STUDENT
Activity Book

Name: _____

Class: _____

POWER SAVVY

ERGON ENERGY RETAIL

Part of Energy Queensland

Table of Contents

LESSON 1

Types of energy worksheet

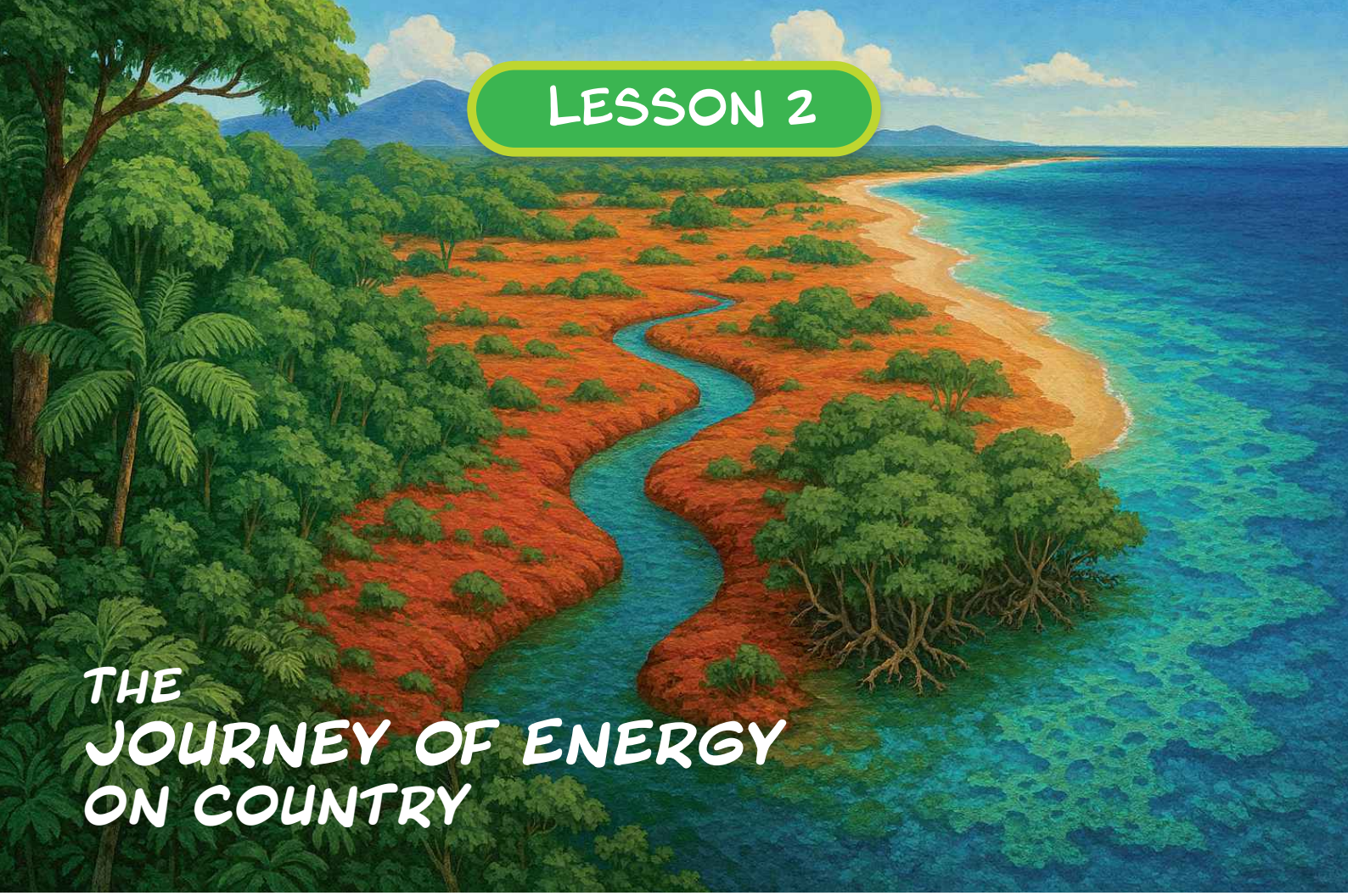
Be creative but accurate!

Instructions

In the box on the left, you'll find the name and definition of a type of energy.

In the empty box on the right, draw a real-world example of that type of energy.

Energy type and definition	Draw your example here
Light Energy (Kinetic) Energy that travels in waves and can be seen by our eyes, like sunlight or light from a torch.	
Sound Energy (Kinetic) Energy made when things vibrate, travelling in waves through air, water, or solids.	
Movement (Kinetic) Energy an object has when it is moving, like a rolling ball or a running person.	
Thermal (Heat) Energy (Kinetic) Energy from the movement of tiny particles inside matter, felt as heat.	
Chemical Energy (Potential) Stored energy inside substances, released during chemical reactions, like in food, batteries, or fuel.	
Electrical Energy (Kinetic) Energy from moving electric charges, powering devices like lights, TVs, and computers.	
Gravitational Energy (Potential) Stored energy an object has because of its position above the ground, like water behind a dam or a book on a shelf.	
Elastic Energy (Potential) Stored energy in stretched or squashed objects, like a stretched rubber band or a compressed spring.	



LESSON 2

THE JOURNEY OF ENERGY ON COUNTRY

Long before power lines and light switches, the Sun was already sharing its energy with everything on Country.

Each day, the Sun shines its light down on the rainforests, red earth, rivers, mangroves, coral reefs and seas of Queensland. The Sun warms the land, grows our food, and gives life to everything.

One bright morning, a ray of sunlight landed on a green leaf of a paperbark tree growing near a freshwater creek. The tree drank up water from the ground and breathed in carbon dioxide from the air. With the help of the Sun, it used photosynthesis to make its own food and grow tall and strong. That sunlight became chemical energy inside the tree's leaves, bark and branches.

