speed of sound in the air is 300 m s^{-1}.

What is the time lapse between the two bangs?

A 0.12 s **B** 0.17 s **C** 0.25 s **D** 0.34 s

29 The diagram shows a negatively charged object subjected to a constant pulling force and is moving to the right on a rough insulated surface at a uniform speed before entering a uniform electric field. The electric force exerted on the charged object due to the electric field is greater than the weight of the charged object.



Which statement describes the motion of the charge in the electric field?

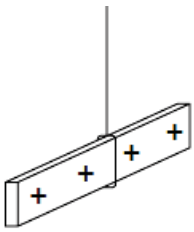
A The object will decelerate along the rough surface.

B The object will accelerate along the rough surface.

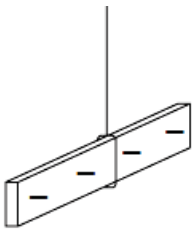
C The object will move along a curved path towards the top of paper.

D The object will move in the direction that is perpendicular to the plane of this paper.

30 The diagram shows a positively charged acetate strip and a negatively charged polythene strip that are freely suspended.



acetate strip



polythene strip

When an object is brought either to the acetate strip or polythene strip, the strip moves towards the object.

What is the state of charge of the object?

A Neutrally charged

B Positively charged

C Negatively charged

D Cannot be determined

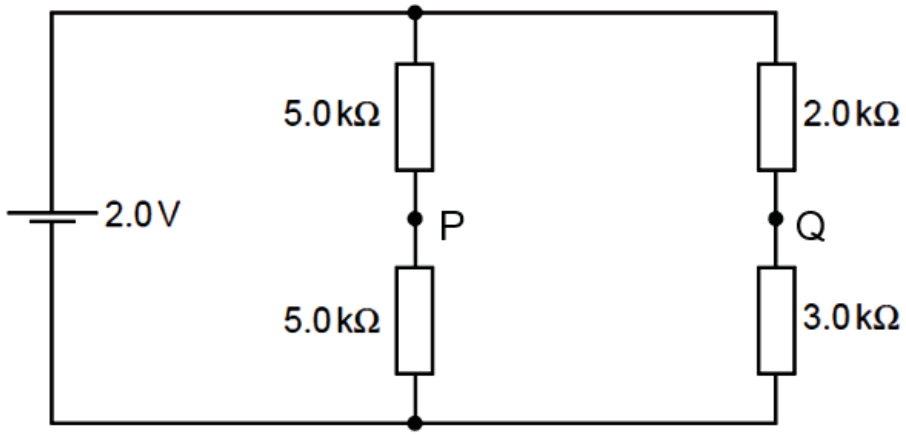
31 The diagram shows an electroshock gun that law enforcement officers use to immobilise a person. The gun delivers electric current to a person and disrupts voluntary control of muscles in the person.

During a single activation that last for 5.0 s, the electroshock gun can deliver a charge of 100 mC with an average voltage of 350 V to the person.

What is the electrical energy transferred to the person?

A 7 J **B** 35 J **C** 7000 J **D** 35 000 J

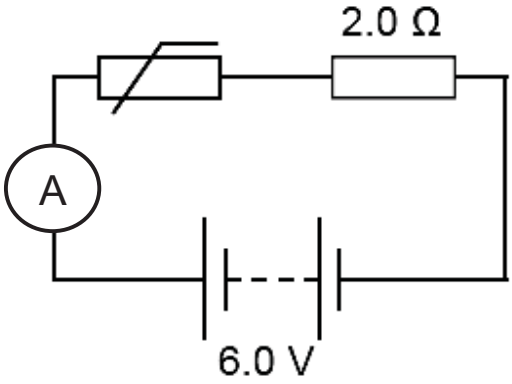
32 A cell of e.m.f. 2.0 V is connected to a network of resistors shown.



What is the potential difference across P and Q?

A 0.2 V **B** 0.5 V **C** 0.8 V **D** 1.0 V

33 The diagram shows a 6.0 V battery connected to a transducer and a fixed resistor.



The following information is provided:

Transducer	Range of Resistance / Ω
Light dependent resistor	4.0 to 10.0
Thermistor	3.0 to 7.0

What is the reading of the ammeter when the transducer is exposed to high temperature?

A 0.50 A **B** 0.67 A **C** 1.0 A **D** 1.2 A

34 What will happen to a bar magnet if it is dropped too often?

A The poles of the magnet will switch position.

B Both ends of the magnet will have the same pole.

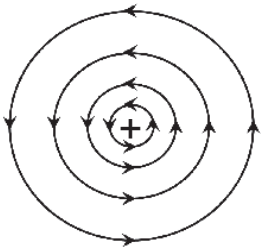
C The strength of the magnet will increase.

D The strength of the magnet will decrease.

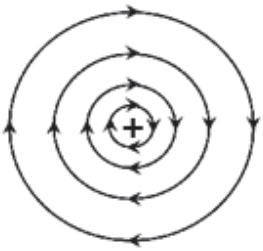
35 A positive charge is moving into the plane of this paper.

Which diagram shows the magnetic field produced by the positive charge when viewed from the top of this paper?

