

# MARK SCHEME

# GCSE

## PHYSICS

## AQA - TRIPLE SCIENCE

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P7 - TEST 4

MAGNETISM

Intermediate

## Mark schemes

- 1.** (a) move a (magnetic / plotting) compass around the wire 1
- the changing direction of the compass needle shows a magnetic field has been produced
- OR**
- sprinkle iron filings onto the card (1)
- tapping the card will move the filings to show the magnetic field (pattern) (1) 1
- (b) **Level 2 (3–4 marks):**  
A detailed and coherent explanation is provided. The response makes logical links between clearly identified, relevant points that explain how the ignition circuit works.
- Level 1 (1–2 marks):**  
Simple statements are made. The response may fail to make logical links between the points raised.
- 0 marks:**  
No relevant content
- Indicative content**
- closing the (ignition) switch causes a current to pass through the electromagnet
  - the iron core (of the electromagnet) becomes magnetised
  - the electromagnet / iron core attracts the (short side of the ) iron arm
  - the iron arm pushes the contacts (inside the electromagnetic switch) together
  - the starter motor circuit is complete
  - a current flows through the starter motor (which then turns)
- 4 **[6]**
- 3.** (a) (i) live 1
- (ii) react faster 1
- (iii) live and neutral 1
- (b) (i) ammeter 1
- to measure current  
*accept to measure amps* 1

plus any **one** from:

- variable resistor (1)  
to vary current (1)  
*accept variable power supply*  
*accept change or control*
- switch (1)  
to stop apparatus getting hot / protect battery  
**or**  
to reset equipment (1)
- fuse (1)  
to break circuit if current is too big (1)

2

(ii) any **two** from:

- use smaller mass(es)
- move mass closer to pivot
- reduce gap between coil and rocker
- more turns (on coil) *coil / loop*
- iron core in coil  
*accept use smaller weight(s)*

2

[9]

4.

(a) aluminium cannot be magnetised

*accept aluminium is not magnetic*

*"it" refers to aluminium*

*do **not** accept aluminium is not easily magnetised*

*reference to conduction and aluminium negates mark*

*iron can be magnetised is insufficient*

1

(b) (i) 10 to 50

*either order*

1

(ii) (data is) anomalous

*accept does **not** fit the pattern*

*it is an error is insufficient*

1

(iii) 21

*accept 22*

*do **not** accept any fraction of a turn ie 20.1*

1

secondary p.d. (just) larger than primary p.d.  
*accept output (just) larger than input/2V*

**or**

there must be more turns on the secondary coil than primary coil  
*do not accept coil for turns*

1

- (c) to reduce/step-down the (input) p.d./voltage  
*mains p.d. is too high is insufficient*  
*step-down transformer is insufficient*  
*answers in terms of changing/ stepping-up current **or** fuse blowing*  
***or** not working with 230 volts are insufficient*  
*any mention of step-up negates mark*  
*stepping down both voltage/p.d. **and** current negates mark*

1

[6]

5.

- (a) 10

*allow 1 mark for correct substitution ie  $\frac{230}{V_s} = \frac{4600}{200}$*

2

- (b) any **one** from:

- to prevent short circuiting
- to ensure that the current flows / goes round the coil
- to prevent the current entering the core  
*do not accept electrocution*  
*do not accept electricity for current*  
*answers including heat / energy loss negate mark*

1

- (c) (i) (soft) iron

*do not accept 'steel'*

1

- (ii) can be magnetised

because it is magnetic

*answers including it's a conductor negate mark*

1

[5]

6.

