

# AMPERE

Discover electricity with André-Marie Ampère



## André-Marie Ampère :



Andre Marie Ampere is a French scientist from the 19th century. He is known for his numerous discoveries in electricity revealing the tension and the current. He is the one who defined the current direction.

While analysing the Danish scientist Oersted experiment, he understood the phenomena and wrote the first electrodynamic laws. In Oersted experiment, when a current was switched on through a wire, it made a compass needle turn.

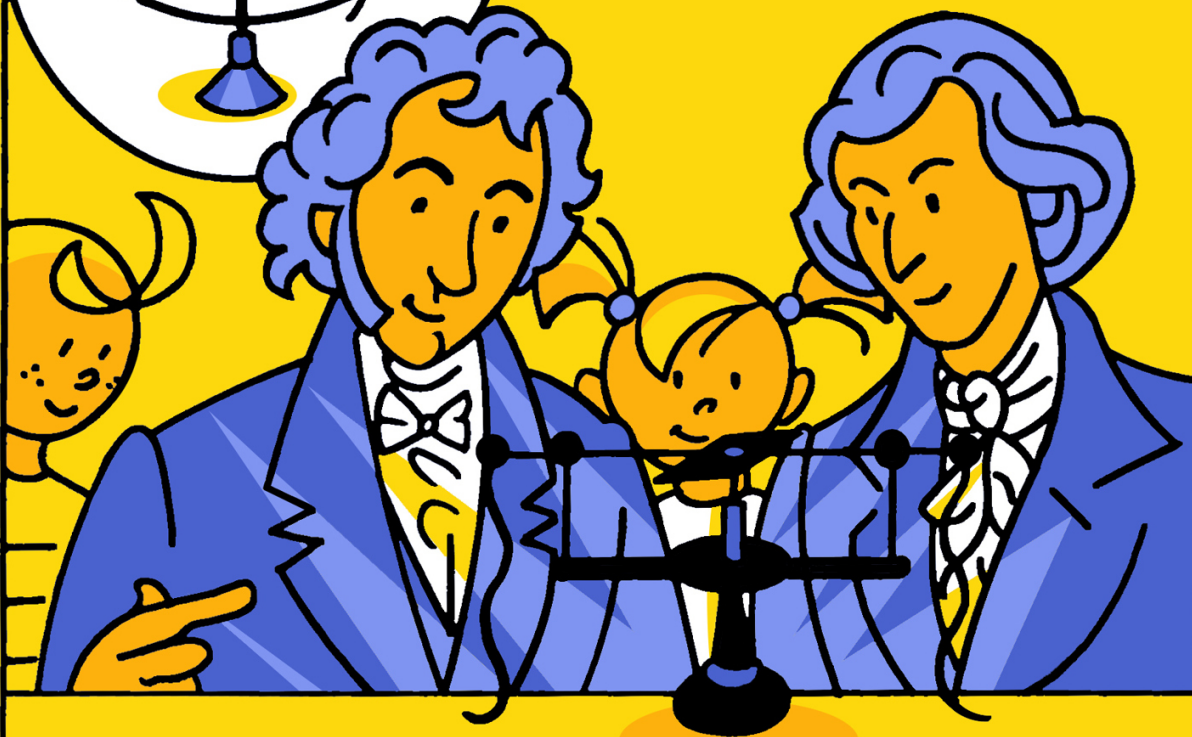
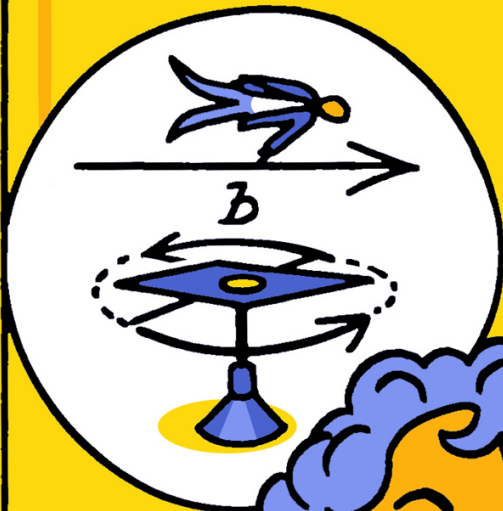
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## The Ampere man

Andre Marie Ampère shows that a magnetic field produced by electricity acts on conductive material

He imagines a man carried by current from head to feet and laid down on a conductive wire. The man indicates the power direction with his left arm.



