

MARK SCHEME

GCSE

PHYSICS

AQA - TRIPLE SCIENCE

P2 - TEST 7
ELECTRICITY
Advanced

Mark schemes

1.

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

1

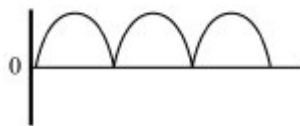
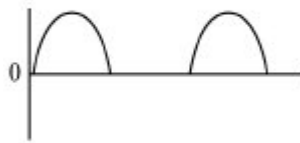
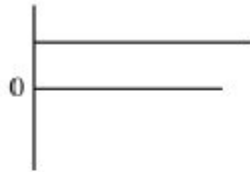
a.c. changes direction (twice every cycle)

accept a.c. constantly changing direction

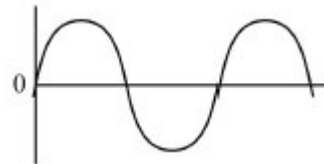
ignore references to frequency

accept answers presented as a clear diagram

e.g.



ac:



1

(b) (i) 10

allow 1 mark for correct transformation and substitution i.e.

$$\frac{2.3}{230} \text{ or } \frac{2300}{230} \text{ an answer } 0.01 \text{ gains 1 mark}$$

2

(ii) 13 A

e.c.f.

accept the fuse size that is the next listed value greater than answer

(b)(i)

1

[5]

2.

(a) negatively charged

1

electrons are transferred

1

from the (neutral) object

1

- (b) minimum of four lines drawn perpendicular to surface of sphere
judge by eye

1

minimum of one arrow shown pointing away from sphere
*do **not** accept any arrow pointing inwards.*

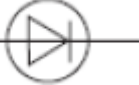
1


- (c) Q

1

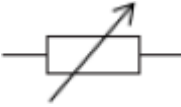
[6]

3.

- (a) (i) symbol for a diode 

accept 

1

symbol for a variable resistor 

1

- (ii) voltmeter is in series **or** voltmeter is not in parallel

1

ammeter is in parallel **or** ammeter is not in series

*accept an answer in terms of how the circuit should be corrected
voltmeter and ammeter are wrong way around is insufficient*

1

- (b) (i) 0.2 (V)

accept any value between 0.20 and 0.21 inclusive

1

- (ii) 37.5

allow 1 mark for $I = 0.008$

or

allow 2 marks for correct substitution, ie $0.3 = 0.008 \times R$

or

*allow 1 mark for a correct substitution using $I = 0.8$ **or** $I = 0.08$*

or $I = 0.009$

or

*allow 2 marks for answers of 0.375 **or** 3.75 **or** 33(.3)*

3

- (c) (i) 25

allow 1 mark for obtaining period = 0.04(s)

2

(ii) diode has large resistance in reverse / one direction

1

so stops current flow in that / one direction

allow diodes only let current flow one way / direction

allow 1 mark for the diode has half-rectified the (a.c. power) supply

1

[12]

4.

(a) (i) 50 000

allow 1 mark for correct substitution, ie

$$6 = 0.00012 \times R$$

or $6 = 0.12 \times R$

or answers of 25 000 or 50 gain 1 mark

or allow 1 mark for an incorrect answer caused by one error only ie using 3V or an incorrect conversion of current

2

ohm / Ω

an answer 50k Ω gains 3 marks

1

(ii) (body) resistance changes

or

body fat/resistance affected by (many) factors

accept named factor, eg age, gender, height, fitness, bone structure, muscle, drinking water related to body fat / resistance

1

(iii) gives misleading / wrong/inaccurate value

do not credit if specifically linked to a change in mass / weight

1

(because) high water content changes body resistance

accept a specific change to resistance

water changes body mass is insufficient

1

(b) (i) RCCB – detects difference between current in live and neutral (wires)

accept RCCB can be reset

1

fuse – (overheats and) melts

accept blows for melts

1

- (ii) switches the circuit / hedge trimmers off within 60 milliseconds
allow for 1 mark the RCCB / it is (very) fast.
do not accept the bigger the current the faster the RCCB switches off

2

[10]

5.

- (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]

6.

- (a) each hair gains the same (type of) charge

or

(each) hair is negatively charged

do not accept hair becomes positively charged

or

(each) hair gains electrons

1

similar charges repel

accept positive charges repel

providing first marking point is in terms of positive charge

or

negative charges repel

or

electrons repel

1

(b) 0.000002

accept correct substitution and transformation for 1 mark

or

2×10^{-6}

ie 30 / 15 or .03 / 15000 or 30 / 15000 or .03 / 15

or

2 μ C

answers 2 and 0.002 gain 1 mark

2

(c) current

*do **not** accept amp / amperes*

1

[5]

7.

(a) (i) 0.0046

accept 4.6 mA

allow 1 mark for correct substitution and transformation

$$\text{i.e. current} = \frac{230}{50000}$$

an answer of 4.6 gains 1 mark

2

(ii) • increases overall resistance

1

• (in event of a shock) gives a smaller current

accept gives smaller shock

*do **not** accept no shock/current*

1

(b) (i) 50 (hertz)

ignore units

1

- (ii) NO has the lowest current at which people cannot let go
answer and reason needed
accept a sensible reason in terms of their answer to (b) (i)

or YES changing the frequency changes the current by only a small amount

1

- (c) 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*

this current causes the fuse to melt

accept blow for melt

2

[8]

8.

- (a) in range $6 < I \leq 13$ A

for 1 mark

(no unit no mark)

1

- (b) 4

gains 2 marks

(else working

gains 1 mark

(resistance of circuit correctly worked (2Ω))

2

- (c) $72 (I^2 R)$ ecf

gains 2 marks

else working

gains 1 mark

an answer of 36W (ie for one lamp) – (1)

2

- (d) 1000 or 16.7 min (ecf from (c))

gains 2 marks

else working

gains 1 mark

(formula with incorrect substitution – no mark (12V))

2

[7]

9.

- (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
- $P = 1036800 W$
gets 1 mark
- 3

[12]

10.

- (a) (i) power \div voltage = current **or**
 $2800 \div 240 = 11.6 - 11.7$ **or** 12
2 marks for correct answer 1 mark for $2.8 \div 240$
- 2
- (ii) resistance = voltage \div current
 $240 \div 11.7$
(efc here)
- 1
- 20.5 **or** 20.57 **or** 20.6 **or** 21
2 marks for correct answer
- 1
- ohms **or** Ω
do not credit R
- 1

(b) $850 \div 1500 \times 100$

marks only available for division of power

1

$= 56.7$

*2 marks for correct answer
for 1 mark accept 5670*

1

[7]