Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/21**

Paper 2 Multiple Choice (Extended) **May/June 2024**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m / s^2).

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **16** pages. Any blank pages are indicated.

1 In which row are quantities correctly categorised into scalar quantities and vector quantities?

	scalar quantities	vector quantities
A	mass and energy	weight and acceleration
B	gravitational field strength and time	force and electric field strength
C	speed and momentum	distance and force
D	distance and energy	velocity and temperature

2 Which name is given to the quantity of matter in an object?

A density

B mass

C volume

D weight

3 A body is moved from place X to place Y where the gravitational field strength is different.

What happens to its mass and to its weight due to the move?

	mass	weight
A	changes	changes
B	changes	stays the same
C	stays the same	changes
D	stays the same	stays the same

4 The mass of an object is 2.5 kg. The volume of the object is 480 cm^3.

What is the density of the object?

A $5.2 \times 10^{-3}\,g/cm^3$

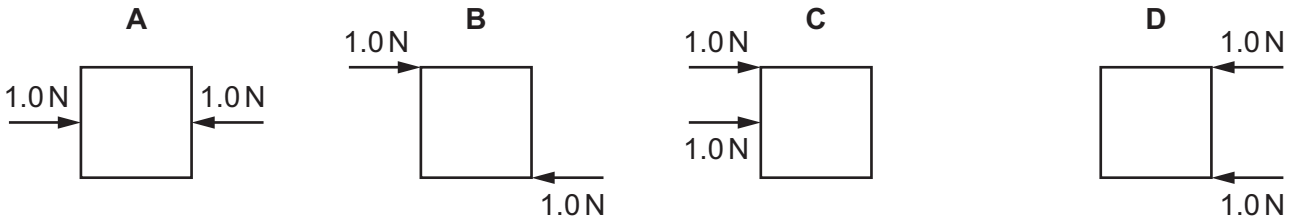
B $5.2\,g/cm^3$

C $190\,g/cm^3$

D $1.2 \times 10^{3}\,g/cm^3$

5 Four objects each have two forces acting on them.

Which object is in equilibrium?



6 A ball of mass m falls vertically and hits a hard surface.

Its speed on hitting the surface is v_1.

It rebounds vertically upwards with speed v_2.

What is the change in momentum of the ball?

A mv_1 **B** mv_2 **C** $m(v_1 + v_2)$ **D** $m(v_2 - v_1)$

7 A stone is dropped from a tall tower and falls a distance of 50 m to the ground.

The stone has a mass of 3.0 kg.

At which speed does the stone hit the ground?

A 17 m/s **B** 31 m/s **C** 54 m/s **D** 150 m/s

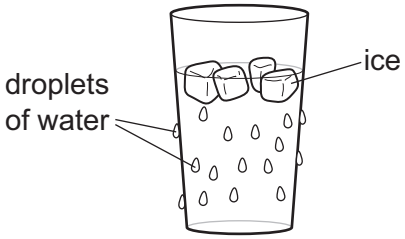
8 A coal-fired power station generates electricity. Coal is burned and the energy released is used to boil water. The steam from the water makes the generator move and this produces electricity.

Which row gives the name of the energy store in the coal and the energy store of the moving generator?

	coal	generator
A	chemical	hydroelectric
B	chemical	kinetic
C	geothermal	hydroelectric
D	geothermal	kinetic

9 A man puts some ice into a glass of water on a warm day.

After a short time, he notices that the ice disappears and that water droplets appear on the outside of the glass.



Which two changes of state are taking place?

A condensation and freezing

B condensation and melting

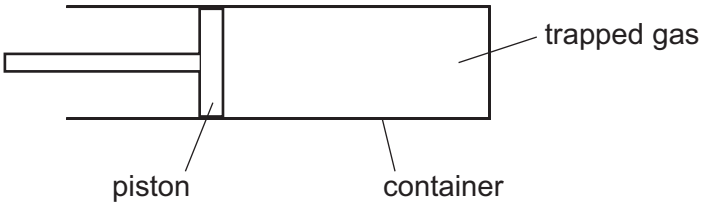
C boiling and melting

D freezing and evaporation

10 Gas of volume 200 cm^3 is trapped inside a container by a piston.

The piston is pushed to the right and the volume of the gas decreases to 100 cm^3.

