

# Squishy Circuits

# What is a circuit?

**Batteries store energy!**



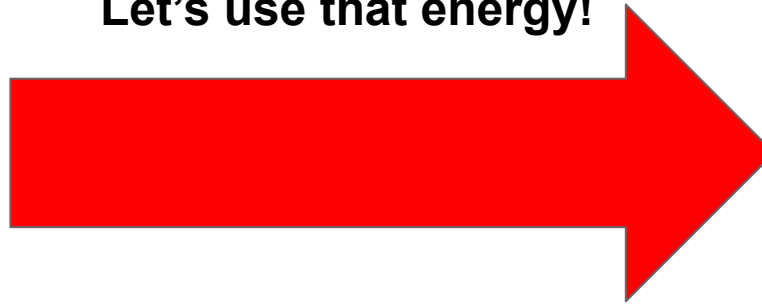
**Lights need energy to run!**

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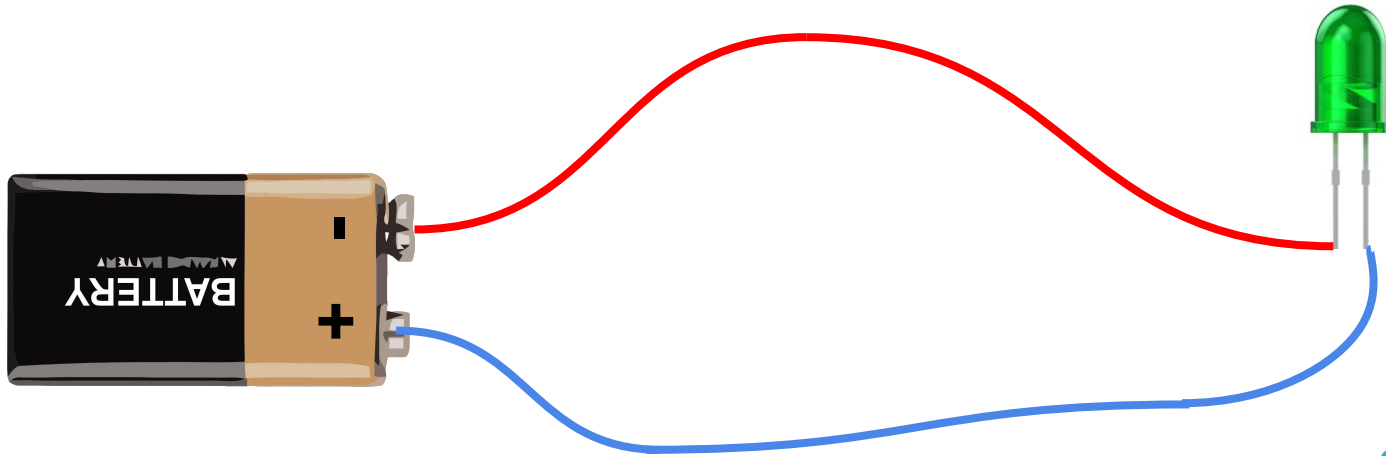
**Let's use that energy!**



**Lights need energy to run!**

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**To use the energy to turn on the light we need to make a closed circuit.**

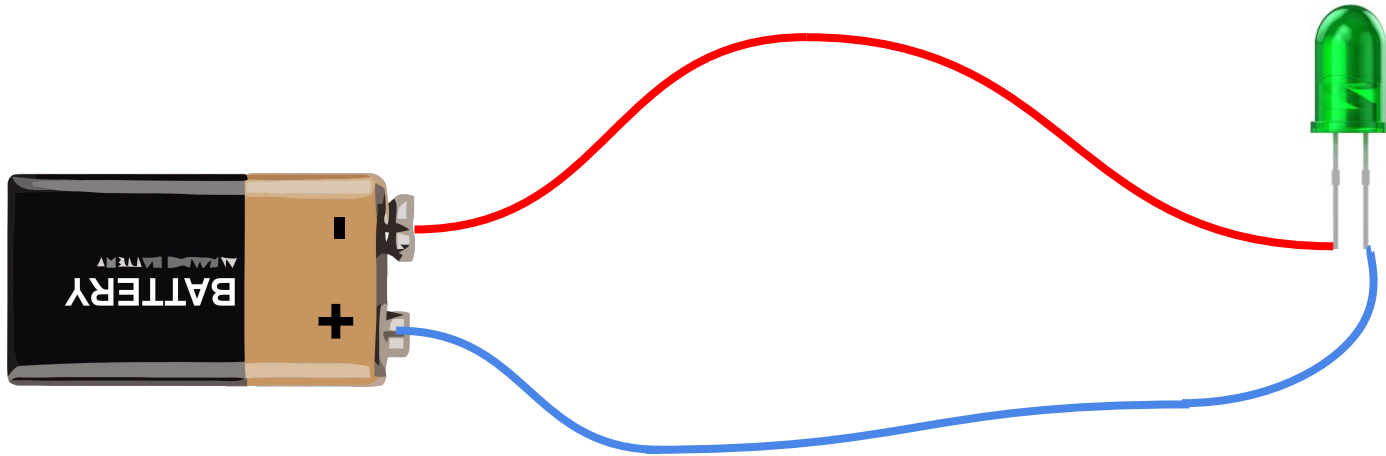


**What does that mean???**



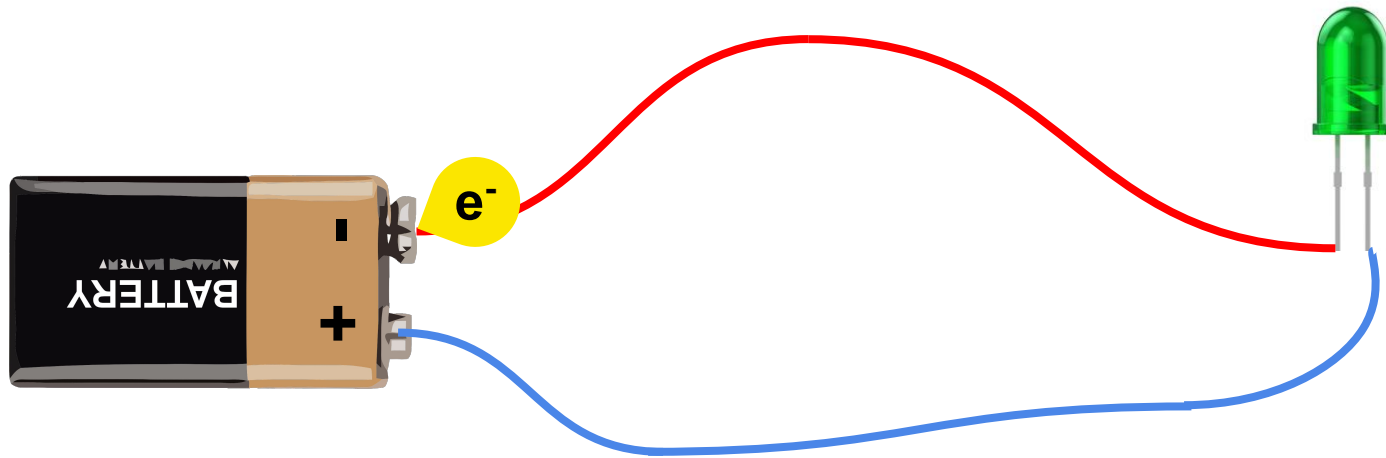
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**Electricity is just a stream of electrons going around in a circle.**



