



Cambridge IGCSE™

PHYSICS

1524/12

Paper 1 Multiple Choice (Core)

May/June 2021

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 10 N (acceleration of free fall = 10 m/s^2).

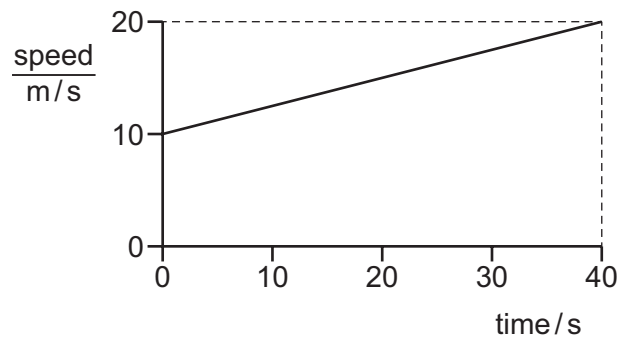
INFORMATION

- 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.

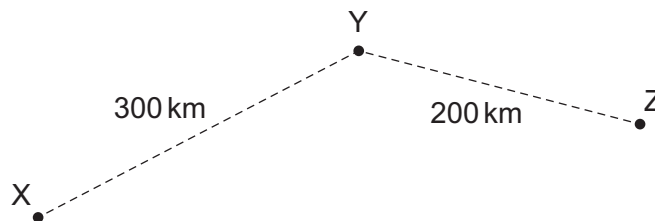


- 1 A student measures the volume of an irregularly shaped stone. Water is available.
- Which single item of equipment is sufficient for the student to complete the task?
- A** a tape measure
B a clock
C a measuring cylinder
D a ruler
- 2 A student draws a speed–time graph for a car.



What is the total distance travelled by the car?

- A** 200 m **B** 400 m **C** 600 m **D** 800 m
- 3 An aeroplane flies from town X to town Z, stopping for 1 hour at town Y to pick up more passengers. The distances between the towns are shown.

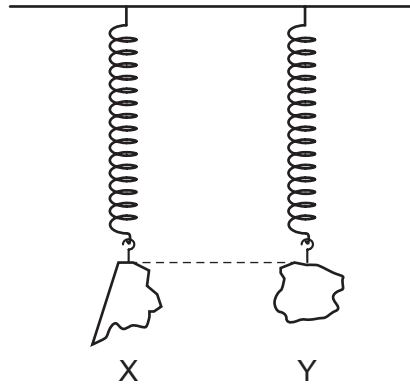


The total time taken between leaving X and arriving at Z is 3 hours.

What is the average speed of the aeroplane **in the air**?

- A** $\frac{500}{4}$ km/h **B** $\frac{500}{3}$ km/h **C** $\frac{500}{2}$ km/h **D** $\frac{500}{1}$ km/h

- 4 Two objects, X and Y, are suspended from identical springs. The extension in both springs is the same.



What does this show about the masses and about the weights of objects X and Y?

	masses	weights
A	mass of X is equal to mass of Y	weight of X is equal to weight of Y
B	mass of X is equal to mass of Y	weight of X is less than weight of Y
C	mass of X is greater than mass of Y	weight of X is greater than weight of Y
D	mass of X is greater than mass of Y	weight of X is equal to weight of Y

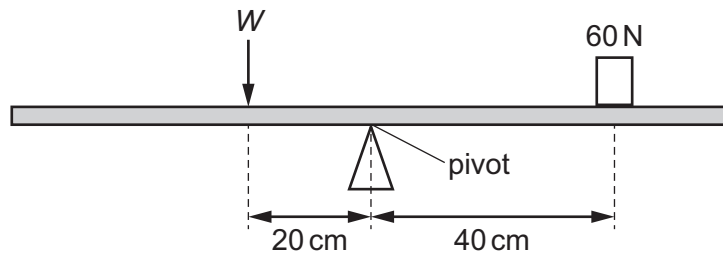
- 5 The mass and volume of four different materials, **A**, **B**, **C** and **D**, are measured.

