

Domestic Uses and Safety

Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.2 Electricity
Sub-Topic	Domestic Uses and Safety
Difficulty Level	Gold Level
Booklet	Mark Scheme 1

Time Allowed: 58 minutes

Score: /58

Percentage: /100

Grade Boundaries:

M1.(a) water heated by radiation (from the Sun)
accept IR / energy for radiation

1

water used to heat buildings / provide hot water
allow for **1** mark heat from the Sun heats water if no other marks given
references to photovoltaic cells / electricity scores **0** marks

1

(b) 2 (minutes)

$$1.4 \times 10^3 = \frac{168 \times 10^3}{t}$$

gains **1** mark
calculation of time of 120 (seconds) scores **2** marks

3

(c) (i) 150 (kWh)

1

(ii) £60(.00) or 6000 (p)
an answer of £6000 gains **1** mark
allow **1** mark for $150 \times 0.4(0)$ 150×40
allow ecf from (c)(i)

2

(iii) 25 (years)
an answer of $6000 / 240$
or
 $6000 / \text{their (c)(ii)} \times 4$
gains **2** marks
an answer of $6000 / 60$
or
 $6000 / \text{their (c)(ii)}$ gains **1** mark, ignore any other multiplier of (c)(ii)

3

(iv) any **one** from:

- will get £240 per year
accept value consistent with calculated value in (c)(iii)
- amount of light is constant throughout the year
- price per unit stays the same
- condition of cells does not deteriorate

1

(d) any **one** from:

- angle of tilt of cells
- cloud cover
- season / shade by trees
- amount of dirt

1

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M2.(a) 35

an answer with more than 2 sig figs that rounds to 35 gains 2 marks

allow 2 marks for correct method, ie $\frac{230}{6.5}$

allow 1 mark for $I = 6.5$ (A) or $R = \frac{230}{26}$

an answer 8.8 gains 2 marks

an answer with more than 2 sig figs that rounds to 8.8 gains 1 mark

3

(b) (maximum) current exceeds maximum safe current for a 2.5 mm² wire
accept power exceeds maximum safe power for a 2.5 mm² wire

or(maximum) current exceeds 20 (A)

(maximum) current = 26 (A) is insufficient

1

a 2.5 mm² wire would overheat / melt
accept socket for wire
*do **not** accept plug for wire*

1

(c) a.c. is constantly changing direction
accept a.c. flows in two directions
accept a.c. changes direction
a.c. travels in different directions is insufficient

1

d.c. flows in one direction only

1

[7]

M3.(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]

M4. (a) (i) 0.25 (A)

1

(ii) 75

allow 1 mark for converting 5 minutes to 300 seconds

or allow 1 mark for correct substitution

ie 0.25×300

allow 1 mark for an answer 1.25

allow 1 mark only for their (a)(i) $\times 300$ correctly calculated

2

coulombs or C

*do **not** accept c*

1

(b) any **two** from:

- fault not repaired
accept if a fault was to occur
- larger current will (still) flow
- aluminium foil will not melt (if a fault)
accept aluminium foil needs a higher current / charge to melt
- wiring will overheat / (may) cause a fire
accept idea of fire hazard
*do **not** accept explode etc*

2

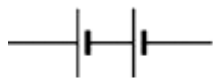
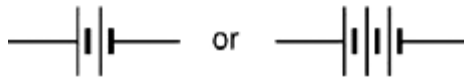
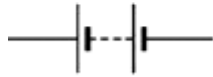
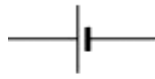
[6]

M5. (a) (i) ammeter and battery **in series** with the **gauge**

symbols must be correct

ignore a voltmeter drawn in series

accept



not



or cells reversed to cancel out

1

voltmeter in parallel with the gauge

symbol must be correct

accept a freestanding circuit

diagram provided strain gauge is labelled or a resistor

symbol used for the strain gauge

1

(ii) d.c. flows only in one direction

a.c. changes direction is insufficient

1

(b) (i) 75

this answer only

*allow 1 mark for correct substitution **and** transformation,*

$$\text{ie resistance} = \frac{3.0}{0.040}$$

2

(ii) increases

1

(iii) elastic / strain potential

do **not** accept potential

1

[7]

M6. (a) 125

allow 1 mark for obtaining time period = 0.008 (s)

or

frequency = $1 / \text{time period}$ (or their calculated time period)

2

hertz

or

Hz

do **not** accept hz

1

(b) 50 (hertz)

1

[4]

M7. (a) alternates

accept switches

accept (constantly) changes

accept goes up and down

1

between positive and negative

1

- (b) potential difference between the neutral and earth (terminal)
accept voltage for p.d

or potential of the neutral terminal with respect to earth

1

- (c) (i) 0.025 (s)

1

- (ii) 40 (Hz)

accept $1 \div \text{their (a)(i)}$

1

[5]

- M8.** (a) Current = 0.4A (1)
R = V/I or $240/0.4$ (1)
R = 600 ohm (1)

3

- (b) Doubles
gets 2 marks

OR gets bigger
gets 1 mark

2

- (c) $P = V.I$ or 240×0.4
P = 96W
for 1 mark each

2

- (d) $I = 0.2A$
P = 48W
for 1 mark each
BUT may get equation mark here if not in (c)

2

(e) $P = V.I.t$ (1)
 $P = 240 \times 0.2 \times 6 \times 3600$
OR $P = 48 \times 6 \times 3600$
gets 1 mark

$P = 1036800 \text{ W}$
gets 1 mark

3

[12]