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JURONG SECONDARY SCHOOL
2021 GRADUATION EXAMINATION 2
SECONDARY 4 EXPRESS

CANDIDATE NAME	

CLASS		INDEX NUMBER	

PHYSICS **6091/01**
Paper 1 Multiple Choice 1 Sep 2021
1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

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

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, class and index number on the answer sheet in the spaces provided.

There are **forty** questions in this paper. Answer **all** the 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.

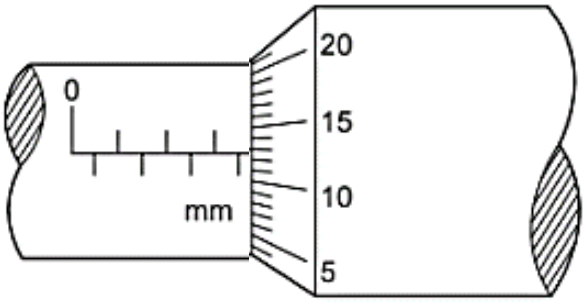
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

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

For Examiner's Use	
PAPER 1 [40 marks]	

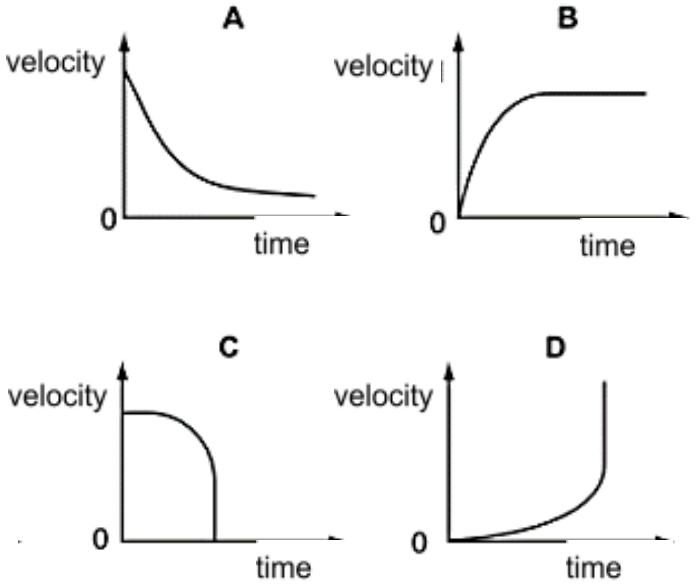
This document consists of **18** printed pages including this page.

1 What is the reading shown on the micrometer?

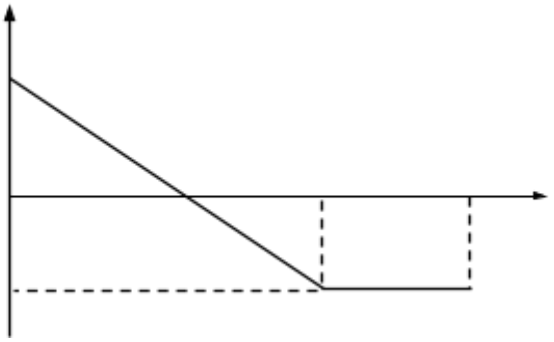


A 3.13 mm **B** 3.63 mm **C** 7.13 mm **D** 7.63 mm

2 Which graph represents the motion of a body falling vertically?



3 The velocity-time graph of an object's motion is shown.



What is the distance travelled in the opposite direction?

A 24 m **B** 60 m **C** 72 m **D** 132 m

4 A man pulls a cart of mass 25 kg across level ground with a horizontal force of 60 N. A constant force of friction of 20 N acts on the cart.

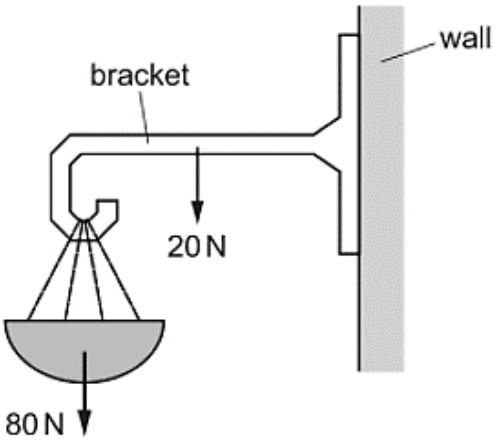
What is the acceleration of the cart?

