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WHITLEY SECONDARY SCHOOL

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PRELIMINARY EXAMINATION 2024

SUBJECT : Physics (6091) Paper 1

LEVEL : Sec 4 G3

DATE : 26 Aug 2024

DURATION : 1 hour

SETTER : Mr Ng Mun Leong

VETTER : Ms Kuah Li Wen

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and index number on the Answer Sheet in the spaces provided unless this has been done for you.

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.

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

1 What represents a physical quantity?

- A** 5.0
C 2.7 N

- B** kilogram
D 90%

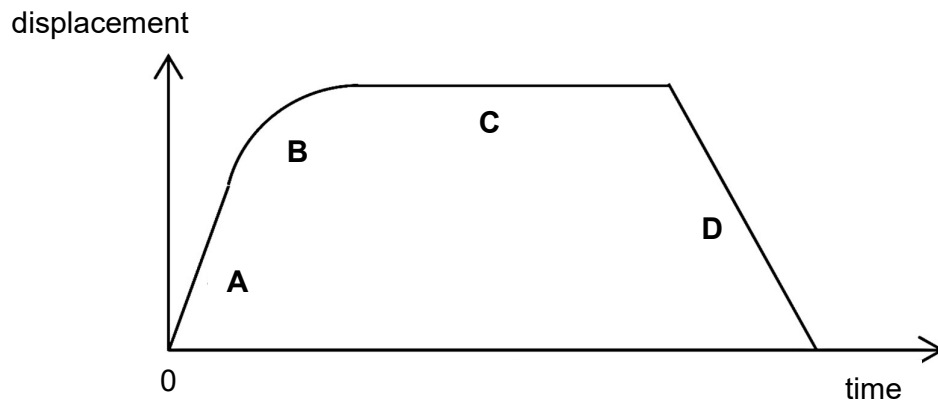
2 How many vector quantities appear in the list below?

work done displacement voltage pressure weight moment

- A** 2
C 4

- B** 3
D 5

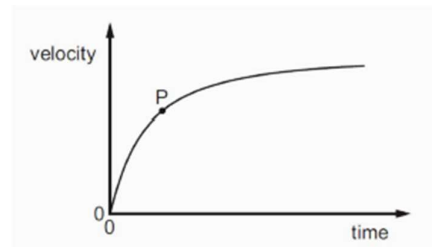
3 The graph illustrates the motion of an object.



Which part of the graph represents the object moving with a decreasing speed?

4 A sphere falls from rest through the air. The graph shows the variation of the sphere's velocity with time.

Which diagram shows the forces acting on the sphere when it is at the velocity corresponding to point P on the graph?



A

B

C

D

air resistance



weight



weight

air resistance



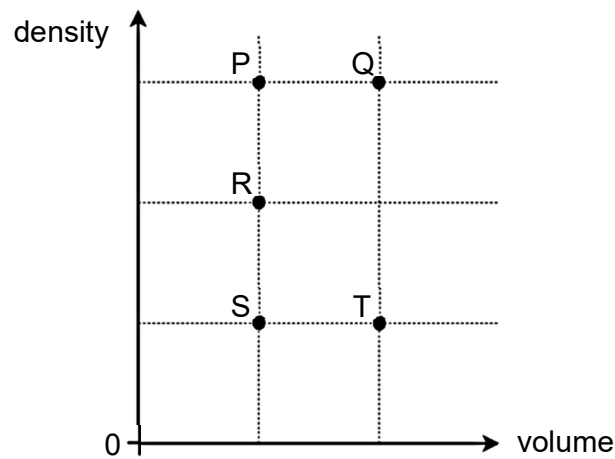
weight

air resistance



weight

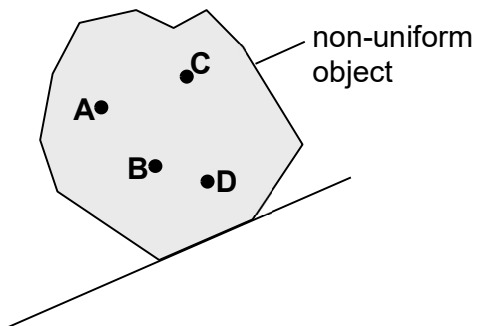
- 8 The graph shows the volume and density of several different objects.



