

# ELECTRONICS

## Energy

Module 4.1



An Australian Government Initiative



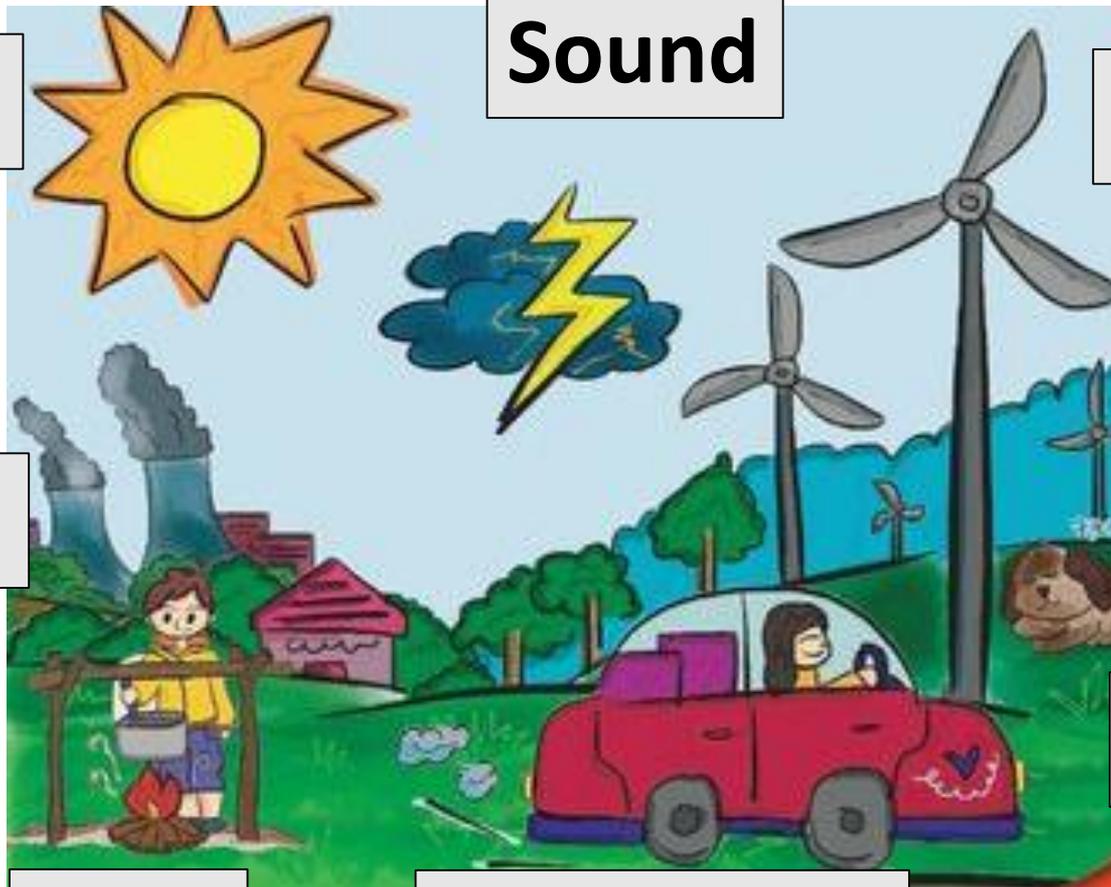
# Energy is all around us

Light

Sound

Wind

Chemical

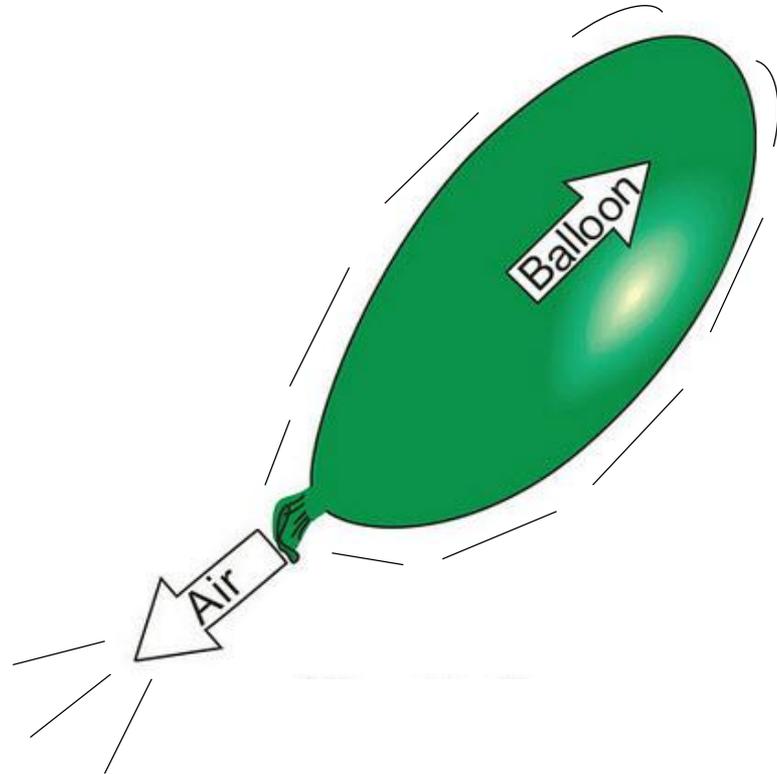
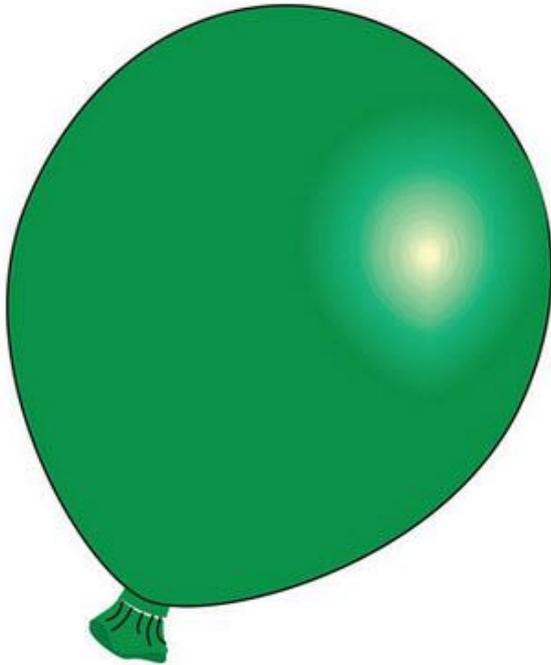


Heat

Movement

Fuel

# Which one has **kinetic** energy?



## Balloons...

Diagram Courtesy of: <http://lohitscience.weebly.com/matter--energy.html>

# Heat Energy & Electrical Energy



# Chemical Energy



# Can a LEMON power a light?

**Aim:** To harness the power stored in a lemon

**Materials:**

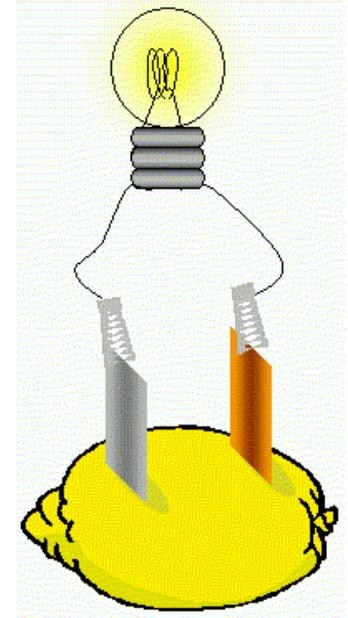
- 2 - 4 lemons (or potatoes)
- 1 LED Light (3mm – 5mm)
- Alligator clips and insulated electrical wire
- 4 pieces of copper wire (4 cm long each)
- 4 galvanised nails (4cm long each)

