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- Authors : Travail collectif(plus d'infos)
- Summary : Wind, sun, falling objects: The students are encouraged to design and carry out experiments that highlight different sources and forms of energy.
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Note :



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Challenges and experimentations to grasp the concept of energy

This sequence was carried out by the Nantes Mines College, primary school teachers and coordinated by Ludovic Klein.

In the context of scientific support of the La main a la pat approach, with regards to primary schools of Loire-Atlantic, the Nantes Mines College, since September 1996, developed in collaboration with teachers, kits containing all the material necessary for carrying out experiments in the class, as well as an accompanying document. This testimony is available from work carried out as part of this support. It can provide a basis to implement scientific activities in the La main a la pat approach and the general progression is only indicative. The pedagogic approach is deliberately not developed here and is rightly left to the discretion of the teacher, who is the specialist in it.

Sequence

Etape 1 : [What is energy ? Preliminary presentations and research documents.](#)

Etape 2 : [The wind](#)

Etape 3 : [Falling objects](#)

Etape 4 : [From solar energy to electrical energy](#)

Step1: What is Energy? Preliminary presentations and research documents..

(2 or 3 short sessions)

Put together the perceptions and preliminary knowledge of the students on energy. The discussion can be started by asking several questions like: what is energy? What is energy used for? Do you know some sources of energy? Distribute a picture/diagram representing some simple objects (a sailing boat, a lamp, a bicycle...) and ask the source of energy.

Word from La main a la pat:

The first part can be done in class. The first idea to emerge is that type of energy is used to do something. The different sources of energy cited by student can be grouped in a table with two columns: source, use. Document research is carried out in small groups, each looking at one source of energy. Each group then reports their research, (the poster is not the only

means to account) and makes the work and findings available to the class.

Step2: The Wind is a Source of Energy.

(3 or 4 sessions)

The children are going to construct a device that uses wind energy to lift an object.

The teacher begins the discussion by asking the students what the effects of the wind outside has (trees move, leaves fly). Then he asks them to name objects that show that the wind is a source of energy (a windmill, a sailing ship...).

Then, he gives the following challenge: raise an object using wind energy. They are given time to discuss their groups and to draw a diagram Each group then comes and looks for their materials.

Here we associate "energy" to "cause a movement" in accordance with the diagram:

Movement of air—Device—Movement of the object

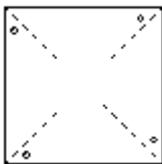
Materials Provided:

All that could be necessary in making a rod and reel, for example a square piece of paper (20 X 20 cm), a stick, a split pin, cellophane tape.

You can also show them a photo of a rod and reel, or a fabrication plan.

Making a Rod and Reel:

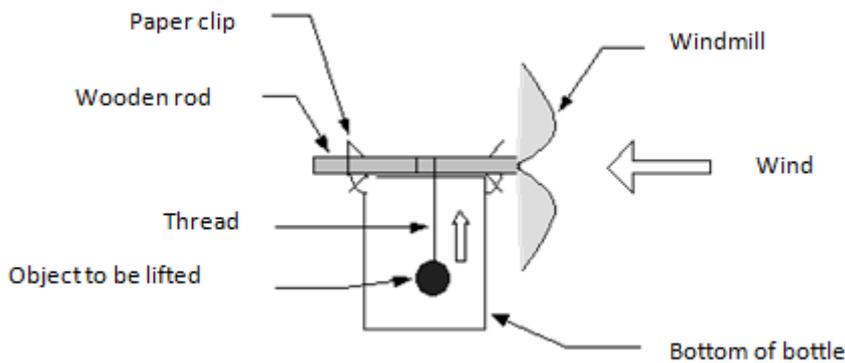
1. Take a square piece of paper (20 X 20 cm), cut it along the dotted lines
2. Pierce the centre with a split pin
3. Turn down the angles marked with a point in the centre and fix them with cellophane tape on the head of the split pin, then attach the line attachment points on the wooden rod.



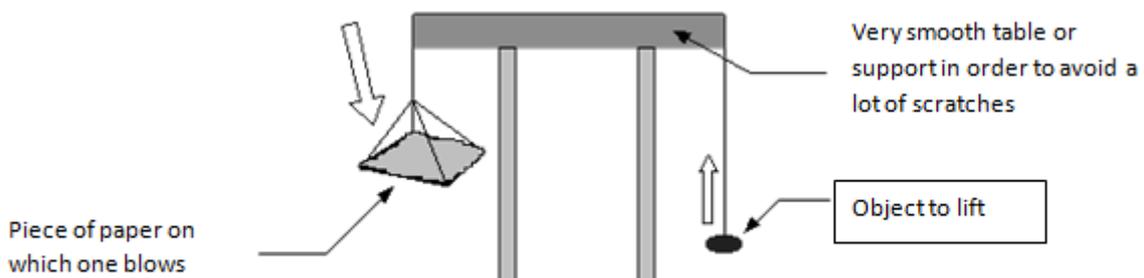
But also:

wire (for example 2 paper clips), thread, half a bottle made of plastic, a small object to be raised (for example a coin).