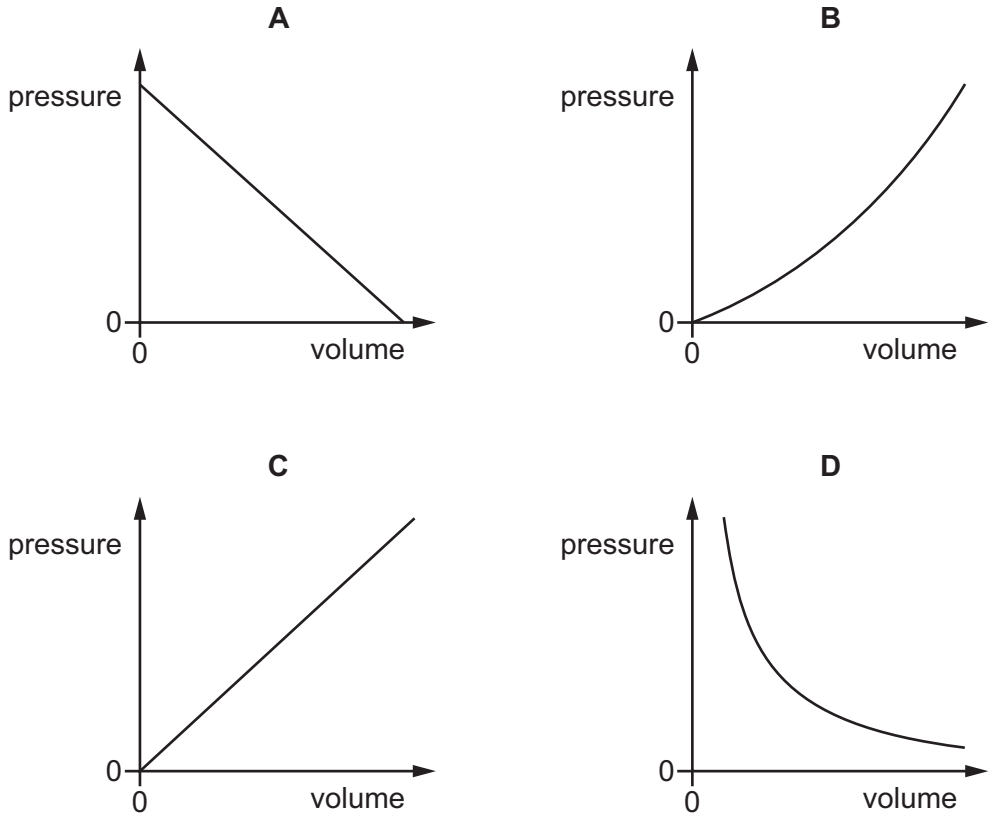
The temperature of the gas remains constant.



Which row states the effect that this has on the kinetic energy of the gas particles and the force per unit area exerted by the particles colliding with the inside walls of the container?

	kinetic energy	force per unit area
A	doubles	doubles
B	doubles	stays the same
C	stays the same	doubles
D	stays the same	stays the same

11 Which graph shows the relationship between the pressure and volume of a fixed mass of gas at constant temperature?



12 During evaporation of a liquid, the most energetic particles escape. The temperature of the remaining liquid changes.

Which row identifies where these particles escape from and describes the temperature change?

	place from which the particles escape	temperature of remaining liquid
A	body of the liquid	decreases
B	body of the liquid	increases
C	surface of the liquid	decreases
D	surface of the liquid	increases

13 Wet clothes are put out on a line to allow the water in the clothes to evaporate.

Which type of weather would cause the water to evaporate most quickly?

A a cold day with no wind

B a cold day with wind

C a hot day with no wind

D a hot day with wind

14 *Due to an issue with question 14, the question has been removed from the question paper.*

15 A solar water heater is designed to absorb energy from sunlight.

Which surface texture and colour would be best for the solar water heater?

A dull black

B shiny black

C dull white

D shiny white

16 Which statement about waves is correct?

A Waves do not transfer either energy or matter.

B Waves transfer both energy and matter.

C Waves transfer energy without transferring matter.

D Waves transfer matter without transferring energy.

17 The angle of incidence of a ray of light incident on a plane mirror is gradually increased.

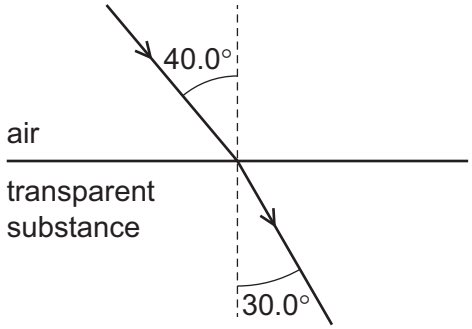
To the nearest degree, what is the maximum possible angle between the incident and reflected rays?

