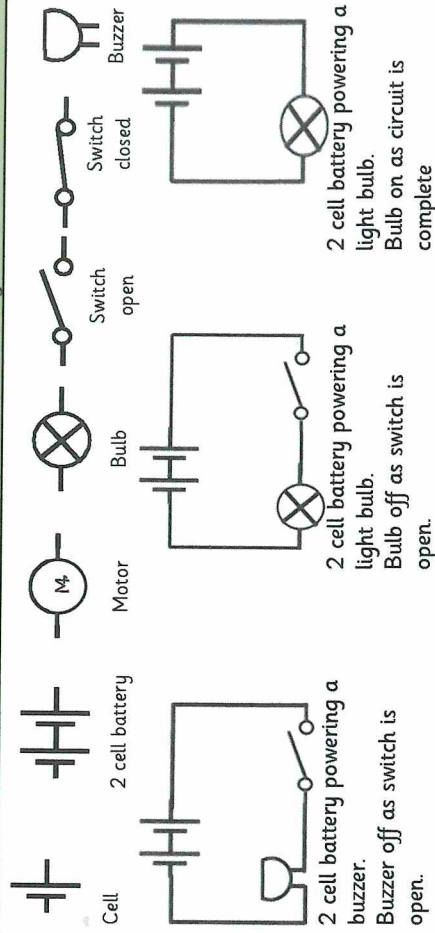


Year 6 Science, Autumn 1, Electricity

Key Vocabulary

Voltage	The force moving the electric current through wires in a circuit.
Complete circuit	A circuit that is closed and the electricity can flow round
Series circuit	A circuit with only one route for the electricity to flow
Symbols	Used to picture components in a circuit
Resistance	The slowing effect on the movement of electrons around a circuit (caused by components and wires)
Electrons	Parts of an atom that can move – these are what move through a circuit.
Conductors	Materials where electricity passes through
Insulators	Materials where electricity does not pass through
Components	Parts of a circuit
Fault	When something is wrong with a component
Filaments	The resistance wire in a bulb

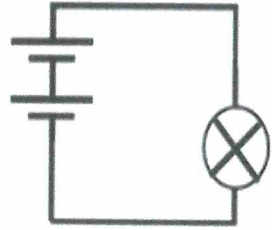
Component symbols and circuit diagrams



Brighter or louder?

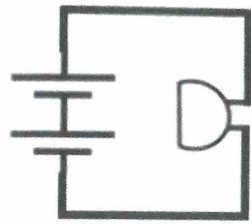
How can we make this bulb brighter?

- More batteries = higher voltage = more power around circuit
- Shortening the wires = smaller path = less resistance to flow through



Challenge...

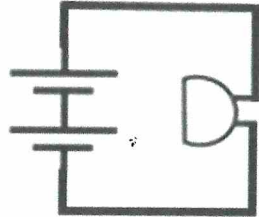
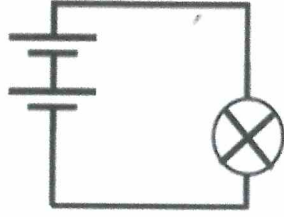
How can we make the buzzer louder?



Dimmer or quieter?

What changes to these circuits will make the bulb dimmer, or the buzzer quieter?

- Remove batteries = less voltage = less power to flow through the circuit.
- More buzzers or more bulbs = power shared between more components = greater resistance = less power to each component.
- Longer wires = more distance to travel = greater resistance = less power.

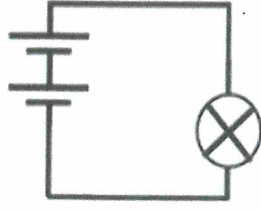


Series circuits

A series circuit = only one route for flow of electrons to take.

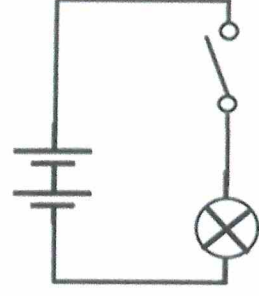
As more components are added, the more the power (voltage) has to be shared.

