Name: _____ ( ) **Class:** _____

WHITLEY SECONDARY SCHOOL

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PRELIMINARY EXAMINATION 2025

SUBJECT	**:**	**PHYSICS PAPER 1 (6091/01)**
LEVEL	**:**	**Sec 4 G3**
DATE	**:**	**2 September 2025**
DURATION	**:**	**1 hr**
SETTER	**:**	**Mr Krishan Sanjay**
VETTER	**:**	**Ms Keira Htay**

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Class and index number on the Answer Sheet in the spaces provided.

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.

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	
Total	**/ 40**

This document consists of **21** printed pages and **3** blank pages

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1 What is the correct order of magnitude for the diameter of an atom, the diameter of the Earth, and the diameter of a human hair?

	diameter of an atom	diameter of Earth	diameter of human hair
A	0.1 μm	10 Mm	100 μm
B	0.1 μm	10 Gm	10 μm
C	0.1 nm	10 Mm	100 μm
D	0.1 nm	10 Gm	10 μm

2 Which of the following lists of SI units contains only base units?

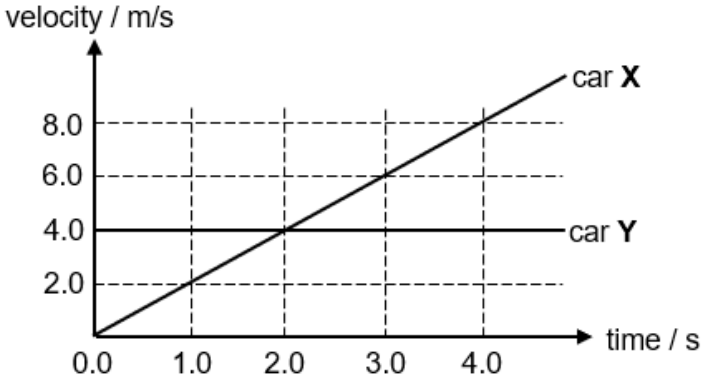
A ampere, kilogram, kelvin, metre, mole
B ampere, kilogram, metre, newton, ohm
C kelvin, mole, newton, second, volt
D kilogram, metre, mole, ohm, second

3 A car is travelling at a velocity of 2.0 m / s. It accelerates at 0.20 m / s^2 for 2.5 minutes. What is the final velocity of the car?

A 2.5 m / s
B 5.2 m / s
C 30 m / s
D 32 m / s

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4 The velocity-time graph of two cars is shown. Car **X** and car **Y** started off their journey from the same position when **t** = 0.0 s.



At what time will the two cars pass each other again?

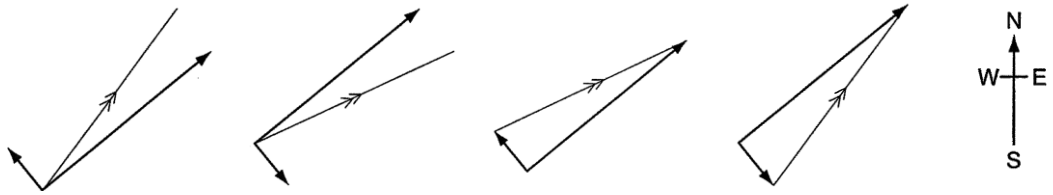
A 1.0 s
B 2.0 s
C 3.0 s
D 4.0 s

5 An aircraft heads north-east at 400 km / h.

The wind is blowing towards the north-west at 100 km / h.

Which vector diagram represents the correct way to obtain the resultant velocity of the aircraft?

