**🎯 Activity 3: 🧪 Virtual Lab – "Conductivity Test"**

**🎙️ Activity Introduction 🎙️ *(Mic Icon)***

“Welcome to your virtual lab station! Here is a simple circuit with a battery and bulb. Your task is to test different materials and decide whether they conduct electricity. Drag a material into the test zone and observe what happens. Will the bulb light up? Let us investigate!”

**👨‍💻 Developer Guide Instructions**

* **Activity Type**: Virtual Simulation – Circuit Tester
* **Visual Setup**: Battery 🔋 + Bulb 💡 + Break in Circuit [Socket to insert material]
* **Test Materials**:
  1. 🧵 Copper wire
  2. 🔩 Iron nail
  3. 📎 Aluminium foil
  4. 🍴 Plastic spoon
  5. 🧽 Rubber band
  6. 🌳 Wood stick
  7. 🧫 Glass rod
  8. ✏️ Graphite (pencil lead)
* **Interaction**:

1. Drag item into gap in the circuit.
2. Bulb lights up (conductor) or stays off (insulator).
3. Show explanation pop-up.

* **Visual Cues**:
  1. Green glow for conductors.
  2. Grey outline for insulators.
* **Audio Cues**:
  1. 💡 Bulb ON chime for conductors.
  2. 🔕 Soft buzzer for insulators.

**📋 Learner Instructions (On-Screen)**

1. Drag a material into the circuit gap.
2. Observe whether the bulb lights or stays off.
3. Read the explanation to learn why the material is a conductor or insulator.
4. Test all materials to complete the activity.

**💡 Hint (On-Screen)**

Conductors allow electricity to pass and will light the bulb. Insulators block electricity and keep the bulb off. Most metals are conductors, while most plastics, glass, and rubber are insulators.

**🧪 Activity Content – Materials and Explanations**

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| **Material** | **Bulb Result** | **Explanation** |
| 🧵 Copper Wire | 💡 Lights Up | Copper is a highly efficient conductor because its outer electrons move freely, allowing electricity to flow easily. This is why it is widely used in electrical wiring. |
| 🔩 Iron Nail | 💡 Lights Up | Iron conducts electricity well, although not as efficiently as copper. It is often used in tools and structural components rather than wiring. |
| 📎 Aluminium Foil | 💡 Lights Up | Aluminium is a lightweight metal that conducts electricity effectively, which is why it is used in power lines and cables. |
| 🍴 Plastic Spoon | 🚫 Bulb Off | Plastic is made from polymers that do not have free electrons, so it does not allow electric current to pass. This makes it useful for insulation and safety. |
| 🧽 Rubber Band | 🚫 Bulb Off | Rubber prevents the movement of electric charge, making it an excellent insulator for coating wires and handling electrical tools. |
| 🌳 Wood Stick | 🚫 Bulb Off | Dry wood does not conduct electricity well because it lacks free-moving charged particles. It is often used for tool handles in electrical work. |
| 🧫 Glass Rod | 🚫 Bulb Off | Glass is an insulator because its tightly bound electrons cannot move freely. It is used in bulbs, insulators, and protective coverings. |
| ✏️ Graphite (Pencil Lead) | 💡 Lights Up | Graphite, a form of carbon, conducts electricity because its carbon atoms form layers with delocalised electrons that can move freely. |

**🎙️ Activity Conclusion 🎙️ *(Mic Icon)***

“You have now explored how different materials behave in an electric circuit. Conductors like copper, aluminium, iron, and graphite allow electricity to flow, lighting the bulb. Insulators like plastic, rubber, wood, and glass block the flow of electricity, keeping the bulb off. This knowledge is key for choosing safe and effective materials in electrical work.”