Water has a density of 1000 kg/m^3 .

Which material will float in water?

	mass / kg	volume / m^3
A	452	0.04
B	2340	0.30
C	90	0.03
D	320	0.40

- 6 A uniform beam is pivoted at its centre. A weight of 60 N is placed on one side of the beam, 40 cm from the pivot.



A weight W , placed 20 cm from the pivot, balances the beam.

What is weight W ?

- A 30 N B 60 N C 120 N D 2400 N
- 7 A car travels forwards along a straight horizontal road. Only the horizontal forces acting on the car are shown.



The length of each arrow represents the size of each force.

Which statement describes the effect of these forces on the motion of the car?

- A The car moves at constant speed.
 B The car starts to move backwards.
 C The car slows down.
 D The car's forward speed increases.

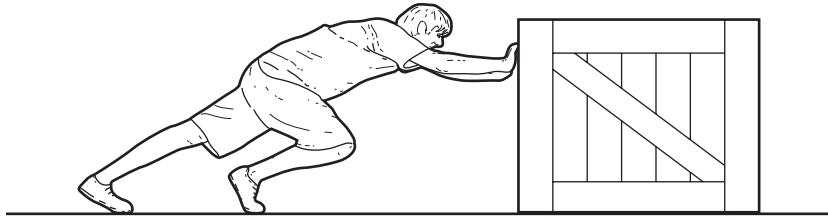
- 8 The diagram shows a man in a small boat.



Why does the boat become less stable when the man is standing up?

- A The centre of mass of the man and the boat is higher.
 - B The centre of mass of the man and the boat is lower.
 - C The total mass of the man and the boat is greater.
 - D The total mass of the man and the boat is less.
- 9 A battery is fully charged.
- Which form of energy is stored in the battery?
- A chemical
 - B elastic (strain)
 - C gravitational potential
 - D kinetic
- 10 What is the source of the electrical energy produced by a hydroelectric power station?
- A chemical energy stored in fossil fuel
 - B gravitational potential energy stored behind a dam
 - C geothermal energy from the Earth's crust
 - D nuclear energy stored in uranium

- 11 A man pushes a heavy crate along a horizontal surface.



Which row shows the measurements he makes to calculate his average power?

	distance moved	size of pushing force	time taken	weight of the crate
A	✓	✓	✓	x
B	✓	✓	x	✓
C	✓	x	✓	✓
D	x	✓	✓	✓

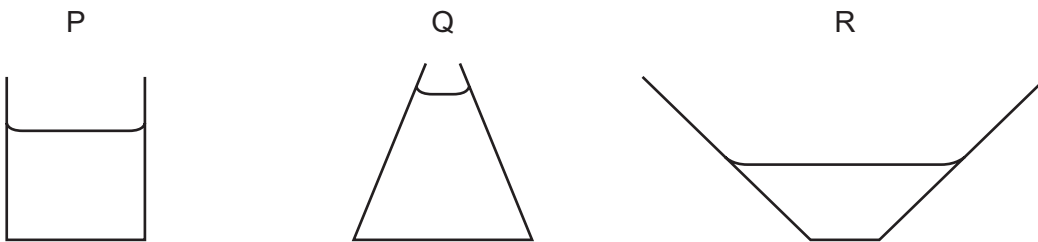
key

✓ = needed

x = not needed

- 12 The diagram shows three vessels, P, Q and R. Each vessel contains water. The water exerts a pressure at the bottom of each vessel.

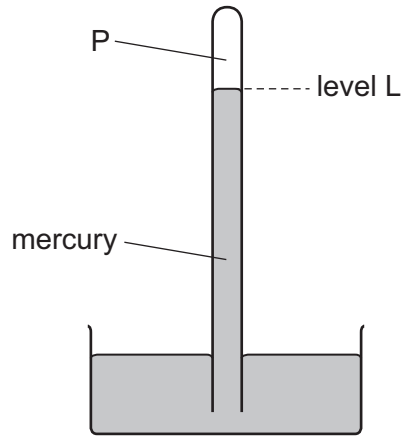
The three vessels are shown to the same scale.



