

NAME:

NO:

CLASS:

RIVERSIDE SECONDARY SCHOOL



PRELIMINARY EXAMINATION 2022

SUBJECT : Physics

SUBJECT CODE & PAPER : 6091/01

LEVEL/STREAM : 4 Express

DURATION : 1 hour

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name and index number on the Answer Sheet in the spaces provided.

There are **forty** questions in 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 question paper.

The use of an appropriate scientific calculator is expected, where appropriate.

This question paper consists of **20** printed pages.

- 1 Which of the following can the time 12 h 15 min be written as?

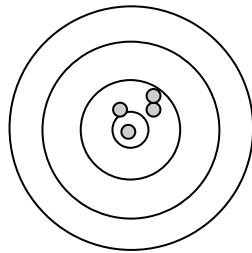
- A** 12.15 h
- B** 7.35×10^2 min
- C** 45.1 ks
- D** 10 800 s

- 2** The diagram shows four target boards used in a shooting competition. Which one indicates a small random error but large systematic error?

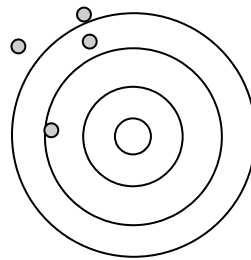
key

○ bullet hole

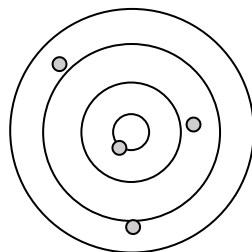
A



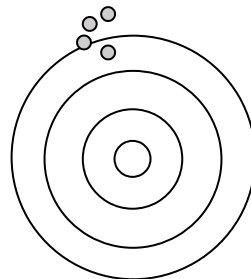
B



C



D



- 3 Vernier calipers are used to measure the thickness of a notebook.

Diagram 1 shows the caliper reading when the jaws are closed.

Diagram 2 shows the caliper reading when the notebook is between the jaws.

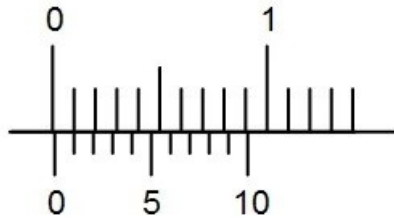


diagram 1

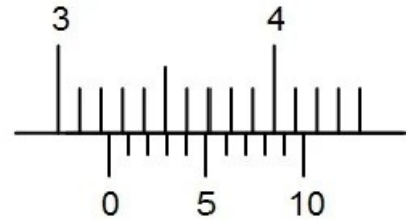


diagram 2

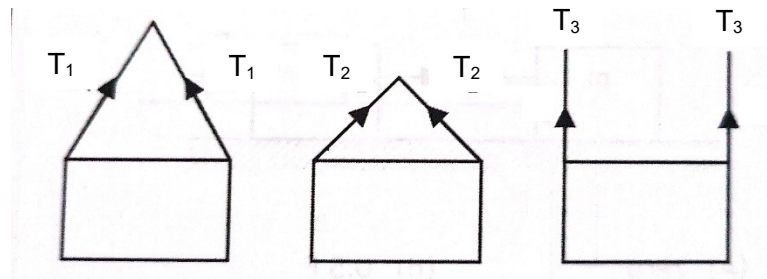
What is the thickness of the notebook?

- A** 3.15 cm
B 3.23 cm
C 3.25 cm
D 3.34 cm
- 4 A stone falling through the air has reached terminal velocity.
 Which row shows the acceleration and the velocity of the stone?

	acceleration of the stone	velocity of the stone
A	zero	constant
B	10 m/s^2	constant
C	zero	increasing
D	10 m/s^2	increasing

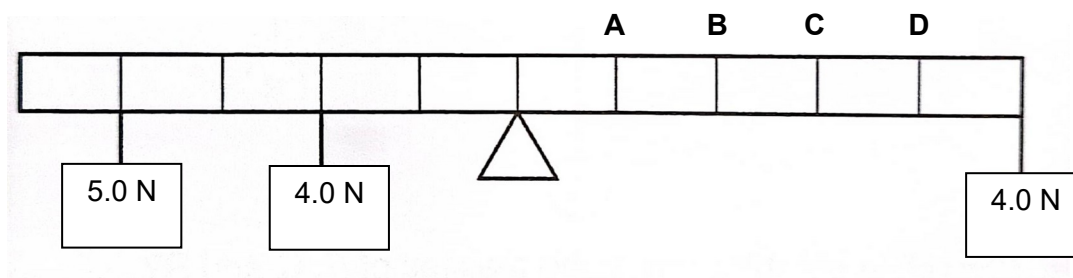
- 5 A bus travels north at a velocity of 25 m/s along a straight, horizontal track.
 At time $t = 5.0 \text{ s}$, its velocity starts to change and its acceleration is -2.0 m/s^2 .
 How is the bus moving at time $t = 15.0 \text{ s}$?
- A** travelling south with decreasing speed
B travelling south with increasing speed
C travelling north with decreasing speed

