



Lighting it up - make and test session





Learning Objectives



Make and use simple circuits.

Design, make, test and evaluate products.

Understand why shadows change in length over the course of the day.

Discover how much fun STEM (science, technology, engineering and maths) can be!

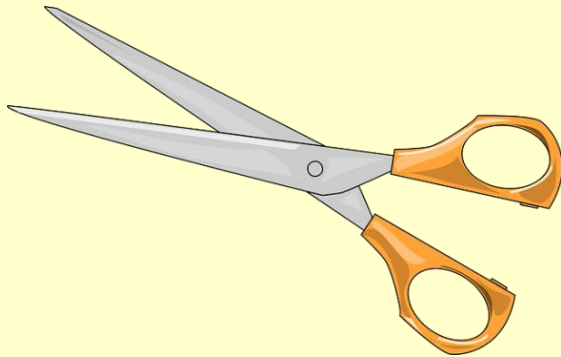


1. Health and Safety



Look at your tools and equipment.

Can you spot any hazards?



How can you reduce the risks?



2. Your Design

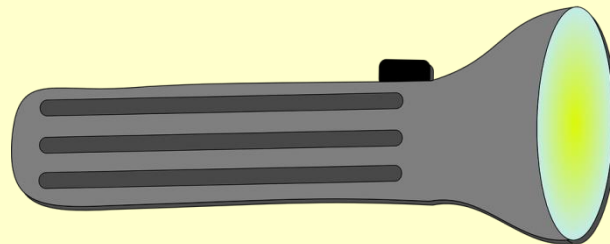
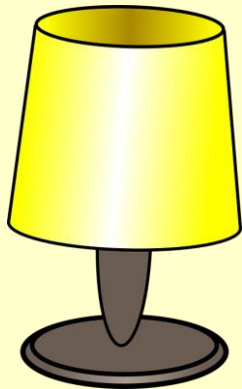


Look back over your worksheet.

Have you got all the materials you need?

Do you need to change your design?

Discuss with a partner what you plan to make.

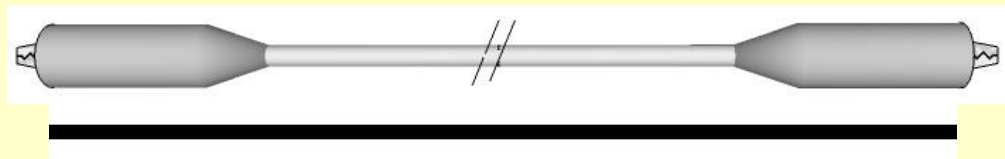
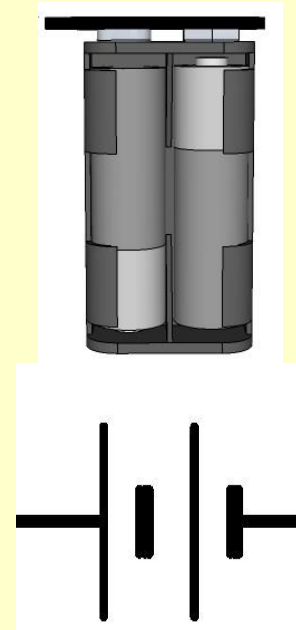
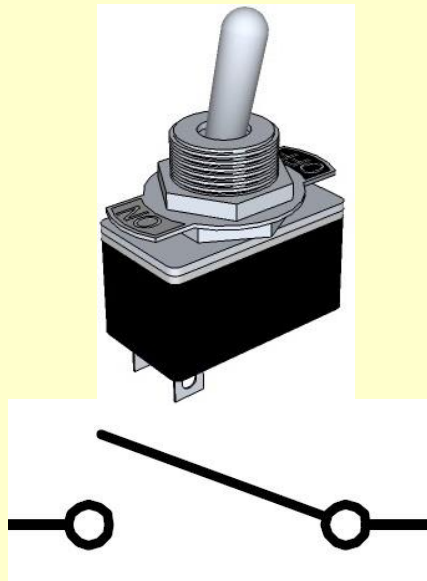
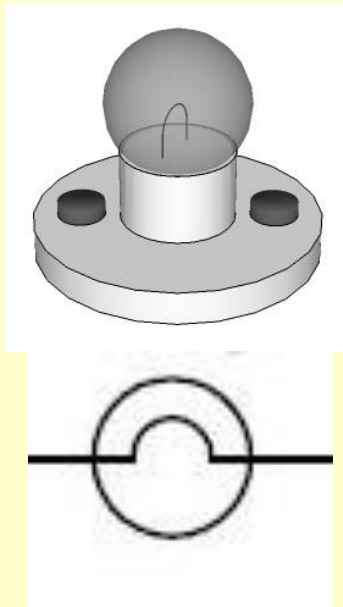