**Procedure:**

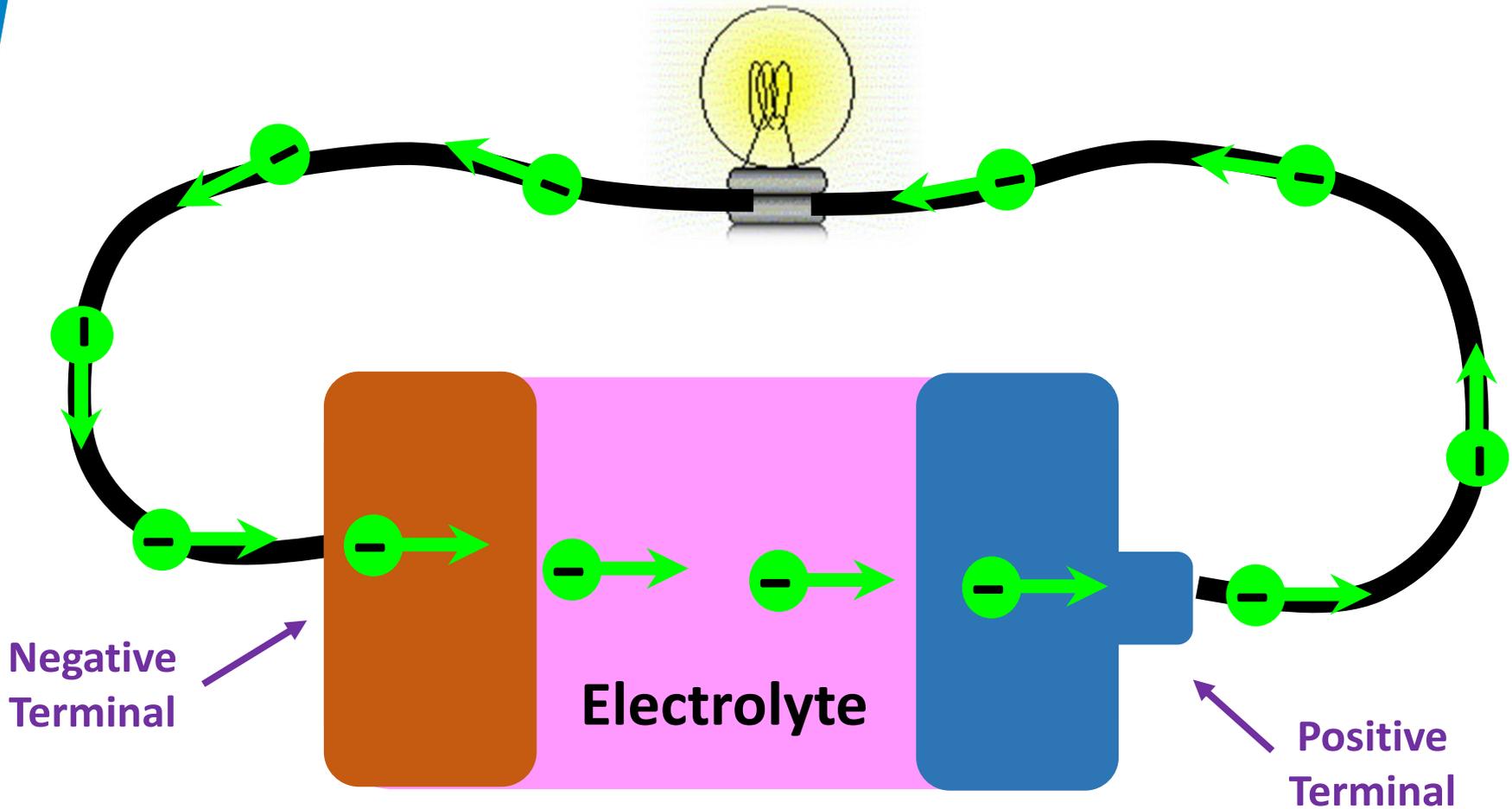
1. Roll and squeeze 2 of the lemons by hand, making them juicy inside (don't cut them open, keep the juice in!)
2. Into each rolled lemon, insert 1 nail, and a 4 cm piece of copper wire. Leaving a small section of each sticking out.
3. Using electrical wire and the alligator clips, connect the nail in the first lemon to the copper wire in the second.
4. Connect the copper wire sticking out of the first lemon to the longer leg of the LED light (using the electrical wire and the alligator clips).
5. Connect the nail sticking out of the second lemon to the shorter leg of the LED light (using the electrical wire and the alligator clips).
6. Observe!

Is there a difference if you change how far the nail and copper wire are pushed in?