Any breaks in a circuit (e.g. switch / broken component) prevent the current from flowing around the circuit.



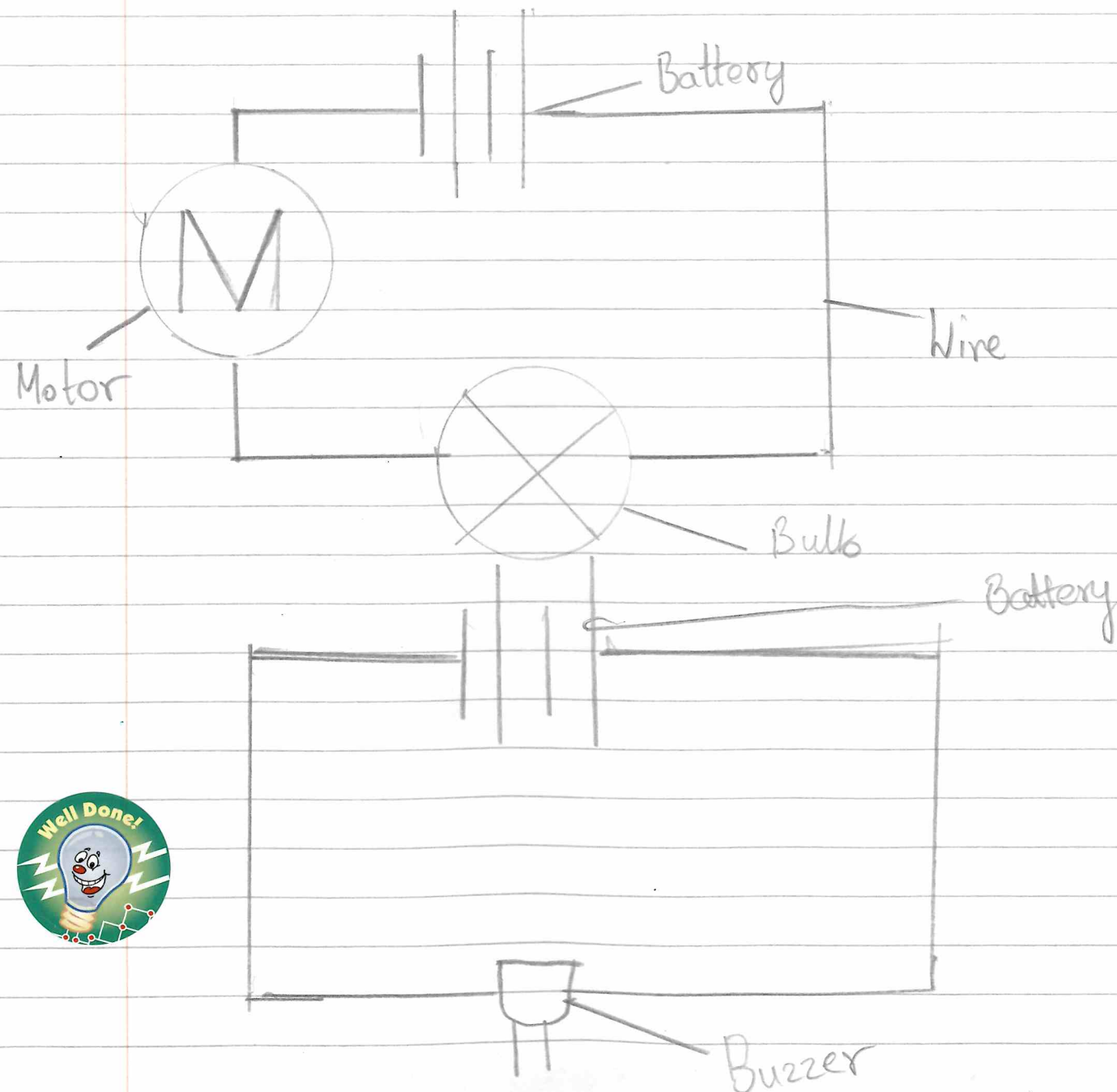
This prevents all components in the circuit from working.

