

9 Electricity — Part 2 — Answers

Answers

9.1 (a) $Q = It = 2.0 \times 30 = 60 \text{ C}$.

(b) $N = Q/e = 60/(1.6 \times 10^{-19}) = 3.75 \times 10^{20}$.

9.2 $v = \frac{I}{nAq} = \frac{8.0}{(8.5 \times 10^{28})(2.0 \times 10^{-6})(1.6 \times 10^{-19})} \approx 2.9 \times 10^{-4} \text{ m s}^{-1}$.

9.3 Its resistance rises. The current heats the filament, and a hotter metal has more lattice vibration that scatters the electrons more.

9.4 It only lets current flow in one direction (it blocks the reverse).

9.5 (a) it falls; (b) it falls.

9.6 With I , n and q fixed, $I = nAvq$ means A and v trade off. A larger area A must go with a smaller drift velocity v to keep the same current — so the thicker wire has the smaller v .

9.7 In the dark the LDR's resistance is high; as it gets dark this change can be detected by the circuit and used to switch the light on (and switch it off again when daylight lowers the resistance).