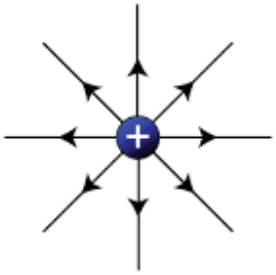
A



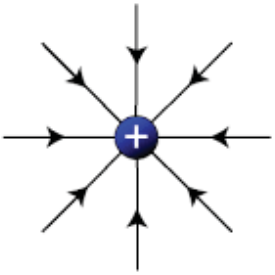
B



C



D



36 What is the purpose of the split-ring commutator in a motor?

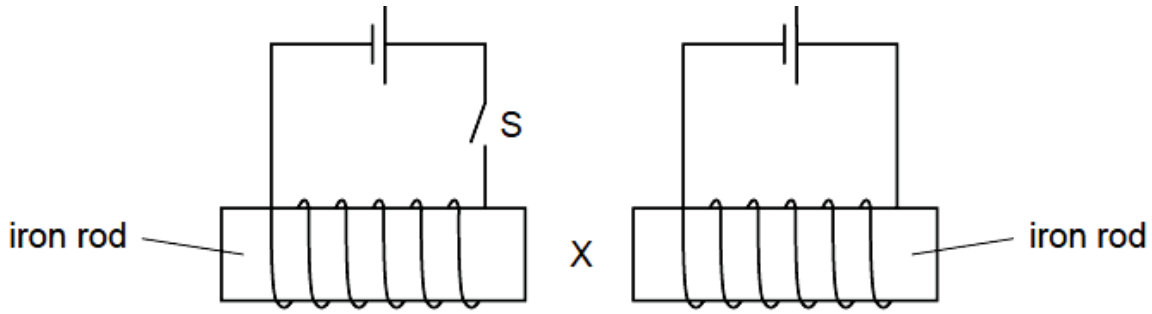
A To ensure that the current produced is a direct current.

B To ensure that the current produced is an alternating current.

C To ensure that the forces acting on the coil will always rotate the coil in the same direction.

D To ensure that there is continuous electrical contact between the coil and the external circuit at all times.

37 Two circuits are set up as shown. The iron rods are placed close together, and are free to move.



What happens to the size of the gap at X when switch S is closed?

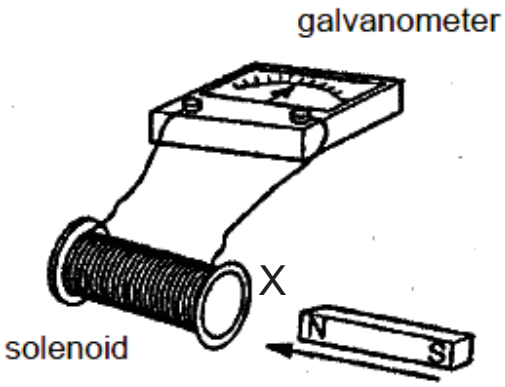
A It decreases.

B It decreases and then increases.

C It increases.

D It does not change.

38 The North pole of a bar magnet is pushed into a solenoid via end X, as shown in the diagram. An electromotive force is induced which moves the galvanometer needle to the left.



Which action, using the same end of the solenoid, would produce the same deflection in the galvanometer?

A Pulling a North pole out of the solenoid via end X

B Pushing a South pole out of the solenoid via end X

C Pulling the solenoid away from a North pole

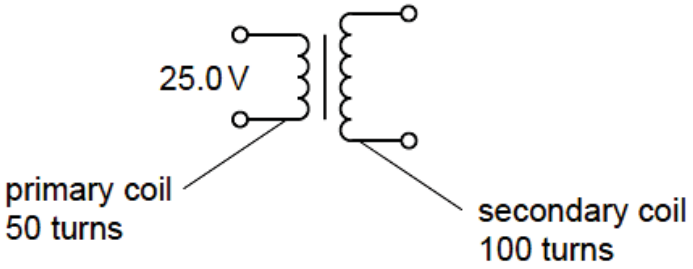
D Pulling the solenoid away from a South pole

39 An a.c generator is able to produce a peak voltage of V when the coil is rotated with a frequency of F.

What will be the new peak voltage if the number of turns of the coil is now three times as before and the coil is rotated with a frequency of $2F$?

A $3V$ **B** $5V$ **C** $6V$ **D** $8V$

40 A transformer has 50 turns on its primary coil and 100 turns on its secondary coil. An alternating voltage of 25.0 V is connected across the primary coil.



What is the voltage across the secondary coil?

A 12.5 V **B** 50 V **C** 175 V **D** 200 V

—— END OF PAPER ——

Class | Register No.

Candidate Name ……..

TANJONG KATONG GIRLS' SCHOOL
PRELIMINARY EXAMINATION 2019
SECONDARY FOUR

6091/02 **PHYSICS**
Paper 2

MONDAY **2 SEP 2019** **1 hour 45 minutes**

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, class and register number in the spaces at the top of this page and on any separate answer paper used.

Write in dark blue or black pen.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Take gravitational field strength to be 10 N/kg, unless specified in the question.

Section A
Answer **all** questions. Write your answers in the spaces provided on the Question Paper.

Section B
Answer **all** questions. Question 11 has a choice of parts to answer.

INFORMATION FOR CANDIDATES

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

Candidates are reminded that **all** quantitative answers should include appropriate units.

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

For Examiner's Use	
Section A	
Section B	
Total	**/ 80**

Setter : Mr Koh Meng Hong

This question paper consists of 22 printed pages including this cover page.

SECTION A [50 marks]

Answer **ALL** questions from this section.

For Examiner's Use

1 Fig 1.1 shows a hot-air balloon rising with a constant velocity of 15 m s^{-1}. A sandbag was dropped by the pilot at time t = 0 s. Air resistance acting on the sandbag is considered to be negligible.