A 0.63 m/s^2 **B** 1.6 m/s^2 **C** 2.4 m/s^2 **D** 3.2 m/s^2

5 How is the motion of a body affected by balanced and unbalanced forces acting on it?

	balanced forces	unbalanced forces
A	velocity changes	velocity changes
B	velocity changes	velocity constant
C	velocity constant	velocity changes
D	velocity constant	velocity constant

6 A hanging basket is fixed to a wall by a socket.



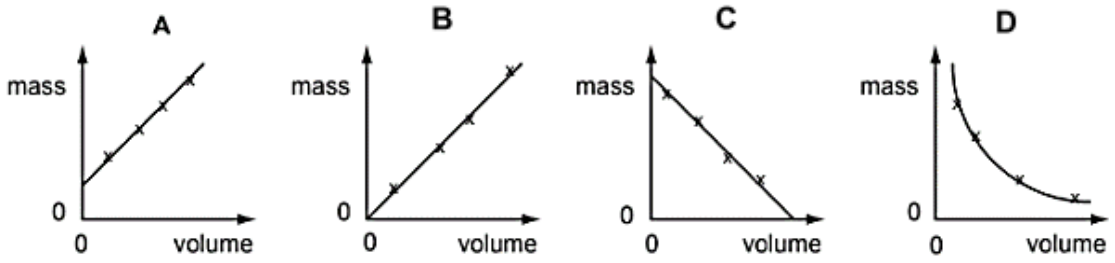
The weight of the basket is 80 N. The weight of the bracket is 20 N.

What is the size and direction of the force exerted on the bracket by the wall?

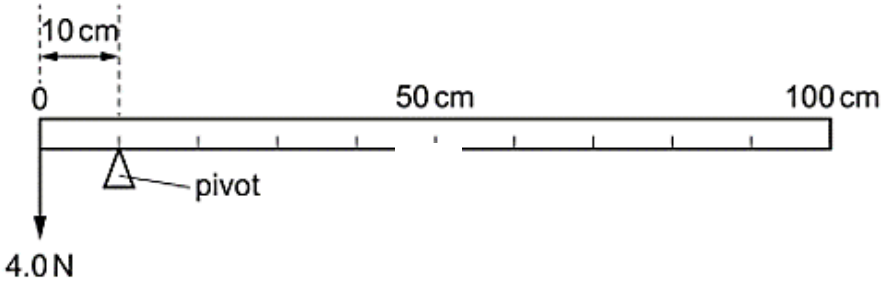
	size of force	direction of force
A	20 N	downwards
B	100 N	upwards
C	20 N	upwards
D	100 N	downwards

7 Some students measure the masses and volumes of different sized samples of a type of wood.

Which graph shows their results?



8 A uniform metre rule is balanced by a 4.0 N weight as shown.

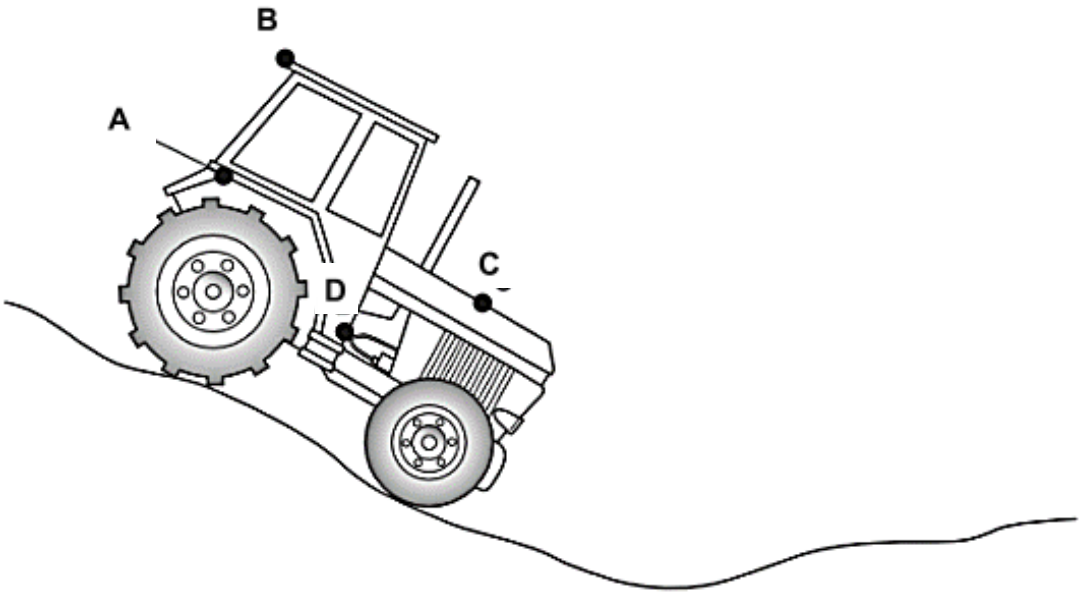


What is the weight of the metre rule?