Which statement about the pressure at the bottom of the vessels is correct?

- A** The pressure is greatest at the bottom of P.
- B** The pressure is greatest at the bottom of Q.
- C** The pressure is greatest at the bottom of R.
- D** The pressure is the same at the bottom of each vessel.

13 The diagram shows a simple mercury barometer used to measure atmospheric pressure.



Atmospheric pressure decreases.

Which row states what happens to the pressure at point P and what happens to the level L of mercury?

	pressure at P	level L
A	decreases	falls
B	decreases	rises
C	stays the same	falls
D	stays the same	rises

14 Molecules are escaping from the surface of a liquid.

Which process is this describing?

- A** The liquid is condensing.
- B** The liquid is evaporating.
- C** The liquid is melting.
- D** The liquid is solidifying.

15 A student investigates the change of volume of a gas as the conditions change.

In experiment 1, she keeps the pressure of the gas constant and increases its temperature.

In experiment 2, she keeps the temperature of the gas constant and increases its pressure.

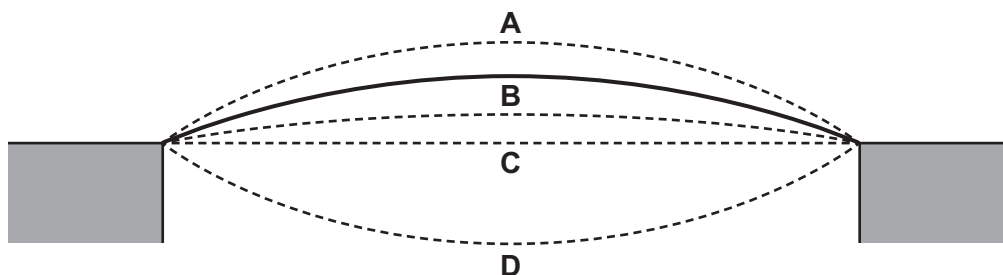
Which row describes the changes in the volume of the gas in the two experiments?

	change of volume in experiment 1	change of volume in experiment 2
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

16 The diagram shows a metal bridge. The ends of the bridge are fixed to the sides of a valley. The air temperature is much less at night than it is during the day.

The solid line shows the bridge during the coldest part of the night.

Which dashed line shows the bridge at the hottest part of the day?



17 Which statement describes the thermal capacity of a mass of water at 20 °C?

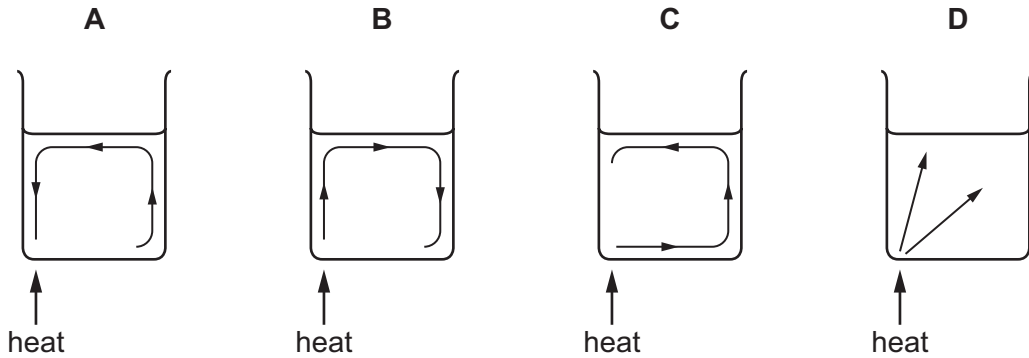
- A** the energy needed to evaporate all of the water
- B** the energy needed to raise the temperature of the water from 0 °C to 20 °C
- C** the energy needed to raise the temperature of the water from 20 °C to 21 °C
- D** the energy needed to raise the temperature of the water to its boiling point

18 Which statement describes what happens when water at 100 °C boils and changes to steam?

- A** Energy is absorbed and the temperature does not change.
- B** Energy is absorbed and the temperature increases.
- C** Energy is released and the temperature does not change.
- D** Energy is released and the temperature increases.