A 0° **B** 45° **C** 90° **D** 180°

18 Which conditions are necessary for light to be totally internally reflected?

	incident light	angle of incidence
A	is in the less dense medium	less than the critical angle
B	is in the less dense medium	greater than the critical angle
C	is in the more dense medium	less than the critical angle
D	is in the more dense medium	greater than the critical angle

19 The diagram shows a ray of light passing from air into a transparent substance.



What is the refractive index of the transparent substance?

A 1.33 **B** 1.29 **C** 0.778 **D** 0.750

20 The diagram shows a ray of light in an optical fibre.

Which statement correctly explains the condition for the maximum transmission of light by the optical fibre?

A The glass must slow the light as little as possible to make the critical angle for the fibre as large as possible.

B The glass must slow the light as little as possible to make the critical angle for the fibre as small as possible.

C The glass must slow the light as much as possible to make the critical angle for the fibre as large as possible.

D The glass must slow the light as much as possible to make the critical angle for the fibre as small as possible.

21 Which region of the electromagnetic spectrum is used for detecting fake bank notes?

A radio

B microwaves

C ultraviolet

D X-rays

22 A sound wave travels at 330 m / s. The distance between the centre of a compression and the centre of the nearest rarefaction in the sound wave is 2.5 cm.

What is the frequency of the sound wave?

A 66 Hz **B** 130 Hz **C** 6600 Hz **D** 13 000 Hz

23 Which waves are used in the medical scanning of soft tissue?

A gamma rays

B infrared

C microwaves

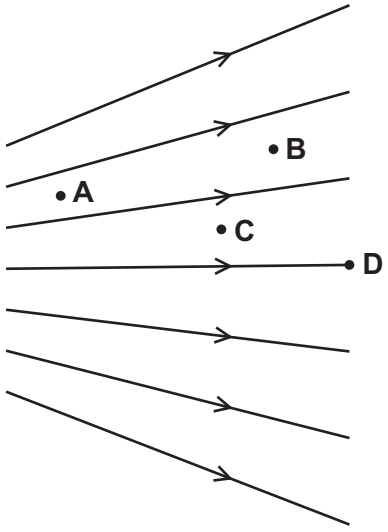
D ultrasound

24 Which row describes suitable materials for use in a temporary magnet and in a permanent magnet?

	temporary magnet	permanent magnet
A	soft iron	soft iron
B	soft iron	steel
C	steel	soft iron
D	steel	steel

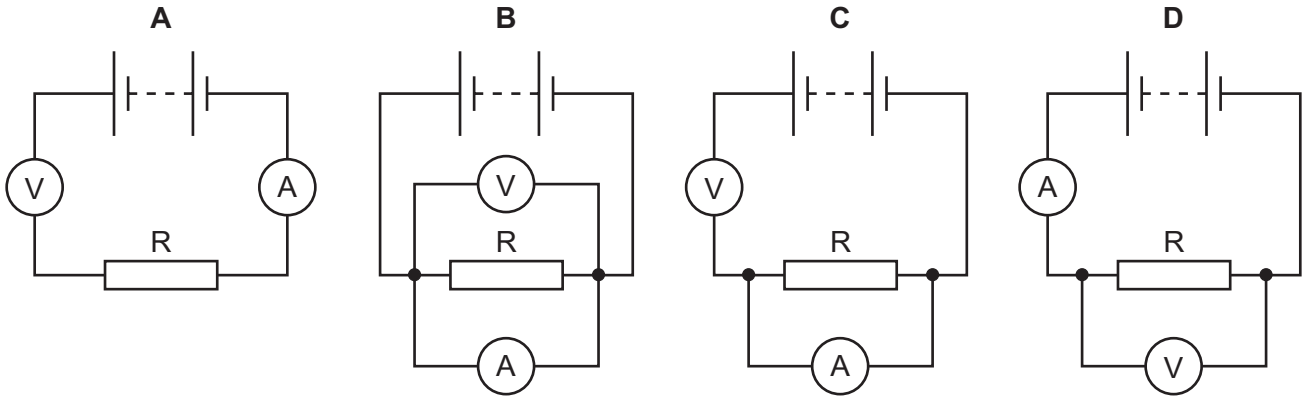
25 A magnetic field is represented in the diagram by magnetic field lines.

At which point is the magnetic field strongest?