A 0.8 N **B** 1.0 N **C** 4.0 N **D** 40 N

9 A tractor is being used on rough ground.

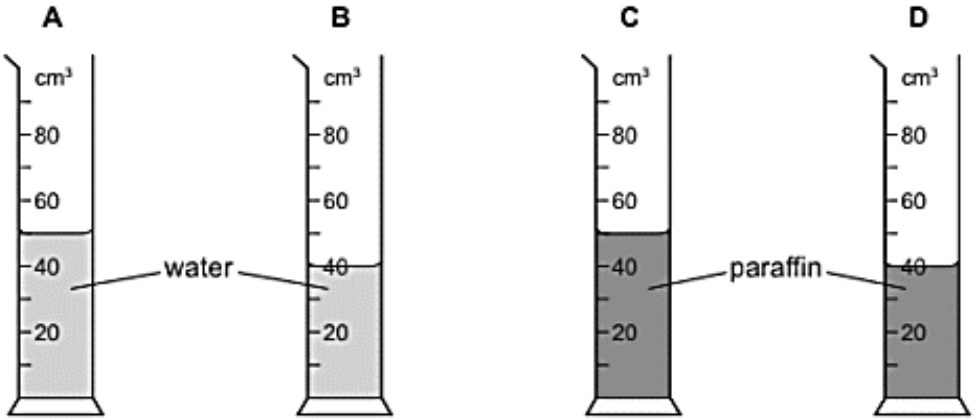
Which is the safest point for its centre of gravity?



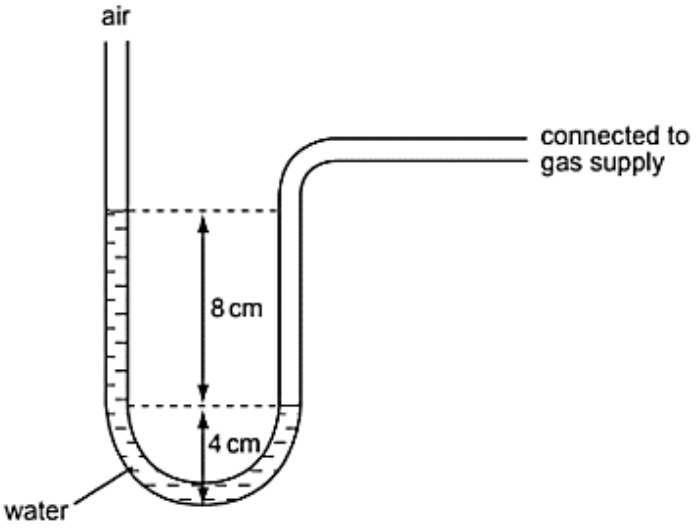
10 Four identical measuring cylinders contain liquid.

Two contain water of density 1000 kg/m^3.
Two contain paraffin of density 800 kg/m^3.

Which cylinder has the least pressure exerted on its base by the liquid it contains?



11 A manometer is connected to a gas supply.



Pressure can be measured in cm of water.

What is the pressure of the gas?

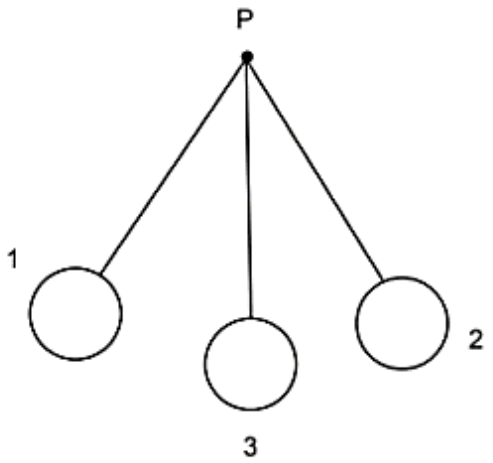
A 4 cm of water more than atmospheric pressure

B 8 cm of water less than atmospheric pressure

C 8 cm of water more than atmospheric pressure

D 12 cm of water more than atmospheric pressure

12 A mass hangs from a fixed point P. It starts from position 1 and swings to position 2 which is the furthest position on the opposite side. It then oscillates several times with decreasing amplitude until it comes to rest at position 3.



Where does the mass have the most kinetic energy?

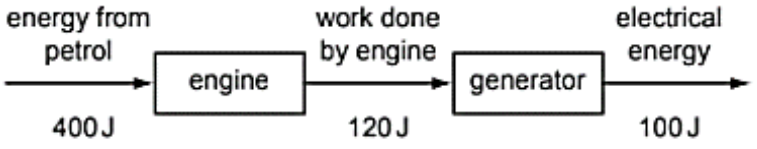
A at position 1

B at position 2

C the first time at position 3

D the last time at position 3

13 Energy from petrol is used to operate an engine. The engine drives a generator, which produces electrical energy.



What is the overall efficiency of the process?

A 25 % **B** 30 % **C** 55 % **D** 83

14 When a microscope is used to look at smoke particles in air, Brownian motion is observed.

What causes the smoke particles to move at random?