After many seasons passed, the tree fell. Over thousands and thousands of years, the tree and other plant matter were buried by soil. In some places, like deep inland or near old swamps, these ancient trees slowly turned into coal and oil, types of fossil fuels. These ancient, buried trees hold energy from the Sun deep underground.

Today, some of that coal is dug up in Queensland mines and taken to big power stations. There, it's burned to make heat, which boils water into steam. That steam turns turbines, which spin fast to make electricity. Oil is also extracted from the Earth, refined into fuel and sent to our remote communities by truck and by boat. Just like how fuel powers our cards, this fuel is used by remote power stations to power communities.

The electricity from the power stations travels through wires and poles, along our streets and into our homes, buildings and schools.

That electricity might be lighting your classroom, powering the aircon on a hot day, or helping you cook dinner with your family.

So, when you flick on a light remember: You're using energy that began its journey with the Sun, passed through Country, waited underground for millions of years, and now helps power your life on your land, your sea, and in your community.

LESSON 2

Storyboard:

How energy from the sun reaches our homes

Instructions

Draw a picture in each box to show the journey of energy from the Sun to your home.

Under each picture, write a short description of what is happening at each stage.

Sun

Plants

Buried Fossil Fuels

Power Station

Your Home

LESSON 3

THE STORM THAT LIT UP THE SKY

Exploring energy transfer and transformation through lightning

Out on the open plains of **Queensland**, the sky was heavy with dark, swirling clouds. A strong wind rushed through the gum trees, and the air felt thick—like something powerful was about to happen.

High above the ground, inside the storm clouds, something invisible was happening. Tiny ice and water droplets bumped and crashed into each other as the wind tossed them around like a dance. Each bump passed on a tiny bit of **electrical energy**, like a secret handshake. That energy didn't change—it just moved from one droplet to another, again and again.

This was **energy transfer**. The electrical energy was moving, but it stayed as electricity.

As more and more energy built up, the cloud started to charge up like a giant invisible battery. Eventually, the energy had to escape—it couldn't hold it anymore.

Then—**CRACK!**

A bright, jagged bolt of **lightning** tore through the sky, jumping between the cloud and the ground.

In that one split second, something amazing happened: the **electrical energy** from the cloud **transformed** into other kinds of energy.

It became **light energy**, flashing across the sky.

It became **heat energy**, making the air so hot it expanded suddenly.

And it became **sound energy**—that loud BOOM of thunder that made the ground shake.

The wind carried the storm away, but the energy didn't disappear. It had just moved, changed, and continued its journey through nature—lighting the sky, warming the air, and rumbling through the bush.

LESSON 3

Story discussion questions

1

What part of the story showed energy being transferred?

What was moving?

What kind of energy was it?

2

What part of the story showed energy being transformed?

What types of new energy were created from the lightning?

3

Why do you think the storm needed to release all that energy?

4

Can energy ever disappear completely?

What do you think happens to it after the storm?

5

Where else in nature can we see energy being transferred or transformed?

Can you think of examples on land or in the ocean?

Bushfire

Transfer: Heat energy spreads from tree to tree through the flames.

Transformation: Chemical energy in plants (from the Sun) is transformed into heat, light, and sound during the fire.

Food chains

Transfer: Energy moves from the plant to the animal when it eats.

Transformation: The chemical energy in the plant is transformed into **movement energy** (kinetic), **body heat**, and **growth** in the animal.

Waves

Transfer: Energy from wind is transferred to the water, creating waves.

Transformation: The wave's **kinetic energy** transforms into **sound** (crash!) and **thermal energy** (friction warming the rocks/ water slightly).

Sea turtle swimming

Transfer: Energy moves from the turtle's muscles to its flippers and the water.

Transformation: The turtle transforms **chemical energy** from food into **kinetic energy** (movement) and **heat** (body warmth).

LESSON 3

Energy transfer and transformation around the home

Key words

Energy transfer: When energy moves from one place or object to another, without changing its form.

Energy transformation: When energy changes from one form into another.

Examples around the home

Energy transfer

- **Touching a hot pan**
  Heat energy transfers from the hot pan to your hand.
- **Boiling water in a kettle**
  Heat energy transfers from the element to the water.
- **Playing music through a speaker**
  Electrical energy transfers to the speaker, then to the air as sound energy.
- **Bouncing a ball**
  Mechanical energy transfers from your hand to the ball.

Energy transformation

- **Using a toaster**
  Electrical energy transforms into heat energy.
- **Watching TV**
  Electrical energy transforms into light energy and sound energy.
- **Using a torch**
  Chemical energy (batteries) transforms into light energy.
- **Riding a bicycle**
  Chemical energy (muscles) transforms into mechanical energy.

Classify these

Write **Transfer** or **Transformation** next to each statement.

a) Energy from a lamp's bulb moves across the room as light. _____

b) A blender changes electricity into spinning blades. _____

c) Heat from soup moves into a metal spoon. _____

d) A mobile phone changes electrical energy into sound and light. _____

e) Kicking a soccer ball passes movement energy from your foot to the ball. _____

LESSON 4

Fill in the blanks

Choose from: heat, sound, light, chemical, mechanical

1. In a toaster, electrical energy transforms into _____ energy.

2. Playing music through a speaker transfers electrical energy into _____ energy in the air.

3. Using a torch changes chemical energy into _____ energy.

4. Riding a bike changes chemical energy from your muscles into _____ energy.

Draw it!

Pick one example of energy transfer and one example of energy transformation from your home.

- Draw a labelled diagram showing where the energy starts and where it goes.
- Use arrows to show the direction of energy movement.
- Label the type(s) of energy.

Challenge question

In full sentences, explain the difference between energy transfer and transformation.

LESSON 4

Electrical circuits - Key terms

Fill in the missing names or definitions for each key term. The tasks alternate between writing the term and writing the definition.

