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SPECA

GCSE Combined Science (AQA Trilogy) · Physics

Electricity · Mark Scheme

For use with the Tiered Worksheet. Marking points are indicative, not exhaustive: award equivalent correct answers.

Section A: Foundation (Q1 to 19)

1) A source of potential difference (1) [1]

2) The rate of flow of electrical charge (1); unit: ampere/amp, A (1) [2]

3) Q = I × t = 3 × 40 (1) = 120 C (1) [2]

4) V = I × R = 2 × 15 (1) = 30 V (1) [2]

5) I = V ÷ R = 12 ÷ 4 (1) = 3 A (1) [2]

6) Resistance increases as the filament heats up (1); so for the same potential difference, the current decreases (1) [2]

7) Resistance decreases as temperature increases (1); used in a thermostat/temperature-sensing circuit (1) [2]

8) Resistance decreases as light intensity increases (1); used in automatic/security lighting (1) [2]

9) R_total = R_1 + R_2 (1); = 6 + 9 (1) = 15 Ω (1) [3]

10) Current: the same at every point in the loop / through each lamp (1); potential difference: shared between the two lamps (1) [2]

11) A parallel branch provides an additional path for charge to flow (1); so total resistance is less than the smallest individual resistance (1) [2]

12) 50 Hz (1); about 230 V (1) [2]

13) Live: brown (1); earth: green and yellow stripes (1) [2]

14) The earth wire only carries a current if a fault occurs (1); providing a safe path for current to flow, reducing the risk of electric shock or fire (1) [2]

15) P = V × I = 230 × 4 (1) = 920 W (1) [2]

16) P = I^2 × R = 2^2 × 5 (1) = 20 W (1) [2]

17) E = P × t = 1200 × 300 (1) = 360 000 J (1) [2]

18) E = Q × V (1) [1]

19) Step-up transformers raise the potential difference (1) for efficient transmission of electricity over long distances (1) [2]

Section B: Higher (Q20 to 23)

20) Vp × Ip = Vs × Is (1) [1]

21) 400 × 15 = 6000 × Is (1); 6000 = 6000 × Is (1); Is = 1 A (1) [3]

22) Vp × 2 = 12 × 40 (1); Vp × 2 = 480 (1); Vp = 240 V (1) [3]

23) Power transmitted stays broadly the same (P = V × I) (1); so if potential difference increases, current must decrease proportionally (1) [2]

Total: 37 marks (Section A) + 9 marks (Section B) = 46 marks

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