
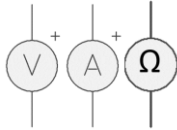



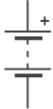

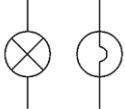








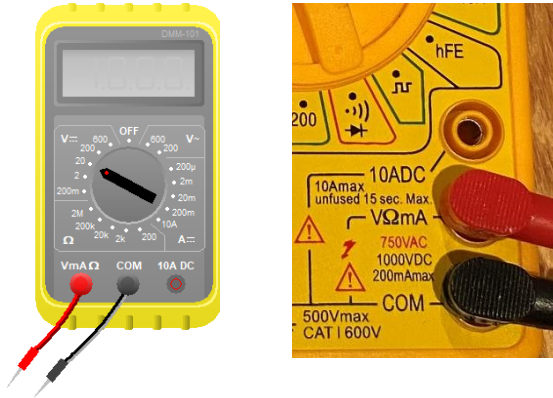


Component	Name	Symbol	Description
	Multimeter (Voltmeter, Ammeter, Ohmmeter)		A tool for measuring voltage, current, resistance, conductivity
	Crocodile leads		Used to temporarily connect components together
	Battery holders and batteries		Converts stored chemical energy into electrical energy
	MES filament bulb		Produces light by passing current through a thin filament
	Resistor		Limits the flow of current in a circuit
	Motor		Converts electrical energy into mechanical energy
	Solar Cell		Converts light energy into electrical energy
	LED bulb		Energy efficient polarised bulb


Activity 2: Testing conductors and insulators

Components:

Range of material to be tested



Task: Use a multimeter as a continuity tester to check if a material is a conductor or an insulator

1. From the test materials, predict in the results table if they are conductors or insulators
2. Attach red probe to VΩmA and black probe to COM
3. Set dial on multimeter to 
4. Touch the ends of the probes together. The multimeter should make a noise when a current is flowing.
5. Use the probes to check the conductivity of the test materials and record results in the table

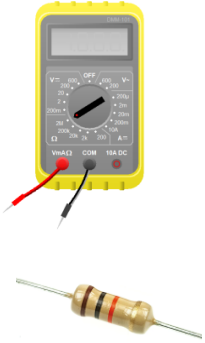
Observations

Results

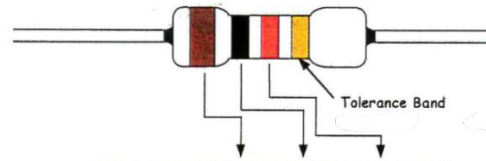
Test material	Predicted	Conductor	Insulator
Plastic ruler			✓

Activity 4: Measuring Resistance

Components:



The image shows a yellow digital multimeter with its probes inserted into the VΩmA and COM ports. Below it is a resistor with four color bands: yellow, violet, orange, and a gold tolerance band.



The diagram shows a resistor with four color bands and a tolerance band. Arrows point from the bands to a color code table below.

Black	0	0	
Brown	1	1	0
Red	2	2	00
Orange	3	3	000
Yellow	4	4	0000
Green	5	5	00000
Blue	6	6	000000
Violet	7	7	0000000
Grey	8	8	
White	9	9	

Task: Use a multimeter as an Ohmmeter to measure the resistance of a selection of resistors.

1. In the results table fill in the colours on the resistor and use the colour code to calculate its resistance
2. Attach red probe to VΩmA and black probe to COM
3. Set dial on multimeter to 2000K Ω
4. Hold the ends of the resistor against the probes
5. Measure the resistance of the resistor and record your results.

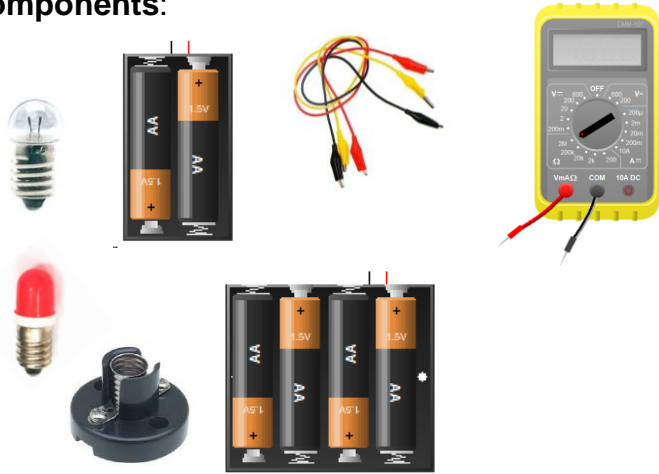
Note: You may need to change the setting on the multimeter from 2000k, 200k, 20k, 20000, 200 until you get an accurate reading.

Observations

Results		
Resistor colours	Calculated Resistance (Ω)	Measured Resistance (Ω)
Yellow, violet, orange	47000Ω	

Activity 5: Build a simple circuit

Components:



Task: Build a simple circuit using a battery pack and a MES filament bulb

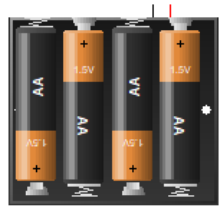
1. Attach a crocodile lead from the battery pack to one of the MES bulb holder connections
2. Attach another crocodile lead from the other MES bulb holder connection back to the battery pack
3. Measure the voltage across the battery pack and the MES filament bulb
4. Measure the current in the circuit
5. Repeat the steps using different power sources and the LED bulb
6. Record your observations and draw a circuit diagram for one of the circuits

Observations

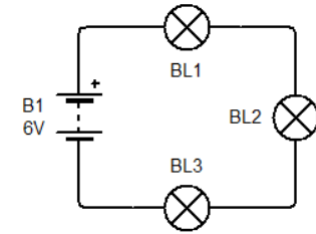
Circuit diagram including voltmeter and ammeter

Activity 6: Build a series circuit with 3 MES bulbs

Components:



Task: Using the components build the circuit as shown in the circuit diagram.



1. Use the multimeter to measure the voltage and resistance across the components
2. Measure the current at number of points in the circuit
3. Record your results in the table and note your observations

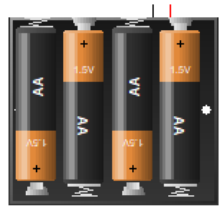
Observations

Results

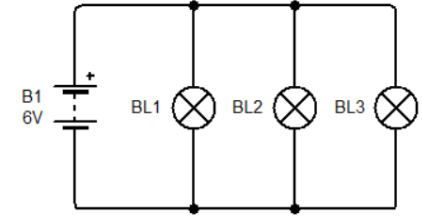
Component	Measured Voltage (V)	Measured Current (I)	Measured Resistance (R)
Battery pack (B1)			
Bulb 1 (BL1)			
Bulb 2 (BL2)			
Bulb 3 (BL3)			
Bulb 1 + Bulb 2 + Bulb 3			

Activity 7: Build a parallel circuit with 3 MES bulbs

Components:



Task: Using the components build the circuit as shown in the circuit diagram.



1. Use the multimeter to measure the voltage and resistance across the components
2. Measure the current at number of points in the circuit
3. Record your results in the table and note your observations
4. Compare results and observations to those from the series circuit

Observations

Results

Component	Measured Voltage (V)	Measured Current (I)	Measured Resistance (R)
Battery pack (B1)			
Bulb 1 (BL1)			
Bulb 2 (BL2)			
Bulb 3 (BL3)			