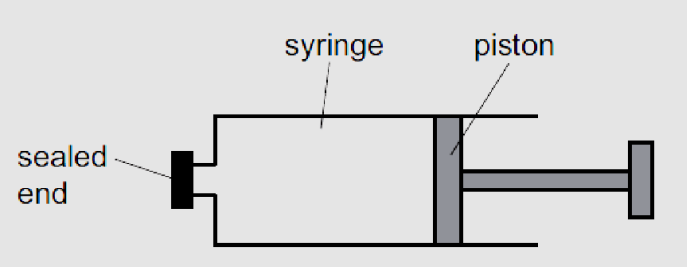
A Smoke particles are hit by air molecules.

B Smoke particles are moved by convection currents in the air.

C Smoke particles have different weights and fall at different speeds.

D Smoke particles hit the walls of the container.

15 The diagram shows a syringe with a fixed piston.
Gas is trapped in the syringe.



The pressure in the syringe increases.

What happens to the temperature of gas and the collision frequency of the gas molecules in the syringe?

	temperature of gas	collision frequency of gas molecules
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

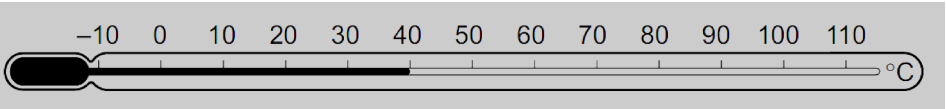
16 Samples of four different substances are heated in turn by the same heater, for the same time duration and in the same conditions. The time taken for the temperature for each sample to increase by 5 °C is recorded in a table.

sample	time for 5 °C rise / s
aluminium	10
copper	5
plastic	800
wood	1200

Which materials should be used to make the body and handle of a frying pan?

	body	handle
A	aluminium	plastic
B	aluminium	wood
C	copper	plastic
D	copper	wood

17 Which points are the fixed points of the liquid-in-glass thermometer shown?



A the beginning and end points of the column of liquid

B the points marked –10 °C and 110 °C

C the points marked 0 °C and 100 °C

D the top and bottom points of the thermometer bulb

18 A 2 kW kettle containing boiling water is placed on a balance. It is left there and the water continues to boil. The balance reading changes by 0.20 kg.

The specific latent heat of vaporisation of water is 3 000 000 J / kg.

How long did the water boil for?

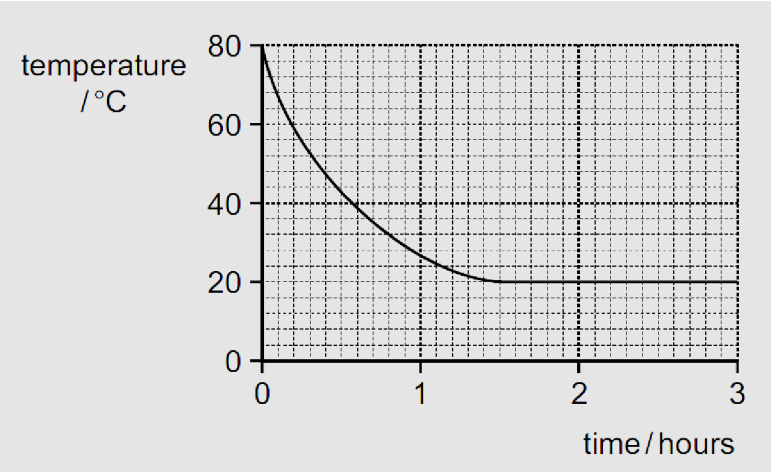
A 0.0033 s **B** 300 s **C** 300 000 s **D** 1 200 000 s

19 When a liquid evaporates, some molecules escape.

What is the effect on the kinetic energy of the liquid molecules and from where do the molecules escape?