Which two objects have the same mass?

- A** P and Q
B P and R
C R and T
D S and T
- 9 A non-uniform object is placed on an inclined plane as shown below. In this position, it is just about to topple.

Which point is likely the centre of gravity?

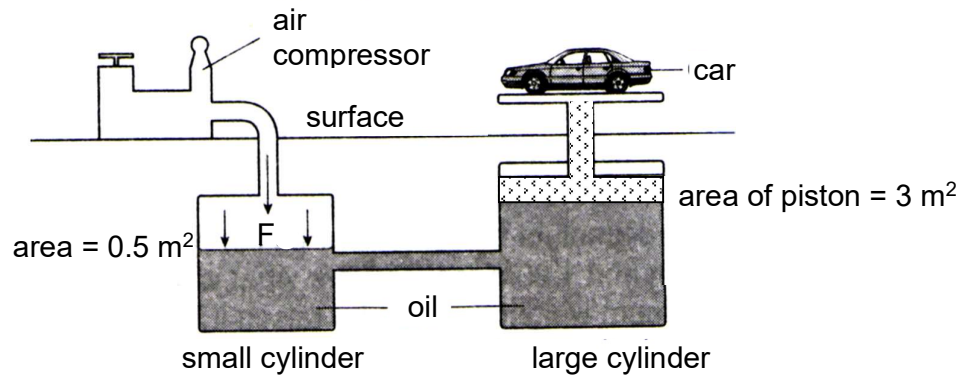


- 10 A washing machine has a power input of 2.5 kW.

What is the work done in half an hour if the washing machine has an efficiency of 95%?

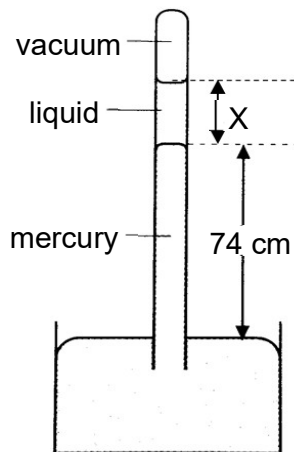
- A** 71 kJ
B 79 kJ
C 4275 kJ
D 4737 kJ

- 11 The diagram below shows a hydraulic pump. Compressed air is pumped into the small cylinder to lift a car.



Which statement is true?

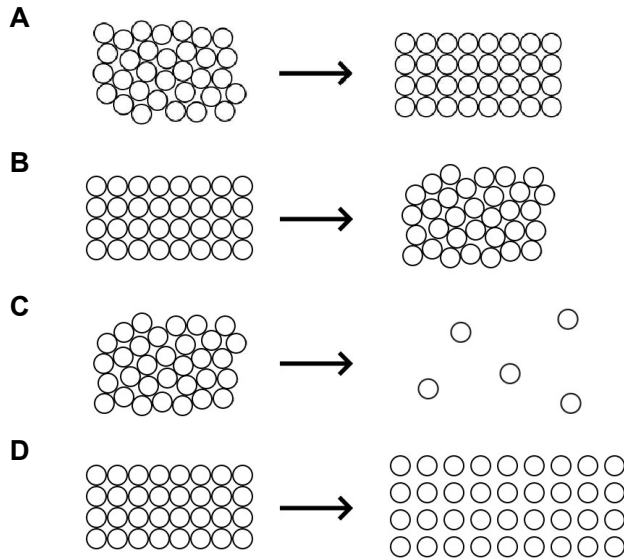
- A Force F is equal to the weight of the car.
 - B Pressure on the piston in the large cylinder is larger than the pressure in the small cylinder.
 - C Ratio of force F in the small cylinder to the weight of the car is 6:1.
 - D Ratio of the pressure in the small cylinder to the pressure on the piston in the large cylinder is 1:1.
- 12 The diagram shows a mercury barometer. A liquid which is less dense than mercury exists above the mercury column. This liquid does not mix with mercury.



Given that the atmospheric pressure is 76 cm Hg, the density of liquid is 1200 kg/m³ and the density of mercury is 13600 kg/m³, determine the height X of the liquid column.