If you have a series circuit containing 200 lights, and one light bulb is broken, then whole set of lights will remain off until the break in the circuit is fixed.



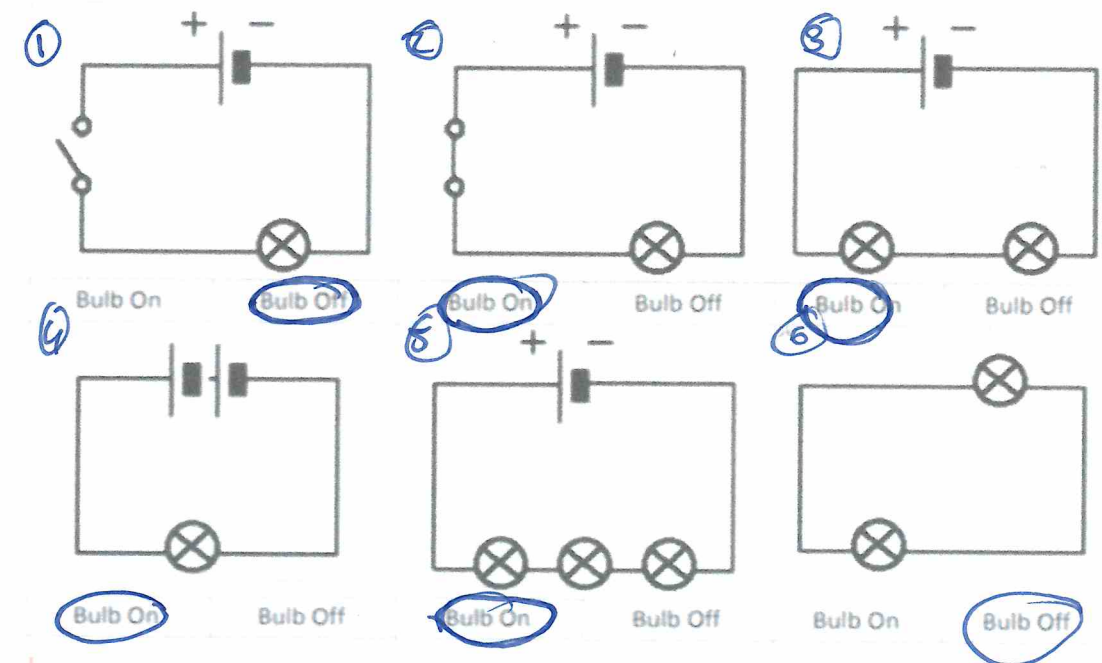
Tuesday 17th September
What is a series circuit?

Sequence 2 - R.P.		Match the vocabulary to the definition.
Battery	1 ✓	A material in which an electrical current cannot flow very well through. 3 ✓
Conductor	2 ✓	Charged particles that move around a circuit. 5 ✓
Insulator	3 ✓	An uninterrupted path in which electrons can travel from an energy source (i.e. a battery), through a device and back to the source. 4 ✓
Complete Circuit	4 ✓	When more than one cell is lined up 1 ✓
Electrons	5 ✓	A material in which an electrical current can flow well through. 2 ✓

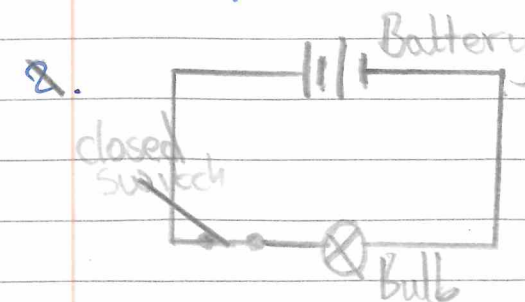


Tuesday 24th September
How do switches work?

