# Task 1 –Explaining energy flow

Watch the videos of chain reactions

Why are they called chain reactions?

This shows a plan for a chain reaction. It is designed to end by switching on an electric circuit.

Diagram of components of a chain reaction in which a magnet falls and completes a circuit containing a battery and light globe

1. Explain how the circuit part of the design would work.
2. How are these key words often used to explain why electric circuits do or don’t work?

***Electrical energy conductor complete circuit transform transfer***

1. Use a diagram to help explain how this is an example of energy flow.



### Fuses

A fuse is a thin piece of metal wire connected into a circuit. When too much electrical energy flows through the circuit the wire gets hot and melts, breaking the circuit. Where are conductors and insulators used in the fuse? Explain why.

Which best describes you?

|  |  |
| --- | --- |
| level |  |
| Not started | I don’t know anything about electricity |
| Getting there | I know something about conductors and insulators or complete circuitsBut I can’t explain how conductors and insulators control how energy does and doesn’t flow |
| Got it | I can explain how conductors and insulators and complete circuits control how electricity does and doesn’t flowBut I can’t identify the conductors, insulators and complete circuits in new examples to explain how energy flows |
| Going further | I can identify the conductors, insulators and complete circuits in new examples to explain how energy flows |

# Task 2 – What’s in a name?

source energy transfer flow electricity circuit transform

1. Choose the words from the list that have the closest meaning to these:

…………………………………………..……………..….. moving electrical energy

……………………………………………………….…….. an idea used to explain how change happens

……………………………………….……………..…….. to move along in a stream

……………………………………………………….…….. to move from one place to another

………………………………………………………..…….. to change from one form to another

………………………………………………………..…….. where something originates or comes from

………………………………………………………..…….. a line of things that ends where it began

1. Write the 5 hardest words in a sentence.

Any feedback on the task?

# Task 3 Energy flow – video response record

1. What is energy?
2. What kinds of energy are there?
3. What affects how energy flows?
4. Examples of energy flow

|  |  |
| --- | --- |
| Kind of energy | Examples of flow |
| *heat* | *Heat flows from the hot saucepan to you hand. A cloth oven mitt blocks this.* |
|  |  |
|  |  |

On energy flow I rate myself (circle 1):

 not started getting there got it going further

Any feedback on the task?

# Task 4 Electrical energy video response

1. What are conductors and insulators?
2. What is a complete circuit?
3. Why is a complete circuit necessary for electrical energy to flow?
4. What are electrons and how do they help us explain the flow of electrical energy.

Any feedback on the task?

# Task 5 - DIY circuit

Information:

* Batteries are sources of electrical energy, often called electricity.
* Electricity flows through metal objects called conductors
* To get electricity to flow you have to have a complete circuit – a connection of metal (wires etc.) from one side of the battery to the other.

Image of a light globe connected to a battery

<https://openclipart.org/detail/16971/battery>

<https://openclipart.org/image/800px/svg_to_png/279900/LightBulb3.png>

Use the instructions below to assemble a circuit that turns the globe on.

* battery
* globe
* a range of metal objects
1. connect one end of a wire to the top of the battery and the other to the metal casing at the base of the globe
2. connect one end of a second wire to the bottom end of the battery and the other to the metal knob on the very bottom of the globe
3. If the globe does not light move the wires to make sure they have a good connection.
4. Try other replacing a wire with other metal objects. Record those that worked.
5. Use a circuit diagram to record your circuits on the back of this sheet.

Any feedback on the task?

# Task 6 Interpret a circuit simulation

This drama represents a circuit..

**The roles:**

Battery: fold a piece of paper yellow side out to represent electrical energy and hand it to the person walking past

Any feedback on the task?

Globe: take the piece of yellow paper from the person, refold it to the white side out to transform it into light energy and throw it onto the floor in front of you

Electrons: transfer electrical energy by walking in a single file around the marked oval, taking a piece of yellow paper from the battery and handing it to the globe. Return to the battery for another.

Label the parts and explain how it represents a circuit.

# Interpret a circuit simulation

How to use a feedback chart:

1. Look for evidence of success criteria number 1
2. If you find it underline and write ① in the margin
3. Circle yes or no on the chart
4. Do the same for the next criteria
5. Add up the number of circled 1’s for the total

|  |  |  |
| --- | --- | --- |
|  | Success criteria feedback for: from: |  |
| 1 | Can you find where they have described the role of the battery actor? |
| *Battery is a source of electrical energy (yellow paper)* | Yes/no |
| 2 | Can you find where they have described the globe actor  |
| *Globe gives out light (white paper)* | Yes/no |
| *Globe transforms electrical energy into light energy (refolds the yellow paper to make white paper)* | Yes/no |
| 3 | Can you find where they have described the moving actors |
| *Electrons carry electrical energy (actors carry yellow paper)* | Yes/no |
| *Electricity moves through conductors like metal wires (actors walk along the path)* | Yes/no |
| *Electrons transfer electrical energy from the battery to the globe (collect and hand over yellow paper)* | Yes/no |
| 4 | Can you find where they have mentioned a complete circuit? |
| *The electrons end up back at the battery where they started* | Yes/no |
| *The electrons keep going around the circuit until the battery runs out of energy* | Yes/no |
|  | Total yes  |  |

|  |  |  |
| --- | --- | --- |
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|  | Total yes  |  |

# Task 7 Test drive electrical energy in the real world

Diagram of an electricity grid

The image below shows a power grid where electrical energy flows from the power station to places where it is used.

1. How is this like the energy flow in your battery operated circuit?
2. How is it different?
3. Where are conductors and insulators?
4. Where is electrical energy transferred and transformed?
5. Where is are there complete circuits?

<http://www.schoolphysics.co.uk/age14-16/Electricity%20and%20magnetism/Electromagnetic%20induction/text/Transmission_of_electricity/index.html>

# Task 8 –Explaining energy flow

This shows a plan for a chain reaction. It is designed to end by switching on an electric circuit.

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1. Explain how the circuit part of the design would work.
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# Task 9 – Build a switch

# A switch is something designed to interrupt the flow of electrons in a circuit. It can be open when electrons can’t flow or closed when they can. Most switches use metal conductors to complete the circuit and air as the insulator to break the circuit. There are several types of switches:

**Toggle switches** move with a turning motion to complete or break the circuit.

**Push switches** are pushed down to close the circuit and spring back up to open it

**Selector switches** have a knob that you turn to complete the circuit and sometimes set it to different positions.

# Construct a switch that would turn the light on and off with one finger

# Record your switch, explaining how conductors and insulators and complete circuits make it work.

# Task 10 – Safety Gear

Use the idea of energy flow to explain how each of these personal safety items work.

|  |  |
| --- | --- |
| Dark glasses |  |
| Ear protection |  |
| High vis jacket |  |
| Heavy rubber gloves |  |

Jacket CC BY-SA 2.5, <https://en.wikipedia.org/w/index.php?curid=9907230>

Any feedback on the task?

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# Task 11 – Enza Rules the TV show

Any feedback on the task?

A new superhero has been created for children’s TV. Enza takes various forms depending on the job and travels in the same way as the energy is transferred. E.g. when he is Sound Enza he travels from sources of sound through the air and other materials. To help the script writers make his adventures accurate you need to produce a set of rules for Enza when he is in Electrical Enza. Where does he come from? What helps him move? What stops him moving? What can he do?