

Candidate Name

Candidate Number

Centre Name

Centre Number

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Model Paper

(2 hours)

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you must have a soft pencil (preferably of type B or HB), a clean eraser, and a dark blue or black pen.

INSTRUCTIONS:

- You must write your name, candidate number, centre name, and centre number on the answer sheets in the designated spaces.
- The objective section consists of 25 questions, and you must attempt all of them.
- Each question has four options labelled A, B, C, and D. Select the option that you think is correct. Mark it on the multiple-choice answer sheet using a soft pencil.
- Attempt all the questions from the subjective section using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.
- You are allowed to use a calculator if needed.

INFORMATION:

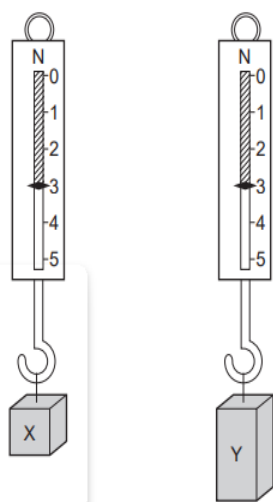
- This paper has a total of 100 marks.
- In the objective section, there are 25 questions, each carrying one mark.
There is no negative marking for incorrect responses.
- Subjective section comprises 75 marks
- The number of marks assigned for every question or its parts is indicated within brackets ().
- Rough work must be completed on this question paper.

OBJECTIVE SESSION**MARKS: 25**

1. Which person is experiencing an acceleration?
 - A. a driver of a car that is braking to stop at traffic lights
 - B. a passenger in a train that is stationary in a railway station
 - C. a shopper in a large store ascending an escalator (moving stairs) at a uniform rate
 - D. a skydiver falling at constant speed towards the Earth

2. A 1kg sample of aluminium is stored in a laboratory. In a different laboratory, in the same town, there is a 1kg sample of iron. Which quantity must these two samples always have in common?
 - A. the same density
 - B. the same temperature
 - C. the same volume
 - D. the same weight

3. Two blocks of metal X and Y hang from spring balances, as shown in the diagrams.



What does the diagram show about X and Y?

- A. They have the same mass and the same volume but different weights.
 - B. They have the same mass and the same weight but different volumes.
 - C. They have the same mass, the same volume and the same weight.
 - D. They have the same weight and the same volume but different masses.
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4. A man stands on the ground. Which action will increase the pressure that the man exerts on the ground?
 - A. The man slowly bends his knees.
 - B. The man slowly lies down on the ground.
 - C. The man slowly raises his arms.
 - D. The man slowly raises one foot off the ground.

5. Visible light and γ -rays are both waves. How may they correctly be described?

| | visible light | γ -rays |
|---|---------------|----------------|
| A | longitudinal | longitudinal |
| B | longitudinal | transverse |
| C | transverse | longitudinal |
| D | transverse | transverse |

6. Different parts of the electromagnetic spectrum are used for different purposes. Below are four statements about parts of the spectrum.

statement 1: Infra-red waves are used in television remote controllers.

statement 2: Radio waves are used to transmit television pictures from satellites to Earth.

statement 3: Ultra-violet waves are used for intruder alarms.

statement 4: X-rays are used for security checks.

Which statements are correct?

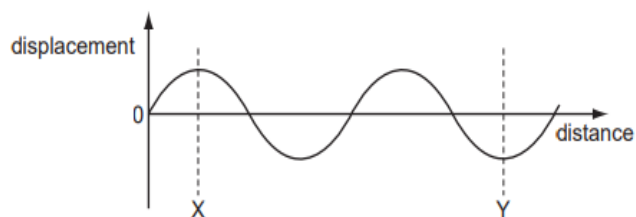
A. 1 and 2

B. 1 and 4

C. 2 and 3

D. 3 and 4

7. The diagram represents a wave.



How many wavelengths are there between X and Y?