- D** travelling north with increasing speed
- 6** In which situation is the resultant force on the moving body equal to zero?
- A** a rock falling freely on the Moon
- B** a car turning a corner at constant speed
- C** a train going up a hill along a straight path at constant speed
- D** a bicycle decelerating along a straight horizontal track
- 7** A rectangular board can be hung on the wall in three different ways as shown in the diagrams below. The tensions in the strings are indicated as T_1 , T_2 and T_3 accordingly.

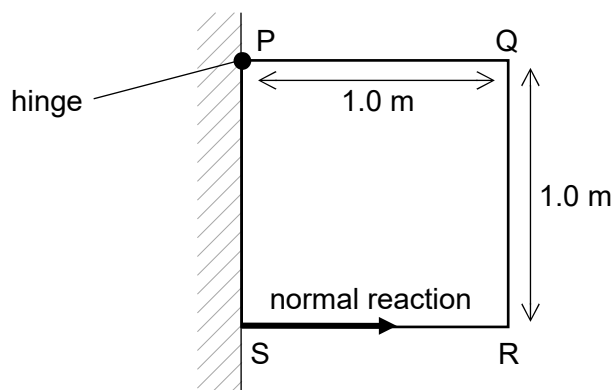


- Which of the following statements is correct?
- A** $T_1 > T_2 > T_3$
- B** $T_1 = T_2$, and $T_2 < T_3$
- C** the resultant force due to T_3 is the largest among the three ways
- D** the resultant force of the tensions in all the three ways are the same
- 8** Two objects each of mass 25 g and having the same density of 3.5 g/cm^3 are carefully lowered into a measuring cylinder containing 65 cm^3 of water. What is the final reading on the measuring cylinder?
- A** 14 cm^3
- B** 72 cm^3
- C** 79 cm^3
- D** 240 cm^3

- 9 The diagram shows a beam. Without any weights, the beam balances at its centre. Three weights are hung as shown. At which point does a load of 4.0 N balance the beam?



- 10 A square shop sign of side 1.0 m made from a uniform flat lamina PQRS is attached to a vertical wall by a hinge at P so that S rests against the wall vertically below P.

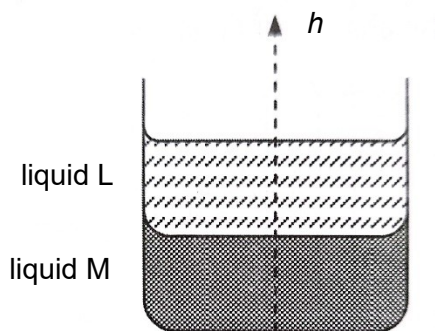


The mass of the sign is 5.0 kg.

What is the normal reaction exerted by the wall at S?

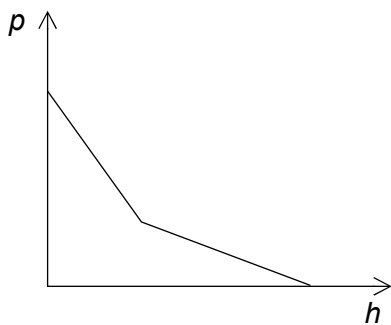
- A 25 N
- B 50 N
- C 75 N
- D 100 N

- 11 A tall container which is open to the atmosphere contains a layer of liquid L, floating on liquid M. Liquid M has a density which is two times greater than that of liquid L.

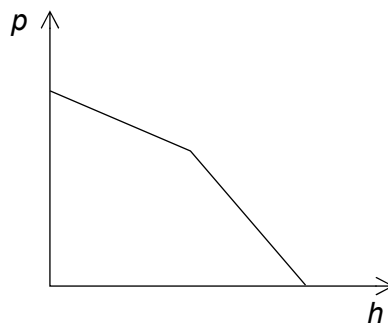


Which graph shows how the pressure p , at a point varies with its height h , above the base of the container?