A **B** **C** **D**



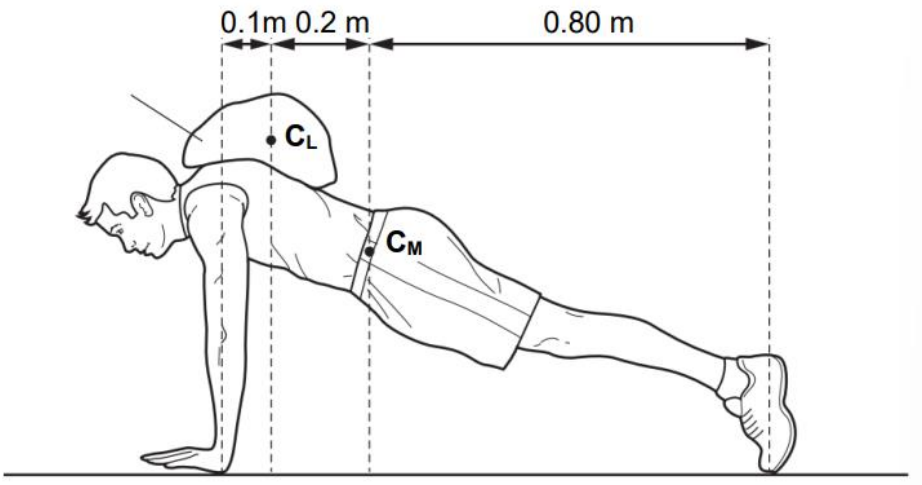
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6 Two boxes, P and Q, were pushed along a smooth surface from rest. The acceleration of box P is twice that of box Q. The mass of box Q is thrice of box P.

Which of the following shows the correct relationship between force exerted on box P, F_p and force on box Q, F_Q?

A $F_p = (2/3)\ F_Q$
B $F_p = (3/2)\ F_Q$
C $F_p = 3\ F_Q$
D $F_p = 6\ F_Q$

7 An athlete with mass 80 kg trains by performing press-ups with a load on his back. The diagram shows the perpendicular distances involved. The centre of mass of the athlete is C_M and the centre of mass of the load he is carrying is C_L.

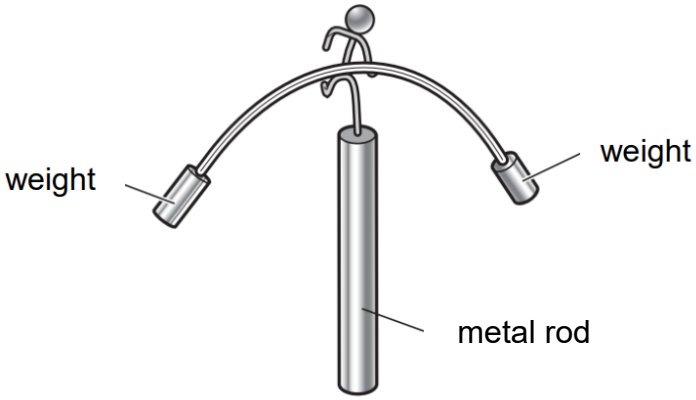


The mass of the load is 10 kg.
What is the upward force exerted on his two arms?

A 90 N
B 230 N
C 670 N
D 900 N

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8 A student makes a model toy which balances on the end of a metal rod.



Why are the weights needed?

A They increase the pressure on the rod.

B They increase the weight of the model.

C They lower the centre of gravity below the top of the rod.

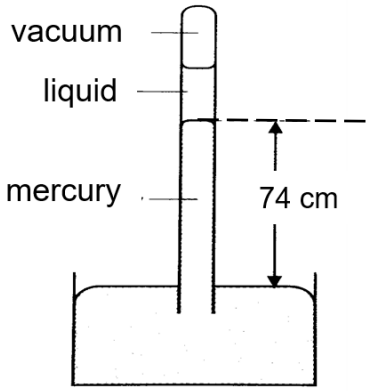
D They raise the centre of gravity above the top of the rod.

9 Which object will exert the greatest pressure on the ground?

	weight / N	contact area with ground / cm^2
A	50	100
B	280	150
C	9400	200
D	20000	600

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10 The diagram shows a mercury barometer. Some liquid less dense than mercury is found above the mercury column. The atmospheric pressure is 76 cm Hg, density of the liquid and mercury are 1200 kg / m^3 and 13600 kg / m^3 respectively.



What is the height of the liquid column?