- A 2.0 cm
- B 22.7 cm
- C 26.0 cm
- D 76.0 cm

- 13 Which diagram represents the change in the arrangements of the particles in a liquid as it freezes?



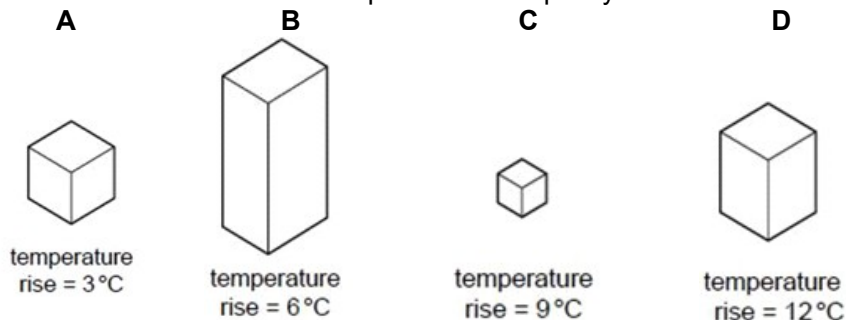
- 14 A piece of ordinary kitchen aluminum foil is used to wrap around food to be cooked in a barbecue fire. The foil has a shiny side and a dull side.

Which side should be on the outside and why?

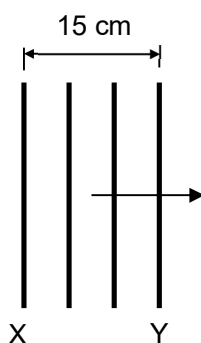
- A** The dull side should be on the outside because it is a better emitter of thermal radiation.
- B** The dull side should be on the outside because it absorbs thermal radiation better.
- C** The shiny side should be on the outside because it is a better thermal conductor.
- D** The shiny side should be on the outside because it is a better absorber of thermal radiation.
- 15 A tiled floor normally feels cooler than a carpeted floor.
- Which of the following is the most appropriate explanation?
- A** tiled floor is a better conductor of heat than the carpet
- B** tiled floor is a better radiator of heat than the carpet
- C** tiled floor is a better reflector of heat than the carpet
- D** tiled floor has a larger specific heat capacity than the carpet

- 16** Four blocks of equal masses are made from different materials. Each block is heated so that they have the same increase in internal energy.

Which block has the smallest specific heat capacity?



- 17 The figure below shows a water wave travelling in a ripple tank. The wavefront at X travels to Y in 5.0 s.



What is the frequency of the water wave?

- A** 0.60 Hz **B** 3.0 Hz
C 15 Hz **D** 75 Hz

- 18** Which of the following correctly lists three waves in order of decreasing wavelength?

- A** gamma rays, microwaves, visible light
B visible light, gamma rays, radio waves
C ultra-violet radiation, infrared radiation, microwaves
D radio waves, infra-red radiation, X-rays

- 19** Which of the following is/are longitudinal waves?

- I light from the sun
- II sound produced by whales
- III x-ray
- IV water wave in a water tray

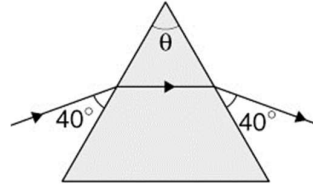
- A** II only
B II and IV
C I, III, and IV
D I, II, III and IV

- 20 A bat produces ultrasound and audible sound at the same time.

Which of the following is true?

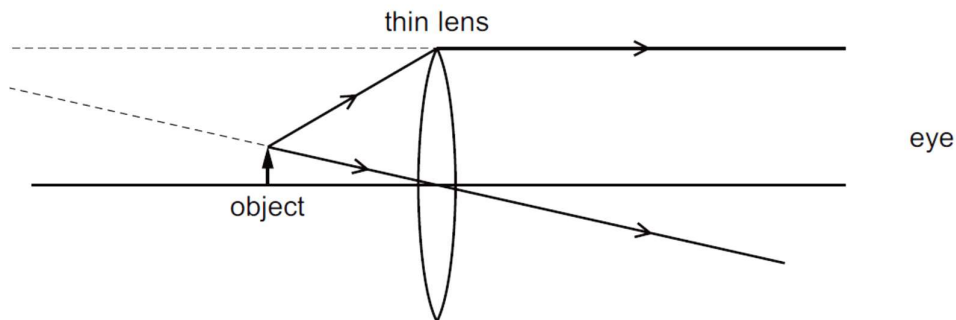
- A Ultrasound travels faster than the audible sound.
- B Ultrasound and audible sound will reach the same distance at the same time.
- C The wavelength of the ultrasound is longer than the wavelength of the audible sound.
- D Ultrasound and audible sound have the same frequency.

