



**Anglo-Chinese School
(Barker Road)**

PRELIMINARY EXAMINATION 2023

SECONDARY FOUR EXPRESS

**PHYSICS 6091/01
(PAPER 1 Multiple Choice)**

TIME: 1 HOUR

READ THESE INSTRUCTIONS FIRST

Write your name and Exam Index number on the Answer Sheet in the spaces provided.
Write in soft pencil.

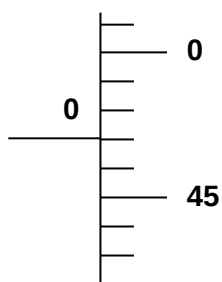
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

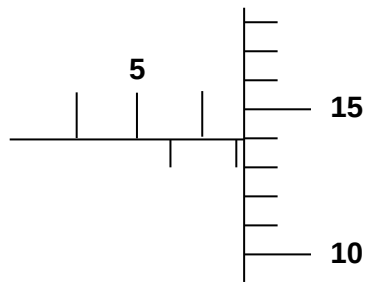
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

- 1 A micrometer is used to measure the diameter of a wire.

The diagrams show the micrometer when the jaws are closed and the micrometer when the wire is between the jaws.



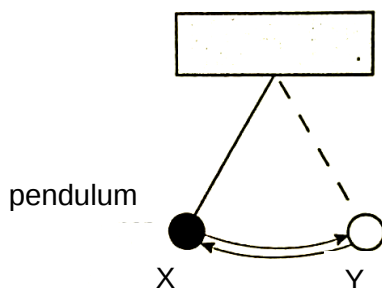
Micrometer when jaws are closed



micrometer when wire is between the jaws

What is the diameter of the rod?

- A 4.42 mm
 - B 6.61 mm
 - C 6.67 mm
 - D 7.11 mm
- 2 The diagram shows a simple pendulum. Using a stopwatch, which would be the most accurate way to measure the period of the pendulum?



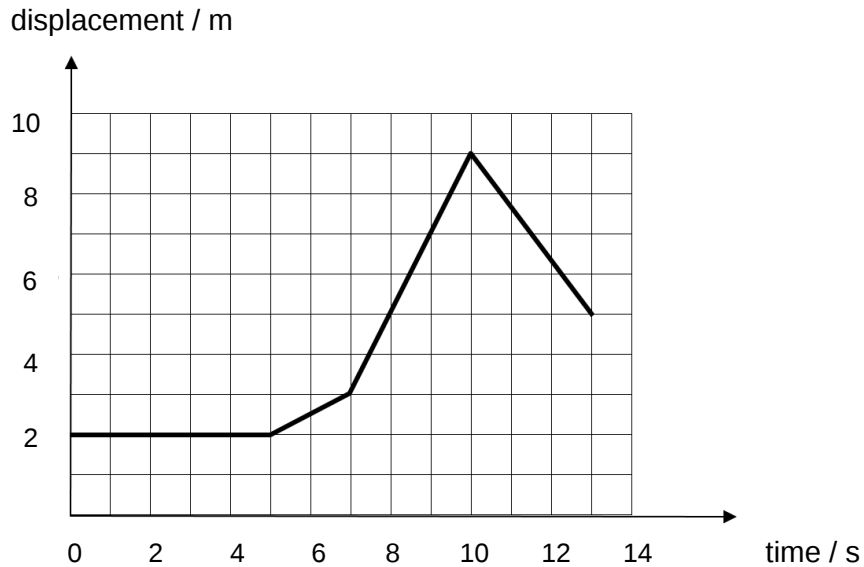
- A Time the motion from X to Y and back to X.
 - B Time the motion from X to Y and back to X again for 20 cycles and multiply by 20.
 - C Time the motion from X to Y and back to X for 20 cycles and divide by 20.
 - D Time the motion from X to Y and double it.
- 3 Green light has a wavelength of 550 nm.

What is the wavelength of blue light?

- A 0.450 μm
- B 0.650 μm
- C 4.500 μm
- D 6.500 μm

- 4 What is the order of magnitude of the diameter of a human hair?
- A 10^{-8} m
 - B 10^{-6} m
 - C 10^{-4} m
 - D 10^{-2} m
- 5 Which pair contains a vector and a scalar quantity?
- A area and displacement
 - B distance and volume
 - C temperature and pressure
 - D weight and velocity
- 6 Two forces, 3 N and 7 N respectively, are acting on a small ball-bearing.
- Which is a possible resultant force acting on the ball-bearing?
- A 1 N
 - B 3 N
 - C 8 N
 - D 11 N
- 7 Which quantity does not have a unit?
- A electric current
 - B gravitational field strength
 - C potential difference
 - D refractive index
- 8 A 1000 kg mass was placed 2 m directly above a 1 kg mass and both were dropped from a tower at the same time. Assuming air resistance is negligible,
- Which statement is correct about the time of landing?
- A Not possible to predict.
 - B The 1000 kg mass would land on the ground at same time as the 1 kg mass.
 - C The 1000 kg mass would land on the ground faster than the 1 kg mass.
 - D The 1000 kg mass would land on the ground later than the 1 kg mass.