Ampère proves the equivalence between electric currents and magnets. He attributes magnetic phenomena to the flow of current in a conductive material. The earth is also a magnet. In that case, the rule of the Ampere man allows us to find the direction of electric currents in the ground.





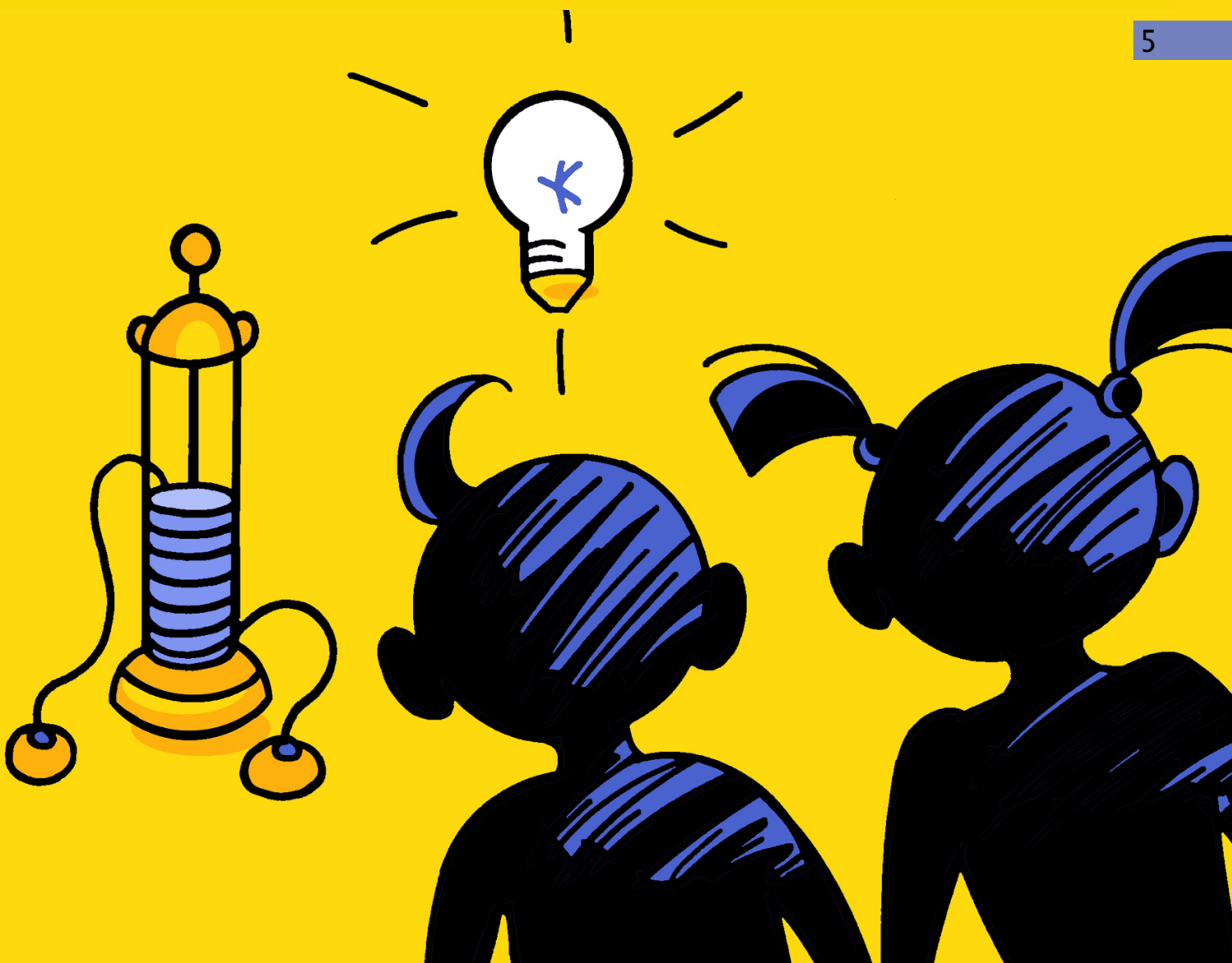
What is electric current?





