

## THE GYRO GEARLOOSE QUIZZZ

If the bulb lights up, you've given the right answer to the question. You are making a nutty electroquiz, with questions and answers you can think up yourselves. And you are going to knock together an electric circuit to connect the right answers to the questions.

### WHAT DO YOU NEED?

#### Materials:

- A flat 4.5 volt battery
- A 6 volt bicycle bulb
- Fitting for the bicycle bulb
- Electrical wire
- Metal paperclips
- Split pins
- Plank
- Thick elastic band
- Screws
- White cardboard
- Adhesive tape

#### Tools:

- Pencil
- Ruler
- Markers
- Scissors
- Hole puncher
- Screwdriver that matches the screws in the fitting
- Stripping pliers

### BUILDING PLAN

Before he starts building, a builder of exhibits first makes a building plan of the exhibit. That's what you are going to do too. A building plan shows how something is made and how big it will be.

First look at the photo and the drawings under 'How are you going to make it?' This will give you an idea of what the exhibit will look like and how it should be constructed.

Tips: 1. You can read the text accompanying the drawings already. 2. If the materials for your exhibit are already available, it's a good idea to have a look at them too.

Under 'What do you need?' you can see all the materials and tools that you need. But the list of materials does not show exactly how much of them you will need. You will



know that only when you have decided how big the exhibit will be. So first decide with your pal how big the exhibit should be and how you are going to draw it.

Discuss your plan with your **teacher**.

Now use a pencil and ruler to make a building plan in your **workbook**. You both make your own building plan in your workbooks, but you do it in the same way. You make the drawing to scale 1:2. This means that one centimeter in the drawing is really two centimeters in real life. So if your real electroquiz is forty centimeters wide, it is twenty centimeters wide in the drawing. Write the real measurements next to the different parts. In your building plan also mark exactly where the holes should be on the quiz board. For this, use the description under '*How are you going to make it?*'

You are going to show the building plan to the rest of your class. Tell them how you plan to build the exhibit. Ask the other children and the teacher what they think of the building plan. Maybe they have an idea to make it even better.

Show your improved building plan to the **teacher**. When he or she has approved your drawing, you can start making the list of materials together.

## LIST OF MATERIALS

The building plan is ready, so you now know the size of all the materials and you can count how many of each part you need. Make the list of materials in your **workbook** and give the list to your **teacher**. Ask him or her where you can get these things. Then you can really start building!

## HOW ARE YOU GOING TO MAKE IT?

To build an exhibit together you have to discuss a lot and make agreements. How are you going to tackle it? Who does what?

Divide up the different tasks as fairly as possible.

Try to work together as much as possible, so that you both get some experience of building. If you come across a difficult word, look it up in a dictionary.

### 1.

Start with the quiz board for the electroquiz. Take the rectangular piece of white cardboard. Using a pencil, divide the board into squares. First divide the board into halves by drawing a line lengthways. Divide each half into six equal squares.

### 2.

Make a hole in each square using the hole puncher. These holes must be one centimeter from the edge of the paper, as in the example below.

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**3.**

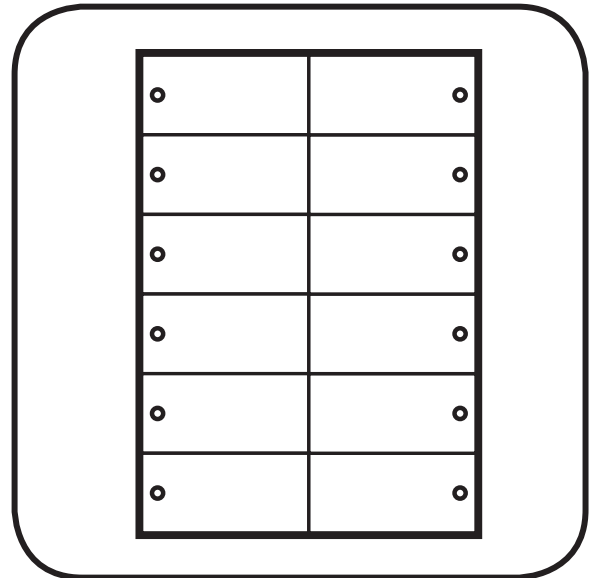
In the six squares on the left side, you neatly write six questions. On the other side, you write the answers to these questions. The answers are jumbled up. So DON'T put the right answer next to the question.

*Tip for the quiz: take six different tree leaves and ask which trees they belong to. For example, look at the trees growing around the school. Take a leaf from each tree and look up the name.*

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**4.**

Now you are going to make the connections on the other side of the quiz board. First mark on the back which squares go together. For example, using a marker, make a purple cross in one set of squares and a green circle for the next two, etc.