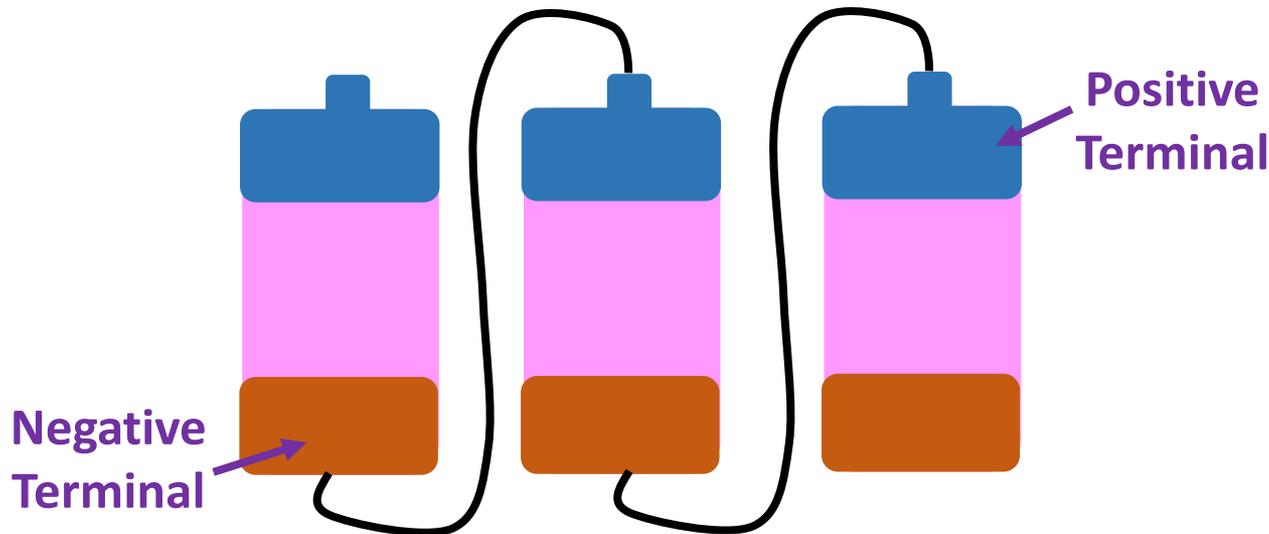
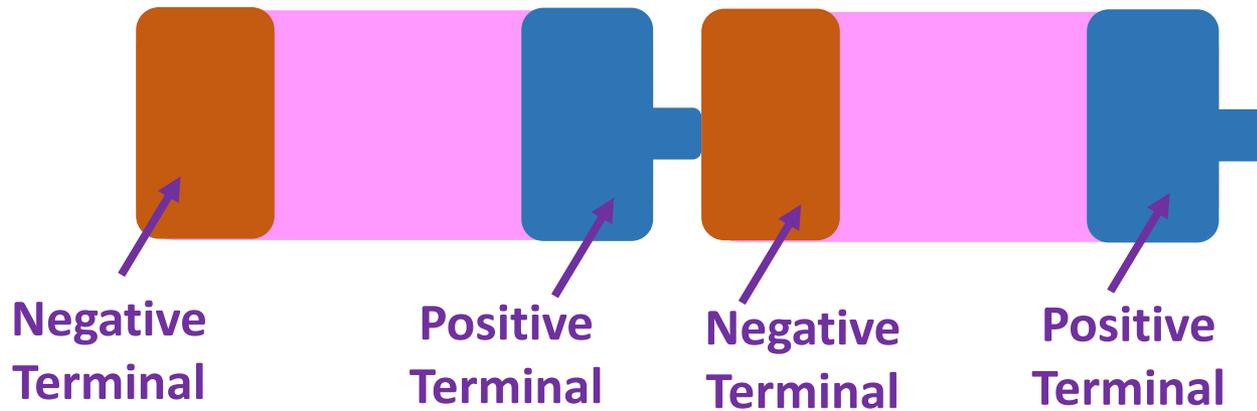
Is there a difference if you add more lemons to the system?



# How do batteries work?



# Connecting batteries



# Battery Challenge!

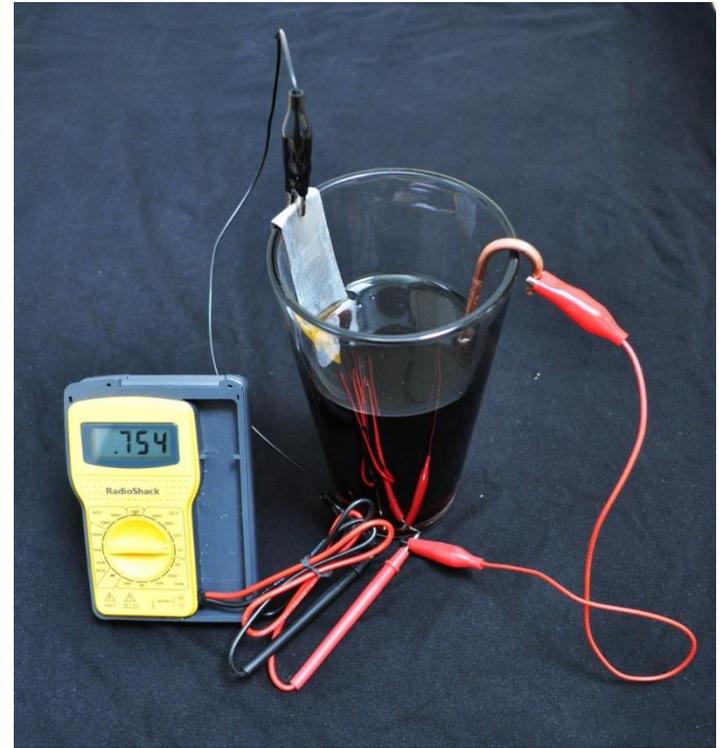
Build a powerful battery using the variety of materials supplied, to brightly light up LEDs.

*Remember: You'll need an electrolyte and electrodes, just like in the lemon battery experiment...*

# Electrolytes and Electrodes



Your sweat?



Coca-Cola?

# How many cells?



Video: 6 cell vinegar battery (using an ice cube tray)  
<https://www.youtube.com/watch?v=Phu--v1WAoU>

# Rules

- The team who can light up the most LED's OR give the highest reading on the multimeter wins.
- You can use any of the supplied materials to construct your battery.
- Do not drink the coke, vinegar or lemon juice, especially if it has had coins and nails in it!
- All materials must be returned.
- You can pre-test your design using only one LED to ensure, that current is being produced.