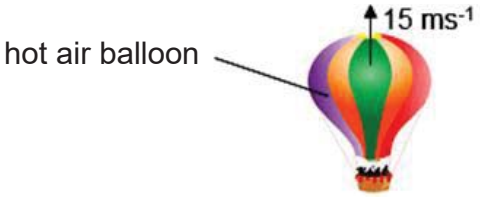


Fig 1.1

(a) A person at ground level observed that the sandbag was moving up with an initial velocity of 15 m s^{-1} at the time of drop. Explain this observation.

……

……[1]

(b) Sketch the velocity-time graph of the sandbag for the first 3.0 s. [2]

(c) Calculate the distance travelled by the sandbag between time t = 0 s and when it reaches its highest point.

Distance travelled = ……[1]

(d) Determine the distance between the sandbag and the hot air balloon at time t = 3.0 s. Show your workings clearly.

Distance = ……[2]

For Examiner's Use

2 Fig 2.1 shows a side view of a windmill.

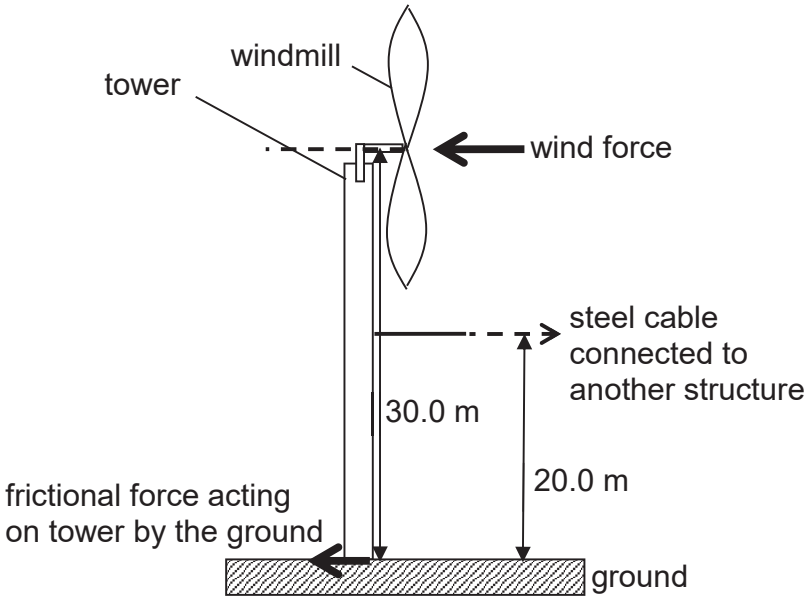


Fig 2.1

The windmill stands on a tower whose base is anchored into the ground. The centre of the windmill is 30.0 m from the ground. The tower is held in place and connected to another structure (not shown in the diagram) via a horizontal steel cable. The steel cable is 20.0 m from the ground. The position of the combined centre of mass of the tower and the windmill is within the tower.

(a) State *the principle* of *moments*.

.....

.....

.....[1]

(b) It can be modelled that the wind force acts through the centre of the windmill. When a wind force of 2000 N is acting horizontally on the windmill, the windmill and the tower remains in equilibrium.

Calculate the magnitude of the frictional force acting on the tower by the ground.

Magnitude of frictional force = ……[2]

(c) The combined weight of the tower and the windmill is 5000 N. The frictional force acting on the tower by the ground is 3000 N. Using a scaled diagram, determine the magnitude and the direction of resultant force acting on the tower by the ground.

For Examiner's Use

Magnitude = ……

Direction = ……

[3]

For Examiner's Use

3 In the movie *Spiderman*, Spiderman attempted to use two flexible flag poles to shoot himself into the sky as if like a catapult. Fig 3.1 shows the set-up which Spiderman attaches his web to the top of the flag poles. He then moves backwards to his final position (as shown in Fig 3.2) just before shooting up into the sky.

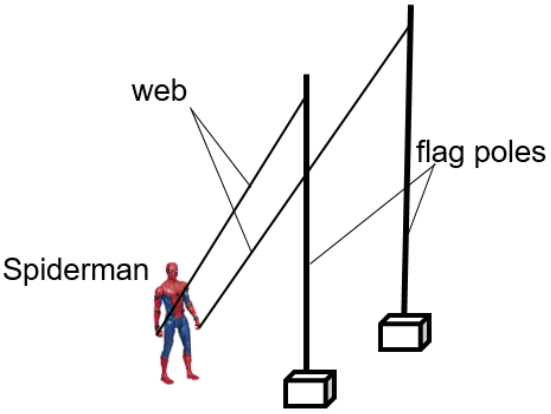


Fig 3.1

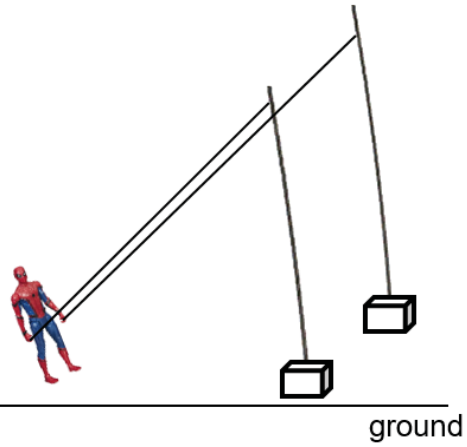


Fig 3.2

(a) Describe the energy changes that have occurred when Spiderman moves backward from his original to his final position as shown in Fig 3.1 and Fig 3.2 respectively. Assume the web is not stretchable.