Term: Circuit

Term: _____

Definition: A component is a device in a circuit that has a specific function.

Term: Cell

Term: _____

Definition: When two or more cells are used together, it is called a battery.

Term: Terminal

LESSON 4

Create a diagram of an electrical circuit

LESSON 5

Power journey map

1. **Draw** the place where electricity starts in our community (e.g., diesel generator). Label it ‘Power source’.
2. **Draw** transmission wires that carry electricity away from the source. Use arrows to show the flow direction.
3. **Add** a transformer somewhere along the path. Label what it does (‘Changes voltage to make it safe for homes’).
4. **Draw** power poles/wires leading to your street or community area.
5. **Add** a fuse box/meter box before electricity enters the building.
6. **Draw** buildings (your house, school, etc) and add labels showing what they use electricity for.
7. **Colour-code** each part (e.g., blue for wires, yellow for electricity, red for buildings).

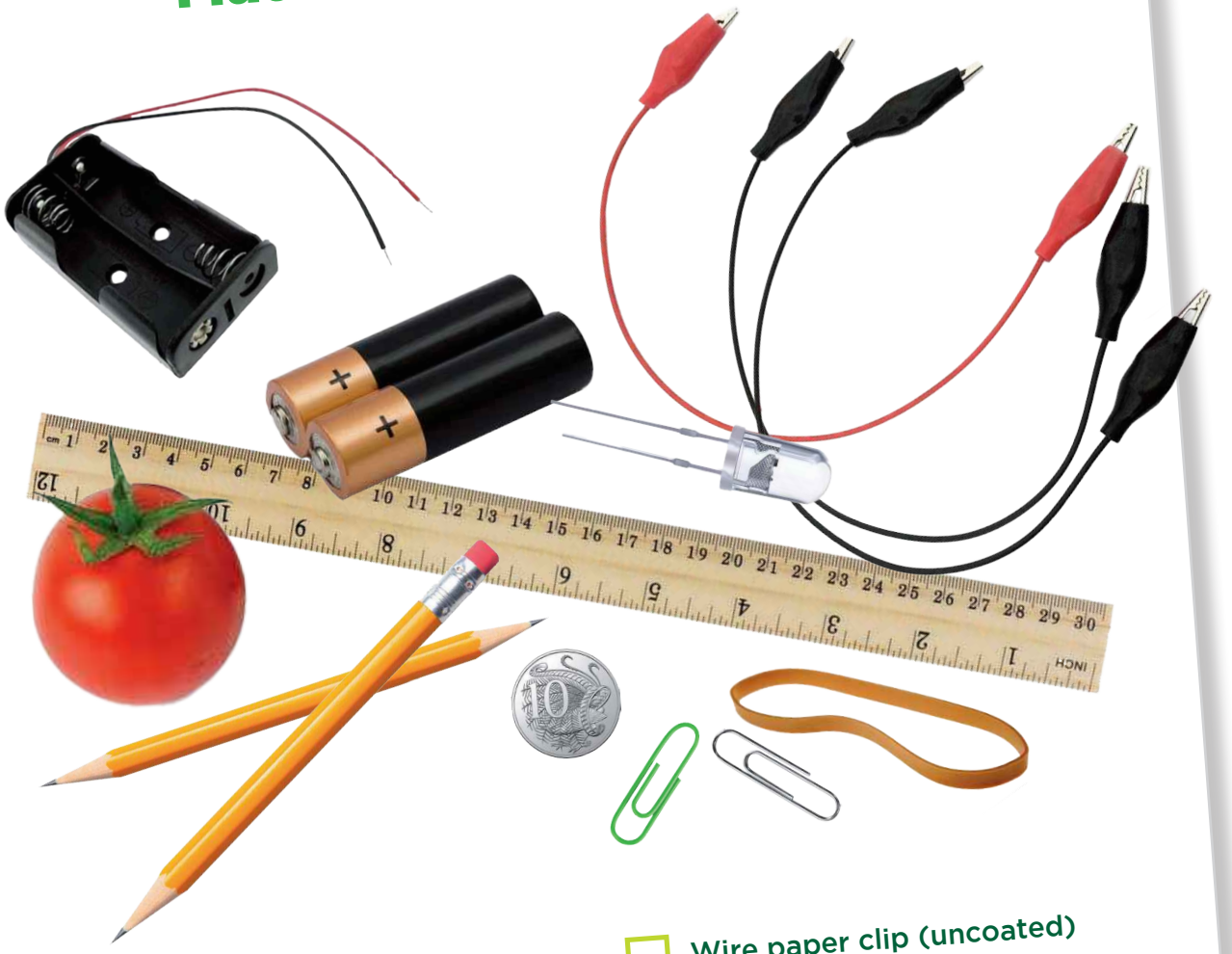
Extension:
Draw a little symbol next to each building showing one way to save electricity there.

LESSON 6

Conductors and insulators

This activity should be led and demonstated by your teacher.

Materials you will need:



- [ ] 2 x AA batteries and battery holder
- [ ] 1 x red (positive) and 2 x black (negative) connector cables with clips
- [ ] Light emitting diode (LED)
- [ ] Wooden ruler
- [ ] Coin
- [ ] Rubber band
- [ ] Wire paper clip (uncoated)
- [ ] Wire paper clip (with plastic coating)
- [ ] Graphite pencil with eraser on end (take care with pointy end of pencil)
- [ ] Graphite pencil with graphite exposed at both ends (take care with pointy ends of pencils)
- [ ] Small (juicy) fruit or vegetable e.g. cherry tomato

LESSON 6

Method:

STEP 1

Install the 2 x AA batteries into the battery holder – following diagram in holder.

STEP 2

Connect one end of the red connector cable (clip) to the red (positive) battery wire.

