LO: To recognise some common conductors and insulators; To use selection within a program

Context: Making and program a device that checks the conductivity of an object.

Success criteria:

- All children will make predictions around which objects are conductors/insulators and will be able to explain what their program needs to do.
- Mastery: children will mostly correctly predict conductors/insulators (with some reasoning) and have a program that meets the goals outlined.
- Greater Depth: children will look at using variables to identify materials that conduct (with resistance).

Prior Learning:
Prior to this lesson, it would be useful if children have had experience using the Crumble, and have an understanding of electricity and conductors/insulators

Resources and Safety:
Along with Crumbles and computers, you will need: a battery box (*NO rechargeable batteries*), croc leads, a sparkle (or baton if possible) and a switch.
Craft materials for making the body of

Key Vocabulary:
The following terminology may be used: electricity, conductor, insulator, sequence, selection, input and variable.

Teacher Input:

Please check prior learning before starting.

Explain to the class that we're going to be thinking about electricity today, and we're going to build a device that checks whether a material is a conductor or an insulator, using the Crumble.

Discussion:

Get the children to discuss what they know already about conductors and insulators. Feedback ideas onto the board. If they haven't covered conductors and insulators before, you will need to explain what they are first of all.

Teacher Input:

Ask, 'how can we test if a material is a conductor or an insulator?'. Take feedback from children.

Now explain that we are going to use the Crumble to create a device capable of detecting if an object is a conductor or an insulator. Using the Sparkle as an output (to convey information) how could we do this? Hint at idea of Red for insulator, green for conductor.

Activity:

Children work in groups of x (dependant on equipment available). First of all, discuss ideas for creating their conductive tester. How can they create a device which, when a material is connected to it, will light up a Sparkle a colour dependant on whether or not it is conductive?

Children also collate a list of materials they would like to test, and make predictions about them. *It will be worth emphasising how we need to be safe when using electricity, and that there are items we don't want to check as they are dangerous.

Teacher Input:

Make sure that all groups are heading down the right path. If needed, provide more guidance on possible solutions.

Set children off on task of making their conductive testers. *It may be the case that you spread this over a couple of sessions, or if your Science and computing sessions are back to back, perfect!*

Explain that children can test whether or not their testers are working by touching the two croc leads together, to close the connection, and breaking them apart to open it.

Activity:

Children work on making their basic conductor tester.

Extension: In its current form (unless children have thought about this already), the device will light up as soon as a conductive material is placed in and if it isn't a conductor, then the device will stay red/negative. By using a switch, children can start their device, making it easier to tell if a material is a conductor or an insulator.

Greater Depth: Although we can classify materials as being either a conductor or an insulator, some materials are worse conductors than others. By taking the analogue value of the input on the Crumble, instead of HI/LO, we can detect how conductive an object is. *This could be an extension/GD activity or another lesson.* Children work on using the Sparkle Baton as a conductivity scale.

Plenary:

Children use their conductive testers to see which materials are conductive, and which are insulators. Check these off against their predictions.

Were any objects surprisingly conductors/insulators?

Next steps:

- Greater Depth Task, if not already completed.
- If age appropriate, look more into resistance.
- Use LDRs to see how resistance can change, and how we can utilise that as an analogue input.