.....

.....

.....

.....

.....

.....[3]

(b) The mass of Spiderman is 65.0 kg. When he released his foot grip from the ground, he shot up to the sky with an initial speed of 40.0 m s^{-1}. When he is at his highest point, he had a speed of 15.0 m s^{-1}. The work done against air resistance during this journey is 5000 J.

(i) Determine the loss in kinetic energy from the time he leaves the ground to the time he reaches the highest point.

Loss in kinetic energy = ……[2]

For Examiner's Use

(ii) Determine the distance of Spiderman from the ground when Spiderman is at his highest point.

Height = ……[2]

4 (a) Fig 4.1 shows a plastic container with a lid cover. A lid tightener is used to control the movement of the base of the lid. As a person flips down the lid tightener, the base of the lid moves up and increases the volume of air in the container. The container is air tight and it becomes difficult to remove the lid cover.

Fig 4.1

(i) Using the kinetic model of matter, explain why the air pressure in the container decreases as the base of the lid moves up.

.....

.....

.....

.....

.....

.....

.....[2]

For Examiner's Use

(ii) Explain in terms of pressure, why it is difficult to remove the lid cover when the base of the lid moves up.

.....

.....

.....[1]

(b) Fig 4.2 shows a hydraulic press that is used to lift up the body of the car during the replacement of a car tyre. A force of 30 N is exerted on piston A.

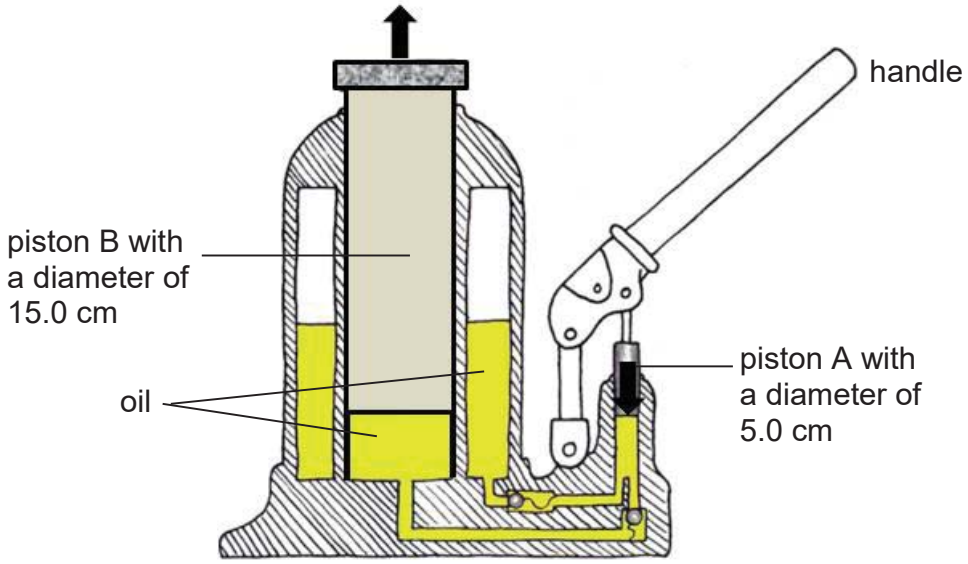


Fig 4.2

(i) Using the idea of molecules, explain why a liquid, such as oil, is used in the hydraulic press.

……

……[1]

(ii) Calculate the force exerted on piston B.

Force = ……[2]

For Examiner's Use

5 Fig 5.1 shows a light dependent resistor (LDR) connected to a circuit. Fig 5.2 shows the relationship between the potential difference V across and the current I flowing through the LDR.

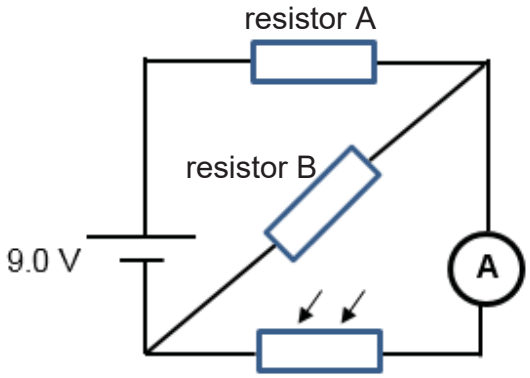


Fig 5.1

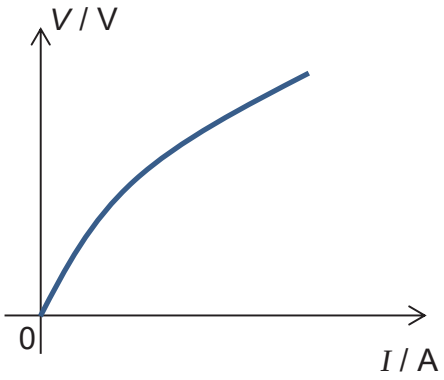


Fig 5.2

(a) Describe how the resistance of the LDR changes with light intensity.

……...

……...[1]

(b) Explain how the graph in Fig 5.2 shows that the LDR is a non-ohmic conductor.

……...

……...

……...[1]

(c) The resistances of resistor A and B are 1000 Ω and 3000 Ω respectively. When the resistance of the LDR is 2000 Ω,

determine, by showing detailed workings,

(i) the effective resistance of resistor B and LDR.

Effective resistance = ……[2]

(ii) the potential difference across resistor A.

For Examiner's Use

Potential difference = ……[2]

(iii) the current through the LDR.

