Topic Test: OxfordAQA International GCSE Physics 9203

Generating and distributing electricity and household use

Name: _____

Class: _____

Date: _____

Time: **40 minutes**

Marks: **40 marks**

Comments:

1 (a) Describe the difference between an alternating current (a.c.) and a direct current (d.c.).

_____

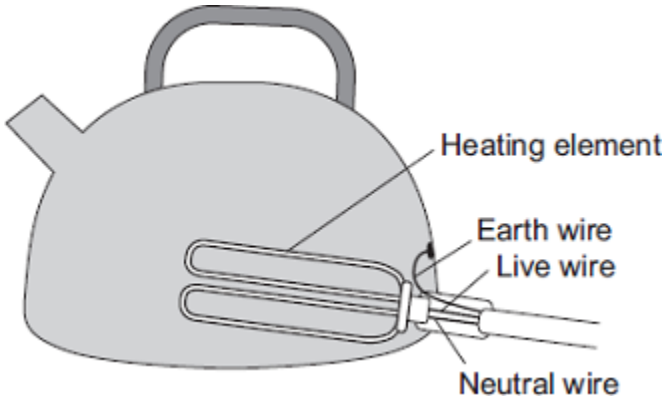
_____

_____

_____

(2)

(b) The diagram shows how the electric supply cable is connected to an electric kettle. The earth wire is connected to the metal case of the kettle.



If a fault makes the metal case live, the earth wire and the fuse inside the plug protect anyone using the kettle from an electric shock.

Explain how.

_____

_____

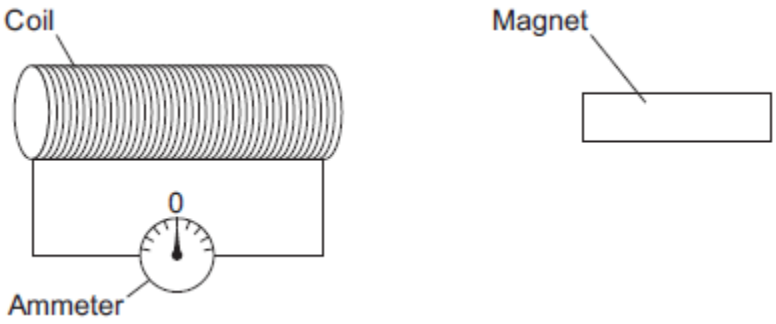
_____

_____

(2)

(Total 4 marks)

2 The figure below shows a coil and a magnet. An ammeter is connected to the coil.



The ammeter has a centre zero scale, so that values of current going in either direction through the coil can be measured.

(a) A teacher moves the magnet slowly towards the coil.

Explain why there is a reading on the ammeter.

(6)

(b) The table below shows some other actions taken by the teacher.

Complete the table to show the effect of each action on the ammeter reading.

Action taken by teacher	**What happens to the ammeter reading?**
Holds the magnet stationary and moves the coil slowly towards the magnet	
Holds the magnet stationary within the coil	
Moves the magnet quickly towards the coil	
Reverses the magnet and moves it slowly towards the coil	

(4)

(c) The magnet moves so that there is a steady reading of 0.05 A on the ammeter for 6 seconds.

Calculate the charge that flows through the coil during the 6 seconds.

Give the unit.

Use the correct equation from **Section C** of the Physics Equations Sheet.

_____

_____

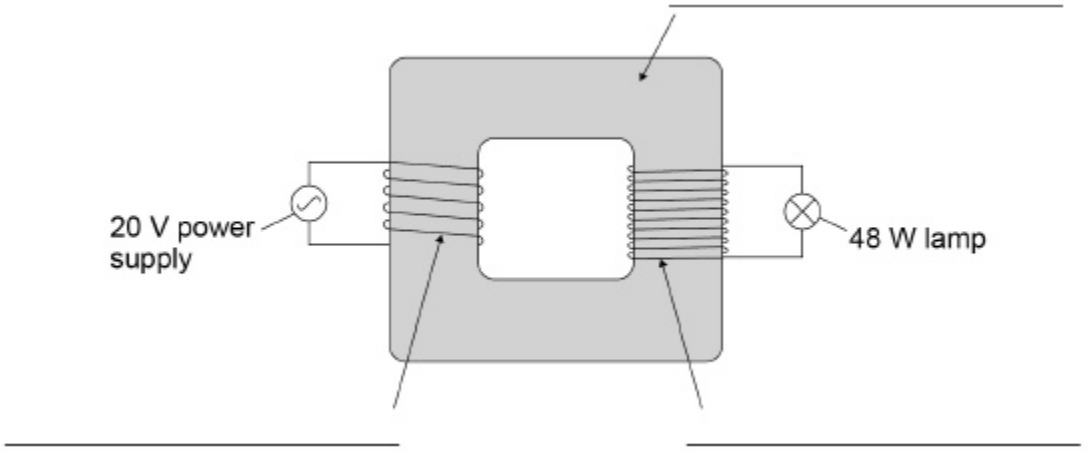
_____

Charge = _____

(3)

(Total 13 marks)

3 The diagram shows a transformer used by a teacher in a demonstration.



(a) Complete the labels on the diagram.

(3)

(b) Explain whether the transformer in the diagram is a step-up or step-down transformer.

_____

_____

_____

(2)

(c) Calculate the potential difference across the lamp in the diagram.

_____

_____

_____

_____

_____

Potential difference = _____ V

(4)

(d) Calculate the current in the power supply in the diagram.

Current = _____ A

(3)

(e) The teacher replaces the lamp in the diagram with a light emitting diode (LED). The LED flickers on and off rapidly.

