

# Electrical Quantities

## Mark Scheme 5

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electrical quantities
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 5

**Time Allowed:** 56 minutes

**Score:** /47

**Percentage:** /100

- 1 (a) (a liquid evaporates) at any temperature/below the boiling point/over a range of temperatures/below 100 °C/at different temperatures/not at a fixed temperature B1
- (during evaporation) vapour forms at/escapes from the surface of the liquid B1
- (without a supply of thermal energy,) evaporation continues/occurs/doesn't stop  
OR causes liquid to cool/is slower/reduces
- (b) (i)  $(Q =) mL$  C1  
OR  $0.075 \times 2.25 \times 10^6$
- $1.7 \times 10^5 \text{ J}$  A1
- (ii)  $(E =) VI t$  OR  $240 \times 0.65 \times (20 \times 60)$  C1  
OR  $P = IV$  and  $P = E/t$  OR energy/time
- $1.9 \times 10^5 \text{ J}$  A1
- (iii) energy is transferred to the surroundings  
OR in heating the surroundings/air/atmosphere/hot-plate

[Total: 8]

- 2 (a) (i) negative at LH end **and** positive at RH end B1
- (ii) (+ve) charge on A attracts electrons/-ve charges/-ve ions B1  
 OR unlike charges attract (ignore reference to + charges) B1  
electrons move to end X/towards A B1  
 (unbalanced) +ve charges (left) at end Y NOT repelled to Y B1
- (iii) idea that each electron leaves behind an equal unbalanced proton B1  
 in nucleus/B has no net charge/B is neutral/idea that B has not  
 gained or lost any charges B1
- (b) nothing OR nothing implied B1
- (ii) +ve charge cancelled/neutralised B1  
 by electrons/negative charges flowing up from earth B1

[Total: 8]

- 3 (a) (E =) Pt symbols or numbers OR  $100 \times 13 \times 3600$  OR  $0.1 \times 13$   
 OR 3 960 000 OR 4 320 000 C1  
 4 680 000 J OR 4.68 MJ OR 1.3 kWh OR 1300 Wh A1
- (b) **EITHER**
- $I = P/V$  in any form OR  $P/V$  OR 100/250 OR 0.4 A C1  
 $Q = It$  OR  $0.4 \times 13 \times 3600$  OR candidate's current  $\times 13 \times 3600$   
 OR candidate's current  $\times$  candidate's time in s C1
- 18 720 C e.c.f A1
- OR**
- volts = joules/coulombs in any form C1  
 $4680000/250$  OR candidate's E/250 C1  
 18 720 C e.c.f A1
- (c) (lost as/changed to) heat/light OR lost to air/surroundings B1

[Total: 6]

- 4 (a) increases (as current increases)  
at an increasing rate M1  
A1
- (b) 25  $\Omega$  B1
- (ii)  $IR$  in any form OR  $0.070 \times 25$  C1  
1.7/1.8 V A1
- (iii)  $(P =) IV$  OR  $I^2R$  OR  $V^2/R$  in any form, numbers, symbols or words C1  
0.12 W e.c.f. from (i)/(ii) A1
- (c) answer to (b)(ii) B1
- (ii) use of  $1/R = 1/R_1 + 1/R_2$  OR  $R = R_1R_2/(R_1 + R_2)$  C  
12.5  $\Omega$  A1

[Total: 10]

- 5 (a) bring rod close but not touching plate M1  
touch metal plate with earth lead M1  
remove lead and then rod A1 3
- (b) (i)  $Q = 20 \text{ (mA)} \times 15 \text{ (s)}$  C1  
 $= 0.30 \text{ C}$  A1
- (ii)  $V = 20 \text{ (mA)} \times 10 \text{ (k}\Omega)$  C1  
 $= 200 \text{ V}$  A1 M3  
[6]

6	(a)	force is produced on any charge placed in the field	B1 B1	[2]
	(b)	at least 3 parallel, straight lines plate to plate, ignore end effect at least one correct arrow, none wrong	B1 B1	[2]
	(c)	$q = It$ or $0.06 = I \times 30$ $I = 0.002$ A or 2 mA	C1 A1	[2]
	(d)	$E = Vit$ $= 1500 \times 0.008 \times 10$ $= 120$ J	C1 C1 A1	[3]
				<b>Total [9]</b>