R.P. Sequence 3			
Cell ✓	Wire ✓	Bulb ✓	Buzzer ✓
Motor ✓	Open switch ✓	closed switch ✓	Battery ✓



1. I predict that the bulb won't light because the switch is open.



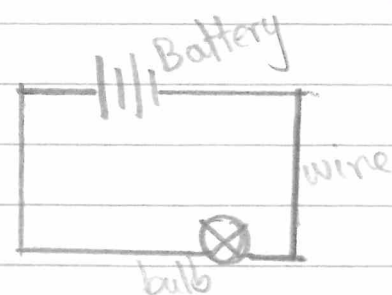
2. I predict that this circuit will work because the switch is closed so the electricity will go through.

3. I predict that this ~~circuit~~ circuit will work because ~~there~~ it's a closed circuit but doesn't have a switch and still work.

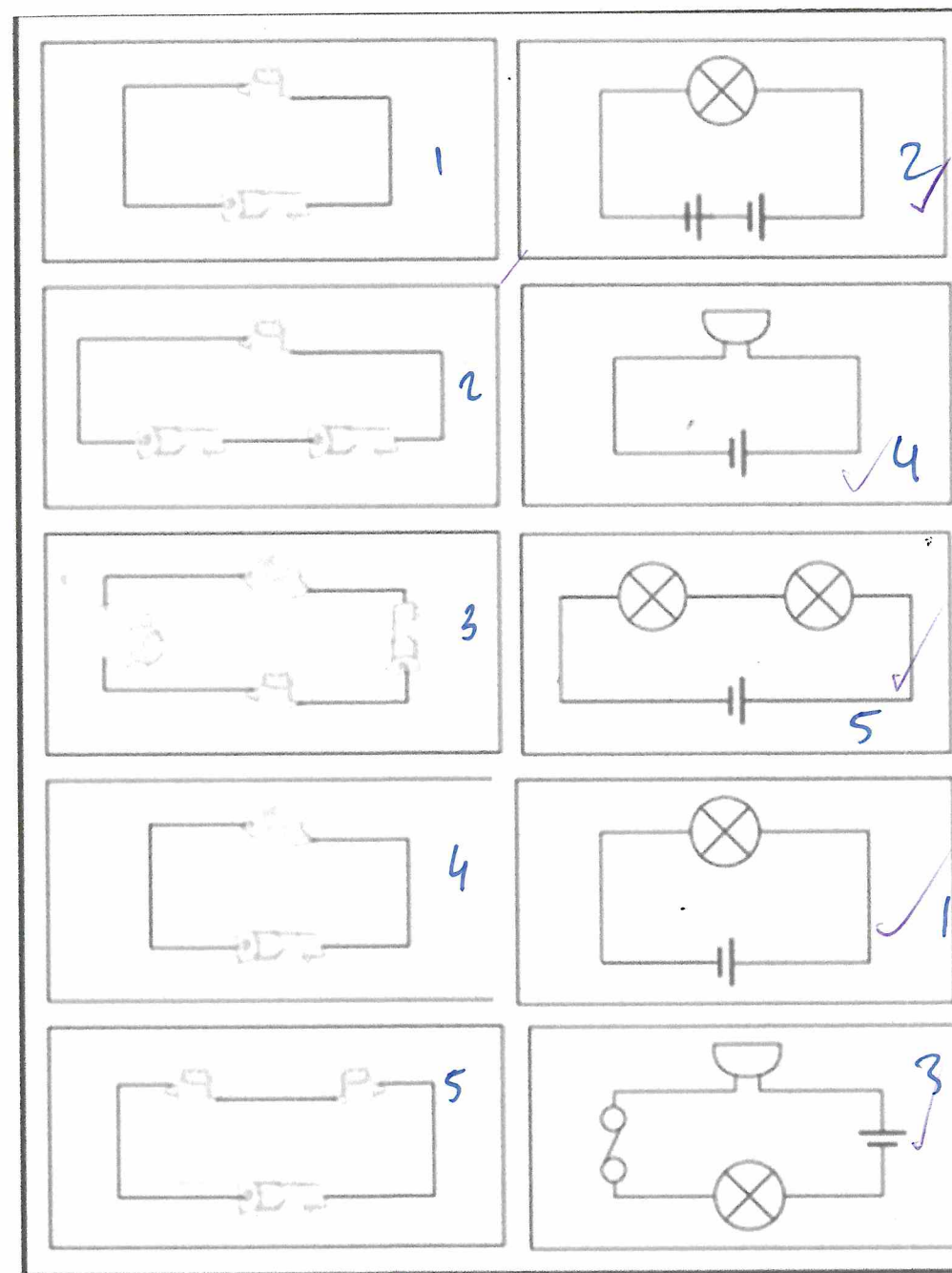
4. I predict this circuit will work because it's ~~has~~ a complete circuit

