



ELECTRIC AFRICA OFFLINE INVESTIGATION

# Conductors and Resistance

S1-S4 | Physics | 50-65 minutes

**Investigate how material, length and thickness affect resistance and current.**

BEFORE YOU TEST

## Predict

Which carries more current: a short thick wire or a long thin wire of the same material?

**SAFETY RULE**

**Do not test sockets, appliances, body tissue or unknown liquids.**



## SIMULATION RECORD

# Change one variable

Keep all other settings constant. Record a prediction, measurement and observation for each trial.

- 1 Material: copper, steel or graphite
- 2 Length: short to long
- 3 Thickness: thin to thick
- 4 Measure: resistance and current

## INVESTIGATION TABLE

| Trial | Variable value | Prediction | Measurement | Observation |
|-------|----------------|------------|-------------|-------------|
| 1     |                |            |             |             |
| 2     |                |            |             |             |
| 3     |                |            |             |             |
| 4     |                |            |             |             |

## HANDS-ON EXTENSION

# Build safely

**Do not test sockets, appliances, body tissue or unknown liquids.**

## Materials

- 1 Teacher-prepared tester below 3 V
- 2 Copper wire or coin
- 3 Wood, rubber and plastic samples
- 4 Pencil graphite
- 5 Results table

## Method

- 1 Predict whether each sample conducts.
- 2 Touch tester probes only to the sample.
- 3 Record conductor, weak conductor or insulator.
- 4 Compare wire length and thickness using the same material.



## EXPLAIN AND ASSESS

# Turn results into evidence

Explain how length, cross-sectional area and material affect resistance.

## Learner explanation

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## Teacher rubric - score each criterion 0-4

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|--------------------|---------------------------------|-----------------|
| <b>Observation</b> | Accurate, relevant observations | Score: ____ / 4 |
|--------------------|---------------------------------|-----------------|

|                         |                             |                 |
|-------------------------|-----------------------------|-----------------|
| <b>Variable control</b> | One variable changed fairly | Score: ____ / 4 |
|-------------------------|-----------------------------|-----------------|

|                 |                                |                 |
|-----------------|--------------------------------|-----------------|
| <b>Evidence</b> | Measurements support the claim | Score: ____ / 4 |
|-----------------|--------------------------------|-----------------|

|                    |                                             |                 |
|--------------------|---------------------------------------------|-----------------|
| <b>Explanation</b> | Scientific reasoning links cause and result | Score: ____ / 4 |
|--------------------|---------------------------------------------|-----------------|

Certificate threshold: 12/16 plus independent moderation in the school pilot.