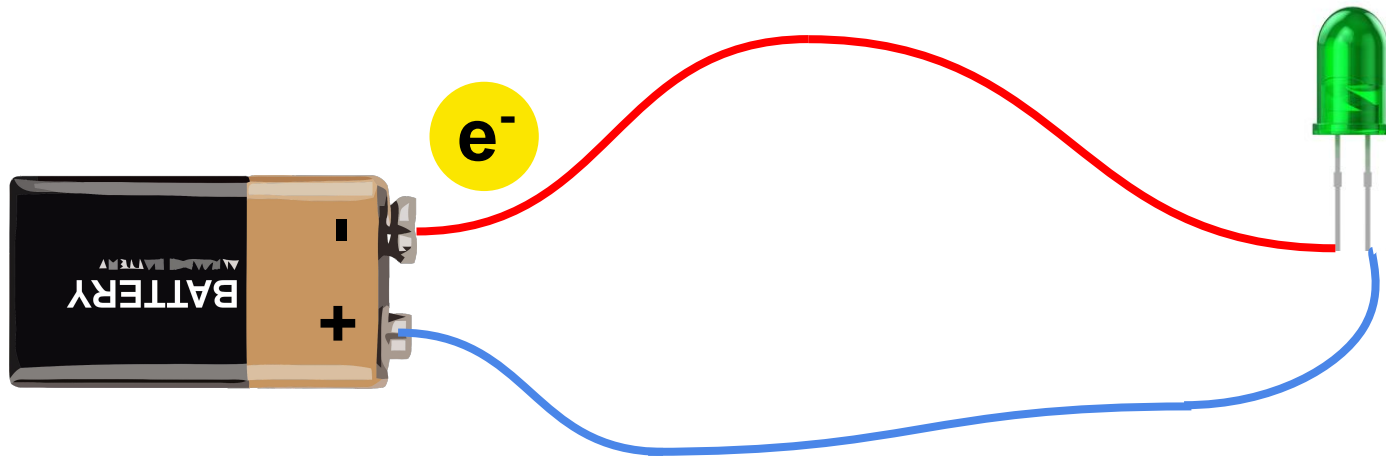
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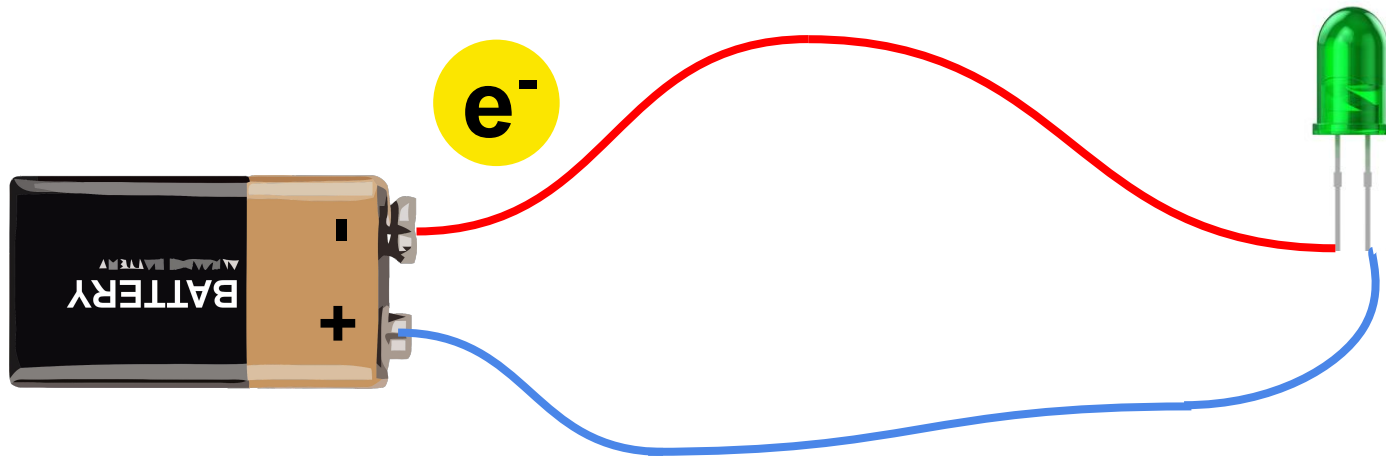
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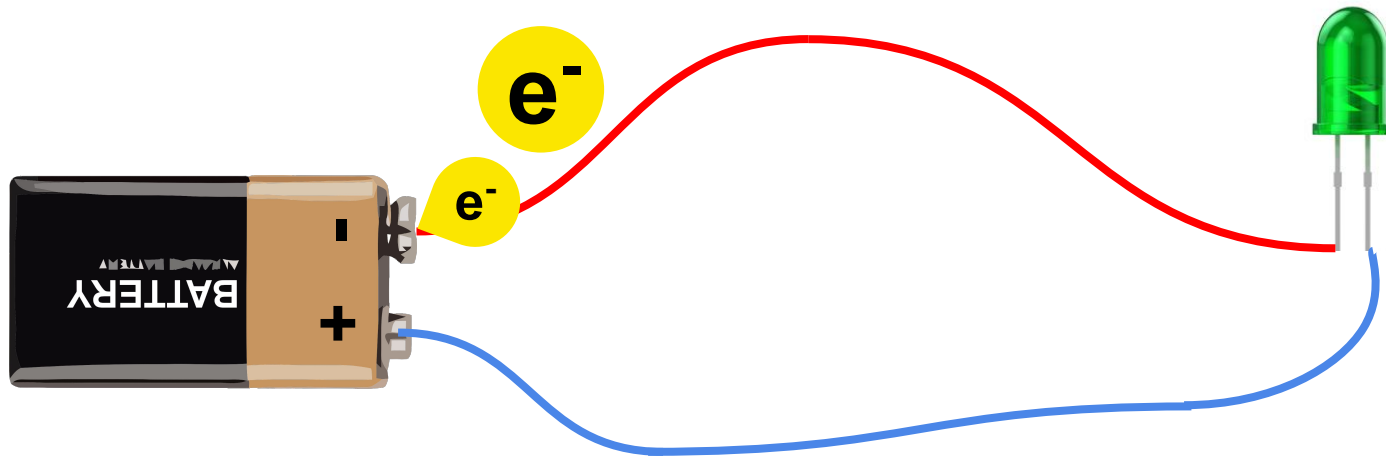
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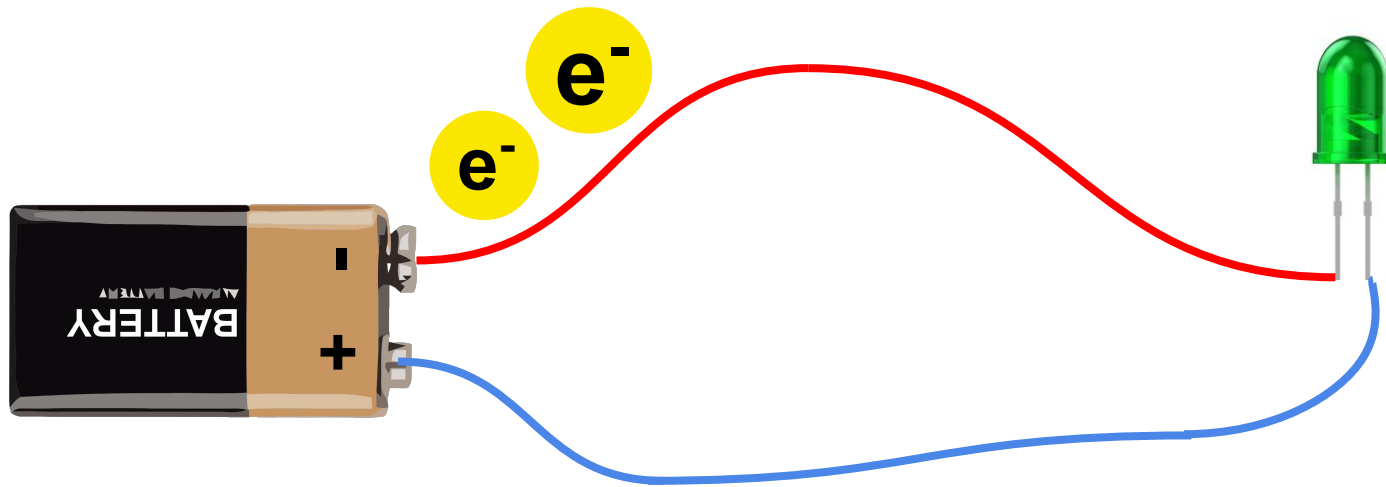
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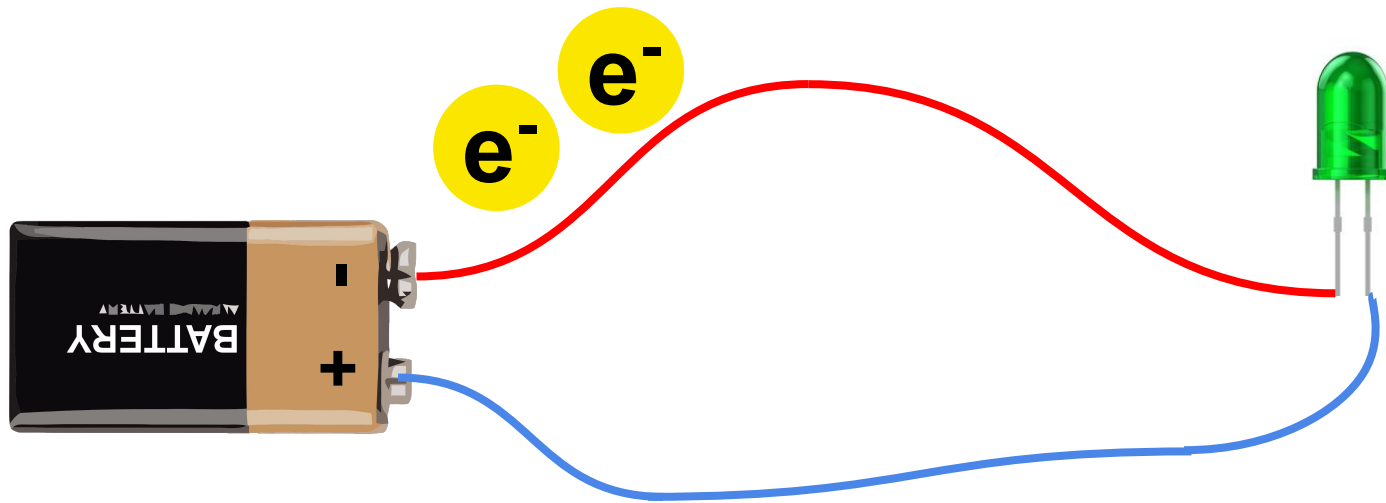
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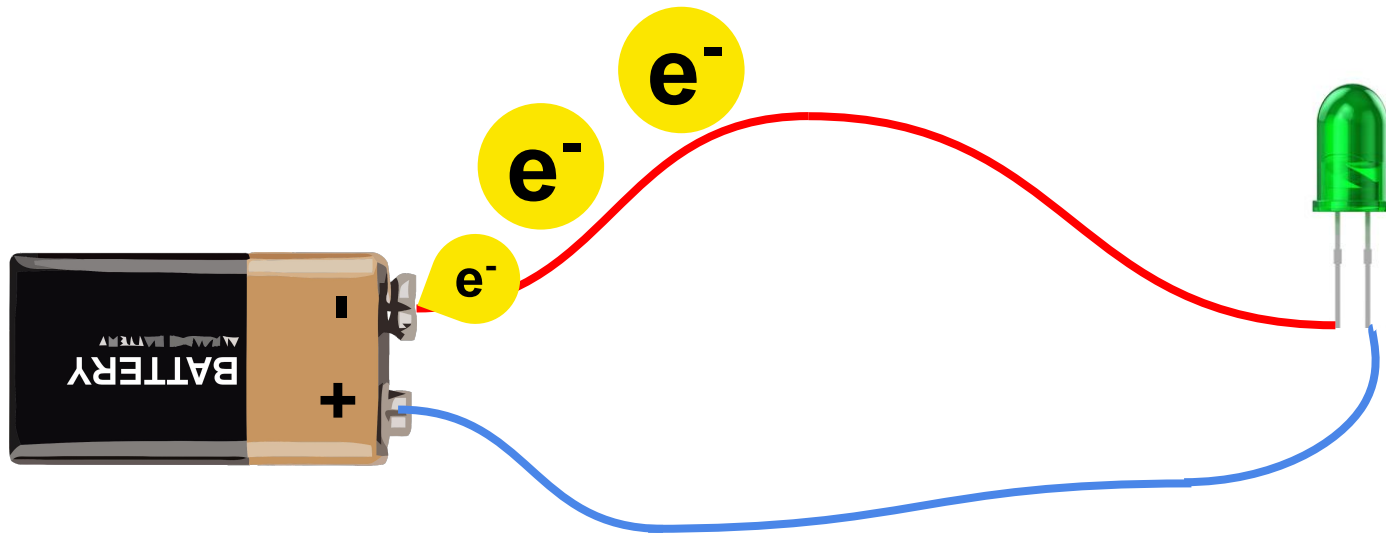
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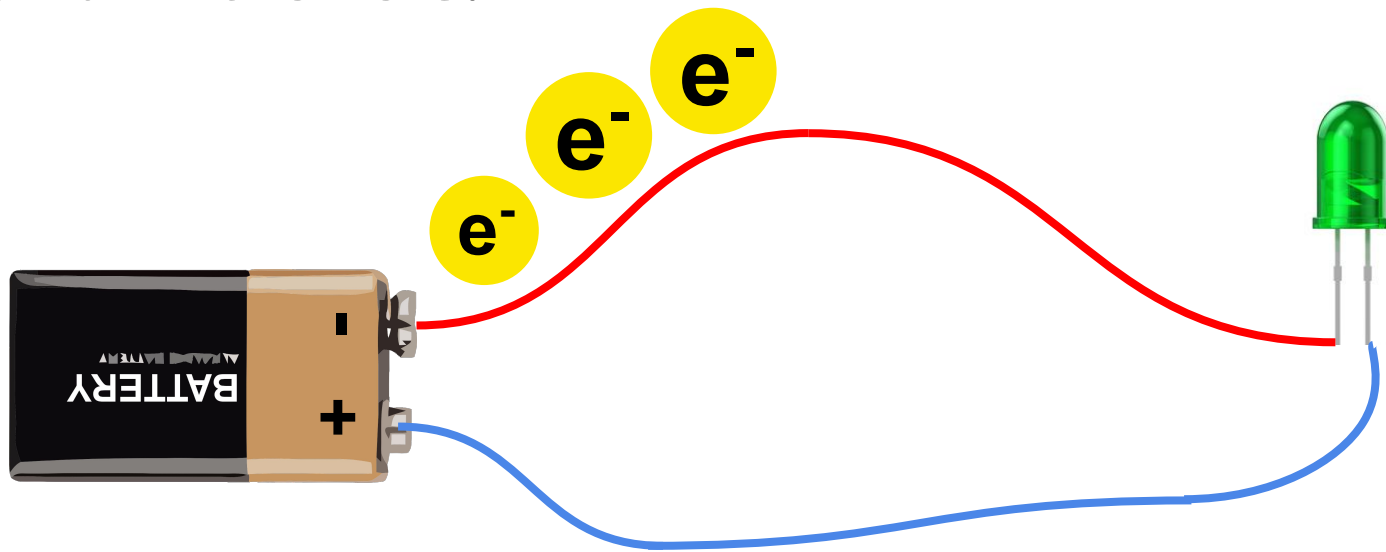
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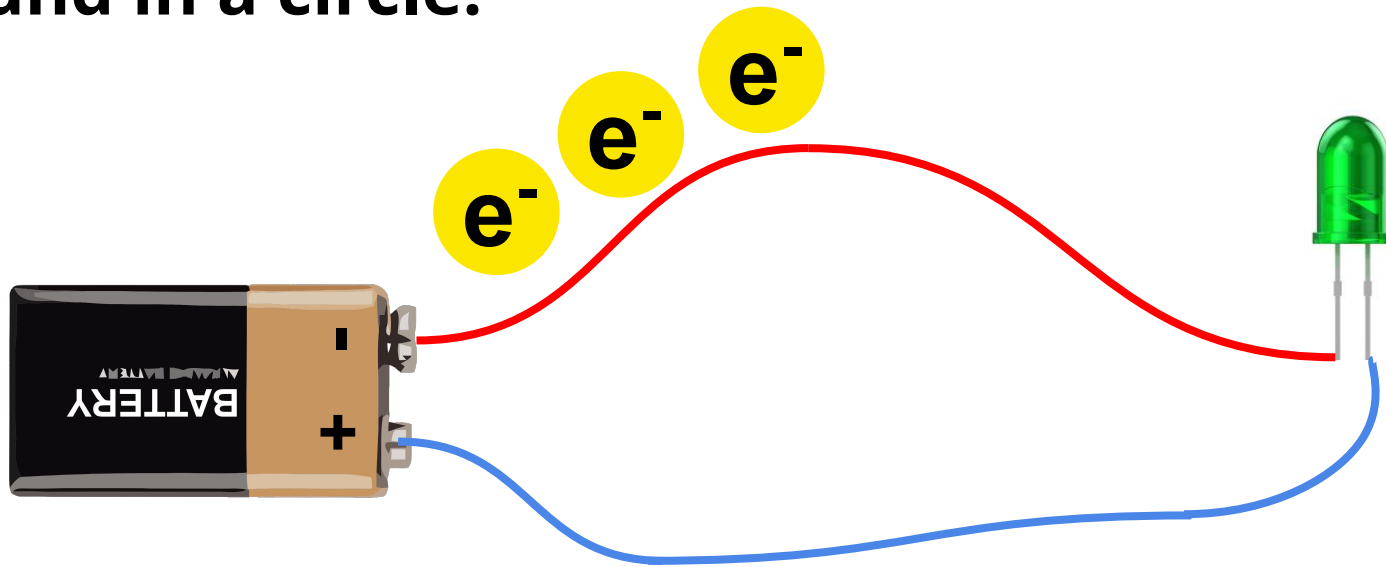
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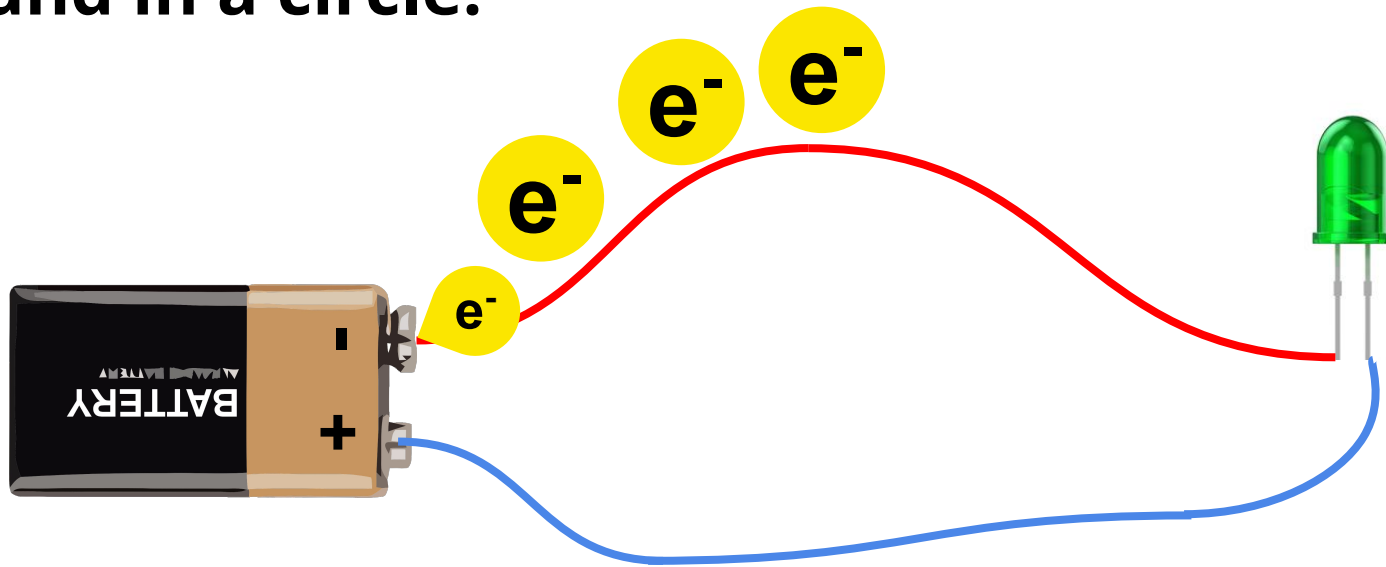
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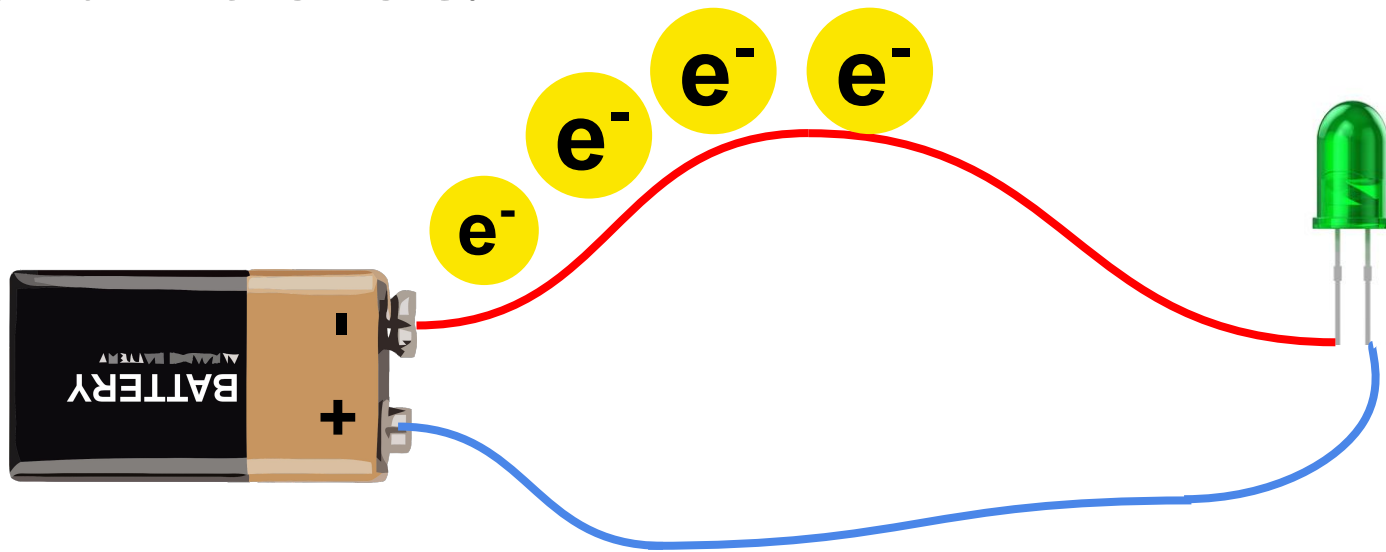
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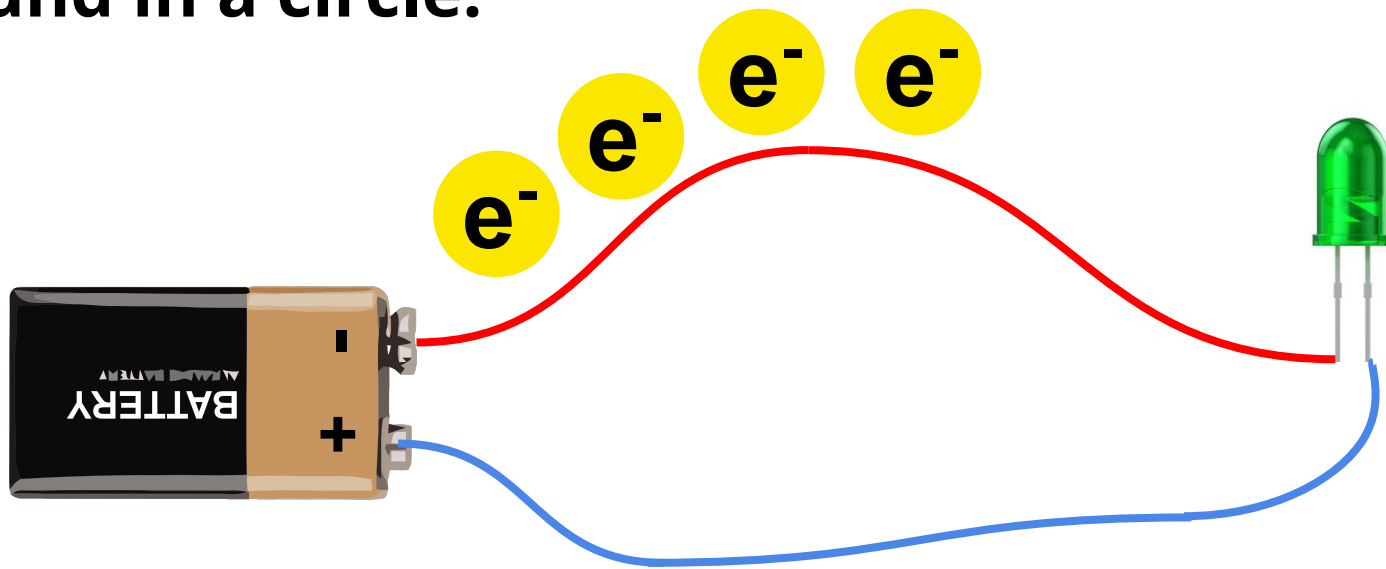
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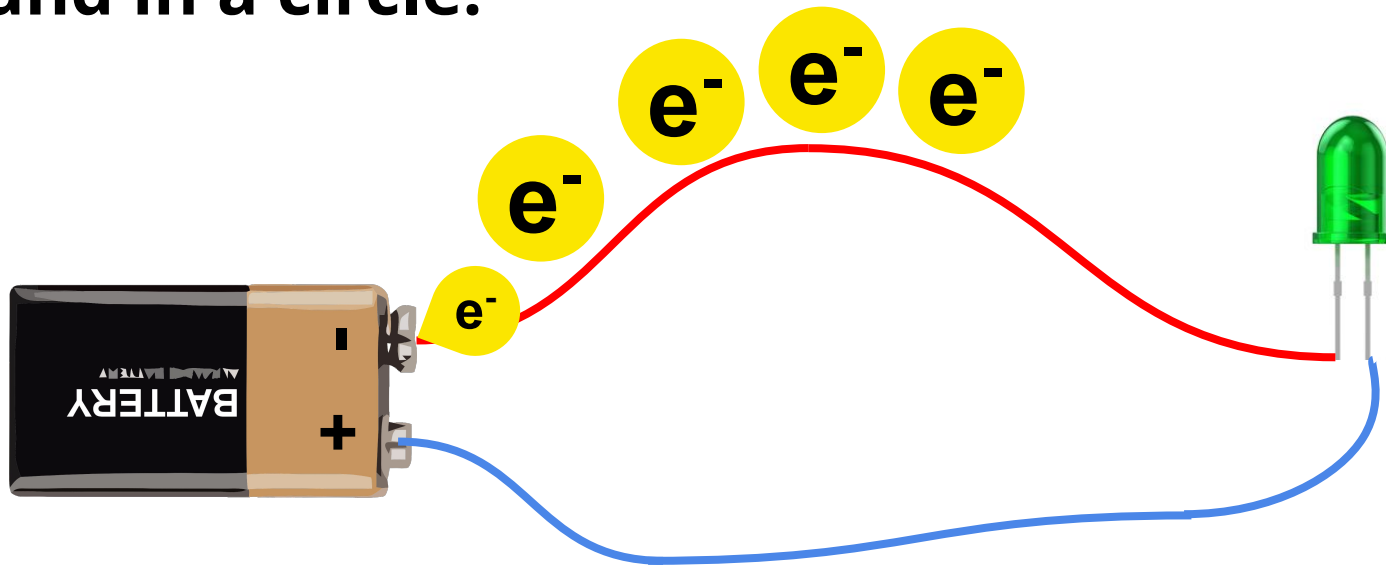
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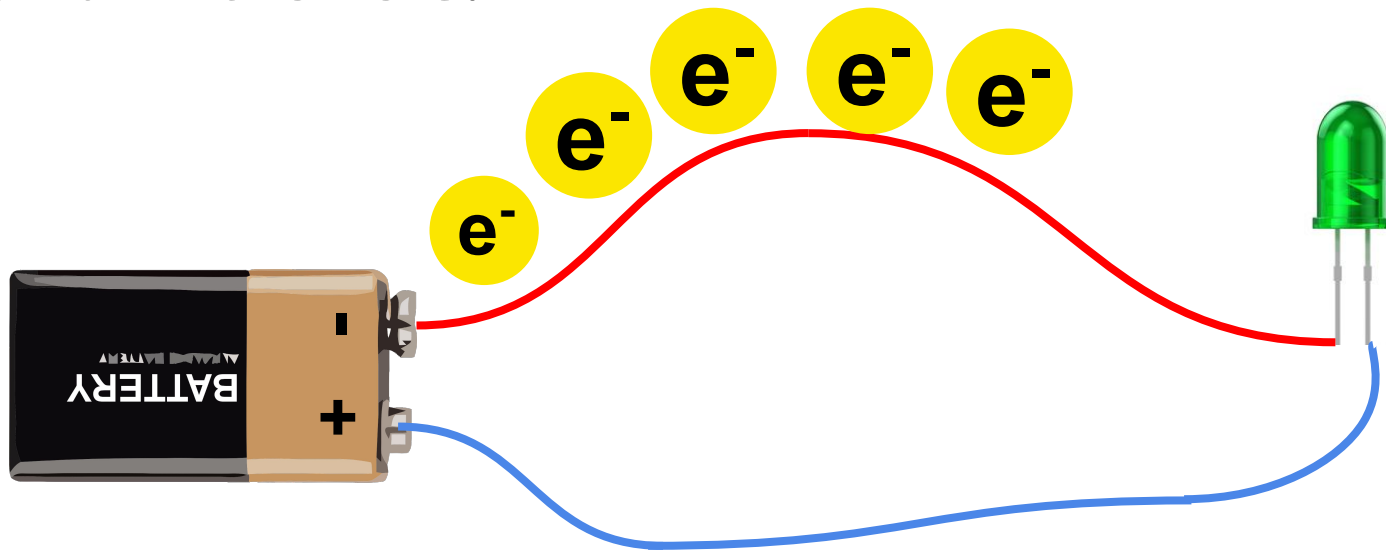