- 9 The diagram shows the displacement-time graph of a bicycle.



When is the velocity of the bicycle 2.0 m/s?

- A 0 s to 5 s
 - B 5 s to 7 s
 - C 7 s to 10 s
 - D 10 s to 13 s
- 10 A motorcycle of mass 800 kg accelerates at 2.0 m/s^2 . The engine of the motorcycle exerts a driving force of 2500 N on it.
- What is the total resistive force acting on the motorcycle?
- A 900 N
 - B 1600 N
 - C 2100 N
 - D 4100 N
- 11 When his parachute is fully opened, a parachutist falls towards the ground at constant speed. Under these conditions, which statement correctly identifies an action-reaction pair?
- A Downward force on parachute by air and the downward force on air by parachute.
 - B Downward force on parachute by air and the weight of the parachutist.
 - C Upward force on parachute by air and the weight of the parachutist.
 - D Upward force on parachute by air and the downward force on air by parachute.

- 12** The mass of a body resists changes to its motion.

Which property of the body is responsible for this resistance?

- A** inertia
- B** gravitational potential energy
- C** kinetic energy
- D** temperature

- 13** A mountaineer of weight 700 N at the bottom of Mount Everest climbs to the top. The gravitational field strength changes from 9.81 N/kg at the bottom to 9.79 N/kg at the top.

What are his mass and weight at the top of Mount Everest?

	mass at top of Mount Everest / kg	weight at top of Mount Everest / N
A	71.4	699
B	71.4	700
C	71.5	699
D	71.5	700

- 14** 5000 kg of iron is melted and mixed with 2.0 m³ of molten copper.

If the density of molten iron and molten copper are 7500 kg/m³ and 9000 kg/m³ respectively, what is the approximate density of the mixture?

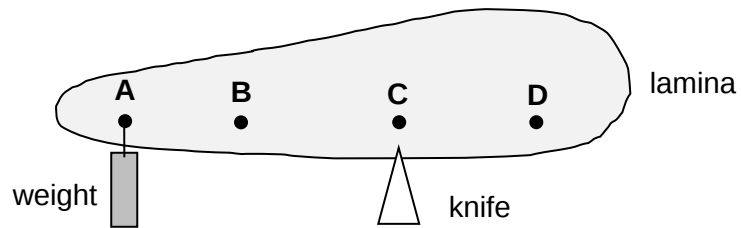
- A** 8.3 kg/m³
- B** 8.6 kg/m³
- C** 8300 kg/m³
- D** 8600 kg/m³

- 15** Which statement correctly defines gravitational field?

- A** It is a region in which a mass experiences a gravitational force of attraction.
- B** It is the amount of substance in a body.
- C** It is the gravitational force per unit mass.
- D** It is the gravitational potential energy stored in a body.

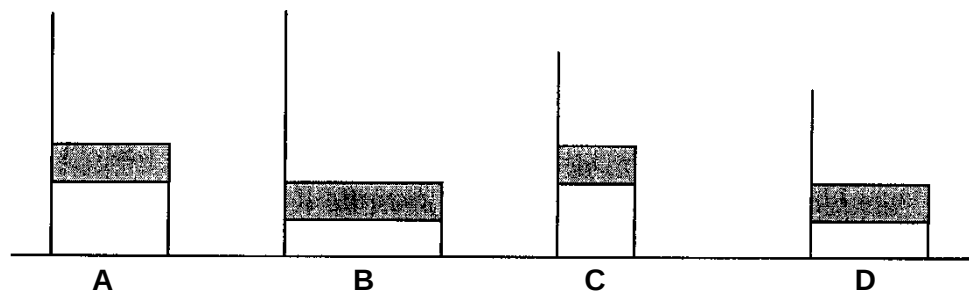
- 16** In order to balance a non-uniform lamina on a knife edge as shown, a weight is suspended at point A.

Where is the position of centre of gravity of this arrangement?

