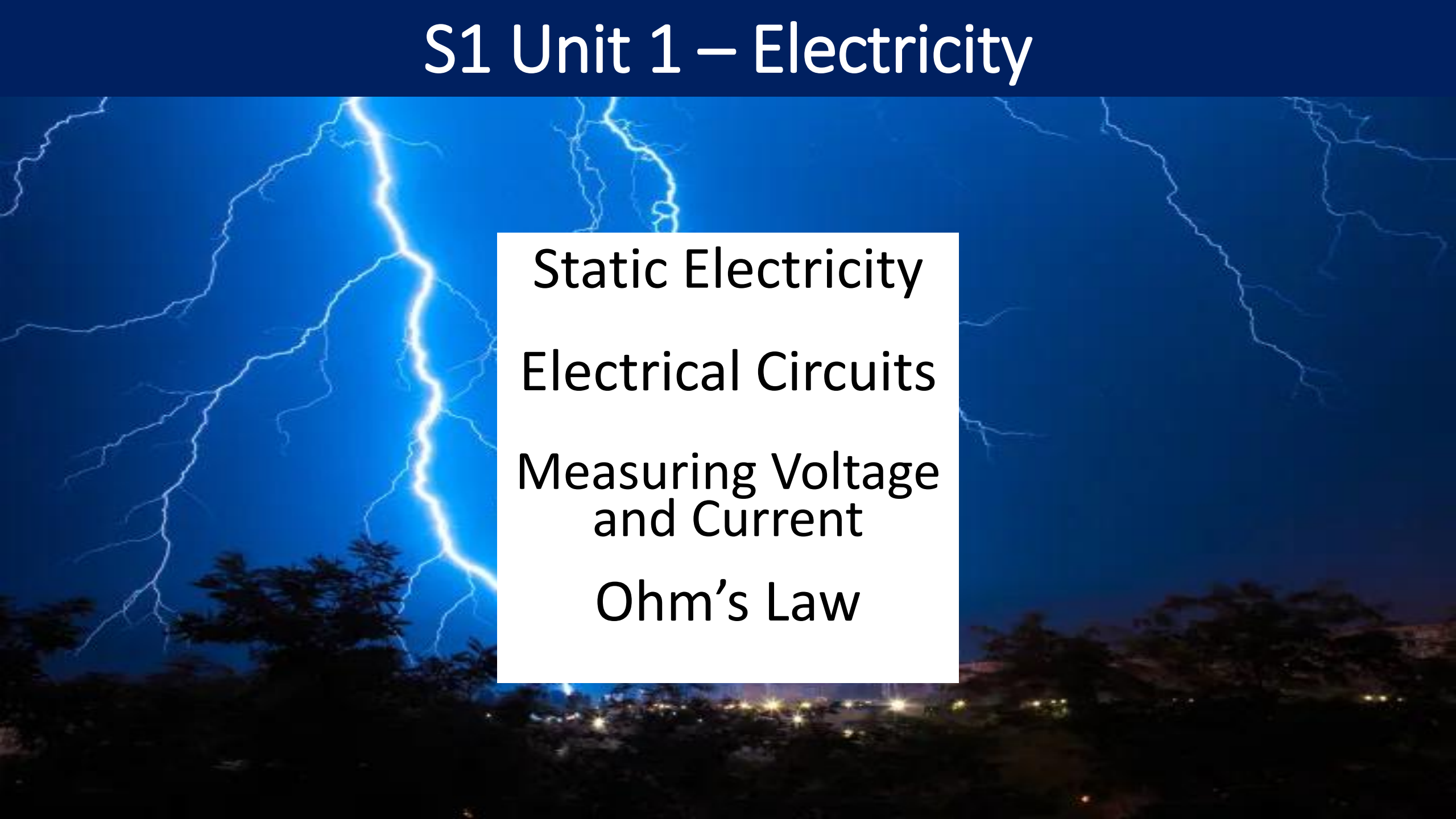


S1 Unit 1 – Electricity



Static Electricity

Electrical Circuits

Measuring Voltage
and Current

Ohm's Law

Education Scotland Experiences, and Outcomes

SCN 3-09a:

- Having measured the current and voltage in series and parallel circuits, I can design a circuit to show the advantages of parallel circuits in an everyday application.

SCN 3-10a:

- I can help to design simple chemical cells and use them to investigate the factors which affect the voltage produced.

SCN 3-04b:

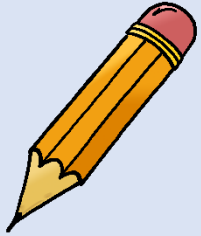
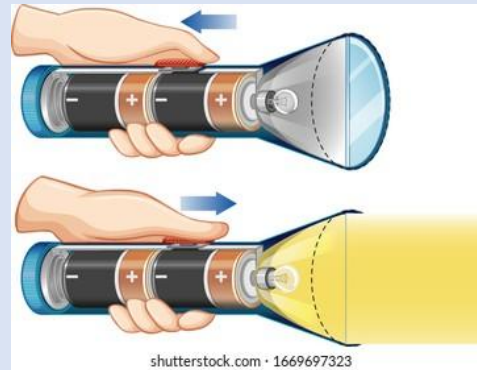
- By investigating renewable energy sources and taking part in practical activities to harness them, I can discuss their benefits and potential problems.

Starter:

Odd One Out:

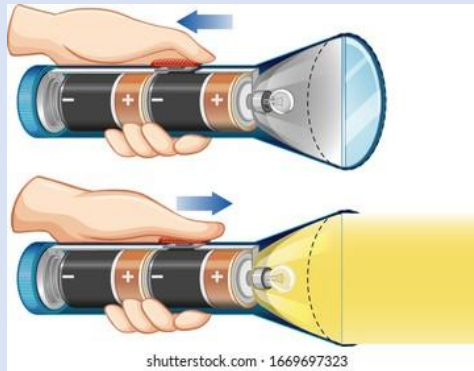
What are 3 differences
between these objects?

Write your answers
in full sentences.



Starter:

Odd One Out (Electricity):



Balloon = static electricity (charge builds up on surface)

Torch battery = safe current electricity in a closed circuit

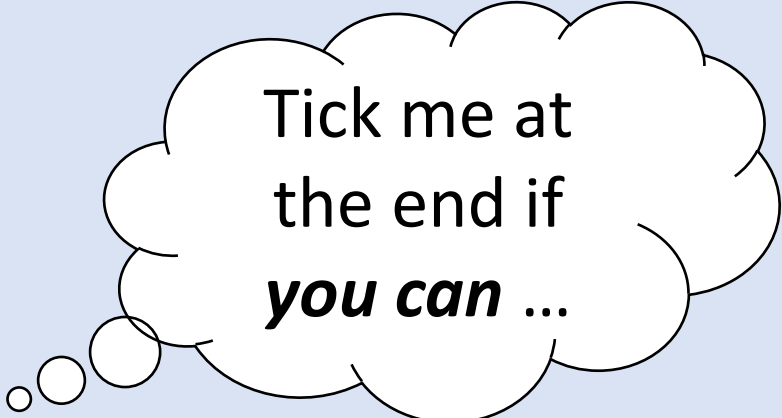
Mains socket = high voltage current electricity (dangerous, continuous flow)

Learning Intentions:

- I am learning about static electricity

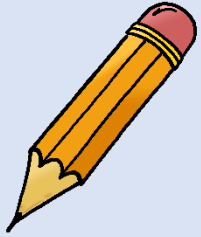
Success Criteria

- ☐ I can describe the two types of electric charge.
- ☐ I can explain how charged objects interact.
- ☐ I can explain static electricity in terms of the movement of charge.

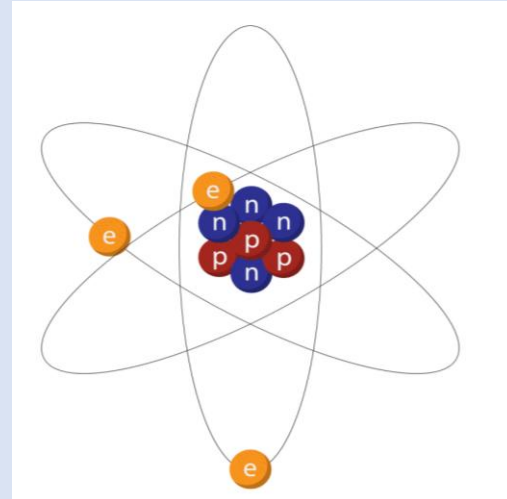


Tick me at
the end if
you can ...

All substances are made of atoms. These are often called particles.

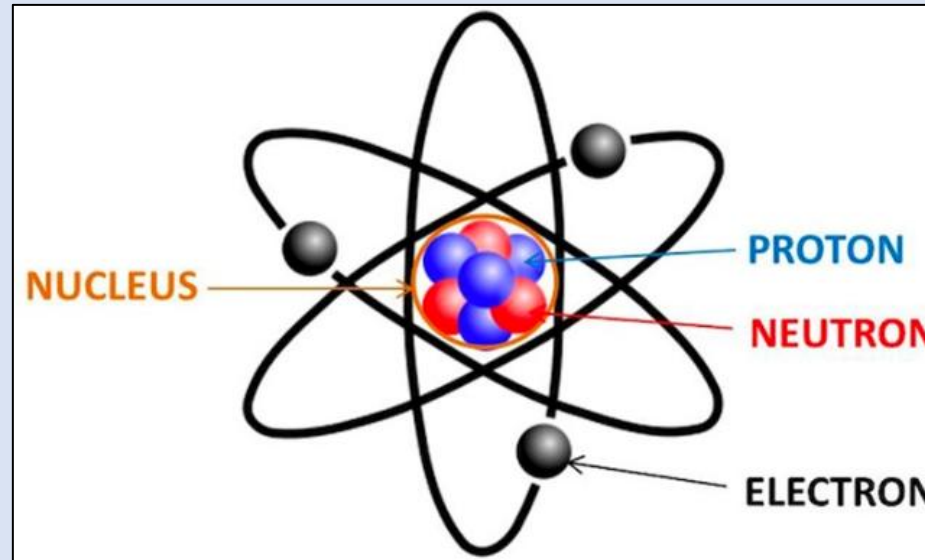


Atoms contain even smaller particles called protons, neutrons and electrons. Protons have a positive charge, electrons have a negative charge and neutrons have no charge.



If an atom **gains** an electron it becomes negatively charged.

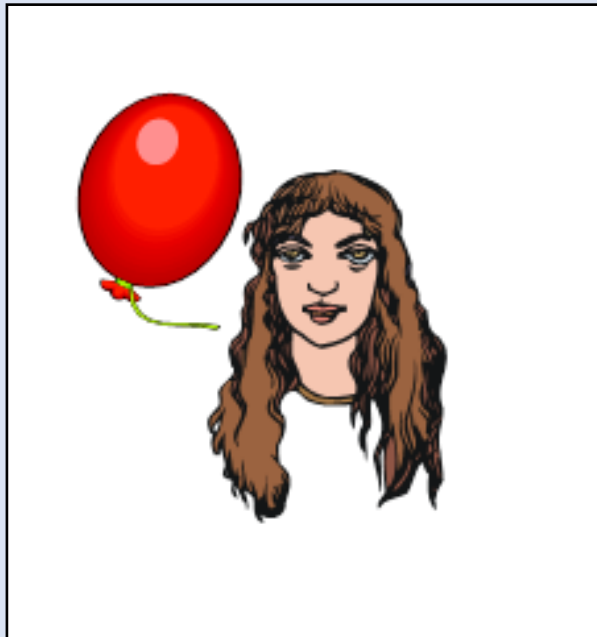
If an atom **loses** an electron it becomes positively charged.



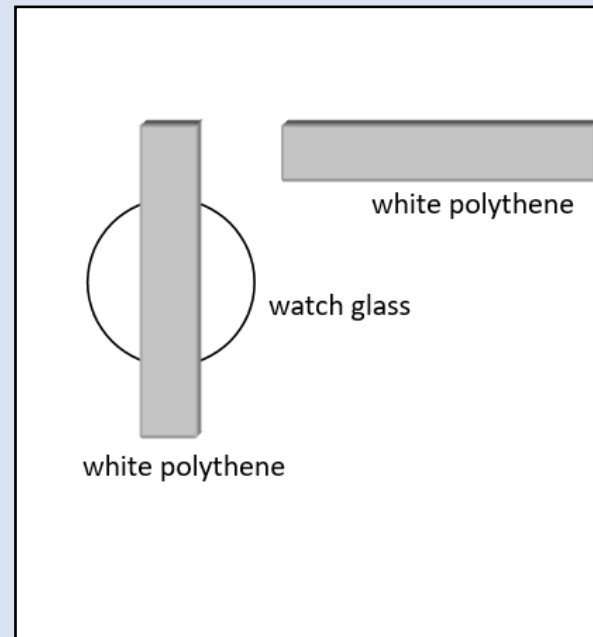
Aim: To investigate the effects of static electricity

Method:

Experiment 1



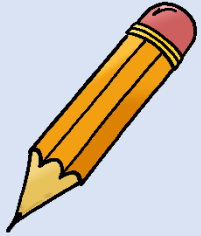
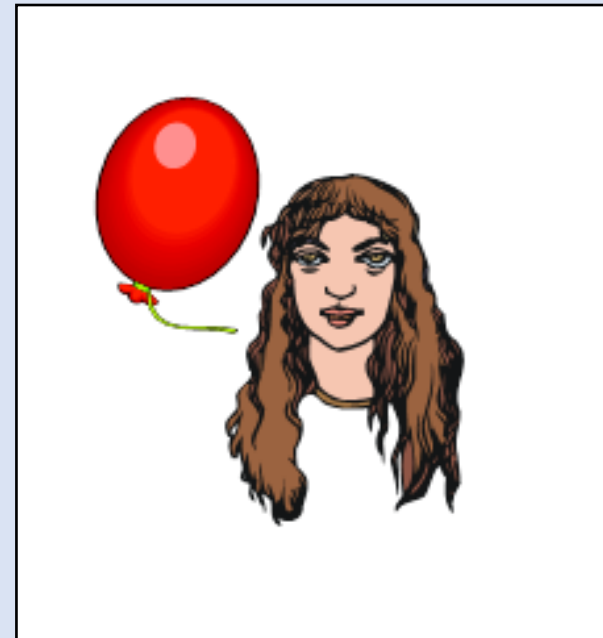
Experiment 2



Method:

1. Blow up a balloon
2. Rub the balloon on your head
3. Observe what happens

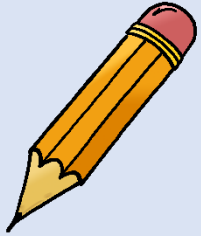
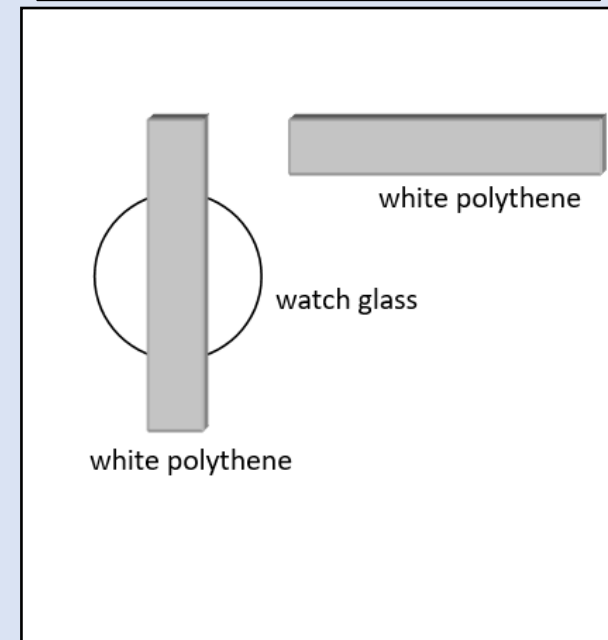
Experiment 1



Method:

1. Rub the plastic rod with the cloth
2. Place the other rod on top of a watch glass
3. Observe what happens when the rods almost touch

Experiment 2



Results: *answer the following questions*

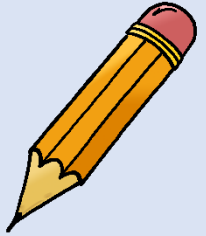
1. What happens with the hair and the balloon?

The hair is attracted to the balloon and sticks to it.

2. What happens with the rods?

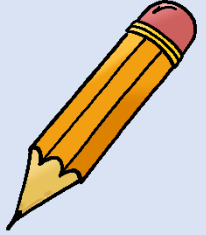
The rods either attract each other or repel each other, depending on the type of charge they have.

3. Try to explain your answers to the above questions



Results: *answer the following questions*

3. Try to explain your answers to the above questions



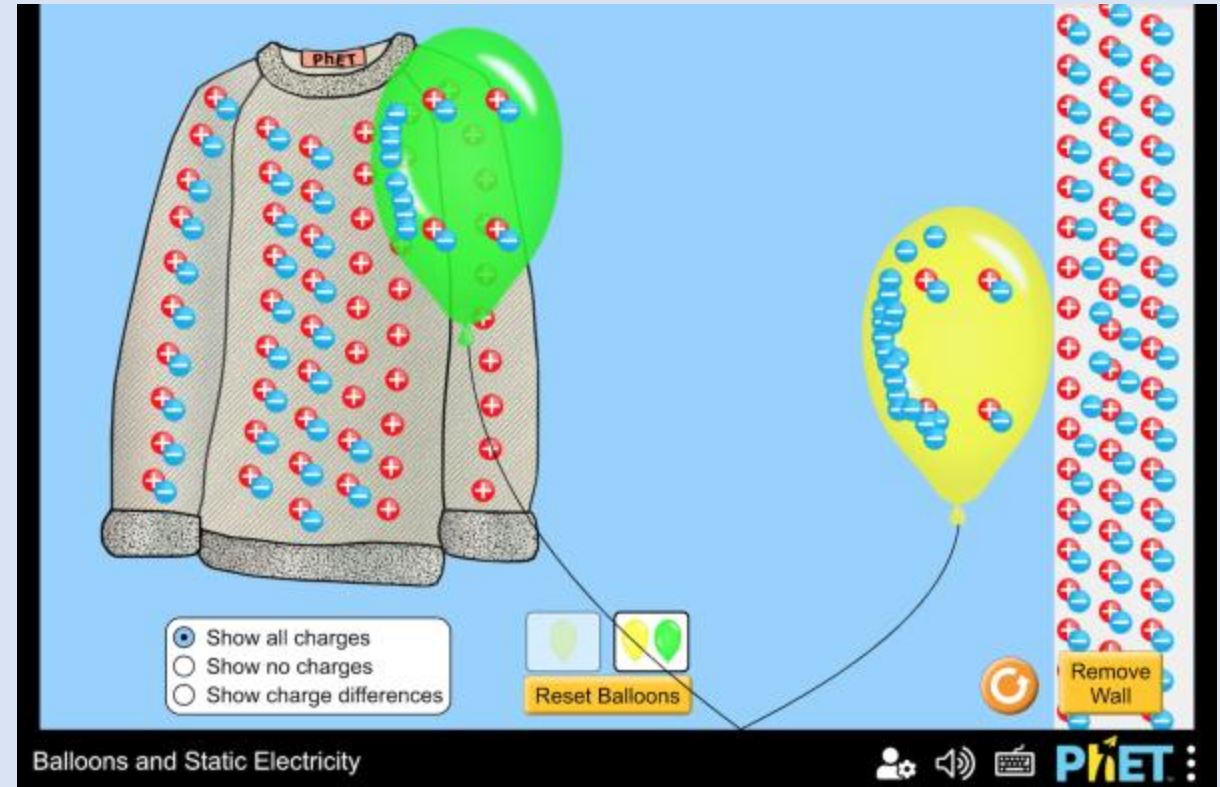
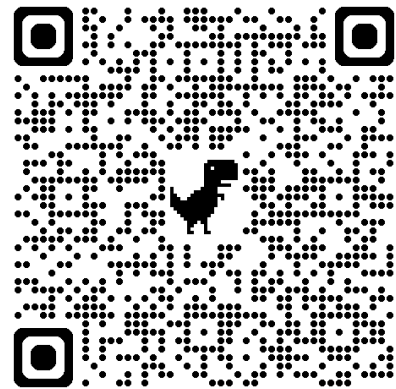
When the balloon is rubbed on hair, it becomes electrically charged. The charged balloon attracts the hair, causing it to stick to the balloon.