5. I predict that this circuit will work because if the battery is strong enough it could work.

6. I predict that the circuit won't work because there is no battery.



Tuesday 1st October
How can a fault be identified?



Why a ^{bulb} battery may not work?

1. The battery might be flat.

2. The bulb could be broken.

3. Batteries are the wrong way round.

4. The wrong voltage bulb will not be bright enough

5. The wires aren't connected

6. The bulb isn't screwed in properly.

7. The circuit has too many bulbs.

Circuit no.	Can I see a fault?	What component I changed	Did this work?	The fault was...
1	✓	changed the batteries around	✗ ✓	batteries in the wrong way round
2	✗	changed the bulb changed the battery	✗ ✓	dead battery
3	✓	reconnected the wires	✓	Wires were incorrectly connected
4	✓	screwed the bulb in	✓	Bulb wasn't so screwed in properly
5	✗	changed the low voltage bulb	✓	The bulb was broken

The most easy to spot fault was that the wires weren't ^{connected} ~~at~~ correctly.

The hardest fault to spot was that the batteries were the wrong way round

Wednesday 9th October
How can a circuit be changed?

R.P.

1. A problem in a circuit. ✓

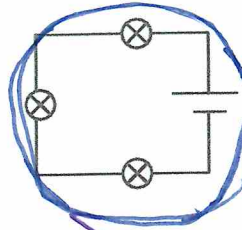
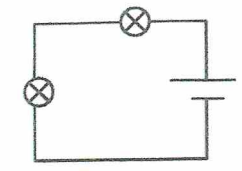
2. The bulb isn't screwed in properly or the battery is in the wrong way. ✓

3. The battery ✓, the bulb ✓

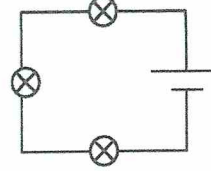
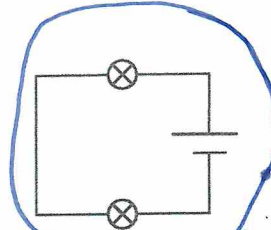
Circuit 1 will have a louder buzzer because the battery only has to power the buzzer in Circuit 1. Unlike Circuit 2. ✓

Voltage is measure of the cell to produce electricity. It measures the 'push' of electric current.

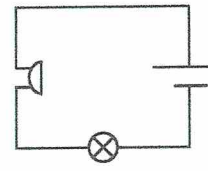
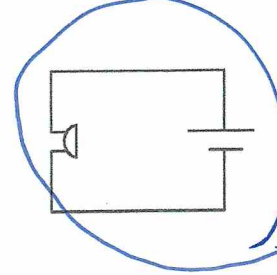
The ^{more} components you add to a circuit the bulbs would light up less than one bulb.



c) Circle the circuit which will have the dimmer bulbs.



b) Circle the circuit which will have the brighter bulbs.



- Look at the circuits containing different components.
- Circle the circuit which will have the louder buzzer.

