

**JURONG SECONDARY SCHOOL
2022 GRADUATION EXAMINATION 2
SECONDARY 4 EXPRESS**

**CANDIDATE
NAME**

CLASS

**INDEX
NUMBER**

PHYSICS

Paper 1 Multiple Choice

6091/01

31 August 2022

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.

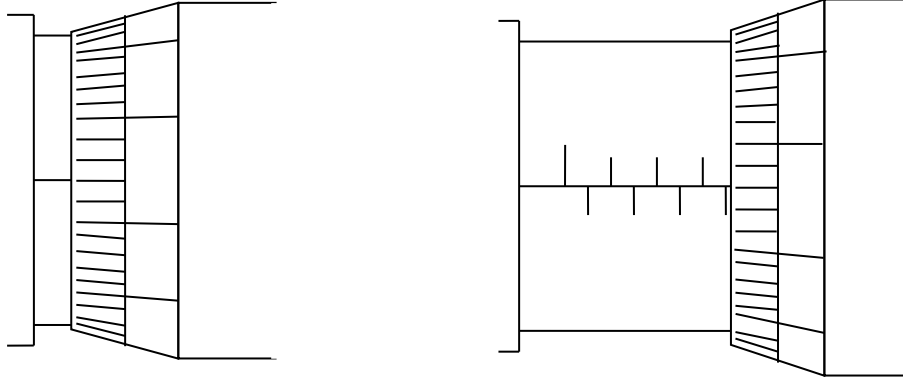
Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this booklet.

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

For Examiner's Use	
PAPER 1 [40 marks]	

This document consists of **19** printed pages including this page.

- 1 A micrometer screw gauge is used to measure the thickness of a metal sheet. Diagram 1 shows the reading on the micrometer screw gauge when it is tightened with nothing between the jaws. Diagram 2 shows the reading taken with the metal sheet between the jaws.



What is the thickness of the metal sheet?

- A** 3.65 mm **B** 3.71 mm **C** 7.15 mm **D** 7.21 mm
- 2 An electromagnetic wave has a wavelength of 0.000 000 238 m.
Which of the following is equivalent to the length of the wavelength?
- A** 2.38×10^{-13} Mm **B** 2.38×10^{-5} mm
C 2.38×10^3 nm **D** $2.38 \mu\text{m}$
- 3 A cyclist riding at a velocity of 5 m/s braked with uniform deceleration and stopped in 3 m.

How long did she take to stop?

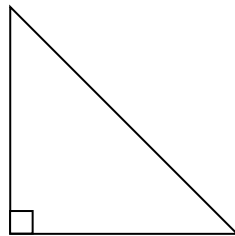
- A** 0.6 s **B** 1.2 s **C** 1.3 s **D** 3.0 s

- 4 A coin and a feather are dropped from rest at the same time in a vacuum. The coin is released at a higher height than the feather.

Before they reach the ground, which of the following statements is **incorrect**?

- A They have the same acceleration.
- B They have the same velocity at any instant.
- C They meet each other at some point in time.
- D They travel the same distance in the same amount of time.

- 5 The diagram shows a right-angled isosceles pathway, PQR.

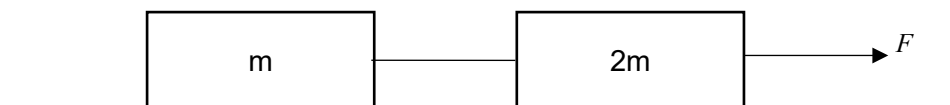


A man takes 10 s to walk from P to Q and 15 s to walk from Q to R.

What is the average velocity of the man?

- A 0.28 m/s
- B 0.33 m/s
- C 0.40 m/s
- D 0.50 m/s

- 6 Two masses are joined by a light inextensible string and pulled by force F along a frictionless surface as shown in the figure below.



What is the magnitude of the tensional force between the two masses?

- A $\frac{1}{3}F$
- B $\frac{2}{3}F$
- C F
- D $\frac{4}{3}F$

7 Inertia is a measure of the

- A ability for objects to move.
- B ability for objects to stop.
- C reluctance for moving objects to stop.
- D reluctance for objects at rest to remain at rest.