The rods become charged when they are rubbed. Opposite charges attract each other, while like charges repel each other.

Charged Particles

06/10/2026

- Everything has two types of particles in it, **positively** charged particles and **negatively** charged particles.
- When two objects rub together, sometimes some of the charges move from one surface to the other. They are then said to be charged.



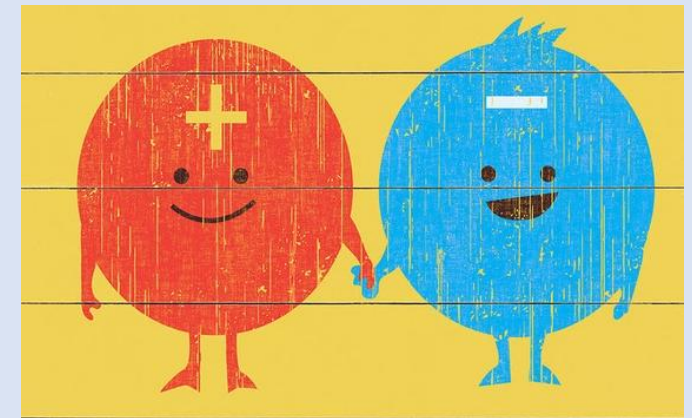
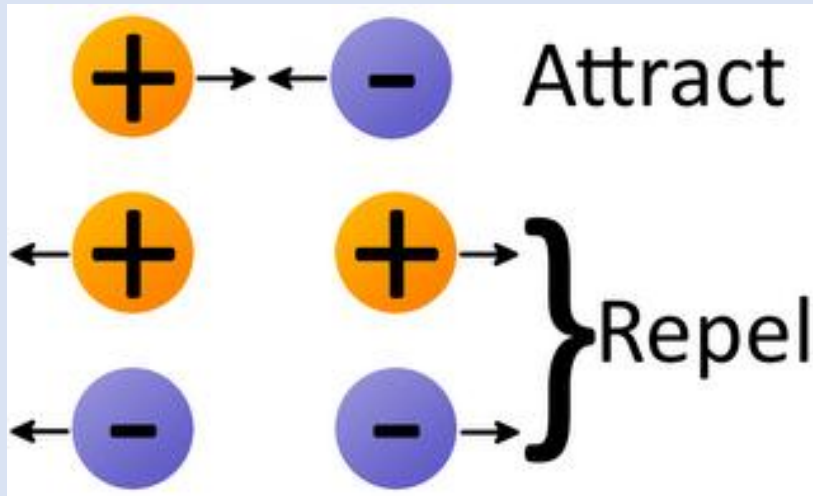
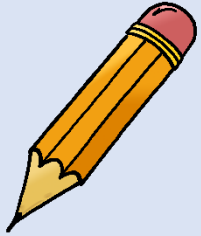
[Balloons and Static Electricity](https://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html)

https://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html

Conclusion:

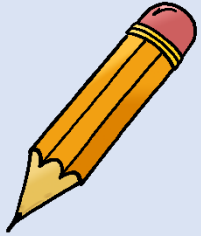
Charges that are the same repel (push away) each other.

Charges that are opposite attract (move towards) each other.

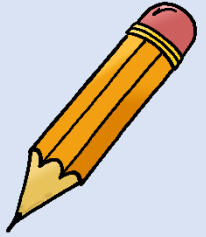


Remember! Opposites Attract

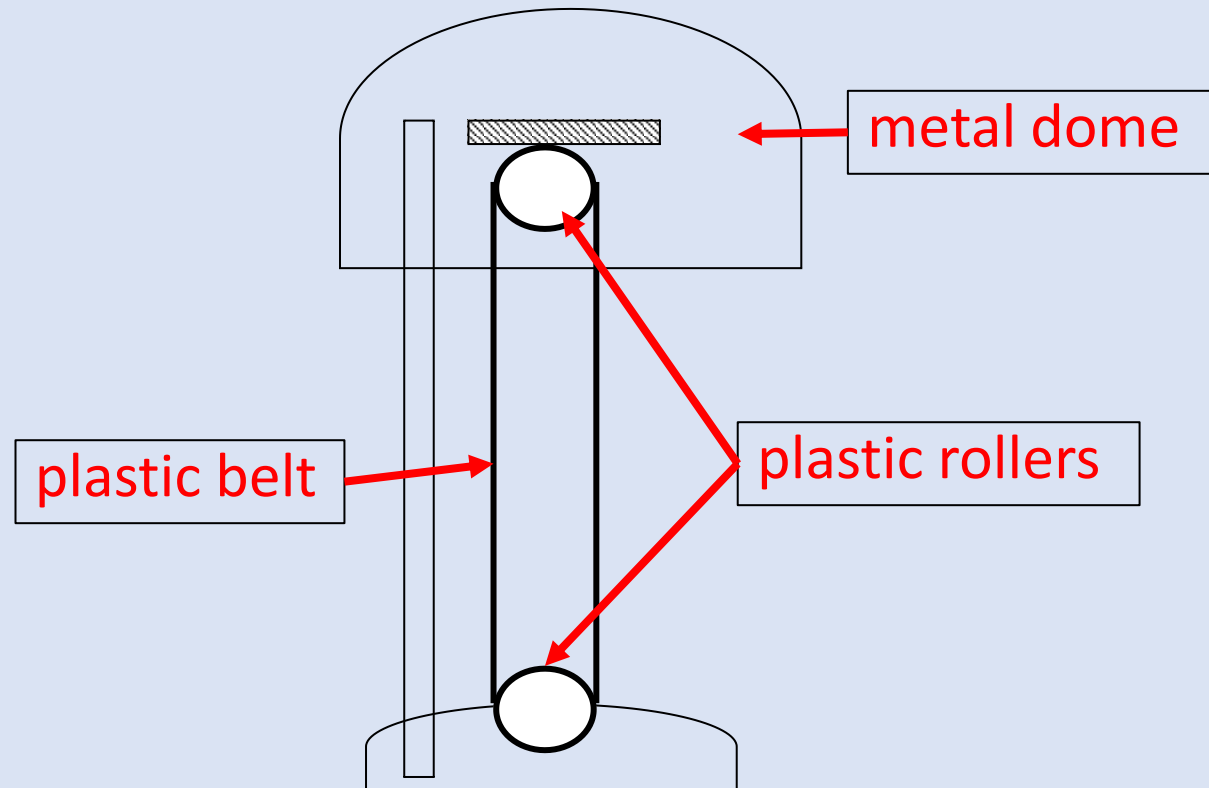
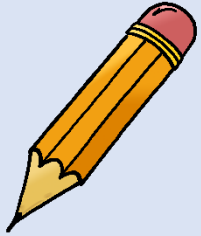
A Van de Graaff generator produces Static electricity, which makes your hair stand on end. Static electricity is caused when electrons are transferred from one insulator to another by friction. This causes an uneven number of protons and electrons in a material.



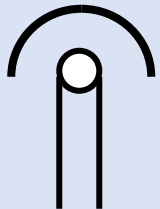
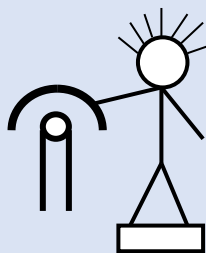
Aim: To investigate the effects of a Van de Graaff generator on different objects

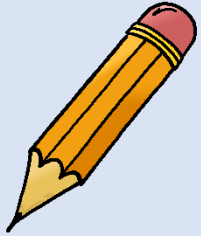


Method: *draw a labelled diagram of the Van de Graaff Generator.*



Results:

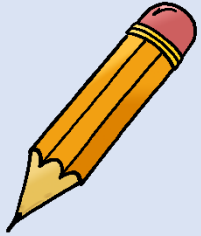
Experiment	Describe what you saw
Foil cups 	
Sawdust 	
Hair 	



Use words like positive, negative, attract and repel in your explanations

Conclusion:

When two different materials are rubbed together they can become electrically charged.



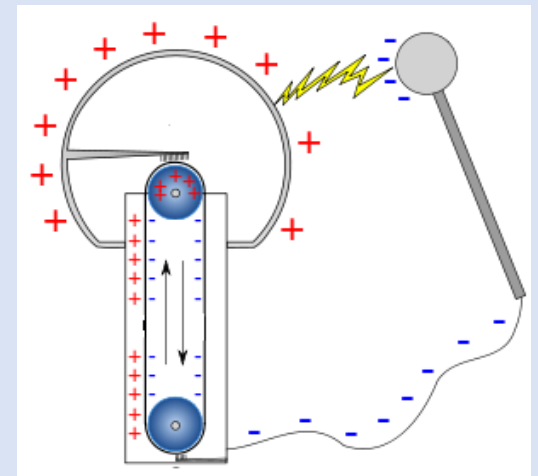
Electrically charged objects can move other objects.

A positively charged object and a negatively charged object will attract.

Two positively charged objects will repel

Two negatively charged objects will repel

Word bank: move, repel, rubbed, positively, repel, negatively



Plenary:

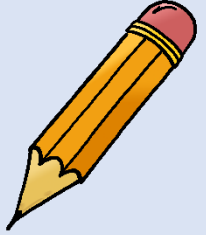
Page 7

Explain static electricity in terms of charge!

Static electricity happens when electric charges build up on an object. When two objects are rubbed together, electrons are transferred from one object to another.

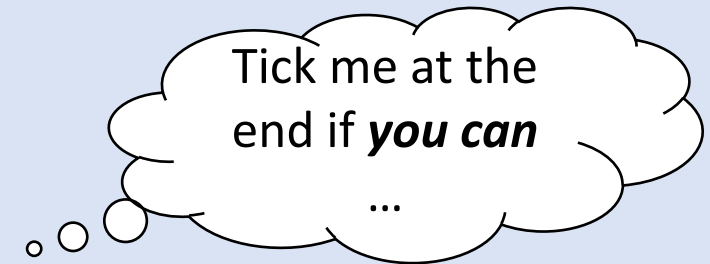
Objects with opposite charges attract each other, and objects with the same charge repel each other.

That attraction or repulsion of charges is what we call static electricity.



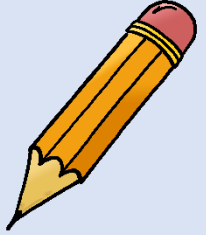
Success Criteria

- ☐ I can describe the two types of electric charge.
- ☐ I can explain how charged objects interact.
- ☐ I can explain static electricity in terms of the movement of charge



Starter:

When you flip a light switch on, the room instantly lights up. How do you think the switch tells the light bulb to turn on? Write or draw your answer below:



When the switch is turned on, electricity can flow through the wires. The electricity travels to the light bulb and makes it light up straight away.

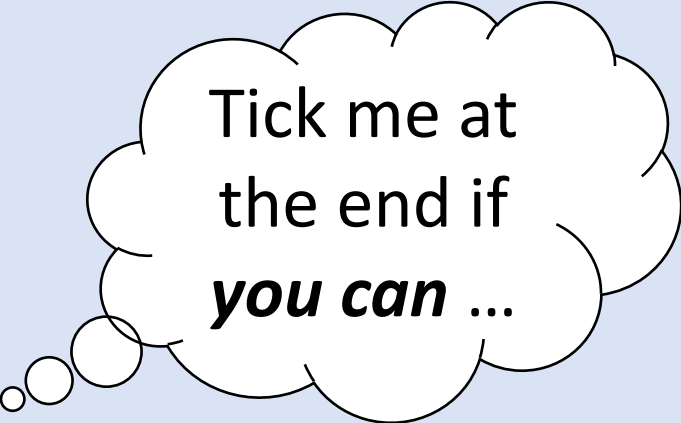


Learning Intentions:

- I am learning about drawing electrical circuits.

Success Criteria

- ☐ I can identify and use symbols for components in electrical circuits.
- ☐ I can draw simple electrical circuits.

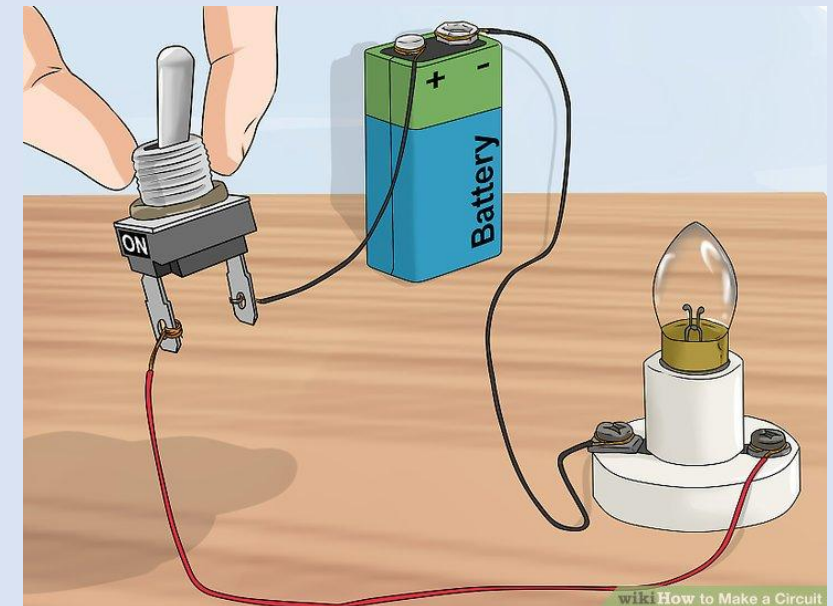


Tick me at
the end if
you can ...

Items that are connected into an electrical circuit are called **components**.

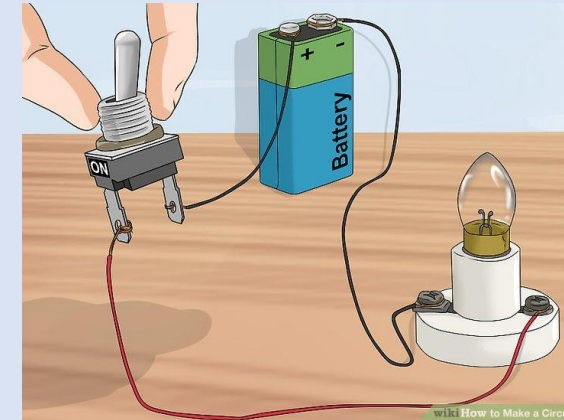
1. Why is a circuit called a circuit?
2. What do you need to make a circuit work?
3. Can you recognize and draw the circuit symbols correctly?

1. A circuit is called a circuit because electricity travels in a complete loop or path.
2. A power source (battery/cell), wires, a components (e.g. bulb), and a closed circuit.



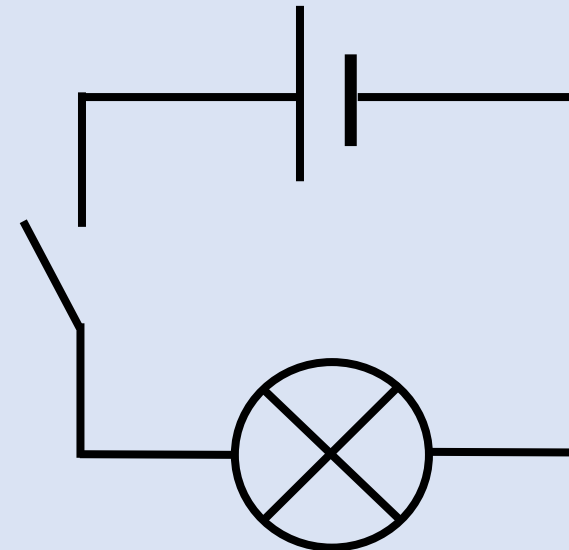
Pictures are:

- difficult to draw
- not always easy to understand



Symbols are:

- easy to draw
- easy to understand

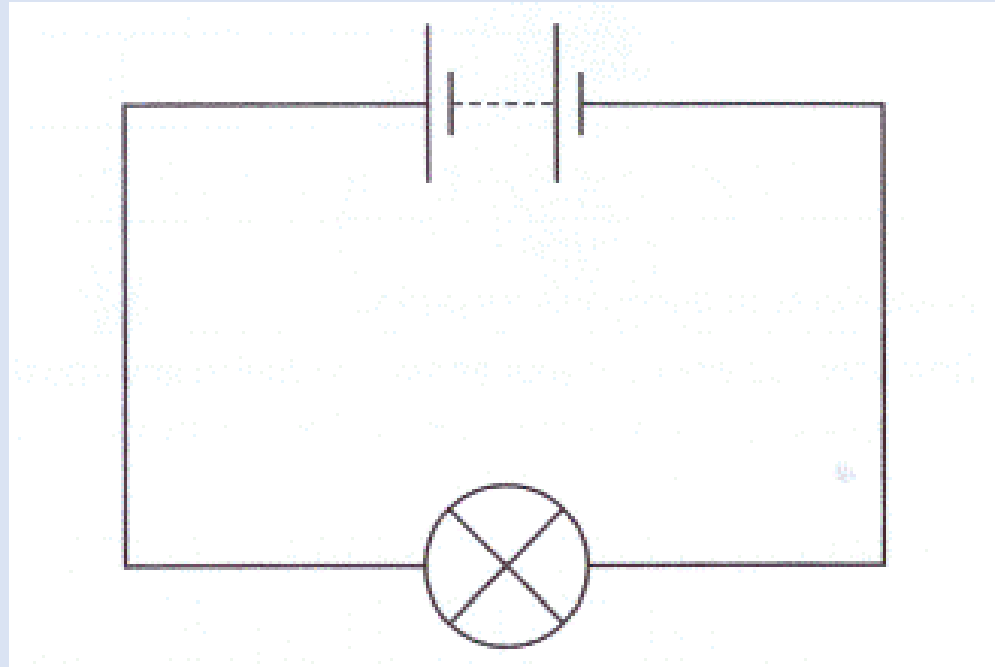


Circuit Diagrams

06/10/2026

When we draw circuits, we draw them like so:

Battery



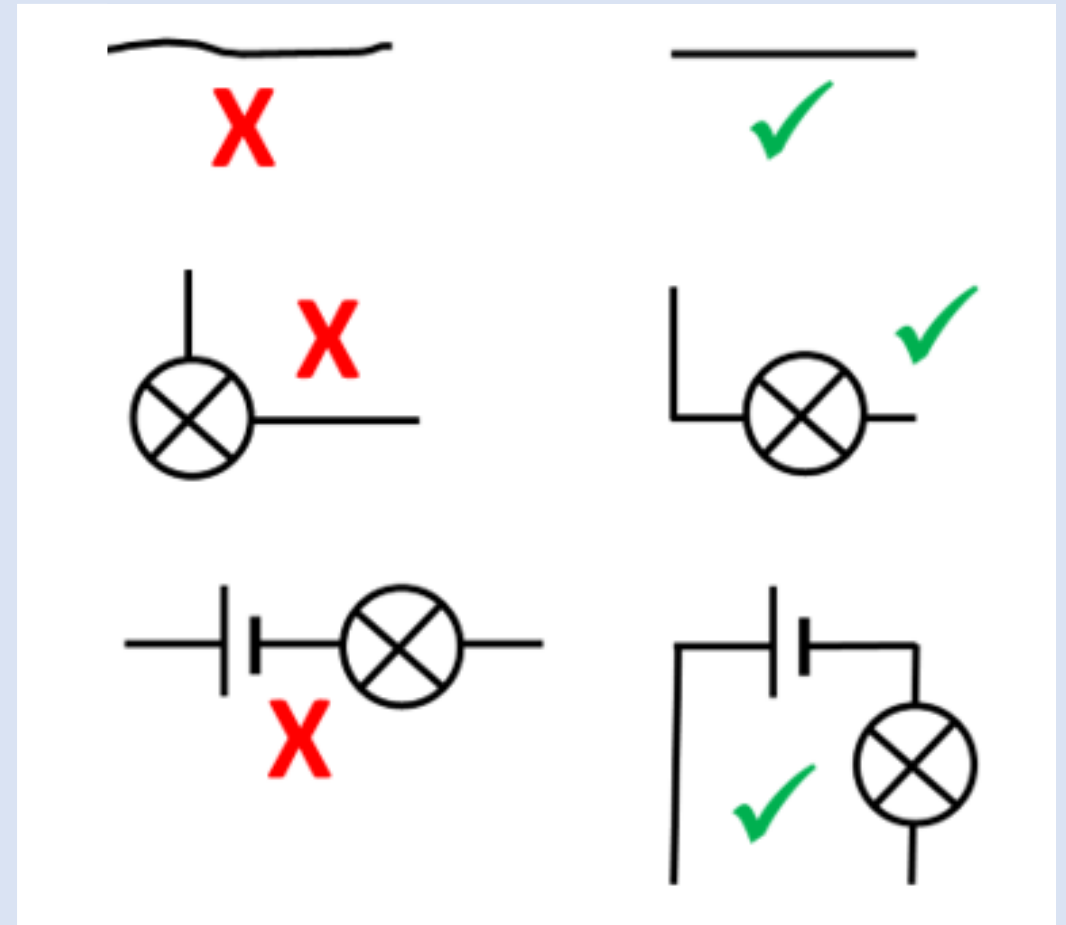
Lamp

When you are drawing a circuit diagram, there are some basic rules to follow:

Connecting wires are drawn with a ruler...

