Assessment schedule: practice paper 2026

AS 91173 Demonstrate understanding of electricity and electromagnetism · Vertex Academy practice paper, not an NZQA paper

QUESTION ONE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	$E = V \div d$ $E = 500 \div 0.020 = 2.5 \times 10^4$ V m^{-1}	$E = 2.5 \times 10^4$ V m^{-1} (or N C^{-1}).		
(b)	$F = Eq = 2.5 \times 10^4 \times 1.6 \times 10^{-19}$ $F = 4.0 \times 10^{-15}$ N, towards the positive plate	$F = 4.0 \times 10^{-15}$ N AND towards the positive plate.		
(c)	$\Delta Ep = Eqd$ $\Delta Ep = 2.5 \times 10^4 \times 1.6 \times 10^{-19} \times 0.020 = 8.0 \times 10^{-17}$ J uniform field: E constant	$\Delta Ep = 8.0 \times 10^{-17}$ J, OR states that the field between the plates is uniform.	Energy 8.0×10^{-17} J AND explains the constant force from the uniform field and F = Eq.	
(d)	$mg = 3.2 \times 10^{-15} \times 9.8 = 3.14 \times 10^{-14}$ N $E = 980 \div 0.020 = 4.9 \times 10^4$ V m^{-1} $q = mg \div E = 6.4 \times 10^{-19}$ C $6.4 \times 10^{-19} \div 1.6 \times 10^{-19} = 4$ electrons V up: Eq > mg	Weight 3.14×10^{-14} N, OR $E = 4.9 \times 10^4$ V m^{-1}.	$q = 6.4 \times 10^{-19}$ C (4 electrons), OR top plate positive with reasoning.	$q = 6.4 \times 10^{-19}$ C and 4 electrons, top plate positive with reasoning, AND explains that a bigger voltage makes Eq greater than mg so the drop accelerates upwards.

QUESTION TWO

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	$\frac{1}{Rp} = \frac{1}{6.0} + \frac{1}{12} = 0.25$ Rp = 4.0 Ω R total = 4.0 + 4.0 = 8.0 Ω	Total resistance 8.0 Ω.		
(b)	$I = V \div R = 12 \div 8.0$ I = 1.5 A	I = 1.5 A.		

(c)	$V_1 = 1.5 \times 4.0 = 6.0$ V V parallel = 12 − 6.0 = 6.0 V $I_2 = 1.0$ A, $I_3 = 0.50$ A $P_1 = 1.5^2 \times 4.0 = 9.0$ W	Voltage across the pair 6.0 V, OR one branch current, OR P_1 = 9.0 W.	6.0 V, I_2 = 1.0 A, I_3 = 0.50 A AND P_1 = 9.0 W.	
(d)	R = 4.0 + 6.0 = 10 Ω I = 12 ÷ 10 = 1.2 A $P_1 = 1.2^2 \times 4.0 = 5.8$ W $P_2 = 1.2^2 \times 6.0 = 8.6$ W $V_2 = 12 - 4.8 = 7.2$ V	New total resistance 10 Ω, OR new current 1.2 A.	Both new powers correct (5.8 W and 8.6 W).	Both powers AND a full explanation: total resistance rises so the battery current falls (less power in R_1), while R_2 takes all the current at a higher voltage (more power).

QUESTION THREE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	F = BIL = 0.40 × 3.0 × 0.25 F = 0.30 N, west	F = 0.30 N AND west.		
(b)	$F = Bqv = 0.50 \times 1.6 \times 10^{-19} \times 2.0 \times 10^6$ $F = 1.6 \times 10^{-13}$ N	$F = 1.6 \times 10^{-13}$ N.		
(c)	V = BvL = 0.60 × 4.0 × 0.30 = 0.72 V I = 0.72 ÷ 1.8 = 0.40 A electrons moving in B feel F = Bqv along the rod	V = 0.72 V, OR I = 0.40 A.	V = 0.72 V AND I = 0.40 A AND explains that the moving electrons feel a magnetic force along the rod, separating charge.	
(d)	F = BIL = 0.60 × 0.40 × 0.30 = 0.072 N P mechanical = Fv = 0.072 × 4.0 = 0.288 W P electrical = VI = 0.72 × 0.40 = 0.288 W equal	F = 0.072 N.	F = 0.072 N opposing the motion with a reason, OR both powers calculated (0.288 W).	Force opposing the motion explained by energy conservation (Lenz's law) AND both powers 0.29 W, explaining that the mechanical work becomes electrical energy.

Judgement for each question

N0	N1	N2	A3	A4	M5	M6	E7	E8

No response; no relevant evidence.	1a.	2a, or 1m.	3a, or 1a and 1m.	4a, or 2a and 1m.	2m, or 1e.	2a and 2m, or 1m and 1e.	1e and 1m, with a minor error or omission elsewhere.	2a, 1m and 1e: every part correct.

Grade score out of 24 (each question's grade: N0 = 0 to E8 = 8): Not Achieved 0 to 7, Achieved 8 to 13, Merit 14 to 18, Excellence 19 to 24 (the 2025 exam's cut scores).