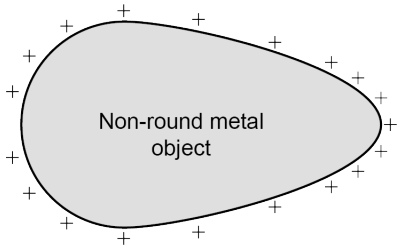
Assessment Schedule – 2018

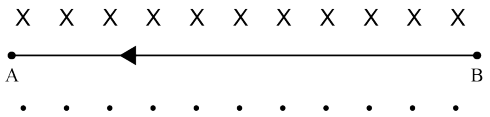
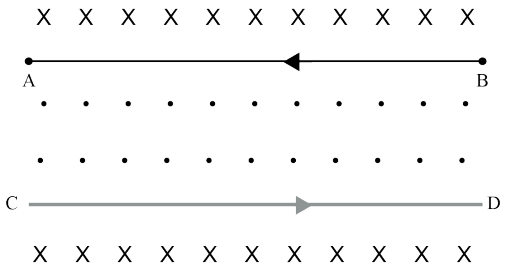
Physics: Demonstrate understanding of aspects of electricity and magnetism (90937)

Evidence Statement

Q	Evidence	Achievement	Merit	Excellence
ONE (a)	 Distributed with more charge on ends	Charges closer together on the right hand side. As seen by evidence. Allow negatives shown if there is an excess of positives.		
(b)	Copper is a good conductor because copper has free electrons, which can move through the metal Glass is a poor conductor / insulator because there are no free electrons that can move through the glass	Copper has free electrons / electrons that can move. OR Glass does not have (many) free electrons / electrons cannot move (easily). OR Copper allows charges to move easily and glass does not allow charges to move easily	Copper has free electrons / electrons that can move. AND Glass does not have free electrons / electrons cannot move.	

(c)(i)	$P = \frac{E}{t}$ $P = \frac{100\,000}{0.001}$ $P = 1.0 \times 10^8$ W $I = \frac{P}{V}$ $I = \frac{1.0 \times 10^8}{2 \times 10^6}$ $I = 50$ A *Could also use E = IVt (not provided).* *Ignore incorrect powers of ten is substitution is correct.*	Correct power. OR Correct method to find current with incorrect power. OR Statement that current is / is not safe consistent with calculated current.	Correct Current OR Correct comparison (including mA to A conversion) for incorrectly calculated current Comparison must be explicit.	Correct current AND correct comparison (conversion between mA and A must be correct if included)
(ii)	The current created is greater than 100 mA, so it is not safe.			
(d)	The balls lose electrons and become positively charged. Like charges repel each other, so the balls are repelled from the bottom plate. This makes them move up from the bottom plate towards the top plate. When the ball touches the top plate, it gains electrons and loses its positive charge and becomes neutral. It then falls back down and the process repeats.	Balls lose electrons / becomes positive. OR Balls repelled from bottom plate. OR Ball becomes neutral / negative when it touches top plate.	Balls lose electrons / becomes positive. AND Balls repelled from bottom plate. AND Ball becomes neutral / negative when it touches top plate. OR Correctly explains charging / discharging by electron transfer at one plate and links to subsequent movement.	Ball loses electrons and becomes positive. AND Balls repelled from bottom plate. AND Ball gains electrons and becomes neutral when it touches top plate, so falls back down.

