

Investigation of resistance.

As you found in other investigations, different materials have different resistances.

This investigation is to find how the size and shape of a material alters its resistance.

The material you will investigate is the carbon in pencil lead, in the form of lines drawn on a sheet of paper.

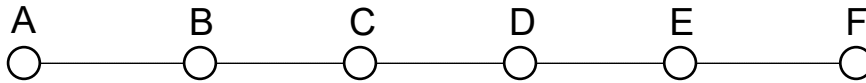
In order to put enough carbon onto the paper, you should use a very soft pencil e.g. 4B.

- (a) First check that the paper is an Insulator.

Heavily shade in circle **A** and circle **F** in the diagram below.

Set Squeekie to INSULATION.

Press the crocodile clip of the Black lead onto circle **A** and the crocodile clip of the Red lead onto circle **F**.



What tone do you hear from Squeekie?

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What does this tell you about the paper?

.....

- (b) Heavily shade in the circles **B**, **C**, **D** and **E**. These provide connection points.

Now draw a thick pencil line between circles **A** and **F** using a ruler.

Ensure that the pencil line is dense.

Press the crocodile clip of the Black Squeekie lead on circle **A** and the Red one on circle **B**. Note the tone.

Now move the Red lead to circle **C**. What happens to the tone?

What has happened to the resistance?

Now move the Red lead onto circle **D**, then **E**, then **F**. What happens to the tone from Squeekie? What happens to the resistance?

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- (c) Complete the following sentences.

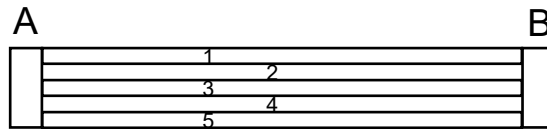
The length of a conductor affects its

The longer a conductor is the its resistance.

In the last experiments you investigated how the length of a conductor altered its resistance.

In this experiment you are going to investigate how the thickness (cross-sectional area) of a conductor alters its resistance.

- (d) Heavily shade in rectangles **A** and **B** in the diagram below.
 Again use Squeekie in its INSULATION settings.
 To check that the paper is an insulator, press the crocodile clip of one of the Squeekie leads on rectangle **A** and the other on rectangle **B**.
 You should not hear a tone from Squeekie, showing that the paper is an insulator.



- (e) Heavily shade in bar 1 in between **A** and **B**.
 Press the crocodile clip of one of the Squeekie leads on rectangle **A** and the other on rectangle **B**.
 Note the pitch of the tone from Squeekie
- (f) Now heavily shade in bar 2 in between **A** and **B** and repeat the test with Squeekie.
 What do you note about the pitch from squeekie this time.

- (g) Repeat for each of the other three bars in between **A** and **B**
 What do you notice about how the thickness of the pencil line alters the resistance?

(h) Complete the following sentences:
 The thickness of a conductor affects its

The thicker a conductor is the its resistance.

Further investigations.

- (j) On separate blank paper, draw a long thick line.
 With the crocodile clip from one of the Squeekie leads pressed on the one end, find out where you would have to press the other crocodile clip to play a tune.