

Spirit of Innovation

STEAM Resources



Science

Year Four

Circuits & Conductors

It's electri-flying!

Links

Working scientifically

- Asking relevant questions and using different types of scientific enquiries to answer them
- Setting up simple practical enquiries, comparative and fair tests
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Identifying differences, similarities or changes related to simple scientific ideas and processes
- Using straightforward scientific evidence to answer questions or to support their findings

Electricity

- Identify common appliances that run on electricity
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- Recognise some common conductors and insulators, and associate metals with being good conductors.

Resources

- Key
- Item of clothing
- Rubber band
- Paper clip
- Wooden ruler
- Silver Spoon
- Plastic bricks
- Bottle top
- Plastic bottle
- Screw
- 1p coin
- Paper
- Tap water
- Drinks can
- Polystyrene
- String
- Cork
- Split pin
- Cardboard
- Sticky tape
- Foil
- Box with lid
- Metal tweezers
- Battery
- Wire
- Bulb
- Buzzer
- Conductor and Insulator worksheet ([Download](#))
- Conductor and Insulator PowerPoint ([Download](#))
- How to make an electrical game PowerPoint ([Download](#))



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- [Electrical Game Design Sheet \(Download\)](#)

Skills

- Working as a pair
- Working in a team
- Discussing ideas
- Collaboration and compromise
- Make predictions and give reasons
- Planning and designing
- Measuring accurately
- Recording data
- Report back findings
- Understand the dangers of electricity.

Questions

- Why is electricity dangerous?
- How do you keep safe? See below for details
- What will you need to make a simple circuit? Why?
- What materials do you think will conduct electricity?
- What materials won't conduct electricity?
- What will stop electricity flowing around a circuit?
- What materials will Spirit of Innovation use in various parts of their plane? Why?

Activity

Activity One

In small groups
(50 – 60 mins)

Work together to test a range of materials and record their findings on a simple chart; Conductor and Insulator worksheet ([Download](#)) Predict and explain which materials they think will be good conductors of electricity, and which are not.

Using a very simple circuit, predict and test which materials conduct electricity, by adding them into the circuit. Understand that a break in the circuit will stop the flow of electricity. Therefore, if the bulb lights up, the material conducts electricity. If the bulb does not light up it is an insulator. Conductor and Insulator PowerPoint ([Download](#))

From these findings, draw conclusions about materials that could be used to make electrical circuits, and materials that would keep us safe from electrical circuits. Particularly important in the case of the Spirit of Innovation plane.

electricity	circuit	switch	battery	plug	mains	appliance	device	wire	crocodile clip
bulb	buzzer	connection	power	cell	energy	flow	current	conductor	insulator

Activity Two

In pairs
(30 - 40 mins)

Allow time for the pupils to explore circuits further; adding buzzers, additional bulbs/batteries.

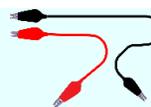
See if pupils are able to predict what might happen with their different 'circuit' layouts. Then test their theories, to see if they are correct.



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Introduce the pupils to drawing circuits, as this will prepare them for Activity Three.



Cell

Bulb

Switch

Wire

Buzzer

Activity Three

In small groups
(40 - 60 mins x2)

Using their knowledge of conductors and insulators design and make a Spirit of Innovation inspired game based on above knowledge - for example Spirit of Innovation Operation, Beat the Buzzer. How to make an electrical game PowerPoint ([Download](#))

Pupils to include a circuit diagram within their game design. Electrical Game Design Sheet ([Download](#))

One lesson should be made available for the pupils to think about and design their electronic game. A second lesson should be provided to make their chosen game.

* Hint: arrange a special event for others to 'play' these games. Maybe a fund-raising event for an environmental charity or special class trip.

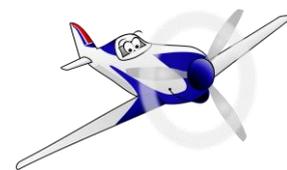
Top 10 rules for electric safety

To play it safe around your home, remember the rules for using electricity the right way.

- DON'T plug a bunch of stuff into one outlet or extension cord. It could damage the electrical system in your house or even cause a fire.
- DO make sure all electric cords are tucked out of the way. Pets might chew on electrical cords, and people might trip and fall.
- DON'T ever play near or on a green transformer box or climb the fence around an electrical substation. If a ball or pet gets inside the fence, ask an adult to call Alliant Energy or your electric company - they'll come and get it out for you.
- DON'T yank an electrical cord from the wall. Instead, pull from the plug. Pulling on a cord can damage the appliance, the plug or the outlet.
- DON'T fly anything like drones or kites near power lines or substations. A kite and its string may conduct electricity - sending it right through you to the ground.
- DO ask an adult for help when you need to use something that uses electricity.
- DO look up and look out for power lines before you climb a tree. The electricity can go right through the tree branch - and right through you.
- DO have an adult put safety caps on all unused electrical outlets. Covering outlets will also help save energy by stopping cold drafts.
- DO watch out for power lines when using a ladder, chainsaw or other outdoor equipment.



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- DO keep electrical stuff away from water. Most electrical accidents around the house happen when people use electricity near water.

Why electricity is dangerous

Have you ever walked across a carpet and received a shock when you touched a doorknob or another person? What you felt was the shock of static electricity.

But a real electric shock is a lot more painful and can be deadly. Here's what can happen:

- Muscles tighten up, making it almost impossible to pull away from the circuit
- Lungs constrict, making it hard to breathe
- Heartbeat is interrupted and blood vessels tighten
- Burns
- Internal organ damage
- Death

It sounds scary, and it is, but if you remember the safety rules, you can use electricity without getting hurt.

https://www.alliantenergykids.com/StayingSafeAroundEnergy/ElectricSafety?utm_source=WS&utm_campaign=PlayingItSafe/ElectricSafety/000552



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