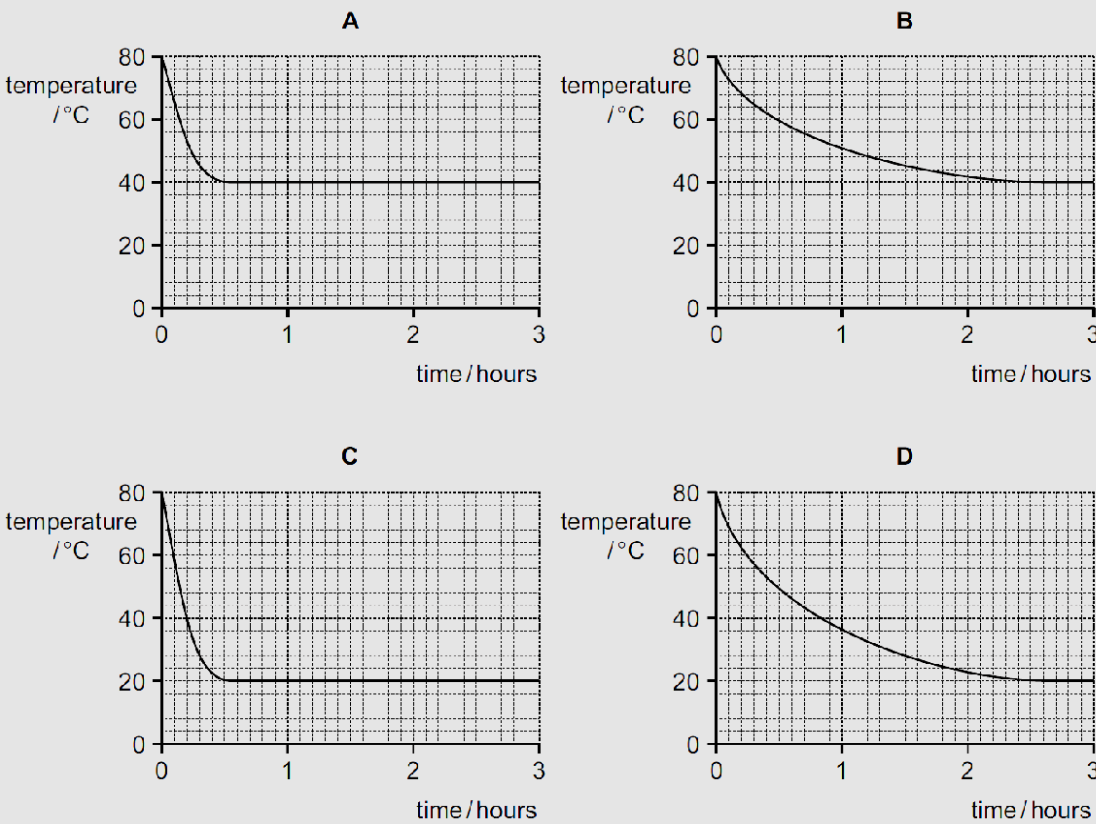
	kinetic energy of liquid molecules	molecules escape from
A	decreases	everywhere within the liquid
B	decreases	the surface only
C	increases	everywhere within the liquid
D	increases	the surface only

20 The diagram shows the temperature-time graph for hot water that is cooling in an uninsulated beaker.



The beaker is now insulated. The same volume of hot water, at the same initial temperature as before, is put into the insulated beaker. The beaker is in the same room as before.

Which is the new temperature-time graph for the water as it cools?



21 The diagram shows a wave on a guitar string with point P marked on the string. The wave is moving in the direction shown.

wave direction
P
What is the movement of P?

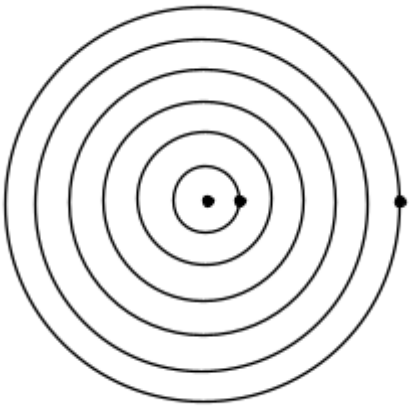
A downwards then upwards

B to the right

C to the right then to the left

D upwards then downwards

22 The diagram shows the top view of some water waves produced from point P.

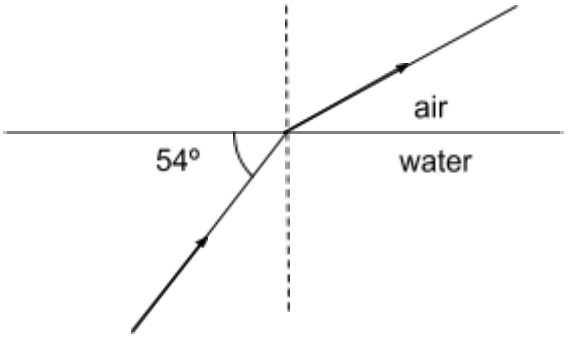


P
R
Q
The waves have a speed of 0.50 m/s and take 2.0 s to travel from point Q to R.

What is the wavelength of the wave?

A 0.10 m **B** 0.20 m **C** 0.25 m **D** 1.0 m

23 A ray of light is incident from below the surface of water as shown in the diagram. The refractive index of water is 1.3.