A 0.02 cm

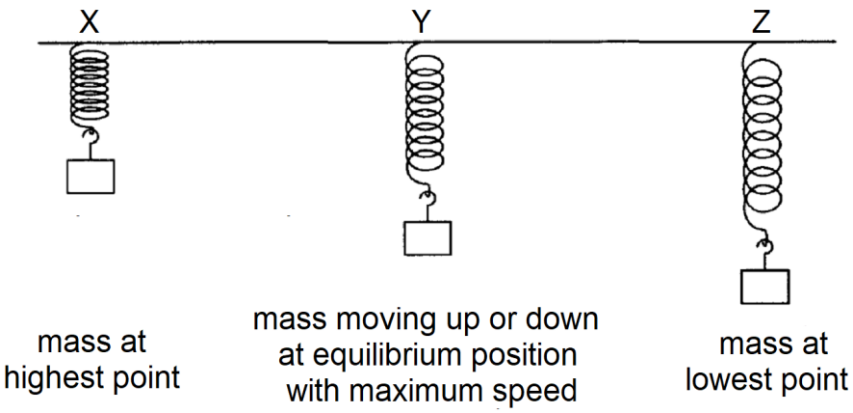
B 2.0 cm

C 22.7 cm

D 26.0 cm

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11 A spring fixed at one end, has a mass attached to the other end. The mass bounces up and down. It is shown in the diagram at three positions X, Y and Z.



Which row correctly describes the kinetic and gravitational potential stores for the mass and the elastic potential stores in the spring?

	kinetic store	gravitational potential store	elastic potential store
A	maximum for Y	maximum for X	maximum for Z
B	maximum for Y	minimum for Z	maximum for Y
C	zero for X	maximum for X	maximum for X
D	zero for Z	minimum for Z	zero for X

12 Which option correctly describes the mechanism by which energy is transferred to food in a microwave oven?

A electrically
B heating
C mechanically
D propagation of waves

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13 A gas placed in a container of fixed volume is heated.

What effect does this have on the gas?

A Both the pressure and temperature of the gas increase.
B Neither the pressure nor temperature of the gas increases.
C Only the pressure of the gas increases.
D Only the temperature of the gas increases.

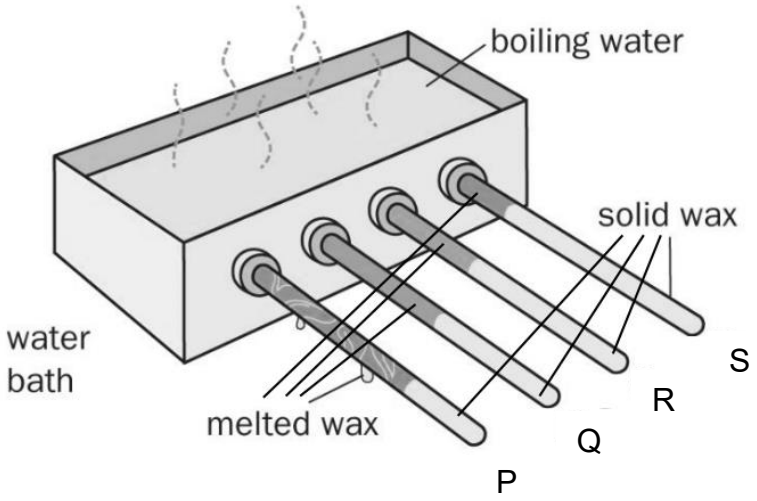
14 Results from a Brownian motion experiment involving smoke particles in air shows that heavy particles settle quickly. However, very small particles remain suspended for a long period of time.

Which of the following statements explain the behavior of very small particles?

A Air pressure has a greater effect on smaller particles.
B Random molecular bombardment by air molecules keeps the particles suspended.
C The Earth's gravitational field does not act on small particles.
D The small smoke particles have the same density as the air.

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15 A water bath is filled with boiling water. Four rods of different materials are coated with solid wax and placed in contact with the metal container holding the boiling water. At the end of the experiment, rod P had the most melted wax, while rod S had the least melted wax.



Which row best fits the likely materials of all 4 rods?

	rod P	rod Q	rod R	rod S
A	copper	glass	iron	wood
B	copper	iron	glass	wood
C	wood	glass	iron	copper
D	wood	iron	glass	copper

16 A person places his two feet on two separate surfaces, a woolen carpet and a marble tile. Both surfaces are initially at the same temperature.

