## Exercise 12: Page 128

1.1 From a to c, to d to b
1.2 The current flows from b, d, c, to a.

2. Current strength is the amount of charge flowing past a point in one second. It is measured in ampere.

3. An ammeter is an instrument that is used to measure the current strength. It has a low resistance. It is connected in series.

4. This is the direction in which positive charges would flow if they could. It is from the positive to the negative pole of a battery.

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| | Charge | Current | Time |
|---|---|---|---|
| 5.1 | 150 C | **1,25 A** | 2 minutes |
| 5.2 | **6 C** | 1,2 A | 5 seconds |
| 5.3 | 360 C | 36 A | **10 seconds** |

## Exercise 13: Page 134

1.1 The brightness is the same.
Since the light bulbs are identical, equal currents will flow through both of them.
1.2 ½ I; the current divides equally.
1.3 Neither of these
The current divides and flows through both simultaneously.

2.1 $R_T = R_1 + R_2$
$= 10 + 5$
$= 15\ \Omega$

2.2 $I = \frac{V}{R}$
$= \frac{45}{15}$
$= 3\ A$

2.3 $V = I \times R$
$= 3 \times 10$
$= 30\ V$

2.4 $\frac{1}{R} = \frac{1}{5} + \frac{1}{5}$
$= \frac{2}{5}$

$\frac{R_P}{1} = \frac{5}{2}$
$= 2,5\ \Omega$

$R_T = R_P + 10\ \Omega$
$= 2,5 + 10$
$= 12,5\ \Omega$

2.5 $I = \frac{V}{R}$
$= \frac{45}{12,5}$
$= 3,6$ A

2.6 $V = I \times R$
$= 3,6 \times 2,5$
$= 9$ V

2.7 $I = \frac{V}{R}$
$I = \frac{9}{5}$
$= 1,8$ A

2.8 9 V, the potential difference across the parallel connection is the same as that of each of its branches.

3.1 $R_T = R_1 + R_2 + R_3$
$R_T = 6 + 4 + 3$
$R_T = 13\ \Omega$

3.2 $R = \frac{V}{I}$
$4 = {}^{2}/_{I}$
$I = 0,5$ A

3.3 0,5 A

3.4 $V_T = I_T \times R_T$
$V_T = 0,5 \times 13$
$V_T = 6,5$ V

3.5 $V_1 = I \times R_1$
$V_1 = 0,5 \times 3$
$V_1 = 1,5$ V

3.6 It will increase. The total resistance of the circuit will decrease, and therefore the current will increase ($I \propto {}^{1}/_{R}$).

4.1 $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
$\frac{1}{R_P} = \frac{1}{2} + \frac{1}{4} + \frac{1}{6}$
$\frac{1}{R_P} = \frac{6 + 3 + 2}{12}$
$R_P = \frac{12}{11} = 1,09\ \Omega$

4.2 $I = \frac{V_T}{R_P}$
$I = \frac{12}{1,09}$
$I = 11$ A

4.3 12 V; the potential difference across the parallel connection is the same as that of each of its branches.

4.4 2 Ω; the biggest current flows through the smallest resistance.

4.5 $I_{A4} = \frac{V_P}{R_{6\,\Omega}}$
$I_{A4} = \frac{12}{6}$
$I_{A4} = 2$ A

4.6 $I_{A3} = \frac{V_P}{R_{4\,\Omega}}$
$I_{A3} = \frac{12}{4}$
$I_{A3} = 3$ A

4.7 The reading will decrease. If the 2 Ω light bulb blows, $R_P$ will increase. Since $I \propto {}^{1}/_{R}$, the total current will decrease if the resistance increases.