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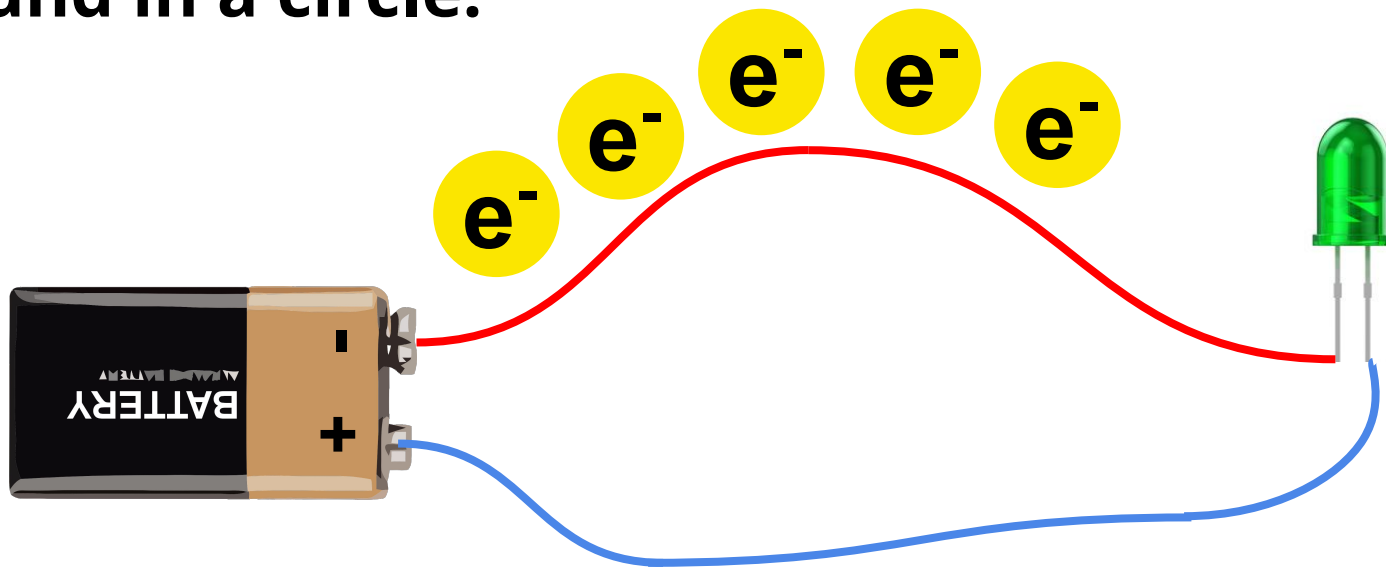
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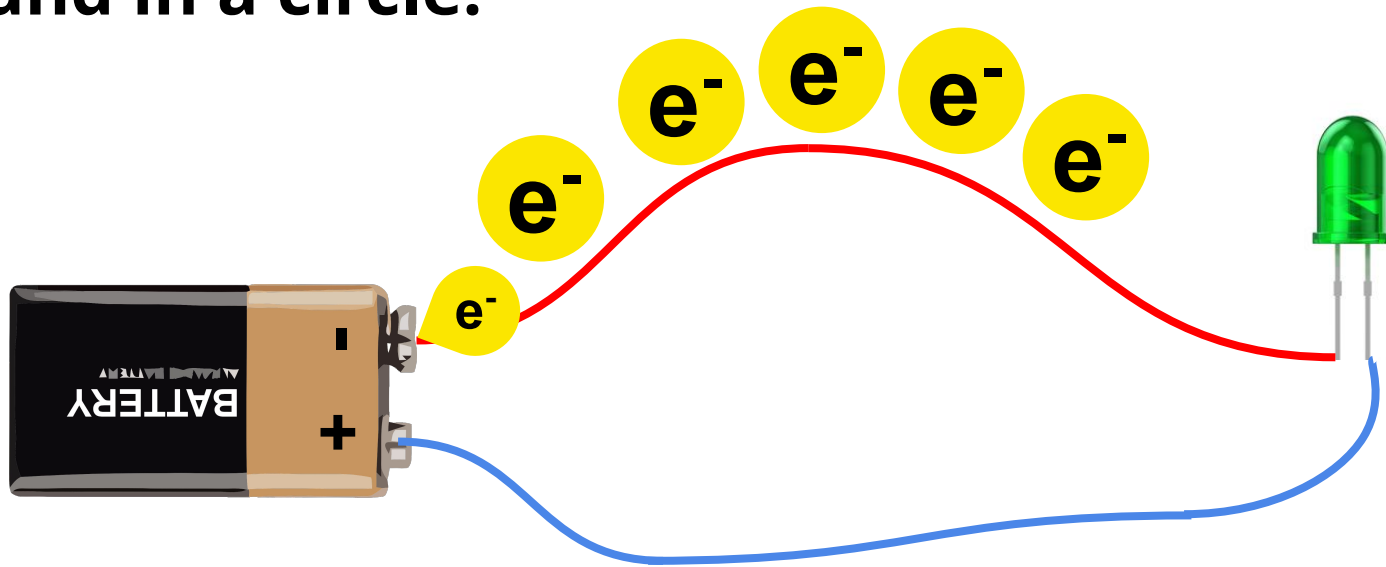
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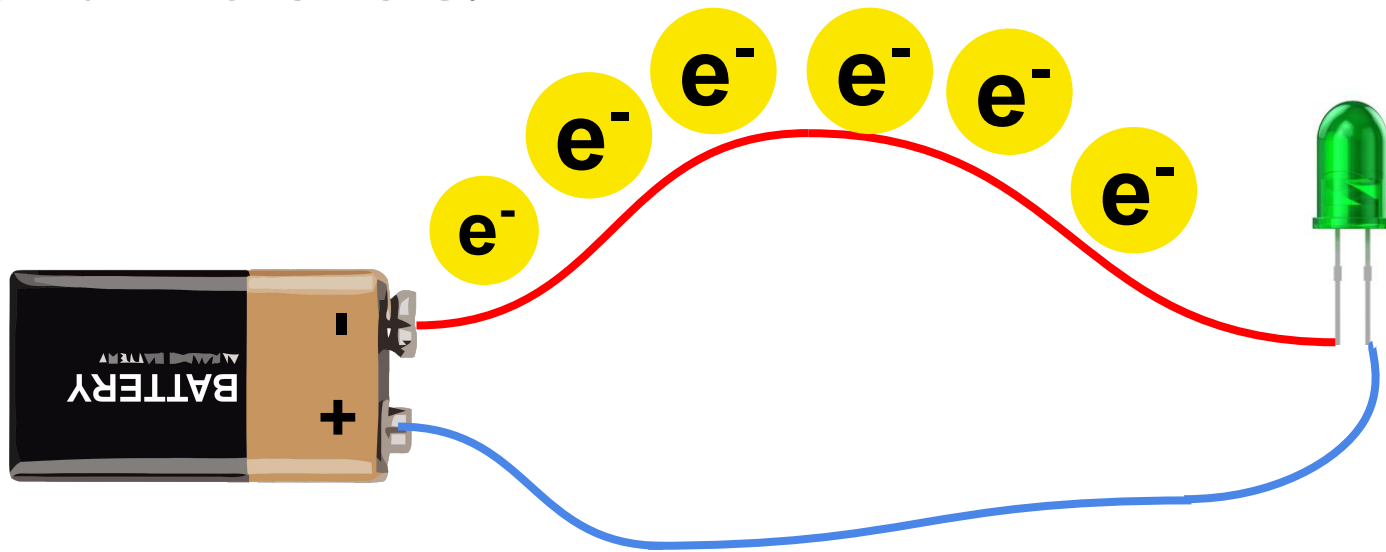
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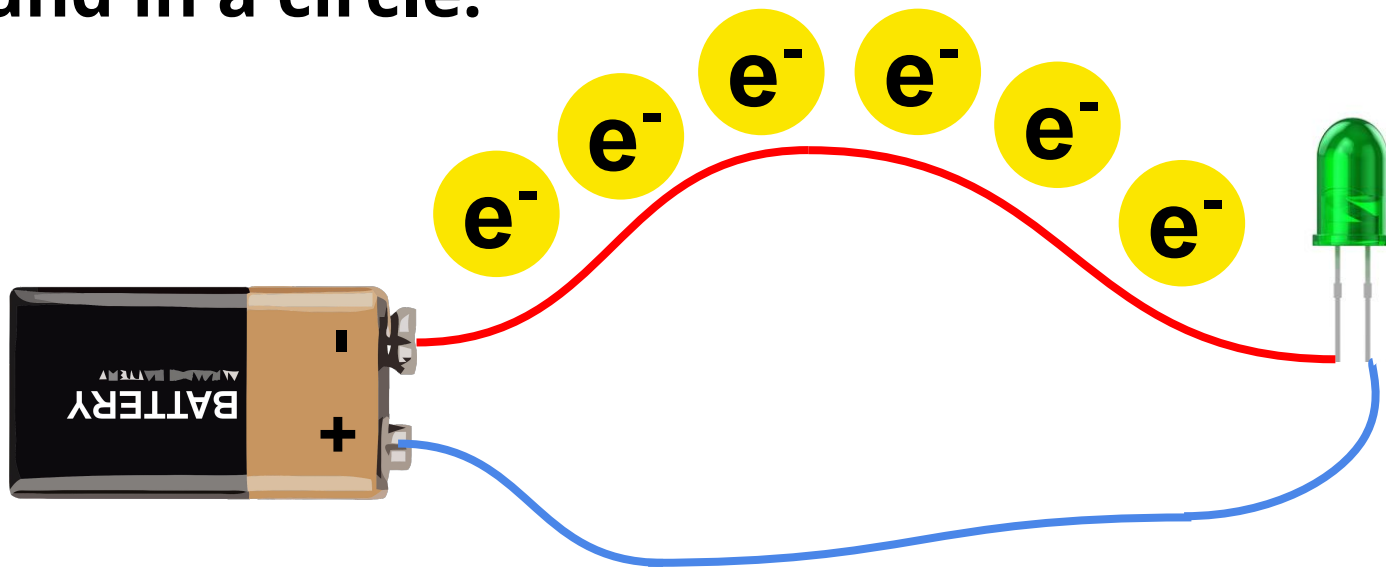
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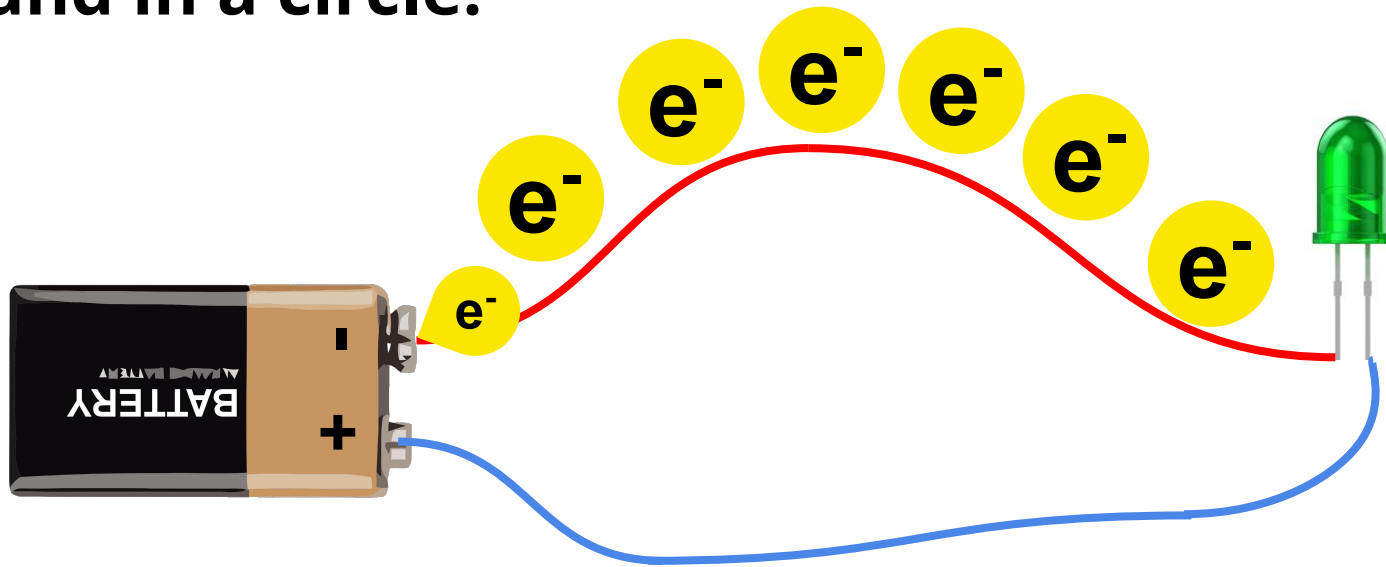
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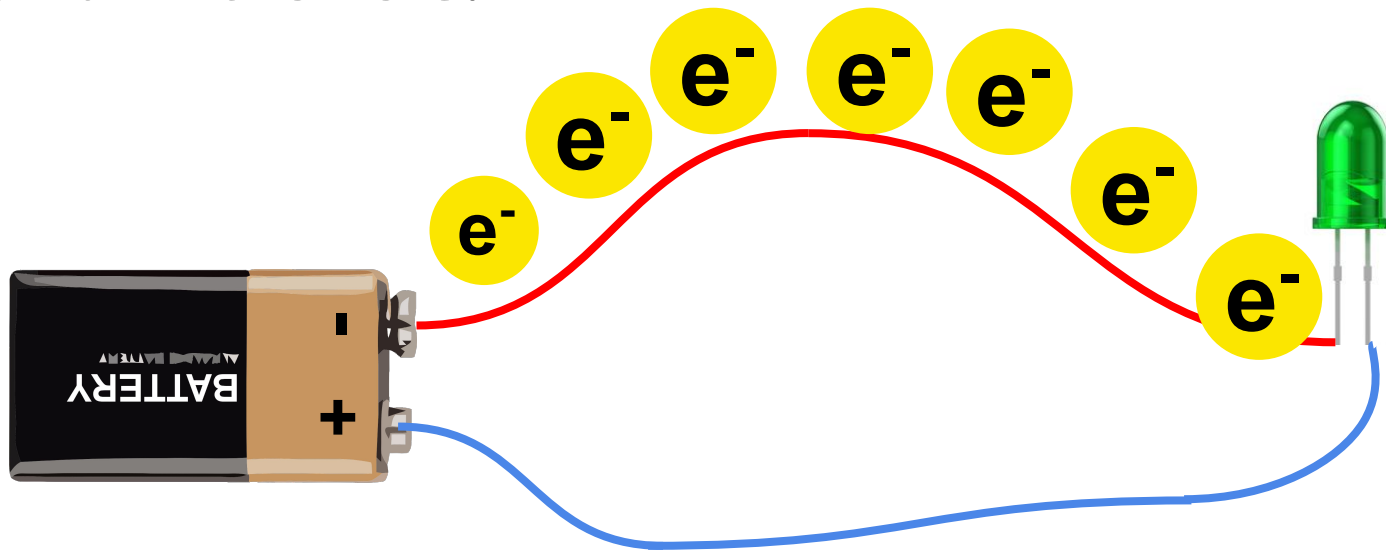
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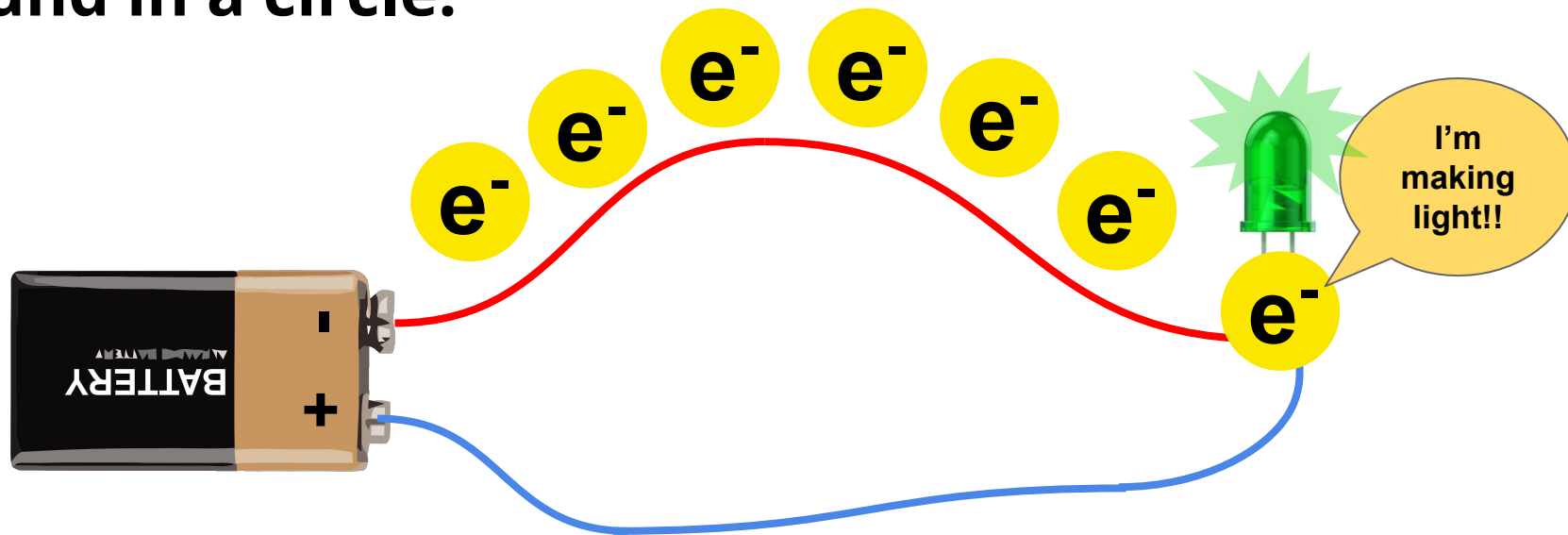
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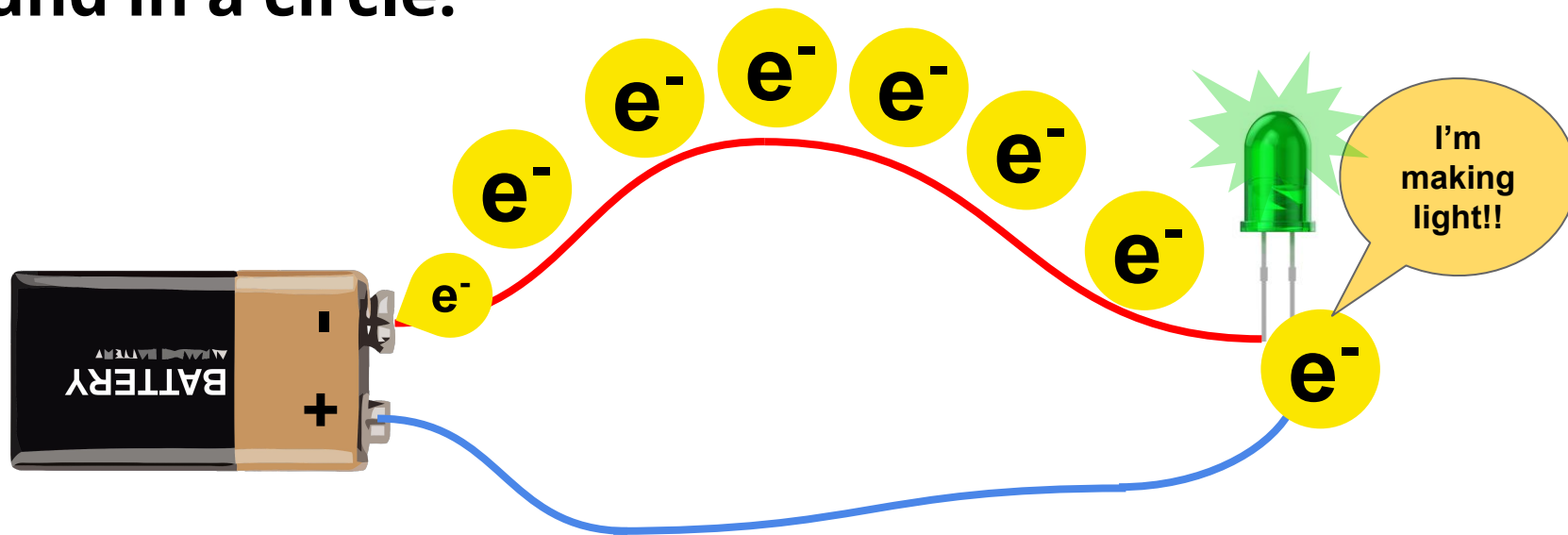
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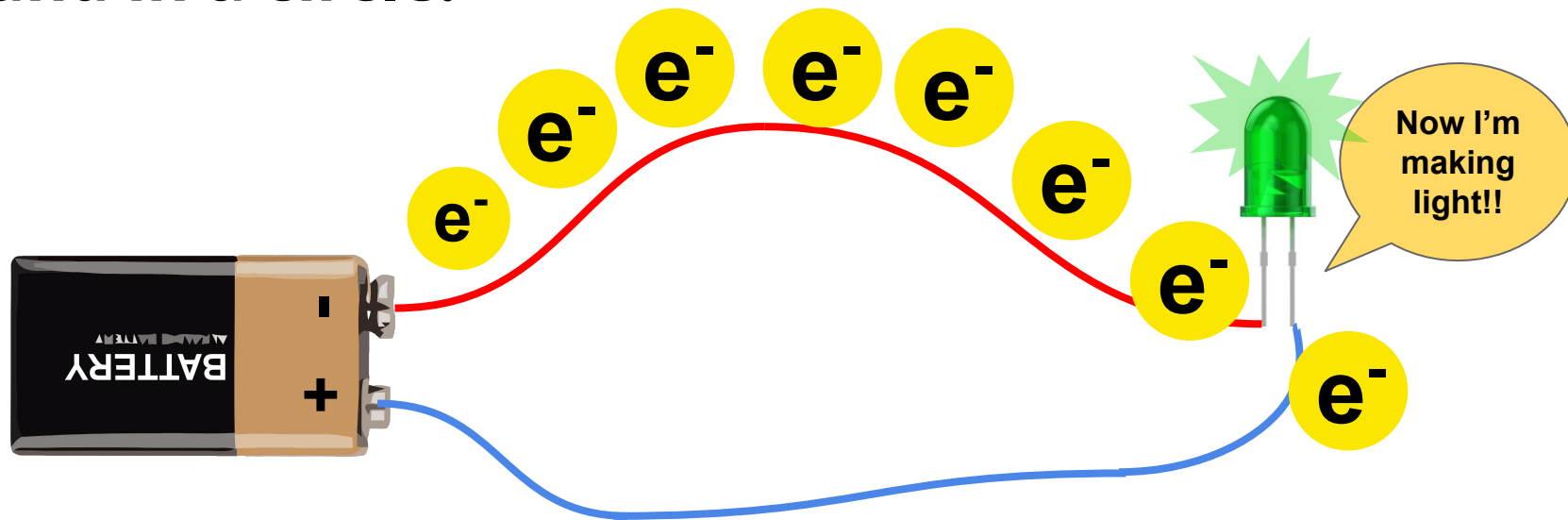
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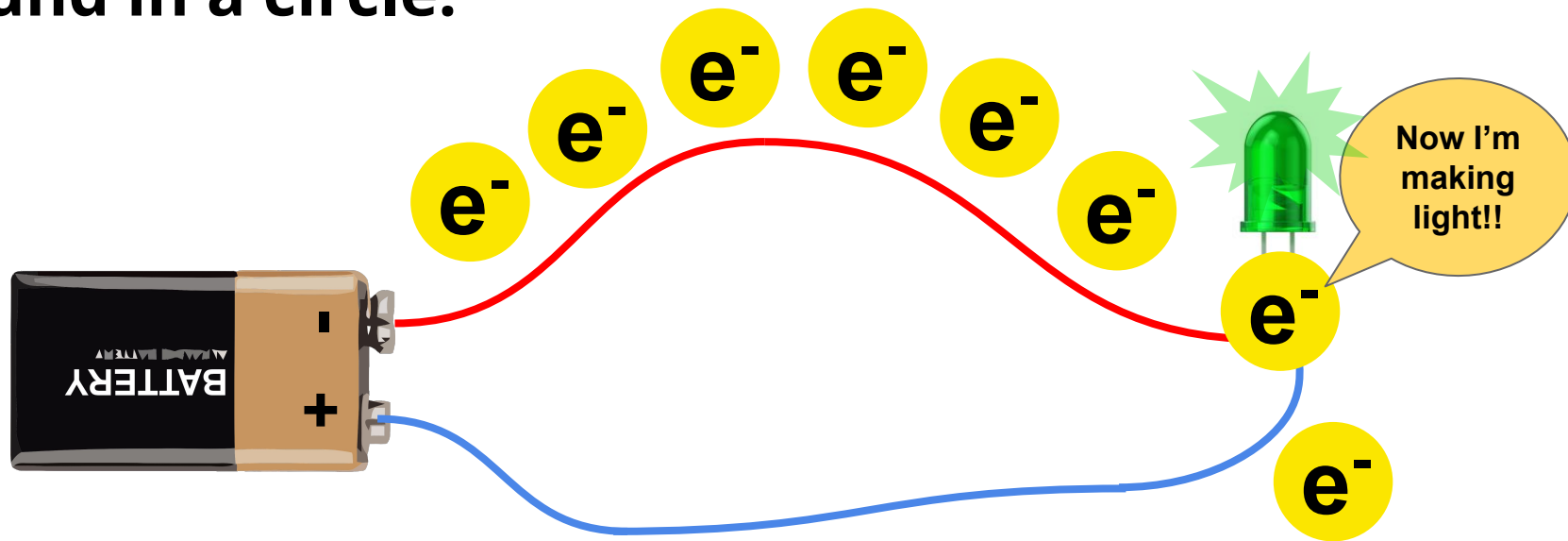
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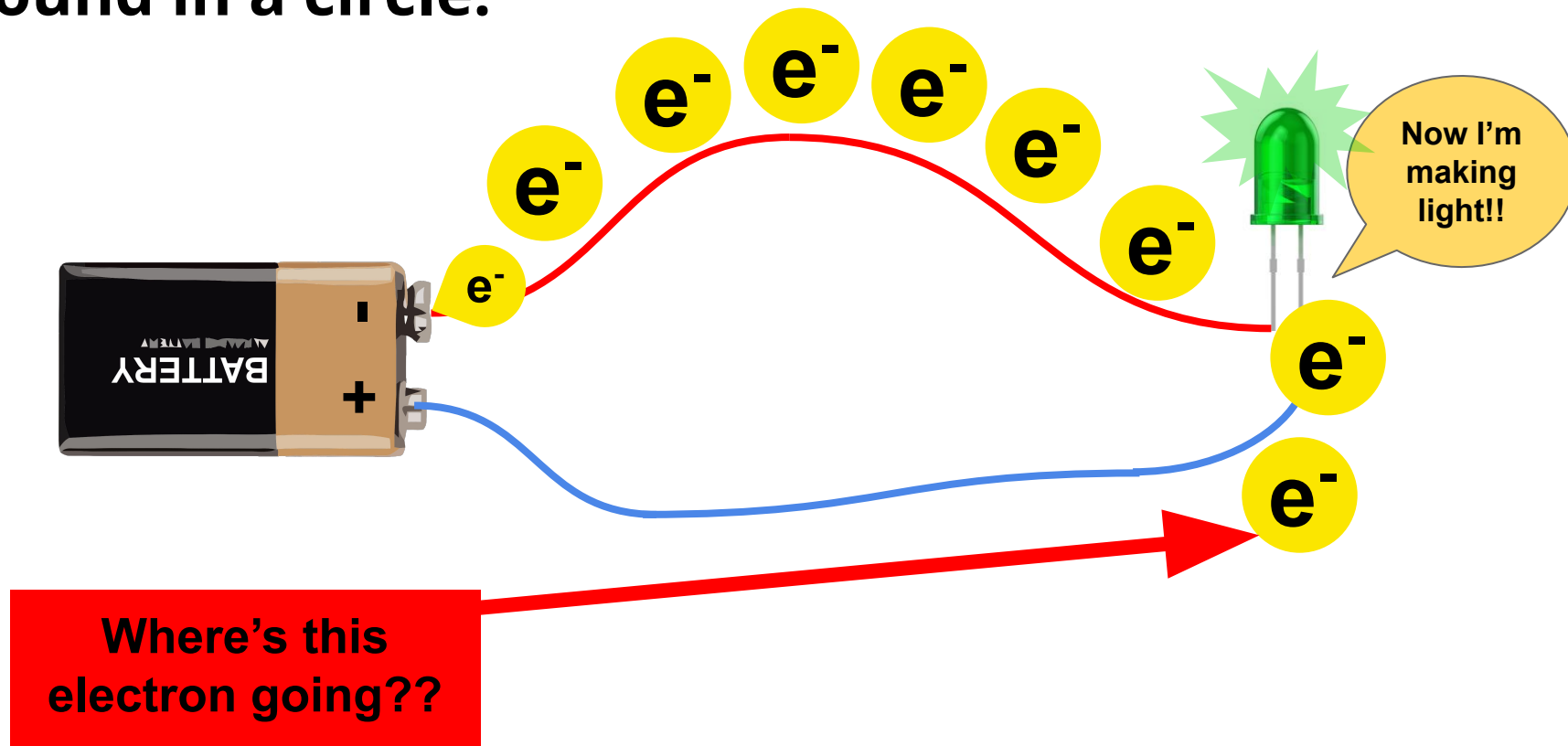
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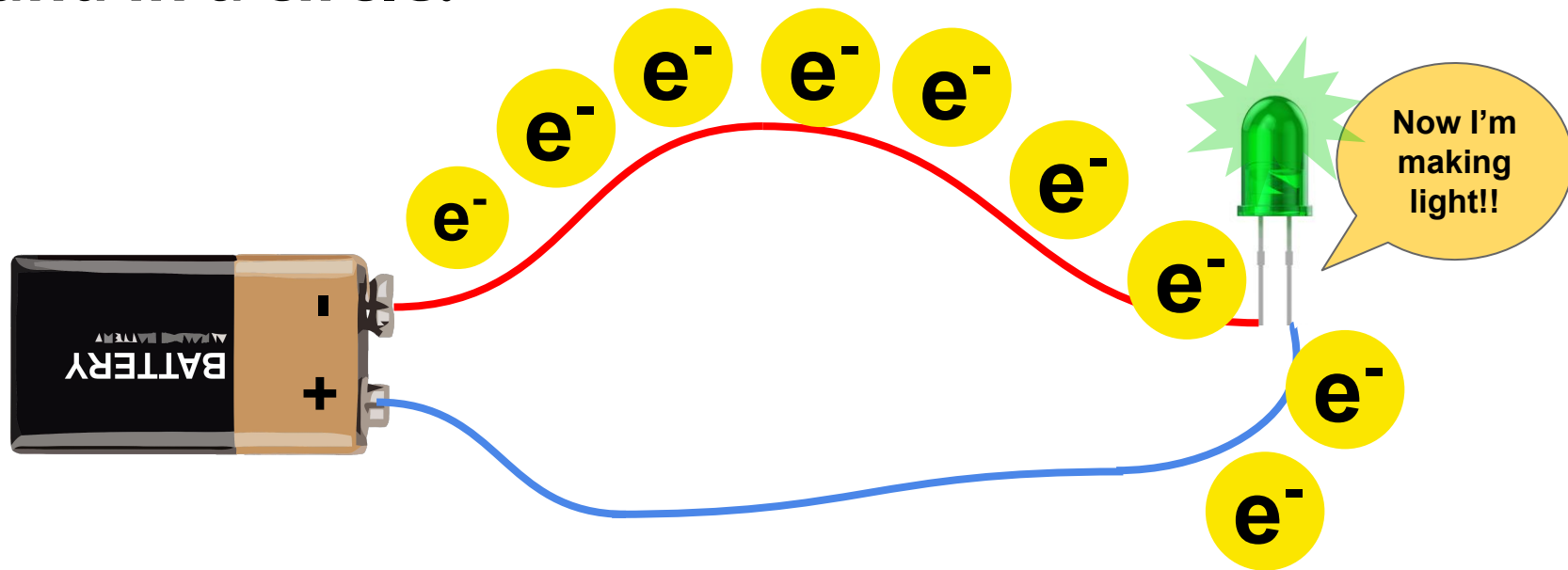