- 21 A light ray passes through a triangular glass prism of refractive index 1.5.



What is angle θ ?

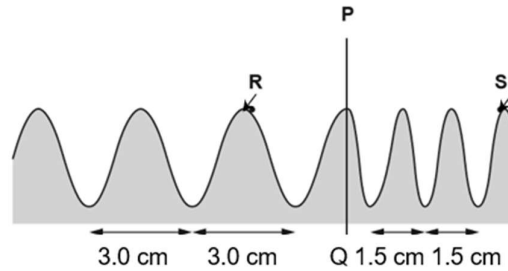
- A 51°
 - B 53°
 - C 56°
 - D 61°
- 22 An object is viewed through a converging lens. The diagram shows the paths of two rays from the top of the object to an eye.



How does the image compare with the object?

- A It is larger and inverted.
 - B It is larger and upright.
 - C It is smaller and inverted.
 - D It is smaller and upright.
- 23 What is meant by the term *wavefront*?
- A A line joining a trough and a crest on a wave.
 - B A line joining all the troughs on a wave.
 - C The distance between successive crests on a wave.
 - D The distance travelled by a complete wave.
- 24 What is the approximate range of audible frequencies for a young and healthy person?
- A 1.0 Hz – 20 Hz
 - B 20 Hz – 20 kHz
 - C 20 kHz – 100 kHz
 - D 100 kHz – 2000 kHz

- 25 The diagram shows a water wave in a ripple tank.



The wave has a speed of 0.15 m/s at R.

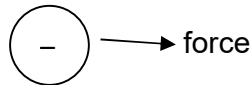
The wave crosses a boundary PQ where the distance between crests changes from 3.0 cm to 1.5 cm.

What is the velocity of the wave at point S?

- A** 0.075 m/s **B** 0.15 m/s
C 0.30 m/s **D** 0.45 m/s
- 26 Which statement about electromagnetic waves is correct?
- A** Gamma rays are used in sunbeds for artificial sun tanning.
B Radio waves are used in satellite communications.
C Visible light can damage human proteins and DNA.
D X-rays are used to check for cracks in metals.
- 27 Ultrasound is used to map the ocean floor. During one survey, the depth of water is 1800m. An ultrasound pulse is sent from the surface and when it returns to the receiver, another pulse is sent immediately. In any period of 12 s, five pulses are sent down from the surface and received.

What is the speed of the ultrasound in water?

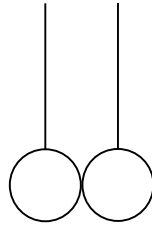
- A** 150 m/s **B** 360 m/s
C 1200 m/s **D** 1500 m/s
- 28 A stationary negative charge in an electric field experiences an electric force in the direction shown.



