2022 Ph H1 Q20

Section: Electricity

Topic: Current, PD, Power, Resistance

Question Summary

Six resistors, each 5 Ω, are connected to a 12 V supply as shown in the paper. Points X and Y lie across part of the network. Which row gives the total circuit resistance and the p.d. across X–Y?

Worked Solution

By simplifying the network, the circuit reduces to three equal 5 Ω sections in series, giving a total resistance of 15 Ω. With a 12 V supply:

Total current, $I = V/R = 12 / 15 = 0.80$ A.
Each 5 Ω section in series therefore drops $V = IR = 0.80 \times 5 = 4.0$ V.
Section X–Y spans one of these 5 Ω sections, so the potential difference across X–Y is 4.0 V.

Final Answer: B

Revision Tips

- Look for symmetry to regroup resistors into simple series sections.
- Once in series, the same current flows and voltages divide proportionally to resistance.
- Use $I = V/R_{total}$ and $V_{section} = I \times R_{section}$ to get section voltages.