Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

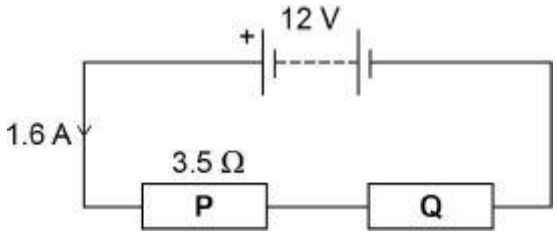
Q1.

(a) Draw a diagram to show how 1.5 V cells should be connected together to give a potential difference of 4.5 V.

Use the correct circuit symbol for a cell.

(2)

A student built the circuit shown in the diagram below.



(b) Calculate the total resistance of the circuit in the diagram above.

Use the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

_____

_____

Downloaded from www.merit-minds.com

_____

_____

Total resistance = _____ Ω

(2)

(c) The resistance of **P** is 3.5 Ω.

Calculate the resistance of **Q**.

_____

_____

_____

_____

Resistance of **Q** = _____ Ω

(1)

(d) The student connects the two resistors in the diagram above in parallel.

What happens to the total resistance of the circuit?

Tick **one** box.

It decreases ☐

It increases ☐

It does not change ☐

(1)

Give a reason for your answer.

_____

_____

_____

_____

(1)

(Total 7 marks)

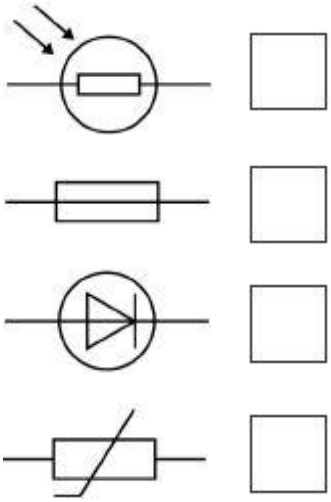
Q2.

The plug of an electrical appliance contains a fuse.

(a) What is the correct circuit symbol for a fuse?

Tick **one** box.

Downloaded from www.merit-minds.com



(1)

(b) The appliance is connected to the mains electrical supply. The mains potential difference is 230 V.

Calculate the energy transferred when 13 C of charge flows through the appliance.

Use the equation:

energy transferred = charge flow × potential difference

_____

_____

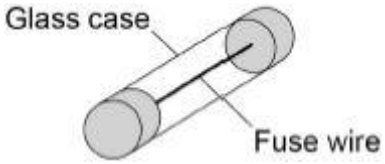
_____

_____

Energy transferred = _____ J

(2)

The diagram below shows the structure of a fuse.



(c) Write down the equation that links charge flow, current and time.

_____

(1)

(d) The fuse wire melts when 1.52 coulombs of charge flows through the fuse in 0.40 seconds.

Calculate the current at which the fuse wire melts.

_____

_____

_____

Downloaded from www.merit-minds.com

_____

Current = _____ A

(3)

(e) The mass of the fuse wire is 0.00175 kg. The specific latent heat of fusion of the fuse wire is 205 000 J/kg.

Calculate the energy needed to melt the fuse wire.

Use the Physics Equations Sheet.

_____

_____

_____

_____

Energy = _____ J

(2)

(Total 9 marks)

Q3.

Figure 1 shows a lift inside a building.

Figure 1

Downloaded from www.merit-minds.com



(a) The motor in the lift does 120 000 J of work in 8.0 seconds.

Calculate the power output of the motor in the lift.

Use the equation:

$$\text{Power output} = \frac{\text{work done}}{\text{time}}$$

Power output = _____ W

(2)

(b) The power input to the motor is greater than the power output.

Tick **two** reasons why.

Energy is transferred in heating the surroundings. ☐

Downloaded from www.merit-minds.com

Friction causes energy to be transferred in non-useful ways. ☐

The motor is connected to the mains electricity supply. ☐

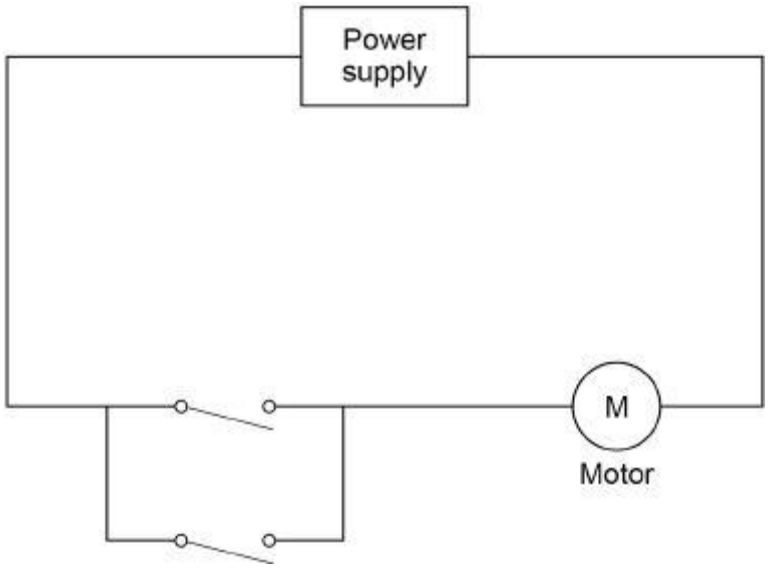
The motor is more than 100% efficient. ☐

There are only four people in the lift. ☐

(2)

(c) **Figure 2** shows part of the circuit that operates the lift motor.

Figure 2



The lift can be operated using either of the two switches.

Explain why.

_____

_____

_____

_____

_____

(2)

(d) Write down the equation that links gravitational field strength, gravitational potential energy, height and mass.

_____

_____

(1)

(e) The lift goes up 14 m. The total mass of the people in the lift is 280 kg.

Downloaded from www.merit-minds.com

gravitational field strength = 9.8 N/kg

Calculate the increase in gravitational potential energy of the people in the lift.

Give your answer to 2 significant figures.

_____

_____

_____

_____

Increase in gravitational potential energy = _____ J

(3)

(Total 10 marks)

Downloaded from www.merit-minds.com