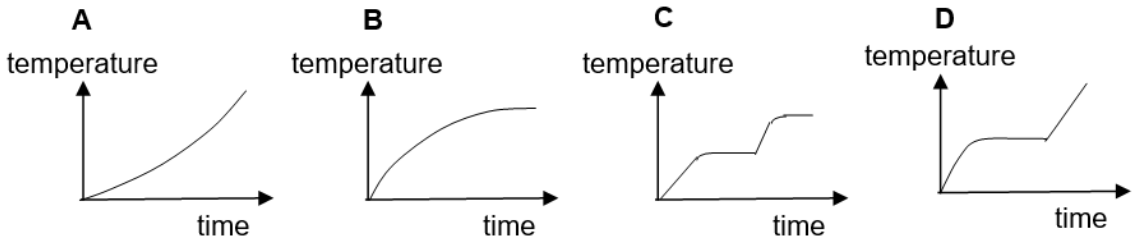
Which statement best describes how the person will feel?

A Both surfaces feel the same since both are at the same temperature initially.
B The foot on the carpet feels warmer because the carpet transfers heat to the foot.
C The foot on the tile feels cooler because the tile transfers coldness to the foot.
D The foot on the carpet feels warmer because the rate of heat transfer is slower through the wool.

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17 A container of water is heated at a constant rate in an insulated container till half of it vaporizes.

Which of the following graphs shows how the temperature changes during this time?



18 Which of the following is **not** a difference between boiling and evaporation?

A Evaporation is a slow process but boiling is a fast process.

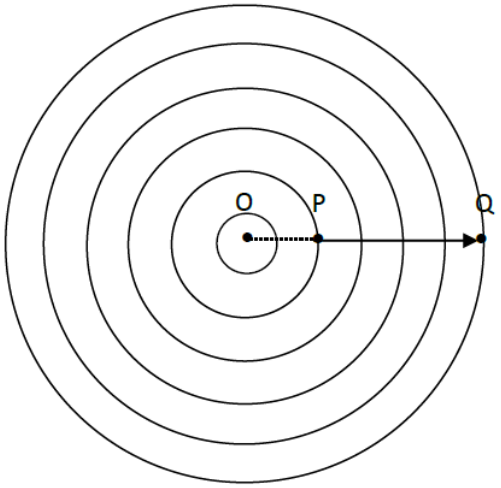
B Evaporation occurs from 0 °C to 100 °C but boiling takes place only at the boiling point.

C During evaporation, there is a change in state and temperature while boiling involves a change in state only.

D Evaporation does not require an external thermal energy source while boiling requires.

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19 The figure shows circular wavefronts travelling from a point source O.



If the time taken for a wavefront to travel from point P to Q is 12.0 s and the wavelength of the wave is 200 cm, what is the speed of the wave?

A 0.67 m / s
B 1.0 m / s
C 17 m / s
D 67 m / s

20 In which of the following scenarios will sound **not** be heard?

A A bell ringing in air.
B A drum being played in an open field.
C A tuning fork vibrating inside a vacuum chamber.
D An alarm clock ringing inside a box with small openings.

21 The wavelength of an ultraviolet ray is approximately 1×10^{-7} m.
What is the approximate wavelength of X-rays?

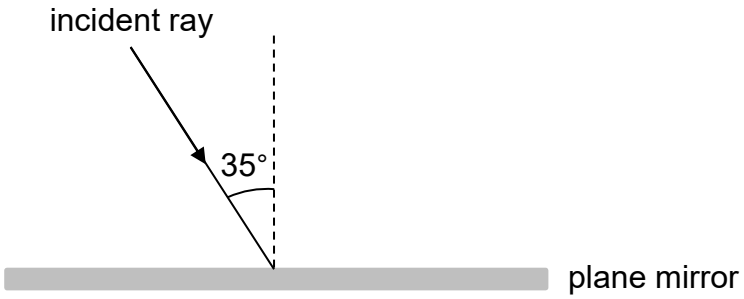
A 1×10^{-10} m
B 1×10^{-7} m
C 1×10^{-5} m
D 1×10^{-2} m

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22 Which electromagnetic wave can cause structural damage to living cells and tissue?

A infra-red radiation
B microwaves
C radio waves
D ultraviolet radiation

23 A ray of light strikes a plane mirror at an angle of incidence of 35°. The mirror is then rotated 10° clockwise while the incident ray remains fixed.