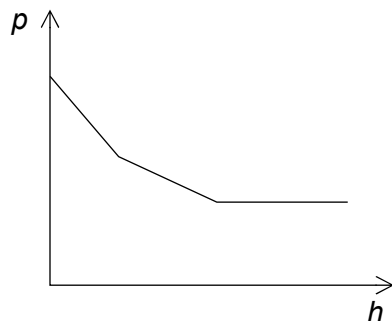
A



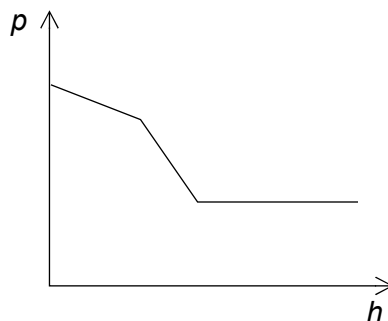
B



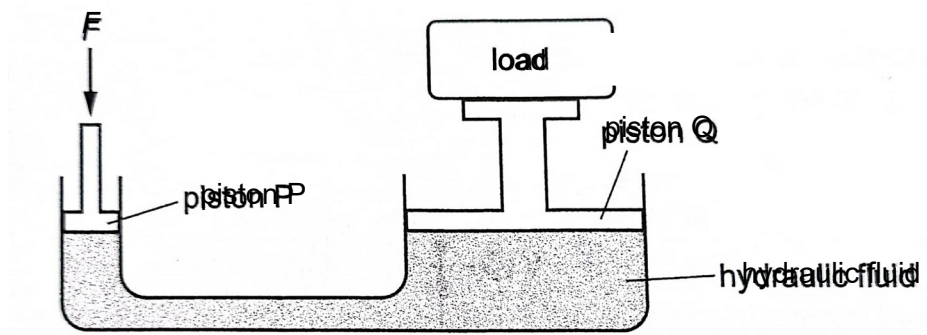
C



D



- 12 A hydraulic jack is used to lift a load of mass 1250 kg by applying a force F to piston P.

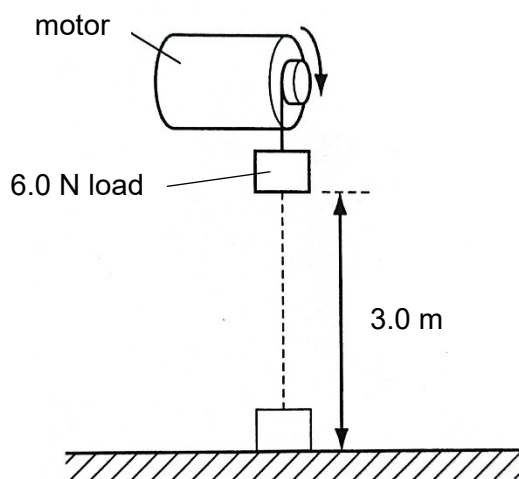


The cross-sectional area of piston P is 100 cm^2 and the cross-sectional area of piston Q is 500 cm^2 . The gravitational field strength g is 10 N/kg .

What is the value of the force F ?

- A 250 N
 - B 2500 N
 - C 6250 N
 - D 62 500 N
- 13 An object is initially at rest. The object is dropped from a 50 m high tower. Air resistance can be ignored. Assume that the gravitational potential energy of the object is zero when it is on the ground.
- What is the ratio of the kinetic energy of the object to its gravitational potential energy at a height of 10 m from the ground?
- A 5 : 4
 - B 2 : 1
 - C 4 : 1
 - D 5 : 1

- 14 An electric motor is used to lift a 6.0 N load through 3.0 m, as shown in the diagram.



The total amount of electrical energy used by the motor is 28 J.

How much energy is wasted?

- A** 9.3 J
B 10 J
C 14 J
D 26 J
- 15 Which row explains why a liquid has a fixed volume but does **not** have a fixed shape?

	force between molecules in the liquid	movement of molecules in the liquid
A	large	move throughout the liquid
B	large	vibrate at fixed positions
C	small	move throughout the liquid
D	small	vibrate at fixed positions

- 16** Container A and container B are filled with equal amounts of hot water and the temperature of the water in the containers are measured with a thermometer. It is observed that container A has a much lower temperature than container B. What are the possible reasons?

- 1 Container A is black and container B is silver.
- 2 Container A has a lid and container B is not covered.
- 3 Container A is made of steel and container B is made of wood.