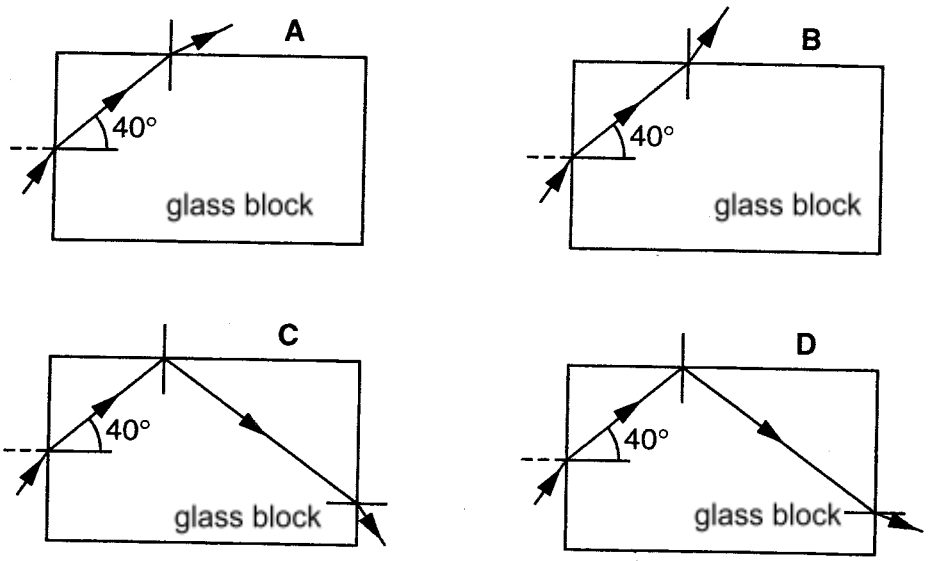


What is the angle of refraction in air?

A 27 ° **B** 38 ° **C** 50 ° **D** 72 °

24 A ray of light is incident on one side of a rectangular glass block so that the angle of refraction is 40 ° in the glass. The refractive index of glass is 1.5.

Which diagram correctly shows a possible path of this ray?



25 Which component of the electromagnetic spectrum has the smallest wavelength?

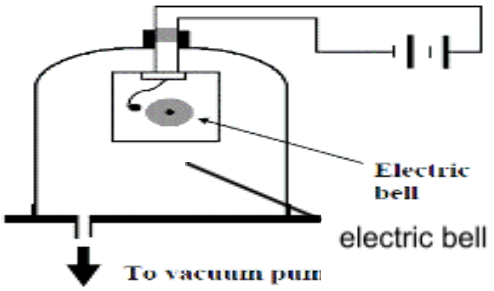
A infra-red waves

B light

C radiowaves

D ultra-violet rays

26 The diagram shows a bell ringing inside an inverted bell jar that is connected to a vacuum pump.



Which is likely to happen when the vacuum pump is switched on?

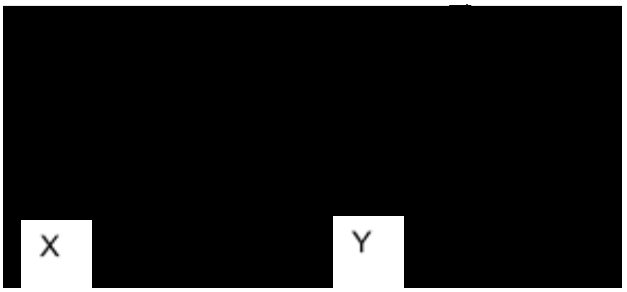
A the bell rings louder

B the bell rings with a higher frequency

C the bell stops ringing

D the ringing of the bell cannot be heard

27 The waveforms of two notes X and Y are shown in the datalogger screens with the same scale.



Which of these statements is true?

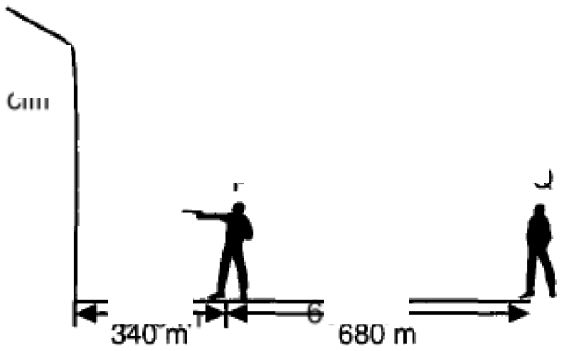
A X has a higher pitch than Y but is not as loud

B X has a higher pitch than Y and is louder

C X has a lower pitch than Y and is not as loud

D X has a lower pitch than Y and is louder

28 Two persons P and Q stand in front of a vertical cliff as shown.
P is holding a pistol.



P fires one shot using the pistol and Q hears two shots instead.
The speed of sound in air is 340 m/s.

What is the time interval between the two shots that Q hears?