- (a) (i) an electrical conductor

1

- (ii) increase current  
*accept increase p.d. / voltage*  
**or**  
 use stronger magnets  
*accept move magnets closer*  
*do **not** accept use larger magnets*

1

- (iii) reverse the poles / ends (of the magnet)  
*either order*

1

reverse the connections (to the power supply)

1

- (b) (i) environmental

1

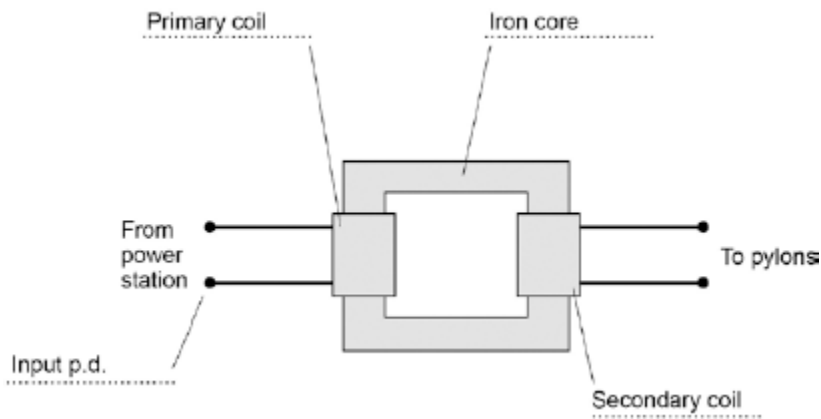
- (ii) ethical  
*allow political (instability)*  
*allow economic (migration)*

1

[6]

7.

- (a) (i)



1  
1  
1  
1

- (ii) 16 000  
*allow 1 mark for correct substitution*  
*ie  $400 \div 25 = n \div 1000$*

2

(iii) p.d. increased (by transformer at power station)  
*do not accept energy increased*

1

so current decreases

1

this reduces energy / power loss (in cables)

*allow heat for energy*

*allow increases the efficiency*

*do **not** accept no energy losses*

1

(b) smaller / lighter

1

uses little power / energy

1

when left switched on with no load applied

*dependent on second marking point*

1

[12]

8.

(a) (it is) magnetic

***or** will carry (an alternating) magnetic field*

***or** magnetises and demagnetises (easily)*

*reference to conduction negates the mark*

1

(b) so the current / electricity does not flow through the iron / core

*accept 'so the current / electricity / wires do not short (circuit)'*

*responses in terms of heat insulation negate the mark*

*ignore references to safety*

1

(c) 5.75 or 5.8 or 6(.0)

*allow for 1 mark **either***

$$\frac{230}{p.d.} = \frac{20\,000}{500}$$

***or***

$$p.d. = 230 \div 40$$

2

V / volt(s)

1

[5]

- 9.** (a) current flows  
coil / core magnetised / electromagnet activated / energised / turned on  
attracts iron bar causing bolt to be pulled out  
*each for 1 mark* 4
- (b) more turns  
bigger current / e.m.f  
softer iron core  
*any two for 1 mark each* 2
- (c) to relock door / return iron bar / to lock door  
*for 1 mark* 1
- (d) iron bar would still be attracted / coil still magnetised so still works  
*for 1 mark each*
- yes + wrong answer  
*0 marks*
- yes + current still flows  
*1 mark*
- yes + still magnetised / iron bar still attracted  
*2 marks* 2

**[9]**

- 10.** (i) relay  
*accept solenoid*  
*do **not** accept magnetic switch* 1

(ii) a current flows through the coil (of the electromagnet)  
**or** a current flows through the electromagnet  
**or** a (magnetic) field is produced  
*accept 'electricity' for 'current'*  
*accept the electromagnet is activated **or** magnetised **or** turned on*  
*do **not** accept answer in terms of magnetic charge*

1

the (iron) arm is attracted to the electromagnet  
*accept the arm pivots **or** moves towards the electromagnet*

1

the contacts are pushed together  
*do **not** accept contacts attract*

1

[4]

11.

(a) increase the current (1)  
*credit increase the p.d./voltage*  
*credit reduce the resistance*  
*credit have thicker wiring*  
*credit add extra / more cells*

1

increase the magnetic field (strength) (1)  
*credit 'have stronger magnet(s)'*  
*do **not** credit 'bigger magnets' either order*

1

(b) **either** reverse polarity  
**or** connect the battery the other way round

1

**either** reverse direction of the magnetic field  
**or** put the magnet the other way round / reverse the magnet  
*do **not** give any credit to a response in which both are done at the same time*  
*either order*

1

(c) **either**  
conductor parallel to the magnetic field  
**or** lines of magnetic force and path of electricity do not cross

1

[5]