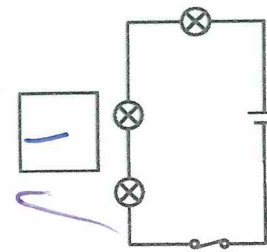
[3]

3

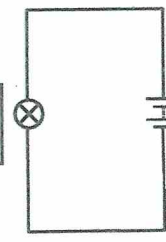
Tommy has created four circuits.

Order the circuits from 1 to 4 according to the brightness of the bulbs.

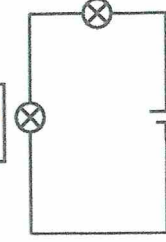
1 has the dimmest bulbs and 4 has the brightest bulbs.



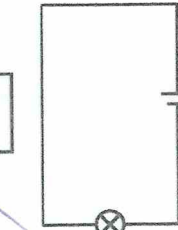
[4]



[2]



[3]



[4]

Circuit components	Observations
one bulb and one cell	The bulb is very bright
two bulbs and one cell	The bulbs became dimmer
three bulbs and one cell	All of the bulbs are very dimly lit. I had a spark at the switch.

[3]

2

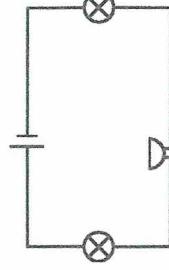
Make three circuits.

What do you notice about the bulbs?

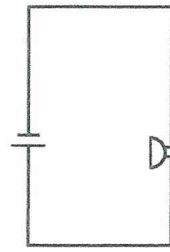
Variations within circuits

- Number the circuit diagrams according to how loud the buzzers would be.

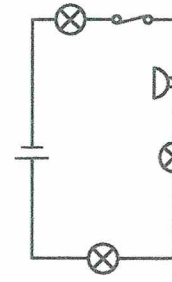
1 has the quietest buzzers and 4 has the loudest buzzers.



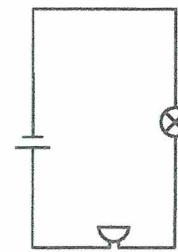
[2]



[4]



[1]



[3]

- Explain your order of quietest to loudest buzzers.

I think circuit 3 is the quietest because it has more components.

[1]

- Diddy has been looking at variations within circuits.

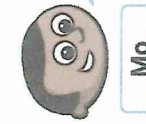
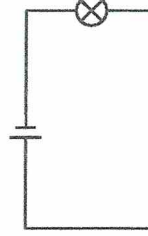


If I make a circuit with one cell and keep adding bulbs, the bulbs will get brighter.

Do you agree with Diddy? NO
Explain your thinking.

The more bulbs you add the lower the brightness will be because you have to share more energy.

- Mo and Annie have made a series circuit.



I can add another cell to the circuit to make the bulb brighter.



I can add a buzzer to the circuit to make the bulb brighter.

Who do you agree with? Mo

Explain your thinking.

I think Mo is correct because if you add another cell there will be more voltage for 1 bulb.

[2]

Wednesday 16th October
Investigation

What effects the brightness of a bulb in a circuit?

I predict the more ^{bulbs} batteries I use, the less more bright the bulb would be.

Equipment:

- Bulb
- Batteries
- Wires

Method:

