

Question number	Answer	Notes	Marks
4 (a)	substitution into $P = E / t$ ; rearrangement; evaluation;  e.g. $1.2 \times 10^5 = 4.0 \times 10^6 / \text{time}$ (time =) $4.0 \times 10^6 / 1.2 \times 10^5$ (time =) 33 (s)	-1 for POT error  allow 33.3...	3
(b) (i)	idea that current only passes (a point) in one direction;	allow does not change direction	1
(ii)	any three from: MP1. provides a connection / current to the coil / commutator; MP2. idea of reverses the current in the coil;  MP3. every half turn; MP4. reverses (coil) field / polarity / force (every half turn); MP5. so that force is always in the same direction; MP6. so that the motor keeps turning (the same way);	allow idea of swapping the contacts  allow moment for force	3
(c) (i)	chemical;	allow thermal / heat	1
(ii)	idea of conservation of energy;  idea that energy is transferred (from kinetic store of car); to chemical store (of battery pack);	allow “energy can’t be created or destroyed” / eq allow energy transferred electrically	3

Total for Question 4 = 11 marks