19 A beaker of liquid is heated at the position shown.

Which diagram shows a convection current moving through the liquid?

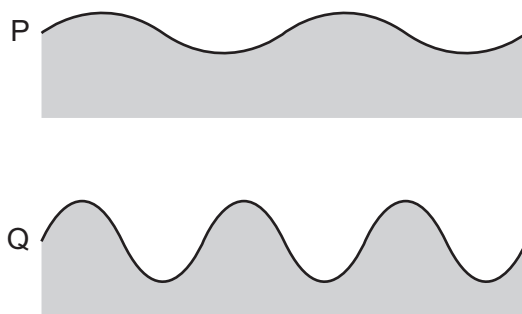


20 A chef tests different types of saucepans. She wants the material that is the best conductor for the bottom of the pan and the best insulator for the handle.

Which materials should she use?

	bottom of the pan	handle
A	metal	metal
B	metal	wood
C	plastic	wood
D	wood	wood

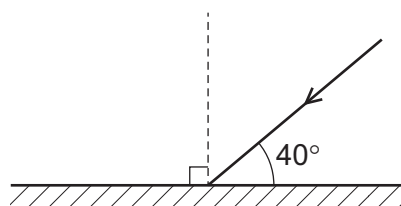
21 The diagrams show two water waves, P and Q, that are travelling at the same speed on the surface of a pond. The diagrams are drawn to the same scale.



Which wave has the greater amplitude and which wave has the greater frequency?

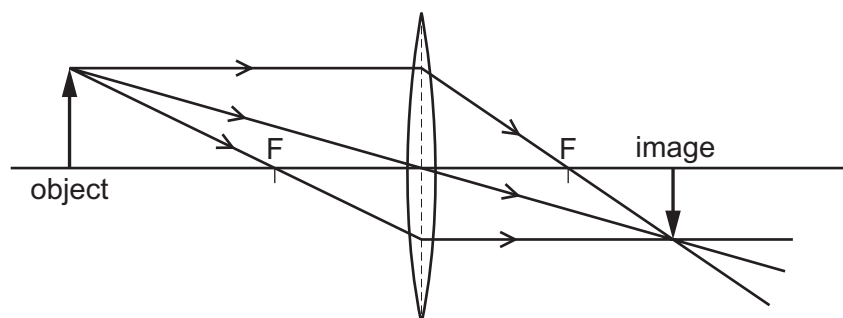
	greater amplitude	greater frequency
A	P	P
B	P	Q
C	Q	P
D	Q	Q

22 What is the angle of incidence of the ray of light on the plane mirror?



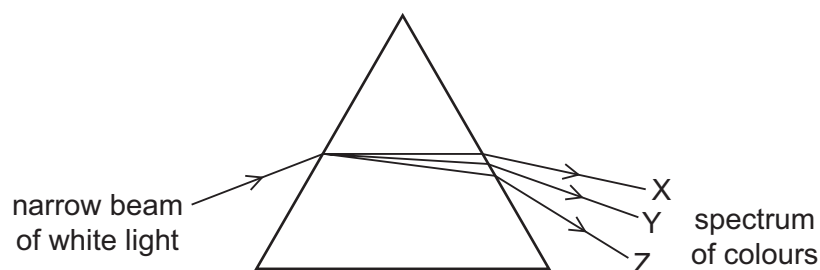
- A** 40° **B** 50° **C** 90° **D** 140°

23 The diagram shows the formation of an image by a thin converging lens.



Which description of the image is correct?