Current = ……[2]

For Examiner's Use

6 A 2.4 kW water heater is connected to a 240 V main supply.

(a) Calculate the current in the heating element of the water heater when it is working normally.

Current = ……[2]

(b) The water heater is protected by a 13 A fuse.

Explain how the fuse works.

……...

……..

……...

……..

……..[2]

(c) The water heater has double insulation. Explain whether it is necessary for the water heater to have an earth wire connected to the casing.

……...

……..

……...

……..

……..

……..[2]

For Examiner's Use

7 Fig 7.1 shows the use of an electromagnetic relay switch to switch on another secondary circuit that is connected to a high voltage power supply.

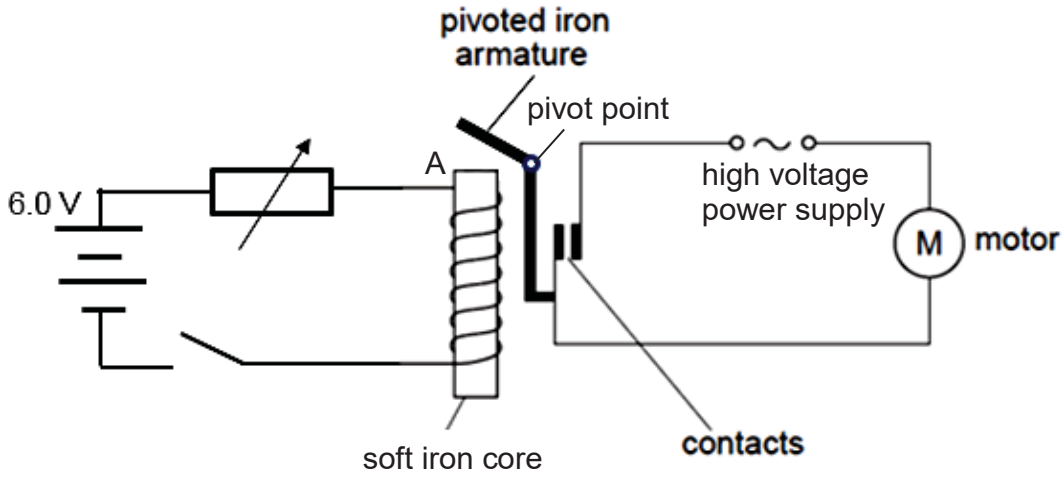


Fig 7.1

(a) Explain how, by adjusting the resistance of a variable resistor, the motor in the secondary circuit can be switched on.

……

……

……

……

……

……[2]

(b) State the pole at end A of the soft iron core when current is flowing through the coil.

……[1]

For Examiner's Use

(c) Fig 7.2 shows a simplified diagram of the motor which is connected to the high voltage supply. Points P and Q are two corners of a copper coil.

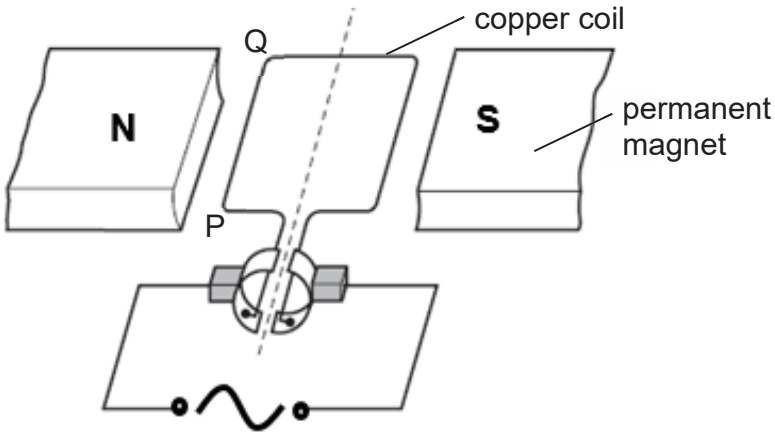


Fig 7.2

(i) Name one electrical device that can be included into the circuit to ensure that the coil in the motor will only turn in one direction.

……...[1]

(ii) At a particular instant, the magnetic force acting on the wire between points P and Q is in the upward direction. Using the idea of magnetic fields, explain why this is so.

……

……

……

……

……

……[2]

For Examiner's User

8 Fig 8.1 shows a set-up with two coils of wire wound around a soft iron core.

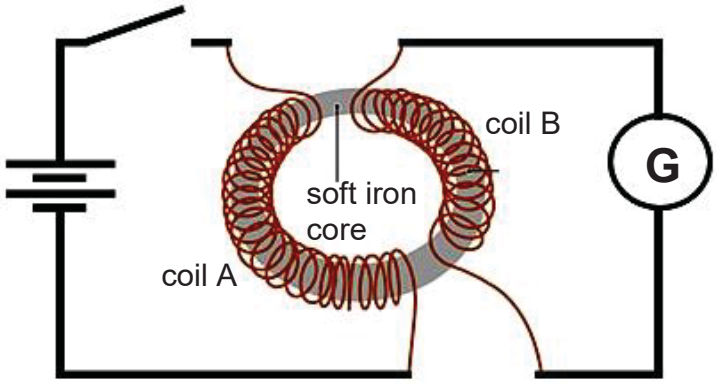


Fig 8.1

(a) State *Faraday's law of electromagnetic induction*.

……...

……..

……..[1]

(b) Explain why the galvanometer shows a deflection when the switch is just closed.

……...

……..