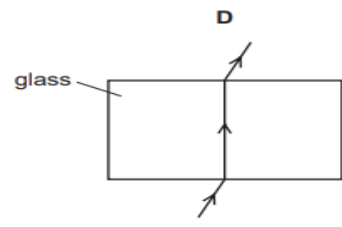
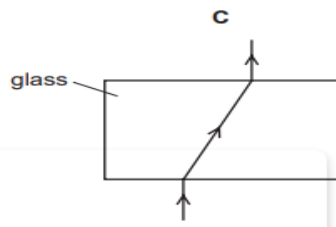
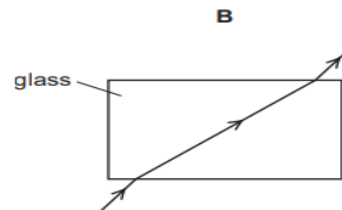
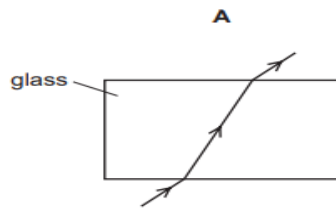
A. $\frac{3}{2}$

B. 1

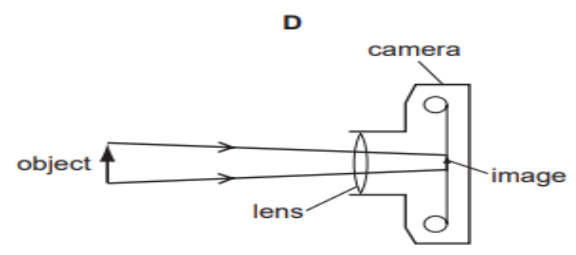
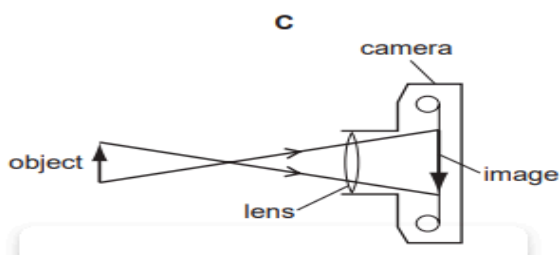
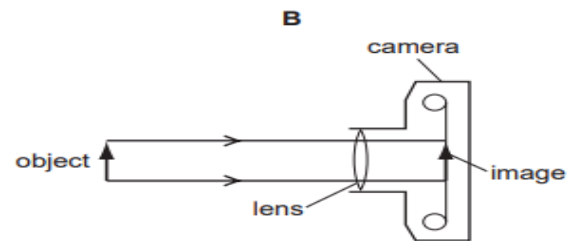
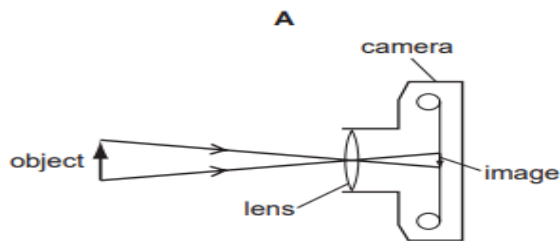
C. $1\frac{1}{2}$

D. 3

8. Which diagram shows how a ray of light could pass through a glass block in the air?



9. Which diagram correctly represents rays of light passing through a converging lens in a camera?



10. A student claps once when standing 100m away from a large wall. The speed of sound in air is 330m/s. How long after clapping does the student hear an echo?

- A. 0.30s
- B. 0.61s
- C. 1.7s
- D. 3.3s

11. Which statement about magnetism is correct?

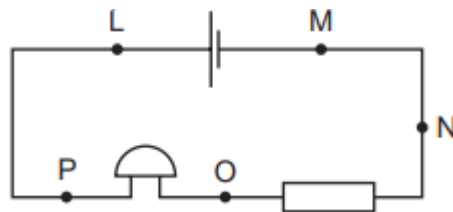
- A. Aluminium is a ferrous metal.

- B. A steel magnet can be demagnetised by heating it.
- C. The core of an electromagnet is usually made of steel.
- D. The magnetic field lines around a bar magnet are evenly spaced.