- A** 1 and 2 only
B 1 and 3 only
C 2 and 3 only
D 1, 2 and 3
- 17** A girl measures the resistance of a metal wire at the ice point and the steam point. She records her results.

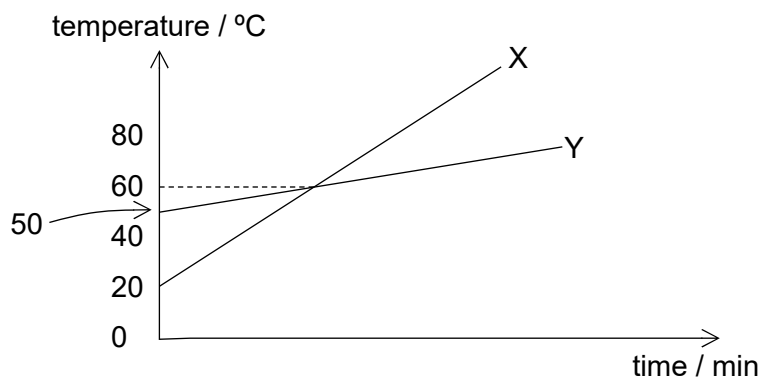
temperature	resistance / Ω
ice point	15.0
steam point	20.0

What is the temperature when the resistance of the wire is 14.0 Ω ?

- A** -20 °C
B -17 °C
C 17 °C
D 20 °C
- 18** A new liquid is tested to decide whether it is suitable for use in a liquid-in-glass thermometer. It is found that the liquid does not expand uniformly with temperature. What will be the effect of this on the scale of the thermometer if this liquid is used?

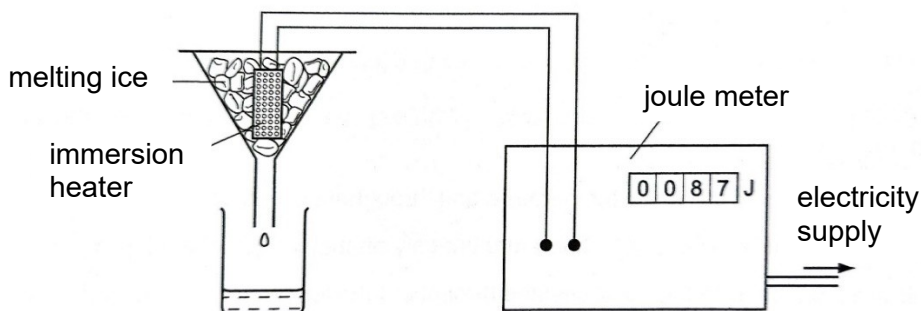
- A** The markings will be spaced unevenly.
- B** The markings will be too far apart.
- C** It will have a short range.
- D** The markings will be too close together.

- 19** Two blocks, X and Y, are made of the same metal. They are heated by heaters of the same power rating. The graph shows the variation of the temperature with time.



What is the ratio of the mass of X to that of Y?

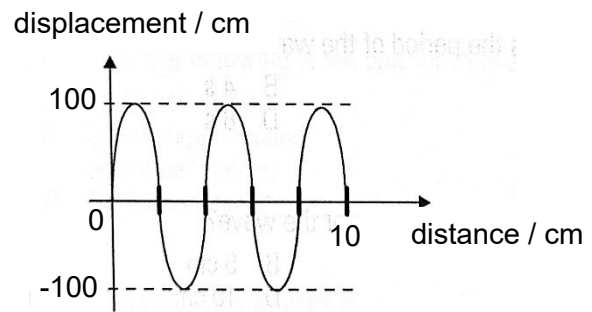
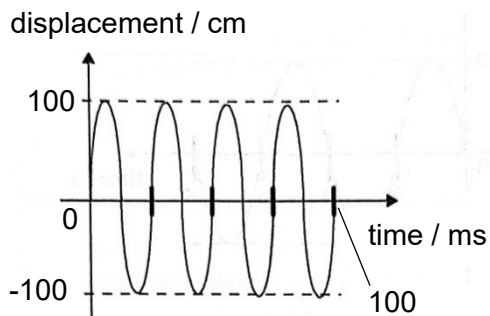
- A** 0.33
 - B** 0.25
 - C** 0.75
 - D** 3.0
- 20** In the experiment shown, the amount of electrical energy used to melt some ice is measured using a joule meter.



To find the specific latent heat of fusion of the ice, what must also be measured?