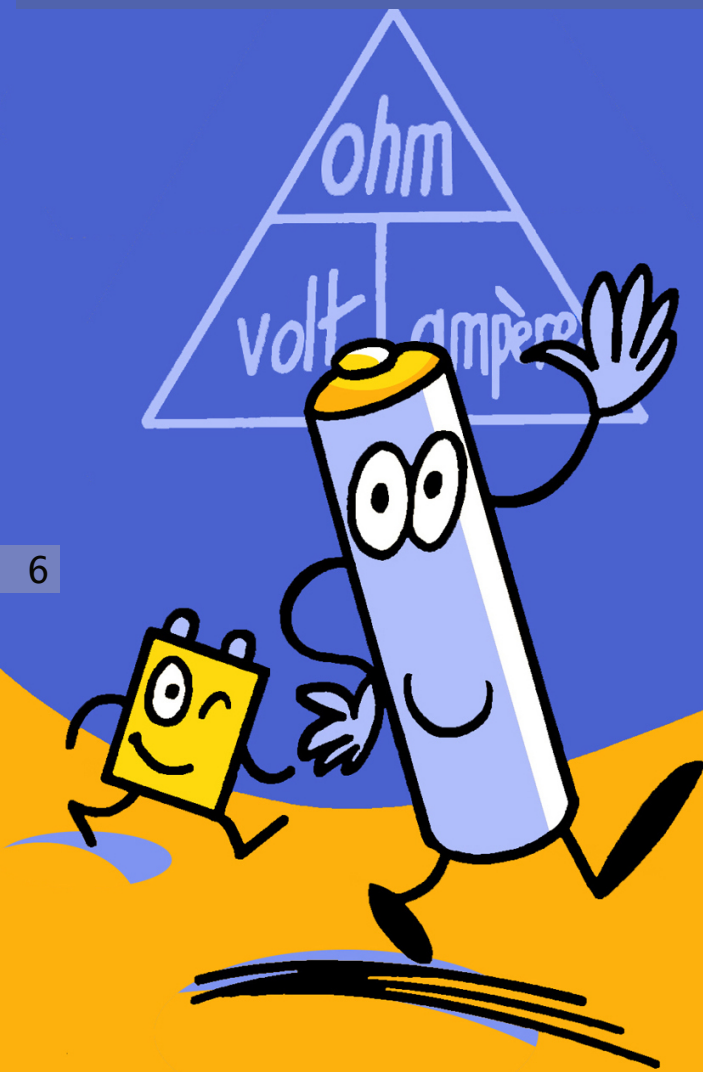
Electricity is a natural phenomenon as lightning or static electricity that man managed to learn, control and generate. Every material is made of tiny atoms. An atom is made up of a nucleus around which electrons revolve. Inside a metal material, the movement of electrons makes the electric current.

The battery was created by Alessandro Volta, a Italian scientist who lived at the same period as Andre Marie Ampere. Volta had the idea of stacking discs of zinc, cooper and cloth or felt soaked in salt water. The salt water or brine facilitates the move of ions between metal discs. Thanks to this discovery, it became possible to generate electricity.