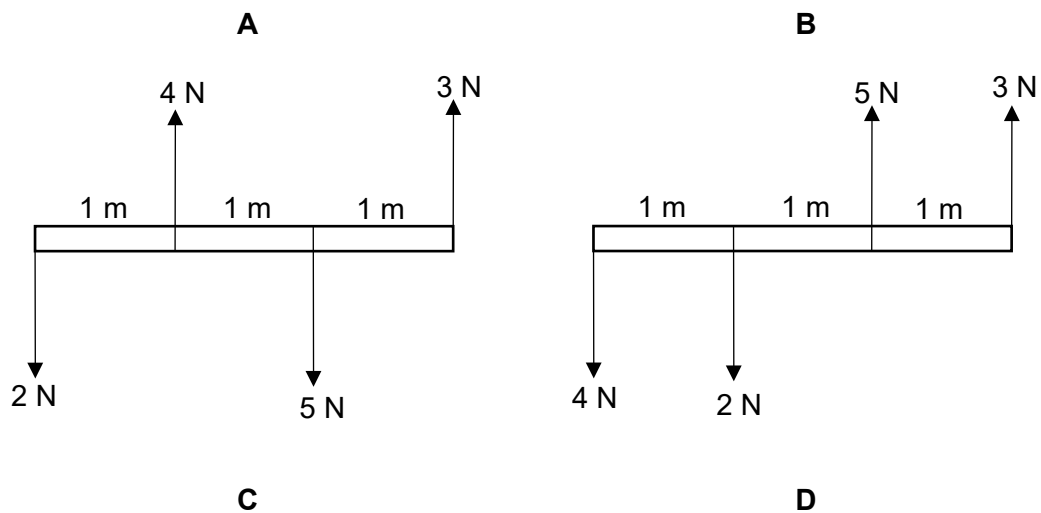
8 Solid A of mass 12 g displaces the same volume of water as solid B of mass 8 g.

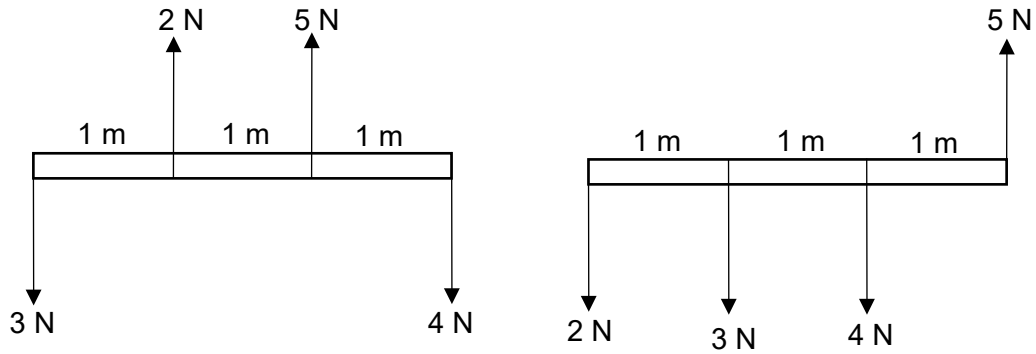
What can be deduced about the densities of solids A and B?

- A both A and B have the same density
- B density of A is $1\frac{1}{2}$ times the density of B
- C density of A is $\frac{2}{3}$ times the density of B
- D density of A is four times the density of B

9 Four forces act on a uniform rod.

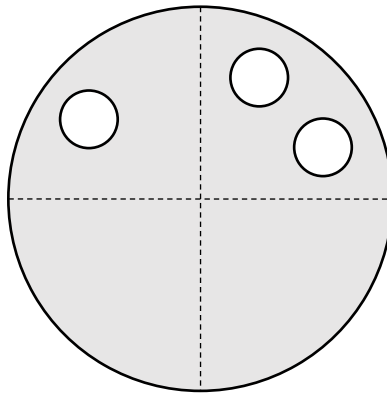
Which rod is in equilibrium?





- 10** A plane lamina has three holes drilled on it.

At which quadrant is the centre of gravity of the lamina?

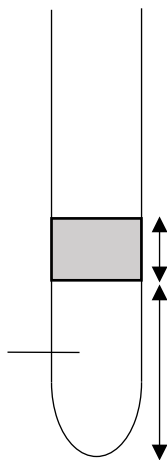


- 11** A diver is 15 m below sea level.
 Atmospheric pressure is 1.0×10^5 Pa.
 The density of sea water is 1020 kg/m^3 and the gravitational field strength g is 10 N/kg .