……..

……..

……..[2]

(c) Suggest one change to be made to the set-up if

(i) the galvanometer is to have a continuous deflection at all times.

……...[1]

(ii) the galvanometer is to show a larger deflection with the same power input.

……...[1]

Section B [30 marks]

Answer **all** the questions in this section.
Answer only one of the two alternative questions in **Question 11**.

For Examiner's Use

9 I-Fly is an indoor skydiving facility which uses high air speeds to keep a person floating in the air. Fig 9.1 shows a simplified setup of how high air speeds are projected onto the person (flyer). Air is drawn into the chamber using the wind blade. The shape of the chamber allows air to move upward at high speed. The speed of the air is regulated by the speed of the wind blade.

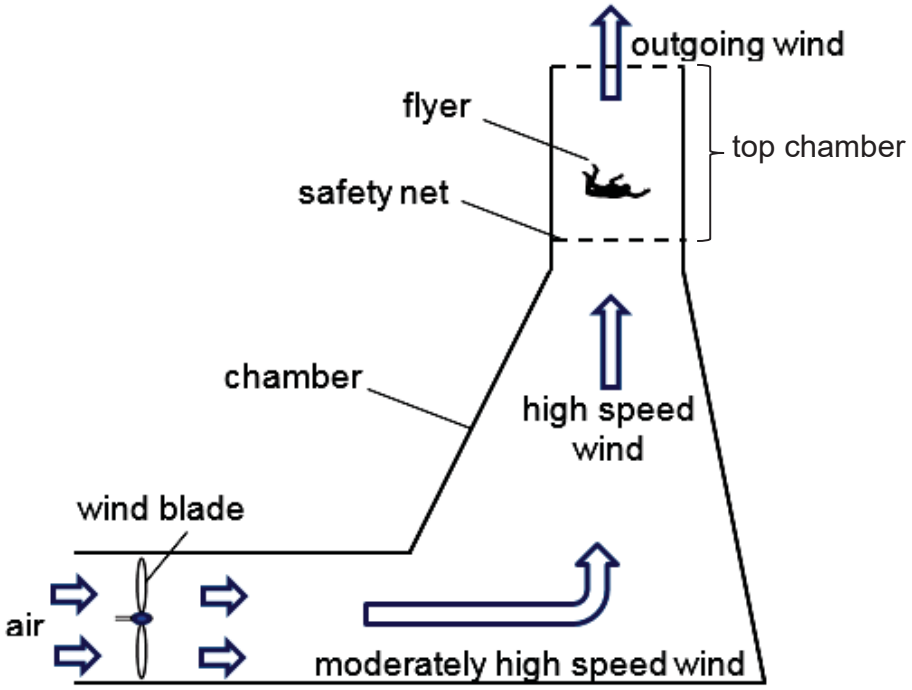


Fig 9.1

Fig 9.2 shows the power of the wind blade and the average wind force acting on a person.

Average Wind Force / N	200	400	640	800	900
Power of Wind Blade / MW	2.0	3.0	4.0	5.0	8.0

Fig 9.2

For Examiner's User

(a) State *Newton's 1st Law of Motion*.

.....

.....[1]

(b) Draw the free body diagram acting on the flyer when he is floating in the air. Label and name all the forces. [2]

(c) Using the data shown in the Fig 9.2, plot a graph of the average wind force acting on the flyer against the power of the wind blade in Fig 9.3 . [2]