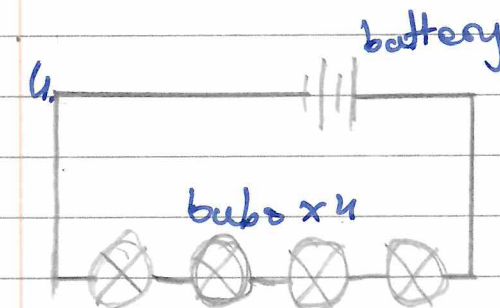
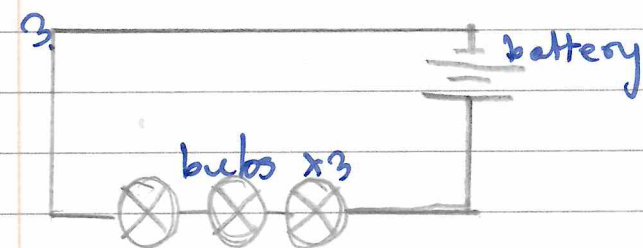
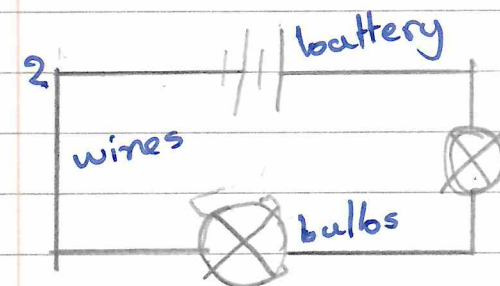
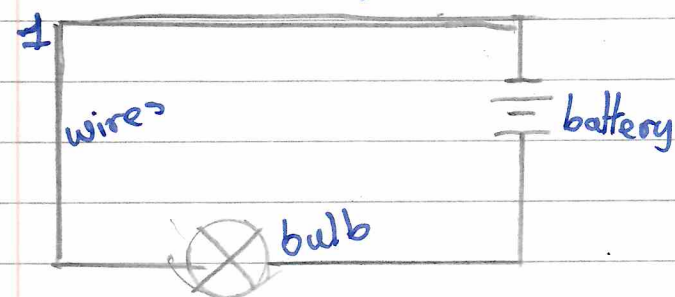
Firstly, I need to gather my equipment together. Then, I will build the circuit with 1 bulb and 1 battery.

Next, I will add my ~~battery~~ bulbs. I will then continue this until I reach 4 ~~batteries~~ bulbs. During this, I will observe and record the brightness of the bulb.

Variables:

My independent variable is the number of batteries used. My ^{controlled} variable is the number of bulbs (1) used. I will make sure my test is fair by being consistent with the equipment. I will also make sure all equipment is fully working beforehand.

Circuit diagram



What I notice

1. I used batteries that were 1.5v, joined to a bulb with crocodile clips, which was quite bright.

2. I used batteries that are 1.5v, joined to a bulb with crocodile clips, which wasn't as bright as the first circuit.

3. I used batteries that are 1.5v, joined to a bulb with crocodile clips. One bulb did not light up, the 2nd was dim but the third bulb lit up.

4. I used batteries that are 1.5v joined to a bulb with crocodile clips. Two bulbs didn't light up and the other two bulbs were dim.

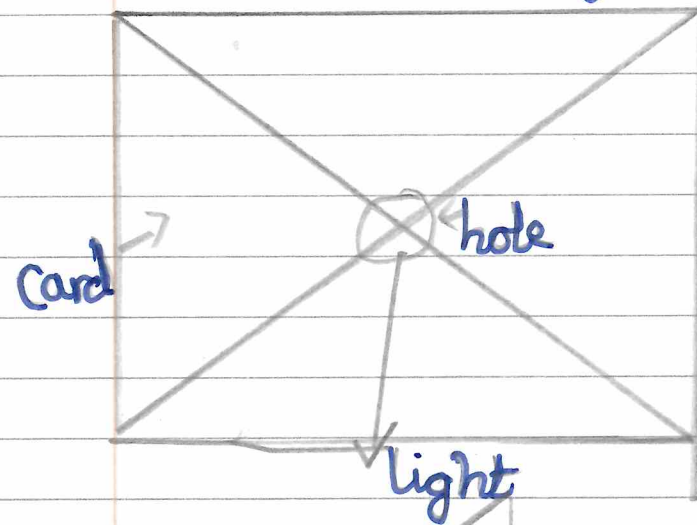
Conclusion:

My prediction was correct. However, my results may not be entirely reliable. This is because my opinion on 'bright' isn't the same as the of other people's.