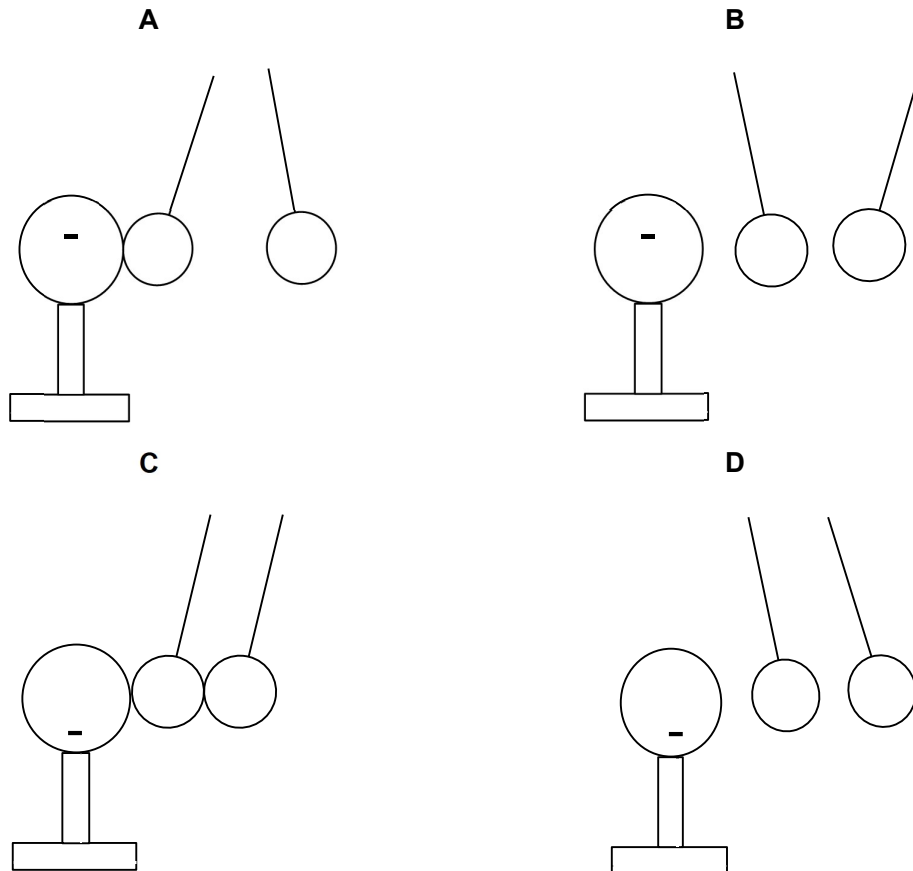
What is the direction of the electric field?

- A** horizontally to the left **B** horizontally to the right
C into the page **D** out of the page

- 29** Two identical uncharged light conducting balls are suspended by insulating thread and touching each other as shown.



Which of the following shows the position of the balls when a strong negatively charged conducting sphere touches one of them?



- 30** The terminals of a battery are joined by a length of resistance wire.

Which of the following changes will increase the current through the battery?

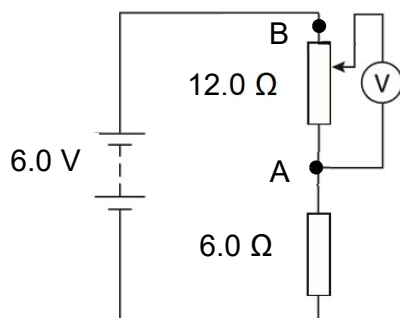
- A** connecting an identical wire in series with the first one
- B** covering the wire with rubber insulation
- C** replacing the wire with a longer wire of the same material and thickness
- D** replacing the wire with a thicker and shorter wire of the same material

31 Which of the following is equivalent to the unit for potential difference?

- A** A/s
C J/C

- B** Cs
D W/s

32 The diagram shows a circuit with a potential divider connected in series with a fixed resistor.



What are the minimum and maximum readings that can be obtained on the voltmeter when the contact of the potential divider moved from A to B?

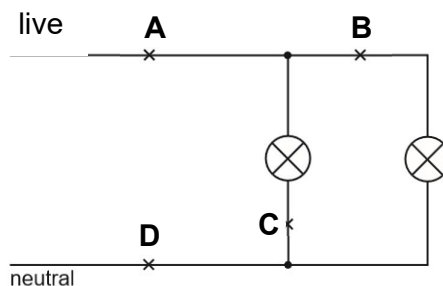
	minimum / V	maximum / V
A	0	4.0
B	0	6.0
C	2.0	4.0
D	6.0	12.0

33 In which of the following situation(s) will a fuse possibly melt?

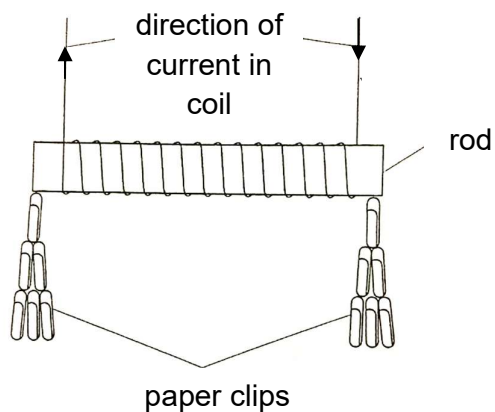
- 1 The live wire touches the earth wire.
- 2 The live wire touches the neutral wire.
- 3 The earth wire is touched by a person.
- 4 The fuse is fixed on the neutral wire instead of the live wire.