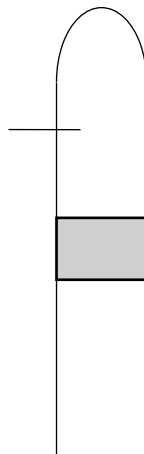
What is the pressure acting on the diver?

- | | |
|---------------------------------------|---------------------------------------|
| A $4.7 \times 10^4 \text{ Pa}$ | B $5.3 \times 10^4 \text{ Pa}$ |
| C $1.5 \times 10^5 \text{ Pa}$ | D $2.5 \times 10^5 \text{ Pa}$ |

- 12** A 5 cm mercury column traps a column of gas of 8 cm, in a glass tube. Atmospheric pressure is 75 cm Hg.



What is the pressure of the trapped gas when the glass tube is inverted?



- A** 70 cm Hg **B** 72 cm Hg **C** 80 cm Hg **D** 88 cm Hg
- 13** Potential energy is
- A** the energy possessed by a moving body.

- B** the energy possessed by an unstretched spring.
- C** the energy released during boiling.
- D** the energy within the forces of attraction between particles.

- 14** Three solar panels produce a total power of 2.0 kW.
 They have a total surface area of 7.2 m².
 1.0 m² of each solar panel receives 800J of energy from the sun every second.

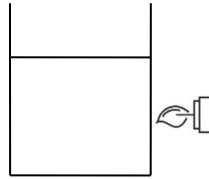
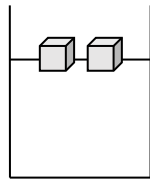
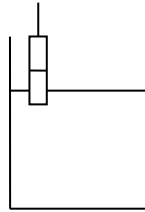
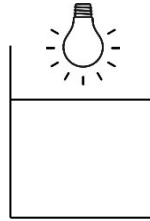
What is the efficiency of the solar panels?

- A** 12 % **B** 17 % **C** 34 % **D** 65 %

- 15** Which of the following correctly states the properties of solids, liquids and gases?

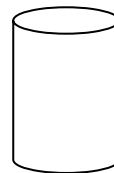
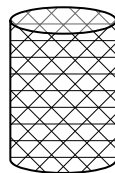
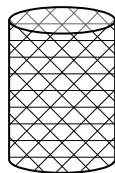
	solids	liquids	gases
A	do not flow easily	flow easily	do not flow easily
B	easily compressed	easily compressed	hard to compress
C	fixed shape	no fixed shape	no fixed shape
D	no fixed volume	fixed volume	no fixed volume

- 16 The diagram below shows four beakers of water.



Which of the following beakers will a convection current be set up in the water?

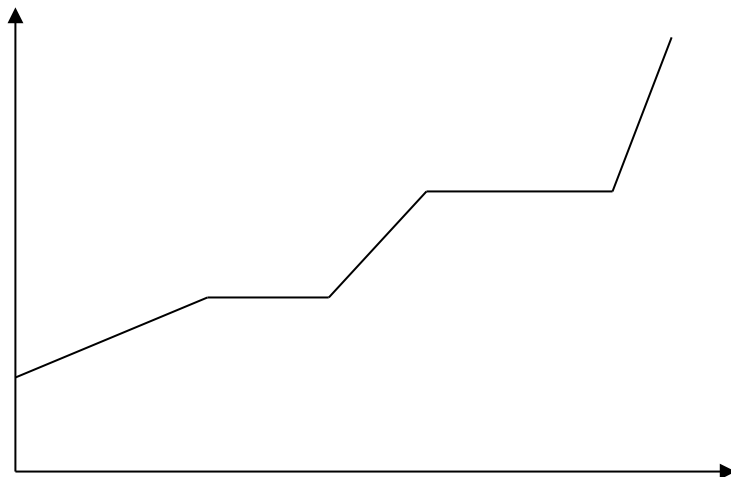
- A** 3 only
B 1 and 2 only
C 3 and 4 only
D 1, 2 and 3 only
- 17 Which of the following containers is the best emitter of infrared radiation if the temperature of the surrounding is 25°C ?