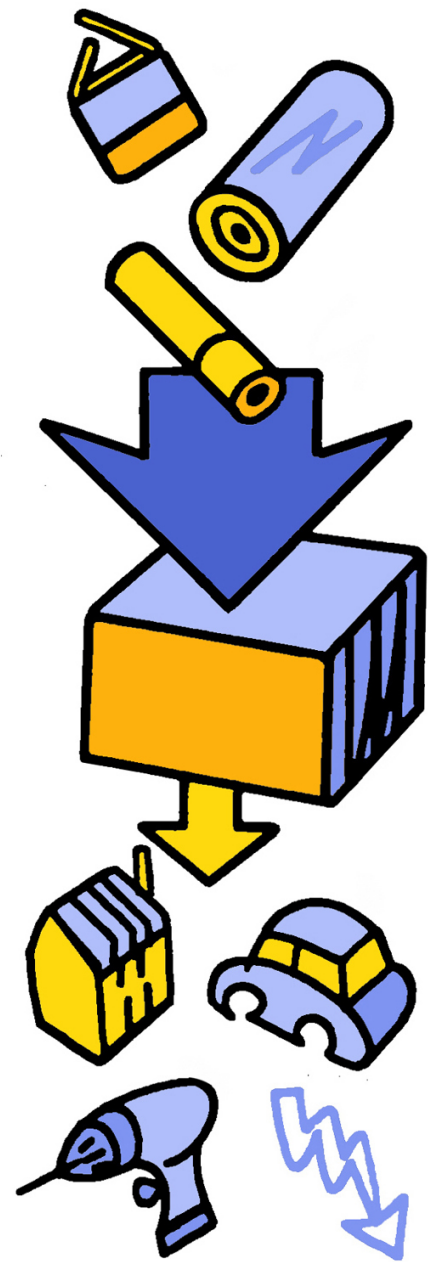


Ampere used several batteries to carry out his experiments. Volta discovery was so important that the unit of electricity voltage is called by his name: the Volt. Likewise, the unit of electric current intensity is called ampere.

Any kind of battery you use, don't forget to recycle them!



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## Alkaline or saline battery:

Saline batteries use salts to generate electricity, while alkaline batteries use an alkali metal just as lithium or sodium. For both batteries, chemical energy is converted into electrical energy.

one ampere, 2 amperes, 3 amperes...



Ampere is the unit which measures the strength of electric current. It indicates how much electricity is carried through a section of a wire per unit of time.

The electrons go from plus to minus. For convenience, the direction of the current is still the one defined by Ampere before the discovery of the electrons.



## Game N°1

Find out which scientist is hiding in this enigma:

1-14-4-18-5    13-1-18-9-5    1-13-16-5-18-5

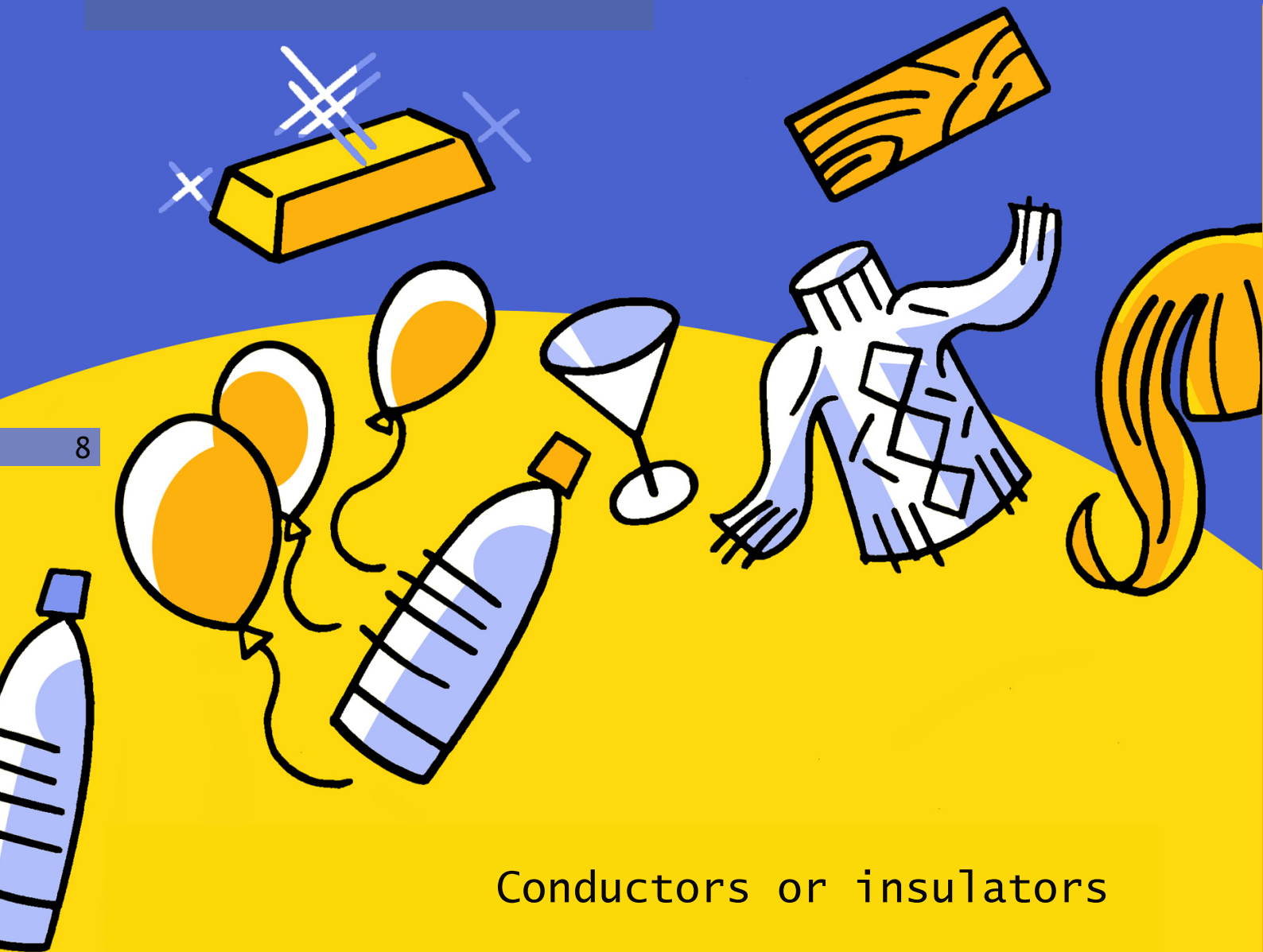
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Clue: A=1, B=2, C=3, D=4, E=5,  
F=6, G=7, H=8, I=9, J=10,  
K=11, L=12, M=13, N=14,  
O=15, P=16, Q=17, R=18,  
S=19, T=20, U=21, V=22,  
W=23, X=24, Y=25, Z=26