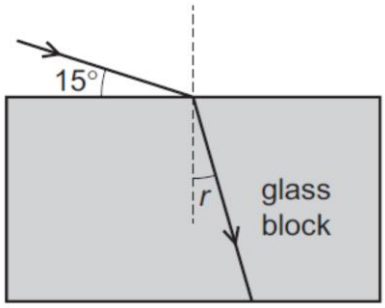


What is the angle between the new reflected ray and the original reflected ray?

A 10°
B 20°
C 35°
D 45°

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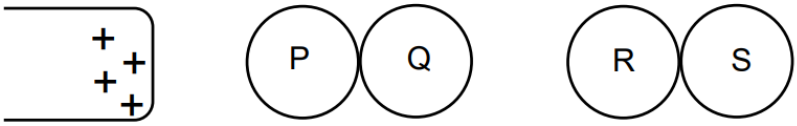
24 Light in air strikes the top surface of a glass block at an angle of 15° as shown. The refractive index of glass is 1.5.



What is the angle of refraction *r*?

A 10°
B 23°
C 40°
D 50°

25 P, Q, R and S are identical insulated neutral metal spheres. They are arranged as shown.



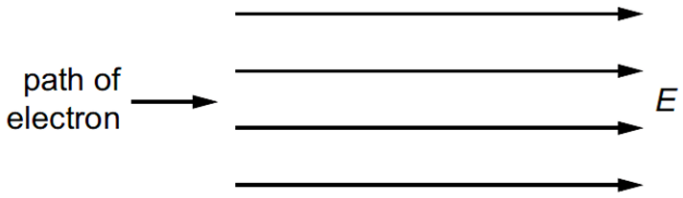
A positively-charged bar is brought near to P. Only sphere S is earthed momentarily.

What would the charge on spheres R and S be after the bar is removed?

	R	S
A	negative	neutral
B	negative	negative
C	neutral	neutral
D	positive	positive

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26 An electron enters a region of space where there is a uniform electric field *E* as shown.



Initially, the electron is moving parallel to, and in the direction of, the electric field.

What is the subsequent path and change of speed of the electron caused by the electric field?

	path of electron	speed of electron
A	curved	decreases
B	curved	increases
C	linear	decreases
D	linear	increases

27 A typical lightning strike occurs when there is a potential difference of 50 MV between the clouds and the ground. When the lightning strikes, it transfers 800 MJ of energy.

What is the number of electrons that travels through the lightning strike? (charge of an electron = 1.6×10^{-19} C)

A 1.6×10^{1}

B 4.0×10^{17}

C 1.0×10^{20}

D 3.1×10^{26}

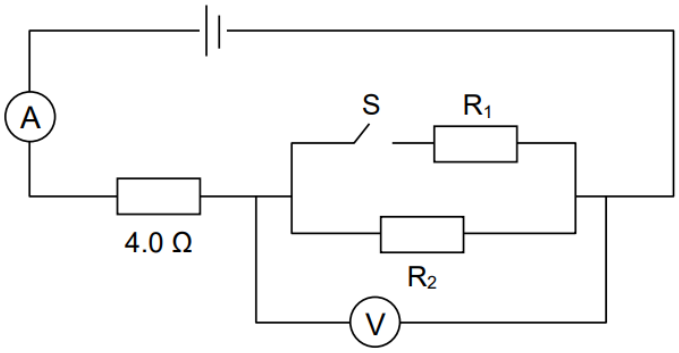
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28 The resistance of a cylindrical wire X of length 1.0 m and cross-sectional area of 1.0×10^{-6} m^2 is 0.5 Ω. A second wire Y is made from the same material. It has a length of 2.0 m and a cross-sectional area of 0.50×10^{-6} m^2.

What is the resistance of Y?