STEP 3

Connect the other end of the red connector cable (clip) to the longer of the two wires of the Light Emitting Diode (LED).

STEP 4

Connect one of the black connector cables (clip) to the black (positive) battery wire.

STEP 5

Connect the other black connector cables (clip) to the shorter of the wires of the LED.

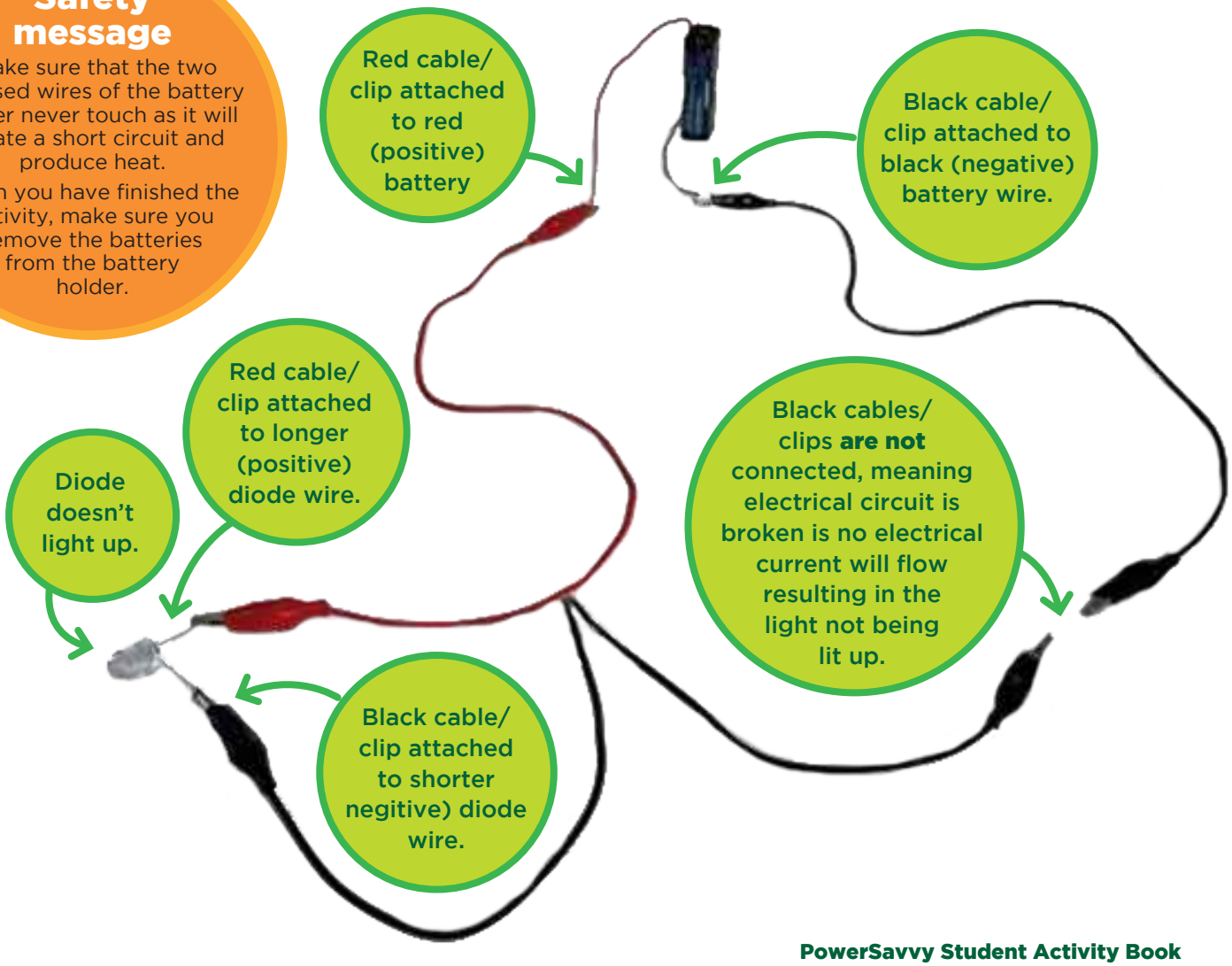
At this stage there should be two black connector cables with ends that aren't connected to anything.

This means that the electrical circuit isn't complete, and the LED shouldn't be lit up (see image below).

Safety message

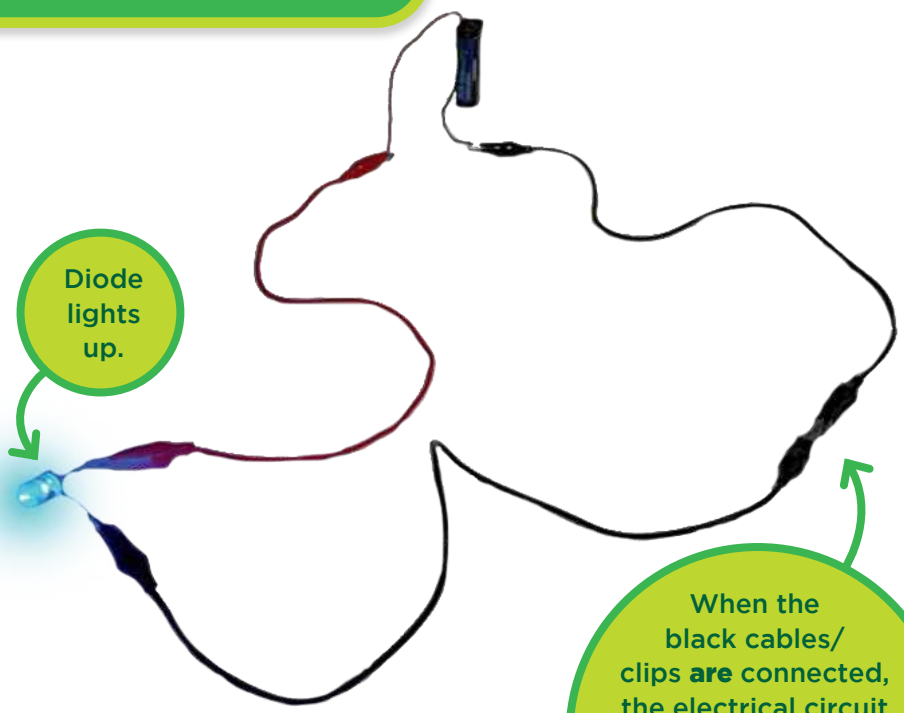
Make sure that the two exposed wires of the battery holder never touch as it will create a short circuit and produce heat.