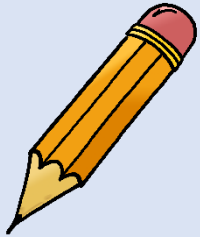
Wires turn corners, components don't...

The battery is usually on the top line of the diagram, on its own.



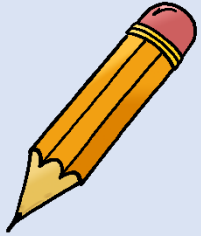
Electrical Symbols

Page



Draw the correct symbol for each of the components.

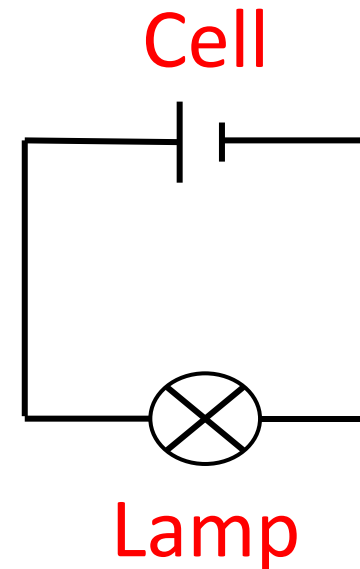
Component Name	Picture	Symbol
Cell		
Battery (of cells)		
Connecting wire		
Lamp		
Switch		
Resistor		
Ammeter		
Voltmeter		



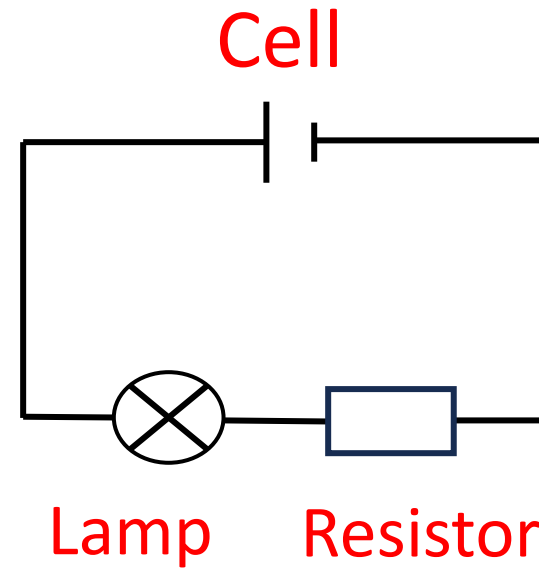
Components

Circuit Diagram

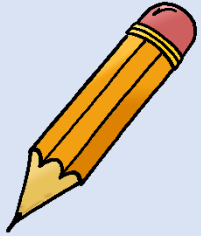
Cell and a lamp



Remember to label
your components

Components	Circuit Diagram
Cell, lamp and resistor	 The diagram shows a rectangular circuit loop. At the top is a cell, represented by two parallel lines of unequal length, with the word "Cell" in red text above it. On the left vertical wire is a lamp, represented by a circle with a cross inside, with the word "Lamp" in red text below it. On the bottom horizontal wire is a resistor, represented by a rectangle, with the word "Resistor" in red text below it. The right vertical wire is a simple connecting line.

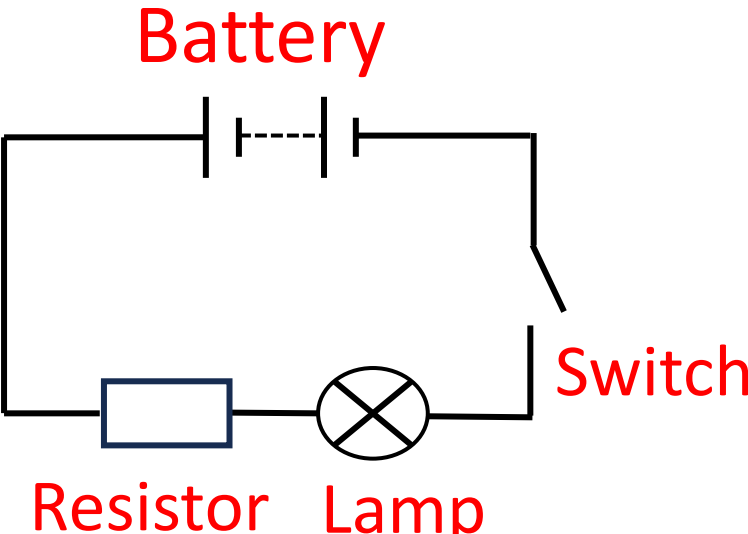
Remember to label
your components



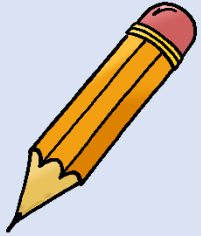
Circuit Diagrams

06/10/2026

Page 10

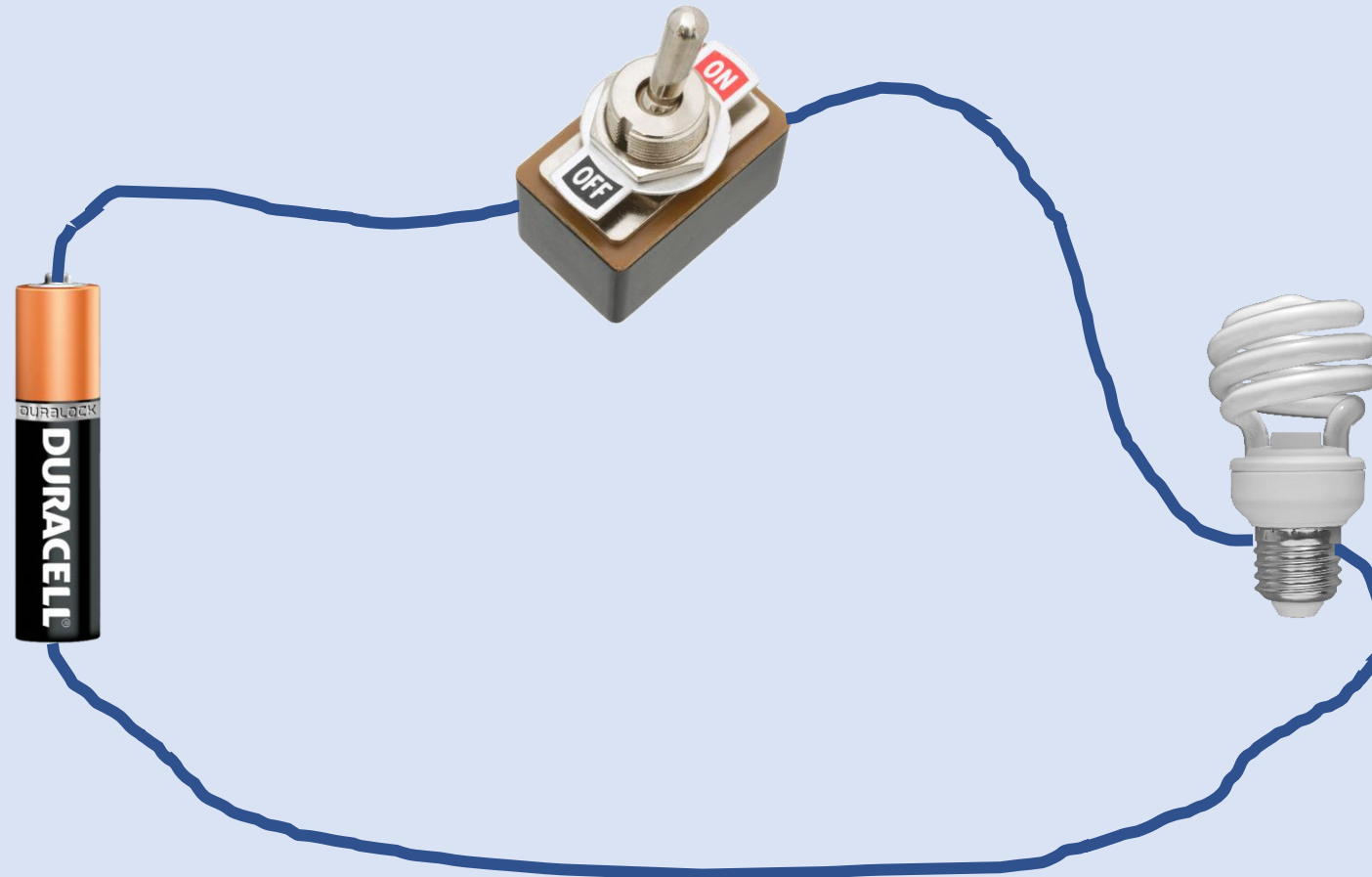
Components	Circuit Diagram
Battery, resistor, lamp and switch	 The diagram shows a single loop circuit. At the top is a battery symbol with the label 'Battery' in red above it. On the right side is an open switch with the label 'Switch' in red to its right. At the bottom, a resistor (represented by a rectangle) and a lamp (represented by a circle with an 'X' inside) are connected in series. The label 'Resistor' is in red below the rectangle, and the label 'Lamp' is in red below the circle.

Remember to label
your components



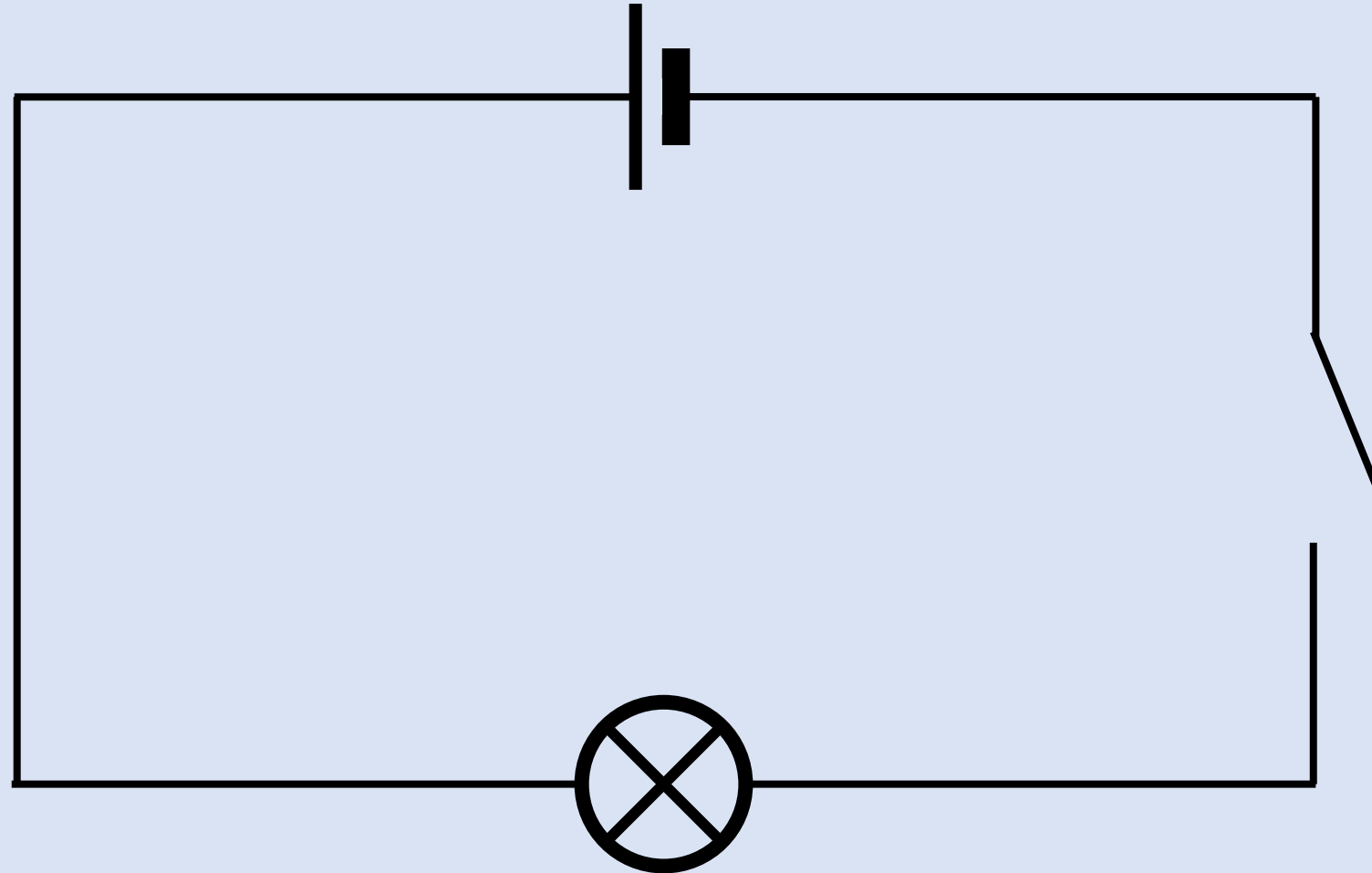
Extra Practice: Circuit Diagrams

On your show me boards, draw this circuit



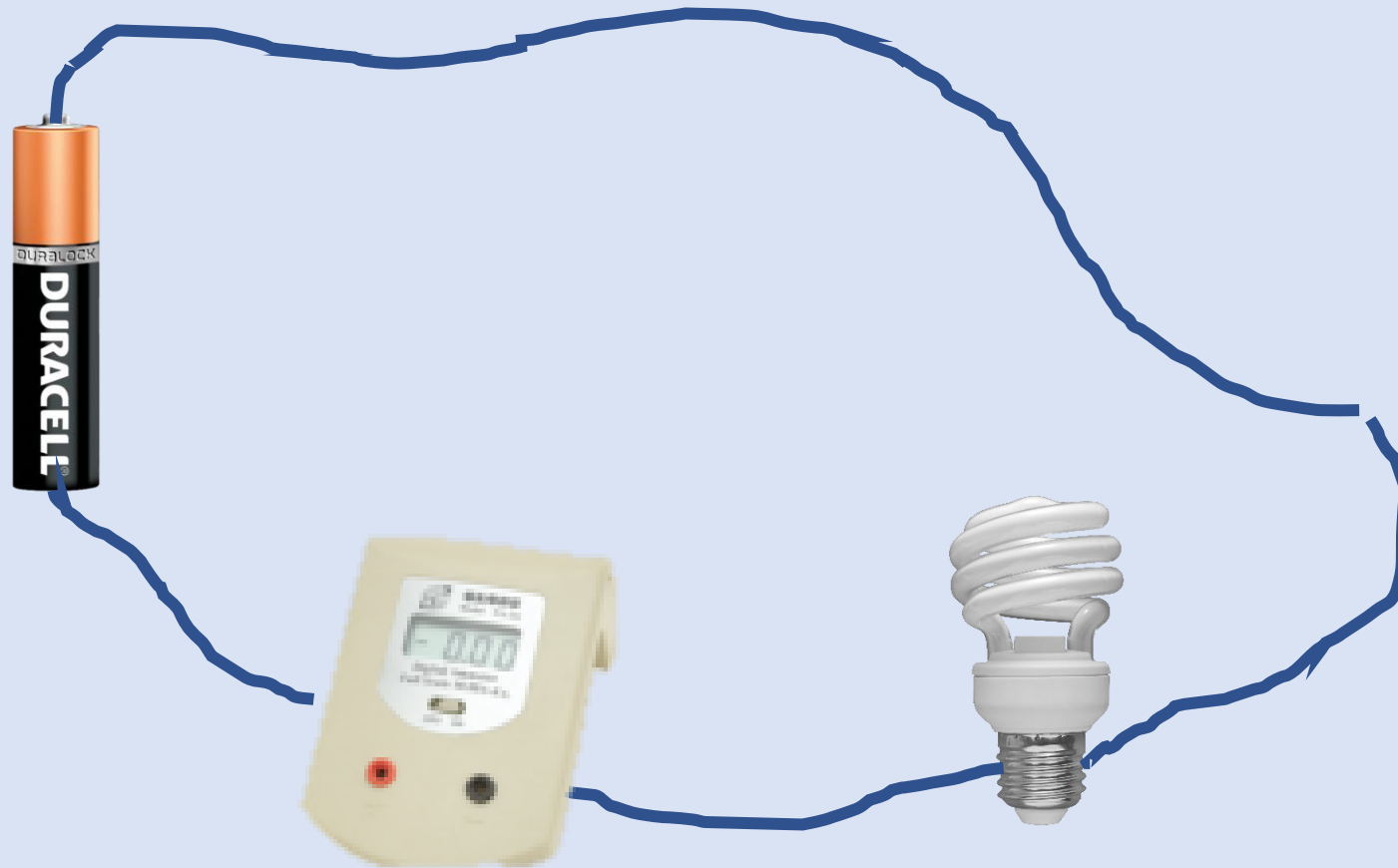
Extra Practice: Circuit Diagrams 06/10/2026