- A** diminished and upright
B diminished and inverted
C enlarged and upright
D enlarged and inverted
- 24 A student shines a narrow beam of white light into a prism, as shown. He sees a spectrum of colours emerging from the prism.



Which three colours does he see at X, at Y and at Z?

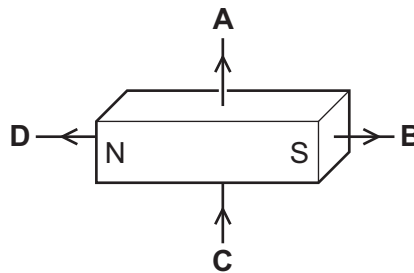
	X	Y	Z
A	blue	yellow	red
B	red	blue	yellow
C	red	yellow	blue
D	yellow	red	blue

25 In which way does ultrasound differ from audible sound?

- A Ultrasound can travel through a vacuum.
- B Ultrasound has a longer wavelength.
- C Ultrasound has a higher frequency.
- D Ultrasound travels at the speed of light.

26 The diagram shows a permanent bar magnet. A student draws arrows to show the direction of the magnetic field at four points.

Which arrow correctly shows the direction of the magnetic field at that position?

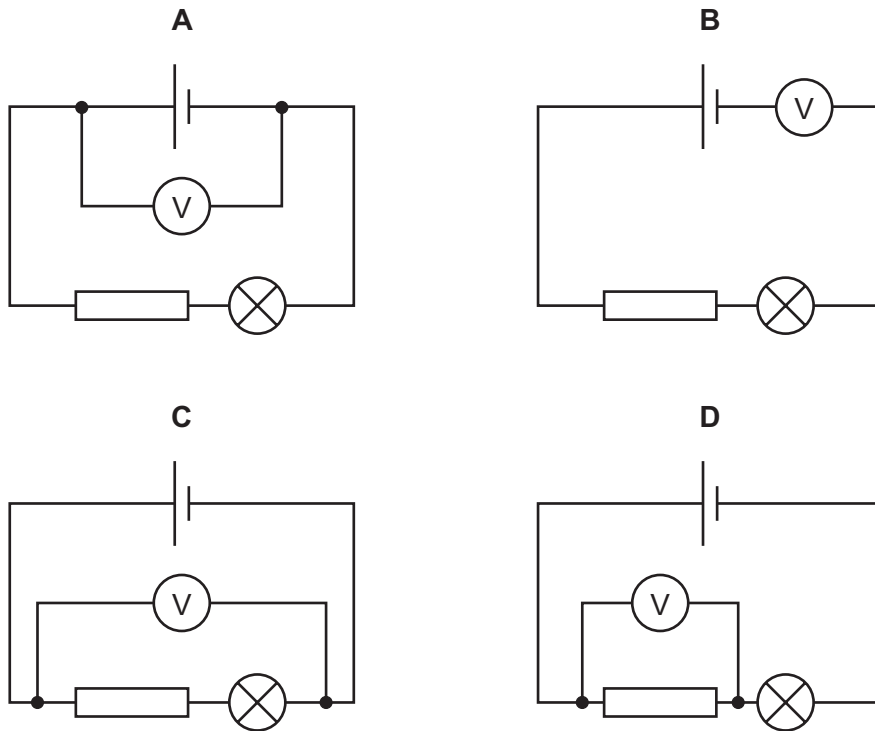


27 A plastic rod is rubbed with a cotton cloth. This causes the rod and the cloth to become charged. These charges cause a force between the rod and the cloth.

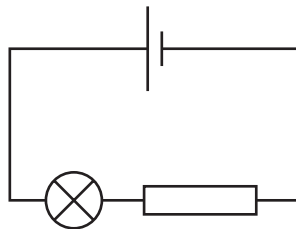
Which row compares the charges on the rod and the cloth, and describes the effect of the force between the rod and the cloth?

	charges on rod and cloth	effect of the force on rod and cloth
A	opposite	they attract
B	opposite	they repel
C	the same	they attract
D	the same	they repel

- 28 Which circuit shows the correct position for the voltmeter to measure the potential difference (p.d.) across the resistor?