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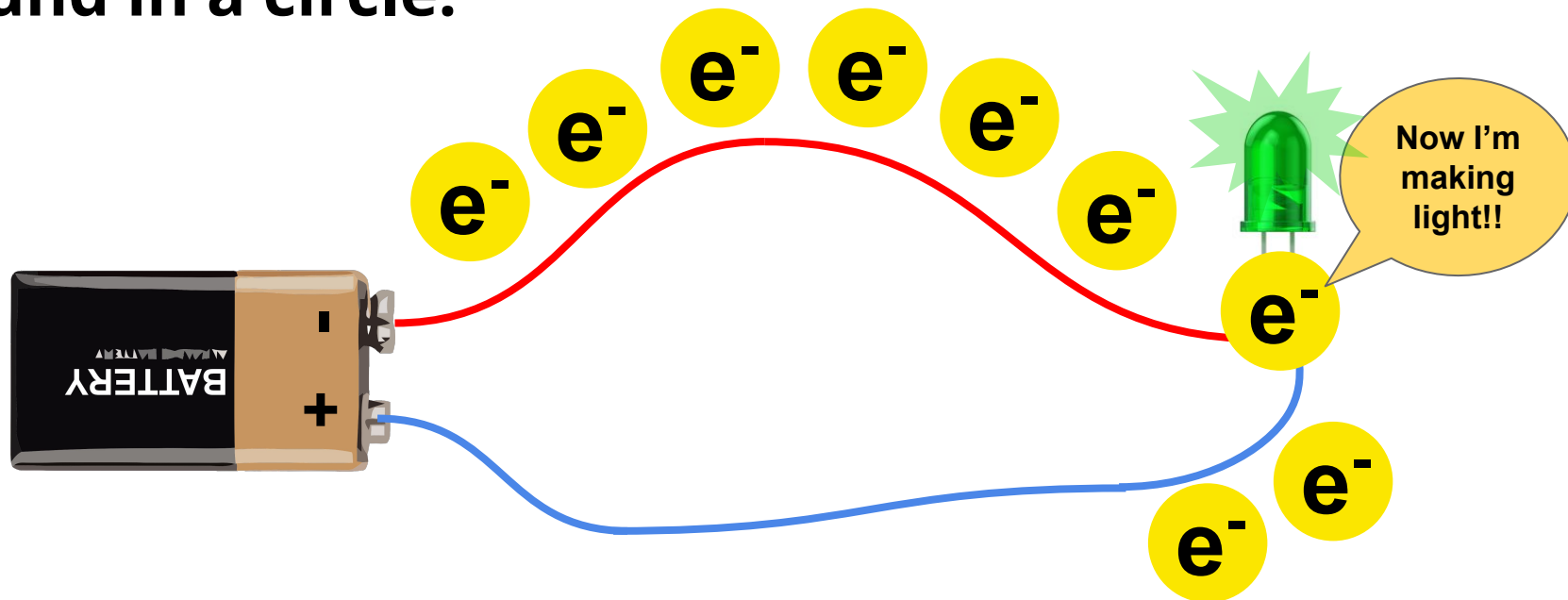
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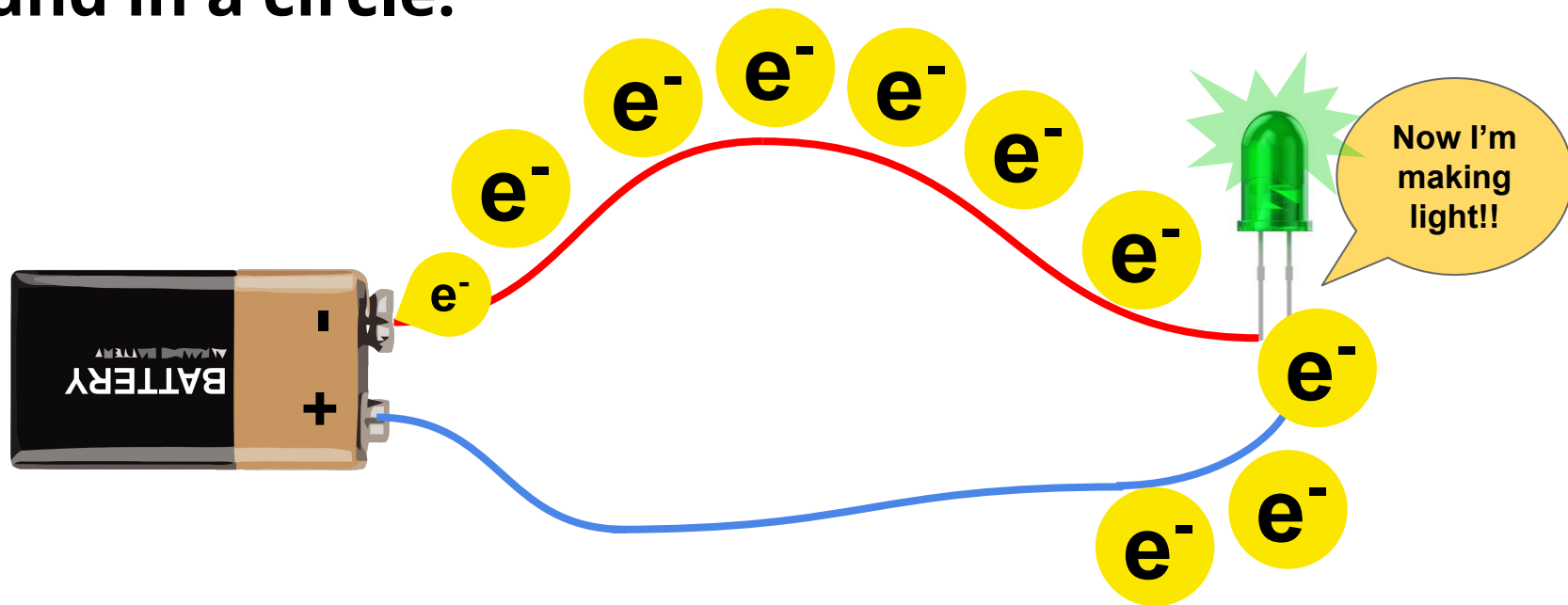
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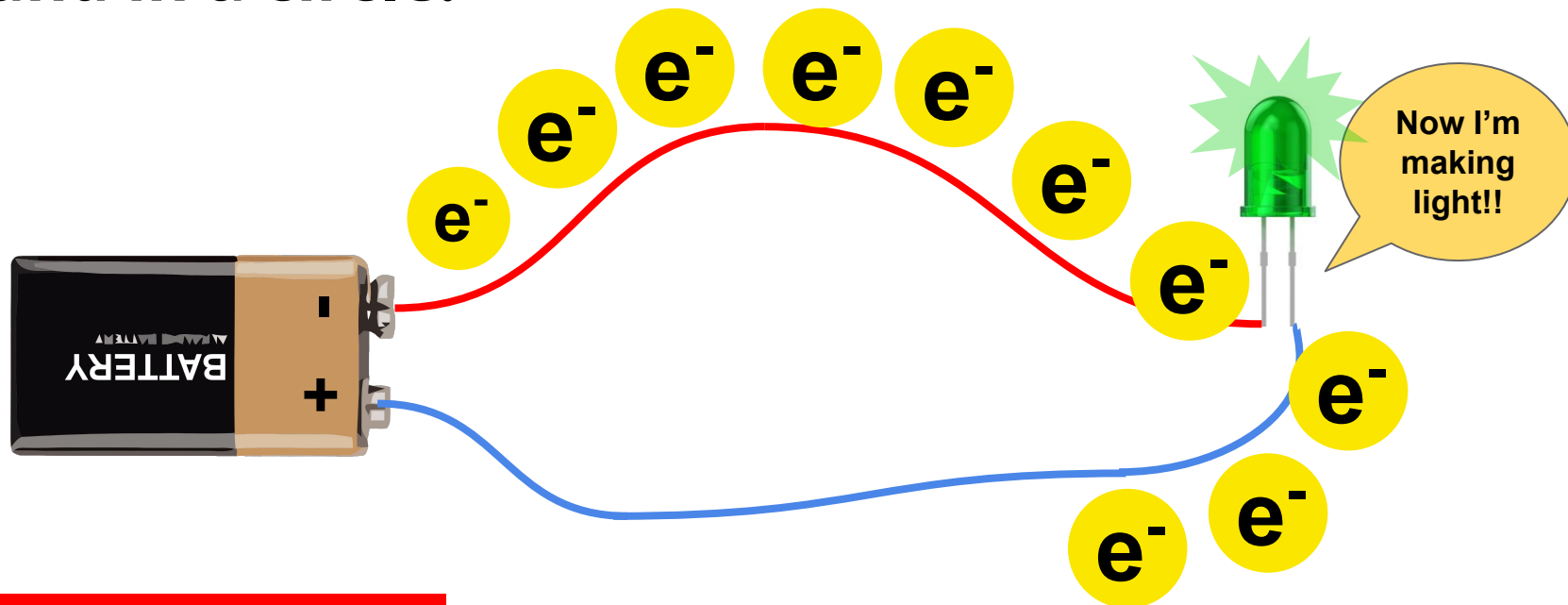
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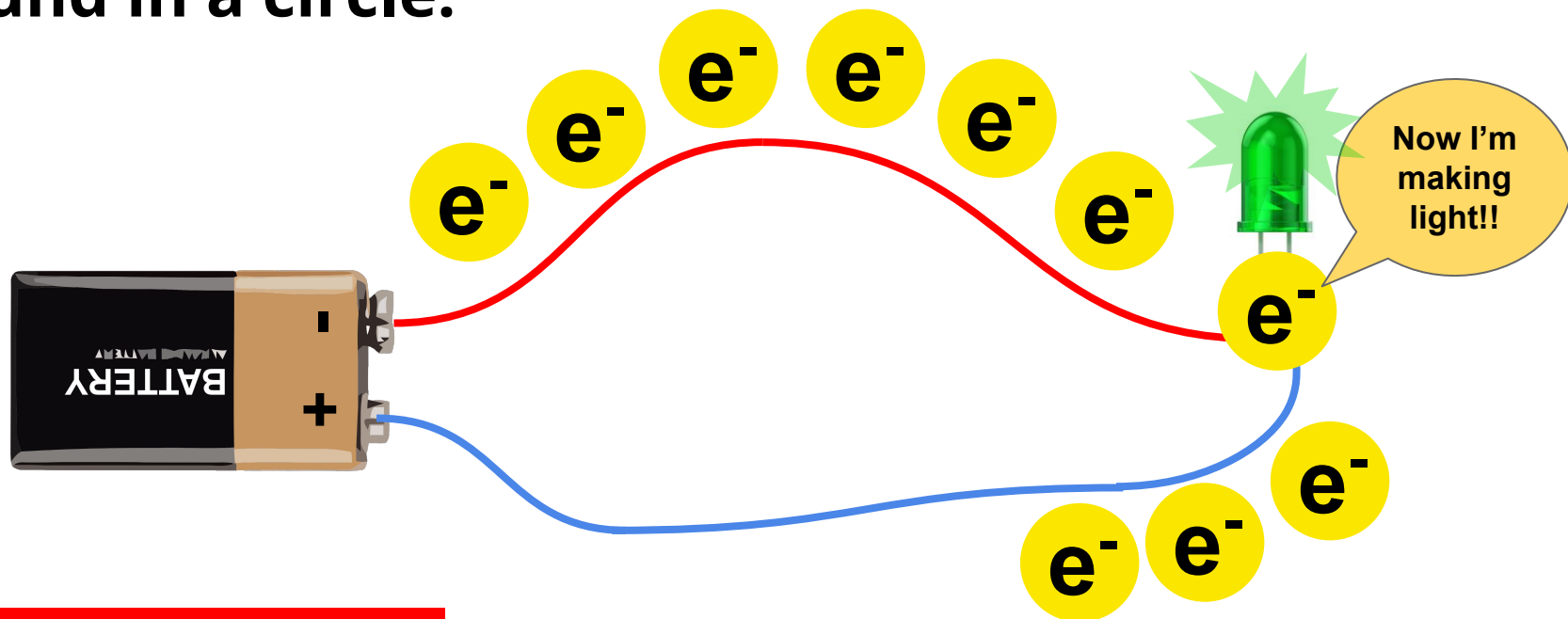
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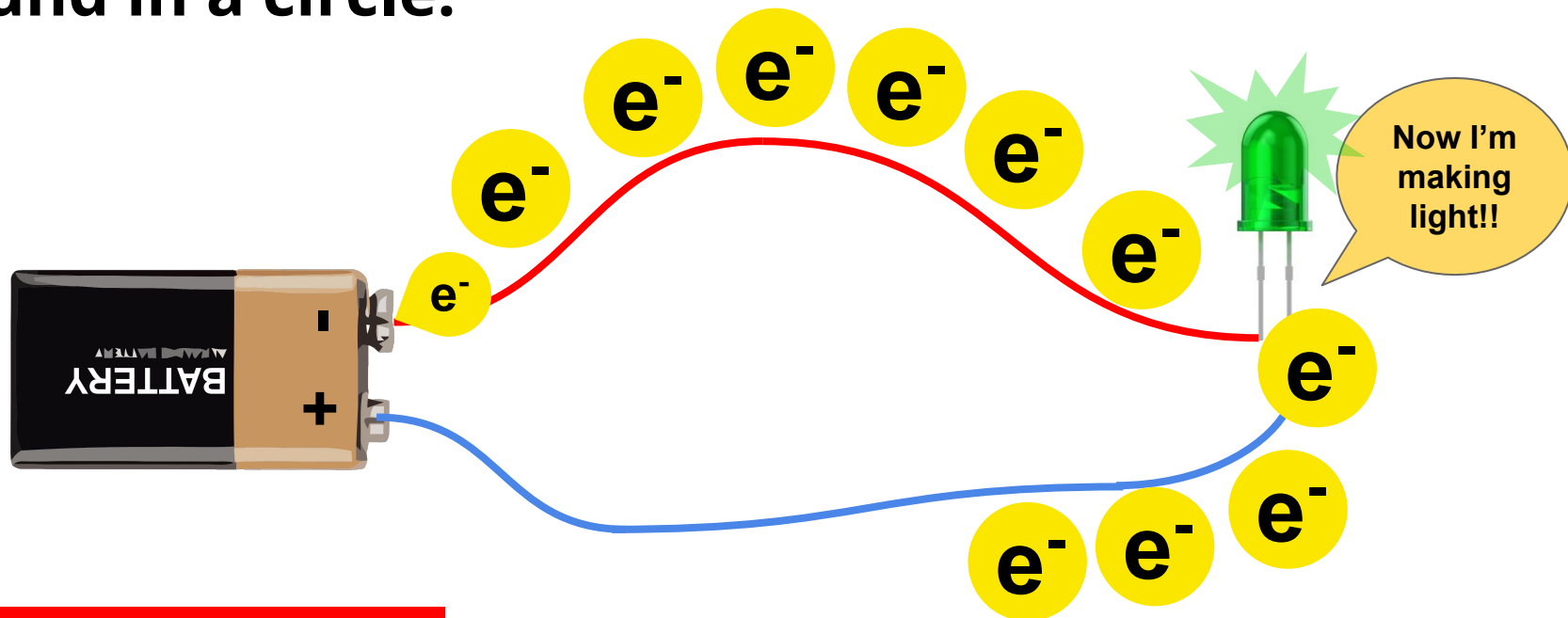
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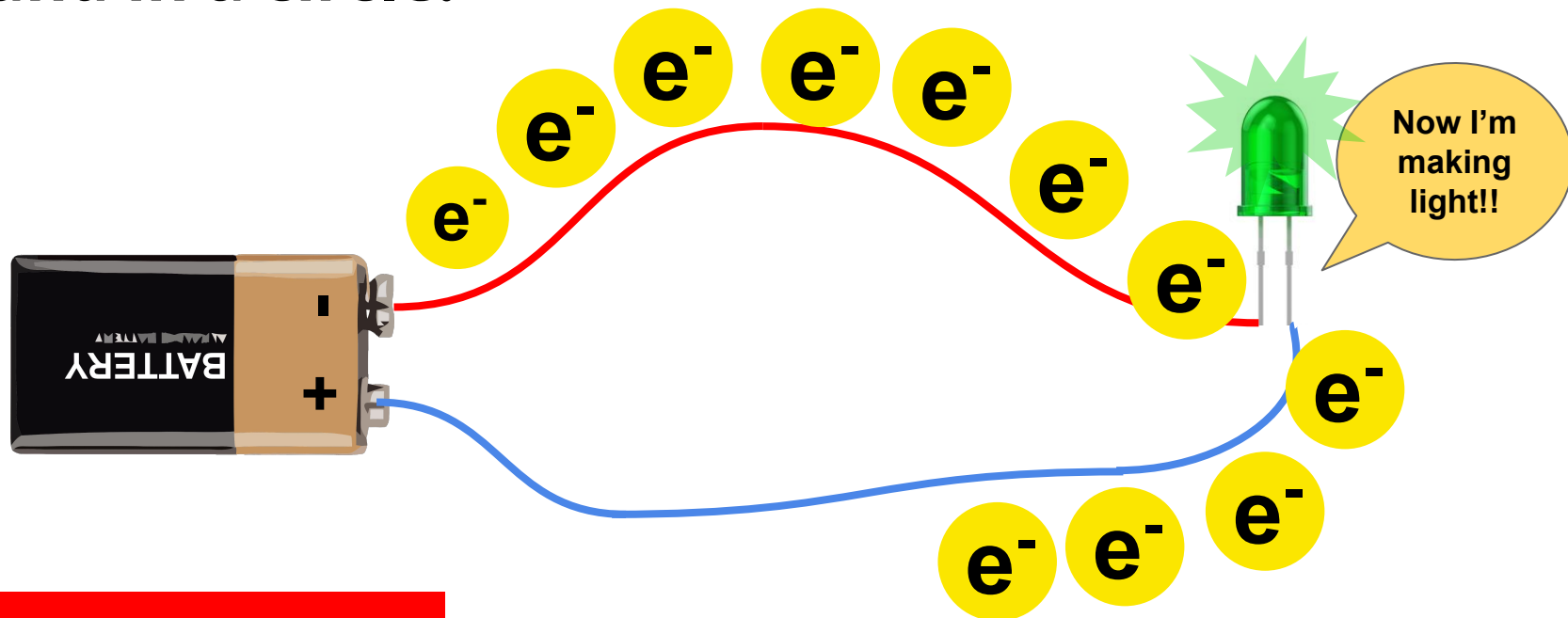
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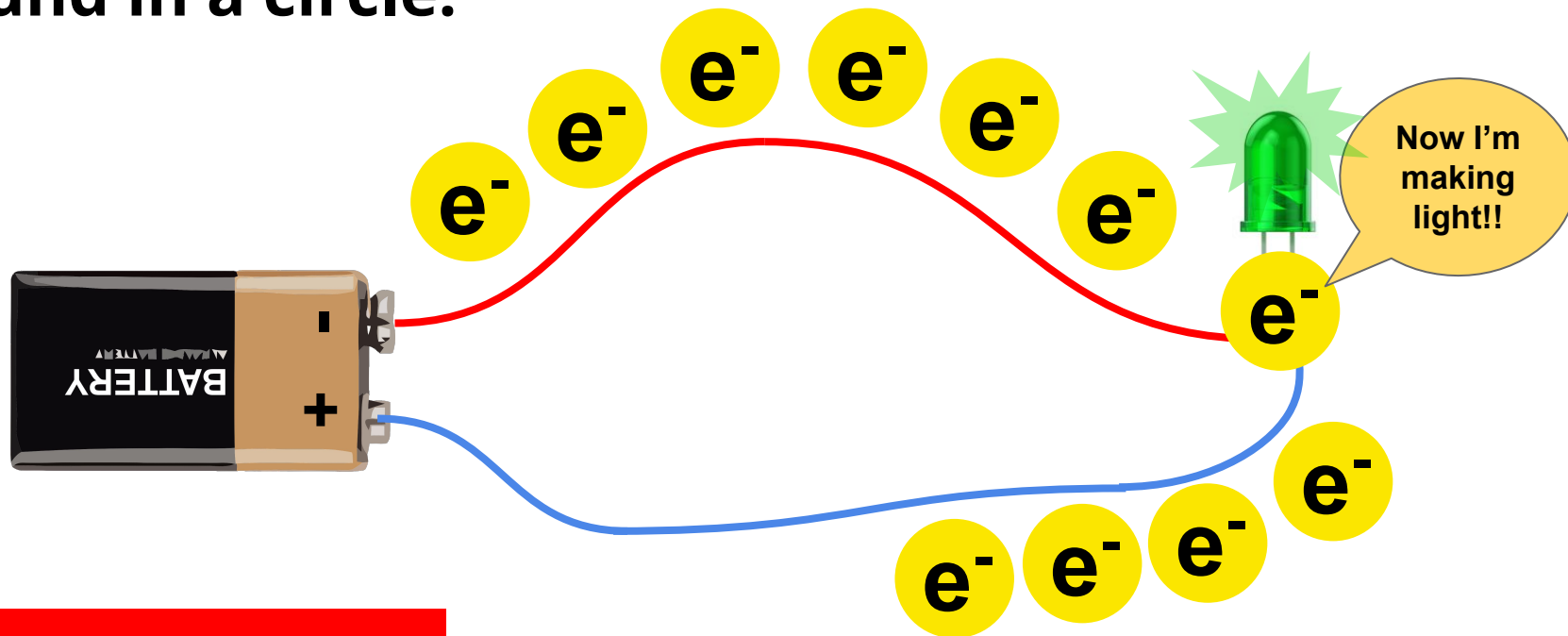
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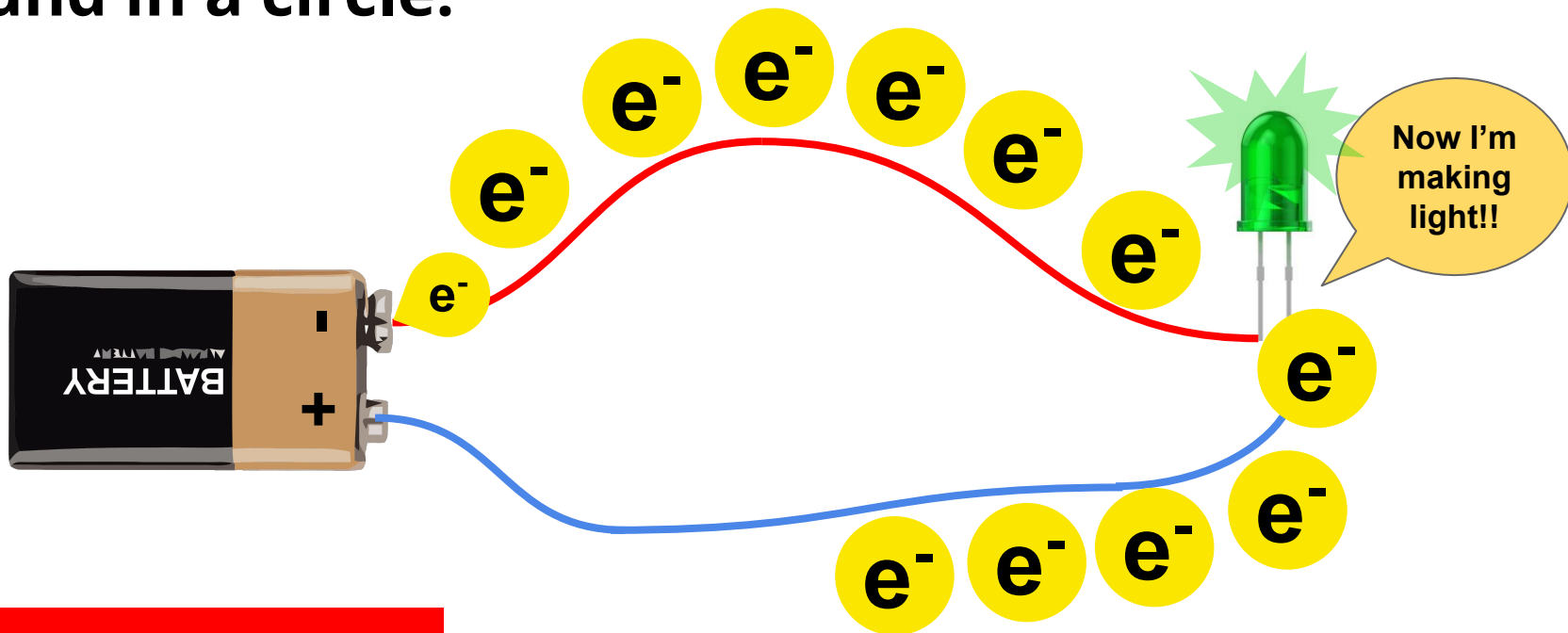
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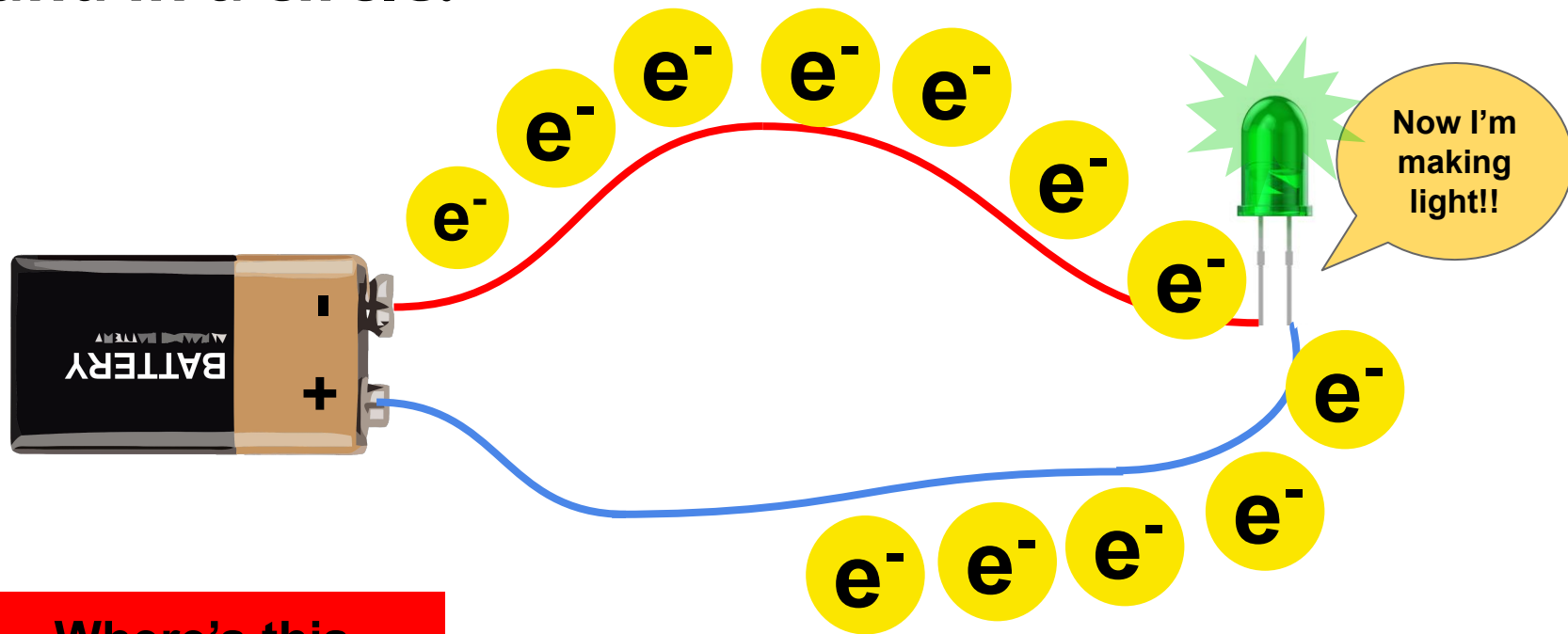
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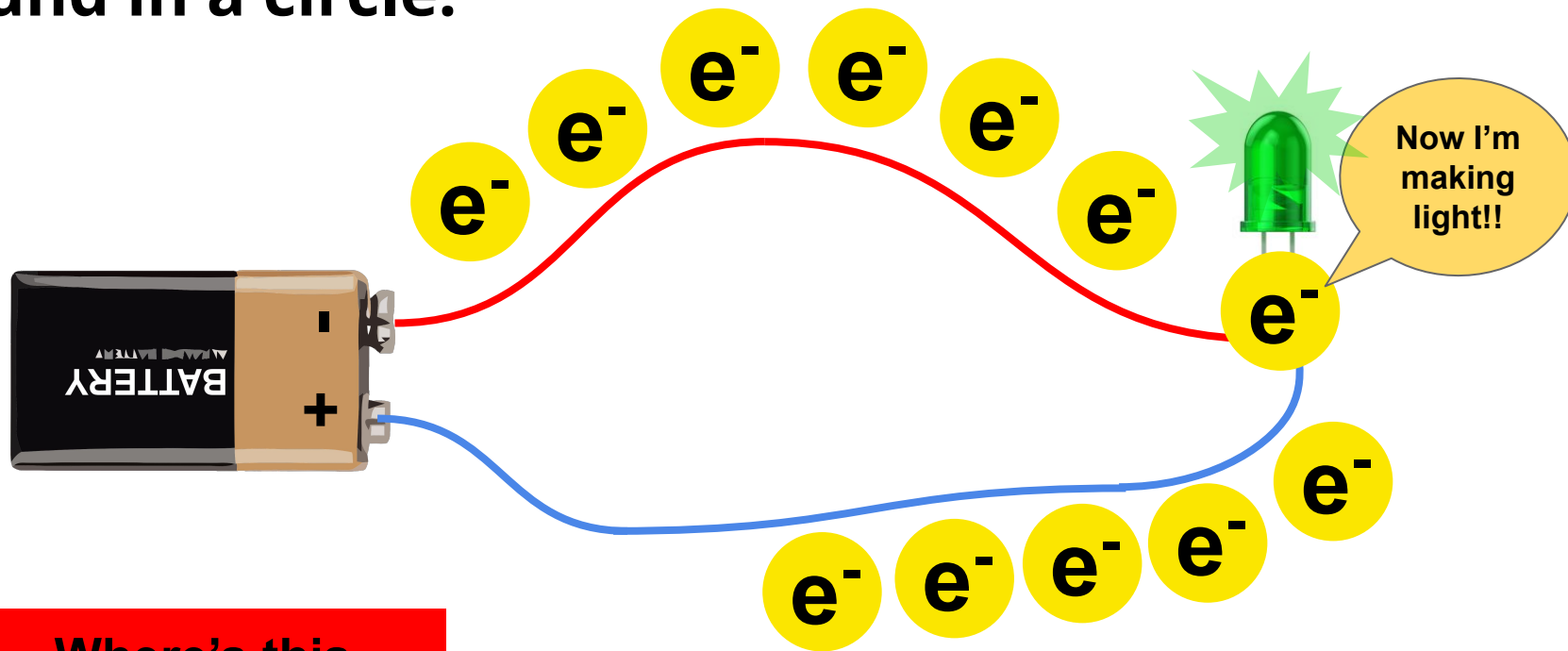
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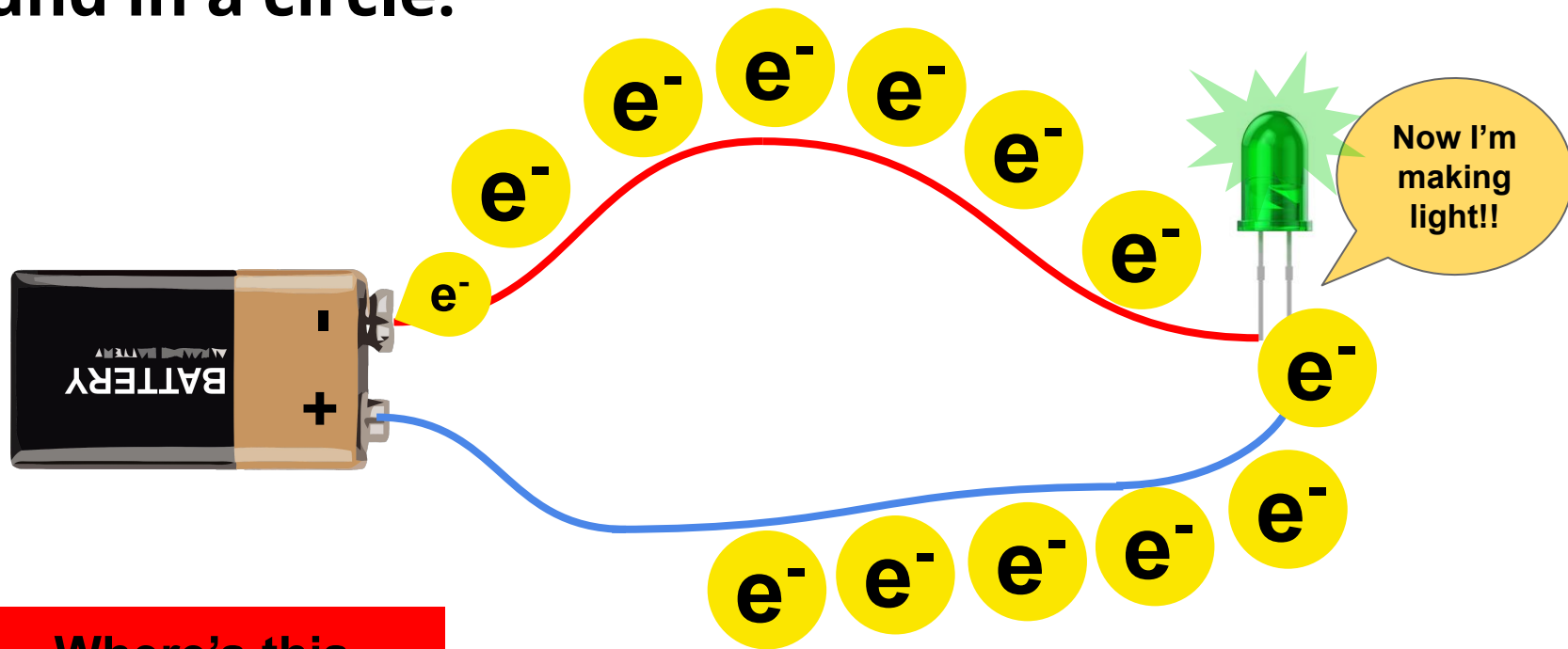
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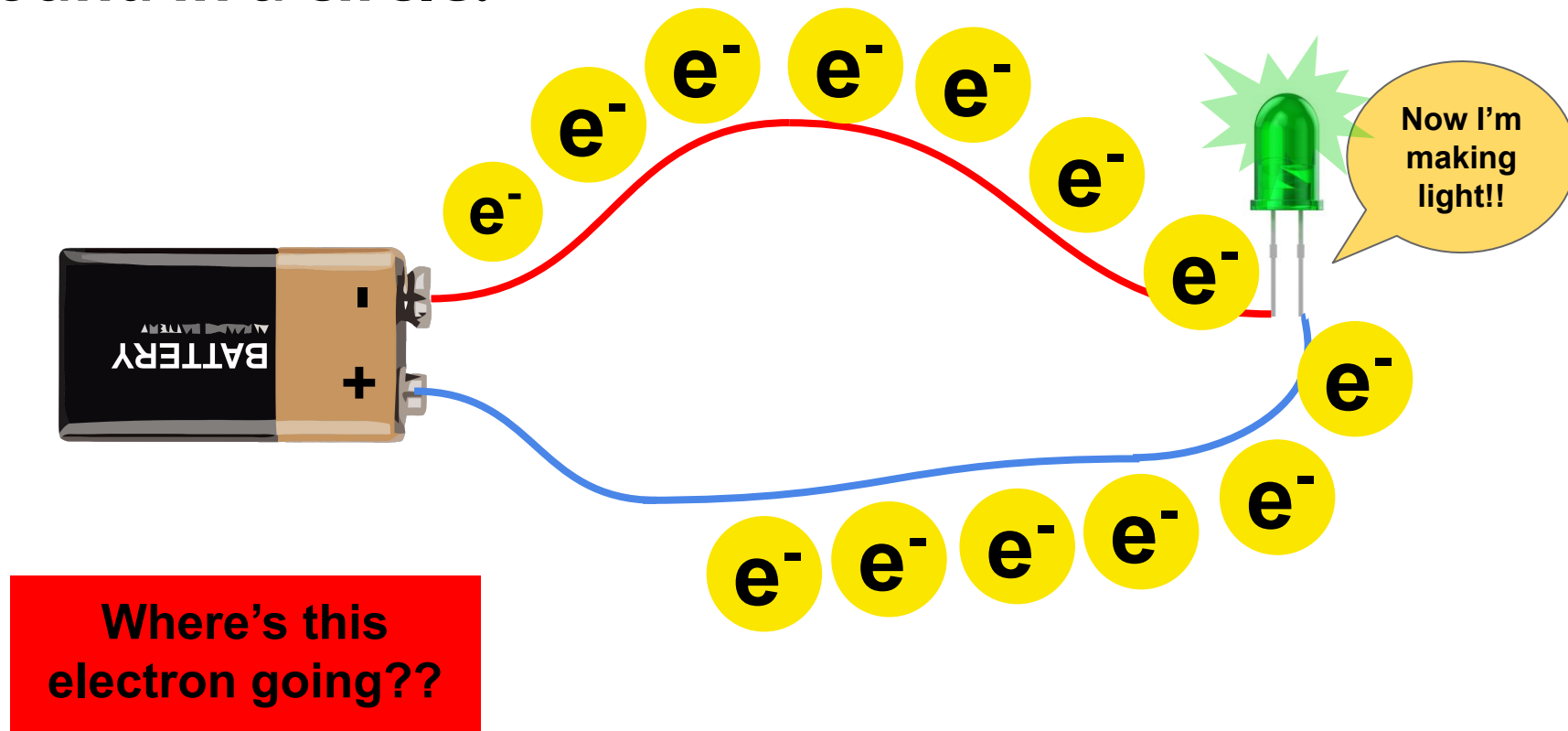