Answer



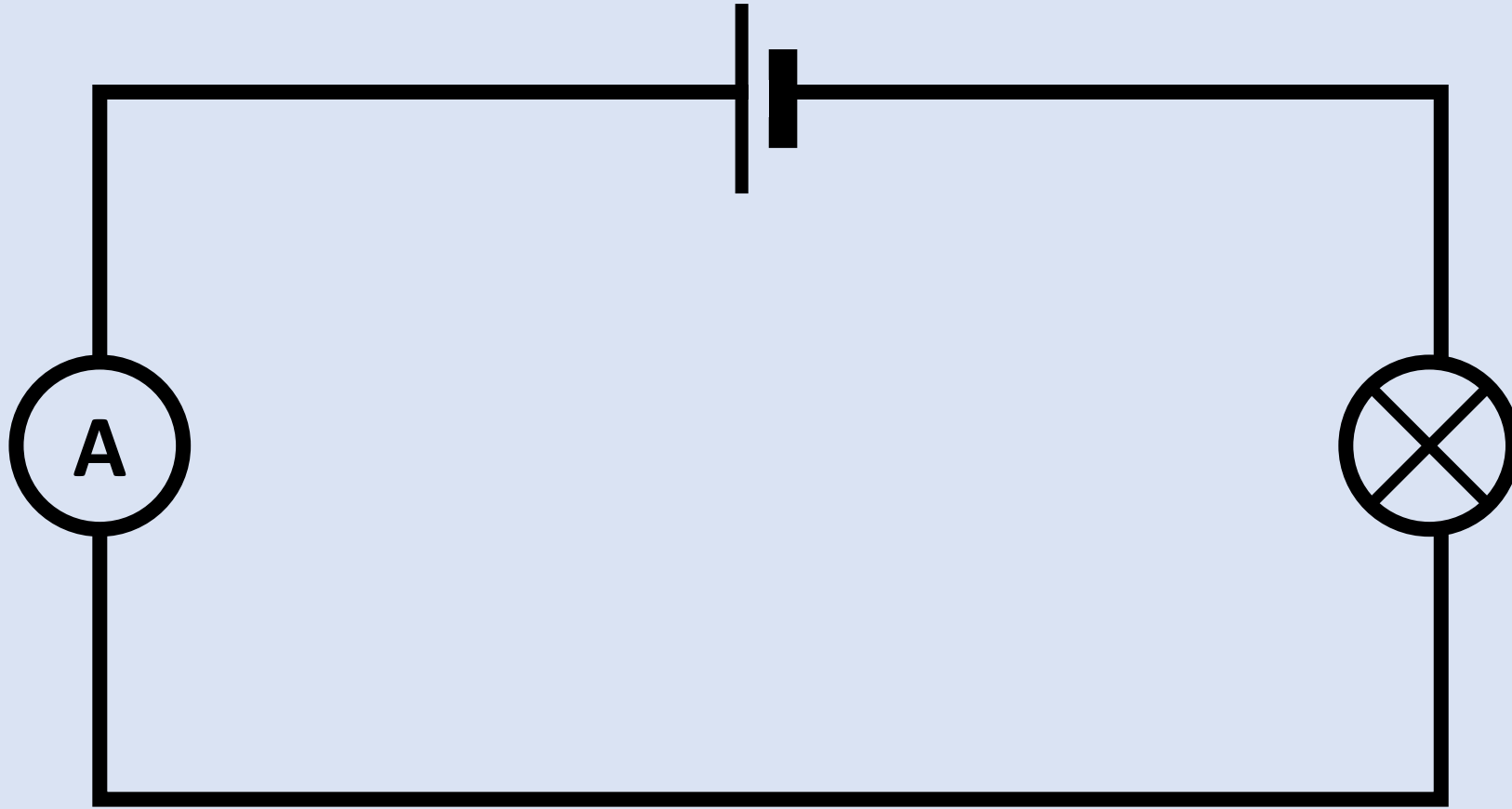
Extra Practice: Circuit Diagrams

On your show me boards, draw this circuit



Extra Practice: Circuit Diagrams 06/10/2026

Answer



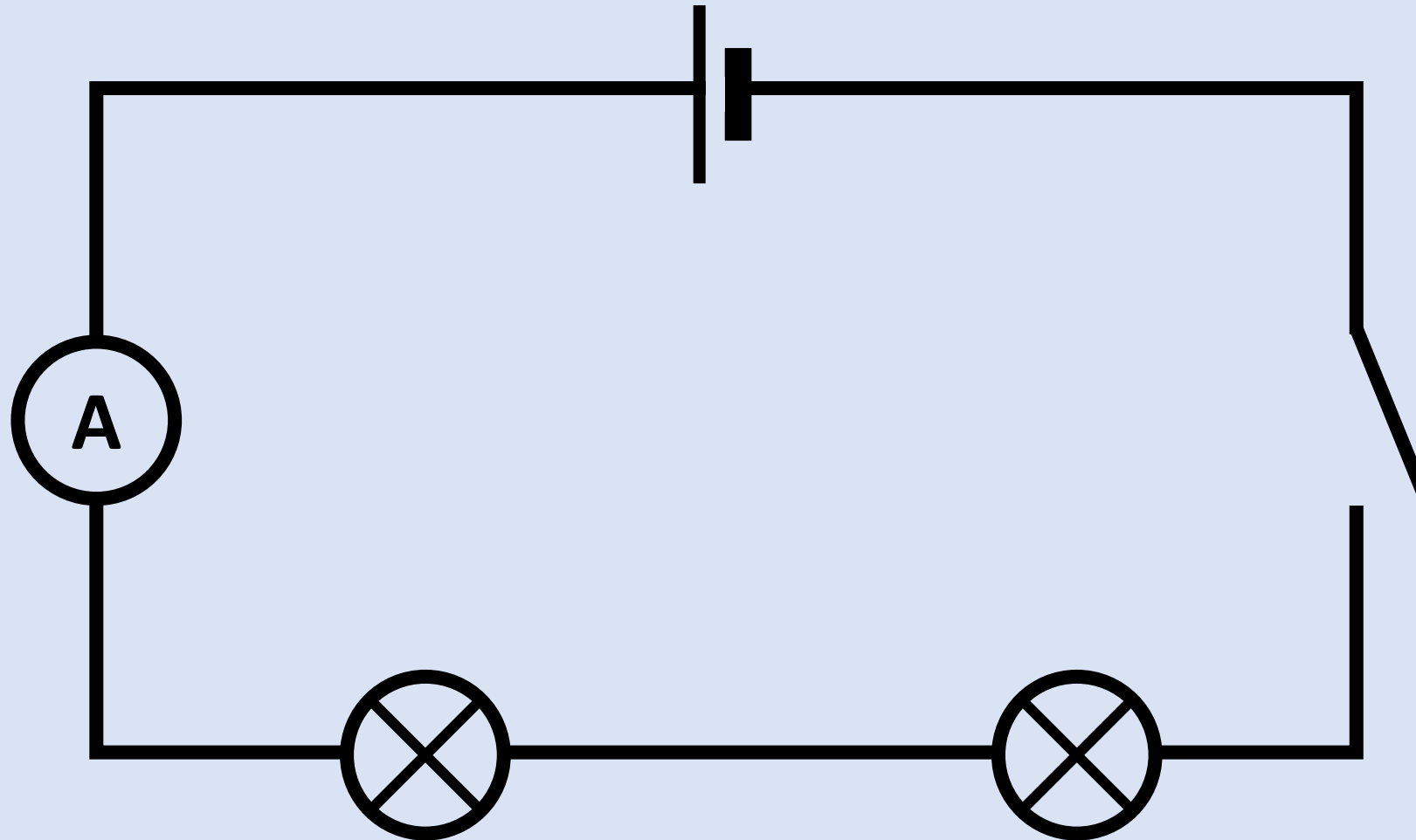
Extra Practice: Circuit Diagrams

On your show me boards, draw this circuit



Extra Practice: Circuit Diagrams 06/10/2026

Answer



Design a circuit for your partner

- Describe a circuit to your partner and get them to draw what you describe on a Show Me Board.
- You are not allowed to start drawing until the person has finished describing the circuit.



The Story of Electricity

Activity: Watch the video and note down three facts

Shock and Awe - Spark

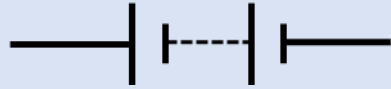


Be
prepared
to share!



[Shock and Awe: The Story of Electricity- Spark \(1 of 3\) - video Dailymotion](#)

Plenary: Match the components to the circuit symbol



Switch



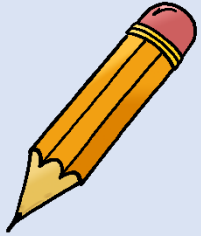
Ammeter



Battery



Lamp



Success Criteria

- ☐ I can identify and use symbols for components in electrical circuits.
- ☐ I can draw simple electrical circuits.

Tick me at the
end if ***you can***

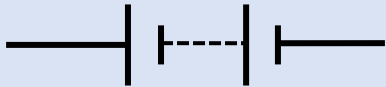
...

Starter:

1. What symbol do we use to represent a lamp?



2. What symbol do we use to represent a battery?

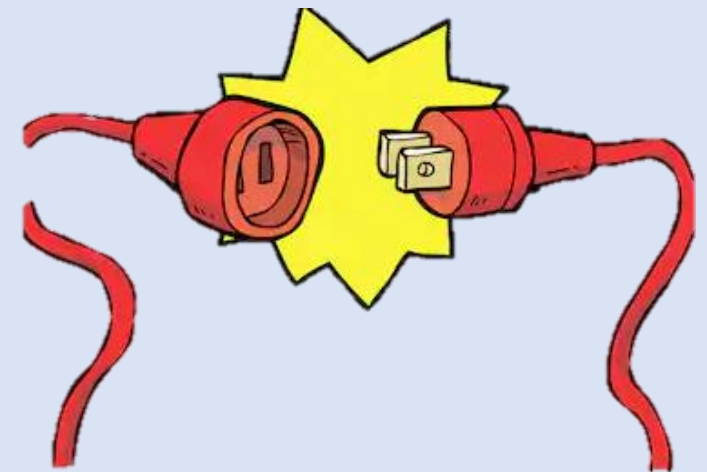
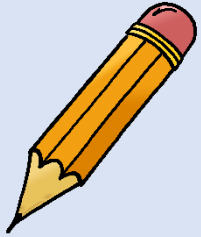


3. What symbol do we use to represent a switch?



4. When we draw wires, what do we need to use?

A ruler!

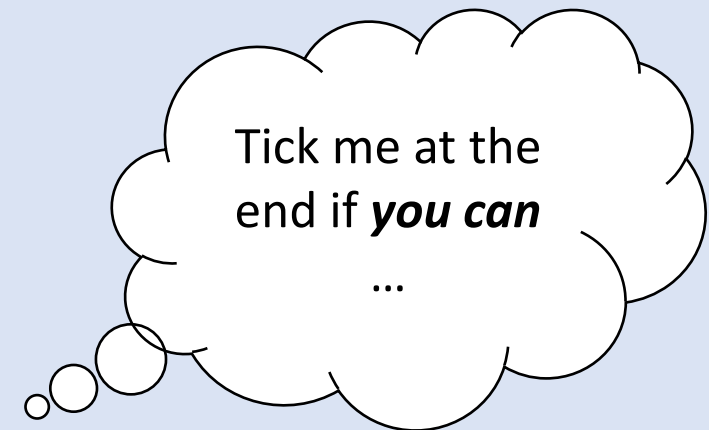


Learning Intentions:

- I am learning about series circuits.

Success Criteria

- ☐ I can describe what a series circuit is.
- ☐ I can identify and use symbols for components in electrical circuits.
- ☐ I can draw and build simple electrical circuits.

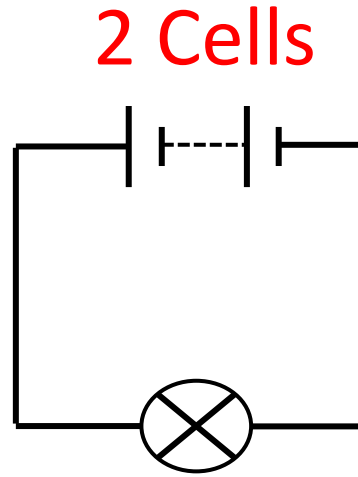


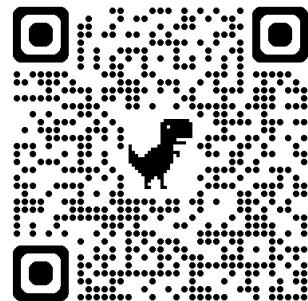
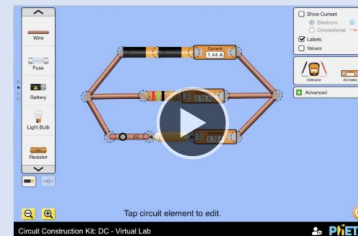
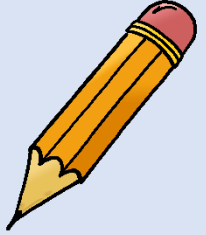
Lamps in a Series Circuit

06/10/2026

Draw and build each of these series circuits and answer the questions

Page 11

Components	Circuit Diagram
2 Cells and 1 lamp	 A circuit diagram showing a rectangular loop. At the top, two cells are connected in series, with the text "2 Cells" in red above them. At the bottom, a single lamp is represented by a circle with an 'X' inside, with the text "1 Lamp" in red below it. The left and right sides of the rectangle are simple vertical lines representing wires.

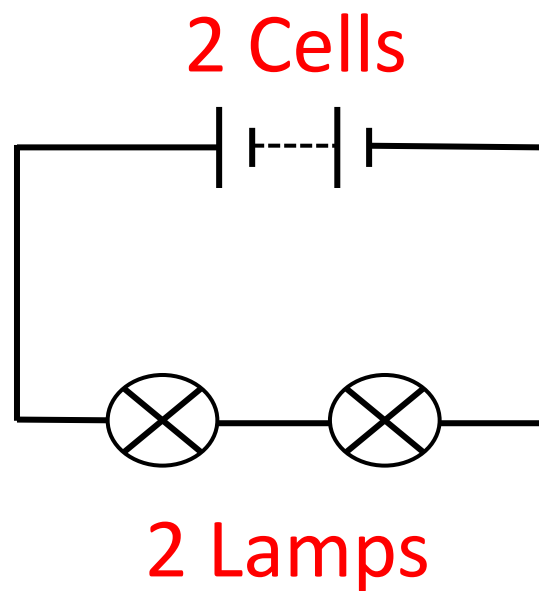


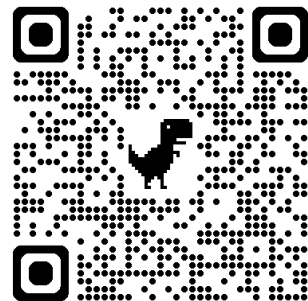
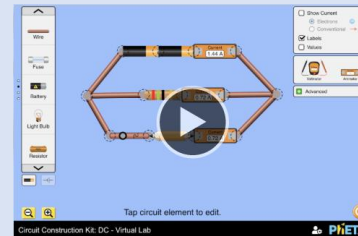
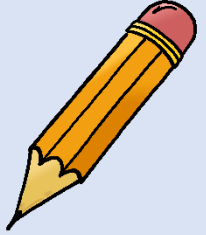
Lamps in a Series Circuit

06/10/2026

Draw and build each of these series circuits and answer the questions

Page 11

Components	Circuit Diagram
2 Cells and 2 lamps	 The diagram shows a rectangular series circuit. At the top, two cells are connected in series, labeled "2 Cells" in red. At the bottom, two lamps (represented by circles with an 'X') are connected in series, labeled "2 Lamps" in red. The circuit is completed by vertical wires on the left and right sides.

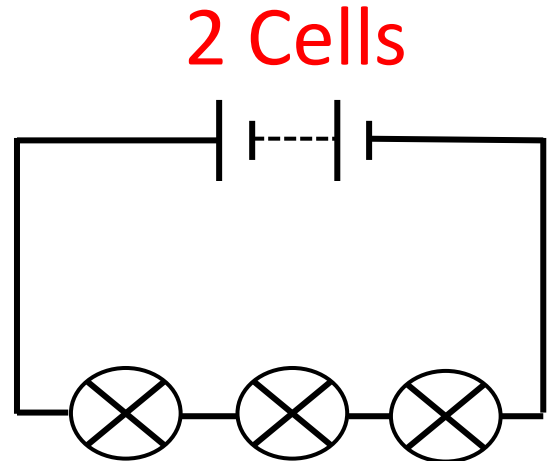


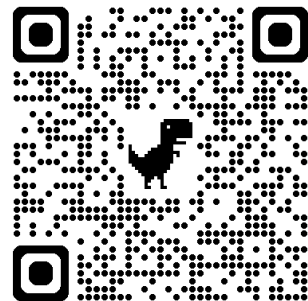
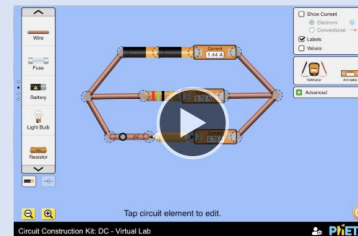
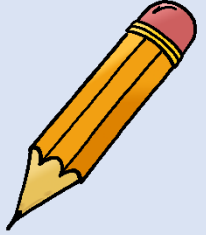
Lamps in a Series Circuit

06/10/2026

Draw and build each of these series circuits and answer the questions

Page 12

Components	Circuit Diagram
2 Cells and 3 lamps	 The diagram shows a series circuit. At the top, two cells are connected in series, labeled "2 Cells" in red. Below them, three lamps are connected in series, labeled "3 Lamps" in red. The circuit is a single loop connecting the cells and lamps.



1. What happens when you add more lamps to your circuit?

The lamps get dimmer.

2. Try to explain your answer to question 1.

Because the current is shared between more components.

3. (a) What happens when you unscrew one of the bulbs?

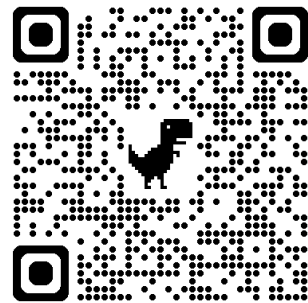
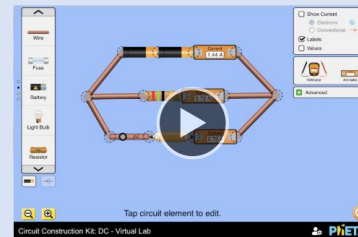
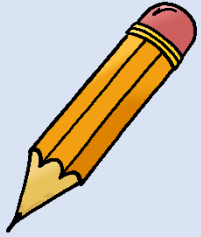
The circuit is broken, so all the bulbs go out.

- (b) Does it matter which bulb you unscrew?

No, it does not matter

4. Try to explain your answer to question 3.

Unscrewing any bulb breaks the circuit, so all lights switch off.



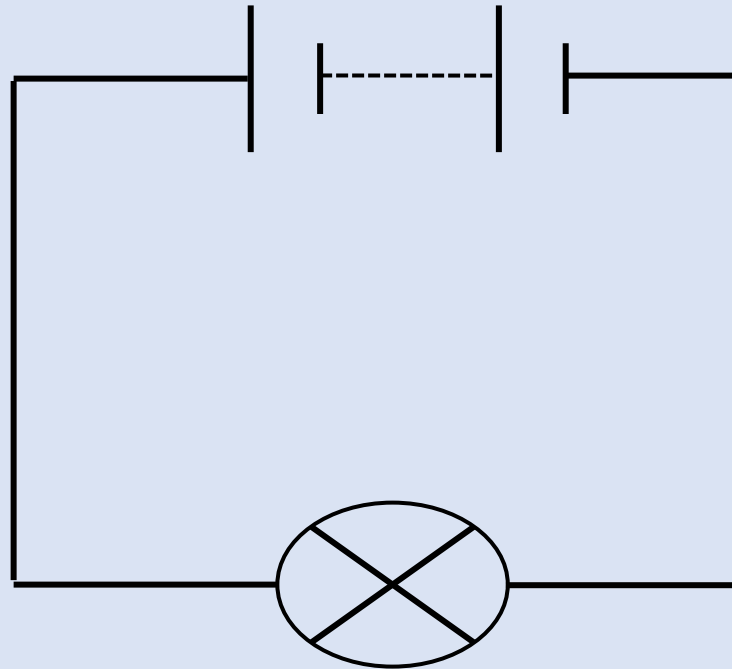
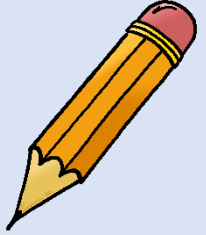
Lamps in a Series Circuit

06/10/2026

Page 12

This circuit has only ONE loop.

This is called a series circuit.

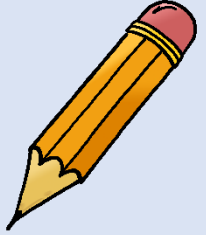


Cells (extension)

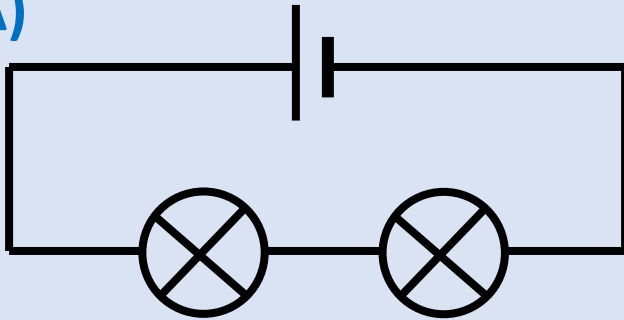
06/10/2026

Draw each circuit, then build and answer the questions.