- 29 The circuit shows a cell connected to a lamp and resistor in series.



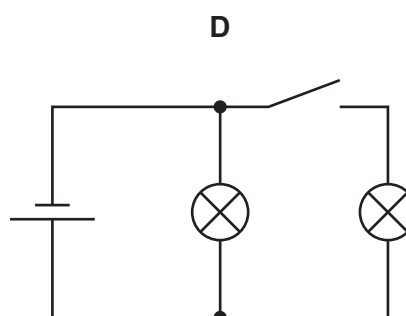
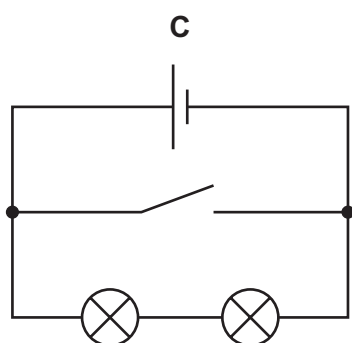
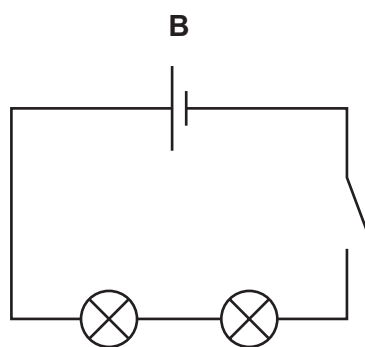
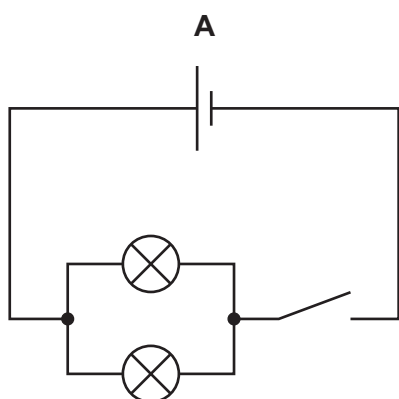
Energy transfer takes place in the lamp and the resistor. Energy is also transferred to the surroundings from the lamp and the resistor.

Which forms of energy are transferred to the surroundings?

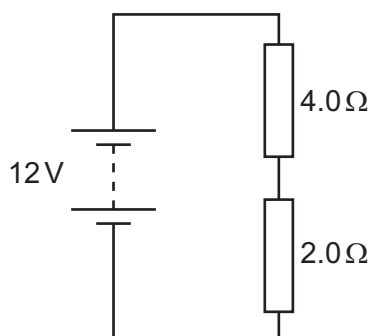
- A chemical energy and thermal energy
- B chemical energy and light energy
- C kinetic energy and light energy
- D light energy and thermal energy

- 30 A circuit is set up so that a cell is connected to two lamps in parallel. A switch is also connected in the circuit so that it can operate both lamps at the same time.

Which diagram shows this circuit?



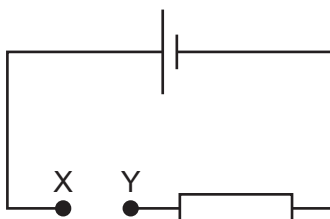
- 31 A $4.0\ \Omega$ resistor and a $2.0\ \Omega$ resistor are connected to a 12V battery in a circuit.



What is the current in the $2.0\ \Omega$ resistor?

- A** 0.50A **B** 2.0A **C** 3.0A **D** 6.0A

32 The diagram shows an incomplete circuit.



A light-dependent resistor (LDR) and a thermistor are each connected across XY in turn and changes to the environment are made.