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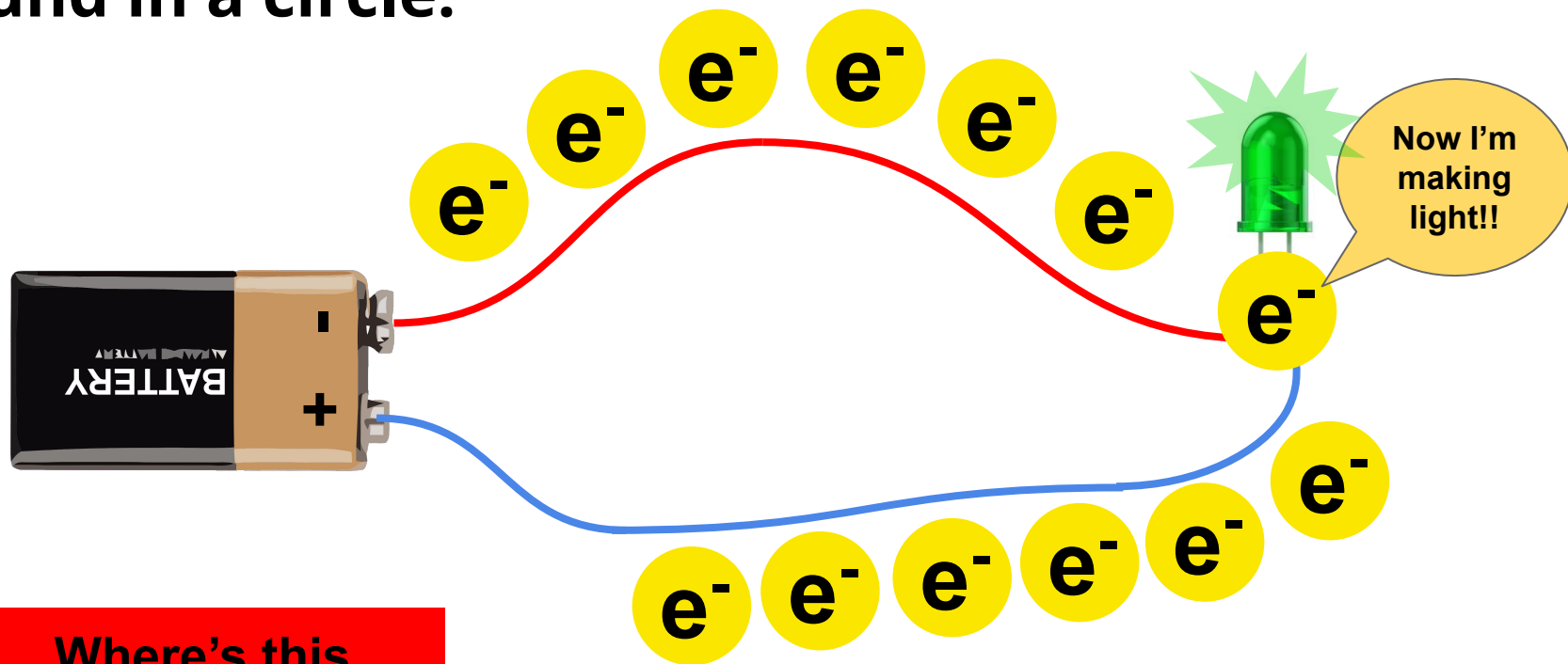
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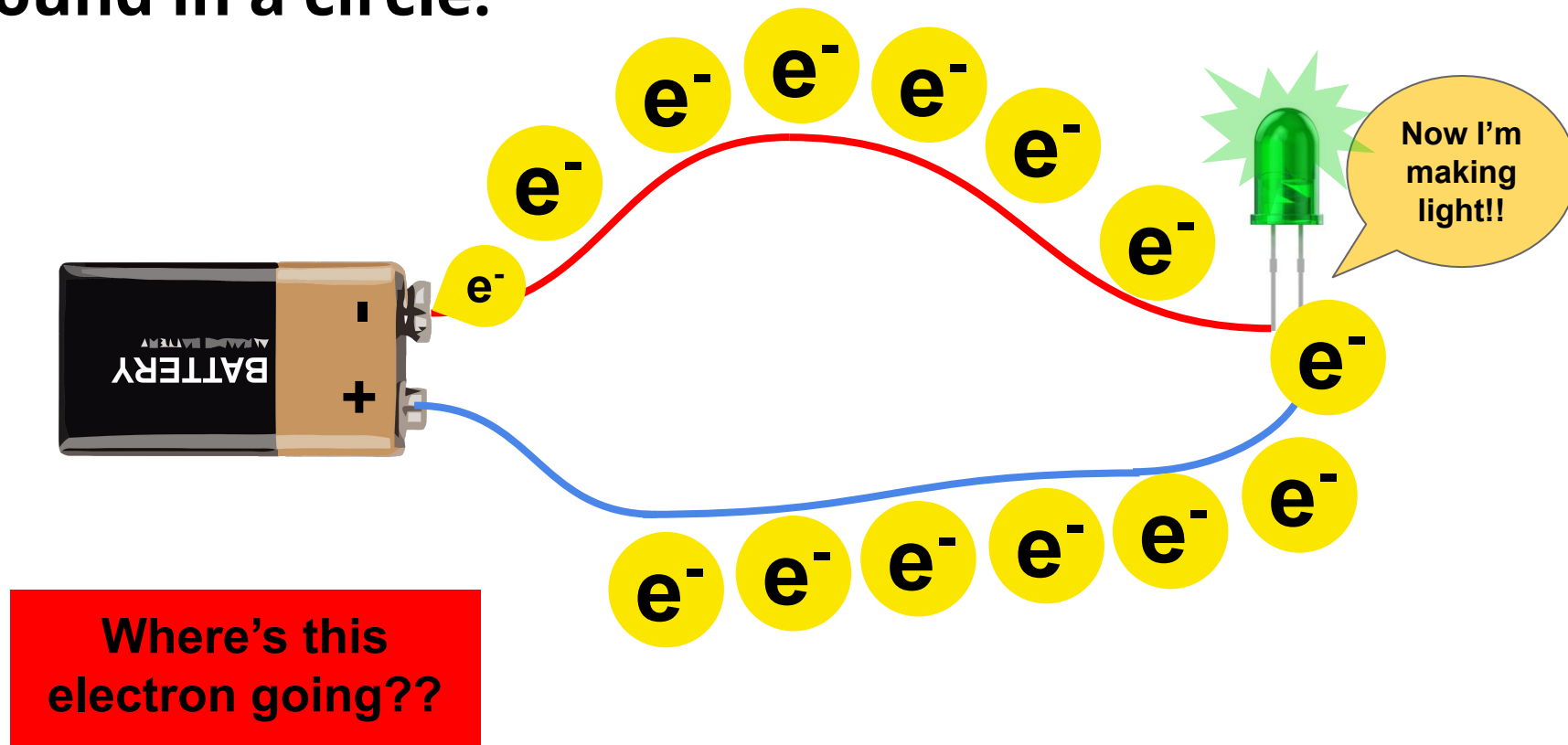
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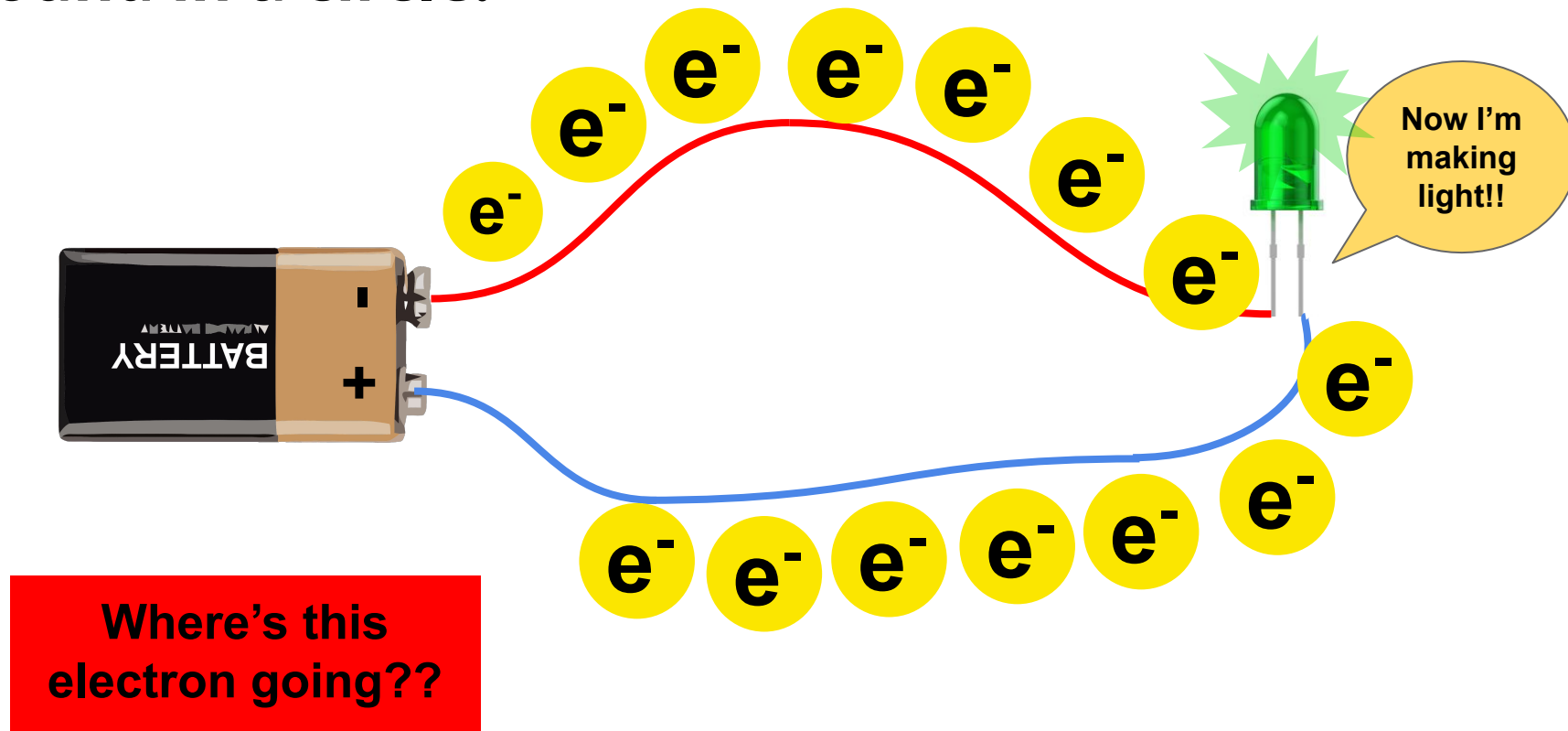
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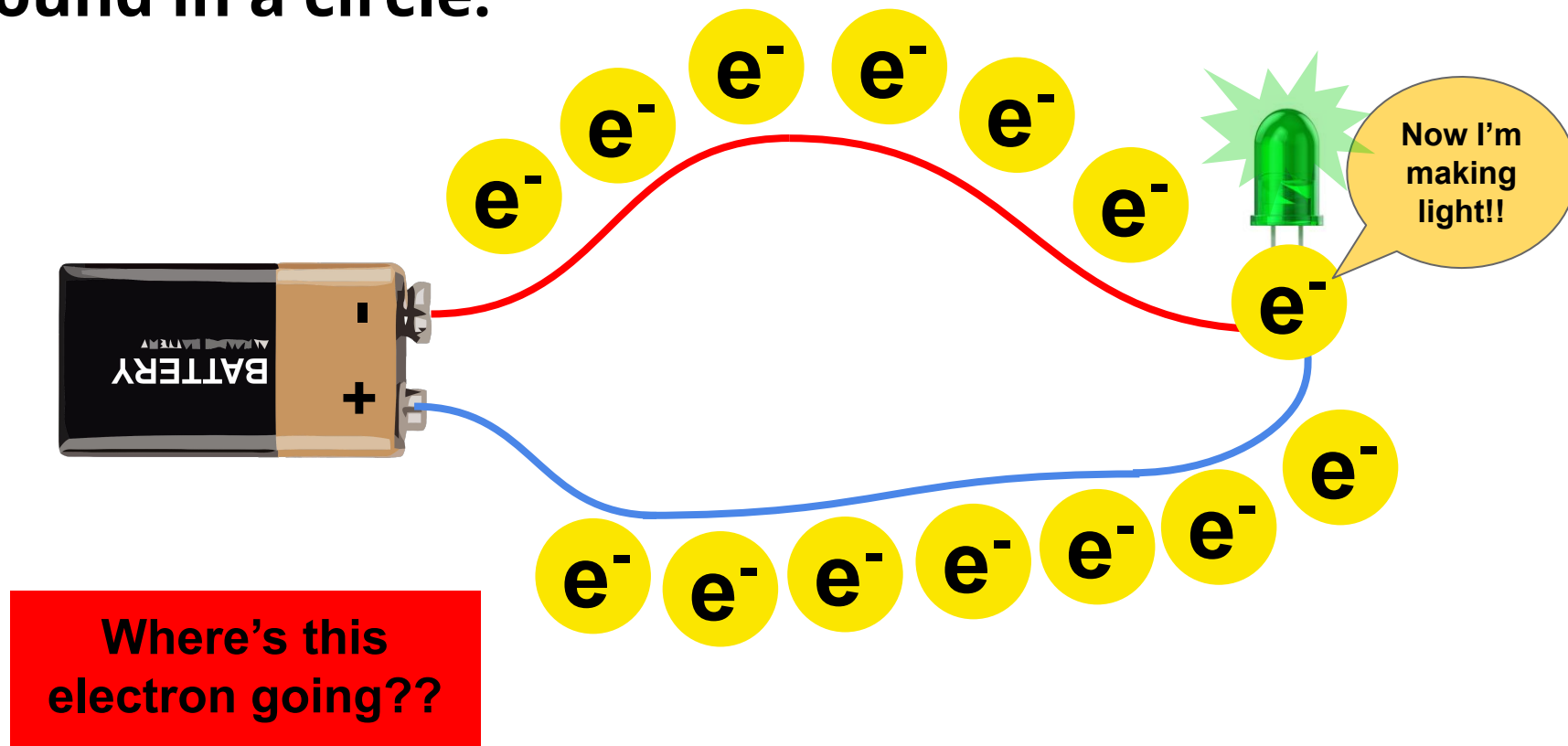
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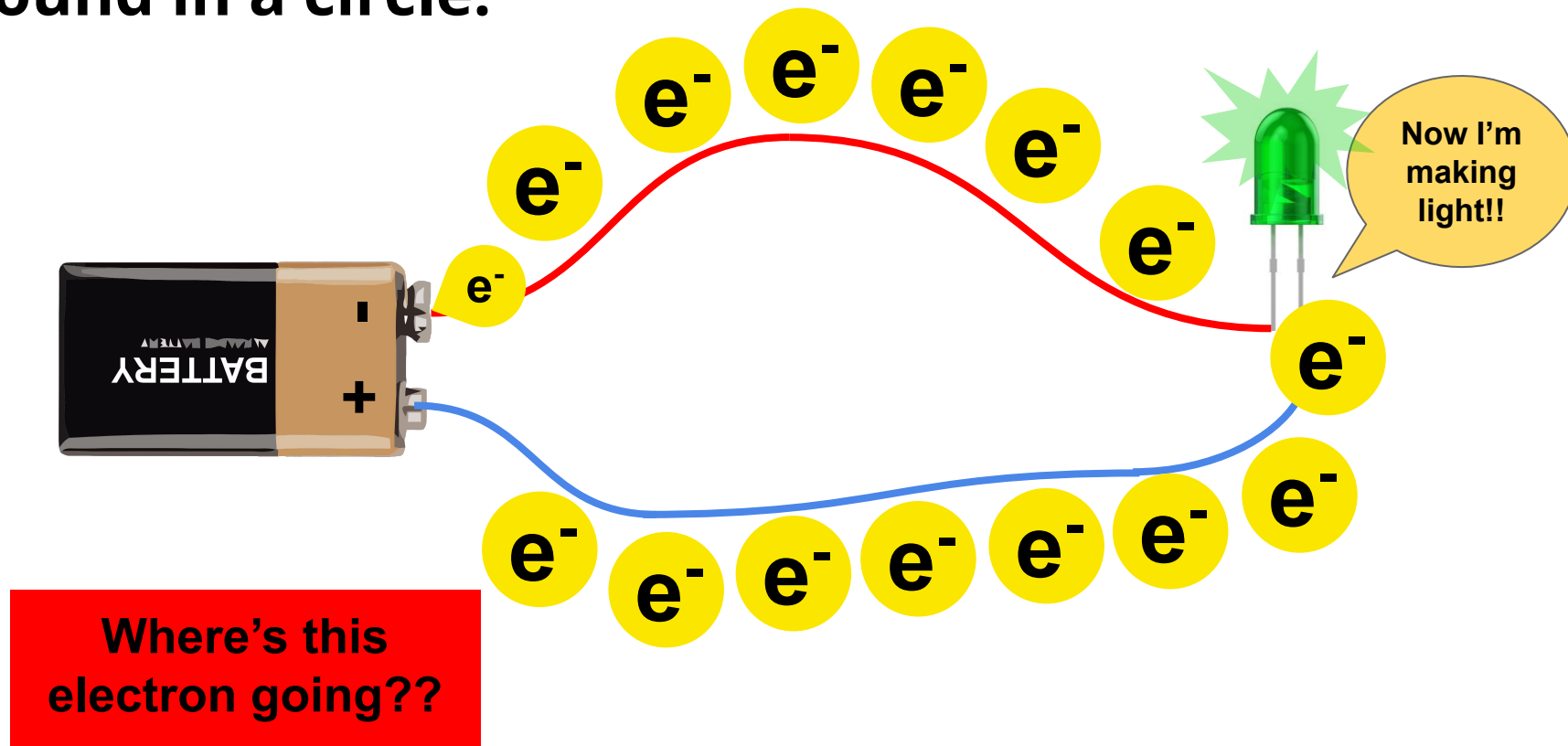
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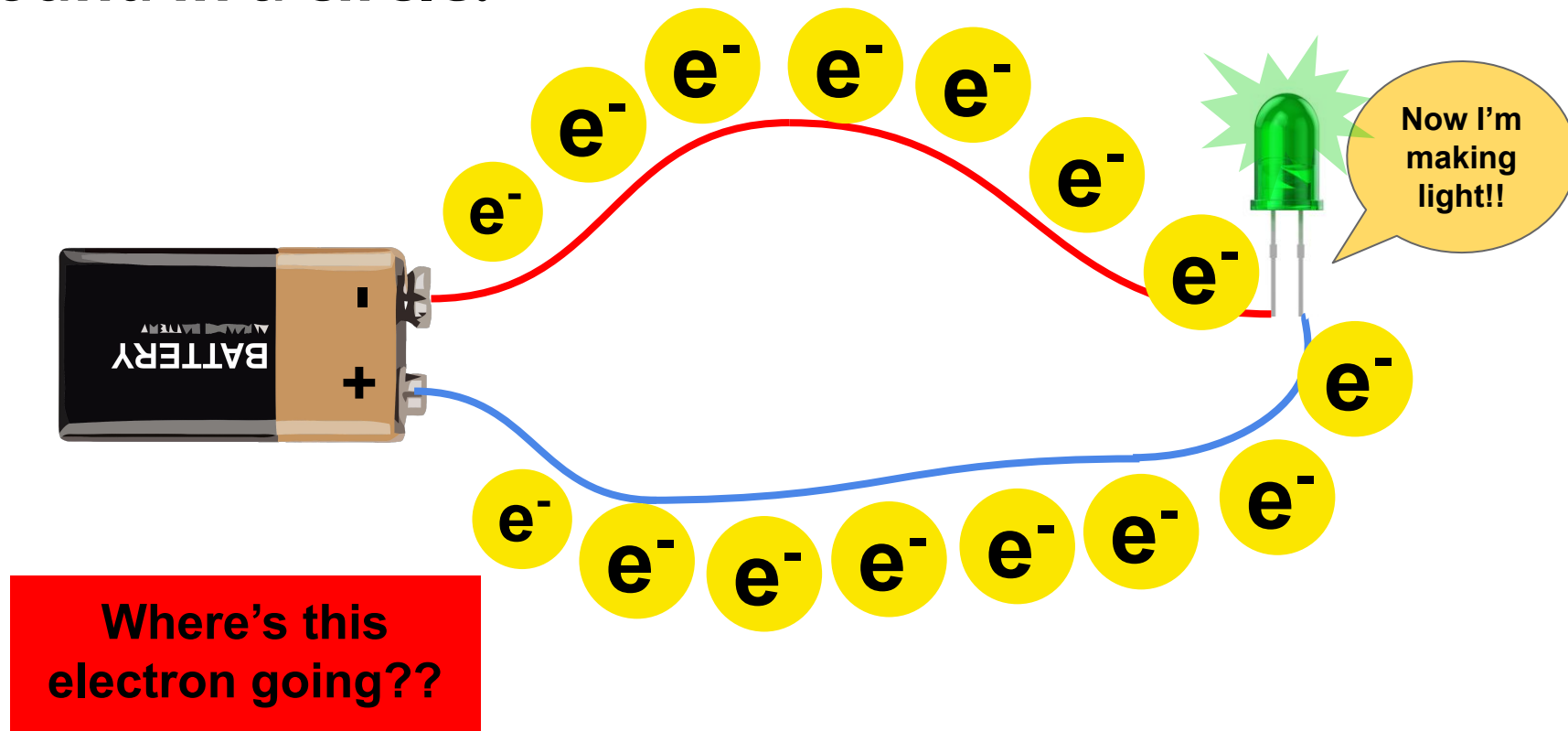
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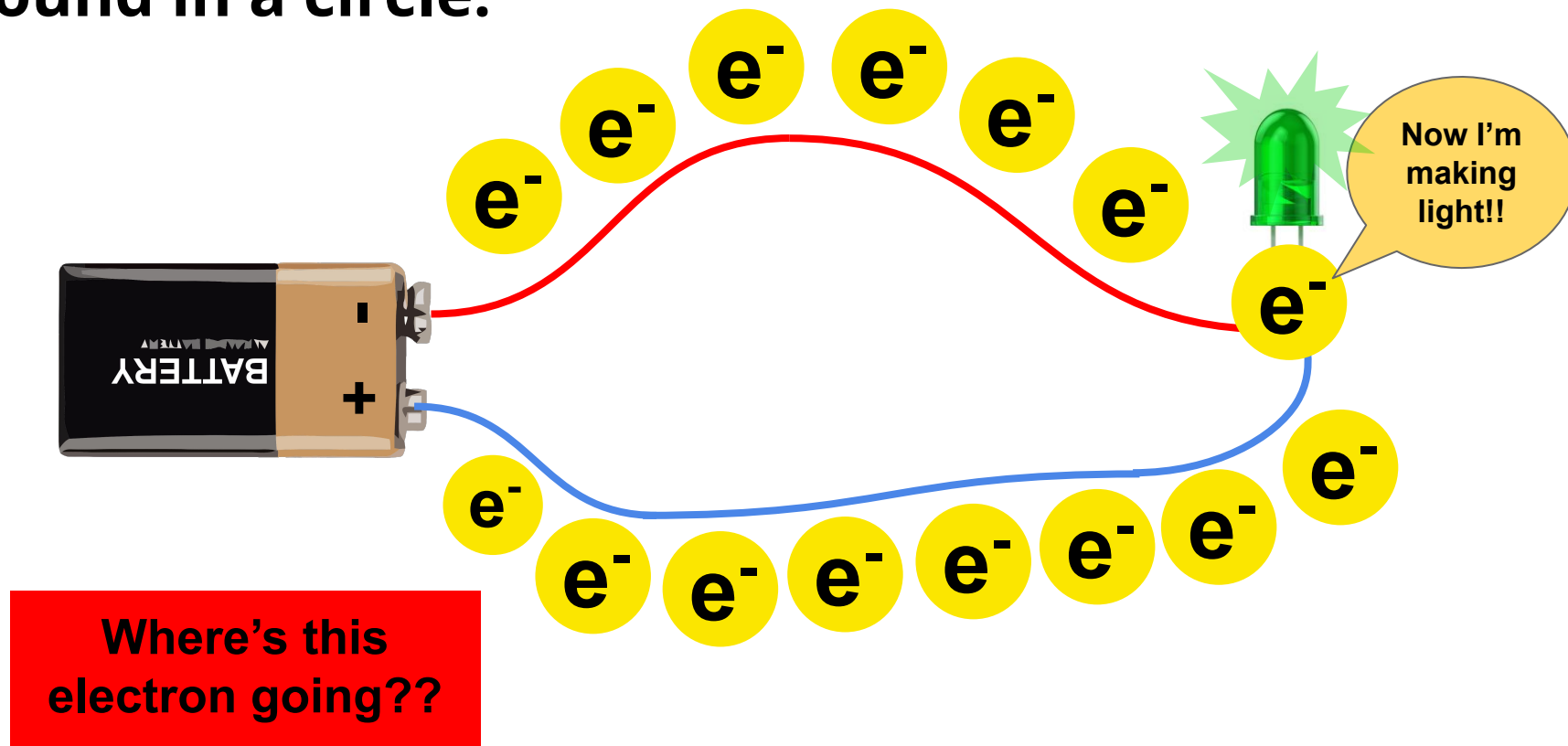
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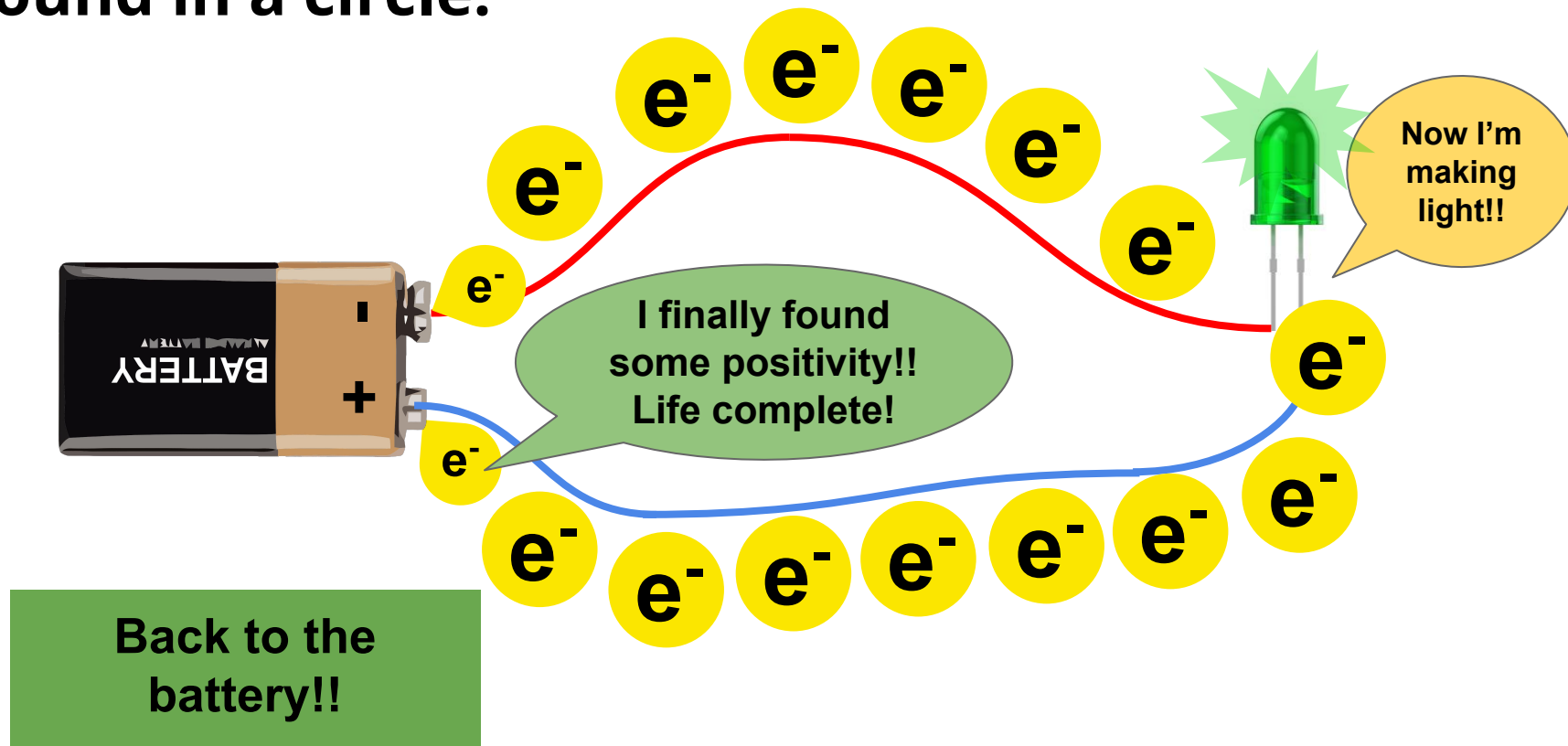
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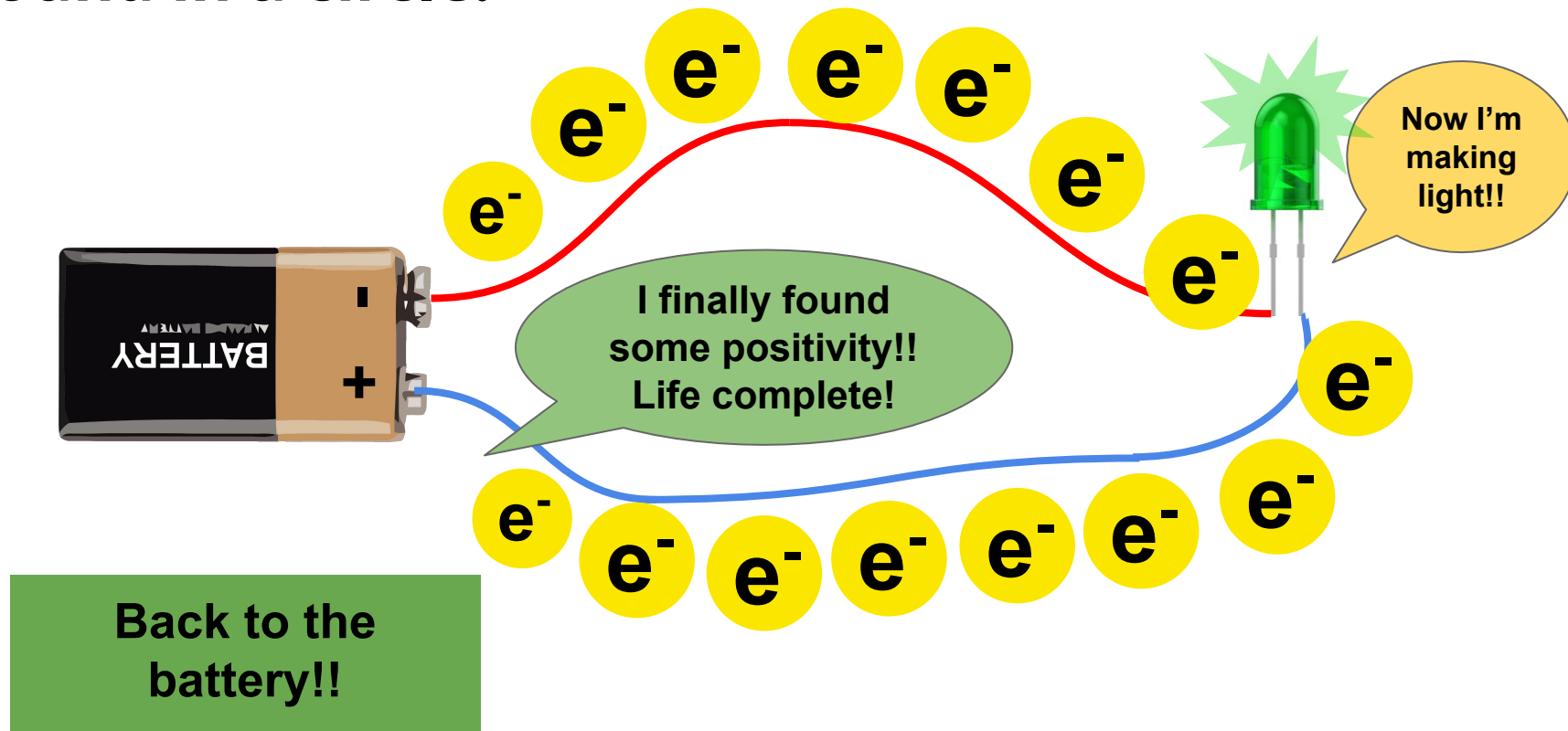
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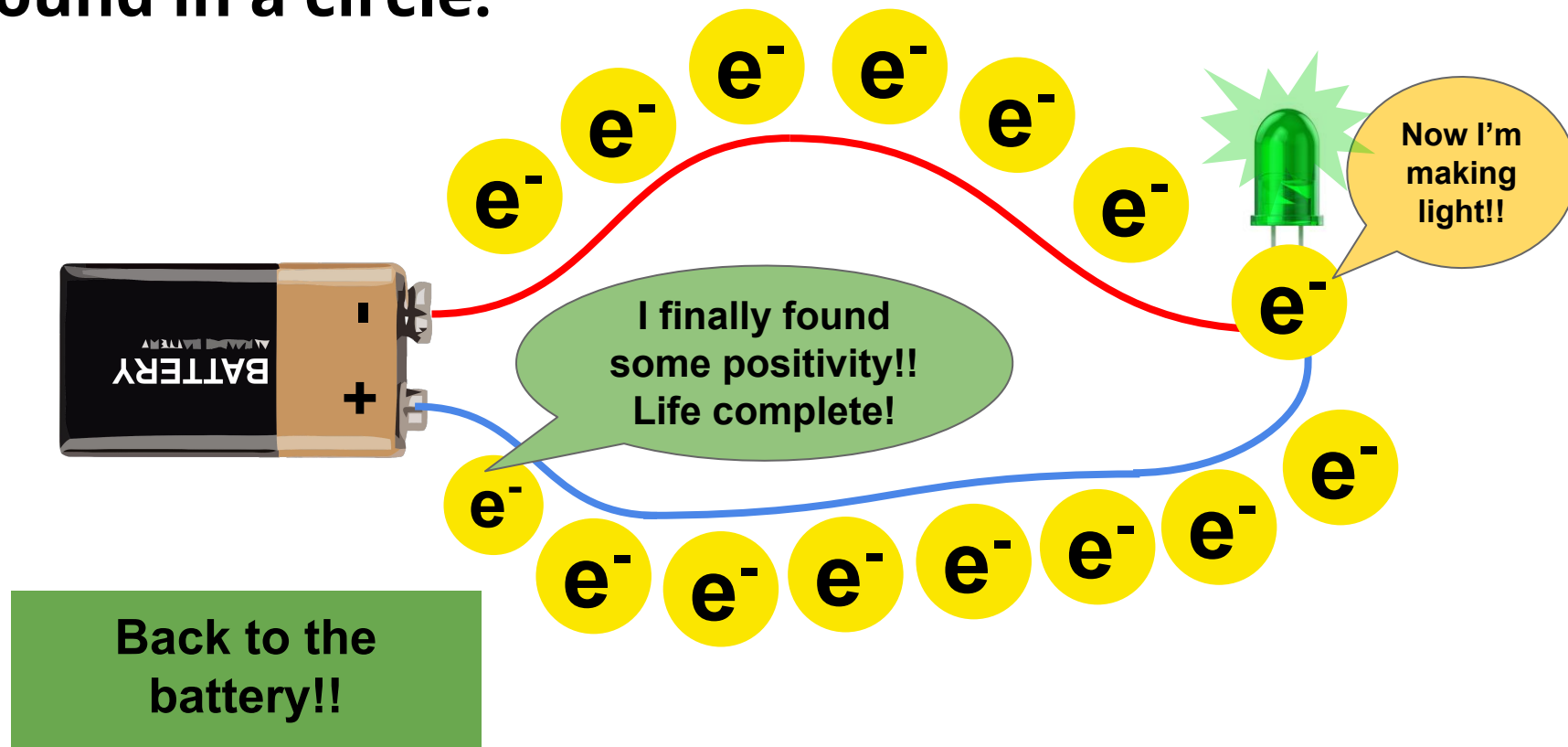
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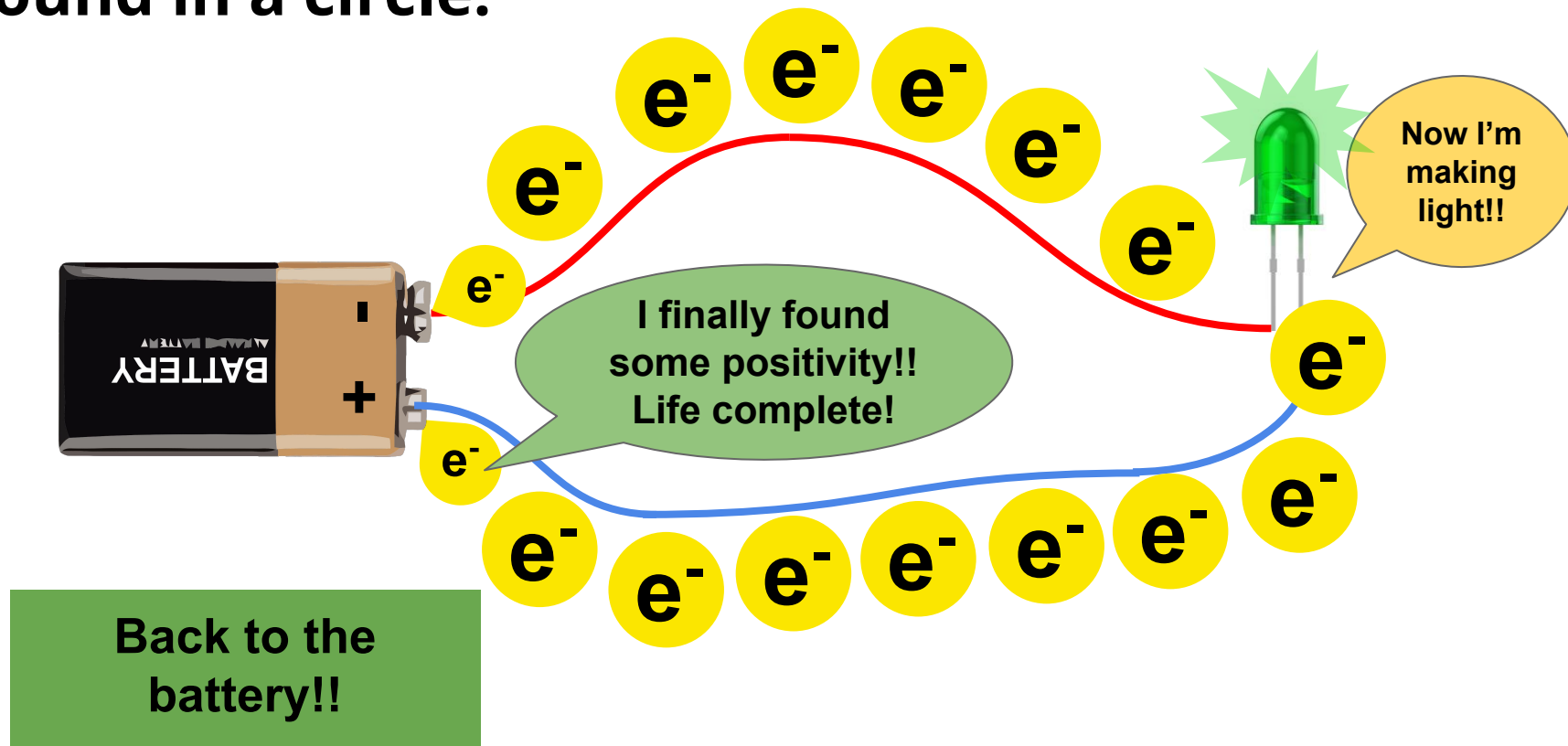
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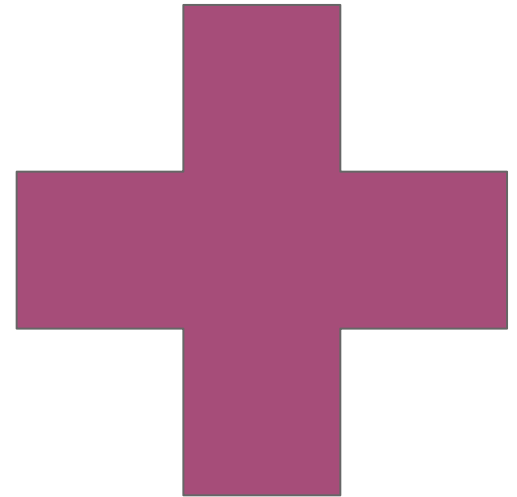
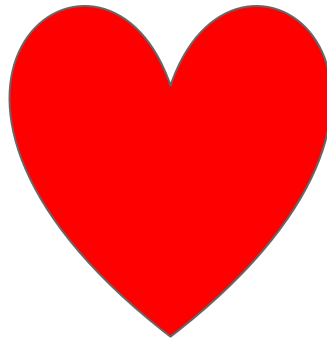