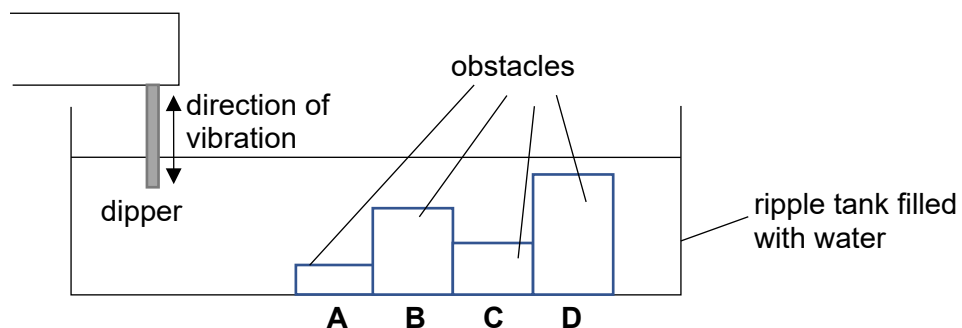
- A** the mass of ice melted by the heater
- B** the temperature change of the ice
- C** the time taken for the ice to melt
- D** the voltage of the electricity supply

- 21** The displacement-time graph and displacement-distance graph of a particular wave are shown below.

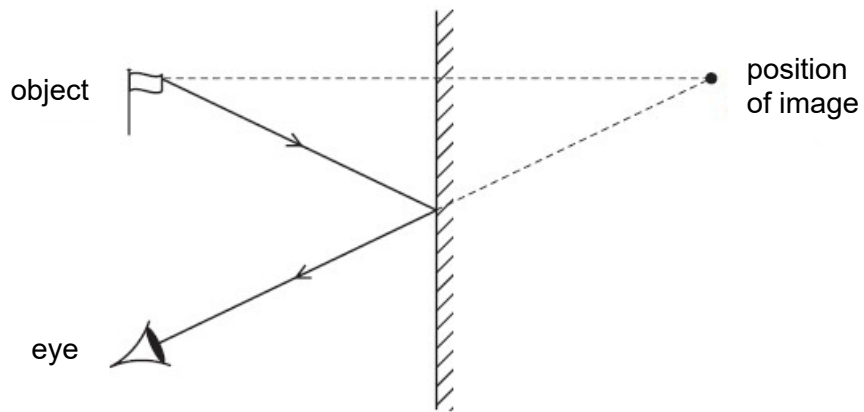


What is the speed of the wave?

- A** 0.16 m/s
 - B** 1.6 m/s
 - C** 2.0 m/s
 - D** 1000 m/s
- 22** A dipper in a ripple tank shown vibrates up and down at a constant frequency. The ripple tank has four different rigid obstacles placed in it.
- Over which obstacle will the wave generated have the highest speed?

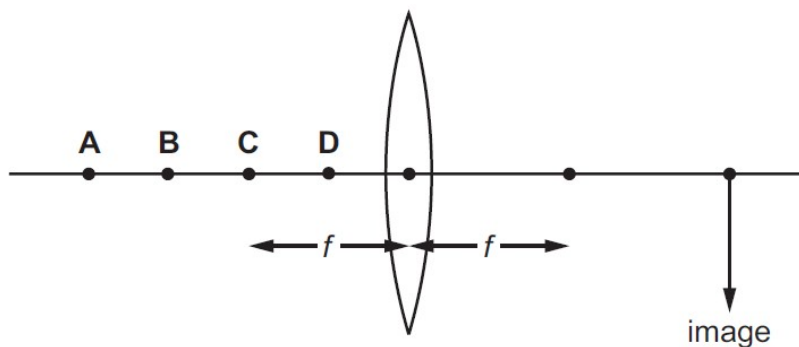


- 23 The diagram shows the position of an image formed by a plane mirror.



What are the characteristics of the image?

- A** inverted and same size as the object
 - B** upright and enlarged
 - C** upright and diminished
 - D** laterally inverted and same size as the object
- 24 The diagram shows a thin converging lens of focal length f and an image.
- Where must the object be placed to produce an image that is real and has the same size as the object?



f f

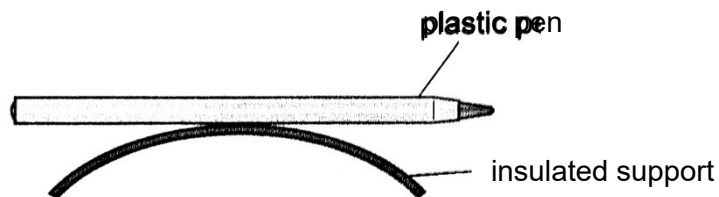
image

- 25** The statements are about signals passing through an optical fibre of refractive index 1.5.
- 1 The speed of the signal in the optical fibre is 3.0×10^8 m/s.
 - 2 There is less signal loss in the optical fibre than in a copper cable.
 - 3 The signal undergoes total internal reflection in the optical fibre.

