

MARK SCHEME

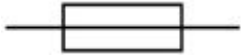
GCSE

PHYSICS

AQA - TRIPLE SCIENCE

P2 - TEST 3
ELECTRICITY
Beginner

Mark schemes

- 1.** (a)  1
- (b) $E = 13 \times 230$ 1
- $E = 2990 \text{ (J)}$ 1
- an answer 2990 (J) scores 2 marks*
- (c) charge flow = current \times time 1
allow $Q = It$
- (d) $1.52 = I \times 0.40$ 1
- $I = \frac{1.52}{0.40}$ 1
- $I = 3.8 \text{ (A)}$ 1
- an answer of 3.8 (A) scores 3 marks*
- (e) $E = 0.00175 \times 205\,000$ 1
- $E = 359 \text{ (J)}$ 1
- allow an answer that rounds to 360 (J) for 2 marks*
- an answer of 359 (J) scores 2 marks*
- [9]**
- 2.** (a) to vary the current. 1
- (b) the temperature of the filament increases 1
allow the filament heats up
- (c) $E = 12 \times 8.5$ 1
- $E = 102 \text{ (J)}$ 1
- an answer of 102 (J) scores 2 marks*

(d) (LED lamp)

longer lifetime (per lamp)

1

wastes less energy

or

lower input energy (for same light energy output)

1

[6]

3.

(a) last box ticked



1

(b) (i) use hotter water (than 60 °C)

accept use boiling water

accept use water at any stated temperature above 60 °C

or

add ice cubes

accept add water at any stated temperature below 12 °C

use different temperatures is insufficient

1

(ii) the current increases as the temperature increases

1

(iii) 0.02 (A)

1

(iv) 5 (V)

or

their **(b)(iii)** × 250 correctly calculated

allow 1 mark for correct substitution ie $V = 0.02 \times 250$

or

$V = \text{their } \mathbf{(b)(iii)} \times 250$

2

(v) the resistance increases

1

[7]

4.

(a) fleece rubs against shirt

it refers to the fleece

1

or

friction (between fleece and shirt)

(causing) electrons to transfer from one to the other

accept a specific direction of transfer

*do **not** accept charge for electrons*

positive electrons negates this mark

movement of protons negates this mark

1

(b) Electrical charges move easily through metals.

1

An electric current is a flow of electrical charge.

1

(c) (i) copper

reason only scores if copper chosen

1

(good electrical) conductor

accept it is a metal

any mention of heat conduction negates this mark

1

(ii) lower than

1

(iii) accept any sensible suggestion, eg:

- too many variables (to control)
- lightning strikes / storms are random / unpredictable
- do not know which building will be struck
- do not know when a building will be struck
- do not know when lightning will happen
- (very) difficult to create same conditions in a laboratory
- lightning storms are not the same
it is not safe is insufficient
*do **not** accept lightning does not strike the same place twice*

1

[8]

5.

(a) **A**

*only scores if **A** chosen*

1

it is alternating / a.c.

accept because B and C are d.c.

or

it changes direction/p.d.

accept voltage for p.d.

it goes up and down is insufficient

it is constantly changing is insufficient

an answer B and/or C with the reason because it is direct current/d.c scores 1 mark

1

(b) too much current (through socket)

accept electricity for current

accept too much power

accept socket/circuit overloaded

do not accept voltage/p.d for current

1

wiring / socket gets hot

accept melts for gets hot

accept risk of fire

risk of fire in appliances is insufficient

ignore reference to sparking

overloaded plugs and plugs getting hot or fuses melting is insufficient

1

[4]

6.

(a) (i) 50 (Hz)

1

(ii) 2760 (W)

1

(b) 12

allow 1 mark for correct substitution, ie 2400/200

or

allow 1 mark for 2760/230 provided no subsequent step shown

2

amps

1

(c) the charge is directly proportional to the time switched on for

accept for 1 mark the longer time (to boil), the greater amount of charge

or *positive correlation*

or *they are proportional*

2

[7]

7. (a) (i)

| Wire | Plug terminal |
|---------|---------------|
| Live | C |
| Neutral | A |
| Earth | B |

*all 3 correct for 2 marks
allow 1 mark for 1 correct*

2

(ii) plastic
or
rubber

accept:

ABS

UF / urea formaldehyde

nylon

PVC

1

(b) (i) 600

allow 1 mark for correct substitution,

$$ie P = \frac{30\,000}{50}$$

provided no subsequent step

2

(ii) power is greater than 820 (W)

power is 1200 W is insufficient

1

the lead / cable / wire will overheat / get (too) hot

accept lead / cable will melt

may overheat / get hot is insufficient

1

so there is a risk of fire

accept causing a fire

1

(c) X

any **one** from:

- most / more efficient
- smallest energy input (per second)
- cheapest to operate

mark only scores if X is chosen

mark is for the reason

accept smallest input (power) for same output (power)

accept wastes least energy

smallest (power) input is insufficient

uses least electricity is insufficient

1

[9]

8.

(a) (i) (3-pin) plug

*do **not** accept plug socket*

1

(ii) live and neutral

1

(iii) double

1

(b) direct current (d.c.) only

1

(c) (i) live

1

(ii) too great a current flows

accept a surge of current

accept too great a power

accept an electrical fault

*do **not** accept voltage / energy / electricity too high*

1

(iii) can be reset

accept does not need replacing

1

(disconnects circuit) faster

cheaper is insufficient

does not melt is insufficient


quicker to fix / replace is insufficient

1

[8]

- 9.** (a) increases
accept reaches highest value
*do **not** accept increases and decreases* 1
- (b) (i) increases 1
- (ii) increases 1
- (c) 18
allow 1 mark for correct substitution i.e. 12×1.5 provided no subsequent step 2
- watt
accept W
answer may be indicated in the list 1
- [6]**
- 10.** (a) 4 1
- (b) (i) 2
allow 1 mark for correct substitution ie

$$I = \frac{100}{20}$$
provided no subsequent step 2
- (ii) 5
allow 1 mark for correct substitution ie

$$V = \frac{100}{20}$$
provided no subsequent step 2
- [5]**
- 11.** (a) correct circuit symbol 1
- 3 cells joined in series in correct orientation
- e.g.
- 
- ignore absence of + symbol* 1

(b) $R = \frac{12}{1.6}$

1

$R = 7.5 (\Omega)$

1

an answer of 7.5 (Ω) scores 2 marks

(c) 4.0 (Ω)

allow their answer to part (b) – 3.5 correctly calculated

1

(d) it decreases

1

the current would be higher (for the same p.d.)

reason only scores if correct box is chosen

or

more than one path for charge to flow

allow current for charge

or

total resistance is always less than the smallest individual resistance

1

[7]