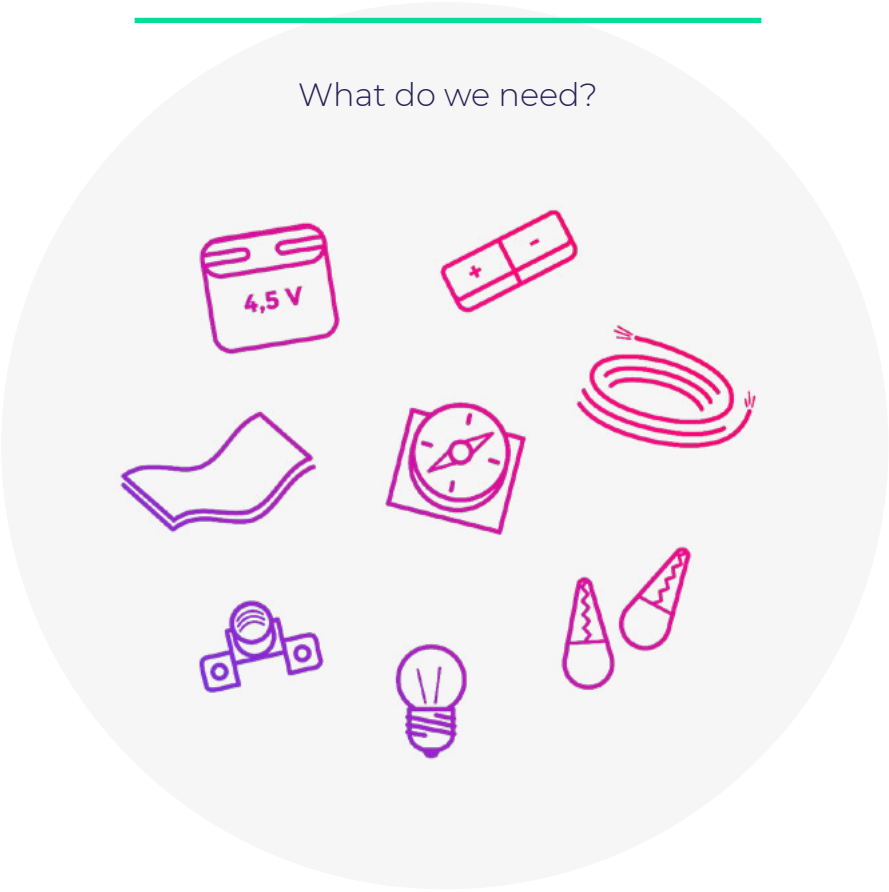
LAB 2

The mystery of the compass that doesn't point North

LET'S GET GOING!

What do we need?



MATERIALS

- ☐ EVA sheet

SAFETY MEASURES

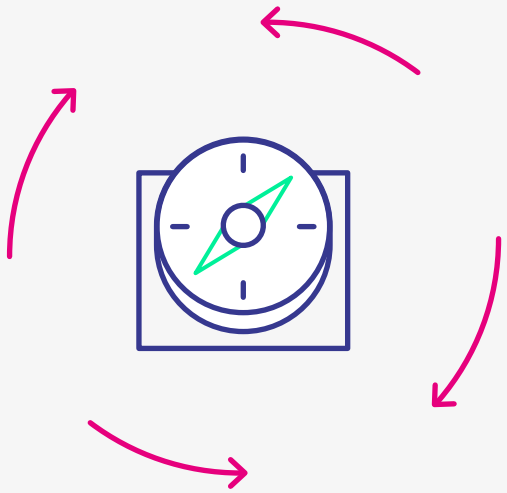
- ☐ This experiment must be carried out under adult supervision.
- ☐ The power from the battery is enough to generate an electric current capable of lighting the bulb but not enough to hurt anyone.