A 1.0 s **B** 2.0 s **C** 4.0 s **D** 8.0 s

29 Which statement best describes an electric field?

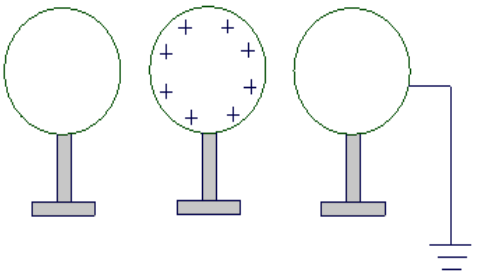
A a field that contains electricity

B a field that surrounds a charge particle

C a region in which an electric charge experiences a magnetic force

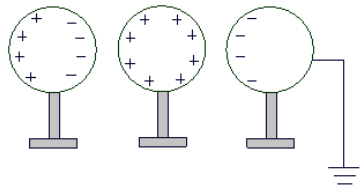
D a region in which an electric charge experiences an electric force

30 The diagram shows a positively charged metal sphere placed between two uncharged metal spheres, one of which is grounded to the earth.

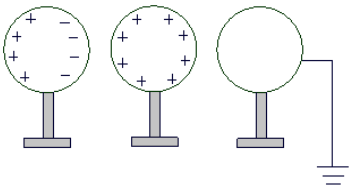


Which of the diagrams correctly shows how the charges are distributed on the spheres?

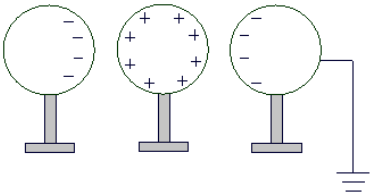
A



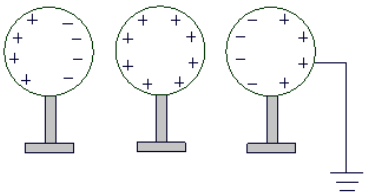
B



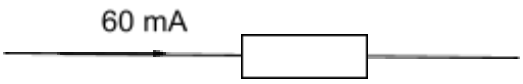
C



D



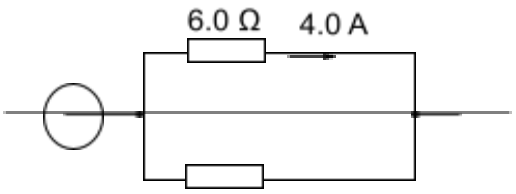
31 The diagram shows the amount of current flowing through a conductor.



What is the amount of charge that flows through the conductor in 10 minutes?

A 36 C **B** 60 C **C** 167 C **D** 600

32 Two resistors of 6.0 Ω and 12 Ω are arranged in parallel as shown.
The current through the 6.0 Ω resistor is 4.0 A.



What current does the ammeter show?

A 4.0 A **B** 6.0 A **C** 8.0 A **D** 12 A

33 The diagram shows a thermistor and a light-dependent resistor (LDR) joined to a circuit with a dry cell. A buzzer is joined to the circuit.

Which of the following conditions will cause the buzzer to sound?

	light intensity	temperature
A	high	high
B	high	low
C	low	high
D	low	low

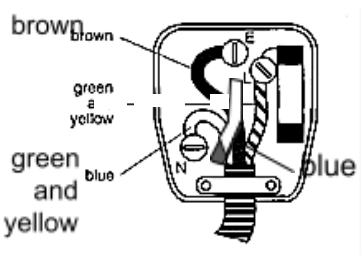
34 A 12.0 V battery is used to supply a current of 0.50 A in a main circuit before branching out to two light bulbs in parallel.

What is the total energy supplied to the light bulbs in 20 s?

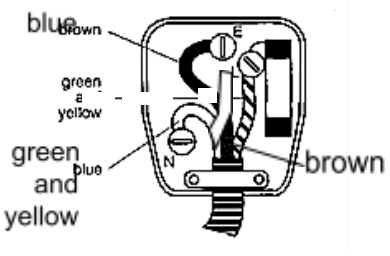
A 0.60 J **B** 120 J **C** 240 J **D** 480 J

35 Which diagram shows the correct connection of the wiring in a 3 pin plug?

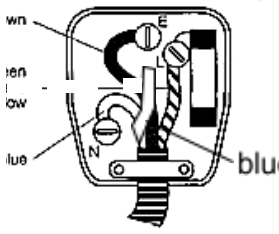
A



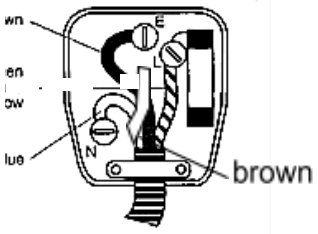
B



C



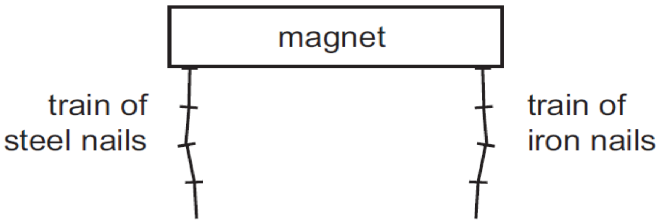
D



36 A train of steel nails and a train of iron nails hang from a strong magnet.

The trains are ther

What happens to t



A Both trains fall apart.