Explain why the LED flickers when connected to the transformer.

(3)

(Total 15 marks)

4 A transformer is used to reduce the 230 V a.c. mains to the 12 V supply required for the lighting system. The transformer has 1150 turns on its primary coil.

(i) Write down the equation which links the number of turns of each transformer coil to the voltage across each transformer coil.

(1)

(ii) Calculate the number of turns on the secondary coil of the transformer. Show clearly how you work out your answer.

_____

_____

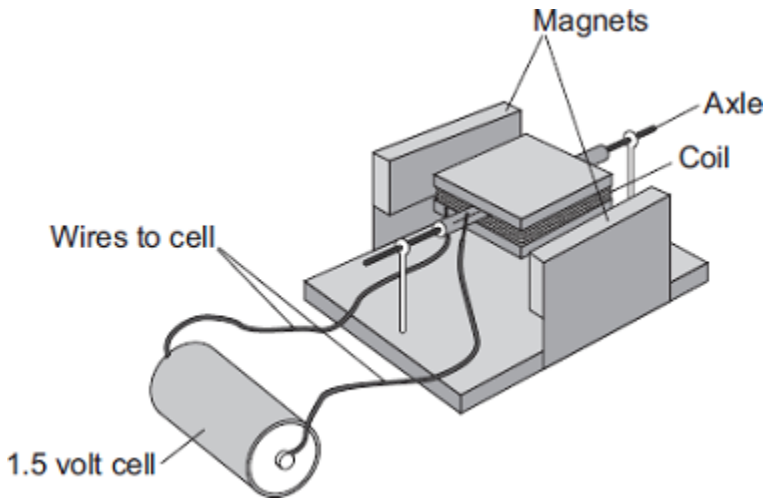
_____

number of turns on the secondary coil = _____

(2)

(Total 3 marks)

5 A student has made a simple electric motor. The diagram shows the electric motor.



(a) Complete the following sentence by drawing a ring around the correct line in the box.

Once the coil is spinning, one side of the coil is pushed by

the cell
the coil
a force

and the other side is pulled, so the coil continues to spin.

(1)

(b) Suggest **two** changes to the electric motor, each one of which would make the coil spin faster.

1. _____

_____

2. _____

_____

(2)

(c) Suggest **two** changes to the electric motor, each one of which would make the coil spin in the opposite direction.

1. _____

_____

2. _____

_____

(2)

(Total 5 marks)

1 (a) d.c. flows in (only) one direction

1

a.c. changes direction (twice every cycle)

accept a.c. constantly changing direction

ignore references to frequency

1

(b) a current flows through from the live wire / metal case to the earth wire

accept a current flows from live to earth

*do **not** accept on its own if the current is too high*

1

this current causes the fuse to melt

accept blow for melt

*do **not** accept break / snap / blow up for melt*

1

[4]

2 (a) *there is a* magnetic field *(around the magnet)*

1

(this magnetic field) changes / moves

1

and cuts through coil

accept links with coil

1

so a p.d. *induced* across coil

1

the coil forms *a* complete circuit

1

so a current (*is* induced)

1

(b) ammeter reading does not change

must be in this order

accept ammeter has a small reading / shows a current

1

zero

1

greater than before

accept a large(r) reading

1

same as originally but in the opposite direction

accept a small reading in the opposite direction

1

(c) 0.30

*allow **1** mark for correct substitution, ie 0.05 = Q / 6*

2

C / coulomb

allow A s

1

[13]

3

(a) soft iron core

1

primary coil

1

secondary coil

1

(b) more turns on secondary coil than on the primary coil

no mark for step-up

1

therefore the output p.d. will be greater than the input p.d (so it is a step-up transformer)

1

(c) $N_p = 5$ and $N_s = 10$

1

$$\frac{20}{V_s} = \frac{5}{10}$$

1

$$V_s = 20 \times \frac{10}{5}$$

1

40 (V)

1

*an answer of 40 gains **4** marks*

(d) $48 = I \times 20$

1

$$I = \frac{48}{20}$$

1

2.4 (A)

allow $I_p = \frac{48}{40} \times \frac{10}{5} = 2.4$ *for* ***3*** *marks*

1

an answer of 2.4 gains ***3*** *marks*

(e) transformers only work with alternating current (so LED is connected to a.c.)

1

diodes only allow current to pass in one direction

1

LED only conducts each half cycle

1

[15]

4

(i) $$\frac{\text{voltage across primary}}{\text{voltage across secondary}} = \frac{\text{number of turns on primary}}{\text{number of turns on secondary}}$$

accept input for primary
accept output for secondary

accept $\frac{V_p}{V_s} = \frac{N_p}{N_s}$ *accept* $\frac{V_1}{V_2} = \frac{N_1}{N_2}$ ***or*** *correct transposition*

1

(ii) 60

allow ***1*** *mark for correct transformation*

2

[3]

5

(a) a force

1

(b) any **two** from:

- more powerful magnet
  *do **not** allow 'bigger magnet'*
- reduce the gap (between magnet and coil)
- increase the area of the coil
- more powerful cell
  *do **not** allow 'bigger cell'*
  accept battery for cell
  accept add a cell
  accept increase current / potential difference
- more turns (on the coil)
  allow 'more coils on the coil'
  *do **not** allow 'bigger coil'*

2

(c) reverse the (polarity) of the cell
allow 'turn the cell the other way round'
accept battery for cell

1

reverse the (polarity) of the magnet
allow 'turn the magnet the other way up'

1

[5]