# Electricity static or linked to the movement of electric charges

Electricity is said to be static when it results from the accumulation of an electrical charge on an object (a plastic object, a balloon, a woollen sweater or hair). It is the rebalancing of the loads that produces the tingling sensation when you touch this object. More commonly, electricity refers to the result of an electric current passing through a conductor.



## Conductors or insulators

Some materials such as glass, wood and plastic do not allow the passage of electric current; they are said to be insulating. Others like metals (iron, copper or gold) or, to a lesser extent, water are conductive. Electricity passes through them as if it were being conducted.

# Where does electricity come from?



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Today in the world, electricity is mostly produced using the heat generated by burning coal, gas or oil (nearly 70%). This combustion produces a lot of carbon dioxide (CO<sub>2</sub>) which is one of the greenhouse gases whose increase in the atmosphere is the main cause of global warming.

This is why many countries are committed to control their future consumption and to increase the share of their electricity produced in power plants from renewable or «decarbonated» energies: the energy of the wind, the sun, water (hydroelectricity), geothermal (earth heat) or atomic (nuclear energy).

The distribution of each of these energies can vary greatly from one country to another. This electricity is delivered from the generating stations to your home via the grids and power lines.



## Game N°2 : Make an electrical circuit





A lamp is connected to a battery by two wires. One of the wires is interrupted. André-Marie Ampère cannot light the lamp. What do you think are the conductive objects he could use?

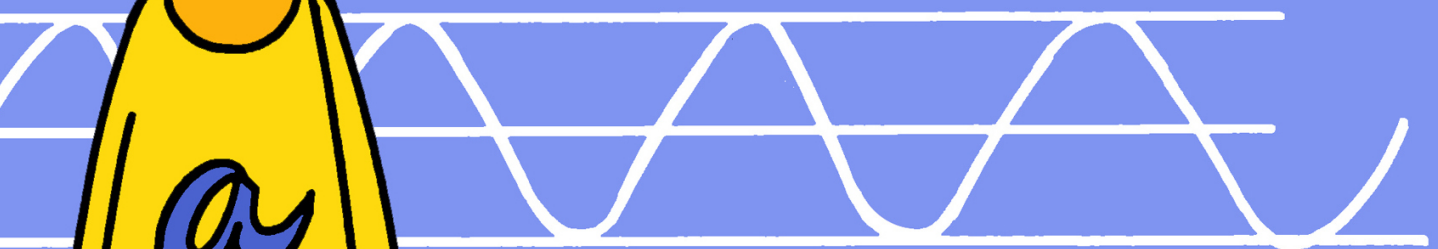
Do not try to use these items on your own.