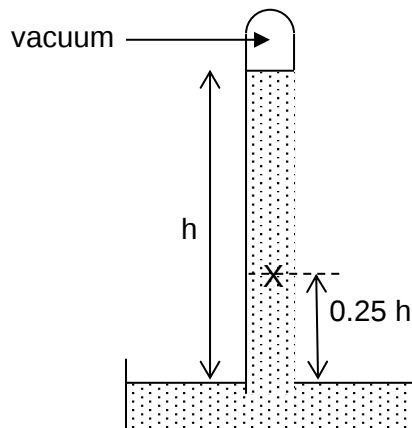


- 17** The following chairs, drawn to the same scale, are displayed in a furniture store.

Which of these chairs is the most stable?



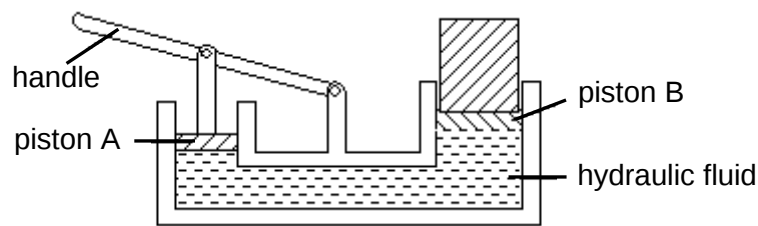
- 18** The diagram shows a barometer. The atmospheric pressure is 100 000 Pa.



What is the pressure at the point marked 'X'?

- A** 25 000 Pa
- B** 75 000 Pa
- C** 100 000 Pa
- D** 125 000 Pa

- 19 The diagram shows a simple hydraulic jack.



What change(s) should be made to the area of the pistons to lift a heavier load if the force applied at the handle remains unchanged?

	piston A	piston B
A	doubled	halved
B	doubled	remains unchanged
C	halved	doubled
D	remains unchanged	halved

- 20 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** 4300 kJ
- D** 4700 kJ

- 21 A bus moves from rest with uniform acceleration along a horizontal road.

After travelling a distance of 100 m, it has 300 000 J of kinetic energy.

What resultant force is acting on the car?

- A** 100 N
- B** 1000 N
- C** 3000 N
- D** 30 000 N

- 22 The temperature shown by a mercury-in-glass thermometer decrease.

Which of the following is constant?

- A** the density of the mercury
- B** the internal energy of the mercury
- C** the mass of the mercury
- D** the volume of the mercury

- 23** A sealed container of gas is heated.

What happens to the molecules of the gas?

- A** The average kinetic energy of the molecules increases and they hit the container more frequently.
- B** The average kinetic energy of the molecules increases and they hit the container less frequently.
- C** The molecules do not change size and the spaces between the molecules become smaller.
- D** The molecules expand and the spaces between the molecules become smaller.

- 24** Brownian motion can be observed by the behaviour of smoke particles in a smoke cell.

What does Brownian Motion show?

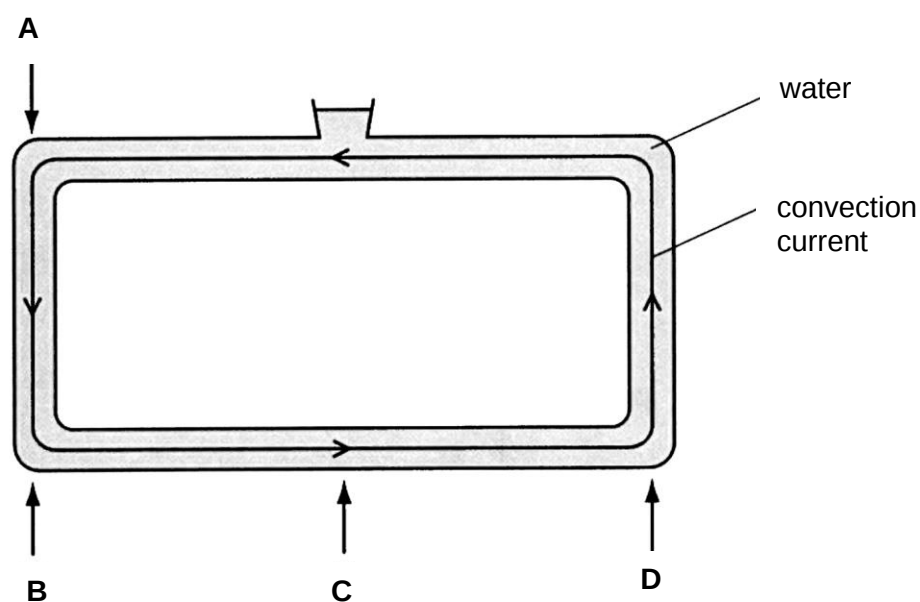
- A** Air is a poor conductor.
- B** Air molecules are moving.
- C** Air molecules have more mass than smoke particles.
- D** Convection occurs in air.