When you have finished the activity, make sure you remove the batteries from the battery holder.



LESSON 6

If you touch the two ends of the black cables together, the circuit will be complete, and the LED should light up (see image).



When the black cables/ clips **are** connected, the electrical circuit is complete and an electrical current will flow resulting in the light being lit up.

If the LED doesn't light up, then the circuit isn't connected correctly.

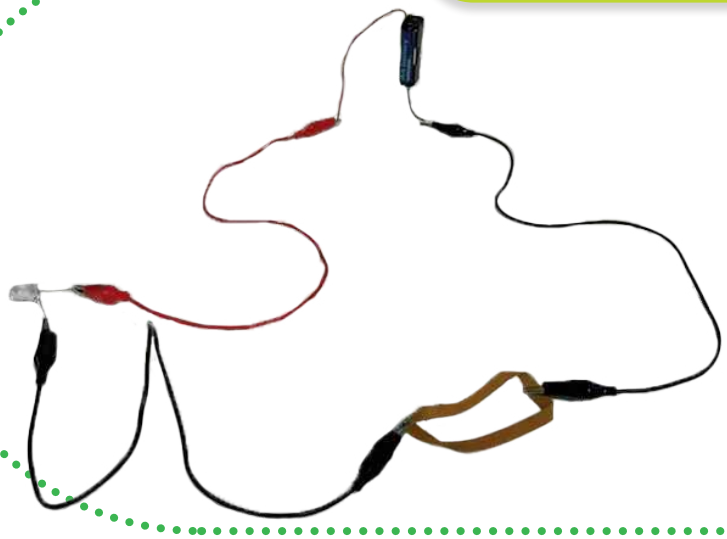
Troubleshoot by:

- Checking batteries have charge and are installed properly in holder.
- Checking that all connections are securely made.
- Check that all the steps were followed correctly.

Coin

Now test each of the materials to see whether they conduct electricity (conductors) or don't conduct electricity (insulator) by connecting them to the two black cables as shown in the below images. Discuss after each test.

The LED **does** light up. Why?

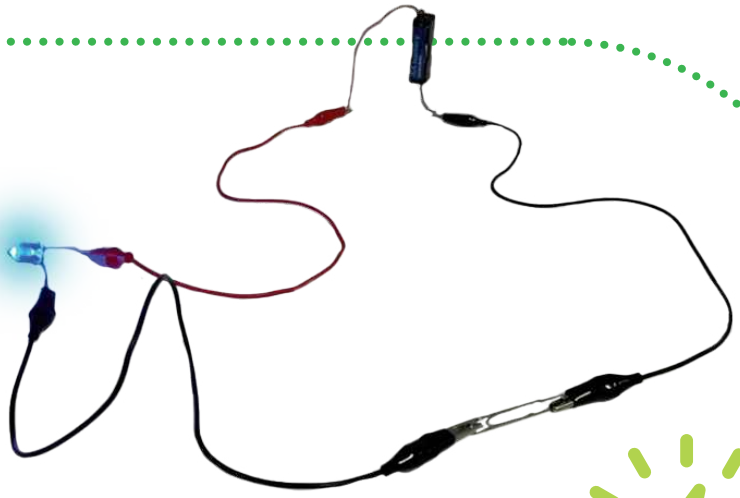


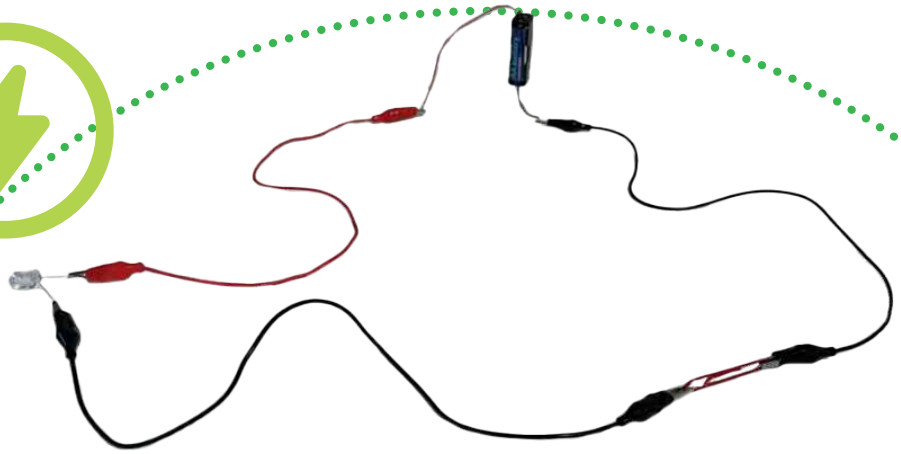
Rubber band

The LED **doesn't** light up. Why?

Paper clip (bare metal)

The LED **does** light up. Why?