A 0.25 Ω
B 0.5 Ω
C 1.0 Ω
D 2.0 Ω

29 Two resistors, R_1 and R_2 are connected in parallel in a circuit as shown in the diagram.
When switch S is open, the ammeter reads 1.0 A and the voltmeter reads 8.0 V.
When the switch S is closed, the ammeter reads 1.5 A and the voltmeter reads 6.0 V

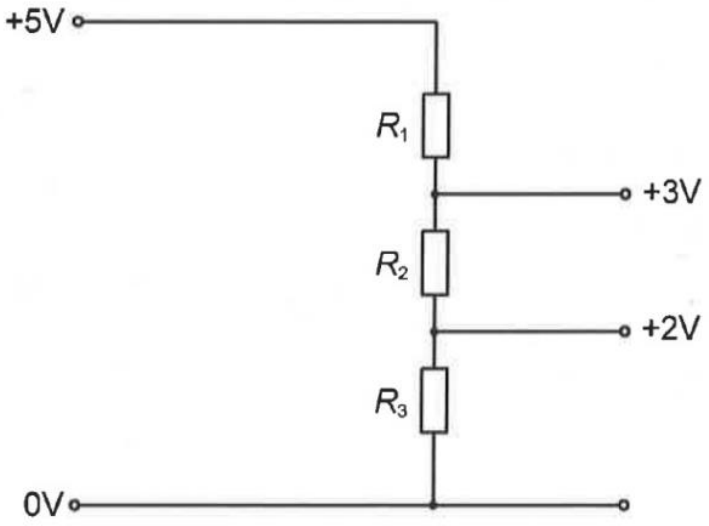


What are the resistances of R_1 and R_2?

	R_1 / Ω	R_2 / Ω
A	4.0	4.0
B	4.0	8.0
C	8.0	4.0
D	8.0	8.0

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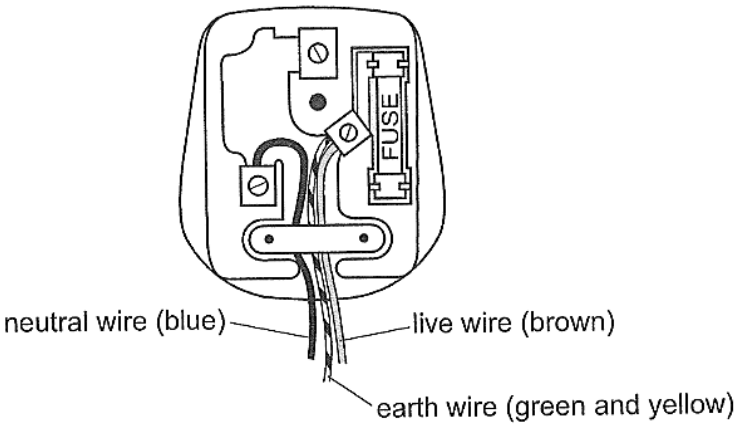
30 A potential divider is used to give outputs of 2V and 3V from a 5V source, as shown.



What are possible values for the resistances R_1 , R_2 and R_3?

	R_1 / kΩ	R_2 / kΩ	R_3 / kΩ
A	2	1	5
B	3	2	2
C	4	2	4
D	4	6	10

31 The plug of an electrical appliance is incorrectly wired, as shown.



What is the effect of using the plug wired this way?

A The appliance catches fire.

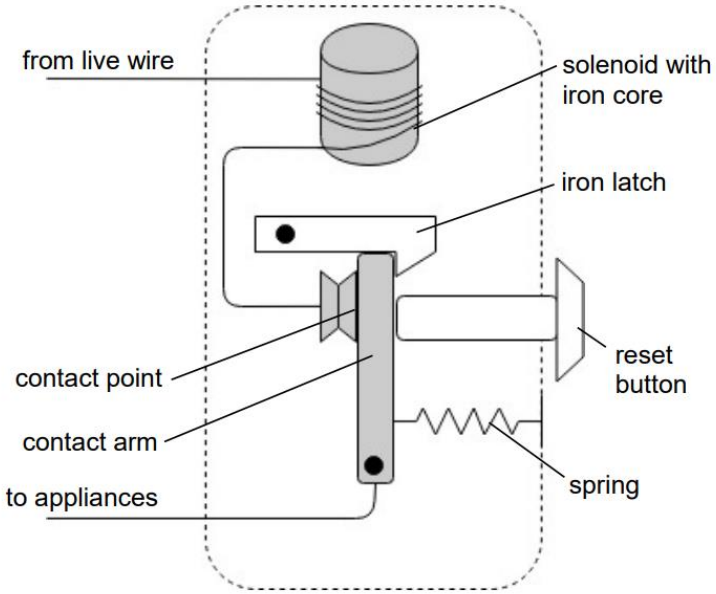
B The appliance does not work.