- 18 In calibrating a thermocouple thermometer, one of its junctions is kept in melting ice and the other in boiling water. The current reading on the galvanometer is 200 mA.
- If the junction in the boiling water is immersed in another substance and the reading is -20 mA, what is the temperature of the substance?

- A** -20°C **B** -10°C **C** 10°C **D** 20°C

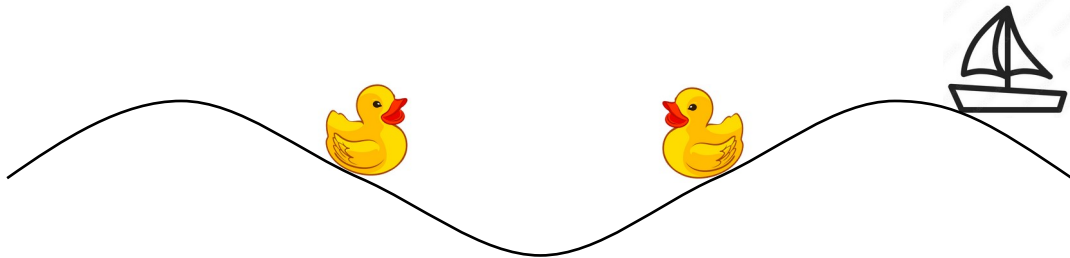
- 19 A heater supplies constant power to heat a substance from solid state as shown in the diagram.



Which of the following statements is true about the substance?

- A The heat capacity of the gaseous substance is higher than the heat capacity of the liquid substance.
 - B The internal potential energy of the substance decreases at QR.
 - C The latent heat of fusion is higher than the latent heat of vaporisation.
 - D The specific heat capacity of the solid substance is higher than the specific heat capacity of the liquid substance.
- 20 Which of the following is correct about boiling and evaporation?
- A Boiling occurs at any temperature whereas evaporation does not.
 - B Boiling occurs throughout the entire liquid whereas evaporation does not.
 - C Both processes are affected by the same factors.
 - D Both processes increase the average internal kinetic energy of the liquid molecules.

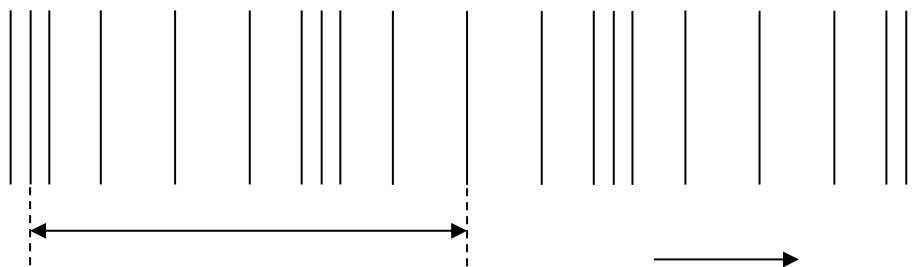
- 21 The diagram shows two ducks M and N sitting on a water wave. A boat moves and creates a wave.



Which row describes the movement of the ducks during the next half cycle of the wave?

	duck M	duck N
A	only falls	only rises
B	falls then rises	rises then falls
C	rises then falls	falls then rises
D	to the right	to the left

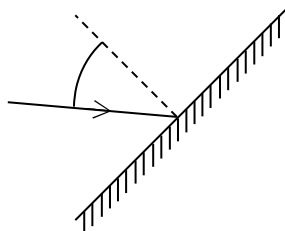
- 22 The diagram shows the waveform of a sound wave in water. It is moving at a speed of 1500 m/s.



What is the frequency of the sound wave?

- A** 25 Hz **B** 38 Hz **C** 2500 Hz **D** 3800 Hz

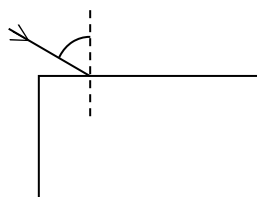
- 23 A ray of light is incident on a plane mirror, as shown.



The mirror is tilted through an angle of 10° clockwise.

What is now the angle between the incident ray and the reflected ray?