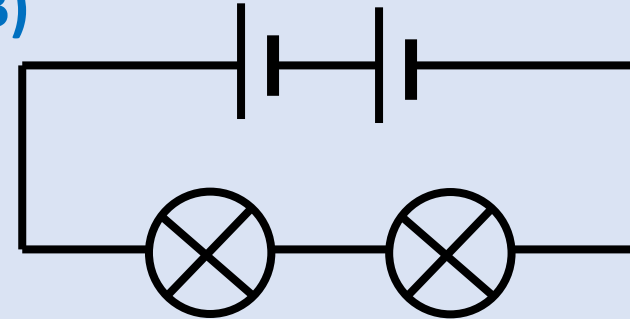
Page 13



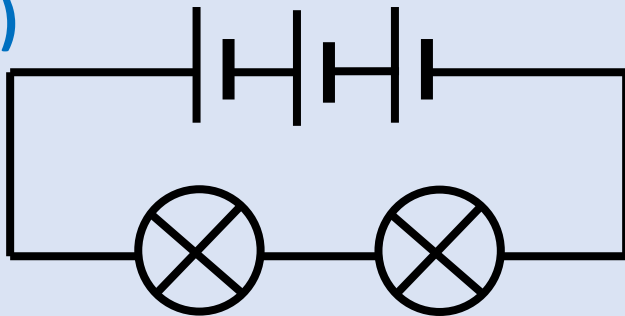
(A)



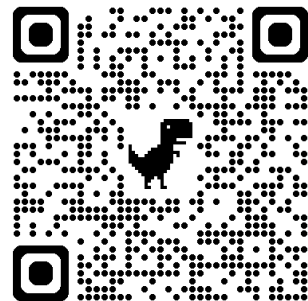
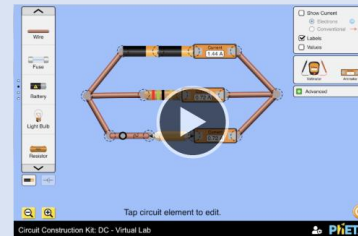
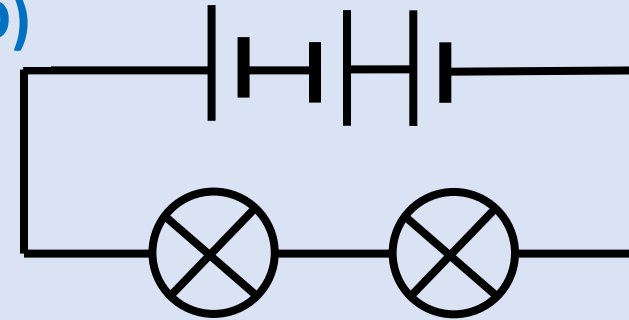
(B)



(C)



(D)



Draw each circuit, then build and answer the questions.

Page 13

1. What happens to the lamps when you add more cells?

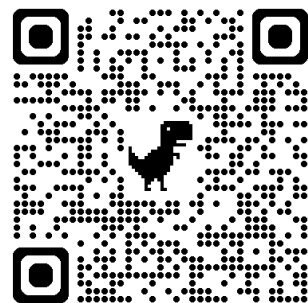
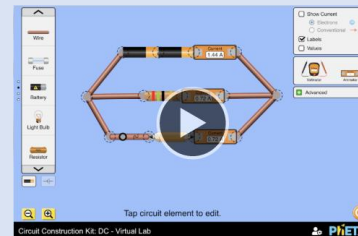
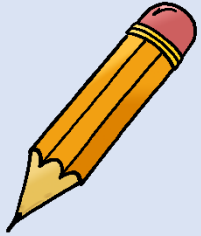
The lamps get brighter because there is more voltage and more current in the circuit.

2. What happens when you turn one cell around?

The lamps get dimmer or may not work because the cells are working against each other.

3. Try to **explain** your answers to questions 1 and 2.

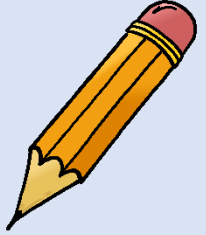
Adding more cells increases the energy in the circuit, making lamps brighter. Turning a cell around reduces or cancels the voltage, so less current flows.



Plenary:

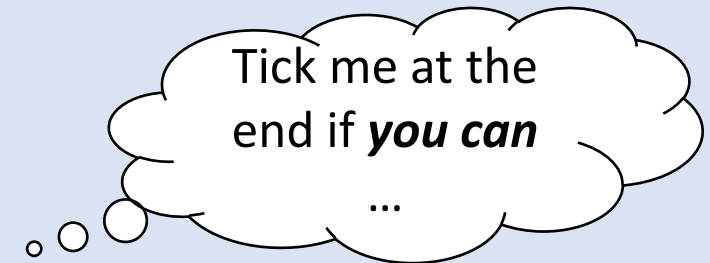
What do you know now about series circuits, that you did not know at the start of the lesson?

Page 13



Success Criteria

- ☐ I can describe what a series circuit is.
- ☐ I can identify and use symbols for components in electrical circuits.
- ☐ I can draw and build simple electrical circuits.



Starter:

1. What happened to the brightness of the lamps when we added more cells to the series circuit?

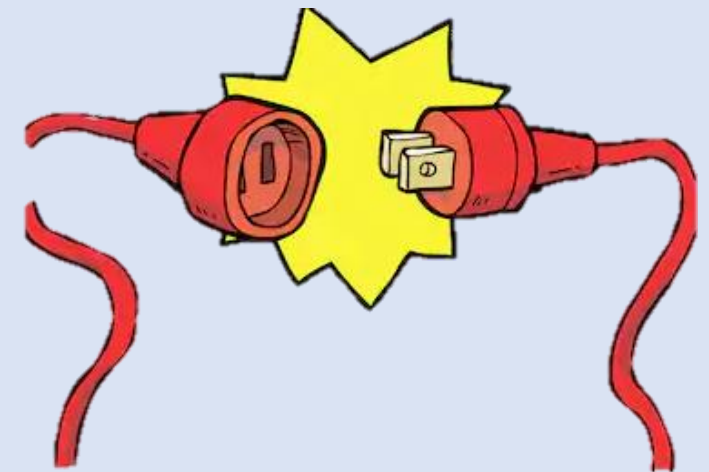
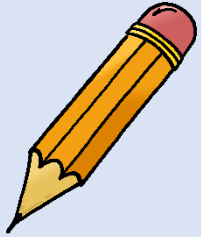
The lamps became brighter.

2. Why?

Because there is more power (voltage), so more electricity flows.

3. What do we mean by a 'series circuit'?

A circuit with one path for the electricity.

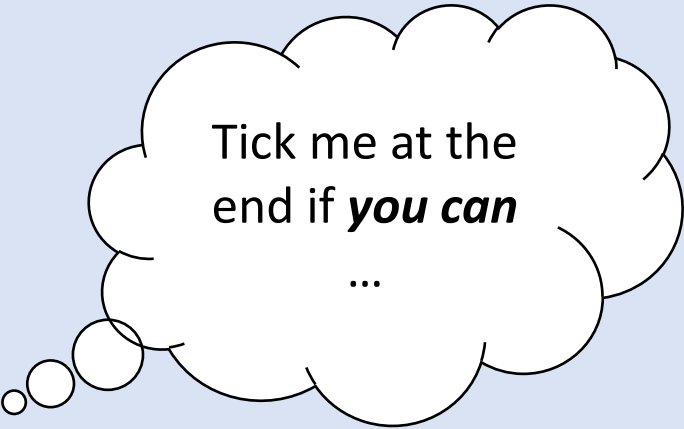


Learning Intentions:

- I am learning about parallel circuits.

Success Criteria

- ☐ I can describe the difference between a parallel and a series circuit.
- ☐ I can build a parallel circuit.



Tick me at the
end if ***you can***

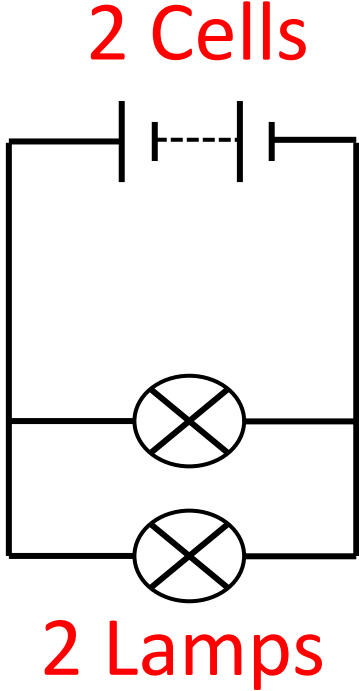
...

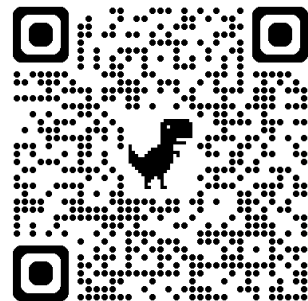
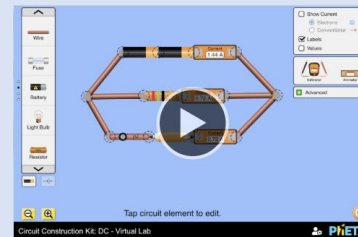
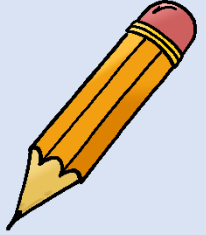
Lamps in a Parallel Circuit

06/10/2026

Draw and build each of these parallel circuits and answer the questions

Page 14

Components	Circuit Diagram
2 Cells and 2 lamps	 The diagram shows a parallel circuit. At the top, two cells are connected in series, labeled "2 Cells" in red. The circuit branches into two parallel paths, each containing a lamp (represented by a circle with an 'X'). The lamps are labeled "2 Lamps" in red at the bottom. The circuit is completed by a single wire on the right side.

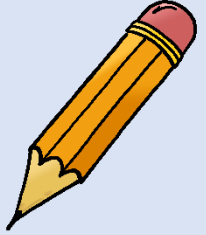


Lamps in a Parallel Circuit

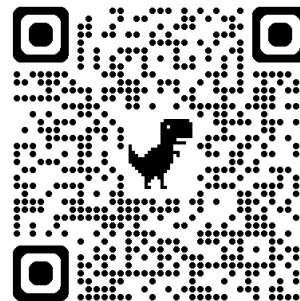
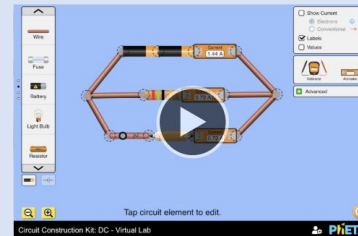
06/10/2026

Draw and build each of these Parallel circuits and answer the questions

Page 14



Components	Circuit Diagram
2 Cells and 3 lamps	2 Cells 3 Lamps The diagram shows a parallel circuit. At the top, two cells are connected in series. Three horizontal branches are connected in parallel to the main vertical wires. Each branch contains a single lamp, represented by a circle with an 'X' inside. The lamps are arranged vertically in the center of the diagram.

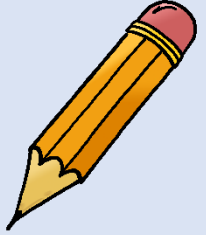


Lamps in Parallel Circuits

06/10/2026

Draw each circuit, then build and answer the questions.

Page 15



1. What happens when you add more lamps to this circuit?

The brightness of each lamp stays the same.

2. (a) What happens when you unscrew one of the bulbs?

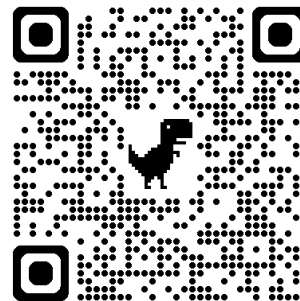
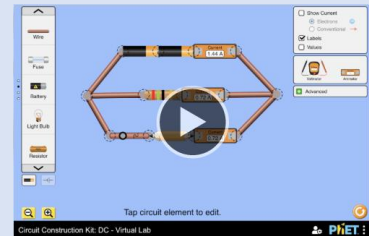
The other bulbs stay on.

(b) Does it matter which bulb you unscrew?

No, it does not matter.

3. Try to explain your answer to question 2.

Each bulb has its own separate path, so current can still flow through the other branches even if one bulb is removed.

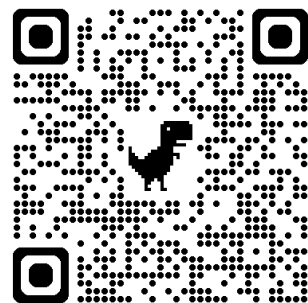
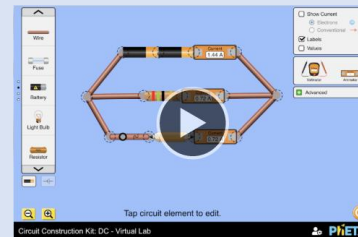
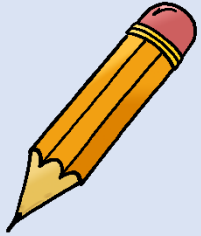
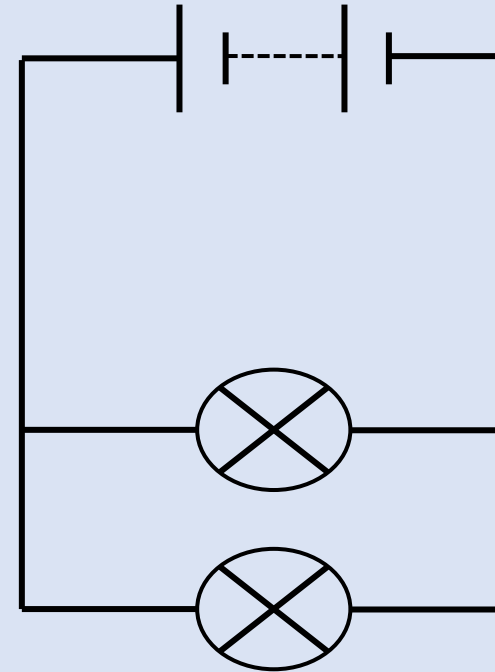


Lamps in a Parallel Circuit

06/10/2026

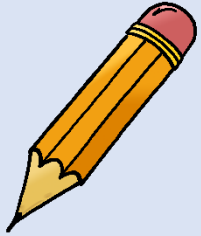
Page 15

This circuit has more than one loop.
This is called a parallel circuit.



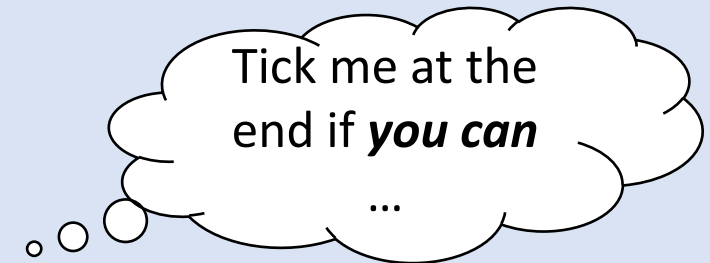
Plenary: What do you think?

Page 15



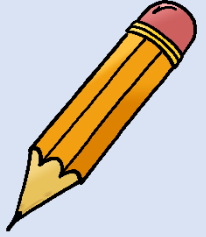
Success Criteria

- ☐ I can describe the difference between a parallel and a series circuit.
- ☐ I can build a parallel circuit.

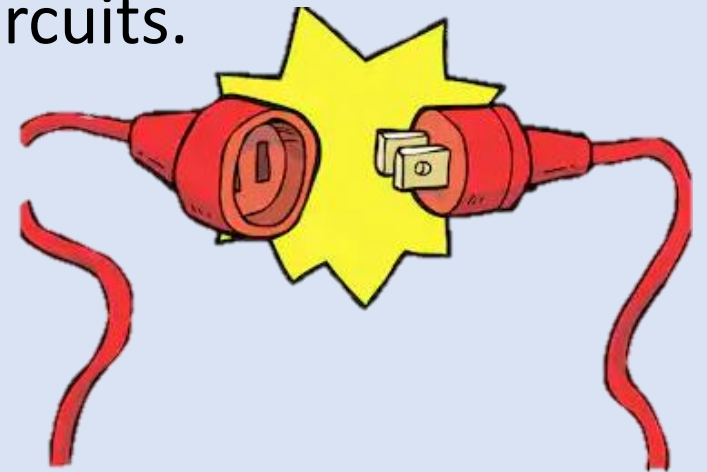


Starter:

1. What happened when we unscrewed one of the bulbs in the parallel circuit? Explain why.



2. Describe the difference between series and parallel circuits.



Starter:

1. What happened when we unscrewed one of the bulbs in the parallel circuit? Explain why.

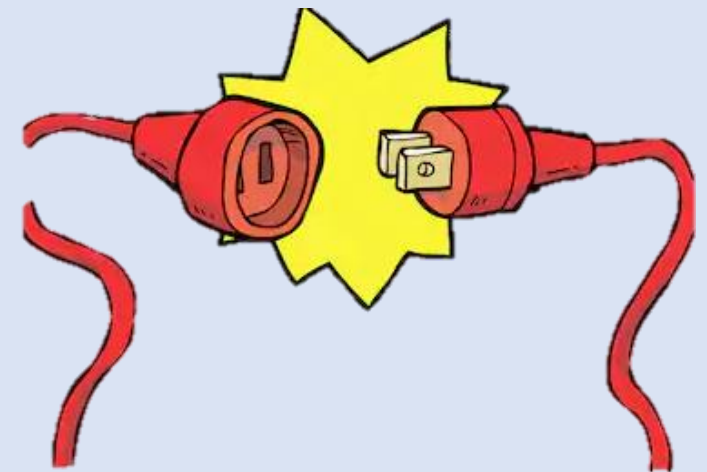
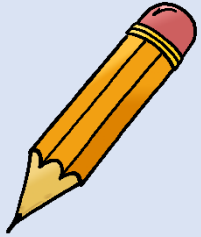
The other bulb(s) stayed on.

This happened because each bulb is in its own separate branch of the circuit, so the electricity can still flow through the other path.

2. Describe the difference between series and parallel circuits.

In a **series** circuit, all components are connected in one loop. If one part is removed or broken, the whole circuit stops working.

In a **parallel** circuit, components are connected in separate branches. If one branch is broken or a bulb is removed, the other branches still work.

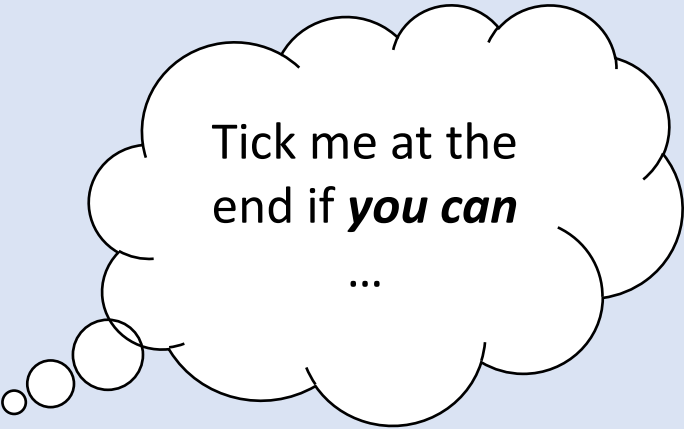


Learning Intentions:

- I am learning about switches in circuits.

Success Criteria

- ☐ I can understand switches in circuits.
- ☐ I can use circuit diagrams to build switches in circuits.



Tick me at the
end if ***you can***

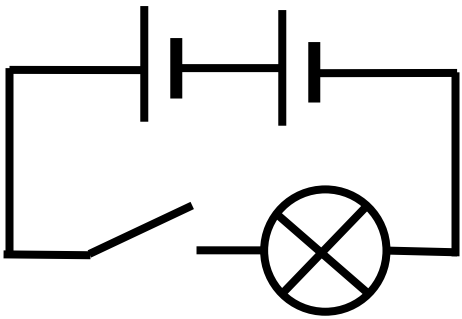
...