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**Electrons are negatively charged particles!**



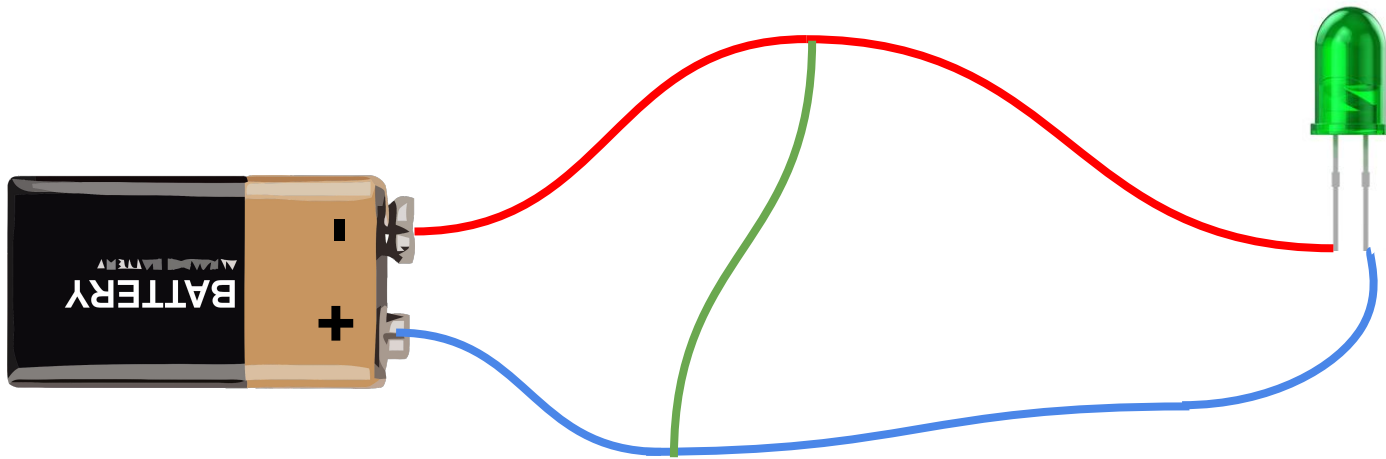
**Opposites attract!**



**Electrons run through the wire to be with their love,  
the positive charge!**

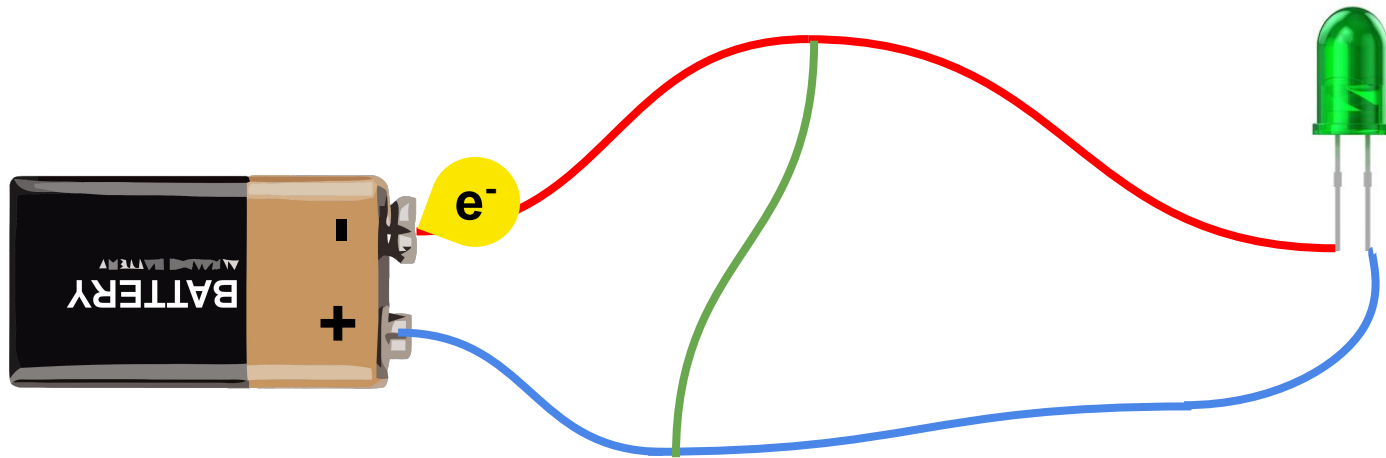
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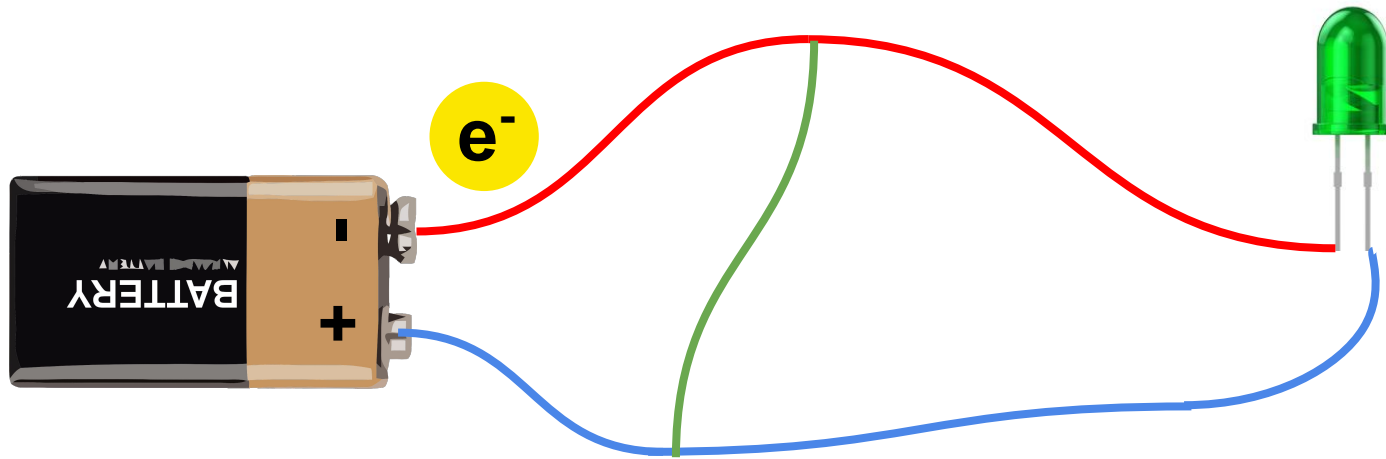
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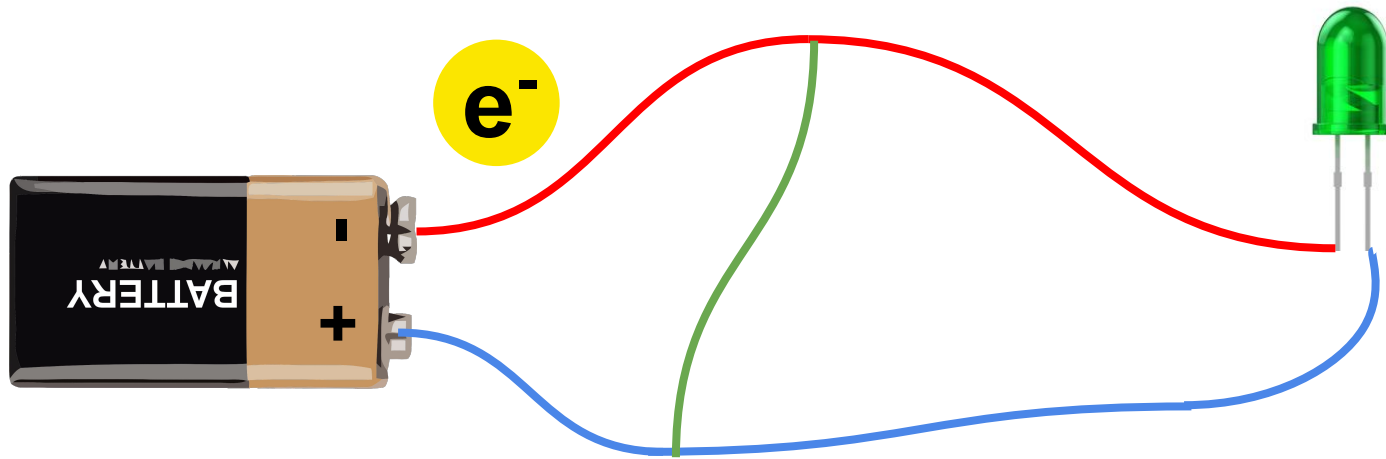
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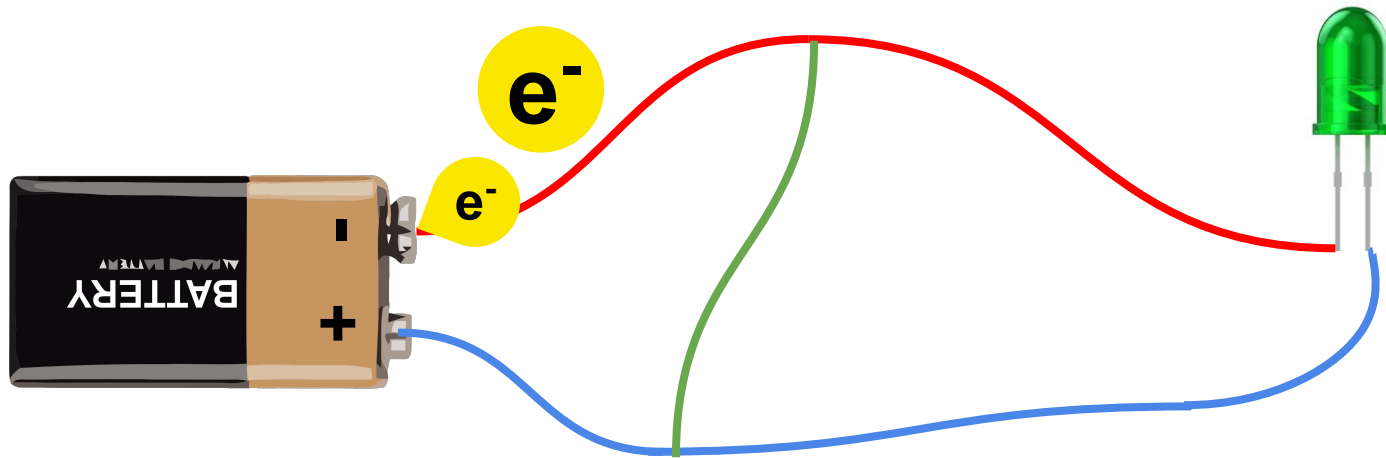
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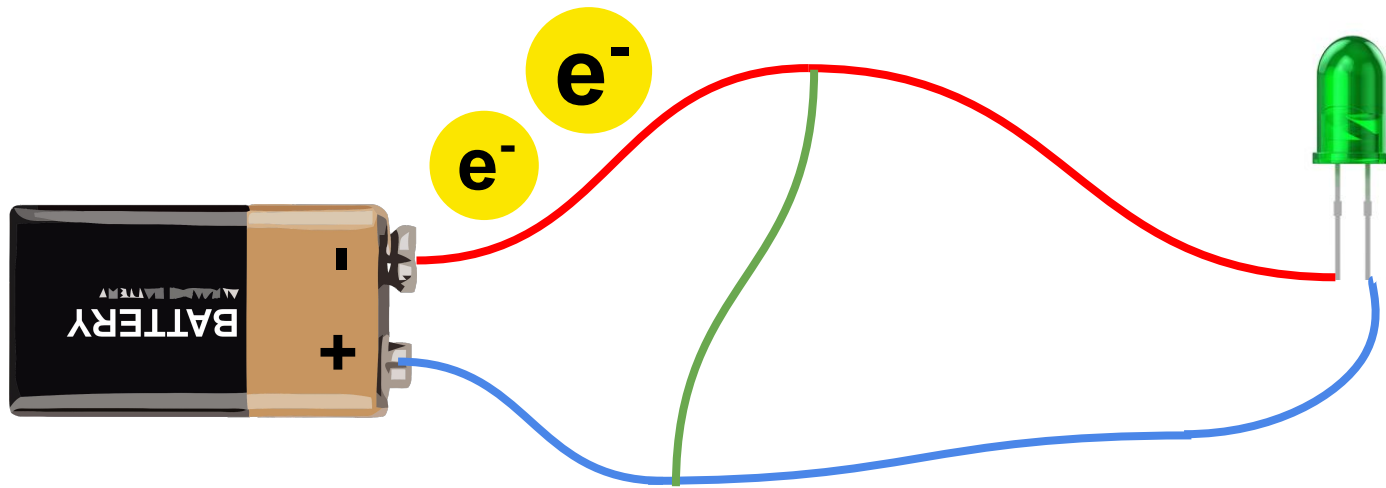
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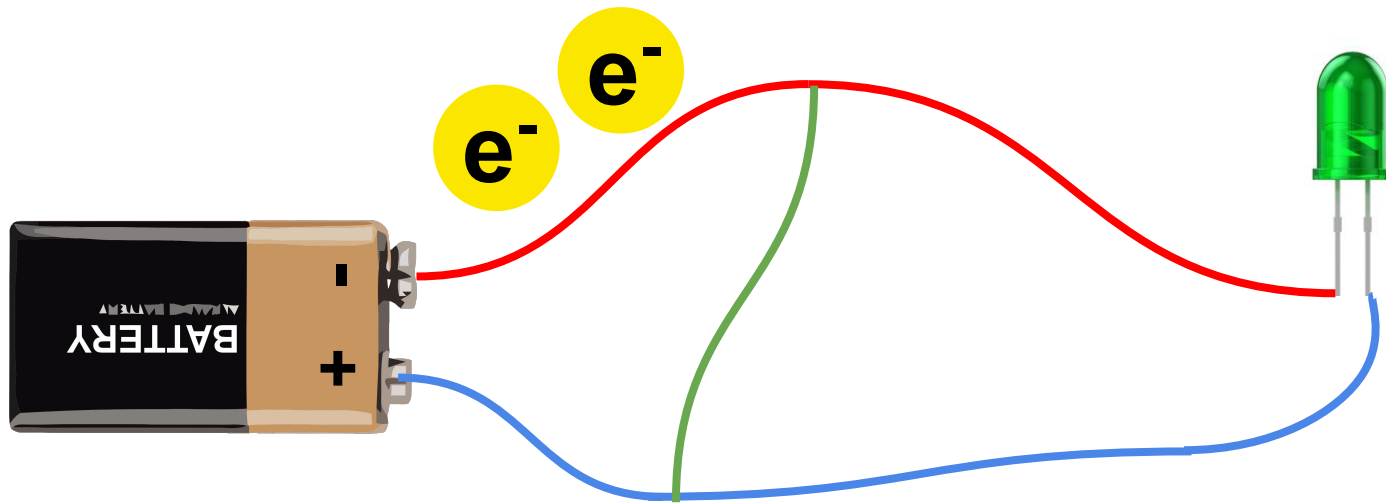
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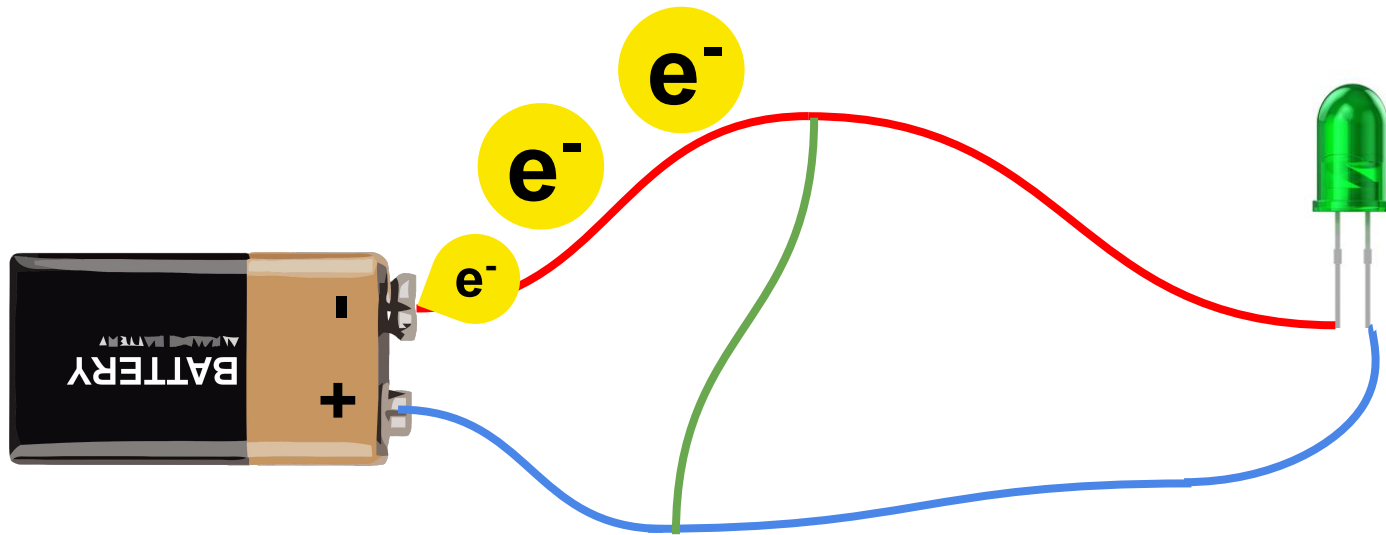
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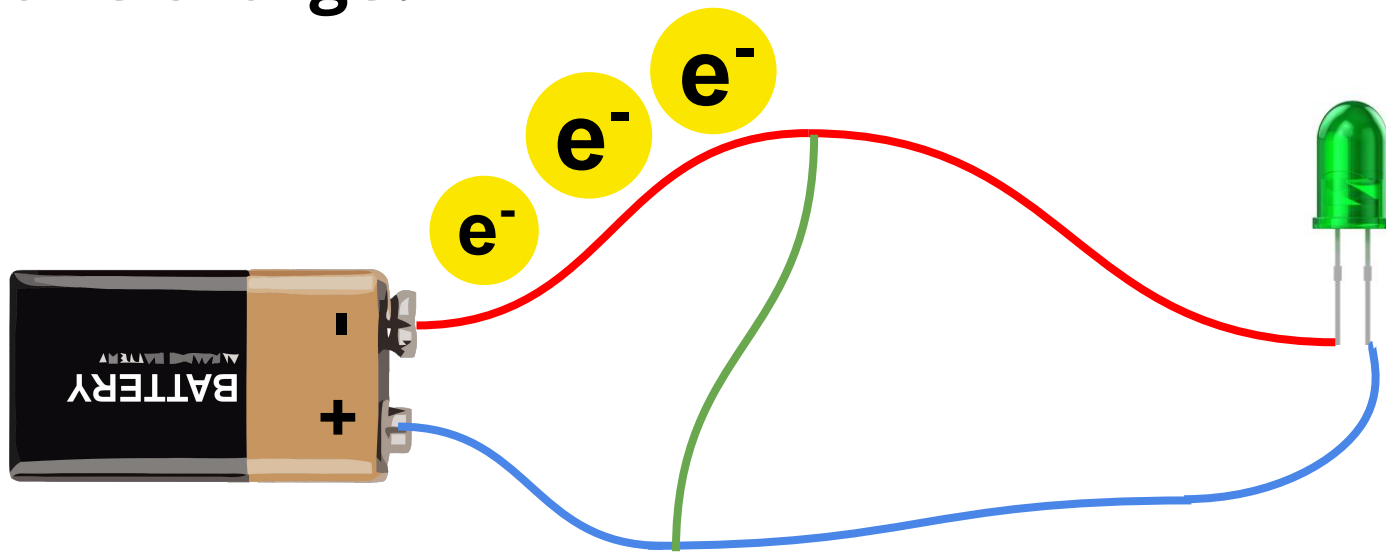
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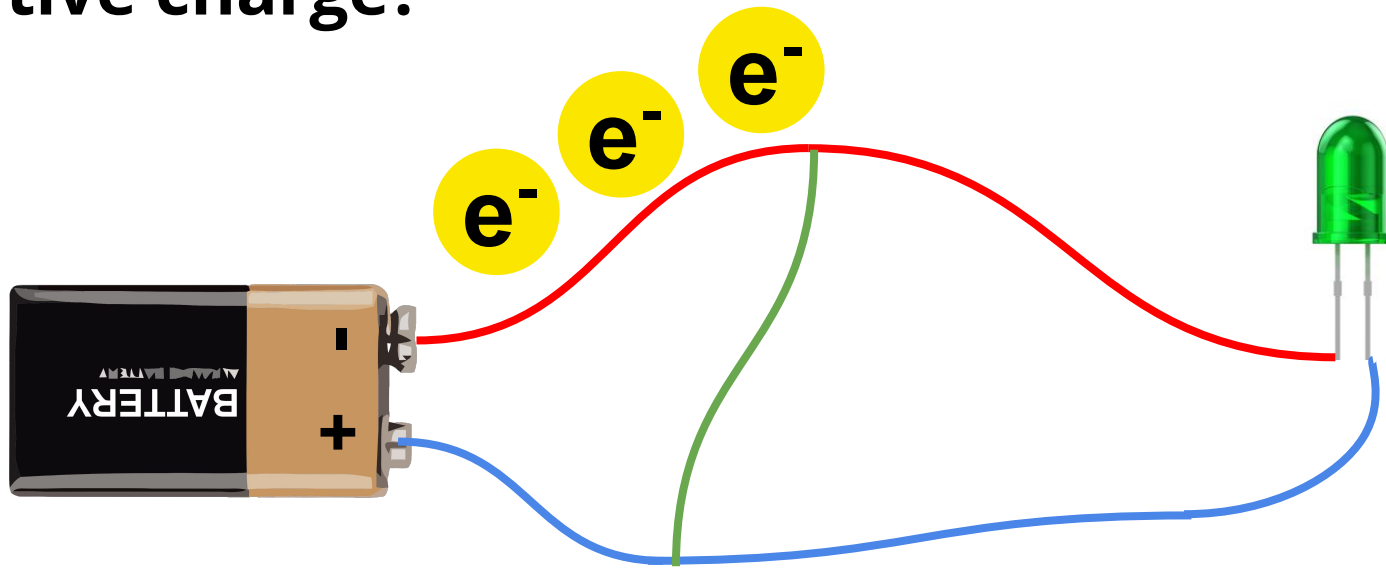
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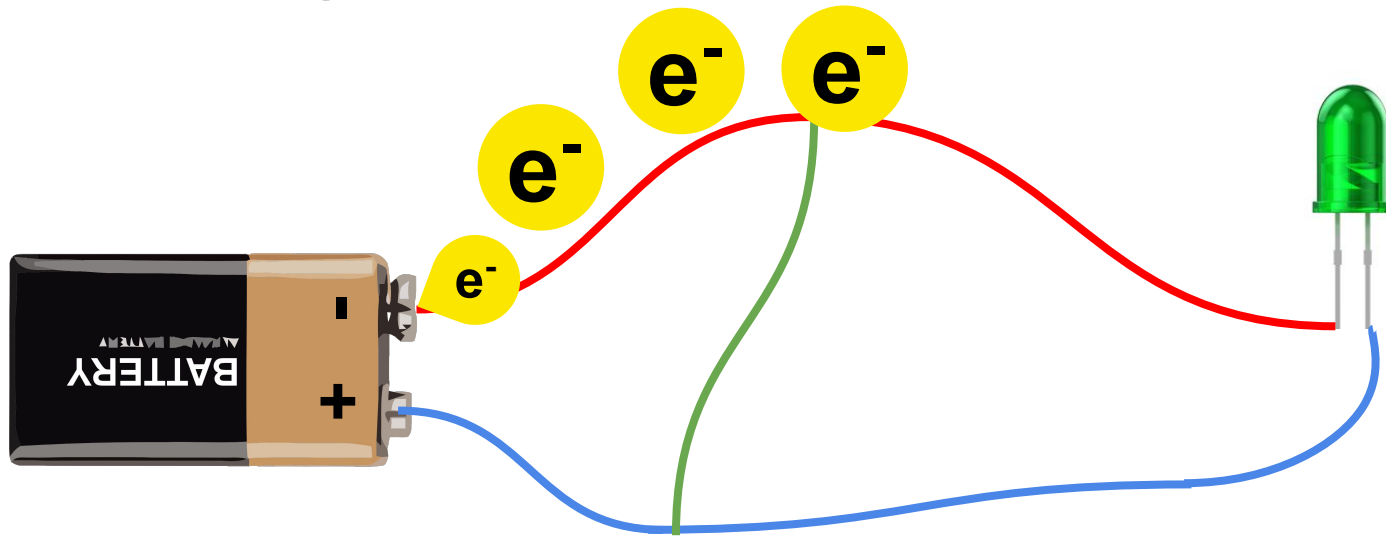
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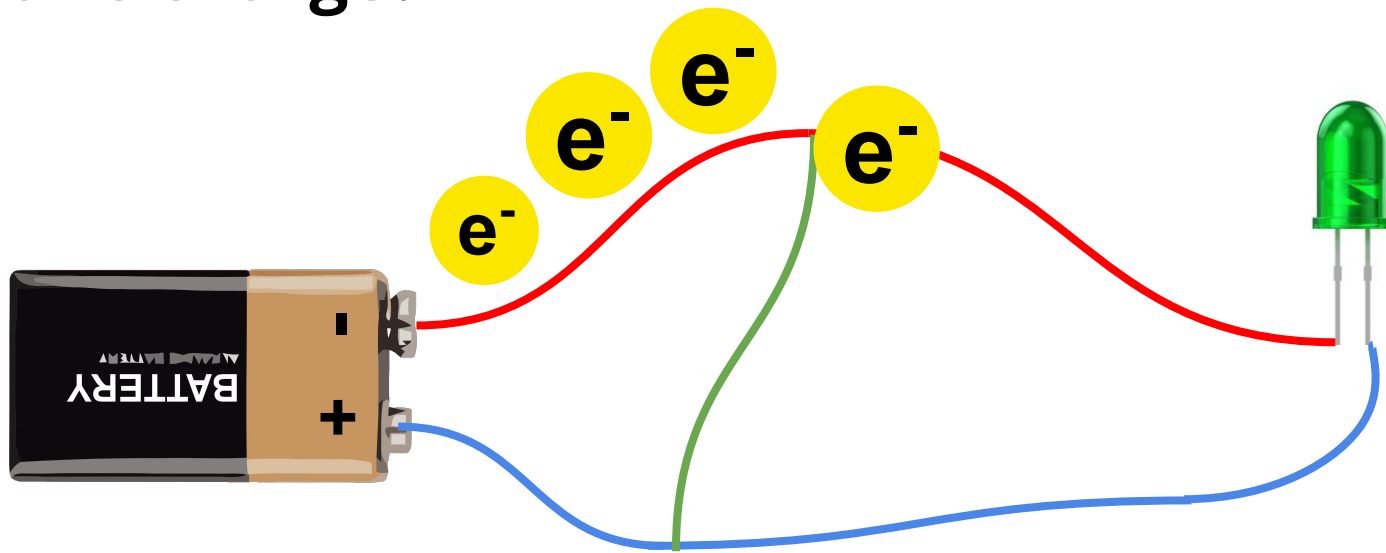
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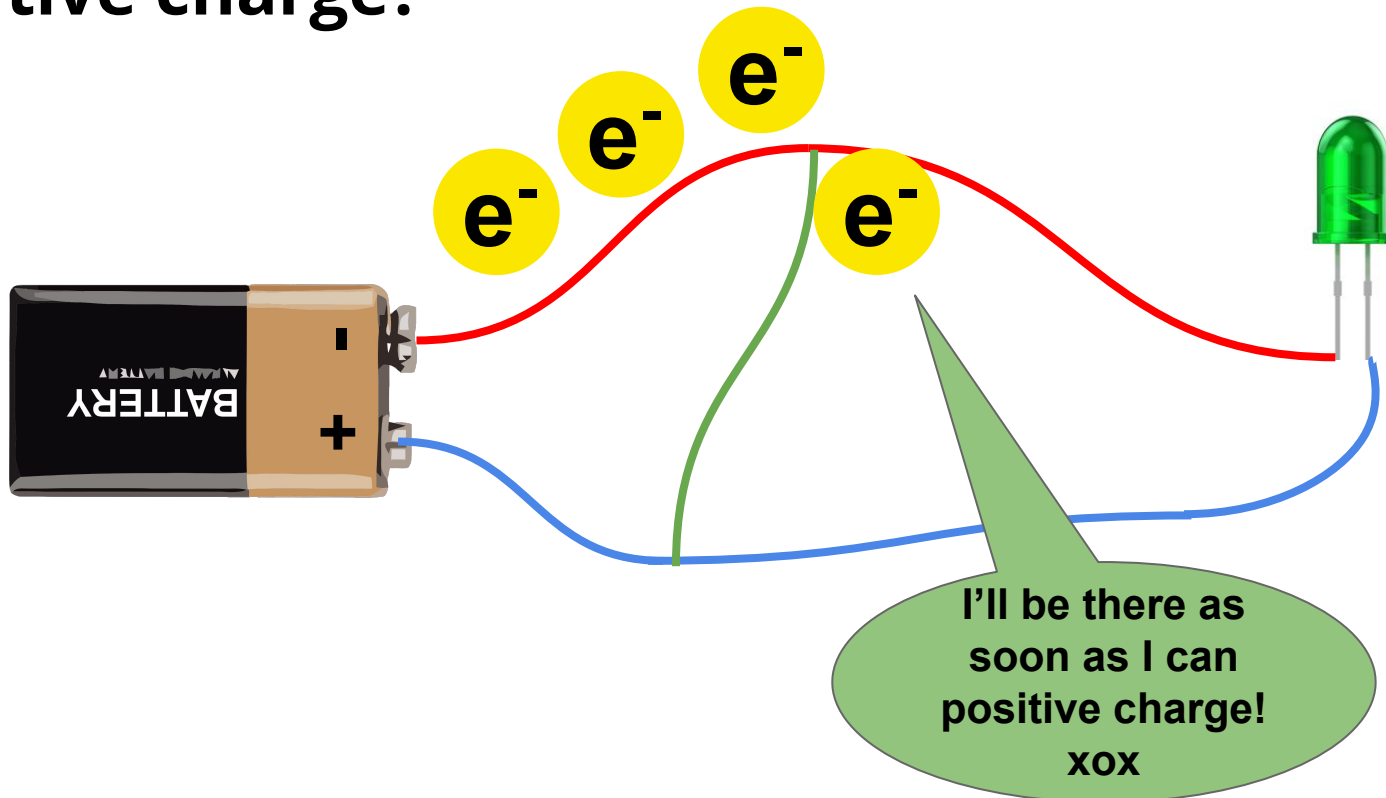
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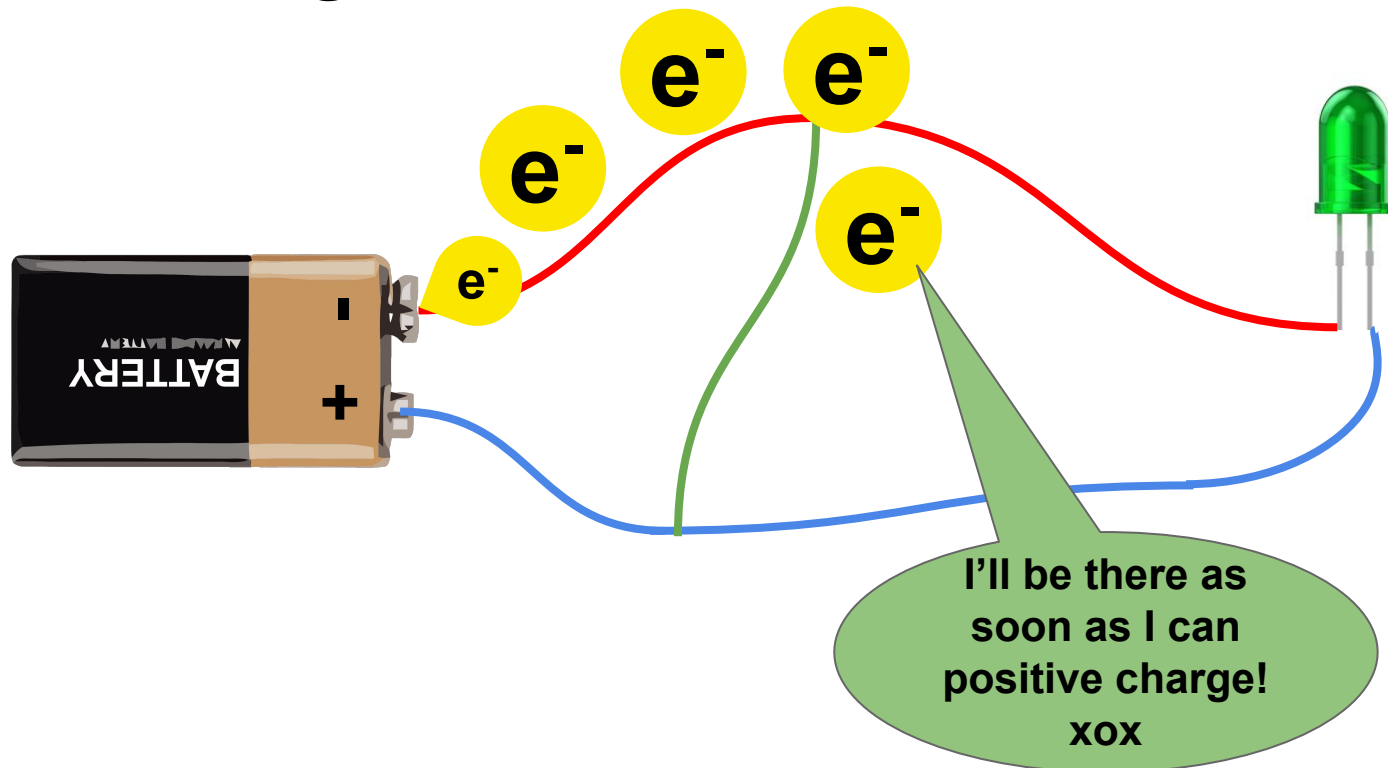
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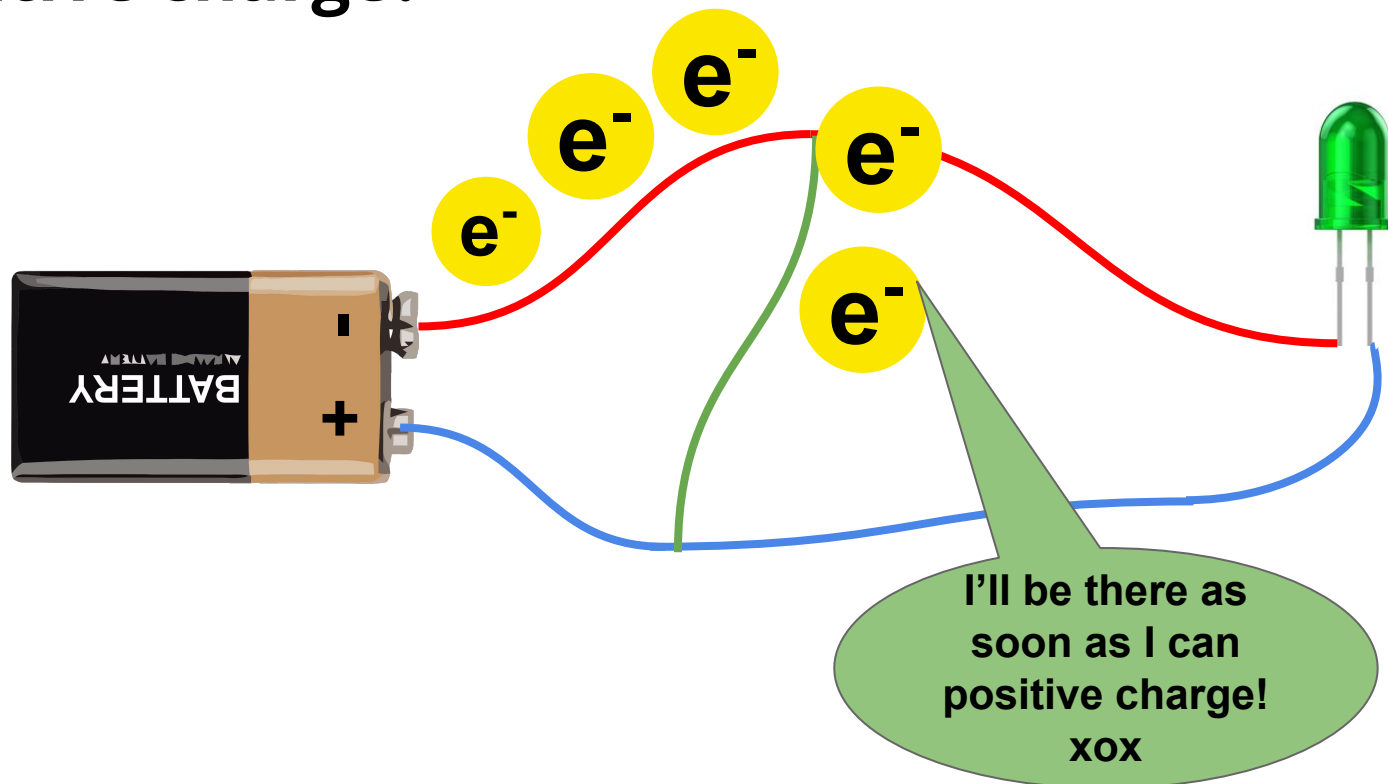
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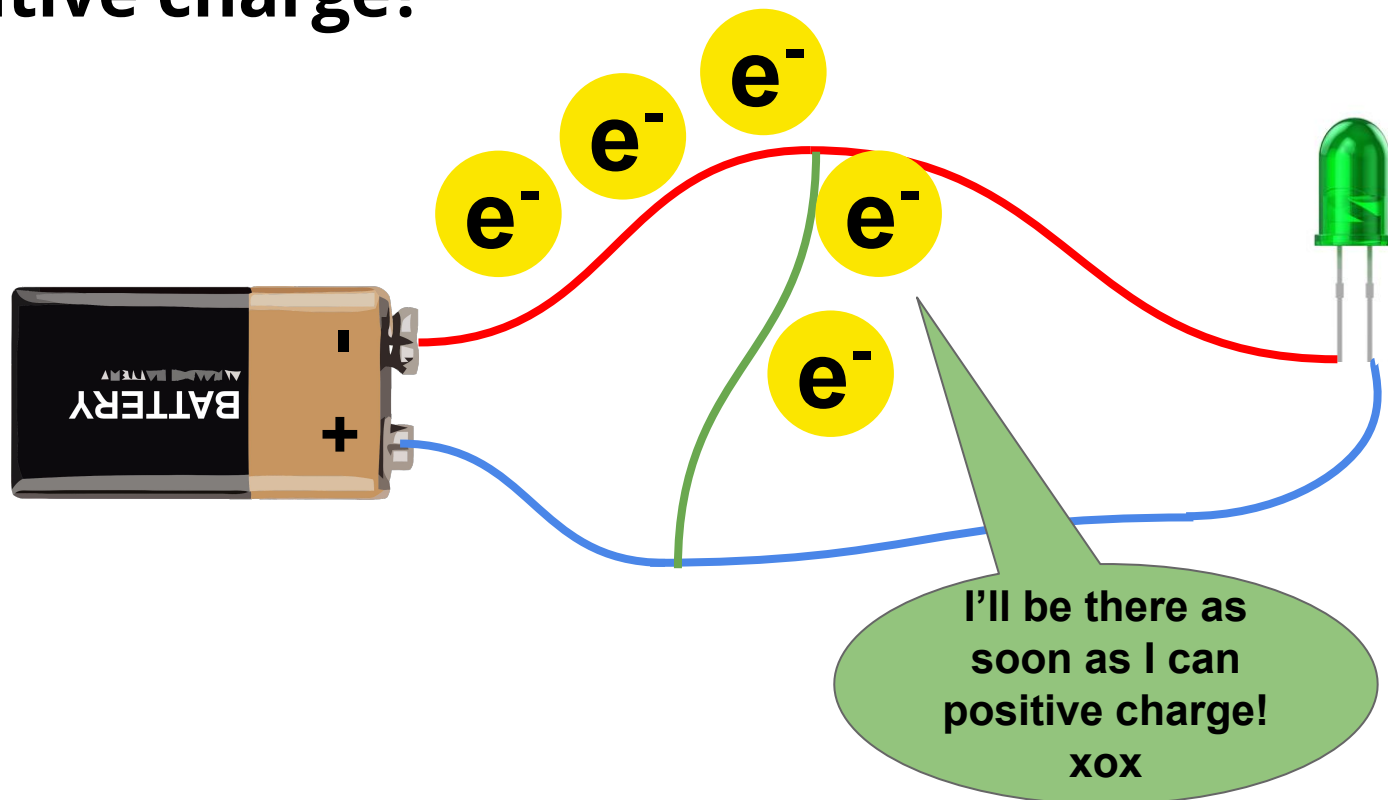