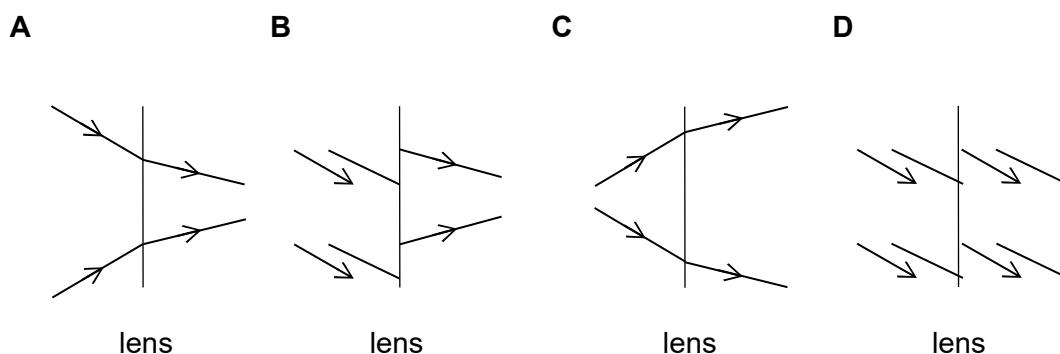
- A** 30° **B** 50° **C** 60° **D** 100°
- 24 A ray of light enters a rectangular glass from air, as shown.



Which statement is correct?

- A** The light ray will exit the glass block at surface QR.
B The light ray bends away from the normal at surface PQ.
C The equation $n = \frac{\sin i}{\sin r}$ is applied at surface RS.
D The angle of refraction at surface PQ is equal to the angle of incidence at surface RS.

25 Which diagram shows rays of light passing through a diverging lens?

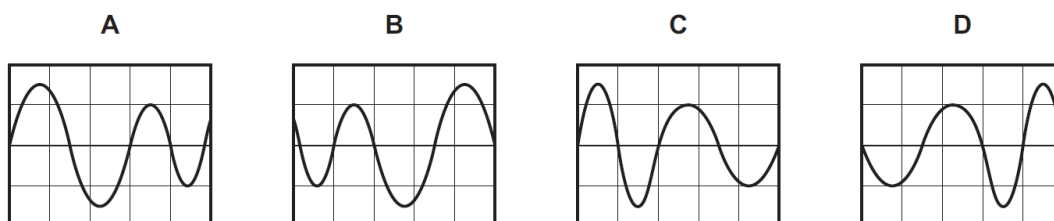


26 Which waves travel at the same speed in air?

- A infra-red and sound
- B microwaves and gamma rays
- C radiowaves and ultrasound
- D X-rays and sound

27 Four sound waves are displayed on the screen of a cathode-ray oscilloscope.

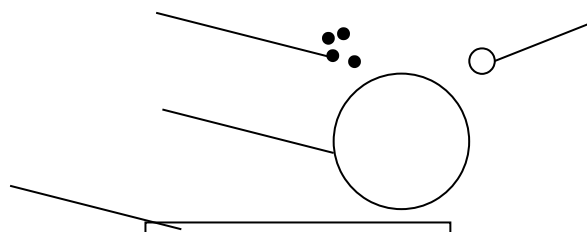
Which sound wave gets softer and has a pitch that decreases?



28 What **always** experiences a force when placed in an electric field?

- A a current-carrying wire
- B a magnet
- C a piece of aluminium
- D an electric charge

- 29 The diagram shows the parts of a photocopier.



The drum is charged by the high voltage positively charged wire.

Toner powder is applied onto the drum and then from the drum to the sheet of paper.

Which row states the charges on the drum and on the sheet of paper for the photocopier to work?

	drum	sheet of paper
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

- 30 5.0×10^{20} electrons pass through a wire in 4.0 s.

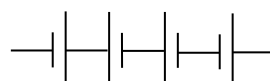
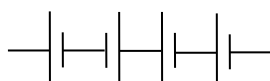
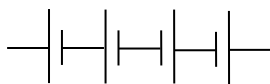
The charge on an electron is 1.6×10^{-19} C.

What is the current in the wire?

- A** 0.05 A **B** 20 A **C** 80 A **D** 320 A

- 31 A boy has 4 cells, each of e.m.f. 2.0 V.

Which combination of cells gives a total e.m.f. of 4.0 V?