INSTRUMENTS

- ☐ 4.5 V battery
- ☐ Electric cables (3 measuring 15 cm and 1 of 100 cm)
- ☐ Crocodile clips
- ☐ Small lightbulb (4 V - 0.4 A)
- ☐ Lamp holder
- ☐ Compass
- ☐ Magnet (can be a fridge magnet)

PHASE 1

Trying to move a compass needle.



1 / Play with the compass for a while. Pick it up and try to get it to point somewhere other than North.

PHASE 1

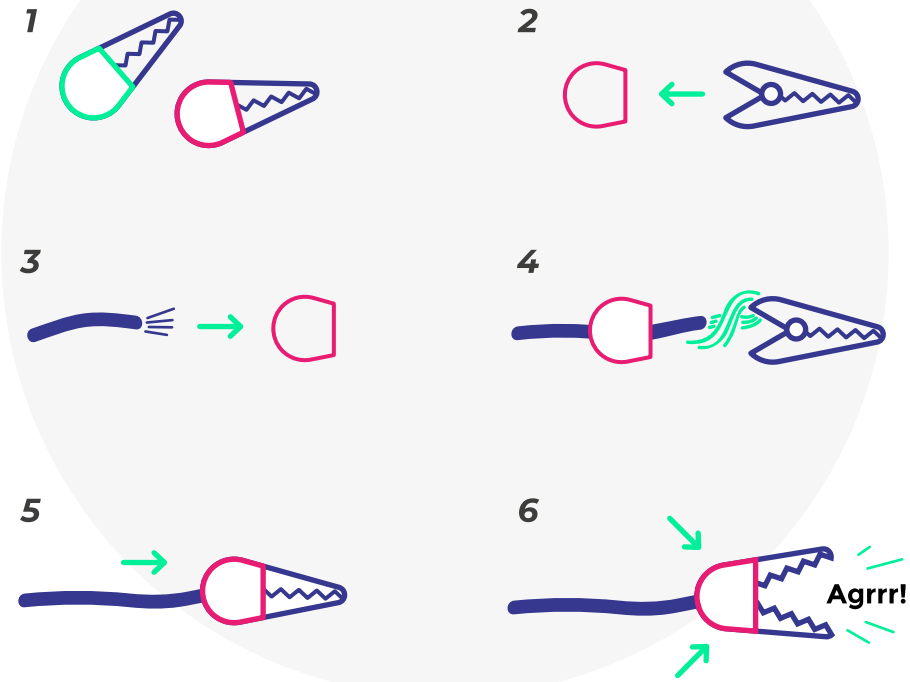
What is special about a compass needle?

Why does it always point to the same place?

SPACE FOR ANSWER

PHASE 2

Prepare an electrical circuit



1 / Here's a clue for completing your challenge: to move the compass needle, you'll need a battery and some electric cable.

2 / Before starting to set up the circuit, you can do a couple of tasks that will make the experiment easier.

- Strip the ends of the 3 cables that are 15 cm long. You should be left with a section of between 1 and 1.5 cm without the insulating plastic.
- With your fingers, twist the copper filaments together at each end. Then, introduce each end into a clip and cover it with plastic, as shown in the drawing.

PHASE 3

What can you do with a battery?
How does an electrical circuit work?

1 / You are going to set up an electrical circuit to see what relationship it has with the compass. What do you need to set it up?

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

2 / Draw what your circuit would look like and how you would connect its elements to turn the lightbulb on.

PHASE 3

3 / Now you have a drawing of your electrical circuit, you can now try it out! You can set it up on top of the EVA sheet.

4 / When it is all connected, does it work?

5 / Try your classmates' different suggestions and test them to see which ones turn the lightbulb on.

What has to happen to make a lightbulb come on?
How does an electrical circuit work?