12. Which copper wire would have the smallest resistance?

- A. a long, thick wire
- B. a long, thin wire
- C. a short, thick wire
- D. a short, thin wire

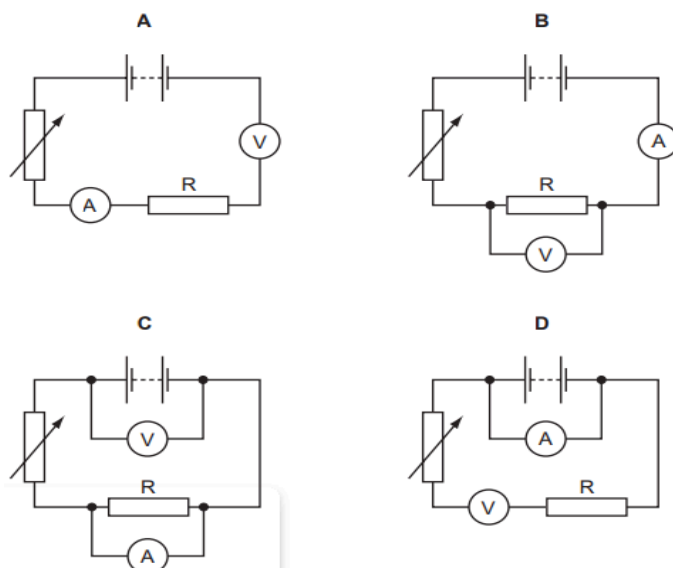
13. The diagram shows an electrical circuit.



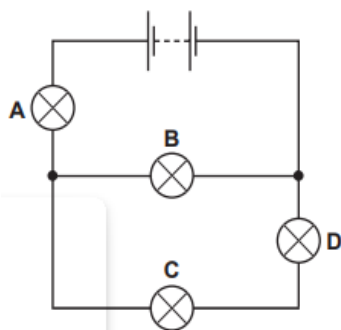
Between which two points must a voltmeter be connected to find the potential difference across the bell?

- A. L and M
- B. M and N
- C. N and O
- D. O and P

14. Which circuit could be used to determine the resistance of the resistor R?



15. The circuit shows a battery and four lamps. All the lamps are lit. One lamp fails and all the lamps go out. Which lamp failed?



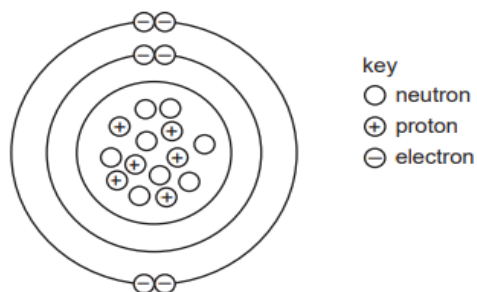
16. A desk lamp should have a 3A fuse fitted, but a 13A fuse has been fitted by mistake. The lamp is not faulty. The lamp is switched on. What happens?

- A.** The fuse blows.
- B.** The fuse does not blow but the lamp does not light.
- C.** The lamp draws too much current and the supply cables could melt.
- D.** The lamp works normally.

17. In a cathode-ray tube, particles are fired at a screen. What are these particles?

- A.** α -particles
- B.** electrons
- C.** neutrons
- D.** protons

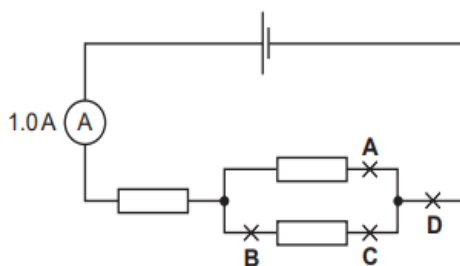
18. The diagram represents a carbon atom.



What is the nucleon number (mass number) for this atom?

- A. 6
- B. 8
- C. 14
- D. 20

19. The reading on the ammeter in the circuit is 1.0A. A second ammeter is connected to the circuit. It also reads 1.0A. At which labelled point is it connected?



20. A car travels at various speeds during a short journey. The table shows the distances travelled and the times taken during each of the four stages P, Q, R and S.

| stage | P | Q | R | S |
|-------------------------|-----|-----|-----|-----|
| distance travelled / km | 1.8 | 3.6 | 2.7 | 2.7 |
| time taken / minutes | 2 | 2 | 4 | 3 |

During which two stages is the car travelling at the same average speed?