- A** 2 only
B 1 and 2 only
C 3 and 4 only
D 1, 2 and 3 only

34 To turn off only one lamp, which is the safest switch position?



- 35 Four rods are placed, in turn, inside a coil of copper wire.

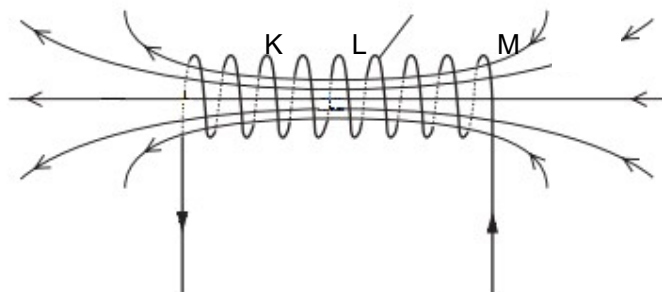


The table below gives the results of the experiment.

Which rod would be the most suitable to use as the core of a coil in a circuit breaker?

	number of paper clips picked up when there is current in the coil	number of paper clips picked up when there is no current in the coil
A	1	0
B	20	5
C	40	0
D	40	20

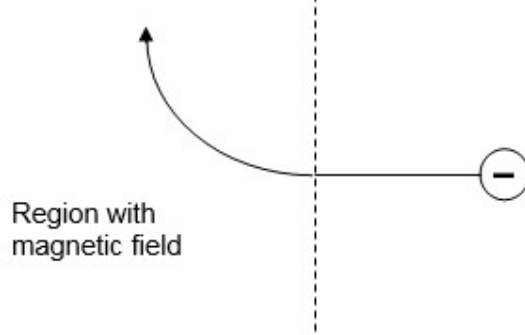
- 36 The diagram shows the magnetic field pattern of a current in a solenoid.



When the current in the solenoid is increased, where is the increase in the magnetic field strength of the solenoid?

- A** at K, L and M
- B** at K and L only
- C** at M and L only
- D** at M only

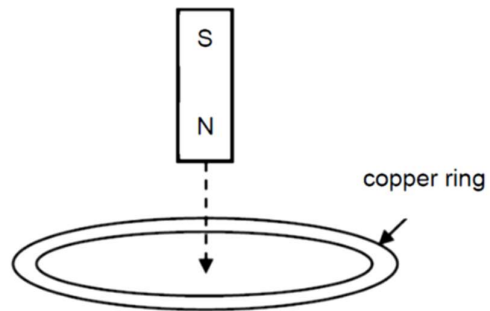
- 37 The diagram shows a beam of electrons entering a magnetic field.



What will be the direction of the magnetic field?

- A into the page
 - B out of the page
 - C towards the bottom of the page
 - D towards the top of the page
- 38 A magnet is dropped vertically through a copper ring. The induced electromotive force is larger than the weight of the magnet.

Which of the following statements is incorrect?



- A A current flows in the ring just before the magnet passes through the ring.
 - B A current flows in the ring just after the magnet passes through the ring.
 - C The magnet slows down just before it passes through the ring.
 - D The magnet accelerates just after it passes through the ring.
- 39 From which of the following materials should a box for storing radioactive substances be made?
- A aluminium
 - B glass
 - C lead
 - D wood
- 40 Which of the following nuclear reactions is an example of fusion?
- A carbon 14 decaying to nitrogen + an electron
 - B two heavy hydrogen nuclei becoming helium + a neutron + energy
 - C radioactive radium 226 decaying to radioactive radon 222 + an alpha particle
 - D radioactive sodium 24 decaying to stable magnesium 24 + a beta particle