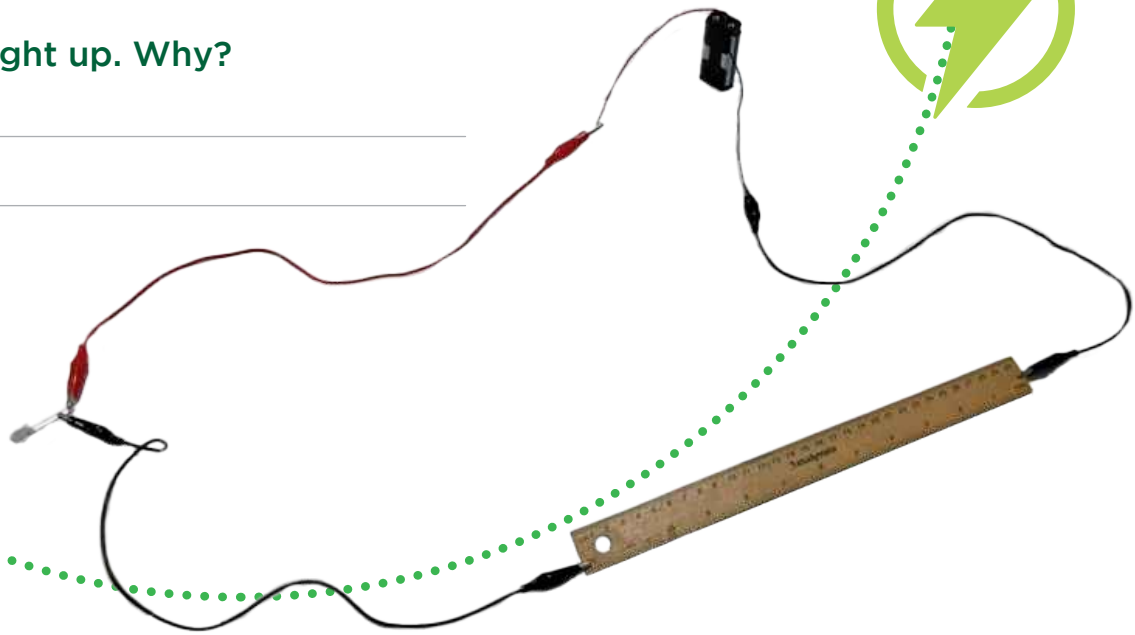
Paper clip (plastice coating)

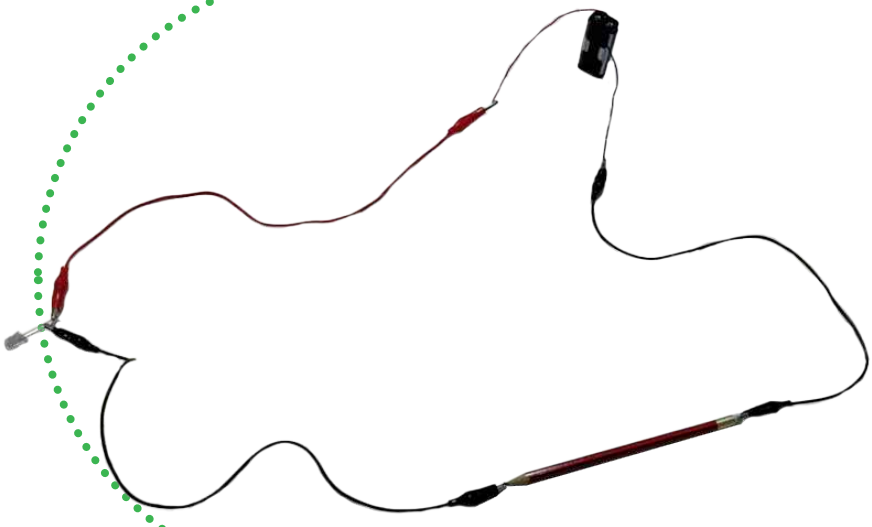
The LED **doesn't** light up. Why?

LESSON 6

Ruler (wood)

The LED **doesn't** light up. Why?



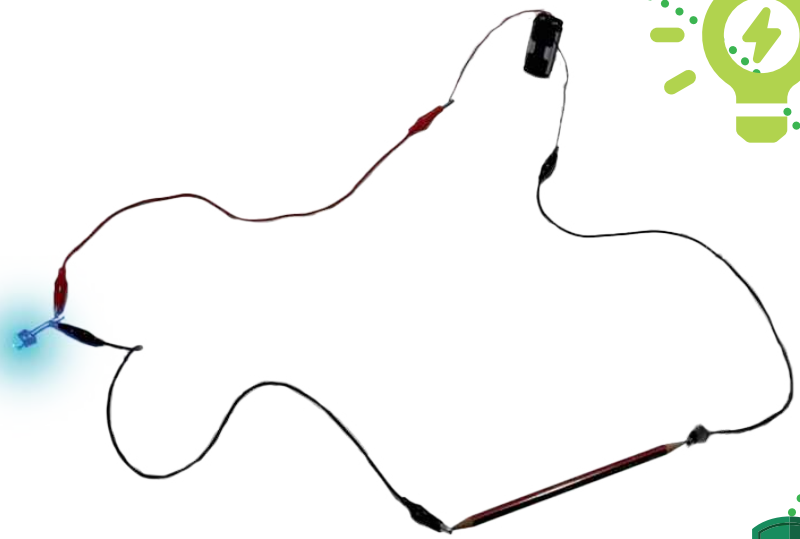


Pencil
(graphite one end and eraser on the other)

The LED **doesn't** light up. Why?

