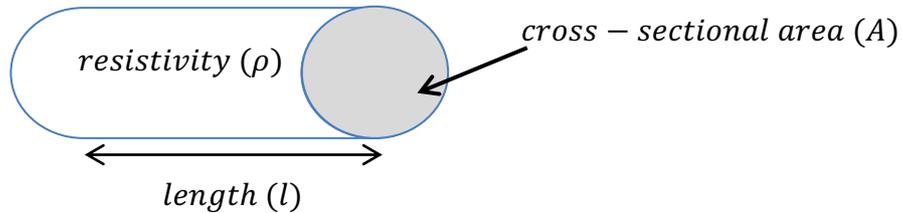


5.3 Resistivity

The resistance of a conductor depends on the length, the cross-sectional area and a property of the material called the resistivity (ρ). Resistivity is a bulk property of the material and is a constant (for a given temperature) for the material. For example, copper has a resistivity of $1.7 \times 10^{-8} \Omega m$ at room temperature.



videos



(1) *What effect do you think increasing the length has on resistance of the conductor?*

(2) *What effect do you think increasing the cross-sectional area has on the resistance of the conductor?*

The resistance of the conductor is given by the following expression:

$$R = \frac{\rho l}{A}$$

(3) *Rearrange this expression to find an expression for resistivity.*

(4) *Put in the units for resistance, length and area to work out a unit for resistivity. Confirm that it is the Ωm (as shown for copper at the top of the page).*

(5) *Do an internet search to find the resistivity of graphite, tungsten, glass and gold.*

Note: To use the formula for resistance, lengths need to be in metres and areas need to be in metre squared. Students often find it difficult to convert areas from mm^2 to m^2 or from cm^2 to m^2 .

(Remember that $1mm=1 \times 10^{-3}m$, so $1mm^2 = (1 \times 10^{-3})^2 = 1 \times 10^{-6}m^2$.)

(6) *convert $1cm^2$ to a m^2*