- 32 A wire with resistance R has a length L and a cross-sectional area A .

A second wire with resistance $2R$ is made of the same material with a length of $4L$.

What cross-sectional area is needed for the second wire?

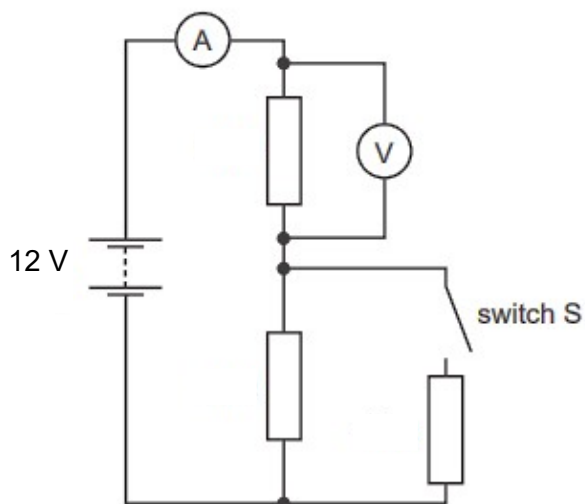
A $\frac{A}{4}$

B $\frac{A}{2}$

C $2A$

D $4A$

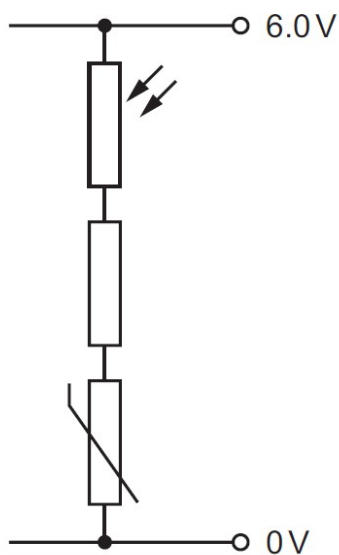
- 33 A circuit is connected as shown below.



What are the readings on the voltmeter and ammeter when switch S is closed?

	voltmeter reading / V	ammeter reading / A
A	4.0	4.0
B	4.0	6.0
C	6.0	4.0
D	6.0	6.0

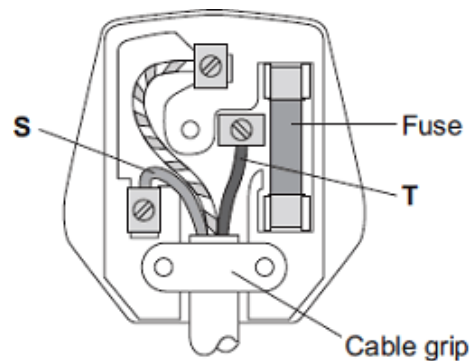
- 34 A student connects a fixed resistor to two components whose resistances can change, across a 6.0 V supply.



Under which conditions is the voltage across the fixed resistor the smallest?

- A cold and dark
- B cold and bright
- C warm and dark
- D warm and bright

- 35 The figure shows an electric plug.



What are the colours of wires S and T?

	S	T
A	blue	brown
B	blue	green and yellow
C	brown	green and yellow
D	brown	blue

- 36 1 kWh of electricity consumption costs \$0.30.

What is the cost of switching on a lamp rated '240 V, 2000 W' for 6 hours?

- A** \$ 0.43 **B** \$ 3.60 **C** \$ 15 **D** \$ 50

- 37 Two identical metal bars X and Y are positioned as shown in Fig. 16.1 and Fig. 16.2.
In Fig. 16.1, there is strong attraction.
In Fig. 16.2, there is weak attraction.