Pencil
(graphite at both ends)

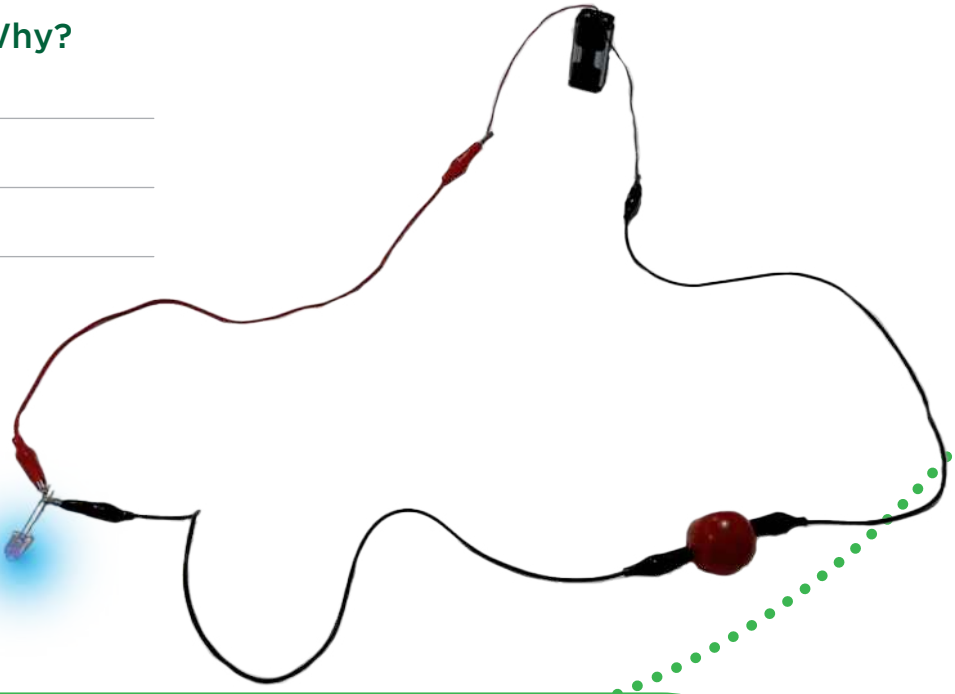
The LED **does** light up. Why?



LESSON 6

Small (juicy) fruit or vegetable (e.g. cherry tomato)

The LED **does** light up. Why?



Safety message

Remember when you have finished the activity, remove the batteries from the battery holder.

You can try all kinds of different things

Why the diode lights up with some materials and not others?

Cross out the incorrect word in the below sentences:

- Conductors **[carry] [don't carry]** electricity.
- Insulators **[carry] [don't carry]** electricity.

LESSON 7

SAFETY HEROES

ELECTRICAL SAFETY

Being *Power Savvy* also means being a *Safety Hero*

Check out these Safety Heroes videos

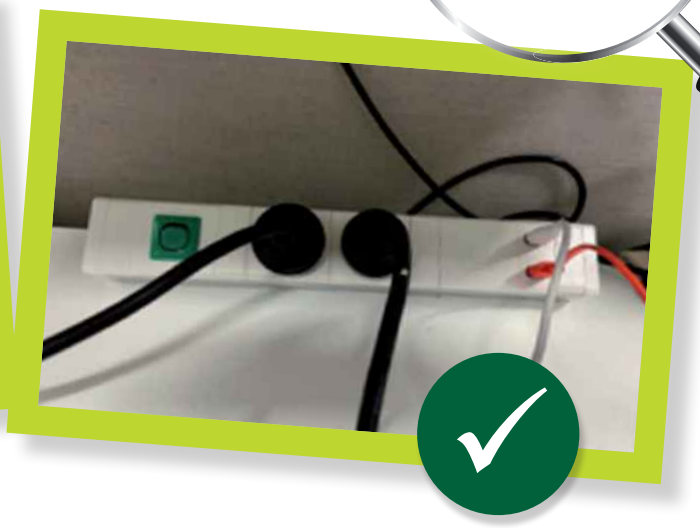
https://www.ergon.com.au/network/safety/kids-safety/safety-heroes-videos

1. Heroes at home
2. Diggy's tips before you dig
3. The Wiggles electrical safety
4. Step and touch potential
5. Vehicle accidents and powerlines
6. What is electricity?
7. Generating electricity
8. The electrical circuit
9. Keeping safe
10. Electricity poles and powerlines
11. Electrical emergencies
12. Metal is a conductor
13. Electricity and water
14. Stay away from substations

LESSON 7

Identifying electrical hazards

What's wrong in the picture on the left?



