Resistivity

The basis of Ohms Law, of which the Ohmic Triangle we are all so familiar with is derived, is in part derived from these two simple rules…

The resistance of a conductor is Directly Proportional to it's length...

i.e. If we double it's length we will double it's resistance.
If we half it's length we will half it's resistance.

And

The resistance of a conductor is inversely proportional to it's Cross-Sectional Area….

i.e. If we double the C.S.A we will half the resistance.
If we half the C.S.A we will double the resistance

…at a given temperature.

Note1 - Temperature:

This is an important factor when we consider resistance, as if the Temperature of a conductor increases the resistance increases quite dramatically. All Current Carrying Capacities of cables given in BS7671: 2008 are taken at 30°C. Reasons for an increase in temperature could include **Thermal Insulation** surrounding a conductor (Ci), **Grouping** of a number of cables together, all dissipating their heat against each other (Cg), and the **Ambient Temperature** they are installed in (Ca).

Note2 - Maths:

Doubling the C.S.A is NOT the same thing as doubling the diameter. Since if the diameter of a cable is doubled it's C.S.A will increase by a factor of 4! Similarly if we half the diameter of the cable it's C.S.A will fall to a quarter of it's original value.

Hence if we double the diameter (or radius) of a conductor it's resistance will fall to one quarter (1/4) of its original value.

If we halve the diameter (or radius) of a conductor it's resistance will increase by a factor of 4.