- A. P and Q
- B. P and S
- C. Q and R
- D. R and S

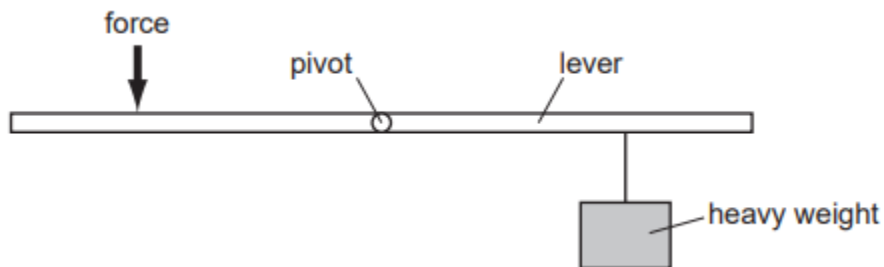
21. A car moves along a level road. The diagram shows all of the horizontal forces acting on the car.



Which statement is correct?

- A. The car is slowing down.
- B. The car is speeding up.
- C. The car is moving at a constant speed.
- D. The car is moving backwards.

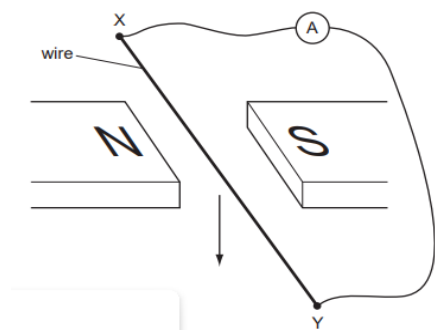
22. The diagram shows a force being applied to a lever to lift a heavy weight.



Which change would enable the heavyweight to be lifted with a smaller force?

- A. Move the force to the right.
- B. Move the heavy weight to the right.
- C. Move the force to the left.
- D. Move the pivot to the left.

23. The diagram shows an experiment to demonstrate electromagnetic induction.



X and Y are joined, in turn, by four wires, each made of a different material. Each wire is then moved quickly downwards between the magnets. Which material will not give rise to an induced current in the wire?

- A. aluminium
- B. copper
- C. iron
- D. nylon

24. The graph shows how the count rate on a detector due to a radioactive source changes with time.



What is the count rate at 5.0 hours?

- A. 960 counts per minute
- B. 600 counts per minute
- C. 150 counts per minute
- D. 0 counts per minute

25. An electric current can produce a heating effect and a magnetic effect.

Which row shows the effect that a relay uses, together with one application of a relay?

| | effect used by a relay | one application of a relay |
|----------|------------------------|---|
| A | heating effect | allowing a small current to switch on a large current |
| B | heating effect | changing the voltage of an alternating current |
| C | magnetic effect | allowing a small current to switch on a large current |
| D | magnetic effect | changing the voltage of an alternating current |

THEORETICAL PORTION**MARKS: 45**

1. i) Write 2 disadvantages of radioactivity. [2]

ii) Define the terms beta-particle and beta decay. [2]

iii) State Bohr's Atomic Theory. [3]

iv) What is the working Principle of Step-Up Transformers? [3]

v) Calculate the magnetic force on a current-carrying conductor. [3]

2. i) Which circuit is a parallel circuit? [2]

ii) Define Conductor with examples. [3]

iii) Write the properties of the Electric Field with a diagram. [4]

iv) Draw the flow chart which relates to Mechanical Waves and Electromagnetic Waves. [4]

v) If it takes 600 J of heat energy to increase the temperature of 150 g of a substance by 15°C (without changing its phase), calculate the specific heat of the substance. [2]

3. i) What is the Relationship Between The Temperature And Pressure Of A Gas with a graph? [3]

ii) When a body slides against a rough surface, the work done by friction is positive or negative? [2]

iii) Name types of Kinetic Energy. [2]

iv) What two conditions must be met if an object is to be in equilibrium? [2]