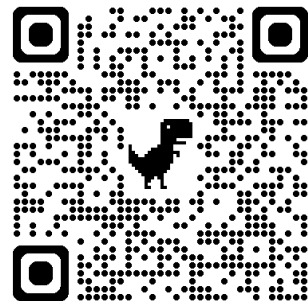
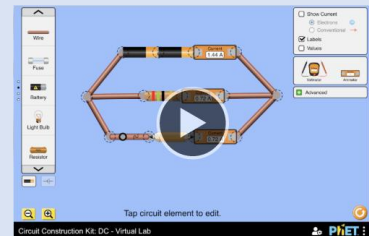
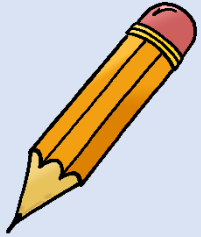
Switches in Circuits

06/10/2026

Draw and build each of these circuits and answer the questions

Page 16

Components	Circuit Diagram
2 Cells, 1 lamp, 1 switch in series	2 Cells  1 switch 1 Lamp

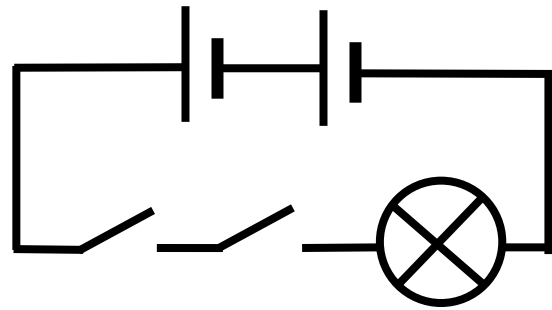


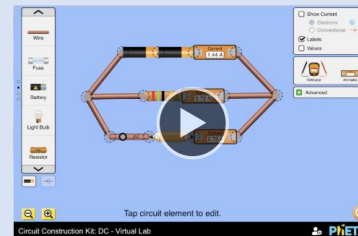
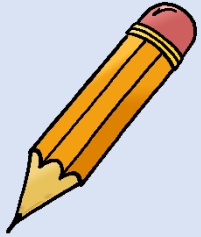
Switches in Circuits

06/10/2026

Draw and build each of these circuits and answer the questions

Page 17

Components	Circuit Diagram
2 Cells, 1 lamp, 2 switches in series	2 Cells  2 switches 1 Lamp

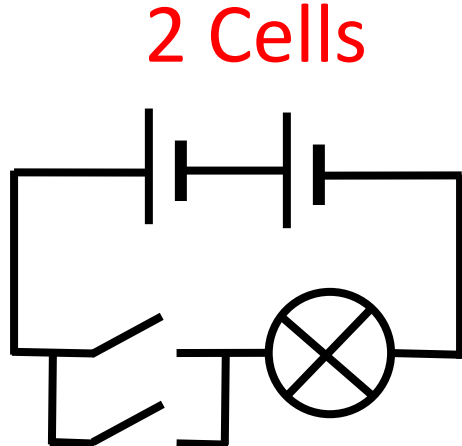


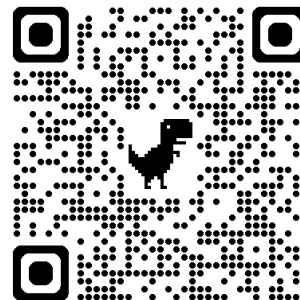
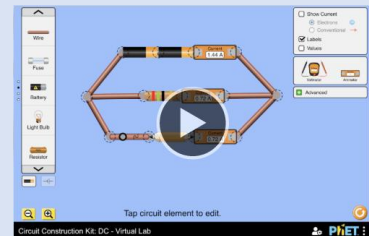
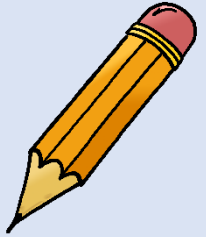
Switches in Circuits

06/10/2026

Draw and build each of these circuits and answer the questions

Page 17

Components	Circuit Diagram
2 Cells, 1 lamp, 2 switches in parallel	 2 Cells 2 switches 1 Lamp



Switches in Circuits

06/10/2026

Draw each circuit, then build and answer the questions.

Page 17

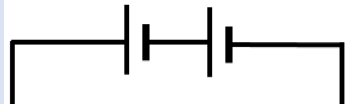
1. What do you have to do to light the bulb in each circuit?



The bulb lights when the circuit is complete (closed) so that electricity can flow through it.

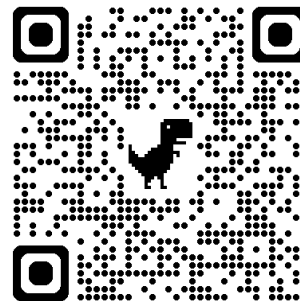
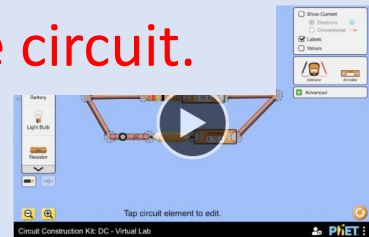
2. Try to explain your answer to question 1.

If the circuit is broken, electricity cannot flow, so the bulb will not light.

3. Does it matter what “side” the switches are on? Eg: 

No, it does not matter which side the switches are on as long as they are part of the circuit.

4. Give an example of a situation where you would want to use:
 - (a) two switches in series to make a device work?
 - (b) two switches in parallel to make a device work?



Draw each circuit, then build and answer the questions.

Page 17

4. Give an example of a situation where you would want to use:

(a) two switches in series to make a device work? **(both must be ON)**

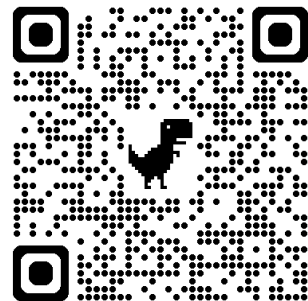
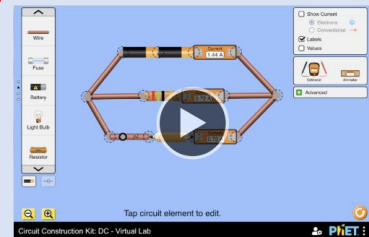
A washing machine that only starts when the door is closed and the power button is pressed.

1. A factory machine that only works when two safety switches are pressed.
2. A security alarm system that only activates when two sensors are triggered.

(b) two switches in parallel to make a device work?

(either can turn it ON)

1. A hallway light that can be turned on from either end of the corridor.
2. A bedroom light controlled by two switches at different doors.
3. A staircase light that can be switched on from the top or bottom of the stairs.



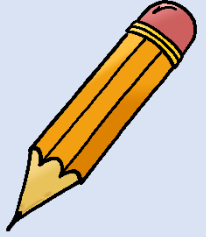
The Doorbell Circuit Challenge

06/10/2026

Page 18

Your task is to design a doorbell system for a person with hearing difficulties. There are three challenges below.

With your partner, talk about your challenge, and decide what you are going to do.



Each pair will:

- a) Build the working circuit
- b) Draw a circuit diagram on a sheet of A4 paper, using correct circuit symbols
- c) Describe how the circuit works (what does each component do).

CHALLENGE 1

When in their living room, the person must know if the front doorbell has been pressed.

CHALLENGE 2

The house has a doorbell at the front door and the back door.

Redesign your circuit to let the person know whether the front or back doorbell is rung.

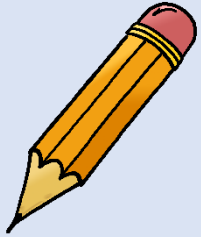
Draw the circuit diagram after your teacher checks your circuit.

Does your circuit tell you what doorbell – front or back – was rung?

CHALLENGE 3

Extend the system so that it could work in two different rooms.

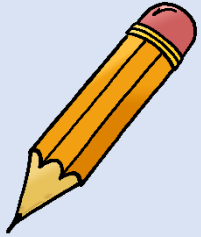
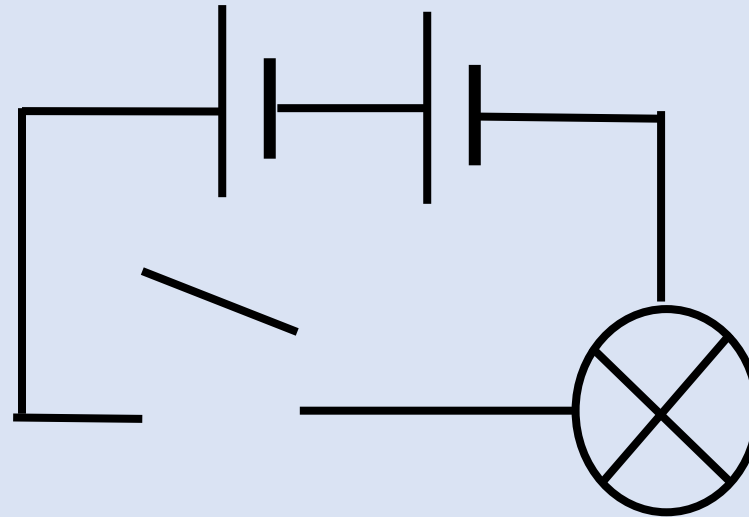
Your will have to report back to the rest of the class what you have done, and how your design works.



Plenary: What is wrong with this diagram and why?

Page 18

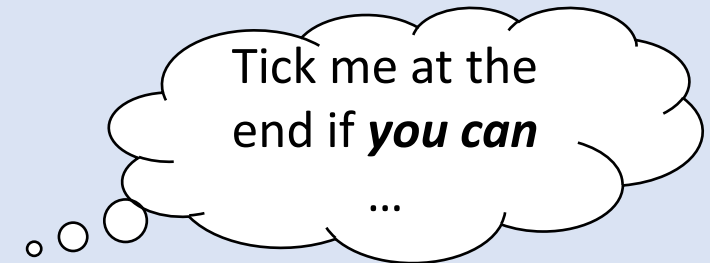
- Switch drawn incorrectly
- Lamp is placed in the corner



Describe to your neighbour what a switch does in a circuit

Success Criteria

- ☐ I can understand switches in circuits.
- ☐ I can use circuit diagrams to build circuits that use switches.



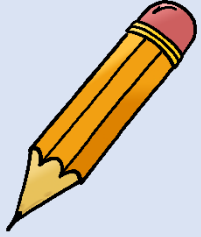
Starter:

1. When two switches are in a series circuit, how do we make the lamp work?

Both switches must be closed (ON).

2. When two switches are in parallel, how do we make the lamp work?

At least one switch must be closed (ON).

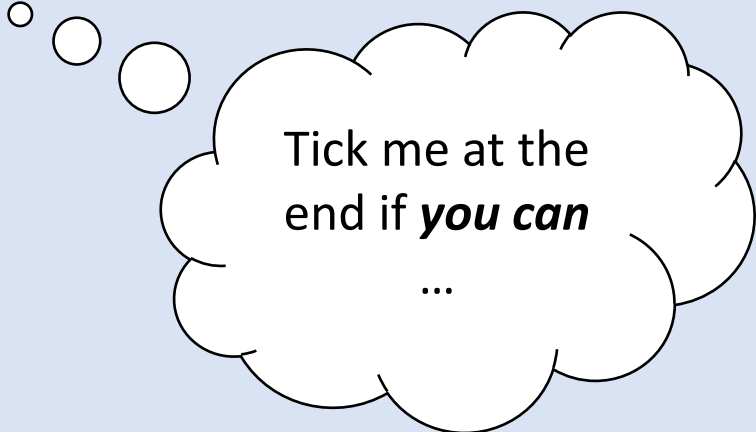


Learning Intentions:

- I am learning about voltage and current

Success Criteria

- ☐ I can define voltage and current
- ☐ I can state how current and voltage are measured



Tick me at the
end if ***you can***

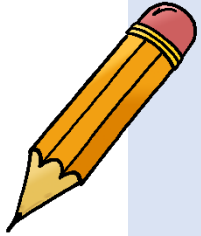
...

Electric current is the rate of flow of electrons.

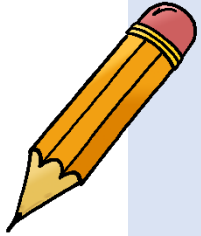
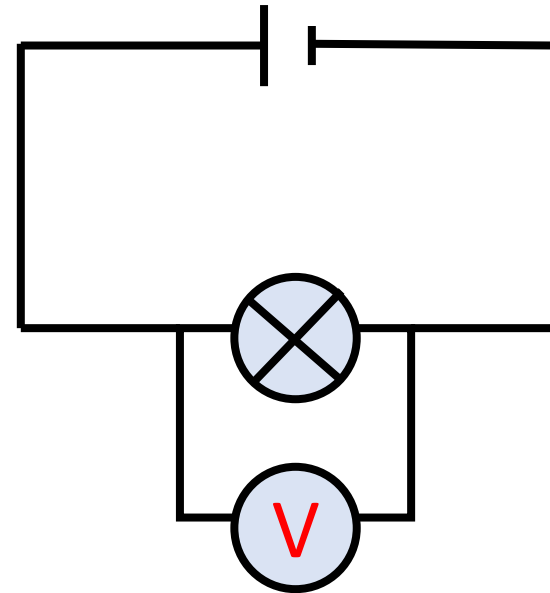
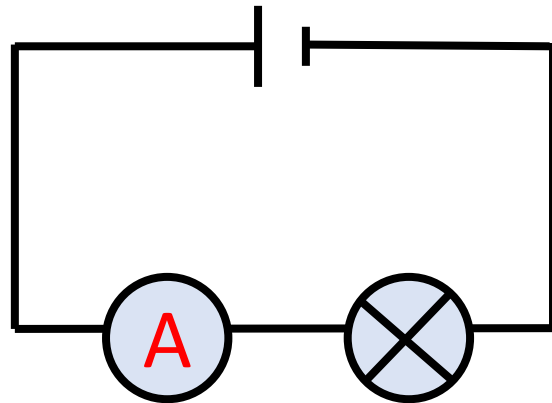
Current is measured using an ammeter.

Voltage is the electric push from a battery. It is the energy given to the charges in the circuit.

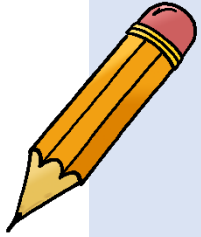
Voltage is measured using a voltmeter.



Complete the diagrams:



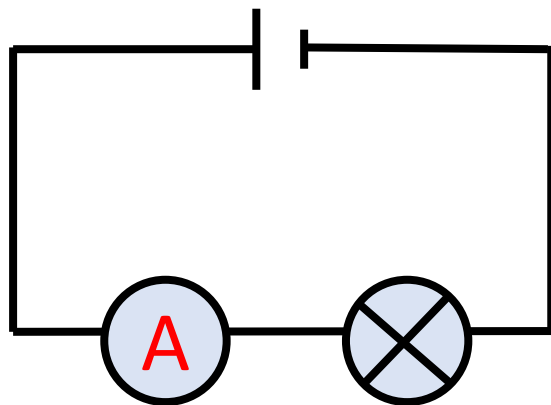
Aim: To investigate the effects of changing the number of cells on current in a series circuit.



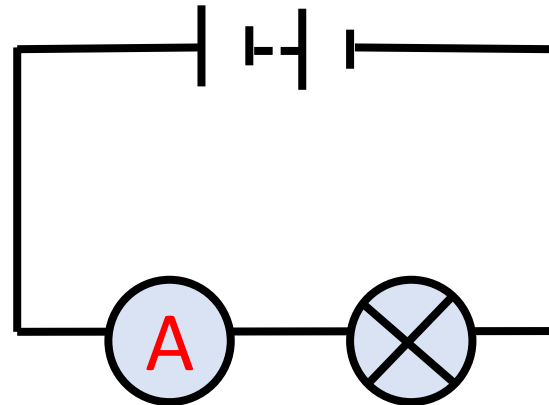
Method:

1. Build a simple series circuit containing 1 cell, lamp and ammeter
2. Measure the current
3. Add a 2nd cell, measure the current. Repeat for 3 cells.

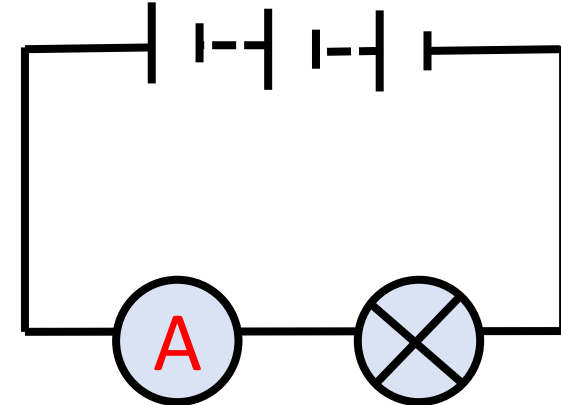
Method:



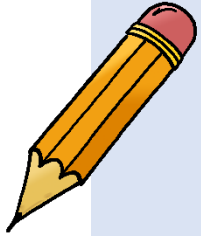
1 cell



2 cells

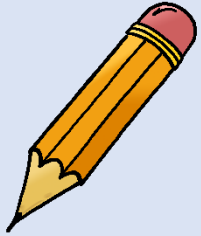


3 cells



Results:

Number of cells	Current (A)
1	
2	
3	



Effect of Number of Cells on Current

Conclusion: *What is the answer to your aim?*

The current increased when the number of cells increased.

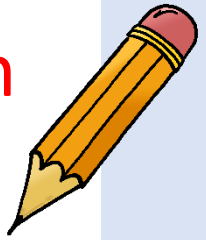


Evaluation: *How could you improve your experiment?*

To improve the experiment, I could:

- Repeat each measurement and calculate an average.
- Check that all connections are secure.
- Use cells with the same voltage.
- Take measurements more carefully to reduce reading errors.

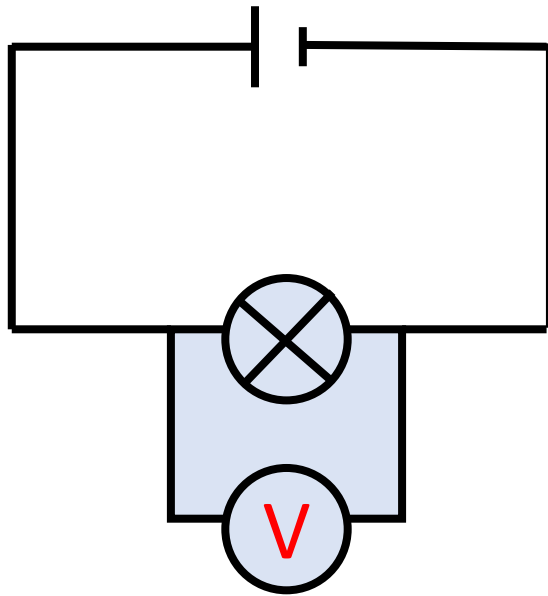
Aim: To investigate the effects of changing the number of cells on voltage.



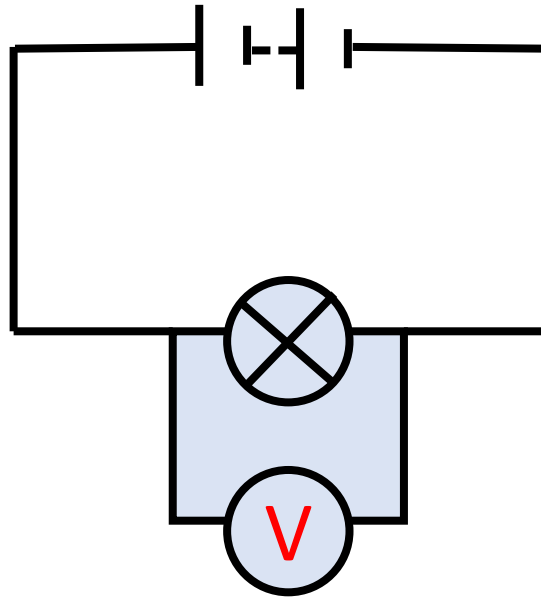
Method:

1. Build a simple circuit containing 1 cell, lamp and voltmeter
2. Measure the voltage
3. Add a 2nd cell, measure the voltage. Repeat for 3 cells.