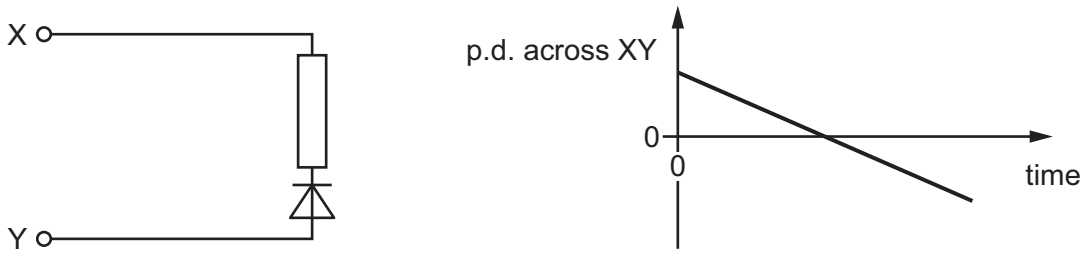


26 A student determines the resistance of resistor R. She uses a circuit including a voltmeter and an ammeter.

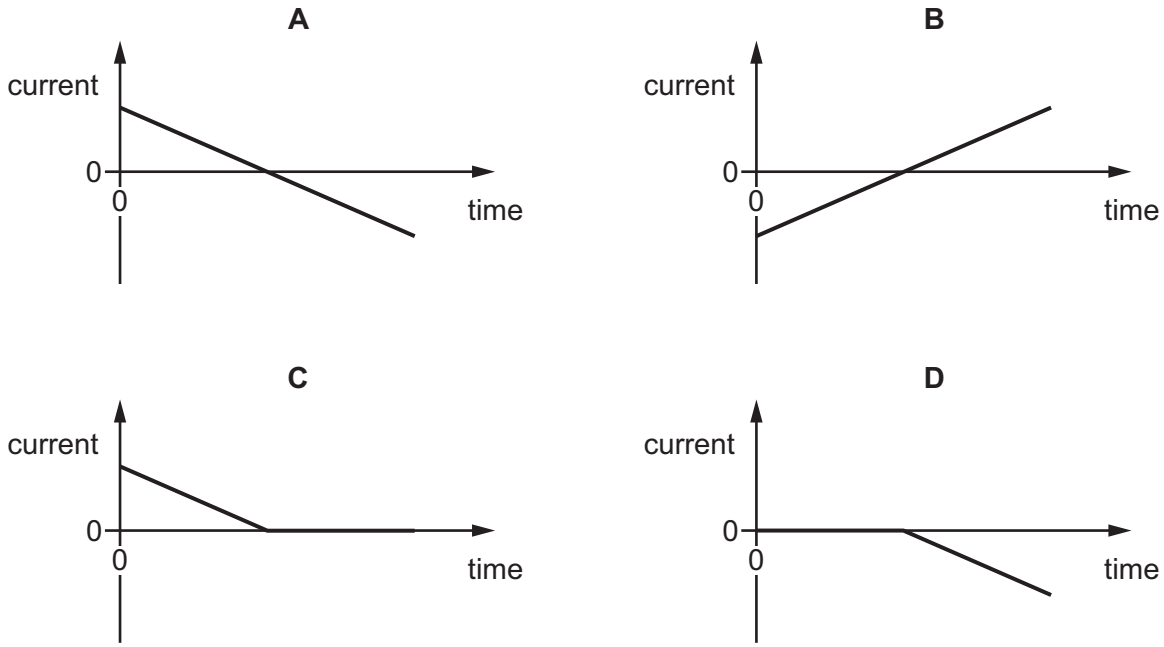
Which circuit does she use?



27 A diode and a resistor are connected across a variable d.c. supply. Terminal X is initially positive and at a maximum value. The potential difference (p.d.) across XY is adjusted so that it changes, as shown by the graph.



Which graph shows how the current in the circuit (from X to Y) varies during the same time interval?



28 When a conductor in a complete circuit cuts across a magnetic field, a current is induced in the conductor.

Which statement about the induced current is correct?

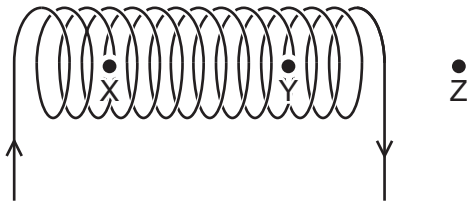
A The induced current is in the same direction as the motion of the conductor.

B The induced current is in the opposite direction to the motion of the conductor.

C The direction of the induced current is in the same direction as the magnetic field.

D The direction of the induced current opposes the change causing it.

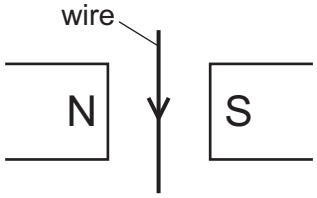
29 The diagram shows a solenoid carrying an electric current.