Which statements are correct?

- A** statement 2 only
- B** statements 1 and 3 only
- C** statements 2 and 3 only
- D** all the three statements
- 26** A loudspeaker plays a certain sound wave of wavelength 60 m. Given that the speed of sound in air is 300 m/s, what will a student hear if she is standing just in front of the loudspeaker?
- A** a sound which becomes loudest every 0.20 s
- B** a low pitch sound
- C** a high pitch sound
- D** nothing

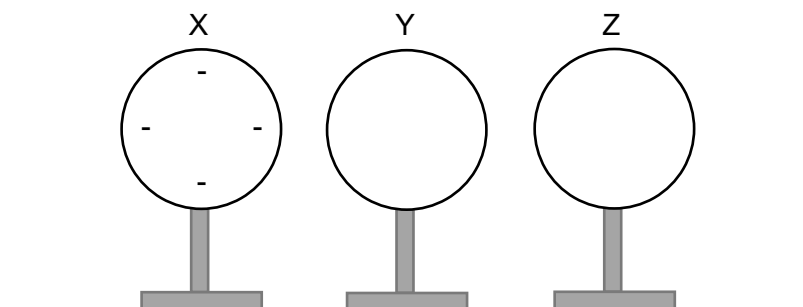
- 27 A teacher has two identical plastic pens. They are both rubbed with identical cloths. The first pen is balanced on an insulated support, as shown.



The balanced pen rotates when the cloth or the second pen are held near it.

Which statement is correct?

- A The cloth attracts the balanced pen and the second pen repels the balanced pen.
 - B The cloth repels the balanced pen and the second pen attracts the balanced pen.
 - C Both the cloth and the second pen attract the balanced pen.
 - D Both the cloth and the second pen repel the balanced pen.
- 28 Three conductors are placed close to each other. Conductor X is negatively charged. Both conductor Y and conductor Z are neutral.



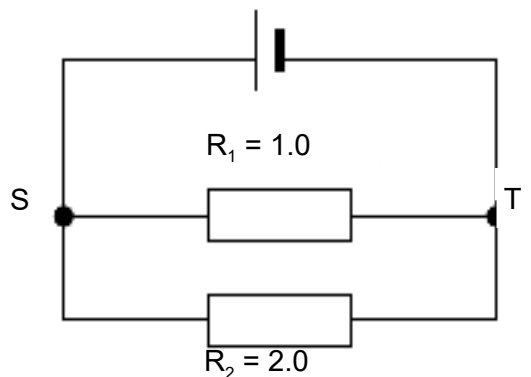
What will be the charge in conductor Z after it is earthed momentarily?

- A** neutral
- B** negative
- C** positive
- D** cannot be determined

29 What is the e.m.f of the cell in an electric circuit if it uses 1.0 kJ of energy to send 3.0 A of current around the circuit for 2.0 minutes?

- A** 2.78 V
- B** 6.0 V
- C** 25 V
- D** 360 V

30 A circuit is set up as shown in the diagram.

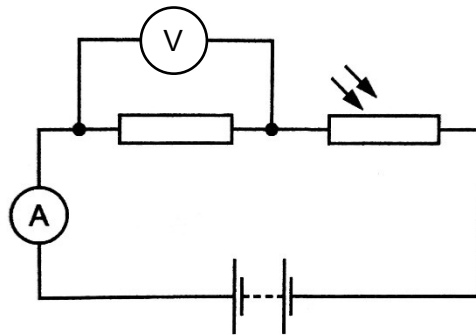


When an electron travels from T to S through R_2 , its energy is converted to thermal energy. Which statement best describes this conversion of energy?

- A** The amount of energy converted is twice as much as the energy converted if the electron was travelling through R_1 .
- B** The amount of energy converted is the same as the energy converted if the electron was travelling through R_1 .

- C** The amount of energy converted is half as much as the energy converted if the electron was travelling through R_1 .
- D** The amount of energy converted is four times as much as the energy converted if the electron was travelling through R_1 .

- 31** A resistor and a light-dependent resistor (LDR) are connected in series with a battery, as shown.

