Explore More!

Points awarded: _____

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Module 001: What is Resistance?

Notes:

Question 1: Write down the things you measured in Table 2 and whether they have high resistance (display reads OVLD), low resistance (display reads 0), or a measurable resistance (record the value).

Material	Resistance	Configuration and Comments
pencil	3.3Ω	measurable
plastic ruler	OVLD	high
coin	0.05Ω	low
eraser	OVLD	high
tweezer	0.1Ω	low
single staple	0.1Ω	low
arm	OVLD	high

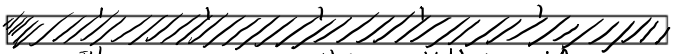
Table 2: Your measured resistances of various materials and structures.

Since you will be probing arbitrary surfaces, the measurements process can be tricky. The banana cables were designed to interface with a device with conducting leads. For example, if I hold one connector between my thumb and index finger and the other between my ring and little finger the resistance is 5-15 MΩ depending on how tightly I squeeze the connectors.

Question 2: Did the results surprise you? Most people can guess which materials are good conductors – materials with a low resistivity/resistance - by knowing which materials are good thermal conductors. There is often a high correlation between thermal and electrical conductivity. What property of the skin might make people decent conductors?

No. skin contains water

✓ Using any pencil, shade in the rectangle below. Make sure the line is fairly uniformly filled. Line dimensions: 6" x .25"

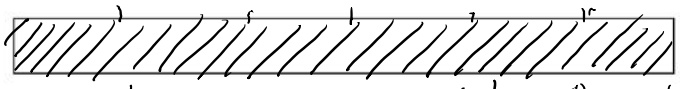


35kΩ 82kΩ 114kΩ 140kΩ 188kΩ 221kΩ

Question 3: Place one probe at one end of the line. With the other probe, take measurements along the line at different points. Label each point at which you took your measurement and write the resistance as measured by the DMM next to your mark.

Notes:

✓ Color the rectangle below with approximately the same darkness as before. The length of this second box is the same as the first but it is twice as wide. Line dimensions: 6" x .5"



29kΩ 38kΩ 42kΩ 48kΩ 58kΩ 67kΩ

Question 4: Repeat Question 3 using the larger rectangle. Try to make the measurements at approximately the same points.

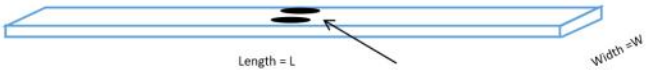
Question 5: When you were probing the line at different points along the length of the rectangle you were actually measuring the same resistance as a rectangle snipped to that shorter length. Why does the resistance depend on where along the line you position the probe?

the longer the resistor is, the harder it is for current to go through so resistance depends on position of the probe

Question 6: Do your measurements agree with the formula $R = \frac{\rho l}{A} = \frac{\rho L}{W*H}$?

Yes, they agree with this formula.

✓ Probe the line you drew for question 4 as shown in the figure below.



Position of DMM probes

Question 7: Write down the result. Why is the value measured in this way different from that measured by probing the line at the ends.

8kΩ. the lengths are different