Which row compares the strength of the magnetic field due to the solenoid at points Y and Z with the strength of the magnetic field at point X?

	magnetic field strength at Y	magnetic field strength at Z
A	equal to X	less than X
B	equal to X	greater than X
C	greater than X	less than X
D	greater than X	greater than X

30 A conducting wire is placed between the poles of a magnet. When an electric current in the wire is in the direction shown, then the force on the wire acts out of the page.



Three statements of different conditions and how the wire is affected are given.

1 When the current is towards the top of the page and the direction of the magnetic field is unchanged, the force produced acts into the page.

2 When the current is towards the bottom of the page and the magnetic field is reversed, the force produced acts into the page.

3 When the current in the wire is alternating, the wire vibrates into and out of the page.

Which statements are correct?

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

31 Which types of electric current are in the primary coil and the secondary coil of a step-up transformer?

	primary coil	secondary coil
A	a.c.	a.c.
B	a.c.	d.c.
C	d.c.	a.c.
D	d.c.	d.c.

32 A scientist fires alpha-particles at a very thin sheet of gold and detects the particles that pass through.

Which statement about the results of the scattering experiment is correct?

A Alpha-particles are attracted to the nucleus of the atoms in the metal sheet.

B Half the mass of the atom is concentrated in the nucleus.

C Most of the alpha-particles are deflected, showing that the nucleus is very dense.

D Only a small number of alpha-particles are deflected, but some of these are deflected through large angles.

33 The notation represents the nucleus of a gold atom.

$$^{197}_{79}\mathrm{Au}$$

The relative charge on a proton is +1.

What is the relative charge on the gold nucleus?

A +79 **B** +118 **C** +197 **D** +276

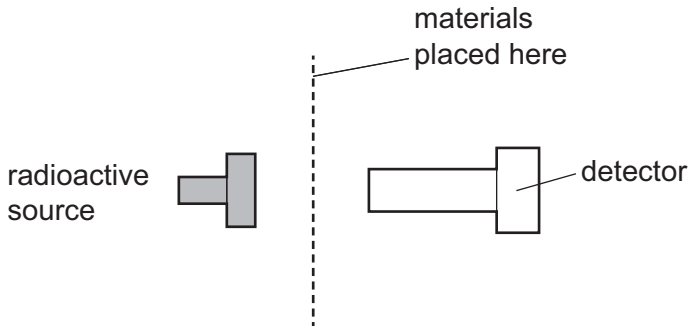
34 An isotope of hydrogen has the nuclide notation $^{2}_{1}\mathrm{H}$.

How many neutrons are in the nucleus of this isotope and what is the relative charge on the nucleus?

	number of neutrons	relative charge
A	1	+1
B	1	+2
C	2	+1
D	2	+2

35 A radioactive source is placed near a detector.

The radiation arriving at the detector from the source is measured for 10 minutes with different materials placed between the source and the detector.



material between source and detector	radiation detected / counts
none	5626
sheet of paper	5629
thick sheet of aluminium	2226
thick sheet of lead	255

Which types of radiation are emitted by the source?

A α-particles and γ-rays

B α-particles only

C β-particles and γ-rays

D β-particles only

36 The reading on a detector placed near a radioactive material is 536 counts per second.

The background count rate is 44 counts per second.

The half-life of the radioactive material is 34 hours.

What is the reading on the detector after 68 hours?

A 44 counts per second

B 123 counts per second

C 134 counts per second

D 167 counts per second

[Turn over

37 A planet in the Solar System is at the point in its orbit where it is closest to the Sun.

Which row is correct?

	orbital speed	energy in gravitational potential store
A	at its maximum	at its maximum
B	at its maximum	at its minimum
C	at its minimum	at its maximum
D	at its minimum	at its minimum

38 What is the main process that powers the Sun?

A burning of helium and oxygen

B burning of hydrogen and oxygen

C nuclear fusion of hydrogen to form helium

D nuclear fission of helium to form hydrogen

39 A galaxy is 3.0×10^{20} km from the Earth.

At which speed is the galaxy moving away from the Earth?

A 660 km / s **B** 6600 km / s **C** 660 m / s **D** 6600 m / s

40 An astronomer observes a distant galaxy.

The table shows how the distance and the speed of recession of the galaxy are determined.

Which row is correct?

	distance	speed of recession
A	brightness of a supernova in the galaxy	change in wavelength of starlight from the galaxy
B	brightness of a supernova in the galaxy	brightness of the galaxy
C	brightness of the galaxy	change in wavelength of starlight from the galaxy
D	brightness of the galaxy	brightness of a supernova

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