B Both trains stay together.

C Only the train of iron nails falls apart.

D Only the train of steel nails falls apart.

37 A current-carrying solenoid is used to magnetise a steel bar.

What must be part of the procedure for magnetising the bar magnet?

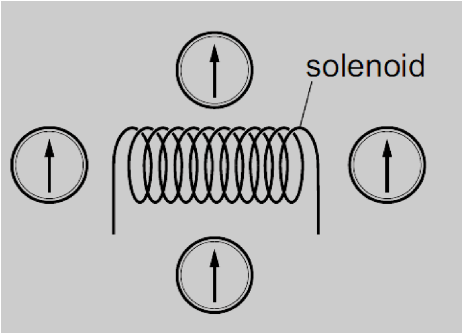
A Alternating current (a.c.) is used.

B The magnet is inserted slowly into the solenoid with the current switched on.

C The magnet is inserted quickly into the solenoid with the current switched on.

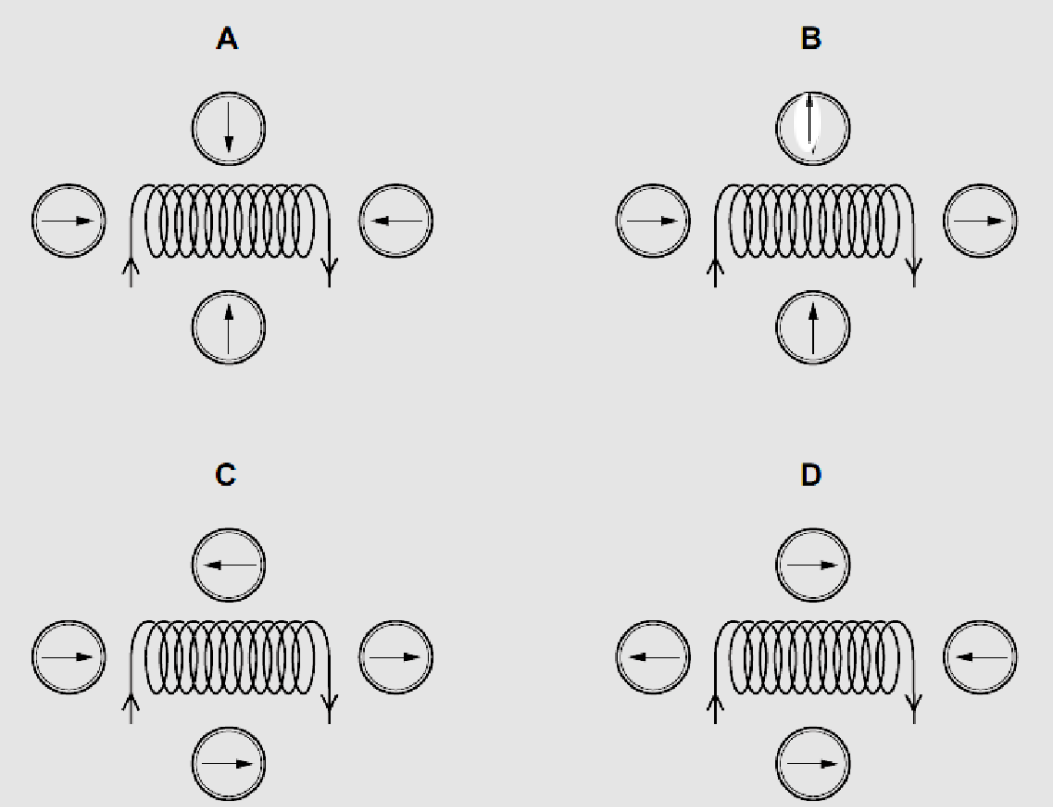
D The magnet is left inside the solenoid when the current is switched on.

38 Four small compasses are placed around a solenoid.



A current passes through the solenoid.

Which diagram shows possible new directions of the compass needles?



39 P and Q are wires carrying electric currents.
The magnetic field pattern of wire P is shown.

P
Q

Which of the following shows the correct direction of current in wire P and wire Q, and the effect on both wires?

	direction of current in wire P	direction of current in wire Q	effect on wires
A	into the page	into the page	repulsion
B	into the page	out of the page	repulsion
C	out of the page	into the page	repulsion
D	out of the page	out of the page	attraction

40 What is the purpose of using a split-ring commutator?

A it ensures that the current is the same in all parts of the coil of a motor

B it produces a force on a current-carrying coil

C it reverses the direction of the current in the external circuit of a motor

D it reverses the direction of the current in the coil of a motor

END OF PAPER