LESSON 7

LESSON 7

SAFETY HEROES

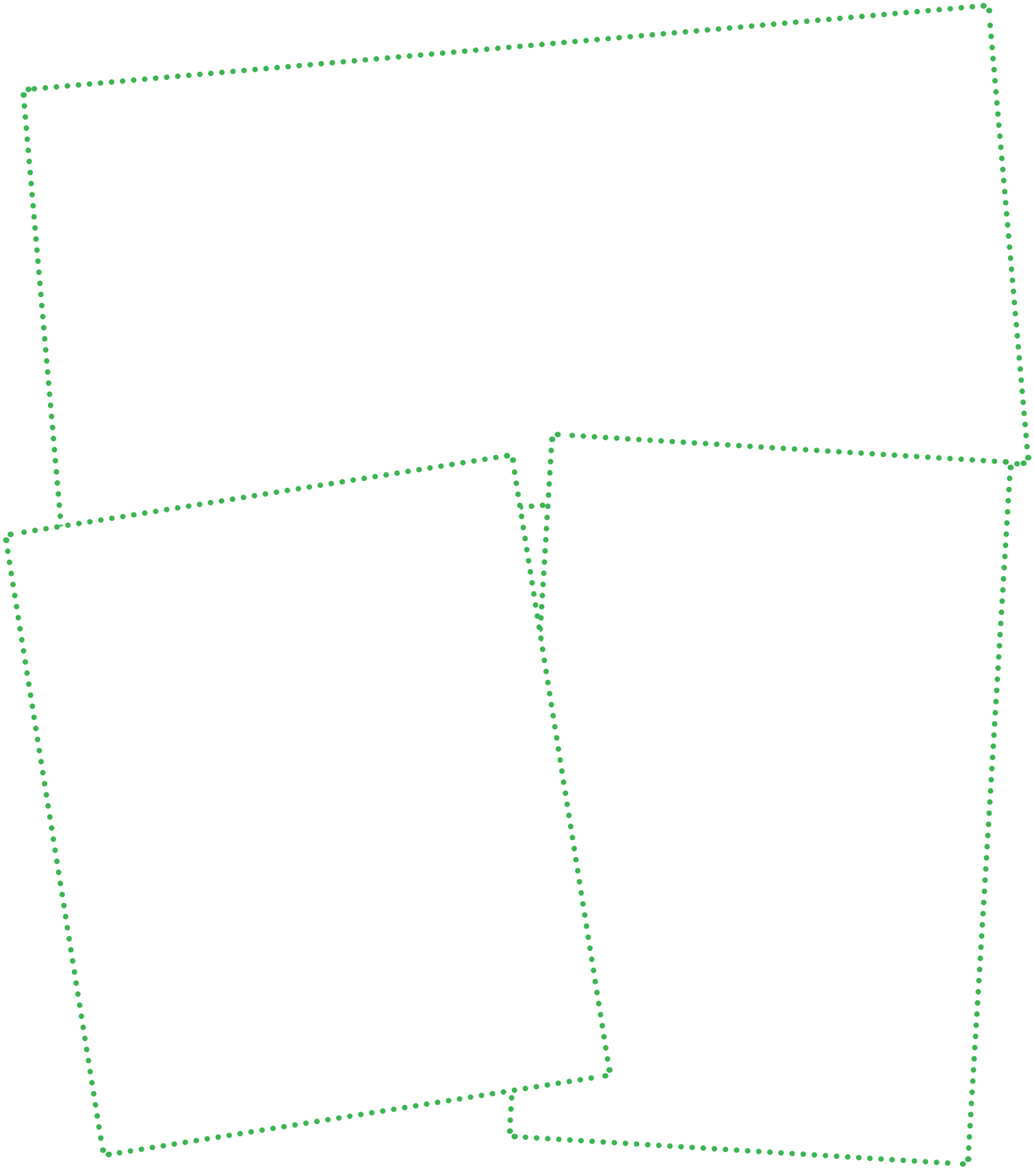
HOME SAFETY CHECK

You can be a Safety Hero by doing a Home Safety Check with your parents or an adult at home.

- Safety Heroes Home Safety Checklist
- Safety Heroes - Keeping Safe at Home
- Safety Heroes Mythbusters

LESSON 7

Draw 3 items that use electricity



LESSON 7

Summarise how to improve electrical safety

LESSON 7

Electrical safety audit worksheet

Electrical safety item	Yes (Safe)	No (Needs attention)	Comments or actions needed
1. Are electrical cords and plugs in good condition?			
2. Are power points free from overloading?			
3. Are electrical devices kept away from water?			
4. Are cords arranged to prevent tripping hazards?			
5. Are switches and plugs easy to reach and use safely?			
6. Are any wires exposed or damaged?			
7. Are devices turned off when not in use?			
8. Are smoke alarms and safety devices working?			

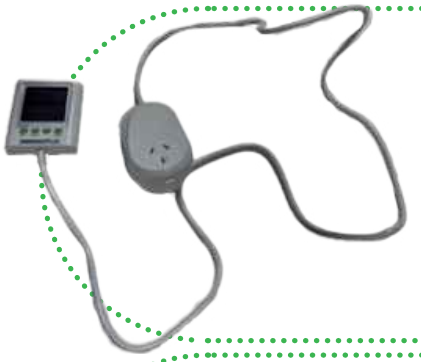
Instructions:

Walk around your home or classroom with an adult and check each item. Tick "Yes" if it is safe, or "No" if it needs attention. If the item is 'safe', describe in why you think it is safe. If it is 'unsafe', describe why and give 1 suggestion how the safety could be improved.

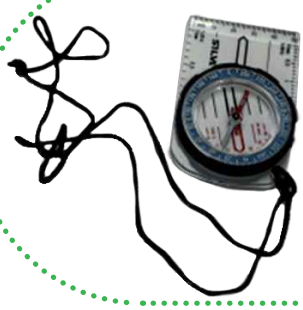
LESSON 8

Investigation equipment

What do you think Power Savvy Detectives use a **surface temperature scanner** for?



What do you think Power Savvy Detectives use a **power meter** for?



What do you think Power Savvy Detectives use a **compass** for?

What do you think Power Savvy Detectives use a **stopwatch** for?

What do you think Power Savvy Detectives use an **air temperature sensor** for?

LESSON 8

Hypothesis and data collection

Write your question about energy use:

Write your answer (hypothesis):

a Appliances	b Power (W)	c How many hours (h) per day is it being used?	d = (b/1000) x c Energy use (kWh) per day Note: We need to convert watts (W) into kilowatts (kW) (1000W = 1kW)	P Price of electricity ($0.33/kWh)	d x P Cost of electricity ($) per day	Rank 1-5 (1 = the appliance that cost the most)
				34c		
				34c		
				34c		
				34c		
				34c		
				34c		
				34c		
				34c		
				34c		

LESSON 8

Constructing a site plan/map

Select a site and go on a site visit. It may be easiest to select your own classroom first.

When you are at the site, draw a simple map in the space below.

Make sure you draw the locations of key features like:

- Walls, windows and doors
- Orientation to north, east, south and west
- Electrical appliances, equipment and lights

You may need to use the tools in your detective kits to find some of the electrical appliances.

LESSON 8

Write a short paragraph to conclude the investigation

Ergon Retail acknowledges the Traditional Custodians of the land on which we live and work, and recognise their continuing connection to land, waters and community. We pay respect to Elders past and present.

ergon.com.au

POWER SAVVY

ERGON ENERGY RETAIL

Part of Energy Queensland

5-25-0048