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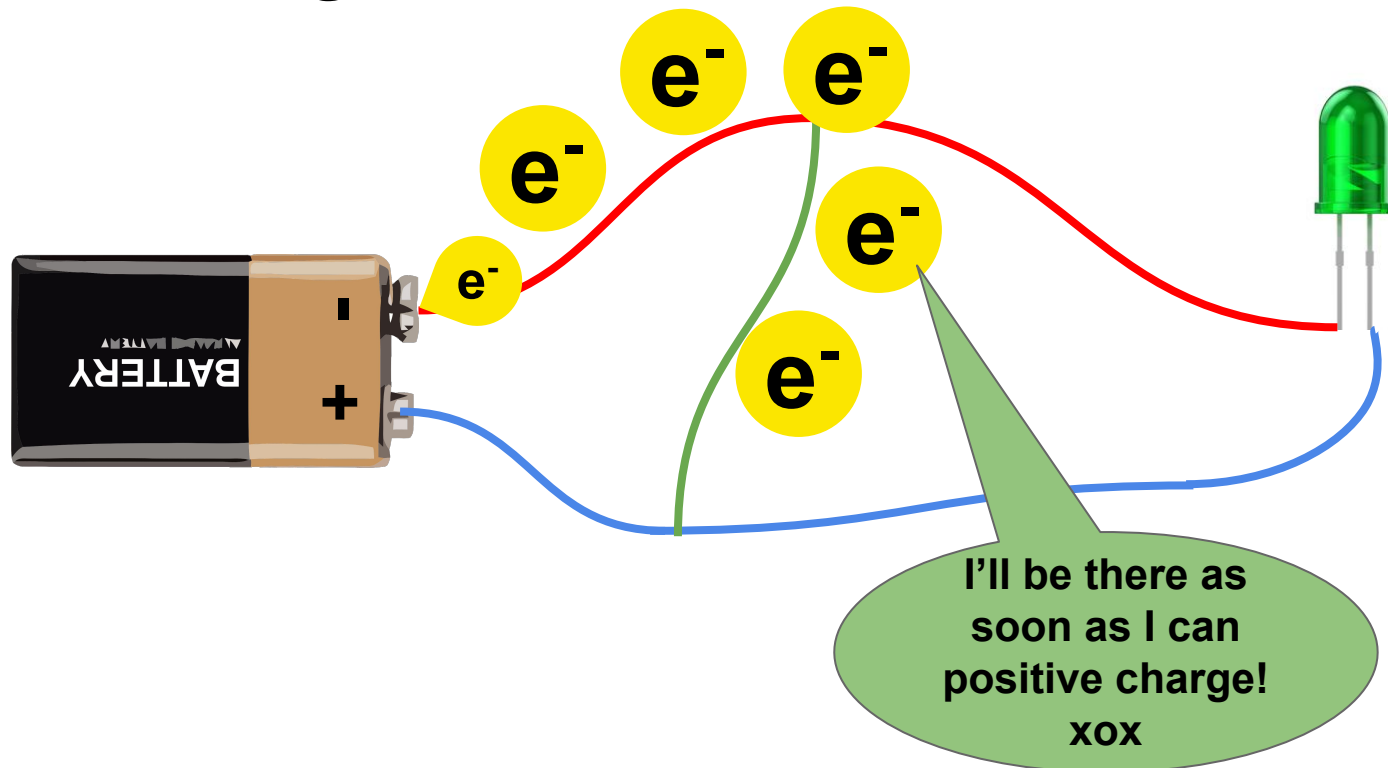
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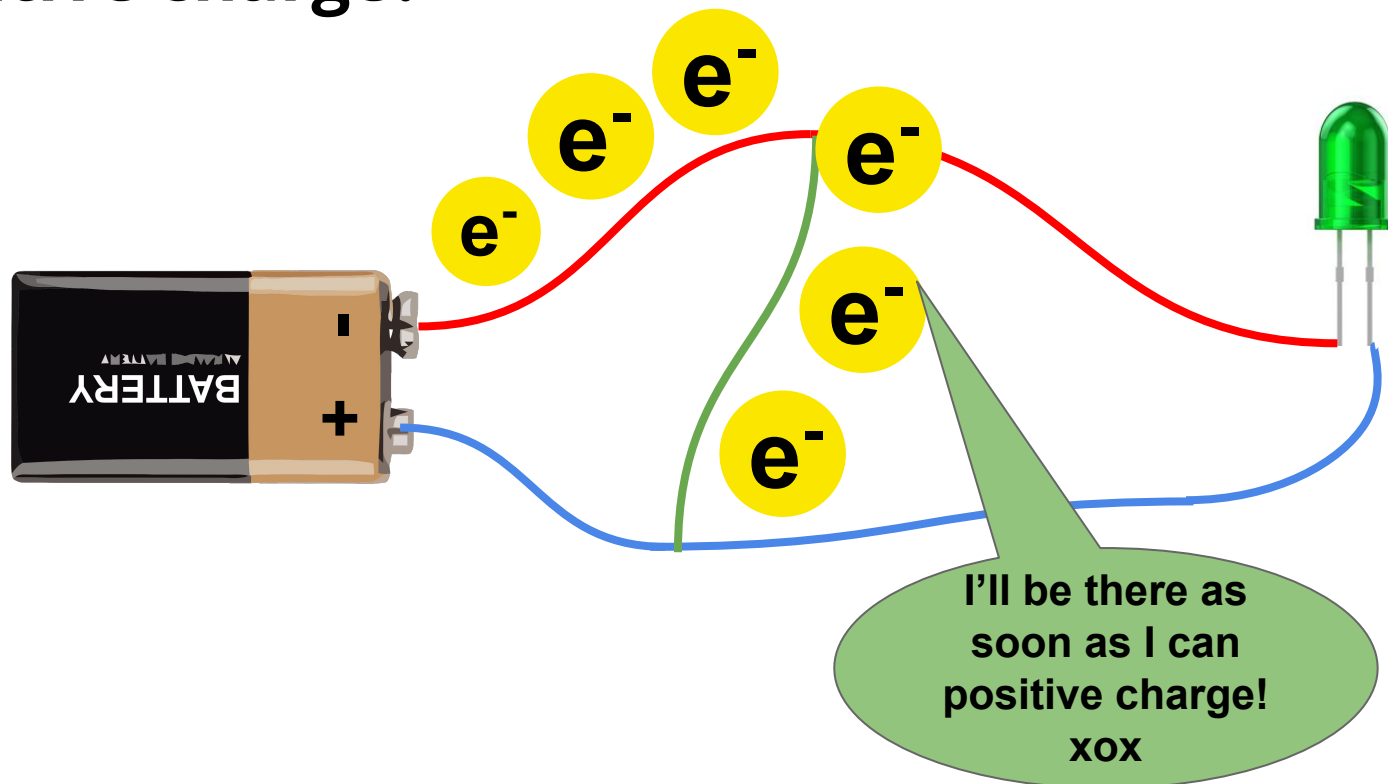
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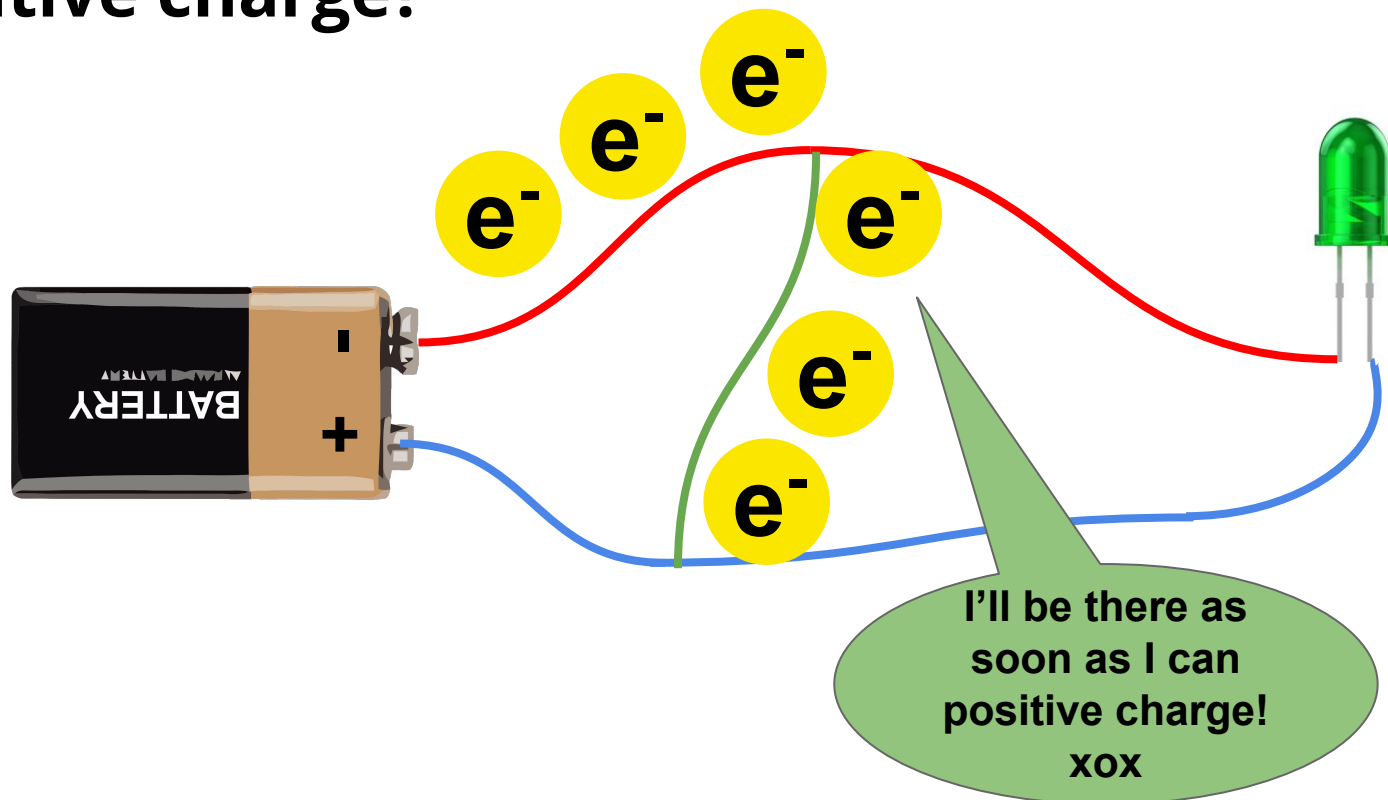
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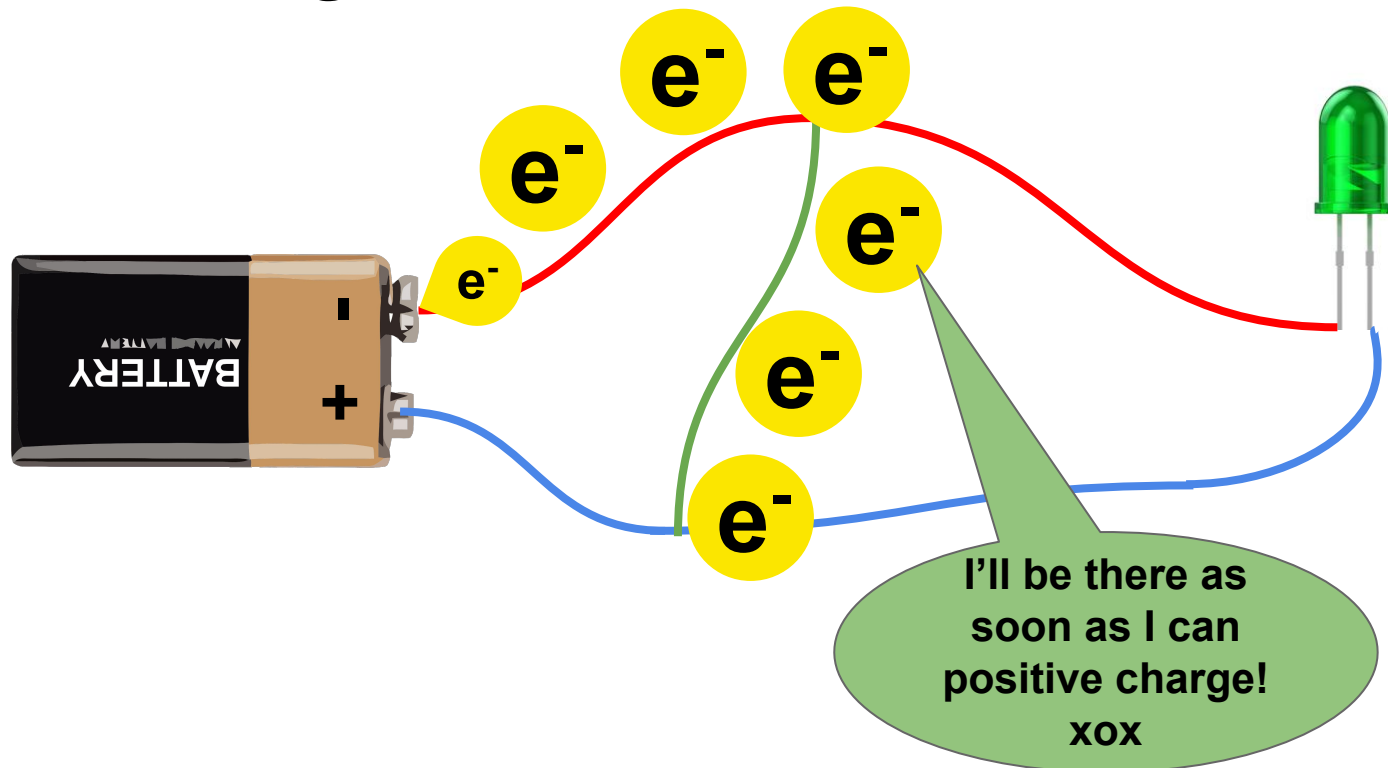
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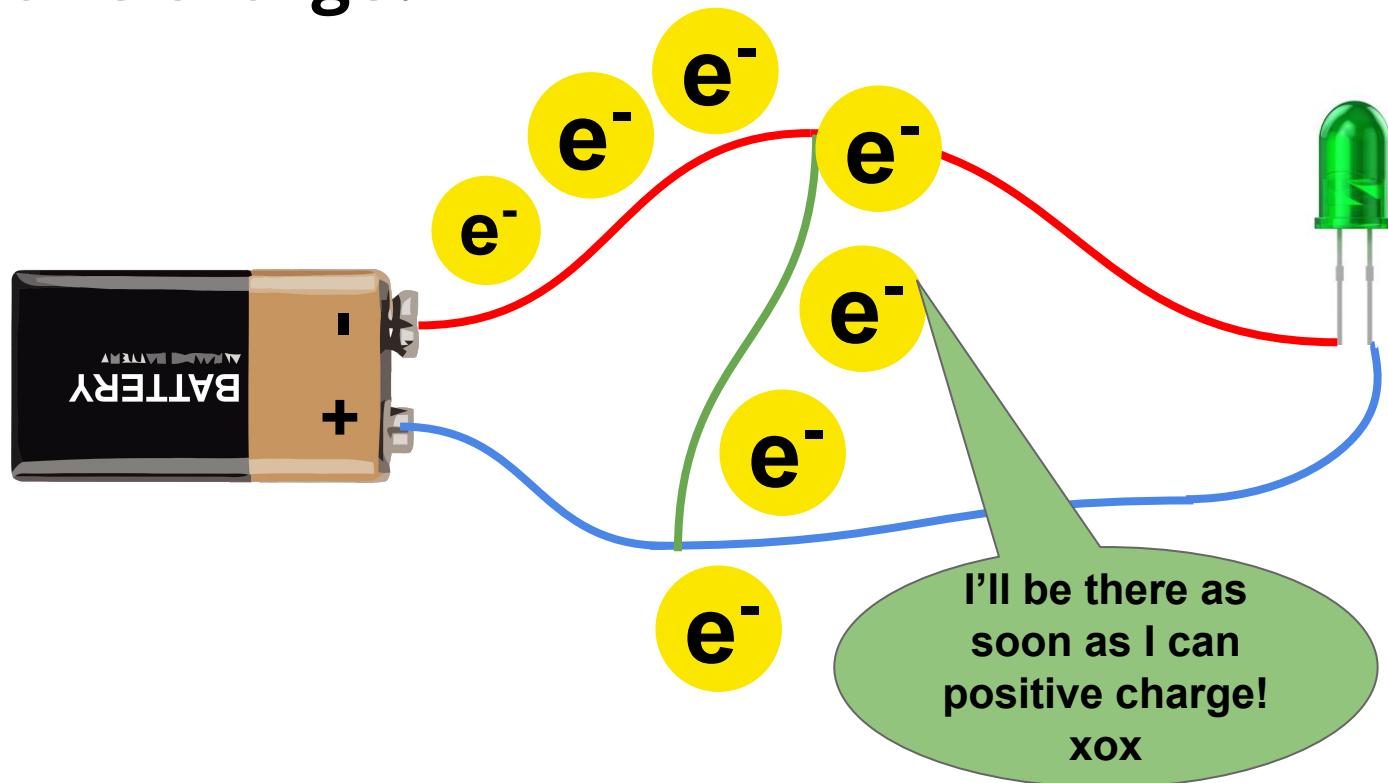
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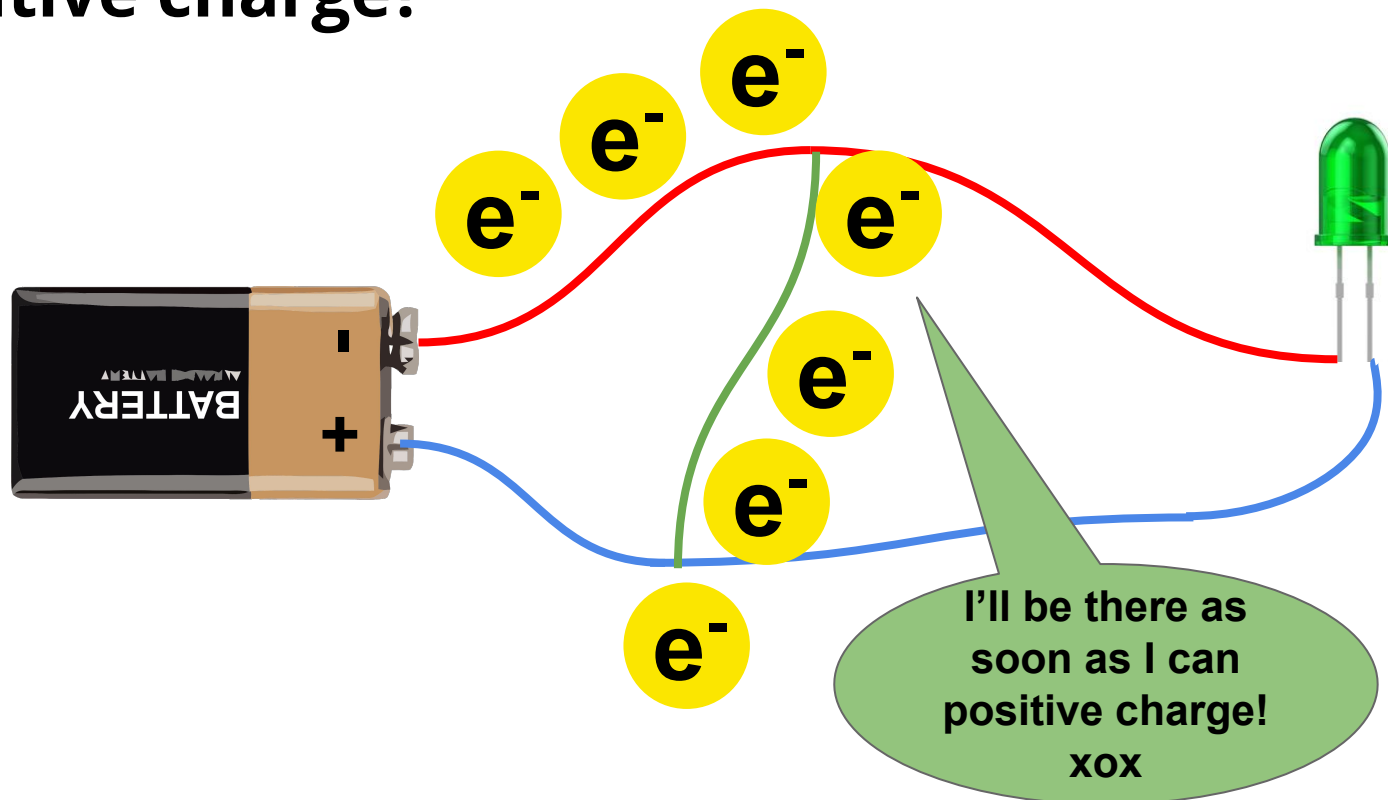
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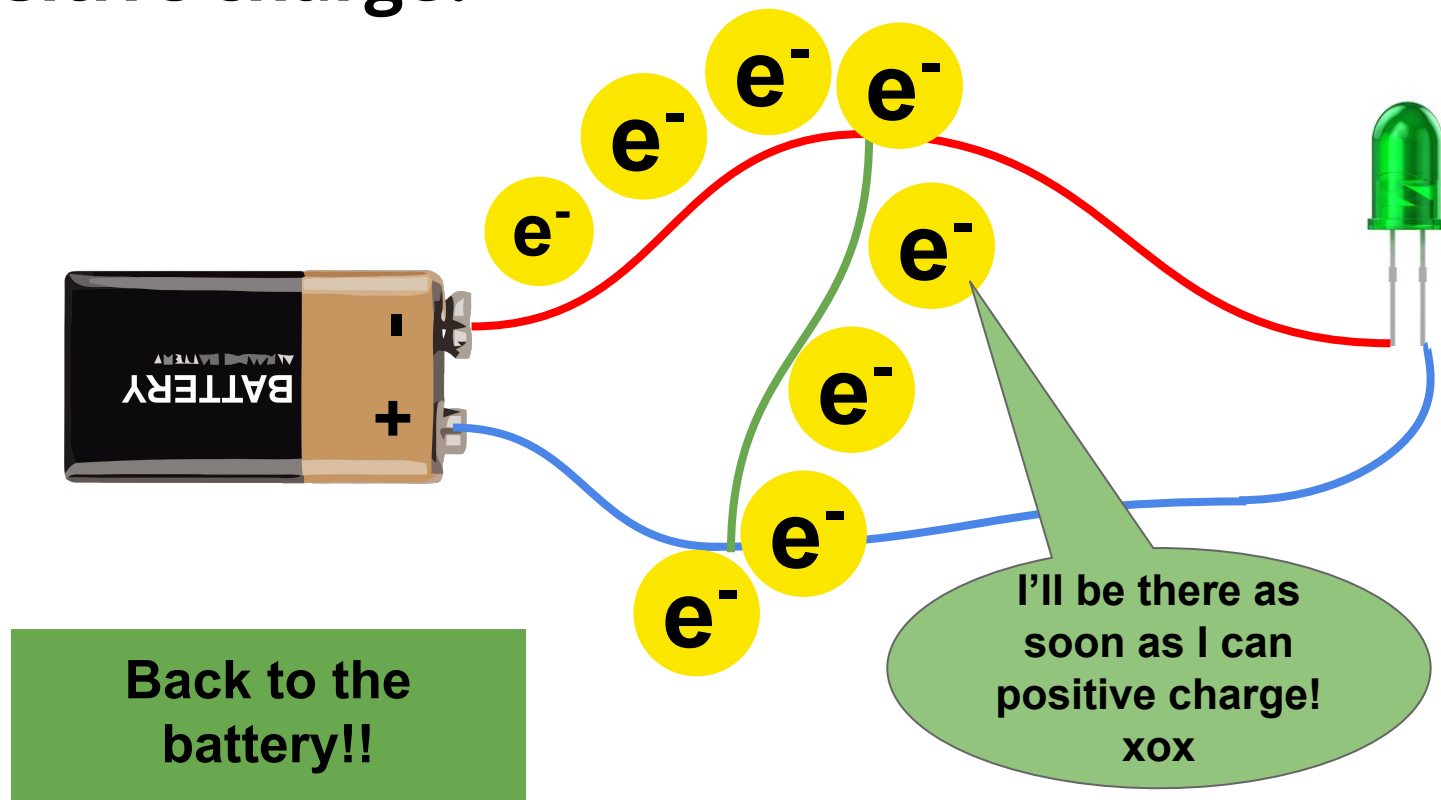
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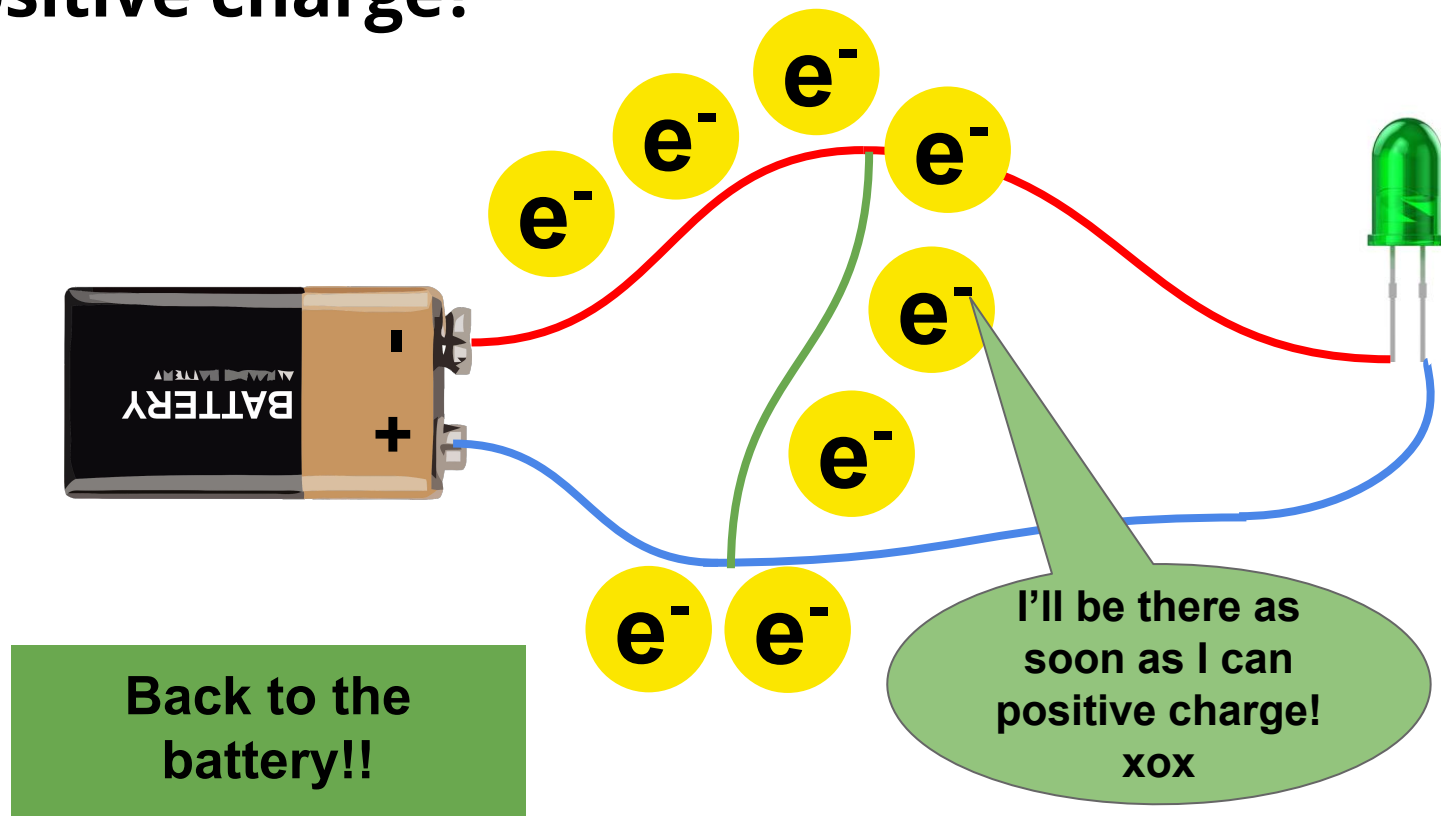
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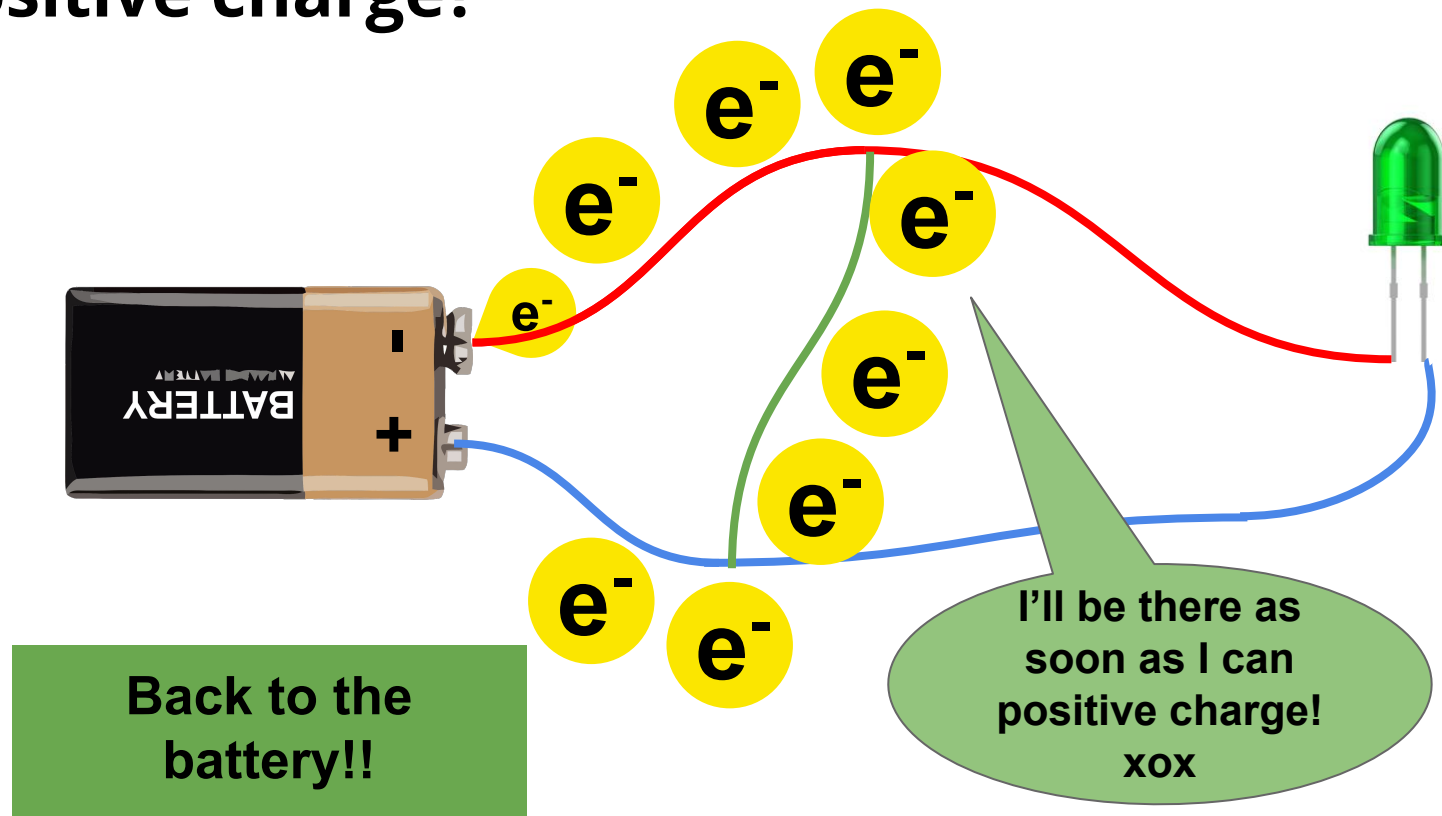
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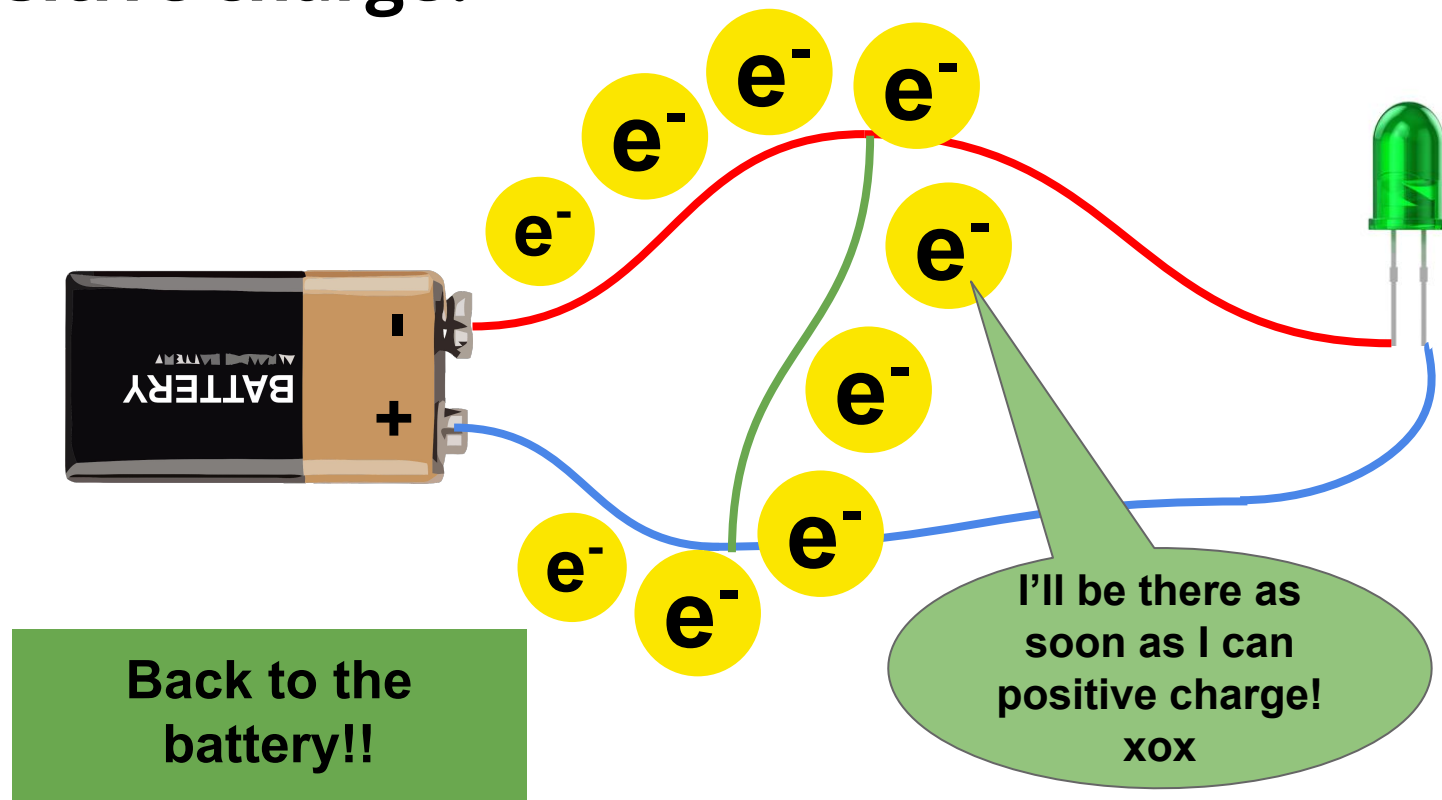
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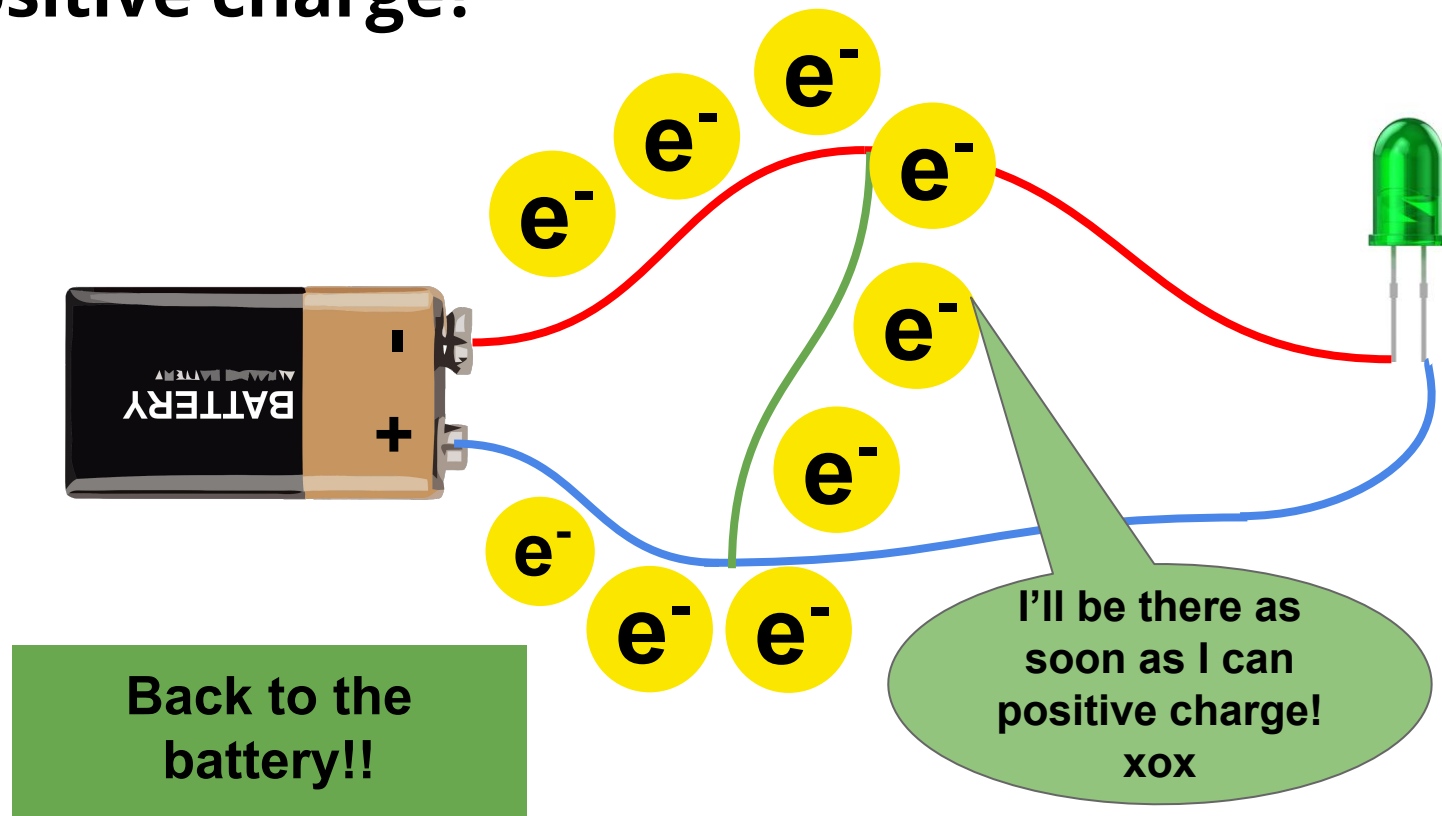
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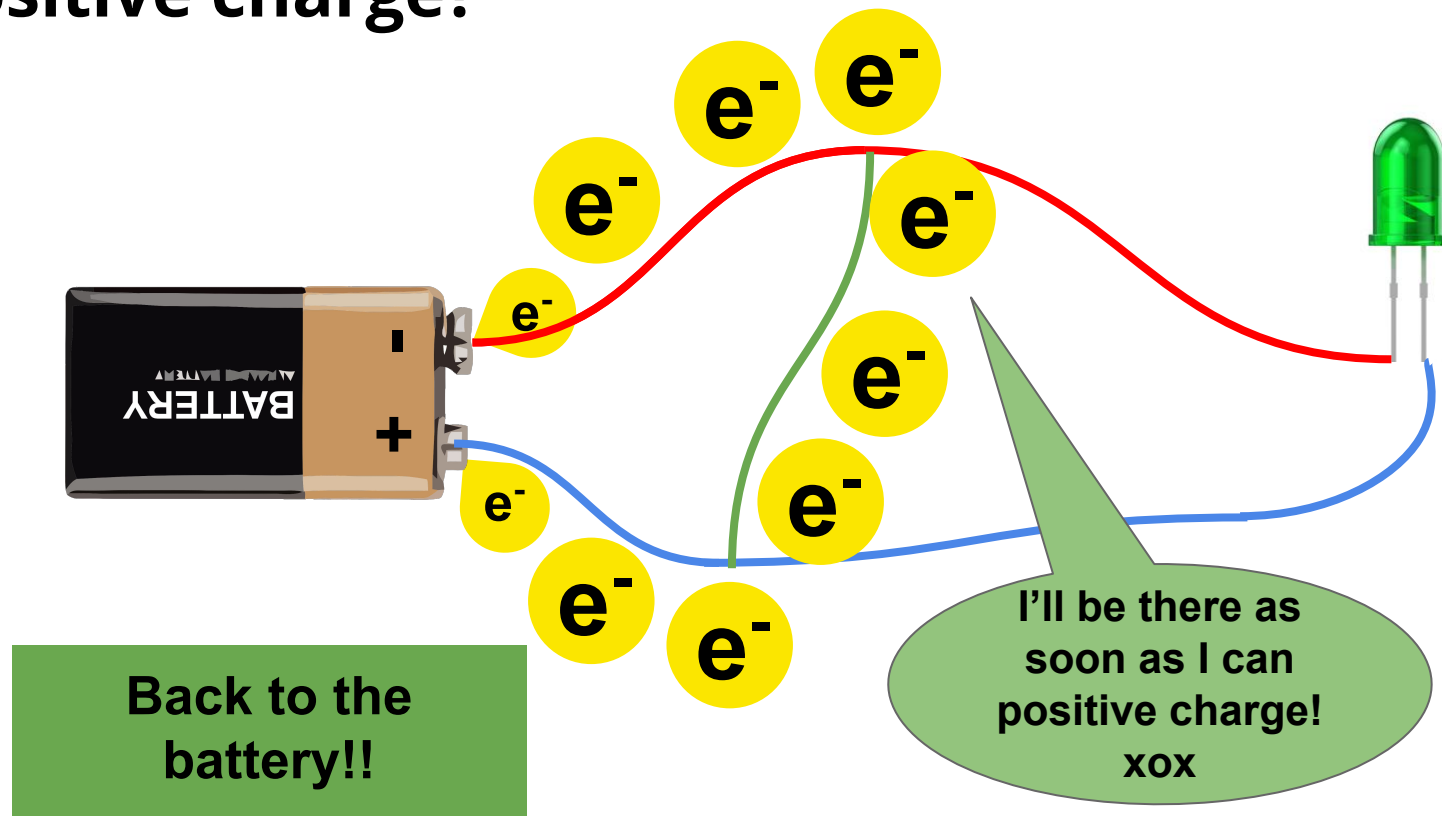
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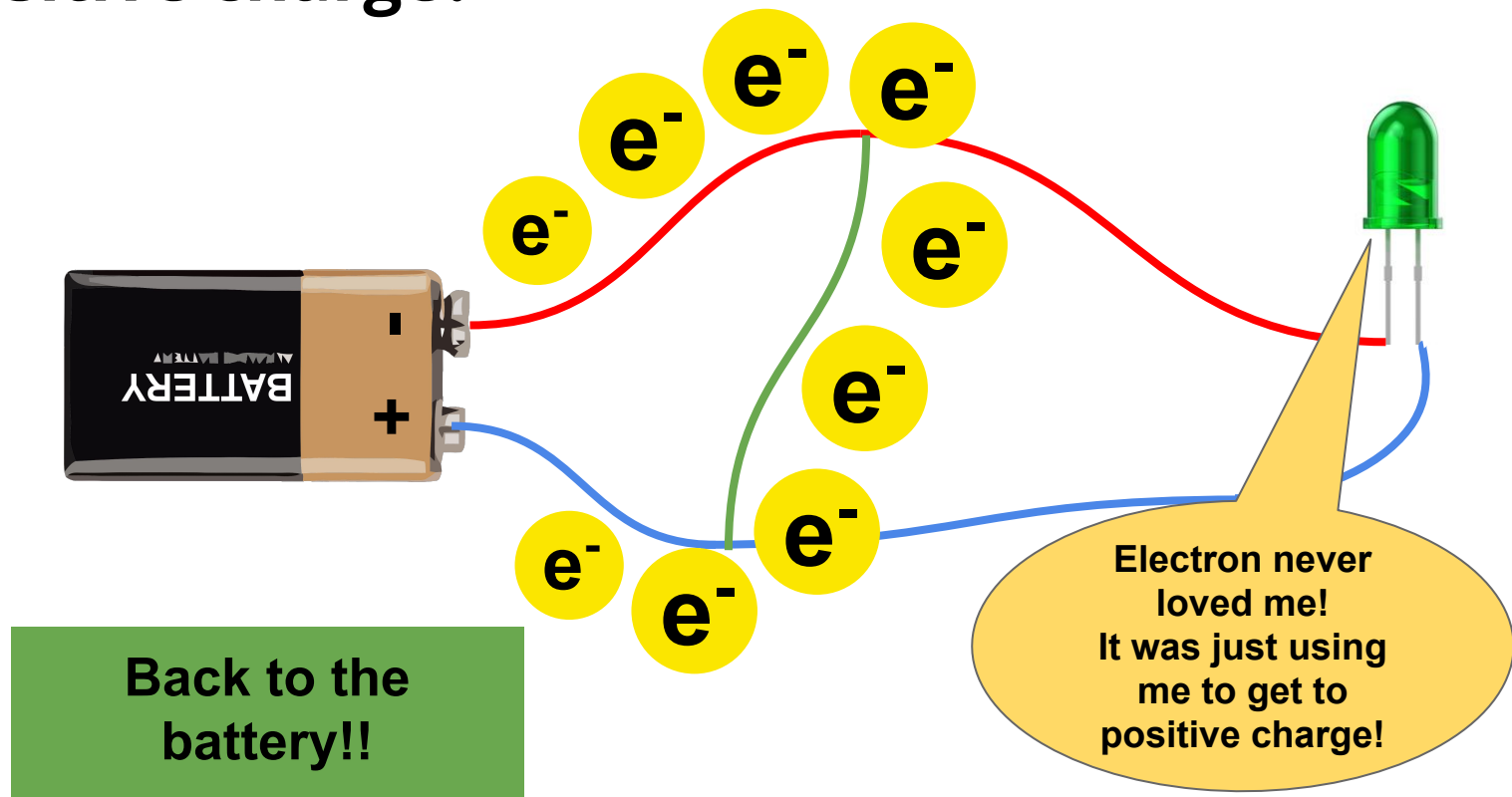
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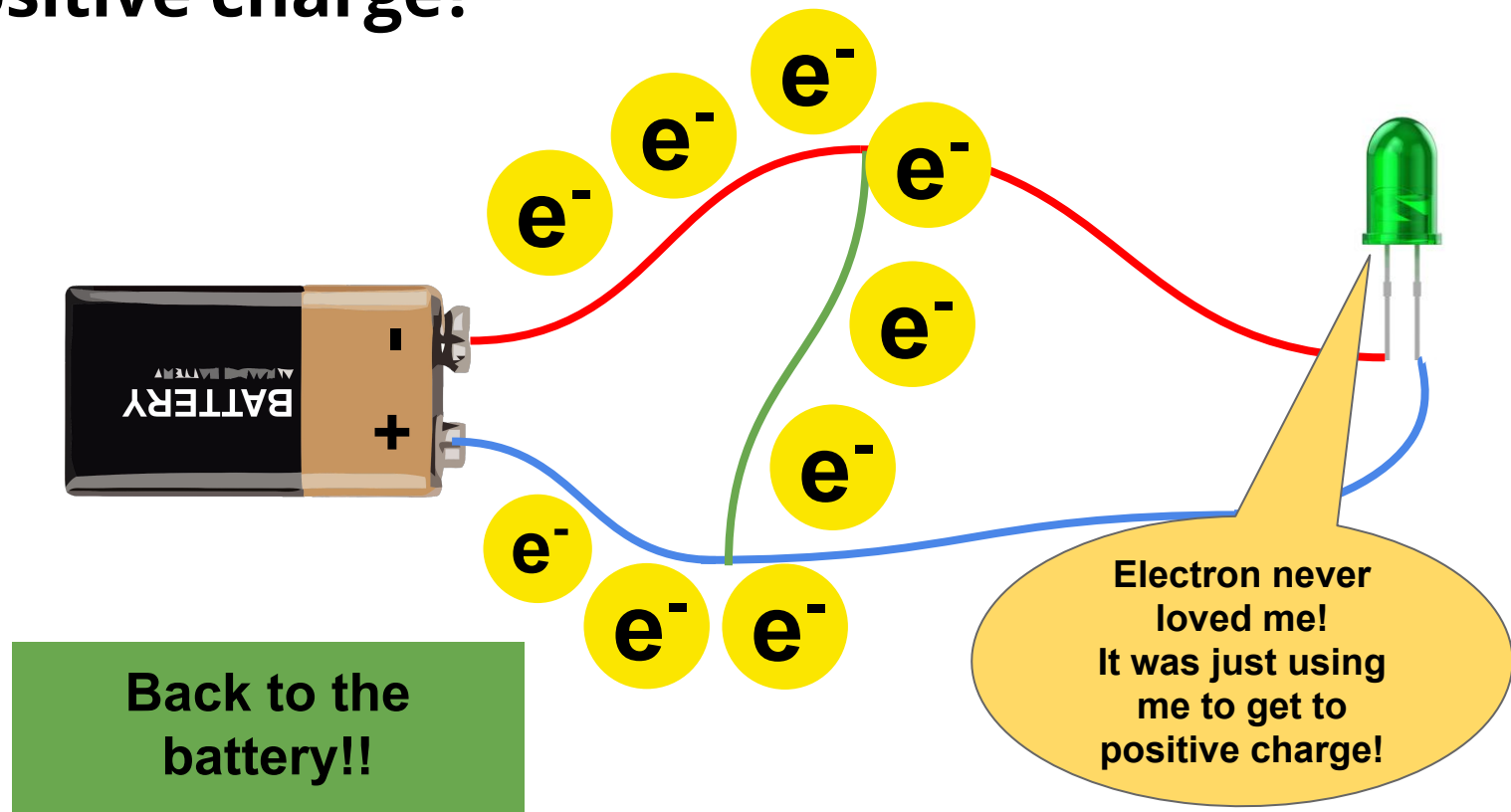
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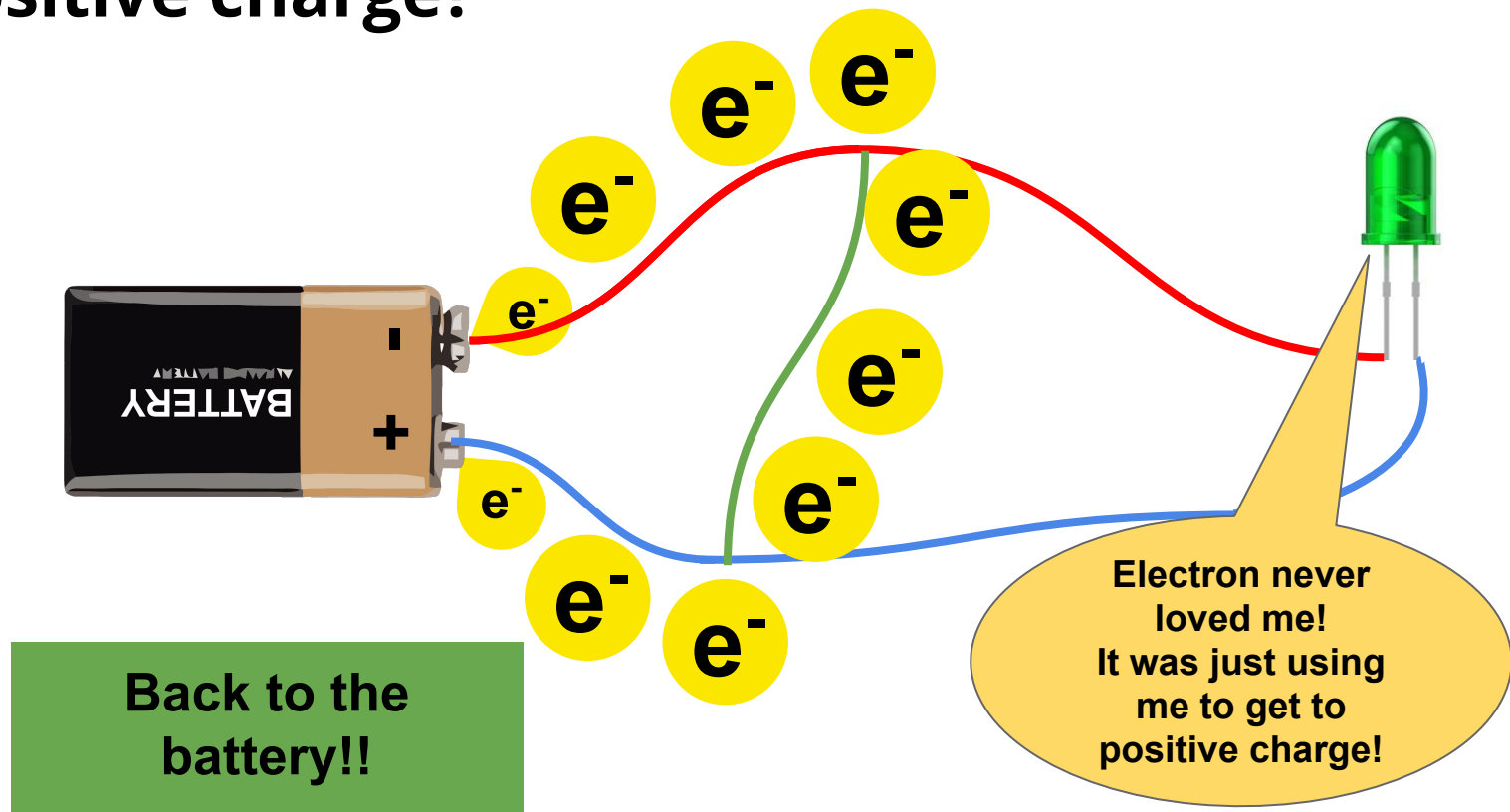
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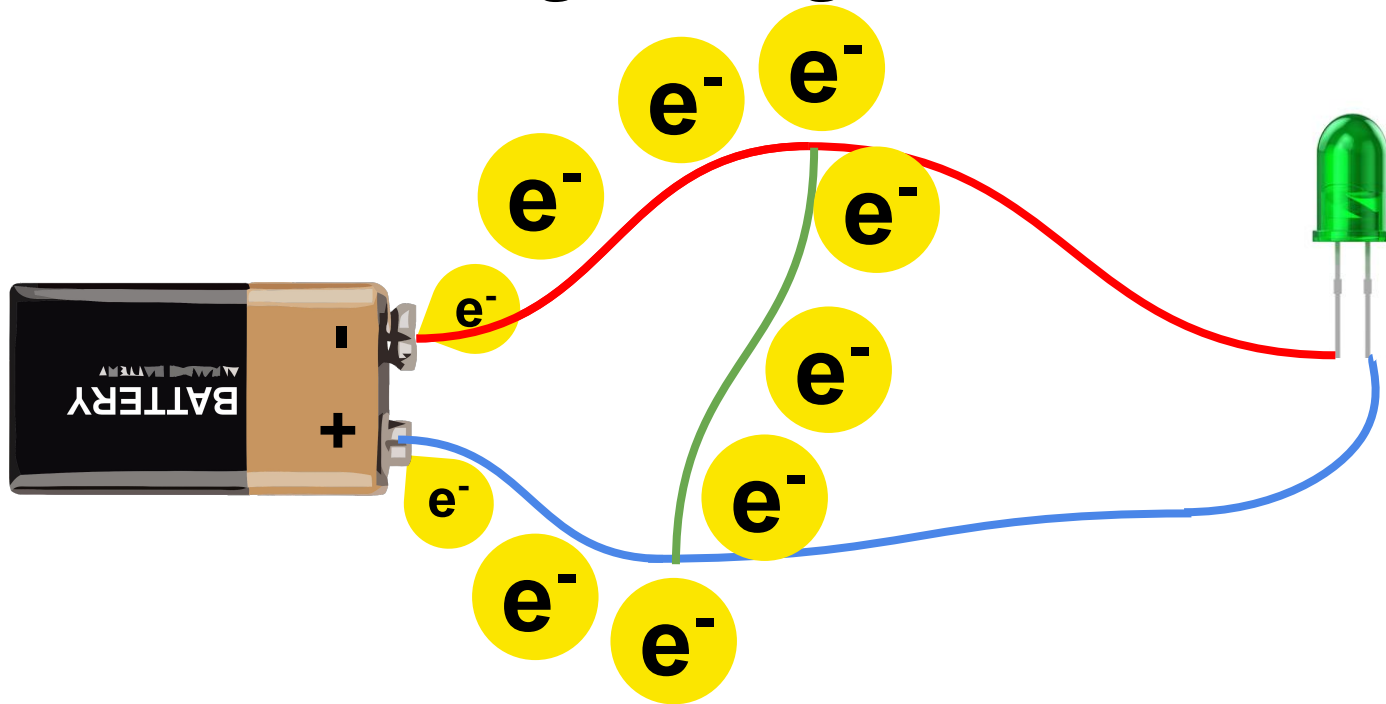
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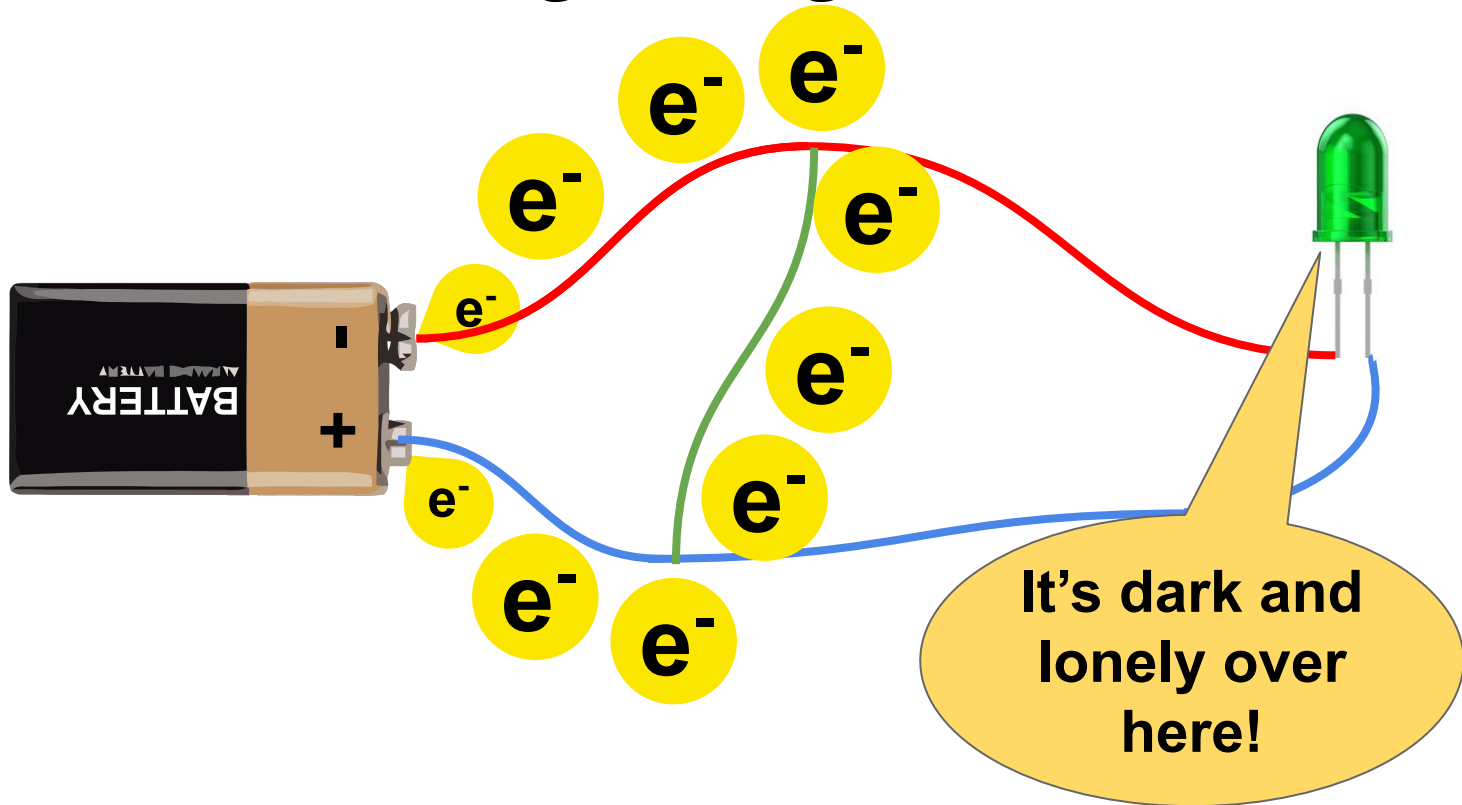
# What is a circuit?

