$$R = \frac{V}{I}$$

$$\frac{\Delta R}{R} = \frac{\Delta V}{V} + \frac{\Delta I}{I}$$

$$\therefore \Delta R = R\left(\frac{0.1}{3.0} + \frac{0.01}{I}\right)$$

For example, if I = 0.50±0.01A then resistance will be calculated as follows:

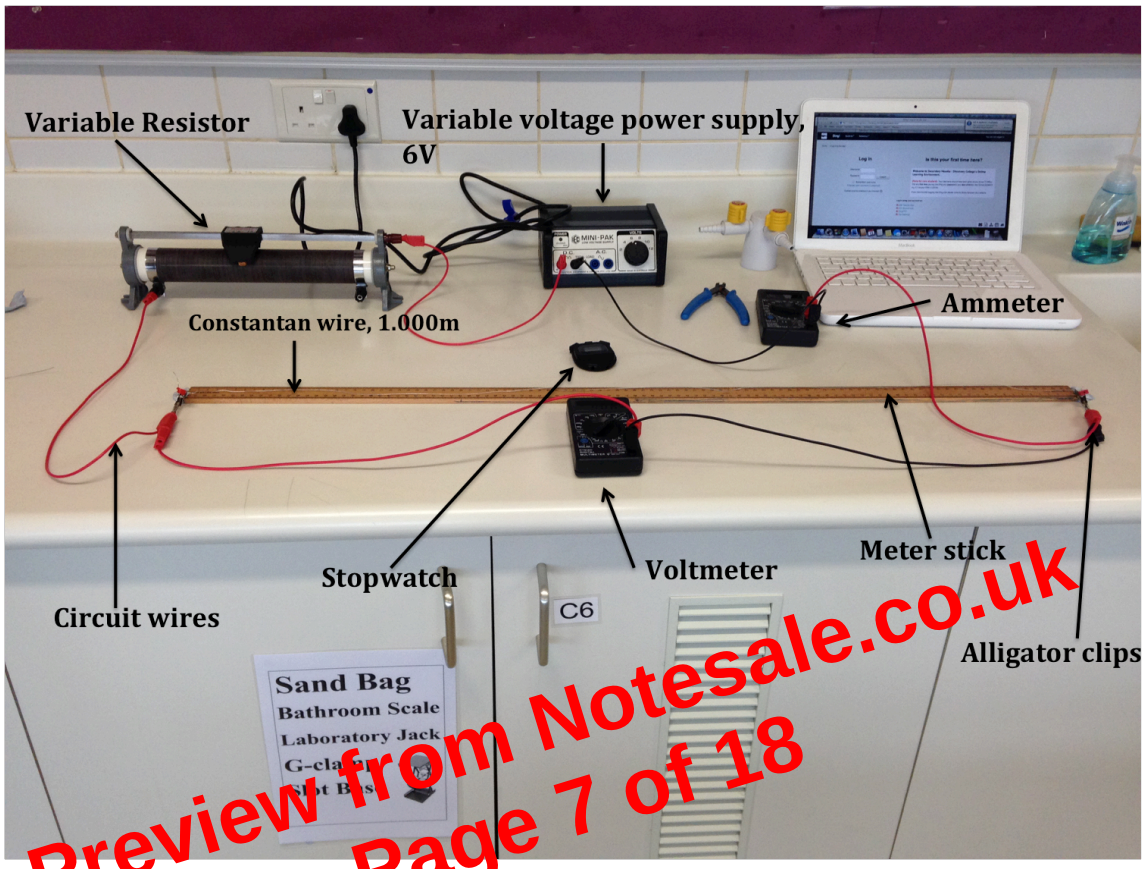
$R = \frac{V}{I}$ $R = \frac{3.0}{0.50}$ $R = 6.00\Omega$	$\Delta R = R\left(\frac{0.1}{3.0} + \frac{0.01}{I}\right)$ $\Delta R = 6.00\left(\frac{0.1}{3.0} + \frac{0.01}{0.50}\right)$ $R = \pm 0.32\Omega$

$$\therefore R = 6.00 \pm 0.32\Omega$$

Controlled Variables:

Variable	How variable will be controlled and measured	Possible affect on data if not controlled
Material of wire	The same sample of nichrome wire will be used throughout the experiment. There is no specified uncertainty associated with the material; the manufacturing of the wire	Different materials of wire may vary in conductivity. Keeping the wire the same ensures that the wire's *resistivity* (ρ) is controlled and therefore the resistance calculated will accurately reflect

Diagram 2: Live set up



Method:

Part A – Setting up

1. Set up battery to 6V. Connect 2 wires, 1 positive and 1 negative to the appropriate ports
2. Connect the negative wire from the battery to the variable resistor
3. Connect another negative wire with an alligator clip to the unoccupied end of the variable resistor. This will connect to one end of the nichrome wire.
4. Add the ammeter to the circuit by plugging the positive wire from the battery into the positive end of the ammeter.
5. Connect a negative wire to the ammeter. Add an alligator clip to the unoccupied end. This will connect to the other end of the copper wire.

6. Prepare the voltmeter by connecting a positive and negative wire to the appropriate port and detection setting to 200.0V.
7. Add the voltmeter to the circuit by connecting the negative wire to the alligator clip coming from the variable resistor, and the positive wire to the alligator clip coming from the negative wire from the ammeter.
8. Using the meter stick, measure out 1.000m of 26 SWG constantan wire.
9. Keep the meter stick below or parallel to the wire in order to ensure accurate length readings during the investigation
10. Use blu tac to secure both ends of the copper wire to ensure it is kept straight throughout the investigation
11. Attach the alligator clip coming from the variable resistor to where length L = 0.000m.
12. Attach the other alligator clip to the other end of the constantan wire. Recommended start length at 1.000m or 0.100m.
13. Turn on battery pack to 6V, adjusting the variable resistor so that the voltmeter reads 3.0V
14. Turn off battery and wait approximately 10.00s for circuit to cool, using the stop watch, before commencing part B

Part B – Data Collection

15. Adjust variable resistor for 0.100m
16. Attach the alligator clip coming from the ammeter to the copper wire at L=0.100m
17. Simultaneously start stopwatch and turn battery on
18. After 5s, record current displayed on ammeter in table (sample table 1 shown below). Reset stopwatch.
19. Turn battery off for 10.00s to allow circuit to return to room tempterature
20. Repeat steps 16 – 18 to collect and record current for 5 trials.
21. Repeat steps 15 – 19 for each the remaining lengths (0.200m, 0.300m, 0.400m, 0.500m, 0.600m, 0.700m, 0.800m, 0.900m, 1.000m)