Q	Evidence	Achievement	Merit	Excellence
TWO (a)	Power bars need to wired in parallel because each outlet needs the full / total voltage / 240 V. / Each outlet can be operated independently / If one outlet (circuit) fails the others still work.	Correct answer. (Do not allow if one bulb blows.)		
(b)	$P = IV$ $I = \frac{P}{V}$ $I = \frac{60}{240}$ $I = 0.25$ A	Show correct formula and substitution.		
(c)	If the power of the energy-efficient light is lower and the voltage stays the same, then the current through the light is lower ($I = \frac{P}{V}$). As V is the same and I is lower, the resistance of the energy-efficient light is higher ($R = \frac{V}{I}$).	Voltage is same linked to change in R. OR Energy-efficient light current is lower / original current is higher. OR Resistance is higher.	Links lower power to lower current hence resistance of energy-efficient light is higher (or vice versa for original light).	
(d)	Energy efficient: $P = IV = 0.20 \times 240 = 48$ W $E = Pt = 48 \times 2 \times 60 \times 60 = 345\,600$ J $E = \frac{345\,600}{4} = 86\,400$ J OR $I = \frac{0.2}{4} = 0.05\ A$ $P = IV = 0.05 \times 240 = 12$ W $E = Pt = 12 \times 2 \times 60 \times 60 = 86\,400$ J Standard: $E = P \times t = 60 \times 2 \times 60 \times 60 = 432\,000$ J A standard light bulb uses more energy than an energy-efficient bulb.	Correct calculation of power for 4 energy-efficient lamps. OR Correct calculation of current for one energy-efficient lamp. OR correct calculation of energy with wrong power for one lamp. OR Attempted calculation of both with a consistent comparison. OR Correct *E* for 60 W lamp.	Correct calculation of energy for both light bulbs. OR Correct calculation of and comparison but used t in hours or minutes. OR Fails to /4 for energy efficient lamp but correct comparison. OR Divides 60W by 4 and consistent comparison (must be explicit comparison).	Correct calculation with comparison.

Q	Evidence	Achievement	Merit	Excellence
THREE (a)(i) (ii)	South labelled (top of solenoid) *(N not required)* Right hand grip rule.	Top of solenoid labelled S. OR Right hand (grip) rule stated. or other valid rule/convention	Top of solenoid labelled S. AND Right hand (grip) rule stated. or other valid rule/convention	
(b)	When the ignition switch is closed, current flows through the solenoid, which produces a magnetic field. This magnetic field attracts the iron relay switch contact. The relay switch closes, completing the circuit for the starter motor, turning it on.	Magnetic field/ electromagnet created in solenoid OR Magnetic field attracts iron and completes starter motor circuit.	Correct answer.	
(c)		Magnetic field drawn into page above wire and out of page below wire. Must be unambiguous.		
(d)(i) (ii)	$B = \frac{kI}{d}$ $I = \frac{Bd}{k}$ $I = \frac{0.00004 \times 0.01}{2 \times 10^{-7}}$ $I = 2$ A 	Correct calculation with incorrect distance (e.g. uses distance in cm to get 200 A). OR Correct magnetic field direction for both wires. OR States that magnetic field strength increases. OR Magnetic field due current in CD is greater than that due to current in AB.	Correct current. OR Correct drawing and states stronger magnetic field between wires. Allow drawing consistent with (c) *Ignore incorrect powers of ten is substitution is correct.*	Correct current. AND States stronger magnetic field between wires due to magnetic fields from both wires being in the same direction. (same direction may be from diagram with idea of field combine/add in the explanation).

Judgement Statement

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No relevant evidence.	Very little evidence at the Achievement level. Most evidence is at the Not Achieved level.	Some evidence at the Achievement level; partial explanations.	Most evidence provided is at the Achievement level, while some is at the Not Achieved level.	Nearly all evidence provided is at the Achievement level.	Some evidence is at the Merit level with some at the Achievement level.	Most evidence is at the Merit level, with some at the Achievement level.	Evidence is provided for most tasks, with evidence at the Excellence level weak or with minor errors / omissions.	Evidence provided for all tasks. Evidence at the Excellence level accurate and full.
No evidence	1 × A	2 × A OR 1 × M OR 1 × E	3 × A OR 1 × A + 1 × M	4 × A OR 2 × A + 1 × M OR 2 × M OR 1A (or more) + 1E	1 × A + 2 × M OR 1 × M + 1 × E OR Q2–3 × A + 1 × M	2 × A + 2 × M OR 3 × M	1 × A + 1 × M + 1 × E	2 × M + 1 × E OR Q2–2 × A + 1 × M + 1 × E

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 13	14 – 19	20 – 24