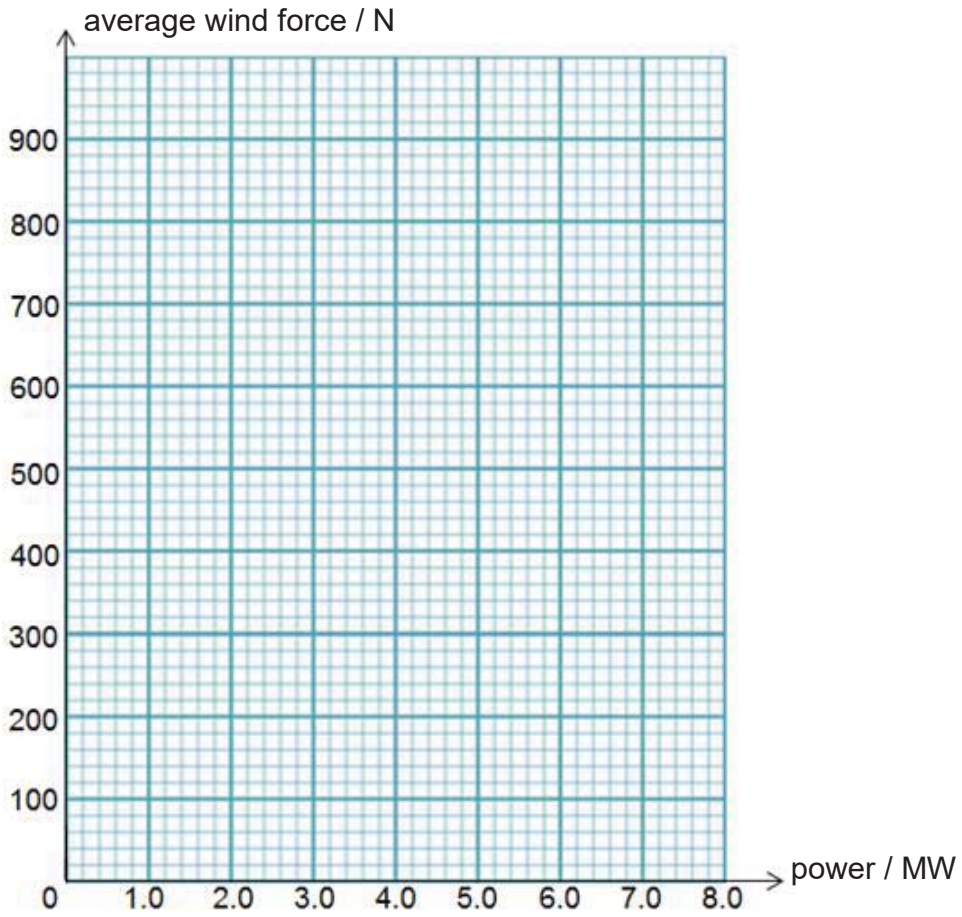


Fig 9.3

For Examiner's User

(d) A person with a mass of 75 kg has signed up to be a flyer.

(i) State the weight of the person.

Weight = ……[1]

(ii) Using the plotted graph in Fig 9.3, determine the minimum power of the wind blade required to keep the person floating in the air.

Minimum power = ……[1]

(iii) The power of the wind blade is adjusted to 5.0 MW. Using the data in Fig 9.2, calculate the initial acceleration of the person.

Acceleration = ……[2]

(e) Explain why it is important to have a safety net installed at the base of the top chamber.

.....

.....[1]

For Examiner's Use

10 (a) Fig 10.1 shows a light ray travelling from diamond to medium X. The diamond has a refractive index of 2.4.

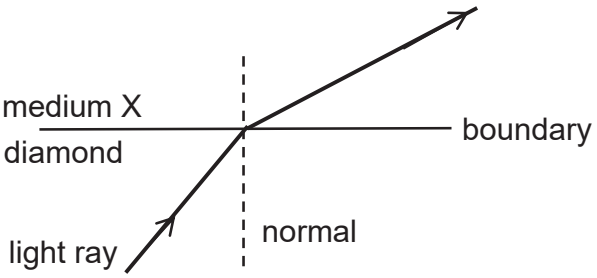


Fig 10.1

(i) Compare the refractive index of medium X to that of the diamond. Use Fig 10.1 to explain how you reach the answer.

……..

……..

……..

……..[2]

(ii) If medium X is glass, the critical angle is found to be 39°.

1. State what is meant by critical angle.

……

……..[1]

2. A light ray strikes the boundary with an angle of incidence 42°. State and explain what will happen to this light ray.

……

……

……

……..[2]

3. If medium X is water which is optically less dense than glass, state, if any, the changes to the critical angle.

……...[1]

For Examiner's Use

(b) Fig 10.2 shows a slanted lens with a focal length of 2.0 cm. The height of the object is 1.5 cm. The intersection point between the horizontal line and the lens is the optical centre of the lens. The diagram is drawn to scale.

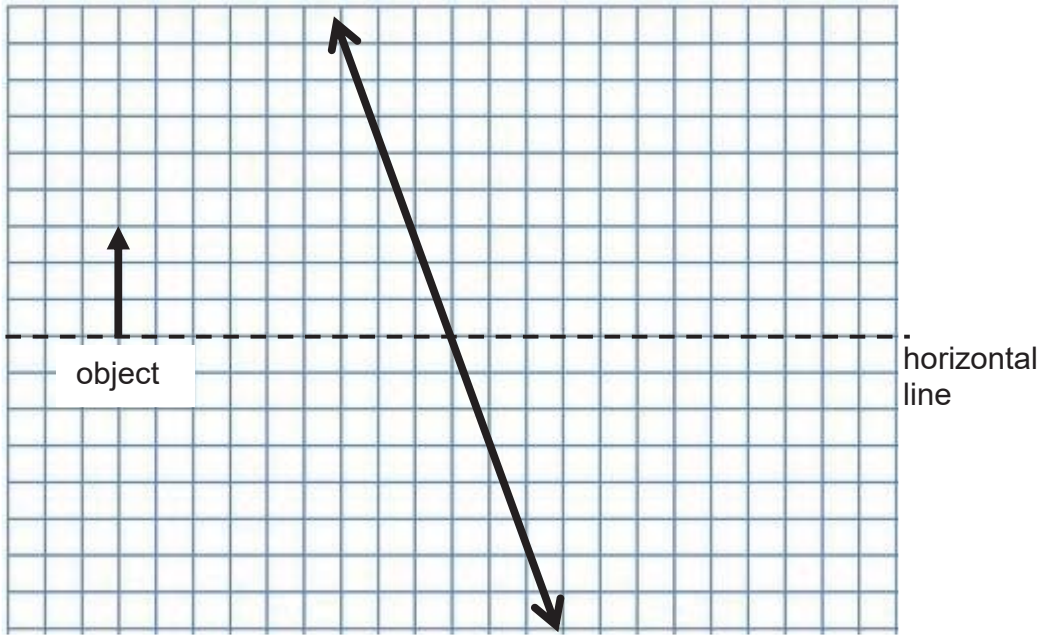


Fig 10.2

(i) Define *principal axis*.

……..

……..

……..…[1]

(ii) In Fig 10.2,

1. sketch the principal axis and label the principal focal points of the lens as f_1 and f_2.

