Assessment Schedule – 2021

Physics: Demonstrate understanding of electricity and electromagnetism (91173)

Evidence Statement

Q	Evidence	Achievement	Merit	Excellence
ONE (a)	$I = \frac{V}{R} = \frac{8}{12} = 0.667$ A	• 0.667 A.		
(b)	$P = IV = 0.667 \times 4 = 2.67$ W OR $P = I^2R = 0.667^2 \times 6 = 2.67$ W $E = Pt = 2.67 \times 60 \times 60 = 9604 = 9600$ J	• Correct power. OR Correct energy from incorrect power.	• Correct.	
(c)	Adding the lamp in parallel lowers the total circuit resistance. This increases the current in the circuit and the current through the 6.00 Ω resistor. This makes the voltage drop over the 6.00 Ω resistor increase, and the voltage drop over the lamp is now less than 8.00 V, so it would not operate normally.	• Total resistance decreases.	• Two linked statements including one on voltage E.g. Total R decreases and V across 6 Ω increases.	
(d)	The total resistance of the circuit is then: $\left(\frac{1}{6} + \frac{1}{4.57}\right)^{-1} + 12 = 14.59\ \Omega$ The current in the circuit is: $I = \frac{V}{R} = \frac{12}{14.59} = 0.822$ A Voltage across $12\ \Omega$: $V = IR = 0.822 \times 12 = 9.87$ V Voltage across lamp $= 12 - 9.87 = 2.13$ V OR $V_{\text{lamp}} = \frac{2.59 \times 12}{14.59} = 2.13$ V	• ONE correct calculation that would help in solving the problem. • Calculates I from $\frac{12}{\text{incorrect calculated total R}}$	• Correct circuit current (0.822) OR Made one error and finds a voltage.	• Correct voltage (2.13).

Not Achieved			Achievement		Achievement with Merit		Achievement with Excellence	
NØ	**N1**	**N2**	**A3**	**A4**	**M5**	**M6**	**E7**	**E8**
No response; no relevant evidence.	Very little Achievement evidence.	Some evidence at Achievement level, but most is at Not Achieved level.	A majority of the evidence is at Achievement level.	Most evidence is at Achievement level.	Some evidence is at Merit level.	A majority of the evidence is at Merit level.	Evidence is provided for most tasks. The evidence at Excellence level may have minor errors, or the evidence is weak.	Evidence is provided for most tasks. The evidence at Excellence level is accurate.

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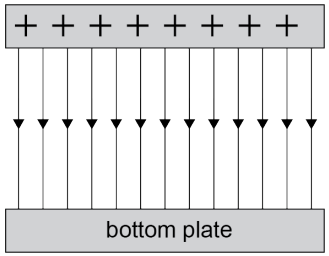
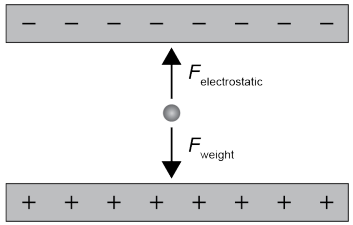
TWO (a)	Top plate labelled positive.  	• Correct answer.		
(b)	The electric field between the plates is uniform / constant / the same everywhere. This is shown by the field lines being parallel and evenly spaced.	ONE of: • is uniform / constant / the same everywhere • field lines evenly spaced. • Strong field as lines are close together.	BOTH of: • is uniform / constant / the same everywhere • field lines evenly spaced.	
(c)(i)	 	ONE of: • arrows same size and opposite direction • correctly named.	BOTH of: • arrows same size and opposite direction • correctly named (accept any name that has electric in it or F_E).	
(ii)	$W = mg = 5.87\times10^{-10}\times9.8 = 5.75\times10^{-9}$ N $E = \frac{V}{d} = \frac{240}{0.02} = 1.2\times10^{4}$ V m^{-1} $F = Eq \Rightarrow q = \frac{5.75\times10^{-9}}{1.2\times10^{4}} = 4.79\times10^{-13}$ C Number of elementary charges $= \frac{4.79\times10^{-13}}{1.61\times10^{-19}} = 2.98\times10^{6}$	• Finds E. OR Performs any calculation correctly that would help get a solution. **Not weight.**	• Finds q. OR Makes one error while calculating the number of charges.	• Correct answer.

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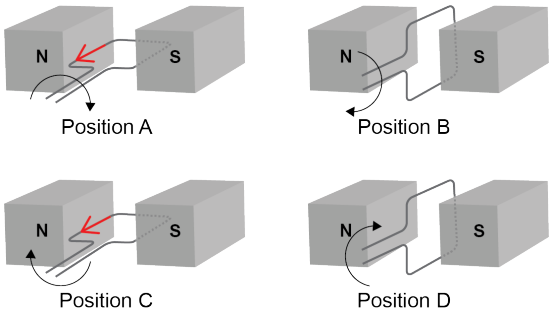
THREE (a)	$F = BIL = 4.7\times10^{-3}\times2.3\times0.05 = 0.00054 = 5.4\times10^{-4}$ N	• Correct answer.		
(b)	Force on: • AB: into the page. • BC: no force • CD: out of the page	• ONE correct.	• TWO correct.	
(c)	Voltage on AB = $BvL = 4.7 \times 10^{-3} \times 6.2 \times 0.05 = 0.00146$ V The same voltage is induced by DC and there are 60 turns. Total voltage induced, $V = BvL = 0.00146 \times 2 \times 60 = 0.174 = 0.17$ V	• Voltage on one wire found (0.00146).	• Voltage for 60 turns on one wire = 0.08742 OR 2.91×10^{-3}.	0.17
(d)(i) (ii) (iii)	Maximum voltage at positions A and C. No voltage at positions B and D. Positions A and C are where the wires are moving perpendicular to the magnetic field so maximum voltage is induced. In Positions B and D the wires are moving parallel to the field so no voltage is induced. 	• TWO correct from part (i).	• TWO correct from part (i). AND (Perpendicular movement **or** parallel movement) in part (ii) linked to correct position. Perpendicular **movement** includes cutting • A correct statement in part (ii) contradicting from part (i) gains "Achievement".	• TWO correct from part (i). AND • Perpendicular movement and parallel movement linked to correct position.

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Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 6	7 – 12	13 – 18	19 – 24