

## Charge, Energy and Current - Mark Scheme

Q1.

Question Number	Answer	Mark
a	Use of $V=W/Q$ (1) $W = 7.92 \times 10^5 \text{ J}$ (1)  <u>Example of calculation</u> $W = V \times Q = 22 \times 36,000 = 792,000 \text{ J}$	(2)
bi	Use of speed = distance/time (1) Time = 0.45 s (1) (Accept $7.5 \times 10^{-3}$ minutes or $1.25 \times 10^{-4}$ hours)  <u>Example of calculation</u> $16 \text{ km hr}^{-1} = 16,000 \text{ m} / 3,600 \text{ s} = 4.4 \text{ m s}^{-1}$ Time = distance / speed = $2.0 \text{ m} / 4.4 \text{ m s}^{-1} = 0.45 \text{ seconds}$ .	(2)
bii	Use of $I = Q / t$ (1) Calculates total charge used in 2.00 m (1) Number of electrons = $4.2 \times 10^{19}$ (1) (e.c.f. from (i))  <b>OR</b> Use of speed = distance / time (1) Calculates total charge used in 2.00m (1) Number of electrons = $4.2 \times 10^{19}$ (1) (no e.c.f. required from (i) for this method)	(3)
	<u>Example of calculation</u> $I = Q / t = 36,000 \text{ C} / (40 \times 60) \text{ s} = 15 \text{ A}$ Total charge used in 2.00m = $I \times t = 15 \text{ A} \times 0.45 \text{ s} = 6.75 \text{ C}$ number of electrons = $6.75 \text{ C} / 1.6 \times 10^{-19} \text{ C} = 4.2 \times 10^{19}$	
	<b>Total for question</b>	<b>7</b>

Q2.

Question Number	Answer	Mark
	<b>A is the correct answer</b>  B is not the correct answer as it appears in neither of the definitions C is not the correct answer as it only appears in the definition for current D is not the correct answer as it only appears in the definition for p.d.	(1)