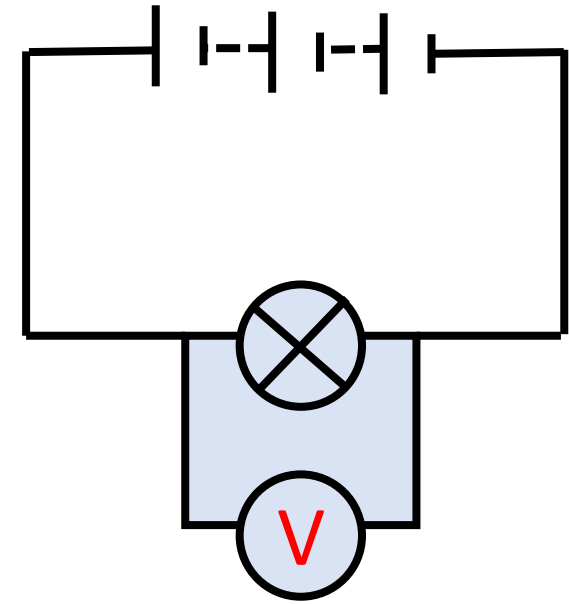
Method:



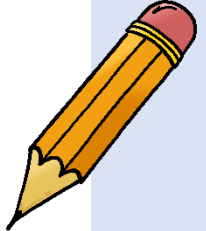
1 cell



2 cells



3 cells

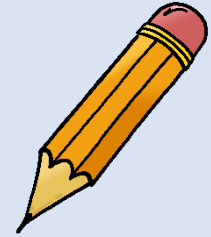


Effect of Number of Cells on Voltage 06/10/2026

Page 21

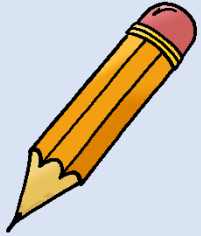
Results:

Number of cells	Voltage (V)
1	
2	
3	



Conclusion: *What is the answer to your aim?*

The voltage increased when the number of cells increased. Adding more cells increases the total voltage supplied to the circuit.



Evaluation: *How could you improve your experiment?*

To improve the experiment, I could:

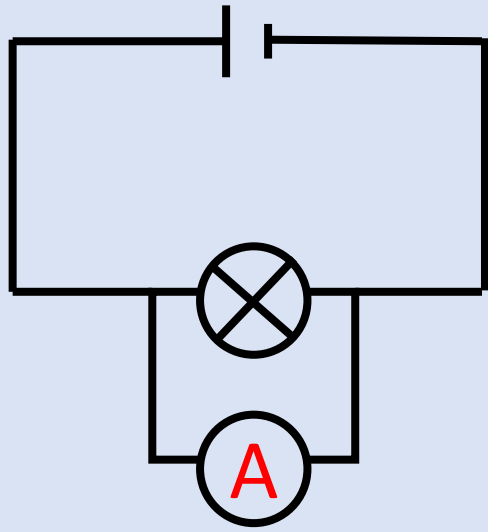
- Repeat each measurement and calculate an average.
- Check that all connections are secure.
- Use cells with the same voltage.
- Use a digital voltmeter for more accurate readings.

Measuring Voltage and Current

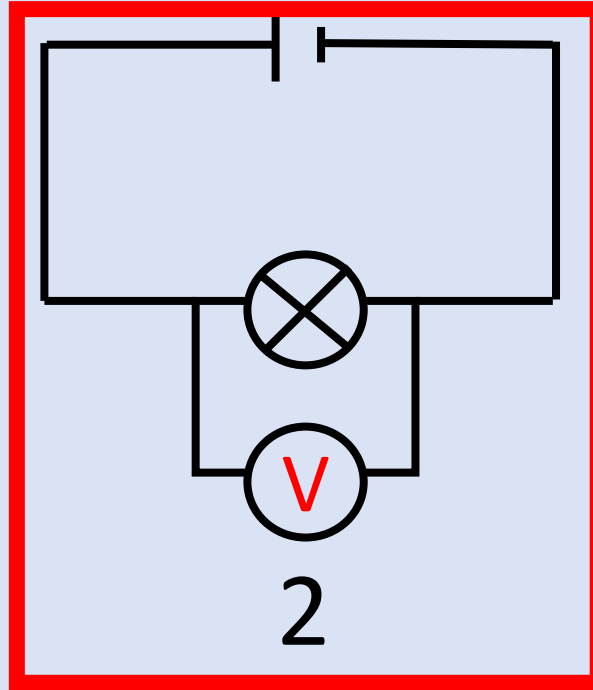
06/10/2026

Page 22

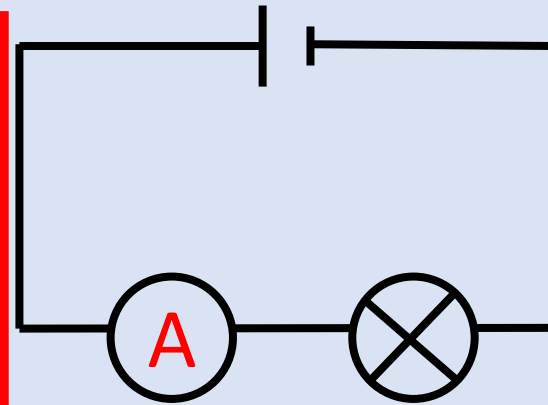
Plenary: Which of these circuits can you use to measure the voltage of the lamp and why?



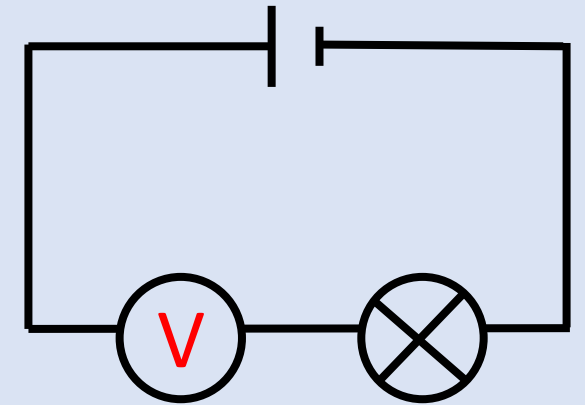
1



2



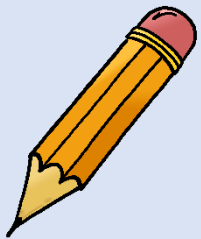
3



4

Success Criteria

- ☐ I can define voltage and current
- ☐ I can state how current and voltage are measured



Tick me at the
end if ***you can***

...

Ohm's Law

06/10/2026

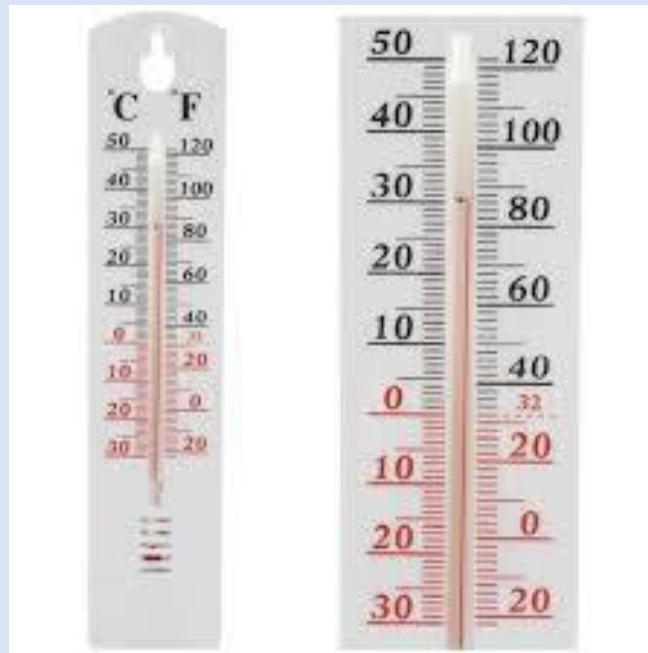
Page 23

Starter:

Which one is the odd one out?



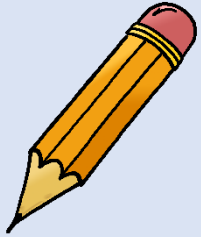
ammeter



thermometer



voltmeter



Answer: C) thermometer

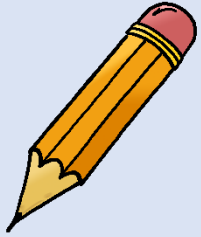
ammeter measures **current (A)**

voltmeter measures **voltage (V)**

thermometer measures **temperature**, not electricity

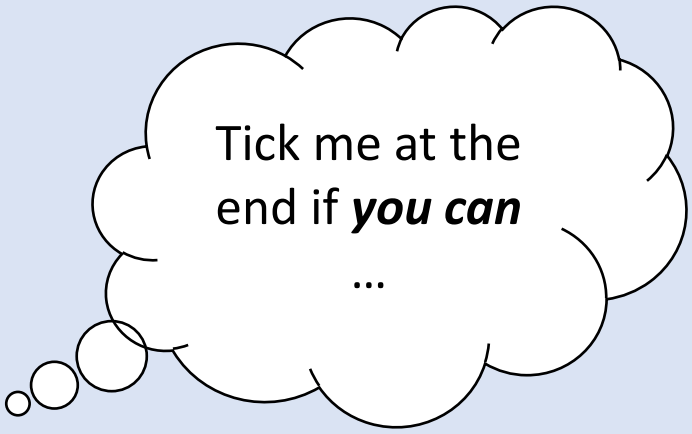
Learning Intentions:

- I am learning about Ohm's Law



Success Criteria

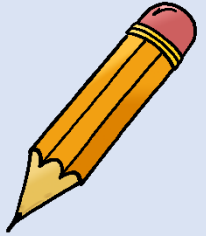
- ☐ I can name the three main quantities in Ohm's Law
- ☐ I can state their units correctly
- ☐ I can use Ohm's Law formula to make calculations.



Tick me at the
end if ***you can***

...

Resistance is a measure of how difficult it is for an electric current to flow through a material or component. It opposes the flow of current in a circuit.



Resistance is the opposition to the flow of electric current in a circuit.

It is measured in **ohms (Ω)**.

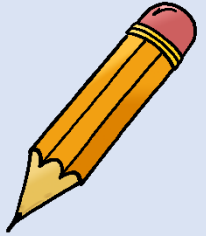
Less Resistance



More Resistance



Ohm's Law describes the relationship between voltage (V), current (I) and resistance (R) in an electrical circuit.

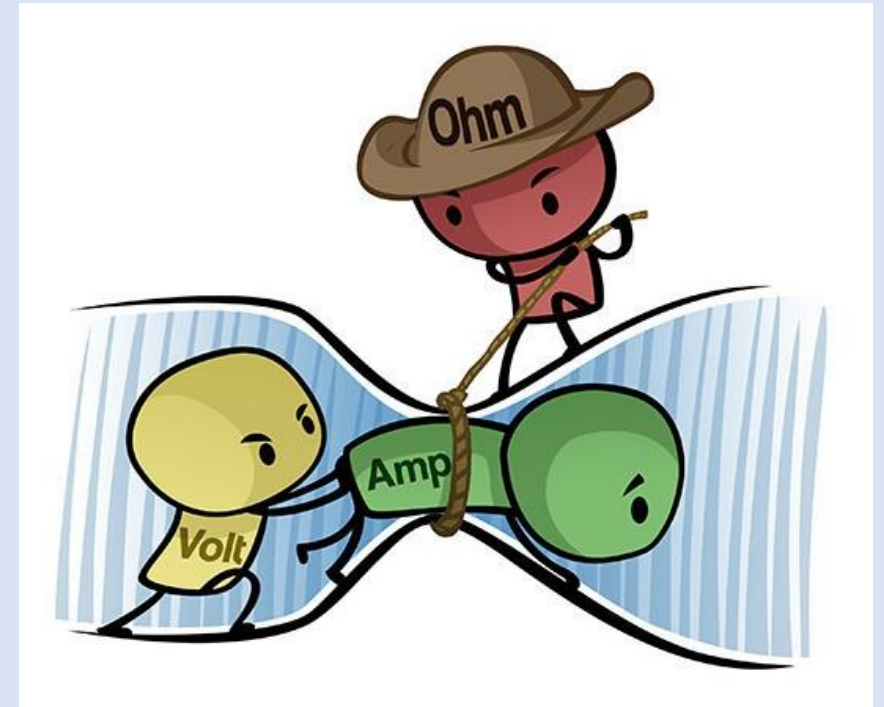


$$V = IR$$

V = Voltage (volts, V)

I = Current (amperes, A)

R = Resistance (ohms, Ω)



Calculations Example:

1. A circuit has a current of 2 A and a resistance of 5 Ω .
Find the voltage.

$$I = 2 \text{ A}$$

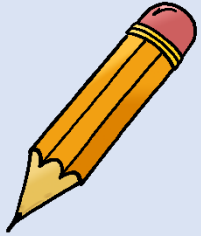
$$R = 5 \Omega$$

$$V = ?$$

$$V = I \times R$$

$$V = 2 \times 5$$

$$V = 10 \text{ V}$$



Calculations Example:

2. A circuit has a voltage of 12 V and a resistance of 4 Ω . Find the current.

$$V = 12 \text{ V}$$

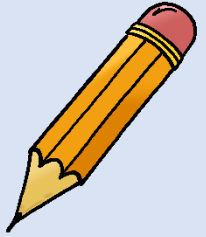
$$R = 4 \Omega$$

$$I = ?$$

$$V = I \times R$$

$$12 = I \times 4$$

$$I = 3 \text{ A}$$



Calculations Example:

3. A circuit has a voltage of 18 V and a current of 3 A.
Find the resistance.

$$I = 3 \text{ A}$$

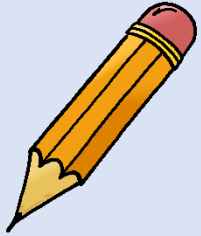
$$R = ?$$

$$V = 18 \text{ V}$$

$$V = I \times R$$

$$18 = 3 \times R$$

$$R = 6 \Omega$$

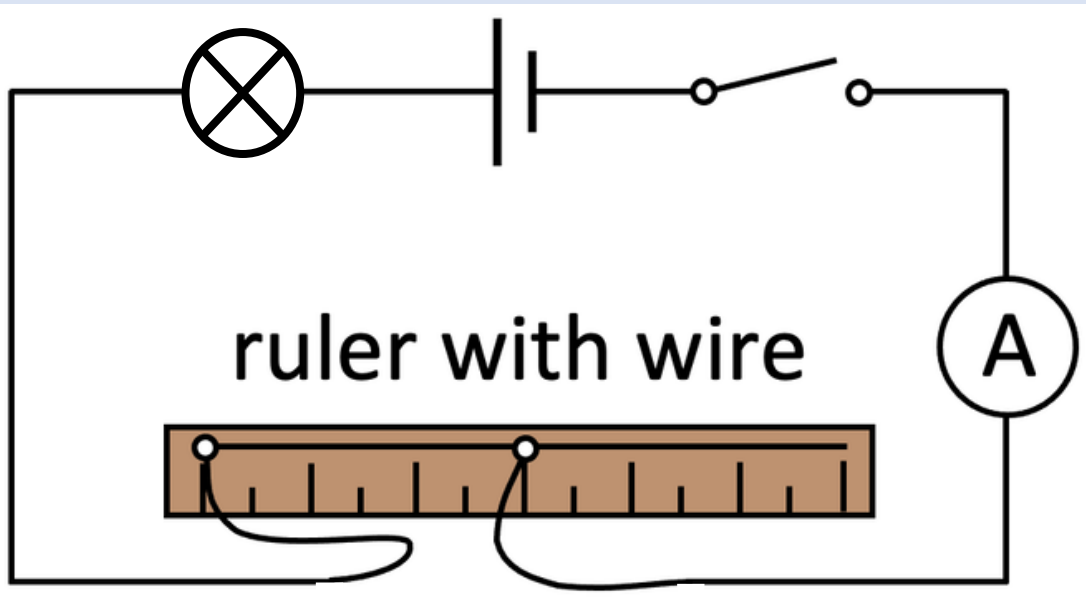
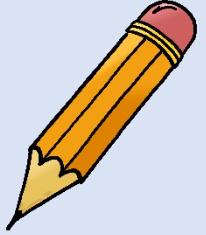


Investigating Ohm's Law

06/10/2026

Aim: To investigate how the length of a wire affects electrical resistance in a circuit.

Page 25

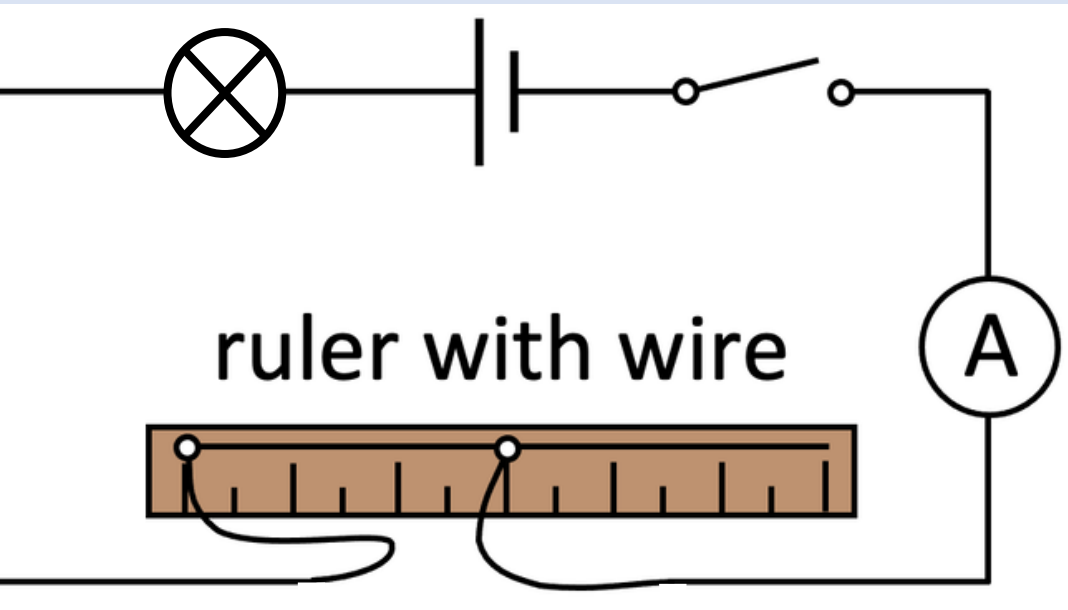


Apparatus (Equipment list)

- Battery
- Ammeter (A)
- Bulb
- Ruler (to measure wire length)
- Connecting wires with crocodile clips
- Test wire

Method:

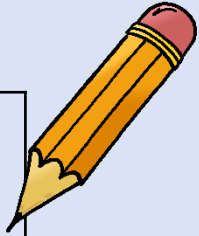
- Set up the circuit as shown in the diagram.
- Attach the crocodile clips to the resistance wire so that they are 5 cm apart.
- Observe the brightness of the bulb and measure the current.
- Record your results in a table.



- Move one crocodile clip so that the clips are 10 cm apart. Observe the brightness of the bulb and measure the current.
- Repeat for distances of 15 cm, 20 cm and 25 cm.