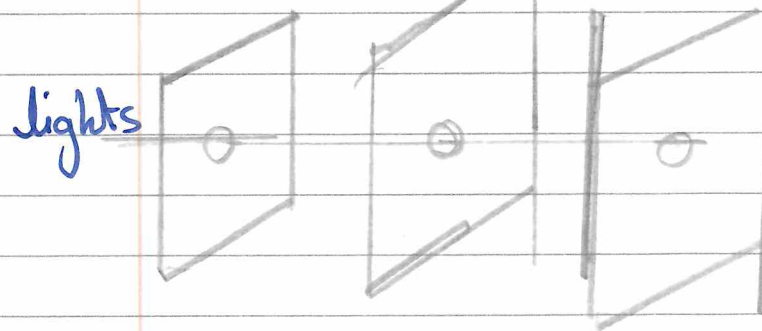
Tuesday 5th November
Light and shadow

- Light could be made natural or man-made
- Fastest thing ever.
- Come from: bulbs, sun, fire screen.

L.O.F - Proving light travels in a straight line



I made a hole using a hole puncher. The hole was located in the middle. I noticed that when a torch was shone, the light came through the hole.



When I lined up 3 card in a row, the light shone through all the holes.

This proves light can only travel in straight lines

Light source	An object that emits (gives off) sends out) light around itself.
Retina	A thin layer of tissue at the back of the eye
Lens	Transparent film at the front of the eye
Pupil	The round opening at the centre of the iris
Cornea	Transparent part of the eye that covers the iris
Iris	The coloured tissue at the front of the eye
Reflection	The bouncing of light (or heat or sound) by a surface without absorbing it.
Refraction	The change in direction of light as it travels through a material such as glass.

Year 6 Science, Autumn 2, Light

How do we see?



- Reflections are light bounced off a shiny surface.
- Some light rays hit the girl's face hit the mirror.
- They bounce off the mirror and travel to her eyes.
- The rays in her eyes help her see her reflection.



Stem sentences

- "I predict that _____ because/therefore _____"
- "In order to improve my investigation I would amend _____"
- "There is a degree of trust/distrust in my results because _____"

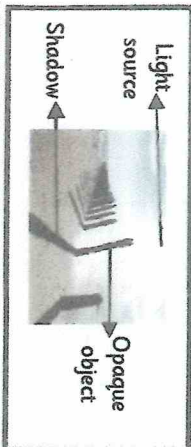
How are shadows formed?

Darkness is an absence of lights shadows look different based on the transparency of the object.

Transparent objects = faint shadows (more light gets through)

Translucent objects = darker than transparent, lighter than opaque object shadows.

Opaque objects = dark shadows.



Splitting light

Violet Indigo Blue Green Yellow Orange Red
There are seven main colours in the spectrum and many more in between.



Most of the light waves in the light spectrum is invisible to the human eye.

Other animals can see parts of the light spectrum that we cannot see.

The light waves that we see from the sun can be described as white light. This contains all of the colours in the spectrum above.

Refraction

A glass or Perspex block can change the direction of a light ray.

Light changes direction as it passes from air into the block.

Once it emerges the other side it changes direction again.



Water refracts the light, making the pencil appear bent when in the water.

Some uses of mirrors

In shops and supermarkets for security.

In cars for safety.

In hairdressers to watch what is happening.



At the dentist to look around teeth.

On the roadside to see around corners.

Periscopes in submarines

Wednesday 13th November
How do we see?

Tuesday
~~Thursday~~ 19th November
How is light effected by different surfaces?

Our line of enquiry

Which material is the most reflective?

I think the most reflective material will be glass bottle cellophane.

Method:

- Hold 2 pieces of card opposite each other
- Shine the torch on one card, causing a reflection of the other card
- Move the cards further apart ^{longer light}
- Stop when the light is ~~not~~ reflected.
- Measure the distance and repeat.

Our independent variable is our card.
Our dependent variable is our distance.

Material	Distance
• Glass	12cm
• Cellophane	36cm
• Card	0cm
• Bubble wrap	26cm
• White material	17cm

A bar graph to show which materials are reflective.