- ① : an iron screw
- ② : A cork plug
- ③ : a stone
- ④ : a glass
- ⑤ : a silver spoon
- ⑥ : a golden ring
- ⑦ : a wet cloth

## Alternative or direct current ?

For direct current, electrons always flow in the same direction, such as a battery. For alternative current, they alternately change direction. In our homes, we use alternative current which have to pass through a transformer before it can be used.

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## Electricity, jobs of the future:

Lighting, heating, medical devices, public transport, TGV, computers and tablets, videos, telephones, coffee makers, microwave ovens, refrigerators... and now scooters, bicycles or cars, our modern world relies on devices that use electricity.

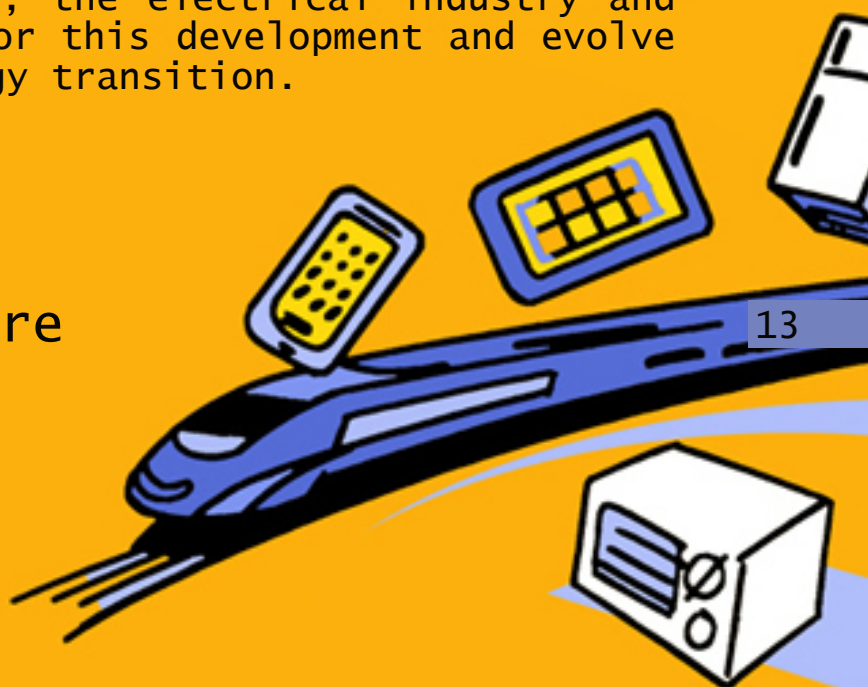
Without it, no more society! It is therefore essential that more and more young people know and choose varied and innovative jobs in these different fields. From production to use, including transport and distribution, there are many professional opportunities.





The protection of our environment by the limitation of greenhouse gases leads to the increasing use of electricity, which is largely decarbonized and renewable. For the future, the electrical industry and businesses must prepare for this development and evolve towards a successful energy transition.

A sustainable future  
with electricity:



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All sectors, in particular IT or digital with the Internet and (tele)communications, use modern and innovative techniques for equipment or installations and create new jobs.

Today and even more tomorrow, the electricity sector offers young men and women many jobs of great diversity, dynamic and with good prospects at all levels... The companies themselves even teachers can advise young people to help them in their choice of career and find their vocation...



Electric energy, let's save it!



Game n°2 : An iron screw, a silver spoon, a gold ring and a wet cloth are conductive

Game N°1 : André-Marie AMPÈRE

Games solution :

I act with civic behavior:

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Check the boxes with the correct answers:

- ☐ I turn on the light even when it's daylight
- ☐ I unplug devices that I am not using
- ☐ I avoid leaving devices on standby
- ☐ I prefer low-consumption lamps to other lighting modes



Thanks :

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