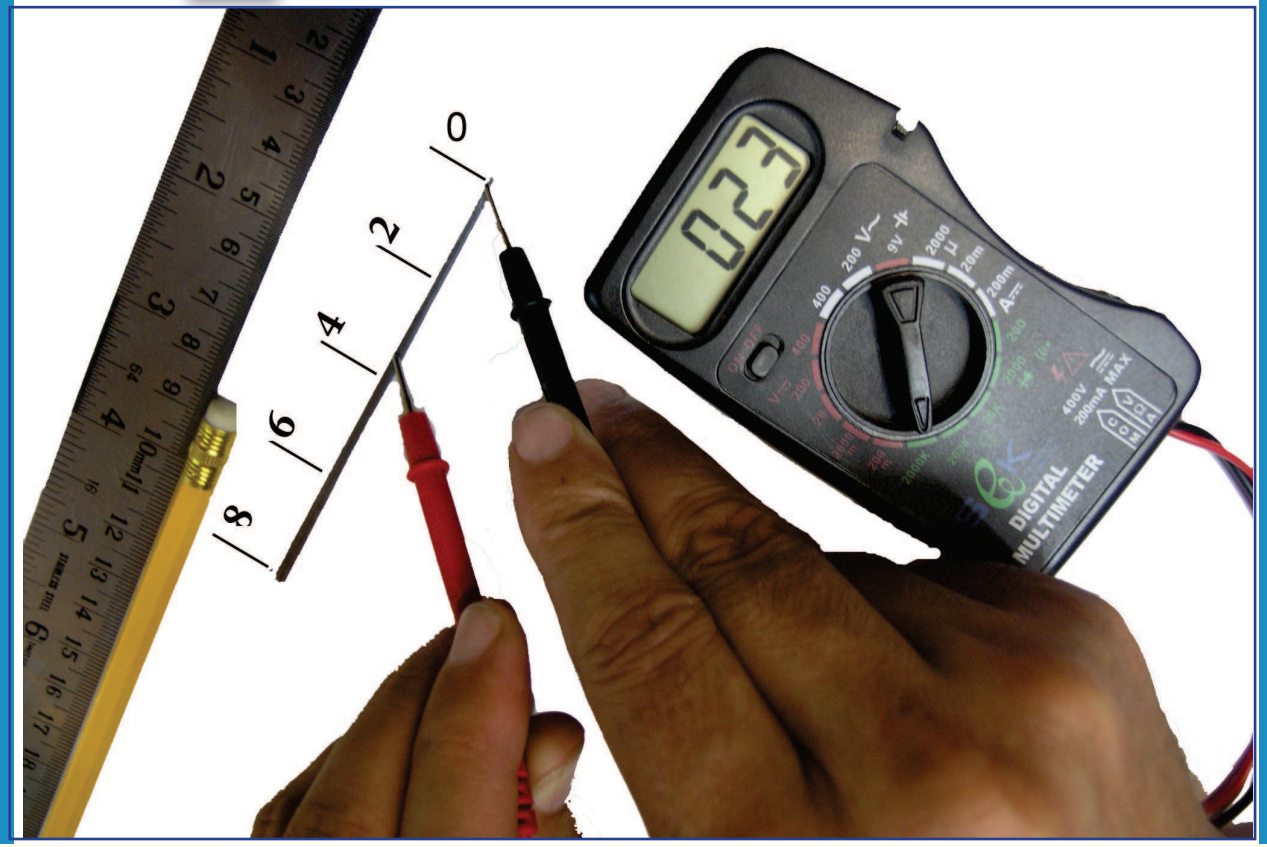
Experiment 13 Make a Resistor Using a Graphite Pencil



Objectives

1. The student will be able to make a resistor using a graphite pencil.
2. The student will investigate and learn that the resistance of a material depends on its length.
3. The student will investigate and learn that the resistance of a material depends on its cross-sectional area.

Apparatus

- DMM
- Graphite Pencil
- Ruler
- Sheet of Paper

Procedure & Conclusions

1. On a sheet of paper, use a graphite pencil to draw a thick line of 8cm length.
2. Set the DMM to Ohm mode (range 2000KΩ).
3. Touch the DMM probes at the ends of the thick line and see the DMM reading which denotes the resistance value of the thick line.

- The thick line length is …… cm, and its resistance is …….. Ω.

4. Fix one of the DMM probes at one end of the line, and start moving the other probe towards the fixed probe while watching the change in the reading of the DMM; make sure that the probe is still touching the thick line while it is moving.

- By shortening the distance between the two probes, the resistance … increases / decreases …

5. Using a ruler, mark the line every 2 cm as shown in the above figure, then measure the resistance of the line for 8cm, 6cm, 4cm and 2cm lengths.
6. Draw the results on a graph in a way that the distance is on the X-axis and the resistance value is on the Y-axis.

Line Length (cm)	2	4	6	8
Resistance (KΩ)				

- Compare you results with other student's results, do they match?
  Explain: ……

7. Draw another line but thinner than the first one, Repeat step 5 and measure the resistance for 2cm on the line, compare the resistance value you get in this case with the resistance value of the same distance that you got when measuring the thick line.

- We conclude that resistance is … directly / inversely … proportional to its length, and … directly / inversely … proportional to its cross-sectional area.

Discussion

1. What substance is the pencil made of?
2. Discuss the factors that affect the resistance?