3. Electrical Parts



Name these components and their symbols:





4. Avoid Short Circuits

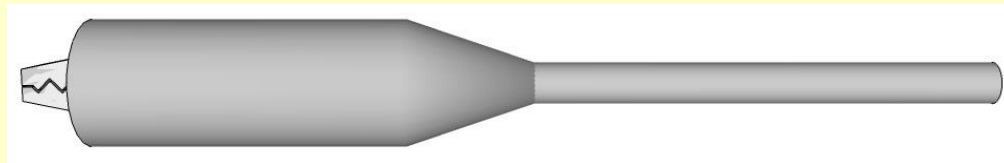


If batteries are 'short-circuited' they can get hot.

Do not connect the bare metal ends of the wires from the battery directly together.

The circuit must include the bulb.

Make sure the plastic sleeves cover the crocodile clips as shown here so the metal parts don't touch accidentally.





5. Dangers of Mains Electricity



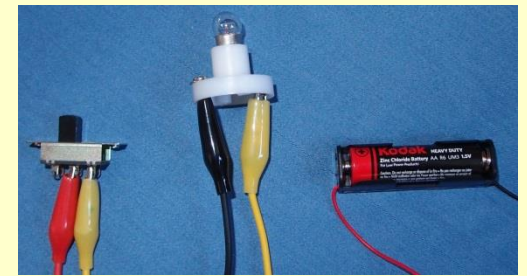
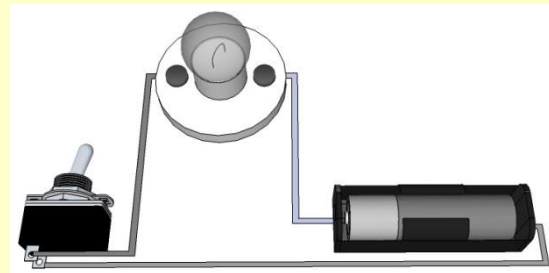
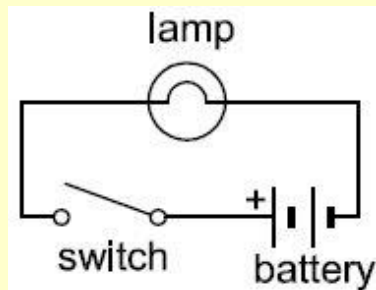
- Your battery will supply approximately 3 Volts of electricity, whilst mains electricity is 240 Volts.
- Can you think of any hazards of mains electricity?
- Can you think of ways to avoid the hazards?



6. Make your Circuit



- Collect your electrical parts (including the right switch).
- Fit the cell into the battery holder (the right way round).
- Make the following circuit - check that it works.



- What will happen if you leave your circuit switched on for a long time?



7. Make your Light



- Have a go at making your light.
- If you have problems ask for help.
- Try out your light and see if it works.
- If it doesn't work try and fix it.
- You can decorate your light.
- Write your name on your light.
- If you have finished you can help someone else.



8. Test your Light



You will need:

- A light or torch
- A ramp
- Two pencils
- Graph paper
- A protractor (or 30° and 45° set squares)
- A dark room
- A ruler
- 3 people
- Plain paper



9. Measure shadows



Set the ramp at an angle, and hold your light at the top of the ramp, facing down the ramp.

Hold a pencil vertically at the bottom of the ramp.

Measure and record the length of the shadow.

Change the ramp angle and repeat.

Plot a graph of shadow length against ramp angle.

Why do shadows change in length over the course of the day?



10. Finish off



- Does your light meet your design criteria?
- Ask others what they think of your light.
- Would you like to make some improvements?
- Clean up thoroughly.
- Complete your worksheet.

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11. Plenary



Discuss how the activity went and what you have learnt.

- What difficulties did you encounter and how did you overcome them?
- What would you do differently if you were starting again?
- What have you learnt about:
 - Electric circuits?
 - Using materials for different purposes?
 - Why shadows change in length during the day?
- What did you enjoy most about the activity?



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