- 25** Which statement on gas/liquid is correct?

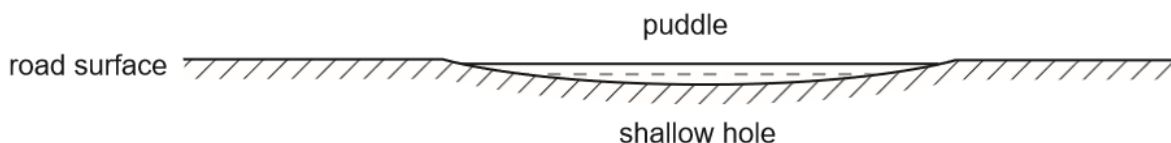
- A** The volume of a gas is fixed but its shape is not fixed.
- B** The volume of a gas is not fixed and its shape is not fixed.
- C** The volume of a liquid is fixed and its shape is fixed.
- D** The volume of a liquid is not fixed but its shape is fixed.

- 26** The diagram shows a convection current produced when water in a standing container is heated.

Where is the container heated to produce the convection current?



- 27** The diagram shows a cross-section through a rain-water puddle formed in a shallow hole in the road surface. Over time, air temperature, wind speed and wind direction remain constant.



What happens to the rate of evaporation of water from the puddle?

- A** It decreases because the surface area decreases.
 - B** It increases because the puddle gets shallower.
 - C** It increases because the temperature of water has decreased.
 - D** It remains constant because air temperature and wind speed is unchanged.
- 28** A block of steel is at room temperature.

Which row describes a bigger block of steel at the same temperature.

	internal energy	heat capacity	specific heat capacity
A	higher	higher	same
B	higher	same	higher
C	same	higher	higher
D	same	same	same

- 29** Which change of state occurs when thermal energy is absorbed by a substance?

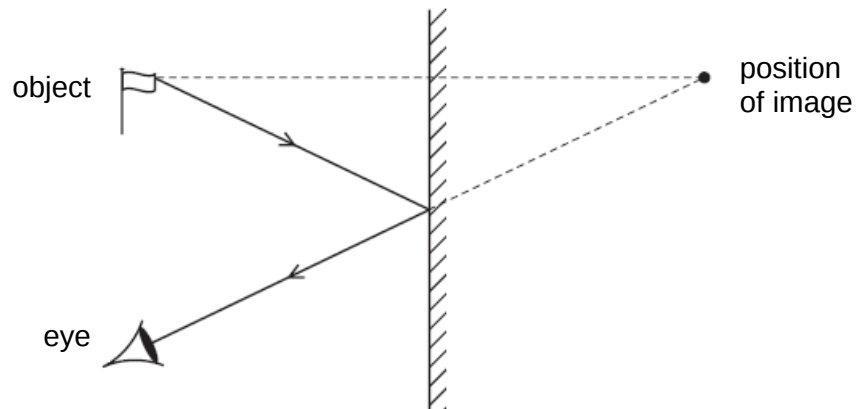
- A** boiling and melting
- B** boiling and solidification
- C** condensation and melting
- D** condensation and solidification

- 30** A rope is fixed to a wall at one end. The other end of the rope is moved up and down to produce a wave.

During this motion, what is transferred along the rope?

- A** atoms
- B** energy
- C** mass
- D** weight

- 31** The diagram shows the position of an image formed by a plane mirror.

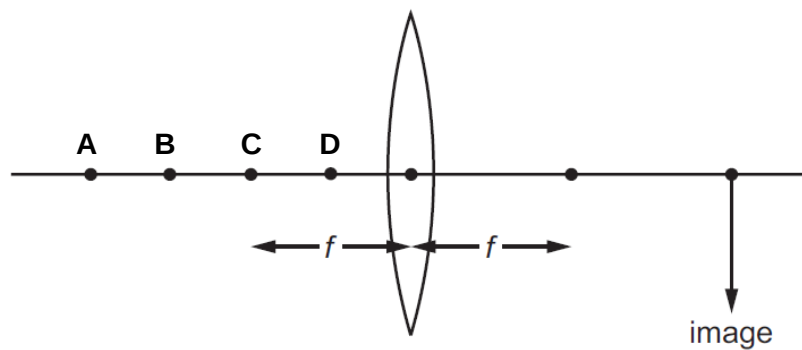


What are the characteristics of the image?

	orientation	size
A	inverted	same size
B	upright	diminished
C	laterally inverted	same size
D	upright	enlarged

- 32** The diagram shows a thin converging lens of focal length f and an image.