C The fuse in the plug blows.

D The metal case of the appliance becomes live.

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32 A diagram of a circuit breaker is shown below.



Which of the following modifications will cause the circuit breaker to trip at a lower current limit?

A Decrease the distance between the solenoid and the iron latch.

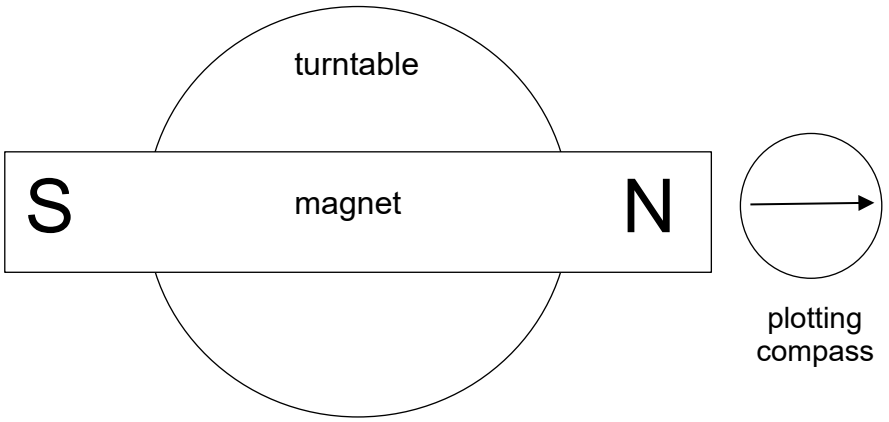
B Decrease the number of turns of coil in the solenoid.

C Increase the mass of the iron latch.

D Remove the iron core.

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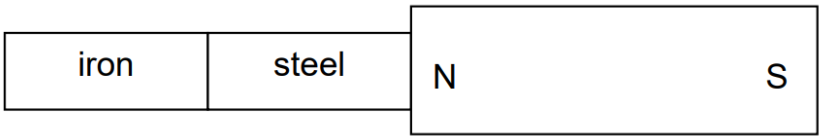
33 The figure shows a bar magnet resting on a turntable. A plotting compass is placed in front of the magnet as shown.



What will happen to the needle of the plotting compass when the turntable rotates in a clockwise direction?

A It does not move.
B It rotates anticlockwise.
C It rotates clockwise.
D It oscillates.

34 A steel bar and an iron bar are attracted to a magnet as shown.

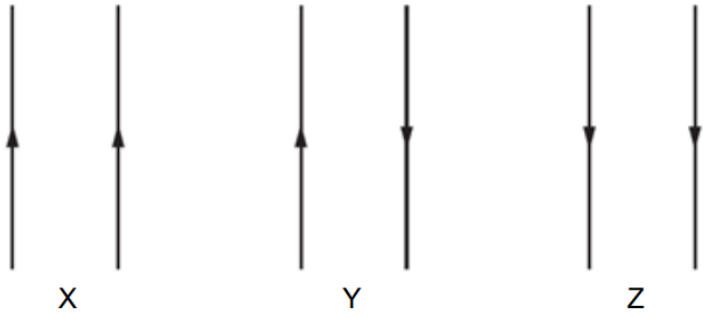


What will happen when the magnet is removed?

A Both steel and iron bars lose their magnetism.
B The iron bar retains its magnetism and steel bar loses its magnetism.
C The steel and iron bars remain attracted to each other.
D The steel and iron bars repel each other.

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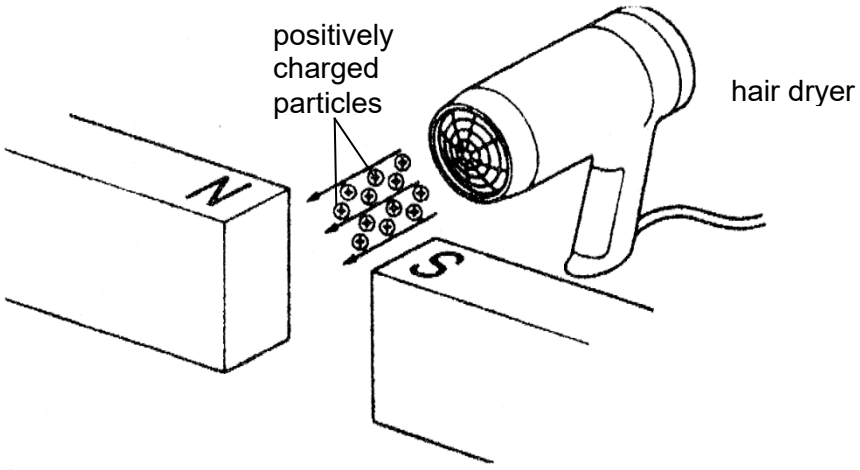
35 Three pairs of current-carrying parallel wires X, Y and Z are shown in the diagram.