[1]

2. sketch two rays from the tip of the object to locate the image of the tip of the object. Mark this point with "X". [2]

Either

11 Fig 11.1 shows a car equipped with a reverse parking sensor at the car's back bumper.

For Examiner's Use

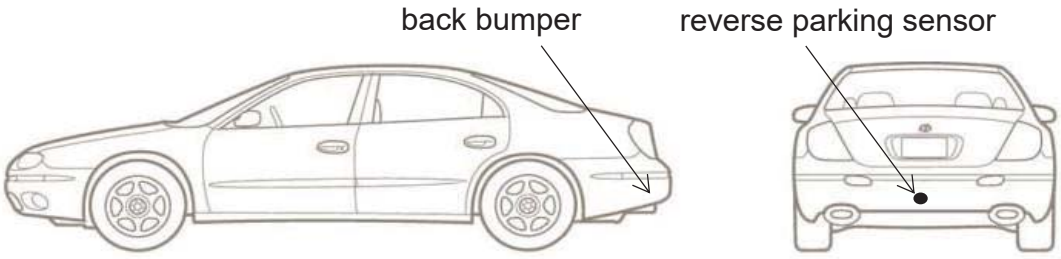


Fig 11.1

The reverse parking sensor uses ultrasound to measure the distance between the car's bumper and nearby objects. The sensor is connected to a sound buzzing system which will provide beep sounds in the car to alert the driver of the obstacles while parking the car.

(a) Define *ultrasound*.

……..

…….[1]

(b) Fig 11.2 shows a screen displaying the signal of one set of pulses picked up by the reverse parking sensor.

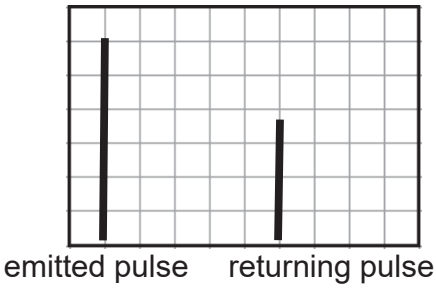


Fig 11.2

The time interval between the two pulses is 800 μs. The ultrasound has a frequency of 25 kHz and the speed of ultrasound is 330 m s^{-1}.

(i) Using the idea about the molecular motion in air, describe what is meant by "a frequency of 25 kHz".

……...

……...[1]

For Examiner's Use

(ii) Calculate the distance (in cm) between the back bumper and the obstacle.

Distance = ……cm [2]

(iii) On Fig 11.2, sketch the returning pulse for the same emitting pulse if the distance between the back bumper and the obstacle is smaller than the value calculated in part **(b)(ii).** [1]

(c) Sound wave comprises regions of compression and rarefaction.

(i) Explain, in terms of pressure, the meaning of region of rarefaction.

……...

……...[1]

(ii) In Fig 11.3, line X represents the position of the air molecules in a sound wave at a particular instant. The sound wave is travelling to the right.

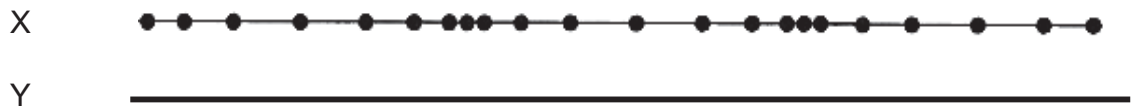


Fig 11.3

1. In Fig 11.3, mark a distance equal to the wavelength of the sound wave on line X. [1]

2. In Fig 11.3, mark the position of the centre of all compressions after another 1½ period on line Y. [1]

3. Describe how you obtained your answer in part **2.**

……..……..…

……..……..…

……..……..…

……..……..

……..……[2]

Or

11 (a) Fig 11.1 shows a simplified diagram of a power station that involves the combustion of natural gas to generate electricity. Water is directed into combustion chamber via a pipe.

For Examiner's Use

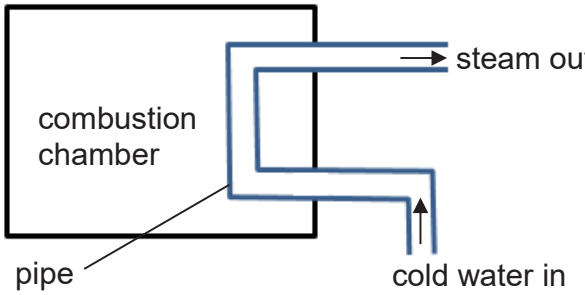


Fig 11.1

(i) Suggest an appropriate material for the pipe. Explain your answer.

……...

……..[1]

(ii) "Using natural gas to generate electricity is an environmentally friendly method".

Do you agree with this statement? Justify your answer.

……...

……..[1]

(iii) In 1.0 minute, 2.0 kg of water at 30°C is converted to steam at 100°C. The specific heat capacity of the water and the specific heat latent heat of vaporisation are 4200 J kg^{-1} $°C^{-1}$ and 2.1 MJ kg^{-1} respectively.

1. Calculate the amount of thermal energy required to change 2.0 kg of water at 30°C to steam in 1.0 minute.

Leave your answer to the appropriate number of significant figures.

Amount of thermal energy = ……[3]

2. The efficiency of the system is 80%.

For Examiner's Use

Calculate the power input.

Power input = ……[2]

(b) Nuclear energy is considered as a good source of energy to generate electricity, however, the gamma radiation produced is extremely dangerous.

(i) Explain why some countries continue to use nuclear energy to generate electricity despite the danger.

……...

……..[1]

(ii) Gamma radiation belongs to a family of waves. Name this family.

……..[1]

(iii) Suggest why gamma radiation is extremely dangerous.

……...

……...

……..[1]

—— END OF PAPER ——