Where must the object be placed to produce the image that has the same size as the object?



- 33** Which waves travel at the same speed in air?

- A** gamma rays and radio waves
- B** infra-red and sound
- C** microwaves and ultrasound
- D** ultrasound and ultra-violet

- 34** A siren is emitting a sound. As time passes, the sound becomes louder and higher pitched. What is happening to the amplitude and to the frequency of the emitted sound wave?

	amplitude	frequency
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

- 35** Which statement about electric current is correct?

- A** It is the rate of flow of charge and its unit is the ampere.
B It is the rate of flow of charge and its unit is the coulomb.
C It is the rate of flow of electrons and its unit is the ampere.
D It is the rate of flow of electrons and its unit is the coulomb.

- 36** Diagram X shows a drum inside a photocopier. After an intense beam of light is shone on the image on the paper, positive charges remain on the drum as shown. Diagram Y shows the drum rolling and toner powder is attracted to the drum. Diagram Z shows a piece of paper passing over the drum's surface.

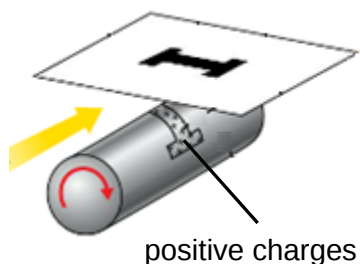


Diagram X

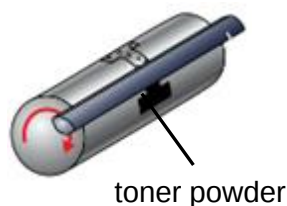


Diagram Y

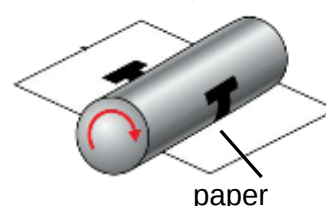
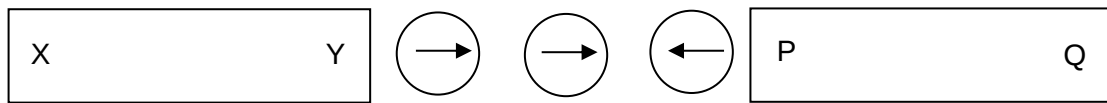


Diagram Z

Which row of the table correctly states the charge of the toner and the paper?

	toner	paper
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

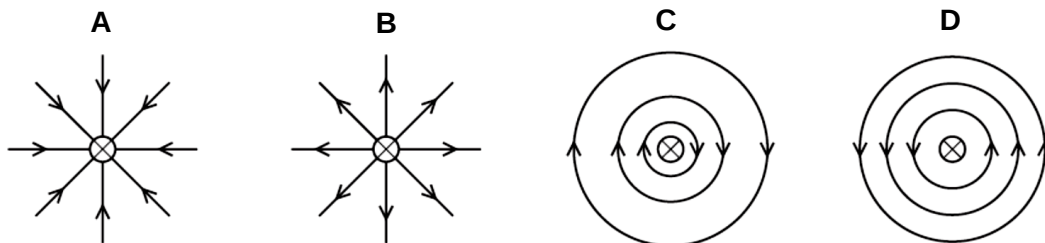
- 37** Three compasses are placed between two permanent magnets XY and PQ as shown in the diagram.



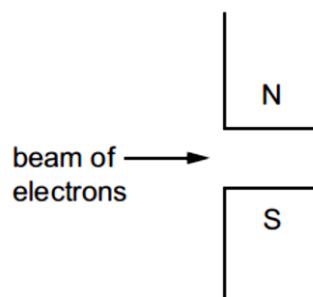
Which statement about the magnets is true?

- A** PQ is a stronger magnet than XY; Y and P are both N-poles.
 - B** PQ is a stronger magnet than XY; Y and Q are both N-poles.
 - C** XY is a stronger magnet than PQ; Y and P are both N-poles.
 - D** XY is a stronger magnet than PQ; Y and Q are both N-poles.
- 38** A straight wire is perpendicular to the paper. It carries a current into the paper.

Which diagram shows the magnetic field pattern of the current in the wire?



- 39** A horizontal beam of electrons passes between the two poles of a magnet.



In which direction is the beam deflected?

- A** into the page
 - B** out of the page
 - C** towards the N-pole of the magnet
 - D** towards the S-pole of the magnet
- 40** Why is high voltage used to transmit electrical energy along cables from a power plant?
- A** It decreases the resistance of the cables.
 - B** It increases the current in the cables.
 - C** It prevents the loss of energy in the transformers at the ends of the cables.
 - D** It reduces the energy loss in the cables.