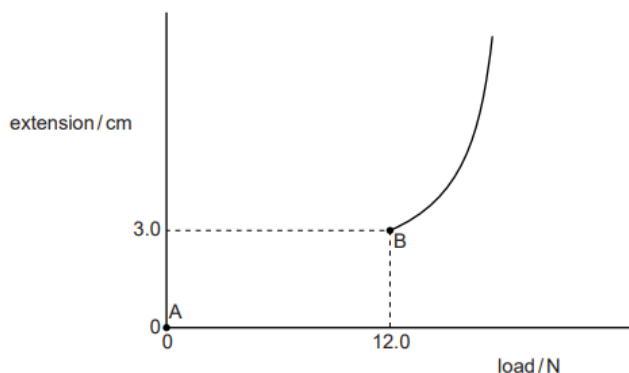
v) The frequency of the water waves is 0.5 Hz. Calculate the number of water waves produced in 5 seconds. [2]

3. i) Beth wants to increase the force from the books by 24 N. Calculate the mass of a book with a weight of 24 N. Gravitational field strength = 10 N / kg [3]

ii) Describe the use of earthing in everyday life. Your answer should state the use and describe why earthing is needed. [3]

PRACTICAL PORTION**MARKS: 30**

1. Fig shows part of the extension-load graph for a spring.



The spring obeys Hooke's law between points A and B.

(a) (i) In Fig, complete the graph between A and B. [2]

(ii) State the name of point B. [2]

(b) The average value of the load between A and B is 6.0 N. Calculate the work done in extending the spring from A to B. [2]

(c) The spring has an unstretched length of 4.0 cm. An object is hung on the spring and the spring length increases from 4.0 cm to 6.0 cm.

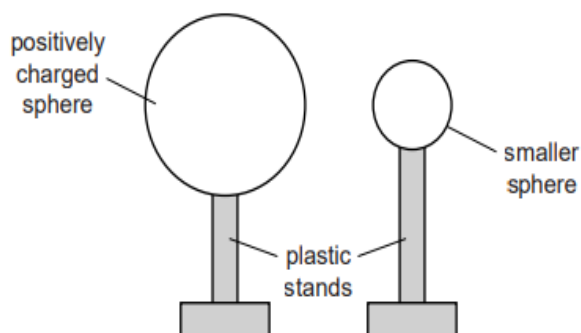
(i) Calculate the mass of the object. [3]

(ii) The object is immersed in a liquid but remains suspended from the spring. The liquid exerts an upward force on the object and the length of the spring decreases to 5.0 cm. Calculate the upward force exerted on the object by the liquid. [3]

2. A metal sphere, mounted on an insulating plastic stand, is positively charged.

(a) State the name of the unit in which electric charge is measured. [2]

(b) A smaller metal sphere, also mounted on an insulating plastic stand, is uncharged. This smaller sphere is moved close to the positively charged sphere. Fig shows the two spheres.

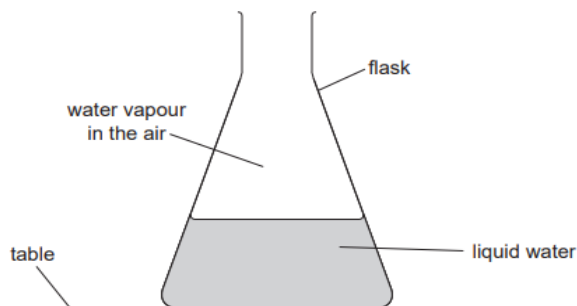


(i) In Fig, draw the distribution of charge on the smaller sphere. [2]

(ii) An earthed metal wire is touched against the smaller metal sphere. State and explain what happens to the charge on the smaller sphere. [3]

(c) Explain, in terms of their structures, why the metal wire is an electrical conductor but the plastic stand is an electrical insulator. [3]

3. Fig shows a flask of hot water.



(a) Describe the arrangement and movement of the molecules in the liquid water and the water vapour. [4]

(b) Describe, in terms of molecules, how water in the flask becomes water vapour in the air. State the name of the process. [4]