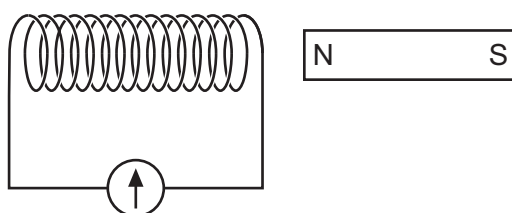
Which row shows the changes to the environment that cause the total resistance in the circuit to decrease?

	thermistor connected across XY	light-dependent resistor connected across XY
A	increase light level	increase the temperature
B	increase the temperature	increase the light level
C	decrease the light level	decrease the temperature
D	decrease the temperature	decrease the light level

33 Why is the electricity supply in a house fitted with a fuse?

- A** to increase the power supplied to the circuits
- B** to increase the resistance in the circuits
- C** to prevent overheating of cables in the circuits
- D** to prevent short circuits

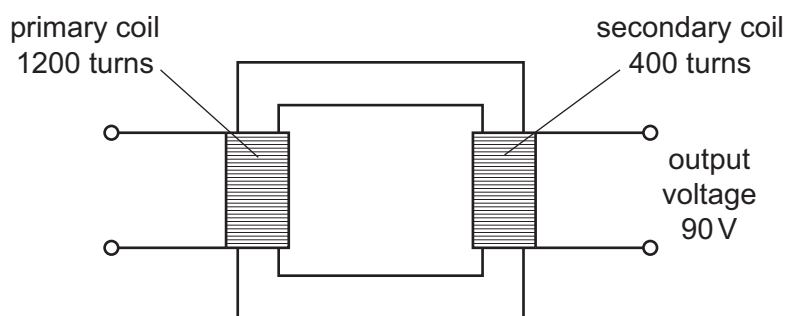
34 A student holds a bar magnet next to a coil of wire connected to a galvanometer.



What will cause a reading on the galvanometer?

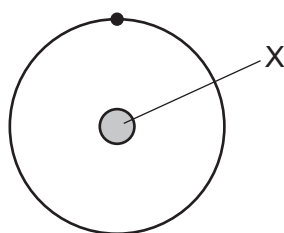
- A** holding the magnet stationary inside the coil
- B** holding the magnet stationary with the S pole next to the coil
- C** moving both the magnet and the coil to the right at the same speed
- D** moving the magnet and the coil towards each other at the same speed

- 35 A transformer has 1200 turns on its primary coil and 400 turns on its secondary coil. An output voltage of 90V is induced across the secondary coil.



What is the input voltage of the transformer?

- A 30V B 90V C 270V D 1200V
- 36 An electric motor consists of a current-carrying coil placed between the poles of a magnet.
- What **must** increase the size of the turning effect on the current-carrying coil in the electric motor?
- A decreasing the current in the coil and increasing the number of turns on the coil
 B decreasing the current in the coil and decreasing the number of turns on the coil
 C increasing the current in the coil and decreasing the number of turns on the coil
 D increasing the current in the coil and increasing the number of turns on the coil
- 37 The diagram represents a hydrogen atom.



Which row correctly describes the part of the atom labelled X?

	name of part X	charge of part X
A	neutron	negative
B	neutron	positive
C	nucleus	negative
D	nucleus	positive

38 Which statement about different isotopes of a certain element **must** be correct?

- A They have a different number of electrons.
- B They have the same number of neutrons.
- C They have the same number of nucleons.
- D They have the same number of protons.

39 Ba-137 is a radioactive isotope of barium.

When a nucleus of this isotope decays, there is no change in its composition.

Which type of radiation is emitted?

- A α -particles
- B β -particles
- C γ -rays
- D neutrons

40 It takes four days for the count rate from a sample of a radioactive isotope to fall from 400 counts/s to 25 counts/s.

What is the half-life of this radioactive isotope?

- A 4.8 hours
- B 24 hours
- C 32 hours
- D 64 hours

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