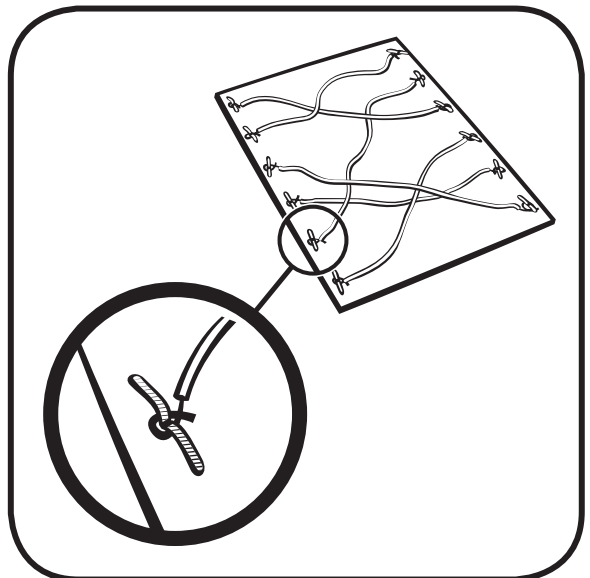


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**5.**

Insert the split pins from the front through the holes and spread them open on the back. Make sure that they do not touch each other when you have done this! Connect the squares that go together with electrical wire.

You make wires like this: cut off a piece of wire that is a couple of centimeters longer than the distance between the two split pins. With the stripping pliers, you remove about two centimeters of the plastic covering at either end. We call this stripping electrical wire. Twist the copper wires around the split pins.



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**6.**

First screw a bicycle bulb into the fitting. Then cut three pieces of electrical wire: one of fifteen centimeters and two of forty centimeters. Strip the electrical wire at either end.

Attach a paperclip to the end of the shortest electrical wire. Push this over a pole of the battery. Attach the other end to the fitting (use the screwdriver for this).

Now attach one of the long electrical wires to the other side of the fitting. Attach a paperclip to the loose end. Connect the third electrical wire with a paperclip to the other pole of the battery. Again, attach a paperclip to the loose end.

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**7.**

Now fix the battery and fitting to the plank. Screw the fitting in place. You can attach the battery with a thick elastic band.

8. If you have time left over, you could make more quiz boards.

Be careful: in the new quiz board, the correct answers must be in exactly the same place as on the first quiz board! Also make the holes in the new quiz board slightly bigger so that the board fits exactly over the split pins.

### ▶ HOW DOES IT WORK?

The exhibit is ready. The exhibit works as follows. Hold one paperclip against the split pin of a question and the other paperclip against the split pin of an answer.

If you have chosen the correct answer - and if you have connected the wires correctly, of course! - the bulb will light up.

Check for every question whether the bulb lights up when you touch the right answer.

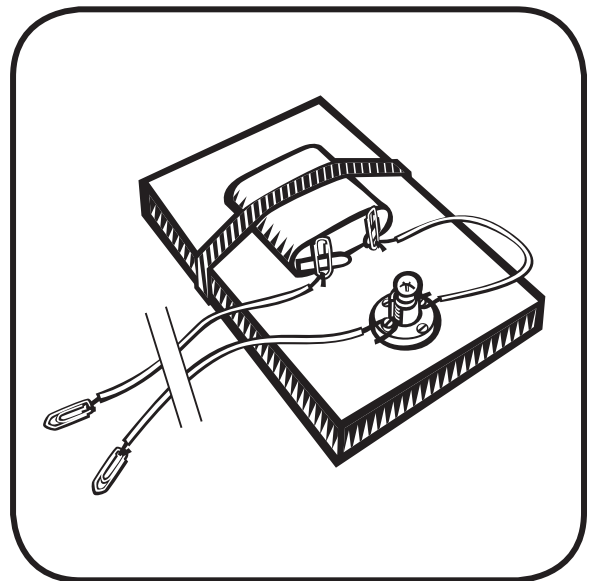
Have you connected all the wires correctly? If so, fix the wires on the back firmly in place with adhesive tape so that the board is flat.

### ▶ WHAT DO YOU SEE HAPPENING?

Now look for the science behind the exhibit. This exhibit is about electricity. Do the research below. Write the answers in your **workbook** under 'Research report 1'.

1. With this exhibit, you can also research which materials conduct electricity and which do not. You can do this by holding the paperclips connected to the battery at each end of the material that you want to test. Try this with a copper coin. Does the bulb light up? Does the copper coin conduct electricity?

2. Now you are going to research a number of other materials that are listed here. First try to predict which of the materials you think will conduct the current and which not. Research this for a piece of iron, a piece of aluminum foil, a piece of paper, a plastic straw, a pencil (the graphite center), a piece of wood and a glass marble. Write down your findings in the report.





## WHAT'S THE ANSWER?

Now you are going to find information about electricity. You can look for information in the school media library, the library or the Internet.

Go to [www.sciencecenteropschool.nl](http://www.sciencecenteropschool.nl) and then to 'primary school pupils' and click on 'links'. Under the title of your exhibit, you will find a number of websites with background information.

Answer the questions below and write the answers in your **workbook** under 'Research report 2'.

○ **Operation:**

How can you make a bulb light up?

○ **Science:**

What is electricity? What is an electric circuit? What is a series connection? What is a parallel connection? What kind of connection did you need for this quiz?

○ **Invention:**

Who invented the battery? Who invented the first bulb?

○ **Application:**

What do we use electricity for? Make a list of all the equipment in your home that works on electricity.

Let your **teacher** read your answers.