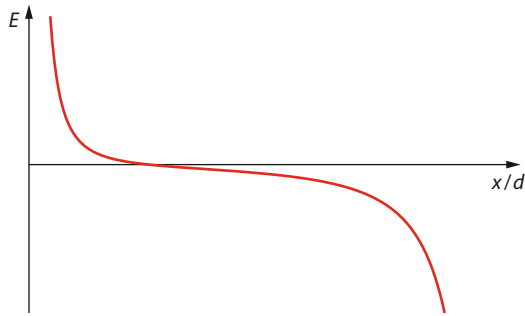


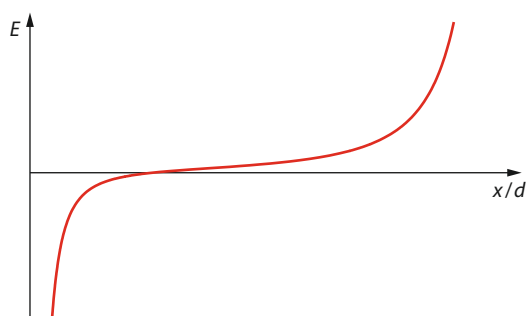
# Additional Topic 5 answers

## Topic 5 Electricity and magnetism

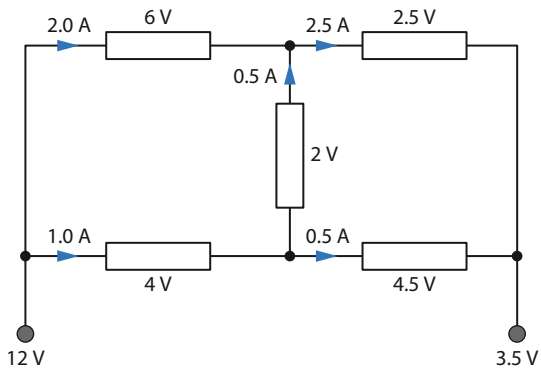
### 5.1 Electric fields

- 1 30 N north east
- 3 **a**  $1.60 \times 10^{-17}$  N left  
**b**  $1.76 \times 10^{13}$  ms<sup>-2</sup>
- 4 **a** 6.4 A  
**b**  $2.7 \times 10^{-4}$  ms<sup>-2</sup>
- 5  $6 \times 10^{28}$  electrons per cubic metre
- 6 **a**  $2.5 \times 10^{-4}$  J  
**b**  $5.0 \times 10^{-4}$  J  
**c**  $2.5 \times 10^{-4}$  J  
**d** C;  $4.2 \times 10^6$  ms<sup>-1</sup>
- 7 **a**  $5.9 \times 10^6$  ms<sup>-1</sup>  
**b**  $1.4 \times 10^5$  ms<sup>-1</sup>
- 8 **a** 0  
**b** 

**c** Field is still 0 at  $\frac{d}{4}$ .

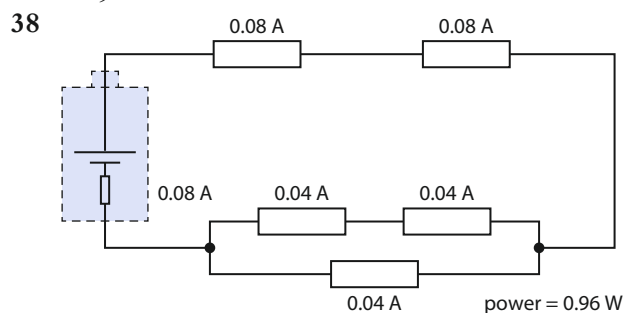


### 5.2 Heating effect of electric currents

- 11 decreases by a factor of 4
- 12 40  $\Omega$
- 13 **a**   
**b** 8.5 V
- 14 **a** 0.27 A  
**b** 0.136 A  
**c** 15 W
- 15 **a** 0.1 kWh  
**b**  $3.6 \times 10^5$  J
- 16 cost is the same
- 17 38.75  $\Omega$
- 18 same
- 19 **a** 0.14 A and 0.17 A  
**b** Costs more at 220 V by a factor of 4
- 20 does not blow
- 21 cannot be used at the same time
- 22 293
- 23 **a** 4.0 V  
**b** 40 mA  
**c** 6.0 V, 30 mA
- 24 5.0 A
- 25 12 V
- 26 6.0 V
- 27 2.8 V
- 28 **a** 20  $\Omega$   
**b** 1.6 V  
**c** 0.080 A
- 29 4.0  $\Omega$
- 30 0.01  $\Omega$ , 100  $\Omega$
- 31  $\frac{R}{4}$
- 32 **a** toaster, 5.45 A; mixer, 2.27 A  
**b** 6.1 MJ
- 33 19 W; 15 W
- 34 2.0  $\Omega$
- 35 6.0 A

## 5.3 Electric cells

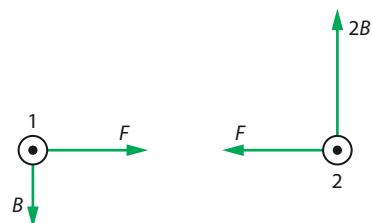
- 36 **a** 16 W  
**b** 600 J
- 37 **a** same  
**b**  $\frac{16}{9}$  times as bright



## 5.4 Magnetic fields

- 39 no
- 40 **a** out of page  
**b** out of page  
**c** left  
**d** left

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- 42 **b** 2.7 cm  
**c**  $7.6 \times 10^6$  per second  
**d**  $7.5 \times 10^5 \text{ ms}^{-1}$   
**e** 0.098 m
- 43  $6.0 \times 10^{-12} \text{ s}$
- 44 **a** 1  
**b** 4