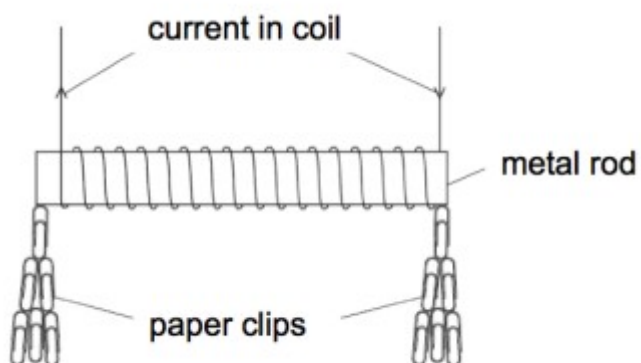


What are the possible materials for bars X and Y?

	bar X	bar Y
A	bar magnet	bar magnet
B	bar magnet	steel bar

C	steel bar	bar magnet
D	steel bar	iron

38 Four metal rods are placed, in turn, inside a solenoid.

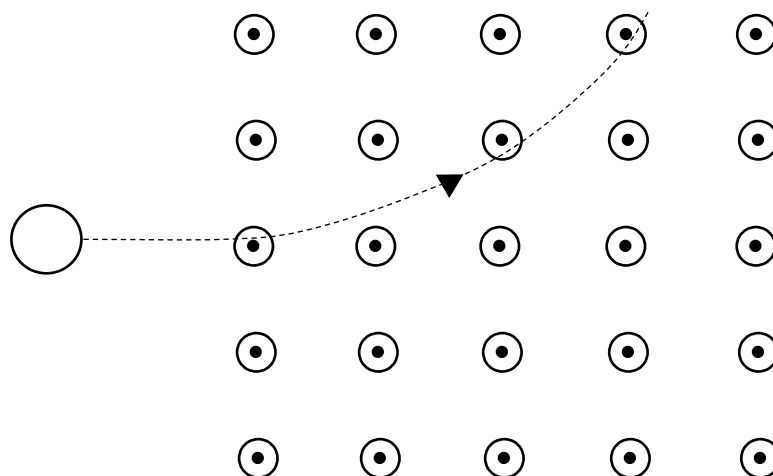


Each rod is used to pick up paper clips. The current is then switched off.

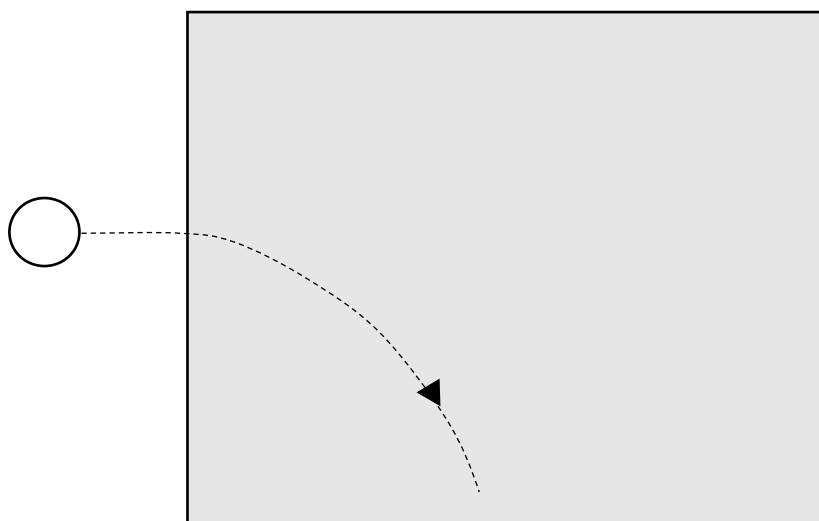
Which rod is most suitable to be used as the core for the coil in a circuit breaker?

	number of paper clips picked up when current is flowing through solenoid	number of paper clips that remained attached when current is switched off
A	1	0
B	20	2
C	35	0
D	35	30

- 39 An experiment is conducted where a positive charge enters a magnetic field and gets deflected as shown.



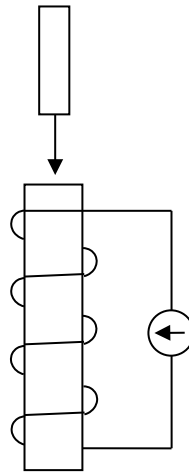
The experiment is repeated and the deflection of the charge is shown.



Which of the following can be done to produce the deflection shown?

- A increase the strength of the magnetic field
- B increase the strength and reverse the direction of the magnetic field
- C reverse the direction of the magnetic field and use a negative charge
- D use a negative charge instead of a positive charge

- 40 A magnet is dropped into a solenoid and falls out from the other end.



What will be the deflections of the galvanometer during the process?

	falling into	inside	falling out
A			
B			
C			
D			

END OF PAPER