Assessment

Name: [redacted]

Class: 12EPh1

Assessment Date: 2025-04-03

Overview

[redacted], you've shown a solid grasp of emf as energy per charge and have used P=VI and E=Pt to compute power, energy, and time while demonstrating versatile problem solving and clear circuit reasoning across Q1, Q2, Q6, and Q7. Your focus on the EBIs—why parallel, not series, extends run time; practicing modeling with combined emf and resistance; and predicting node voltages with a voltage divider under load—shows you're sharpening practical modeling and predictive skills.

What Went Well (WWW)

- Q1: Solid grasp of emf as energy per charge and accurate use of P=VI and E=Pt to compute power, energy, and time.
- Q2: Versatile problem-solver using multiple methods (PΔt and ΔQ=IΔt) to get consistent energy; reliable resistance and I–V interpretation.
- Q6: Strong circuit reasoning—derive I from P/V, explain resistance losses, apply P, V, R relationships coherently.
- Q7: Confident option selection; understands internal resistance and uses systematic network reduction with proper series/parallel choices.

Even Better If (EBI)

- Q1: Explain why parallel, not series, is used to extend run time; parallel increases usable energy and shares current.
- Q3: Practice modeling and combined emf/resistance; open-circuit emf remains the same in parallel, and internal resistance halves.
- Q4: Remember internal resistance causes terminal voltage drop under load; the LDR is not fixed—use a voltage divider to predict node voltages.

Next Step

- Next week, build a simple source-with-internal-resistance circuit in parallel with two loads to practice run-time extension, apply modeling to predict open-circuit emf and effective internal resistance, and use a voltage divider to estimate node voltages under load.

1. Marking Summary

Sub question	Skills / Topic	Your Marks	Maximum Marks	Awarded Points	Justification
1a	emf: definition and circuit calculations; power, energy, and resistance in circuits; link chemical energy to electrical energy / emf equals open-circuit voltage; chemical energy to electrical energy; energy output from a cell	1	2	MP1	MP2: Emf is the terminal potential difference when no current flows in the cell (open-circuit voltage), i.e., the open-circuit voltage equals 1.5 V. Alternative accepted phrasing includes 'open-circuit emf = 1.5 V'. If stated, Kirchoff's second law form relating emf to voltage drops (e.g., emf = I R_internal + V_external) may be used as an additional statement for the second mark.
1b	power, energy, and resistance in circuits; electrical power concept; power from a cell / electrical power in circuits; energy output from a cell	1	1	MP1	
1c	identify energy dissipation in resistor; apply power relationship to circuit; power, energy, and resistance in circuits; interpret result as energy per second; check magnitude of result / electrical power in circuits; resistor dissipates electrical energy as heat; ohms law basic; wasted power concept	2	2	MP1, MP2	
1d	power, energy, and resistance in circuits; emf: definition and circuit calculations; substitute into time expression; solve for the time / stored energy in cell; emf and internal resistance constant; discharge into external resistor; energy delivered equals energy stored; electrical power in circuits; current determined by total resistance	2	2	MP1, MP2	
1e	lamp resistance and voltage vs rating; two cells in serie; power, energy, and resistance in circuits / constant-resistance lamp rating comparison; two cells in serie; internal resistance causing voltage drop	4	4	MP1, MP2, MP3, MP4	

1f	choose parallel arrangement; justify longer operation time; explain constant brightness with more cell; compare parallel vs series strategie / parallel cells share current; increase energy storage capacity; lamp brightness depends on supply voltage; stay within voltage range	0	3		MP1: Cells must be added in parallel. MP2: Explain why parallel addition extends the lamp's operation: more energy stored in the bank of cells and/or less power drawn from each cell, so the lamp can stay at normal brightness longer without increasing the voltage across the bulb (or the terminal pd) above 1.5 V. MP3: Do not gain marks from a series configuration.
2a	power, energy, and resistance in circuits; convert time to second / ohms law basic; battery emf concept; internal resistance causing voltage drop; element resistance known; electrical power in circuits; convert time to seconds	3	3	MP1, MP2, MP3	
2b	resistivity sets electrical resistance; power, energy, and resistance in circuits; material data informs suitability / electrical resistivity and resistance; resistance depends on length and area; material data informs suitability	2	2	MP1, MP2	
2c	led forward voltage concept; led i v characteristic; power, energy, and resistance in circuits; compute circuit current / led forward voltage; led i v characteristic; current-limiting resistor; series circuit current equality	4	4	MP1, MP2, MP3, MP4	
3	combine identical sources in parallel; power, energy, and resistance in circuits; create thevenin model; emf: definition and circuit calculations / identical emf sources in parallel; internal resistance causing voltage drop; equivalent internal resistance halved; thevenin equivalent concept; emf equals open-circuit voltage	0	1		MP1: Expected response: option B
4	lamp resistance and voltage vs rating; power, energy, and resistance in circuits; voltage divider principle / ldr resistance varies with light;	0	1		MP1: Expected response: option A

	internal resistance causing voltage drop; voltage divider principle; ideal battery with no internal resistance				
5	choose parallel arrangement; infer infinite resistance for voltmeter; interpret circuit diagram correctly / voltmeter connected in parallel; ideal voltmeter infinite resistance; measures potential difference across component	1	1	MP1	
6	calculate current from p and v; power, energy, and resistance in circuits; apply resistance loss concept in cable / electrical power in circuits; current derived from p and v; cable resistance causes loss; loss depends on current and resistance	1	1	MP1	
7	apply series rule; choose parallel arrangement; perform stepwise reduction; power, energy, and resistance in circuits; verify result matches option; avoid incorrect connection / internal resistance causing voltage drop; network reduction principle; recognize circuit arrangement	1	1	MP1	
Total		22	28		