Results:

Length of wire (cm)	Brightness of bulb (observation)	Current (A)
5		
10		
15		
20		
25		
30		

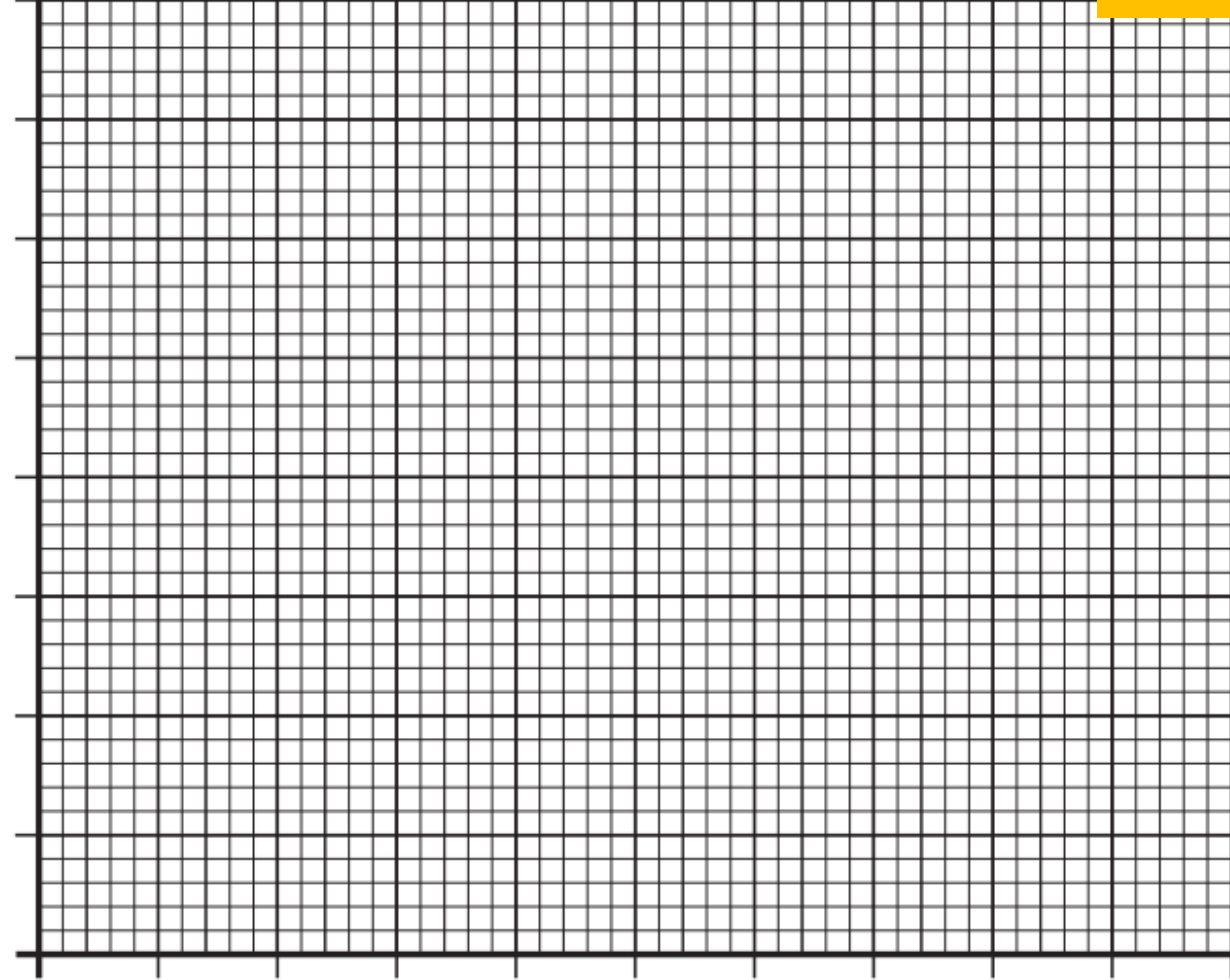


Word bank: Bright, Medium, Dim, Very dim / off

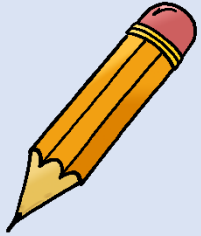
Results:

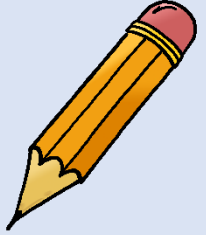
*Draw a bar graph of
your data*

Current (A)



Length of wire (cm)





Conclusion: *What is the answer to your aim?*

As the distance between the crocodile clips increased, the current decreased and the bulb became dimmer. This is because a longer length of wire has a higher resistance.

Evaluation: *How could you improve your experiment?*

- Repeat the measurements and calculate an average.
- Measure the distance between the crocodile clips more accurately.
- Make sure all connections are secure.
- Keep the wire straight and use the same type of wire throughout the experiment.

Investigating Ohm's Law

06/10/2026

Plenary:

Page 27

I was successful
when I

A question I have
about today's
lesson is

Today I learnt
.....

The part of the
lesson I enjoyed
the most was.....

The skills I used in
today's lesson
were.....

One thing I need to
remember from
today's lesson
is.....

Success Criteria

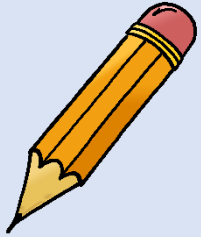
- ☐ I can name the three main quantities in Ohm's Law
- ☐ I can state their units correctly
- ☐ I can use Ohm's Law formula to make calculations.

Tick me at the
end if ***you can***

...

Starter:

Which one is the odd one out?



Answer: C) Coal power
because it is a non-renewable energy source,
while the others are renewable energy
sources.

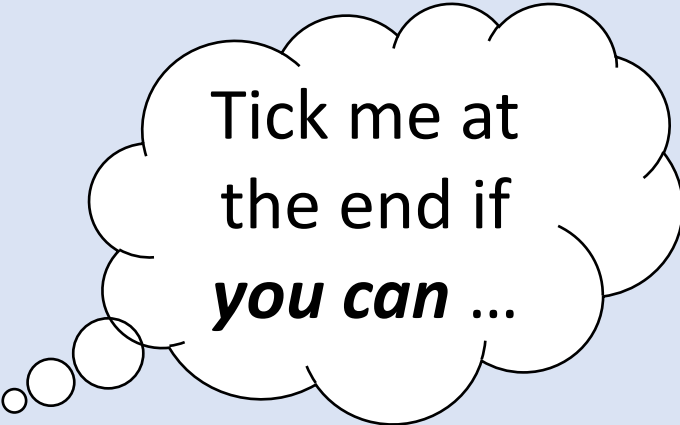


Learning Intentions:

- I am learning about different energy sources

Success Criteria

- ☐ I can name at least 3 different energy sources
- ☐ I can say whether each source is renewable or non-renewable
- ☐ I can describe the benefits of renewable energy sources.



Tick me at
the end if
you can ...

Watch: Fossil fuels and renewable energy



Video Transcript



Energy Sources: Island research station

A small **research team** is setting up a temporary science station on a remote island.

The team needs a reliable supply of energy to power:

- lights
- a radio for communication
- a small water heater
- basic scientific equipment

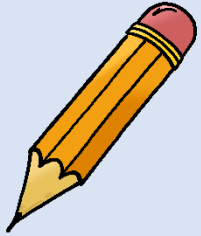


There is no connection to the national electricity grid.

The team must choose the **best energy source (or combination of sources)** to power the station.

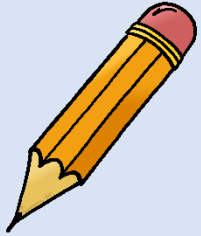
In your group, discuss and decide:

- What energy sources could be used on the island?
- Which sources are renewable and which are non-renewable?
- Which energy source(s) would be the most suitable and reliable?
- What are the advantages and disadvantages of your choice?
- Would you recommend one source or a combination? Explain why.



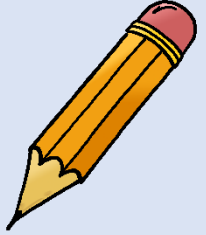
The electrical energy we use comes from a variety of different sources.

We can divide these sources in to two groups – **renewable** and **non-renewable** energy sources.



Renewable Energy Sources	Non-Renewable Energy Sources
Solar energy (Sun)	Coal
Wind energy	Oil (petroleum)
Hydroelectric power	Natural gas
Tidal energy	Nuclear energy
Geothermal energy	
Biomass	

A **renewable** source of energy is one which **will not run out / can be replaced naturally.**



Renewable Energy Sources

Solar energy (Sun)

Wind energy

Hydroelectric power

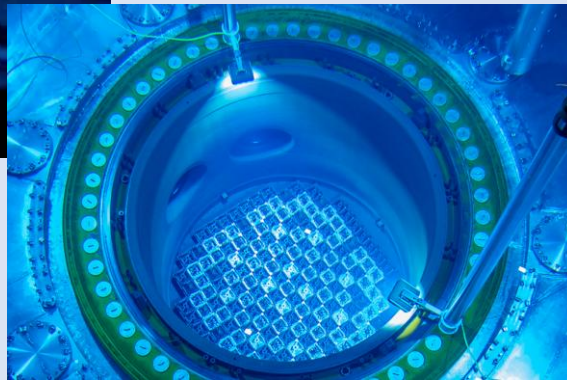
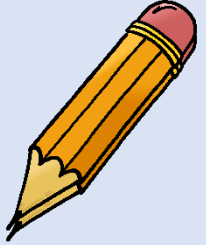
Tidal energy

Geothermal energy

Biomass



A **non-renewable** source of energy is one which **will eventually run out / cannot be replaced once used.**



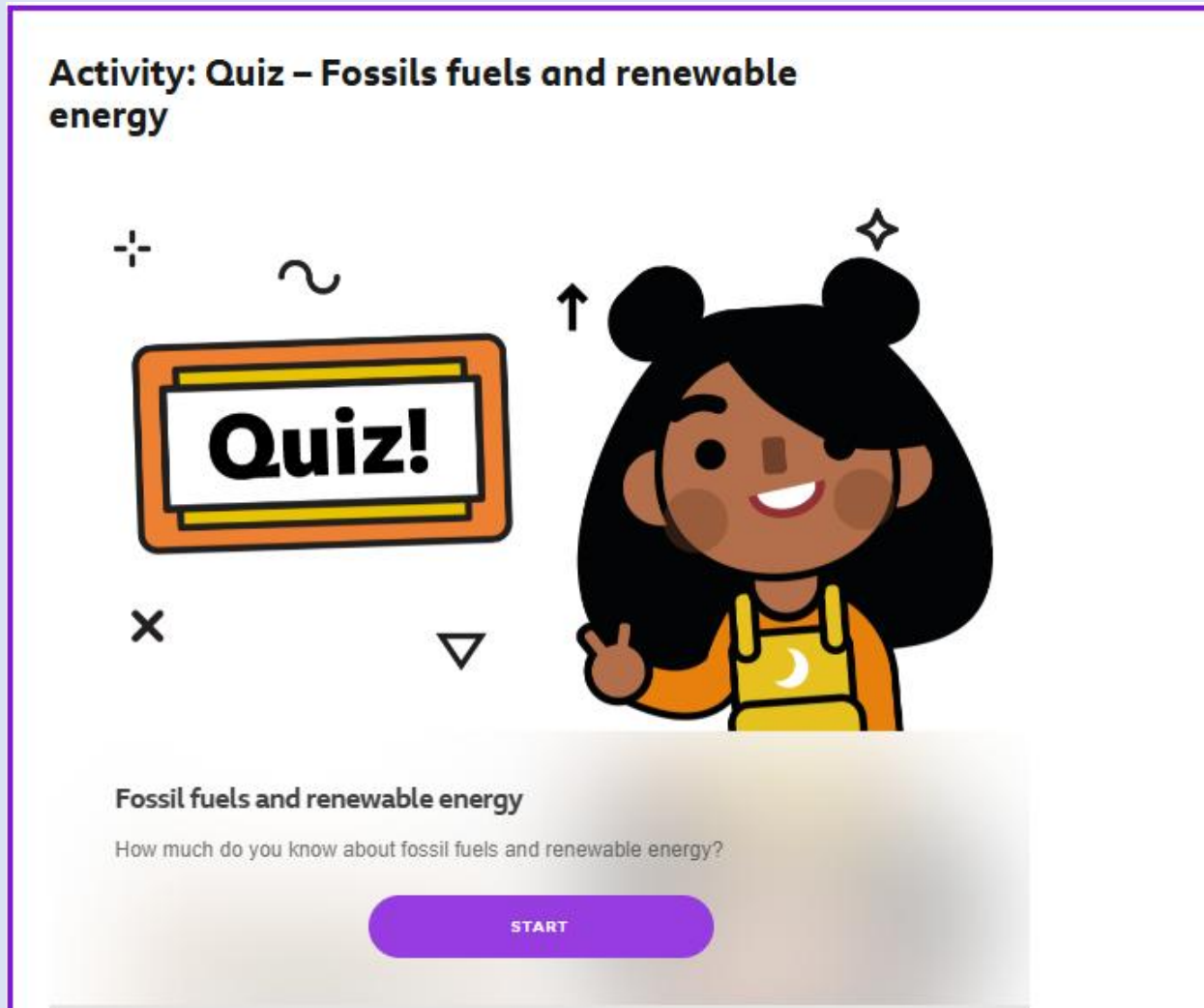
Non-Renewable Energy Sources

Coal

Oil (petroleum)

Natural gas

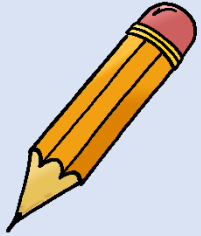
Nuclear energy



Plenary:

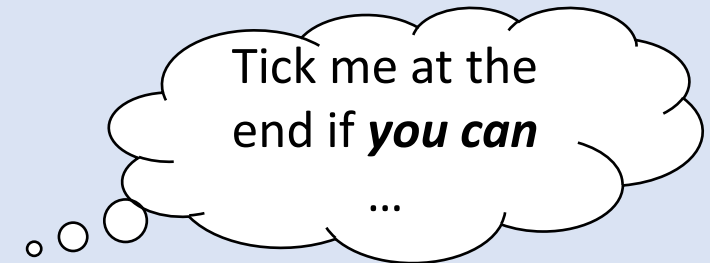
Design a **simple energy plan for the station**, including:

- at least one renewable source
- backup power option
- explanation of reliability (weather, fuel supply, etc.)



Success Criteria

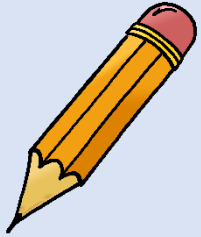
- ☐ I can name at least 3 different energy sources
- ☐ I can say whether each source is renewable or non-renewable
- ☐ I can describe the benefits of renewable energy sources.



In jotter

Starter:

1. Use the data in the table to calculate the average output voltage for each fruit cell.



Type of Fruit	Output Voltage (V)		
	Replicate 1	Replicate 2	Average
Lemon	1.02	1.04	1.03
Apple	0.99	0.97	0.98
Banana	0.80	0.82	0.81

2. Identify the fruit which produced the smallest output voltage.

Banana

Electricity Revision

06/10/2026

Kahoot! GO

Kahoot! GO

Kahoot! GO



Kahoot! GO

Kahoot! GO

 Kahoot

Unit 1 - Electricity - Revision

Kirkcaldy High School S1 Science Unit 1 - Electricity Revision

<https://create.kahoot.it/details/unit-1-electricity-revision/e12d2b9f-7881-4f2f-973e-f2aa5c03a171?drawer=>

Kahoot! GO

Read the passage and answer the questions.

Lightning Literacy Task

What is lightning?

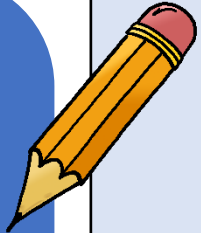
Lightning is a bright flash of electricity produced by a thunderstorm. All thunderstorms produce lightning and are very dangerous. If you hear the sound of thunder, then you are in danger from lightning. Lightning kills and injures more people each year than hurricanes or tornadoes; between 75 to 100 people.

What causes lightning?

Lightning is an electric current. In a thundercloud, many small bits of ice (frozen raindrops) bump into each other as they move around in the air. All of those collisions create an electric charge. After a while, the whole cloud fills up with electrical charges. Positive charge forms at the top of the cloud and negative charge at the bottom of the cloud. Since opposite charges attract, that causes a positive charge to build up on the ground beneath the cloud. The ground's positive charge concentrates around anything that sticks up, such as mountains, people, or single trees. The charge coming up from these points eventually connects with a charge reaching down from the clouds and - zap - lightning strikes!

Top Tips!

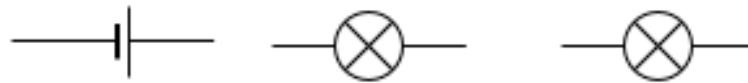
1. The questions are in the same order as the paragraphs
2. Take the words directly from the passage – do not put them into your own words unless you are giving an explanation



Use your workbook to help you answer the questions on page 38

Extra Questions

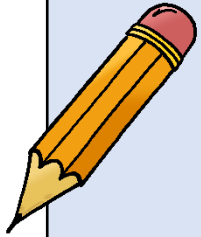
1. Using these three components, and as many wires as necessary, draw circuit diagrams following all the circuit diagram rules and then answer the questions:



- a) draw a series circuit

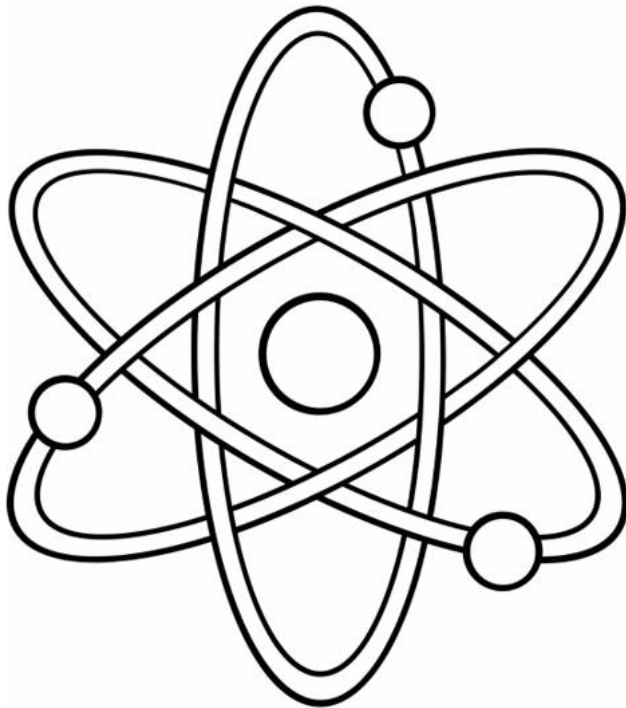
Top Tips!

1. Look back in your workbook to find the information to help you answer the questions
2. Use a ruler for your diagrams, keep it neat!



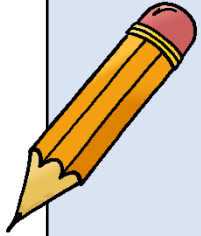
Use the diagram on page 2 of your workbook to help you label the atom
on page 35

Colouring Sheet



THINK!

- Where is the nucleus?
- Which particles are found at the nucleus?
- Which particles are found around the outside of the atom?
- Can you identify which particles have a positive and negative charge?



Electricity Homework Sheet

06/10/2026

S1 Electricity Homework

Name _____ Due Date _____



Complete the questions without your notes first.



Then use your notes to help complete any challenging questions.



Take tricky questions that you need help with to class or study support.



Submit fully completed homework on time.

1. Static electricity was demonstrated in class using the Van der Graaf generator. Explain why your hair stands on end when you do this experiment.

2. Which state the two types of charge _____
3. Which charges attract each other _____
4. Complete the table by drawing the symbol for each component.]

Component	Cell	Lamp	Switch	Voltmeter	Ammeter
Symbol					

5. Draw a series circuit made of a cell, one lamps and a switch.
6. Draw a parallel circuit made of a cell and two lamps.
7. Describe the advantages of using a parallel circuit for lights in a classroom.

8. A set of fairy lights has one broken bulb, however, all the other lights still light up when they are plugged in. What does this tell you about the circuit?

9. A student built a circuit of a cell connected to a lamp in a series circuit. The bulb failed to light.

(a) Suggest a possible reason for this.

(b) Suggest a way to test your idea.

10. The table below shows the voltage measured when the number of cells in a circuit was changed. Draw a scatter graph using the data in the table

Number of cells	1	2	3	4	5
Voltage (V)	0.5	0.9	1.4	2.1	2.4