Which row shows the force between the two wires for pairs X, Y, and Z?

	X	Y	Z
A	attraction	attraction	attraction
B	attraction	repulsion	attraction
C	repulsion	attraction	repulsion
D	repulsion	repulsion	repulsion

36 Hot air from a hair dryer contains many positively-charged particles. The hot air is directed between the poles of a strong magnet as shown in the diagram below.



How would the particles move as they pass through the strong magnet?

A The particles move downwards.

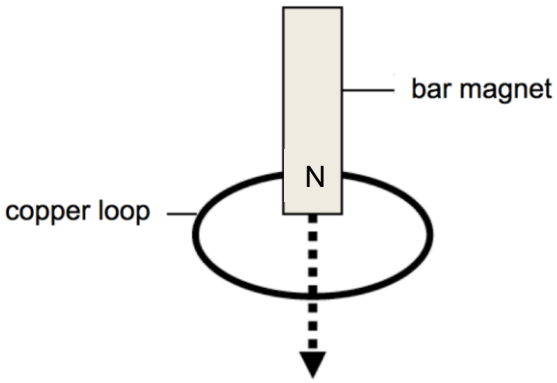
B The particles move in its original direction.

C The particles move towards the North pole.

D The particles move upwards.

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37 A bar magnet is dropped through a loop of copper wire as shown.



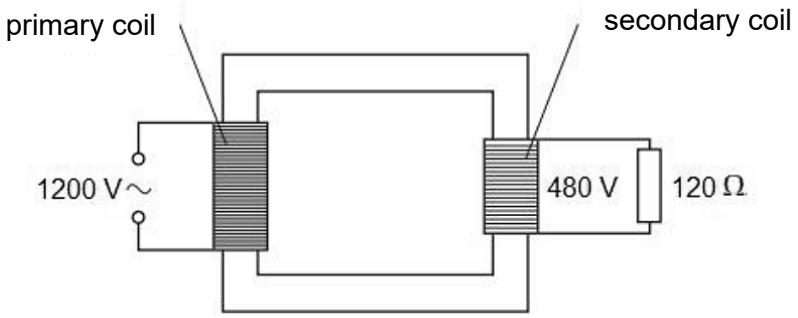
Which of the flowing statement(s) is/are correct?

1. Energy in the thermal store increases in the copper loop.
2. The magnet falls through the copper loop with an acceleration that is lower than the acceleration of free fall due to gravity
3. When the magnet approaches the copper loop, a current is induced in the loop that flows in a clockwise direction as seen by the observer from the top of the loop.
4. When the magnet moves through the copper loop, the current induced in the copper loop sets up a magnetic field that always repel the magnet.

A 2 only
B 1 and 2 only
C 2 and 3 only
D 3 and 4 only

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38 The primary coil of an ideal transformer is connected to a 1200 V alternating current source. Its secondary coil is connected to a 120 Ω resistor.



What is the power dissipated in the resistor and the current in the primary coil?

	power / W	current / A
A	480	1.6
B	480	4.0
C	1920	1.6
D	1920	4.0

39 Astatine is a radioactive substance. It has a nucleon number of 218 and a proton number of 85. It forms a polonium nucleus when it decays, emitting an α-particle and a β-particle.

What are the nucleon number and the proton number of the polonium nucleus?

	nucleon number	proton number
A	214	84
B	214	83
C	216	83
D	215	82

40 In a nuclear fission reactor, which particle causes a Uranium-235 nucleus to split into smaller nuclei?

A alpha-particle
B gamma ray
C neutron
D proton

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