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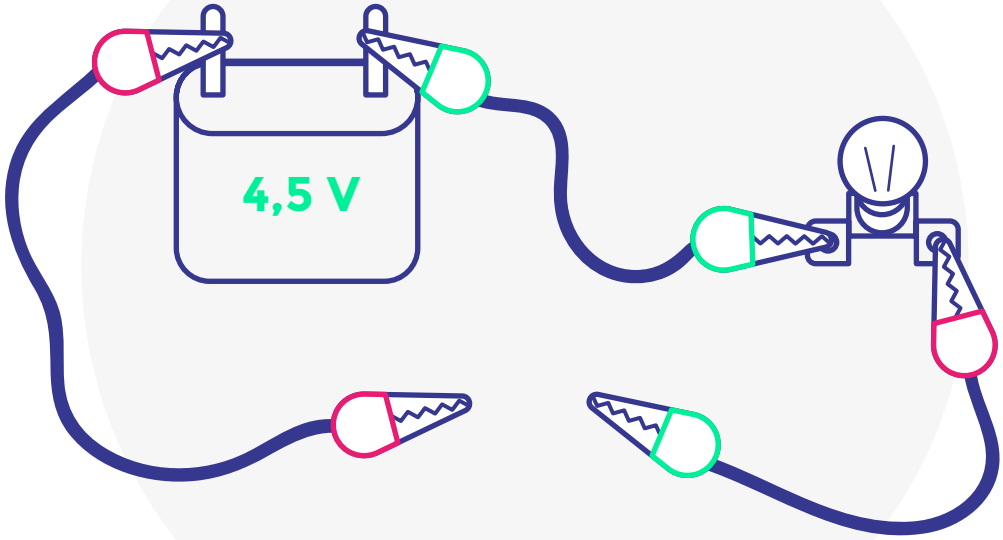
PHASE 3



6 / Now the circuit works, you are going to add a “switch” to turn the lightbulb on and off.

- To do this, replace one of the cables connecting the lamp holder to the battery with two cables, one connected to the lamp holder and the other to the battery. You should end up with a circuit like the one in the picture.
- Once you have set up the circuit, join the two loose crocodile clips to check it works properly. The bulb should come on when the circuit is closed.

7 / Now place the two crocodile clips on the surfaces of different materials and see what happens in each case. Some of the materials you can try are:

- Paper
- Wood
- Metal
- Water
- Ceramics
- Graphite (pencil lead)

PHASE 3

Why does the lightbulb only come on sometimes?

How do the materials affect it?

Do these properties of materials have applications in everyday life?

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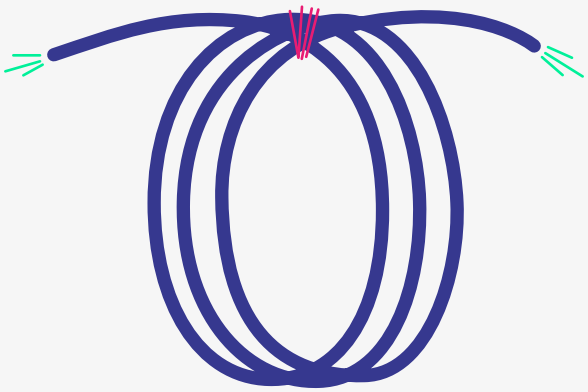
PHASE 4

How can you move the compass with the battery?



1 / Now you know how an electrical circuit works, you are going to build another one. This time it will be very simple, without a lightbulb. Take the 1 m cable and roll it up in the form of a coil. You can use a clip, a piece of thread or some wire to hold it so it doesn't move.

2 / Connect the ends of the long cable to the battery; to do this use two short cables with crocodile clips.

3 / Move the circuit around the compass and see what happens.

4 / Take the magnet, move it around the compass too, and see what happens.

PHASE 4

What happens when you move the working circuit near to the compass?

And what about when you bring the magnet close?

What is the force acting on the needle to move it in each case?

Who is producing it?

SPACE FOR ANSWER

SOLVE THE MYSTERY!

Science has helped us see something
our eyes hadn't noticed before!
Now it's time to solve the puzzle.

WHAT INVISIBLE PHENOMENON IS MOVING THE COMPASS NEEDLE?

SPACE FOR ANSWER