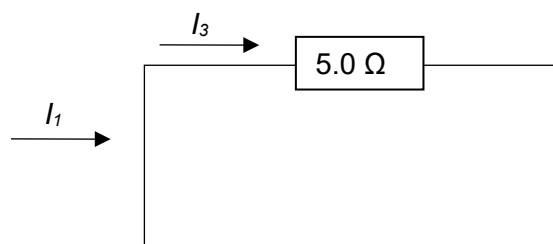


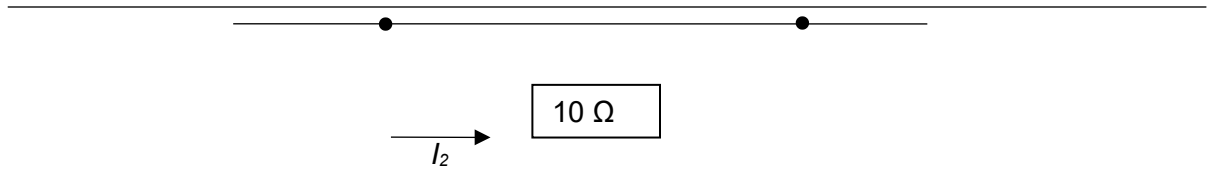
When very bright light is shone on the LDR, the readings on both the ammeter and the voltmeter change.

How do they change?

	reading on ammeter	reading on voltmeter
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

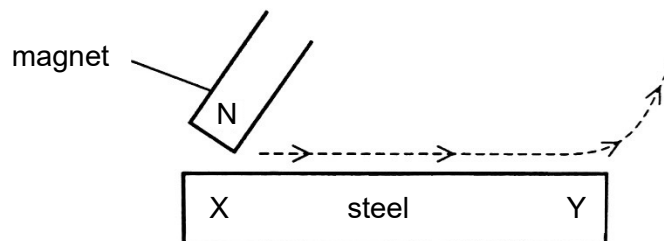
- 32** A circuit is set up as shown.





Which statement is correct?

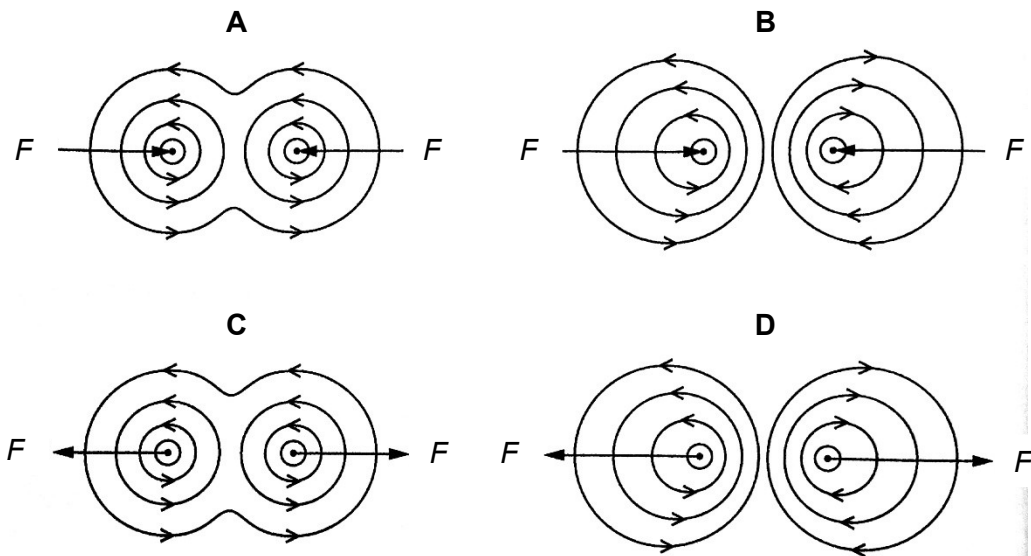
- A** $I_2 = I_3$ and $I_1 = I_2 + I_3$
- B** I_3 is smaller than I_1 , and I_3 is larger than I_2
- C** I_2 is larger than I_3 , and I_2 is smaller than I_1
- D** I_1 is larger than I_2 , and I_1 is smaller than I_3
- 33** It costs \$0.25 for 1 kW h of electrical energy.
How much will it cost to run a 65 W lamp for 10 hours?
- A** \$0.02
- B** \$0.16
- C** \$38.46
- D** \$162.50
- 34** A piece of steel can be magnetised by stroking it with a magnet.



