Assessment schedule: practice paper 2026

AS 91526 Demonstrate understanding of electrical systems · Vertex Academy practice paper, not an NZQA paper

QUESTION ONE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	$I = 9.0 \div (4.0 + 0.50) = 2.0$ A $V = 2.0 \times 4.0 = 8.0$ V	$I = 2.0$ A AND terminal voltage 8.0 V.		
(b)	$P = I^2r = 2.0^2 \times 0.50$ $P = 2.0$ W, as heat in the battery	$P = 2.0$ W AND heat in the battery.		
(c)	$Ir = 150 \times 0.020 = 3.0$ V $V = 12.6 - 3.0 = 9.6$ V headlights across the terminals	$V = 9.6$ V, OR lost volts 3.0 V.	$V = 9.6$ V AND explains that the large current drops the terminal voltage across the headlights, so their power falls.	
(d)	$I_2 = I_1 + I_3$ $6.0 = 2.0\ I_1 + 4.0\ I_2$ $3.0 = 1.0\ I_3 + 4.0\ I_2$ $I_1 = 1.29$ A, $I_3 = -0.43$ A $I_2 = 0.86$ A; 3.0 V cell charged	Correct junction rule and at least one correct loop equation.	$I_2 = 0.86$ A, OR $I_3 = 0.43$ A, from correct equations.	$I_2 = 0.86$ A AND 0.43 A in the 3.0 V cell flowing into its positive terminal, explained as the cell being charged.

QUESTION TWO

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	$Q = CV = 470 \times 10^{-6} \times 12$ $Q = 5.64 \times 10^{-3}$ C	$Q = 5.64 \times 10^{-3}$ C.		
(b)	$E = \frac{1}{2}QV = 0.5 \times 5.64 \times 10^{-3} \times 12$ $E = 3.38 \times 10^{-2}$ J	$E = 3.38 \times 10^{-2}$ J.		
(c)	$\tau = RC = 4.7$ s $V(\tau) = 12e^{-1} = 4.4$ V 3.0 = 12e^(−t ÷ 4.7) $t = 4.7 \times \ln 4 = 6.5$ s	$\tau = 4.7$ s, OR 4.4 V after one time constant.	$\tau = 4.7$ s AND t = 6.5 s to fall to 3.0 V.	

(d)	$C = 8.85 \times 10^{-12} \times 0.040 \div 1.0 \times 10^{-3} = 3.54 \times 10^{-10}$ F $E = ½ \times 3.54 \times 10^{-10} \times 12^2 = 2.55 \times 10^{-8}$ J Q constant $E = 5.10 \times 10^{-8}$ J extra energy = work pulling the plates apart	$C = 3.54 \times 10^{-10}$ F, OR the energy 2.55×10^{-8} J.	C and E correct AND states Q stays the same so V doubles.	Q constant, C halves, V doubles to 24 V, E doubles to 5.10×10^{-8} J, AND the extra energy is the work done against the attraction of the plates.

QUESTION THREE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	Ns = Np × Vs ÷ Vp Ns = 1150 × 12 ÷ 230 = 60	Ns = 60 turns.		
(b)	$V_{max} = \sqrt{2} \times 230 = 325$ V 50 positive and 50 negative peaks per second	$V_{max} = 325$ V.		
(c)	$\Delta I \div \Delta t = -2.0 \div 0.015 = -133$ A s^{-1} $\varepsilon = 0.30 \times 133 = 40$ V Lenz: EMF opposes the fall large EMF across the switch gap	$\varepsilon = 40$ V, OR states the induced EMF opposes the change in current.	$\varepsilon = 40$ V AND explains with Lenz's law that the EMF tries to keep the current flowing, producing a large voltage across the switch.	
(d)	$X_C = 1 \div (2\pi \times 50 \times 22 \times 10^{-6}) = 145\ \Omega$ $Z = \sqrt{(120^2 + 145^2)} = 188\ \Omega$ I = 230 ÷ 188 = 1.22 A $\tan \varphi = 145 \div 120$ f up: X_C down, Z down, I up	$X_C = 145\ \Omega$.	Z = 188 Ω AND I = 1.22 A, OR $\varphi = 50.3°$ with the current leading.	I = 1.22 A AND $\varphi = 50.3°$ with the current leading AND explains that a higher frequency lowers X_C and Z so the current rises.

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 6, Achieved 7 to 13, Merit 14 to 18, Excellence 19 to 24 (the 2025 exam's cut scores).