The short-cut path is shorter and doesn't have the effort of turning on a light, so it's easier!



# What is a circuit?

The short-cut path is shorter and doesn't have the effort of turning on a light, so it's easier!



Let's make circuits!

**Today we're going to make circuits!**

**Out of:**  
**Batteries!**  
**LEDs!**  
**Play dough!**

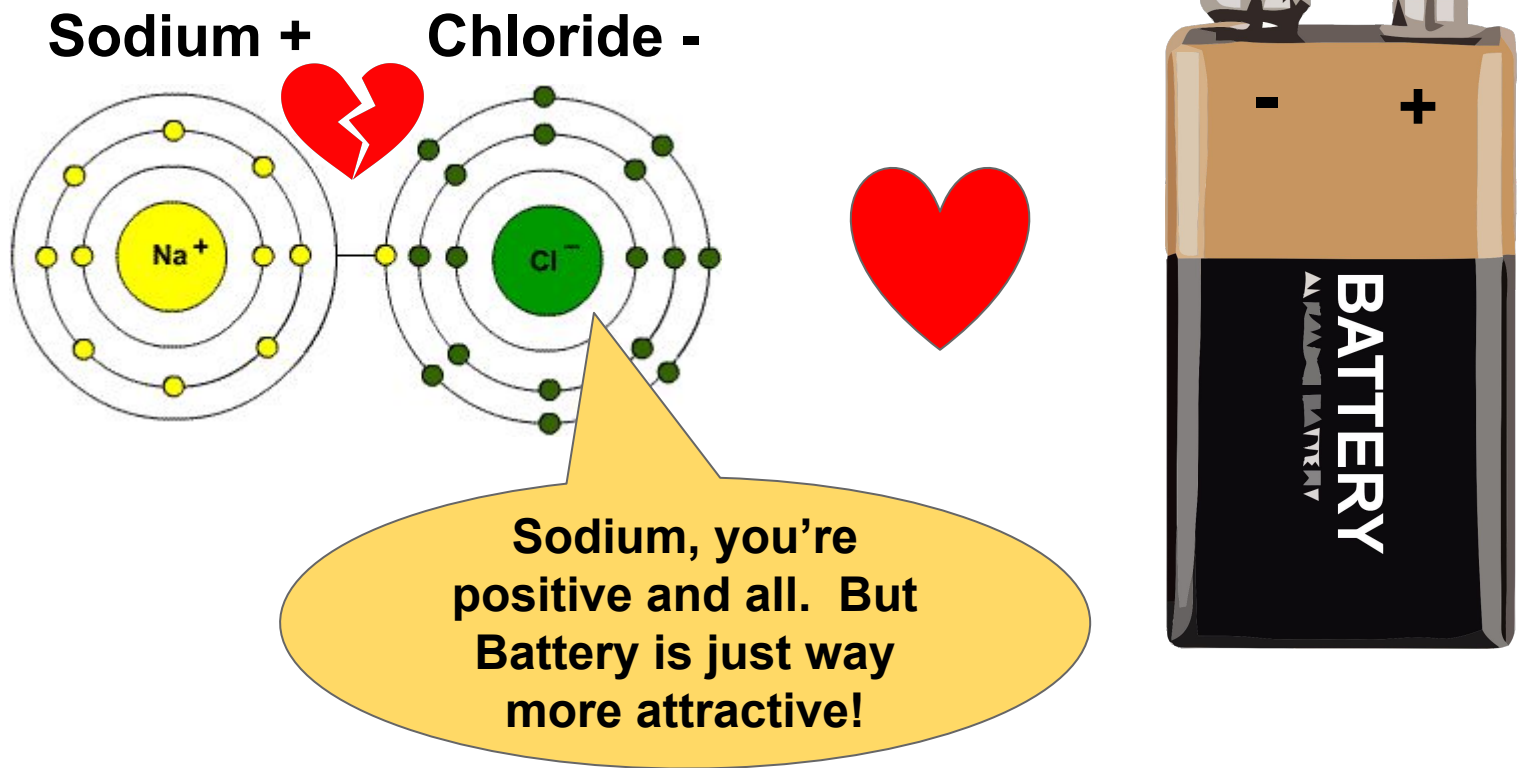
Let's make circuits!

**No wires! Just playdough!**

We can use play dough as wires,  
because it conducts electricity!

# Let's make circuits!

**Play dough is conductive because it's full of salt (NaCl)!**



# Basic Circuit



# What are we making?

**Computers can help us  
make decisions!**

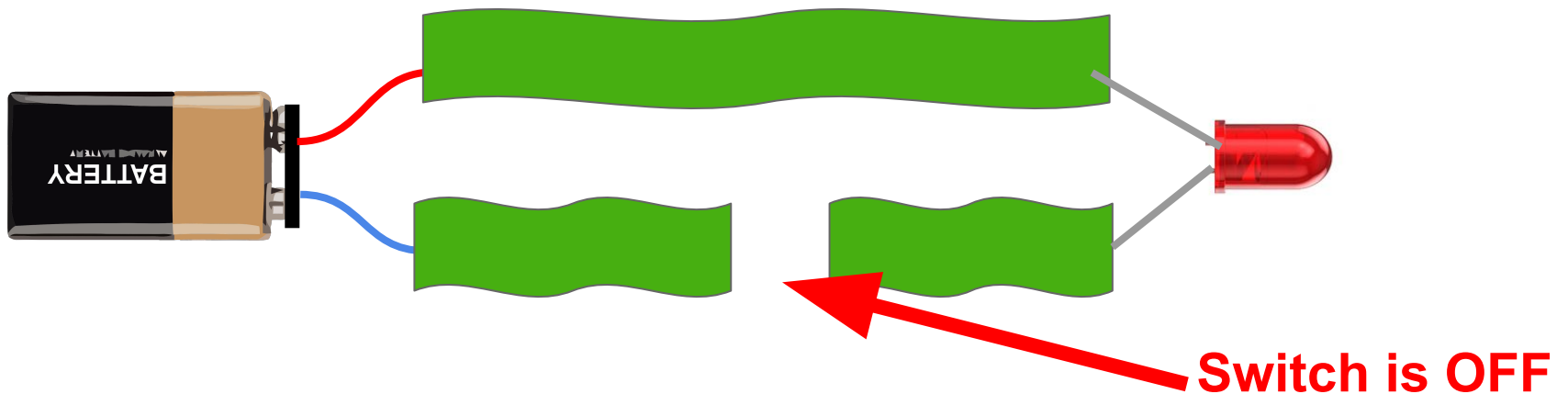
**We teach them the logic,  
then we can sit back and  
relax!**

**That's the dream!**



# What are we making?

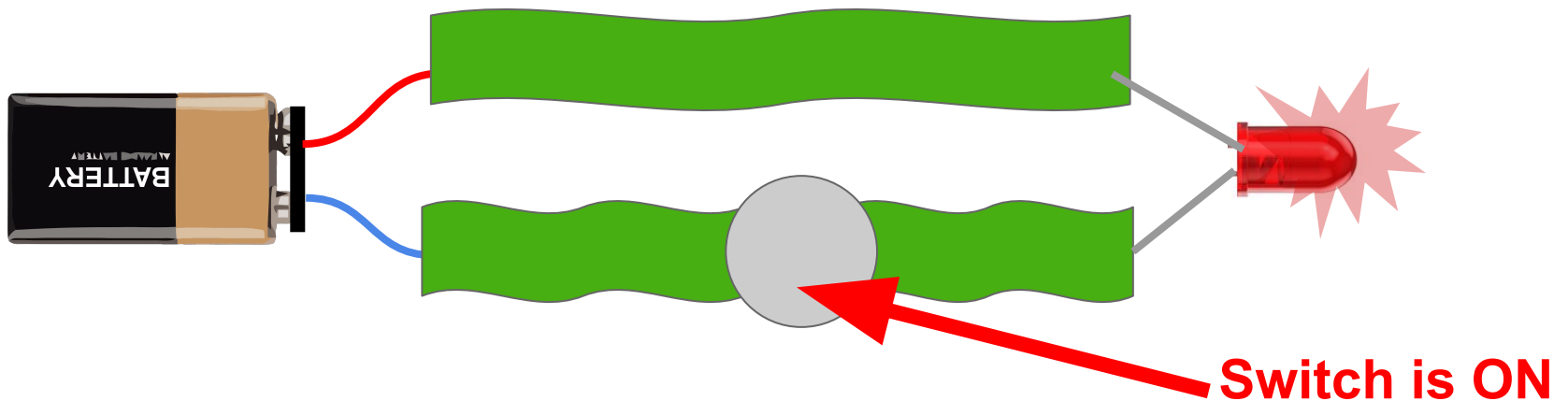
**We need to start teaching the computers how to make decisions for us based on information we tell it.**



**We can use our basic circuit for decision making by cutting the play dough and adding a switch!**

# What are we making?

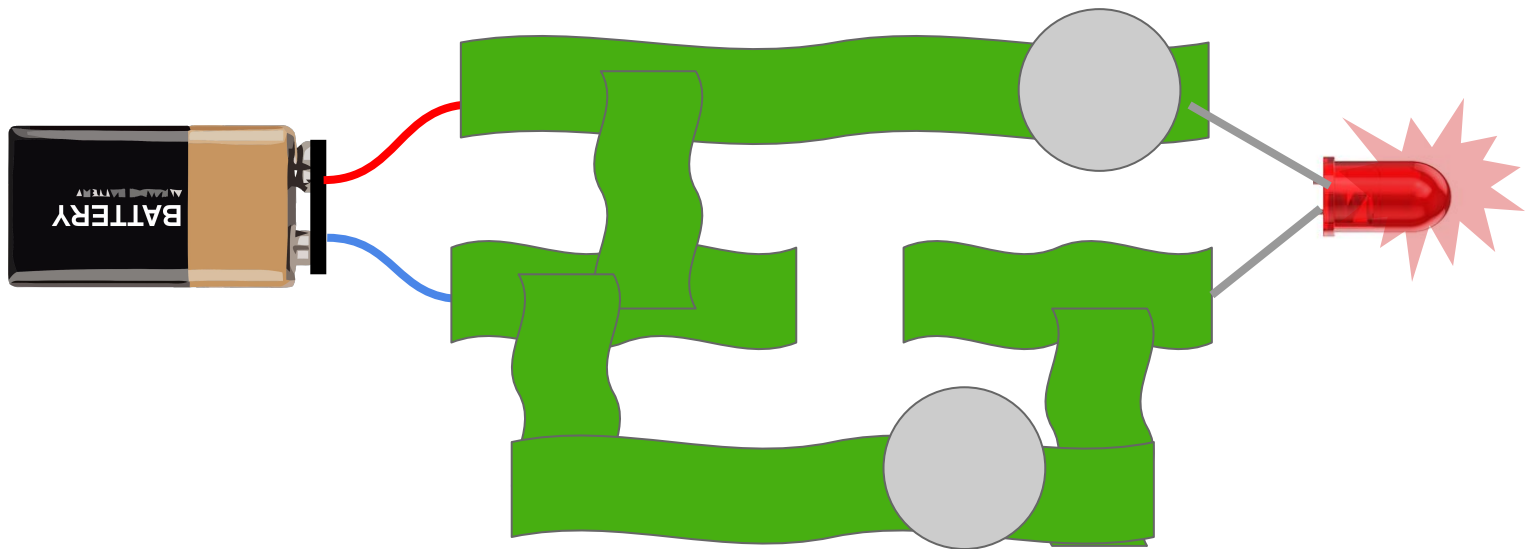
**We need to start teaching the computers how to make decisions for us based on information we tell it.**



**We can use our basic circuit for decision making by cutting the play dough and adding a switch!**

# What are we making?

**We'll give you a bunch of scenarios to make a decision making machine for!**

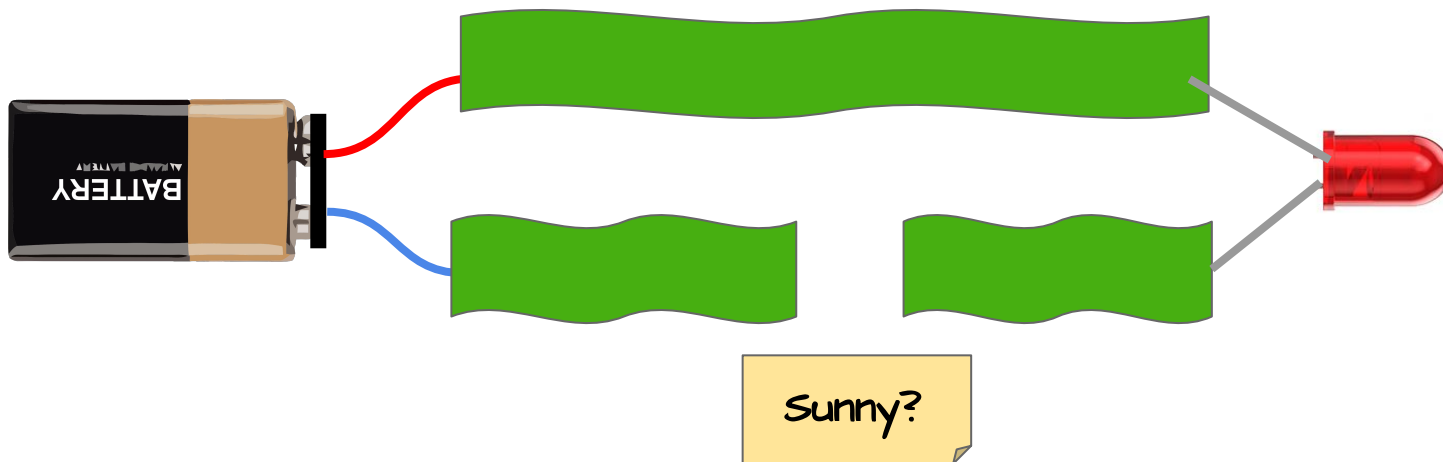


**Add to, cut and deform you basic circuit to make the decision machines!**

# Example

Maddy likes to play netball. But only if it's not raining. Make a circuit that decides if Maddy plays netball. **The light should turn on** to tell Maddy to play netball.

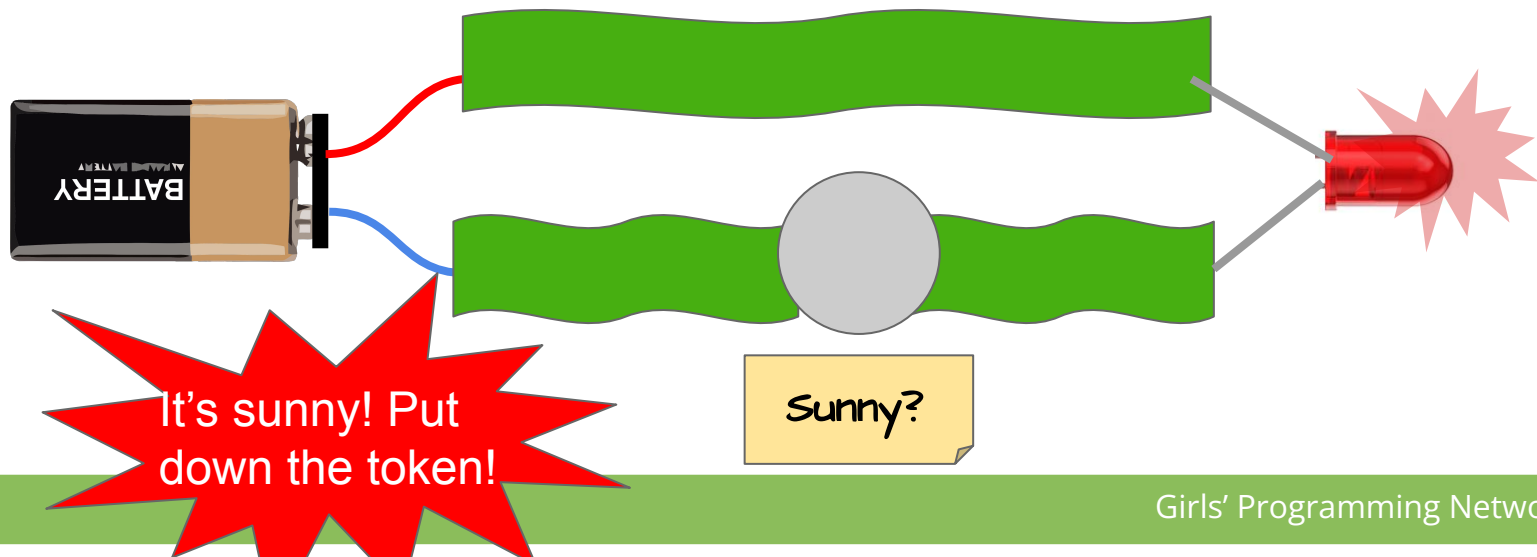
**If it's sunny Maddy has one token to put down on the circuit.**  
**Label the switch "Sunny?"**



# Example

Maddy likes to play netball. But only if it's sunny. Make a circuit that decides if Maddy plays netball. **The light should turn on** to tell Maddy to play netball.

**If it's sunny Maddy has one token to put down on the circuit.  
Label the switch "sunny?"**

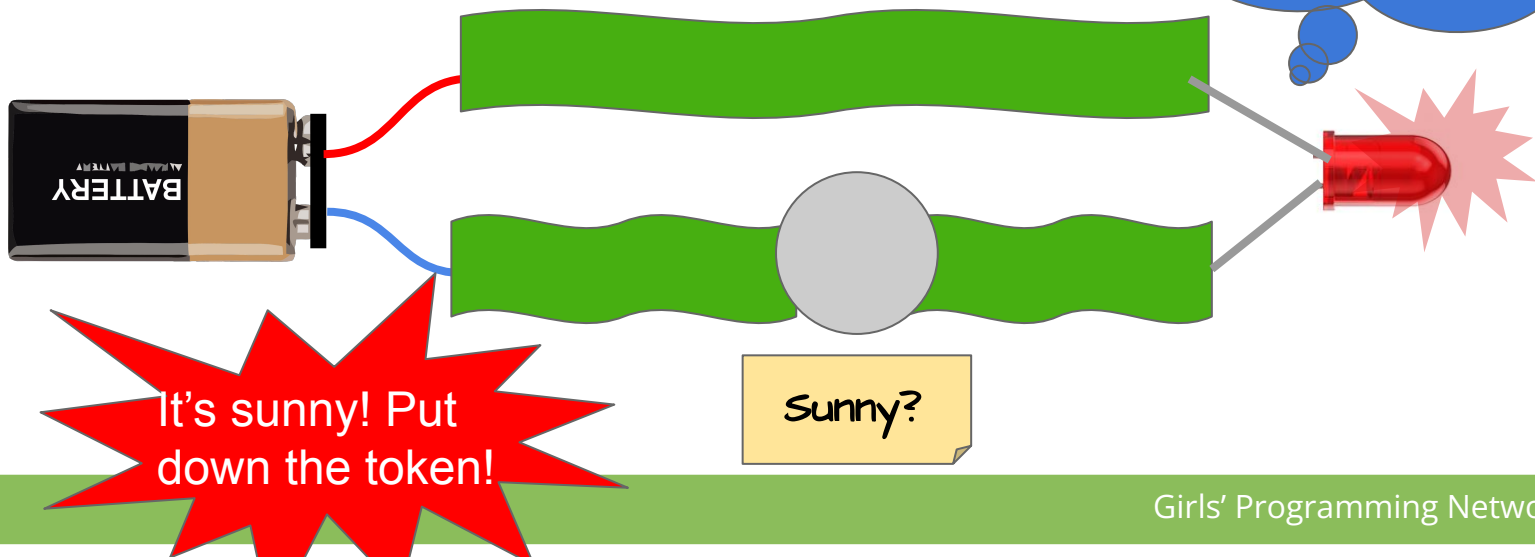


# Example

Maddy likes to play netball. But only if it's sunny. Make a circuit that decides if Maddy plays netball. **The light should turn on** to tell Maddy to play netball.

If it's sunny Maddy has one token to put down  
Label the switch "sunny?"

Light's on, time to  
play netball!  
Thanks computer!



# Logic gates!

**The decision machines we're making are called logic gates.**

**You might have heard of some before like NOT, AND and OR, we use them in programming a lot!**

**You might have heard of some others like:**

**NAND**

**XOR**

**NOR**

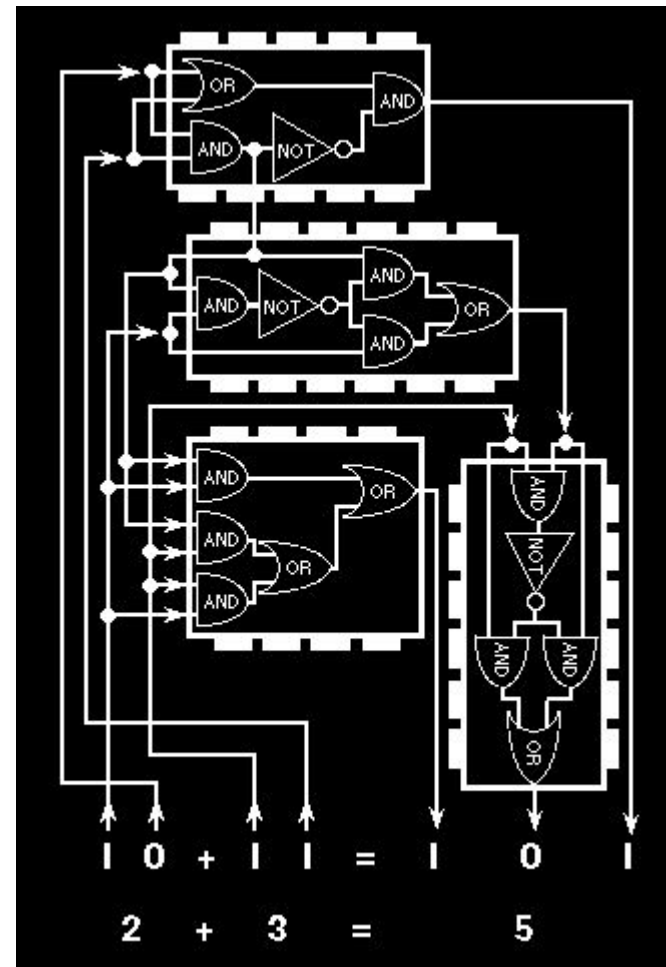
**XNOR**

# Logic gates!

**Programming is made up of lots of decision like this!**

**Your computer is made up of millions of logic gates.**

**Logic gates are the building blocks of the computer's ability to add numbers up!**



# Let's make the world a lazier place!

With less decision to make, there's more time to have fun!

## Tips!

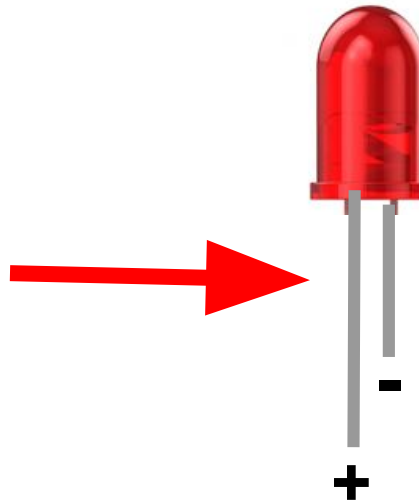
- Don't make your playdough wires too thick
- Don't make your wires too long
- Squish your switches into the play dough if they're not working
- LEDs **don't work backwards**, try it the other way around.

# LED's - Which side goes where?

You may find that your LED doesn't light up, even when it should!

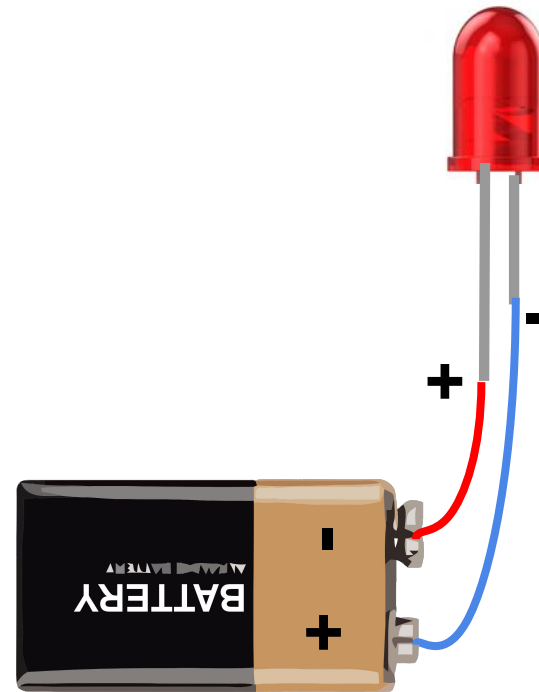
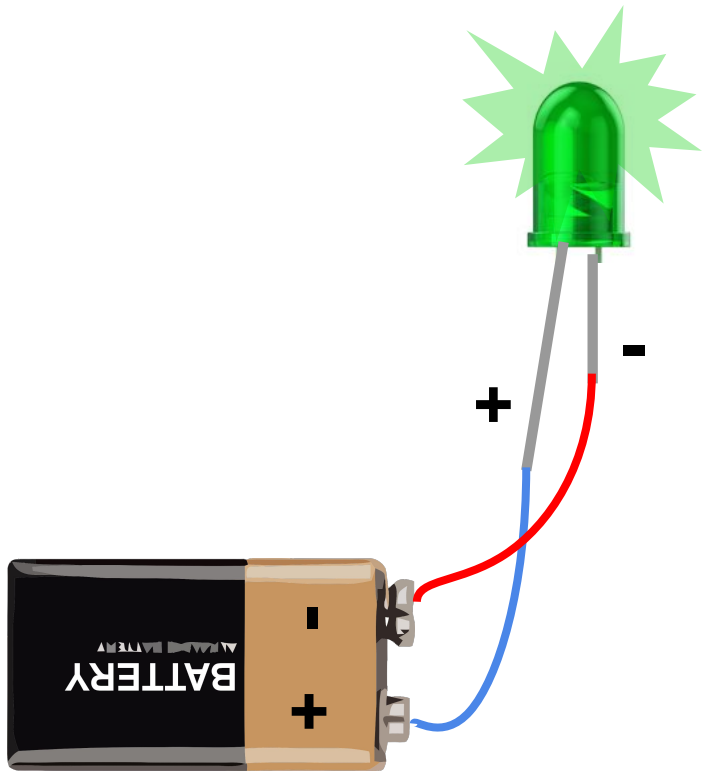
Don't panic! your LED might be the wrong way around!

Your LED should have one leg longer than the other! That's the Positive Side!



# LED's - Which side goes where?

Make sure the positive side of the LED is on the positive side of your battery!



# Safety

## No metal to metal connections!

Metal -> to playdough



Metal -> Metal



# Let's do it

- Get into groups of 3 - 5
- Each group gets:
  - 1 sheet butchers paper
  - Markers
  - Worksheet
  - Play-doh
  - LED
  - Battery (with cap)
- Create your circuits - write it on the paper
- Test it out then call a tutor over to try it
  
- Grab the second (harder) question set
- Do it again!

**Ask a tutor if  
you get stuck!**