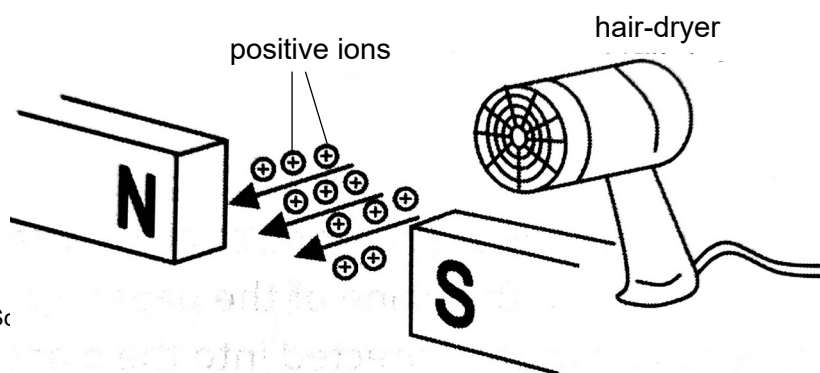
When the magnet is moved in the direction shown, which poles are produced at X and at Y?

	X	Y
A	N-pole	N-pole
B	N-pole	S-pole
C	S-pole	N-pole
D	S-pole	S-pole

- 35** Two parallel, vertical wires each carry an upward electric current. Which diagram shows the magnetic field pattern around the wires and the direction of the force F on each wire?



- 36** Hot air from a hair-dryer contains many positively charged ions. The motion of these ions constitutes an electric current.



The hot air is directed between the poles of a strong magnet as shown.

What happens to the ions?

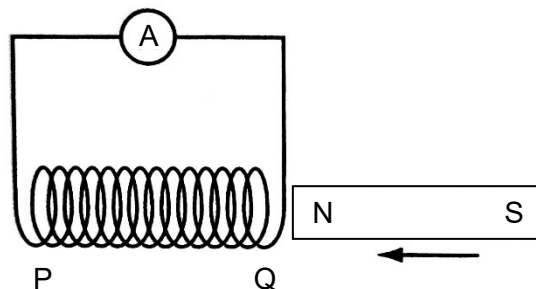
- A** They are deflected towards the N-pole of the magnet.
- B** They are deflected towards the S-pole of the magnet.
- C** They are deflected downwards.
- D** They are deflected upwards.

- 37** A transformer is used to provide a 10 V output from a 100 V supply.

What are the suitable numbers of turns for the primary coil and for the secondary coil?

	number of turns on the primary coil	number of turns on the secondary coil
A	10	100
B	100	100
C	48	480
D	800	80

- 38** A student pushes the N-pole of a bar magnet into end Q of a long solenoid and observes a deflection to the right on the centre-zero ammeter.

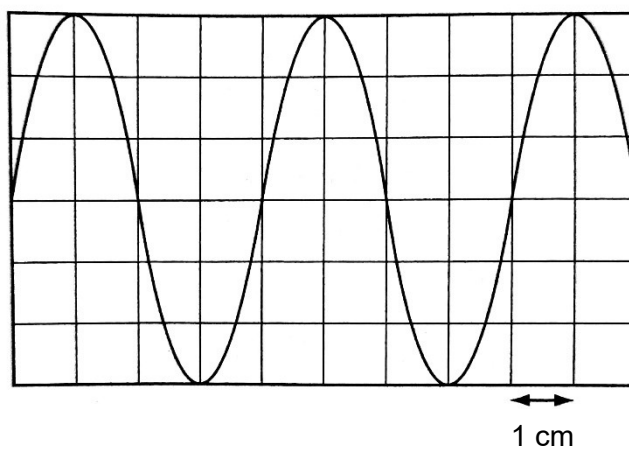


What produces a deflection in the same direction?

- A** pulling the N-pole out of end Q
- B** pulling the S-pole out of end P

- C** pushing the N-pole into end P
- D** pushing the S-pole into end P

- 39** An alternating supply with a period of 20 ms is connected to a cathode-ray oscilloscope (c.r.o.).



What is the time-base setting of the c.r.o.?

- A** 0.2 ms / cm
 - B** 0.5 ms / cm
 - C** 2.0 ms / cm
 - D** 5.0 ms / cm
- 40** Why is a high voltage used to transmit electrical energy along cables from a power station?
- A** It makes the current in the cables greater.
 - B** It reduces the resistance of the cables.
 - C** Less thermal energy is generated in the cables.

- D** No energy is lost in the transformers at the ends of the cables.