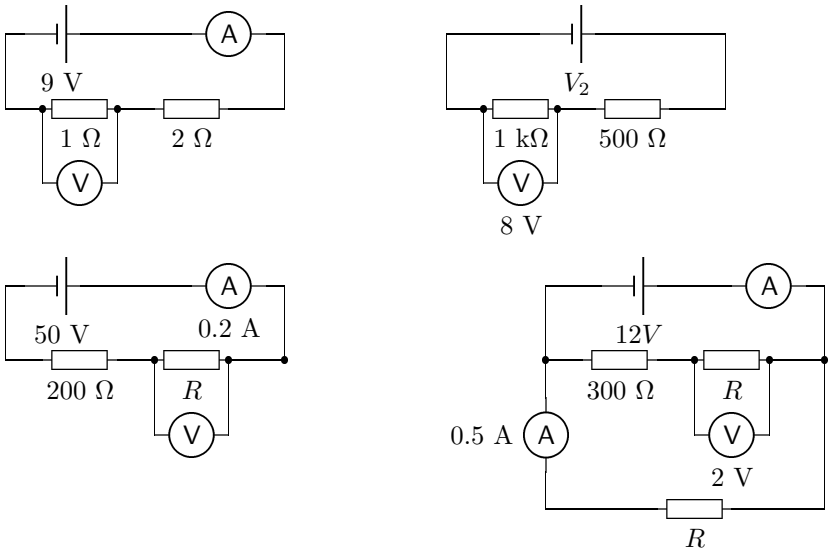
The Resistance of Metals – Question Sheet

1. Fill in the gaps :—

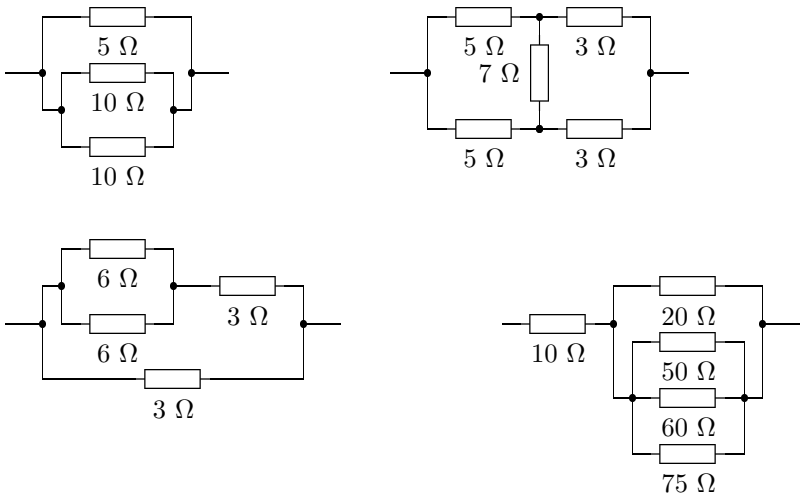
   Materials may be divided into ... and ..., depending on whether or not they will conduct electricity. In an electric circuit, the ... is almost always due to the movement of ... charged ... through the components. Typically, metals are good ..., since they have free ..., which are able to 'flow' between the fixed ... ions. The ... flowing through a component in a circuit measures the amount of ... passing a point in the circuit in a given time.

2. State Ohm's law in words and in symbols. Give the SI units for all the quantities you use, and explain it in a couple of sentences.

3. Work out the labelled values and meter readings in the following circuits.



4. Calculate the resistance of the following networks of resistors.



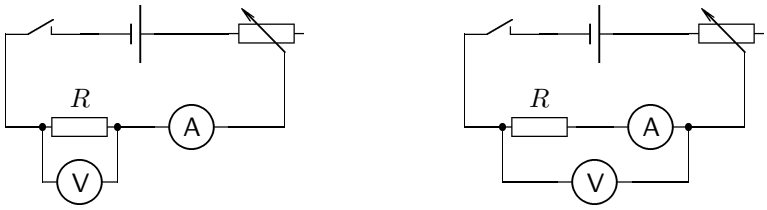
5. Show that

   (a) for two resistors having resistance R_1 and R_2 connected in parallel, the total resistance R is

   $$R = \frac{R_1 R_2}{R_1 + R_2};$$

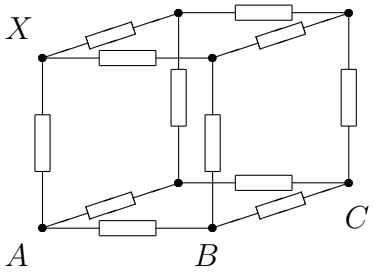
   (b) for n resistors connected in parallel, each having resistance R, the total resistance is R/n.

6. Make brief notes on the dependence of resistance on temperature in metals.

7. 

   Consider the two circuits above. Both might be used for the measurement of the resistance R. Discuss when you would use each, and give your reasons.

Challenge This is a slightly harder problem. Work out the resistances between X and each of the points A, B and C in the resistance cube shown below.



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