Examples of the devices used in mounting an object:



The principle of a lift can be envisaged:



Word from La main a la pat:

Cycle 3 students are aware from Cycle 1, that wind is moving air. Therefore, it involves the transmission of this movement to an object to do work.

To succeed in making a device (such as the one proposed or others), it will be need more than one session. For example:

Session 1: Project + choice of materials

Session 2: Execution + tests + improvements

Session 3: Presentation + analysis of the different devices

Step3: Objects that fall: Sources of Energy

...

Material for each group of 4:

one cork stopper,
a long ruler,
modelling clay,
1m of thread.

Challenge: to show that an object which falls is also a “source of energy”: for example, it

allows another object to be moved.

The first session starts with a discussion. The teacher then announces to the students that the purpose of the session is to show that an object that is falling becomes a source of energy. He challenges the students: invent an experiment where a falling object, causes another to move.

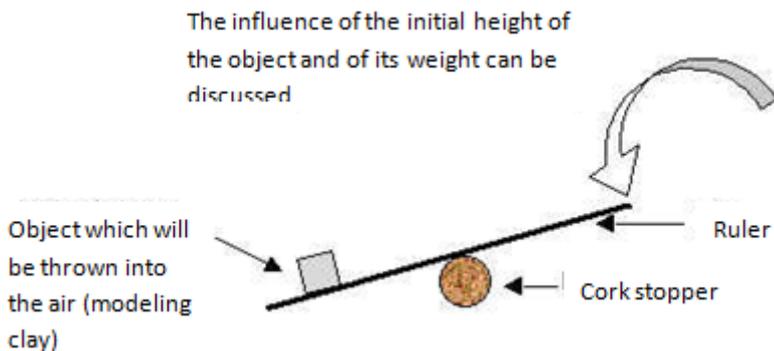
A clue can be given: 'What does a small toy car do when placed on top of a slope?' They are given time to discuss this in each group and to draw a diagram of the set-up, then each group comes to look for its material

Word from La main a la pat:

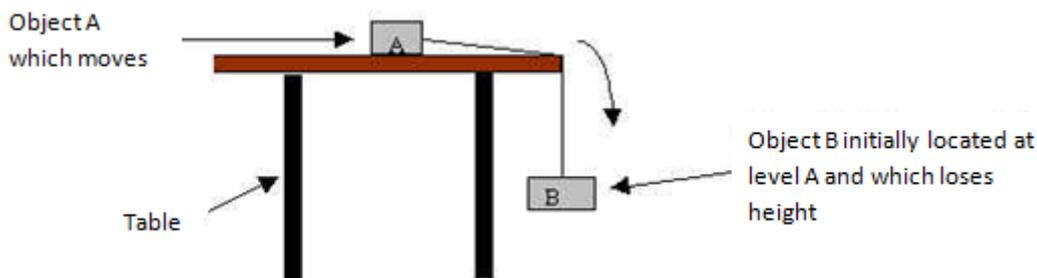
By asking the students questions about the first project they carried out, the teacher directs the students' work towards proposals that can be fulfilled. In this way the students participate in developing and in perfecting the device.

Here are some suggestions of experiments for the following sessions:

The Lever Principle :



L'utilisation d'un contrepois :



(We can add an inclined plane to raise the object; a pulley can also be used to reduce friction.)

Step4: From Solar Energy to Electrical Energy

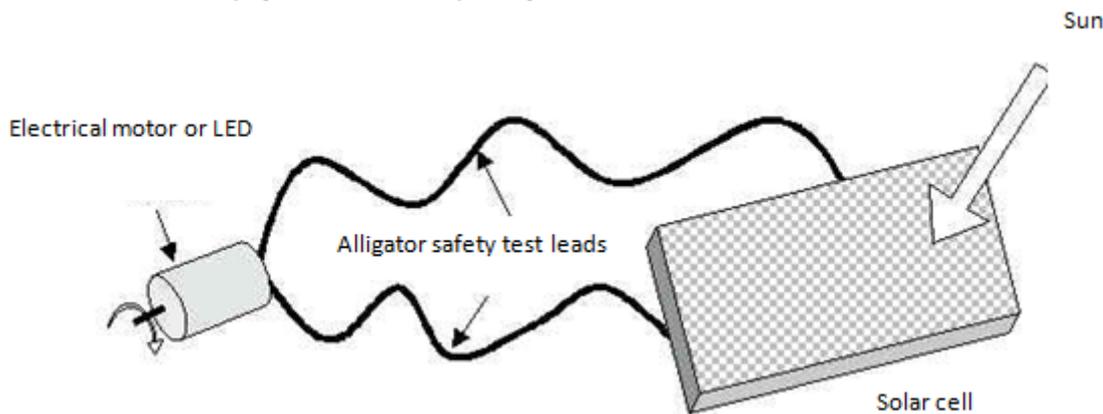
Objective: To use solar energy to run an engine or to light a light-emitting diode. The students already have several ideas about electric circuits.

Material: in groups of 4:

a LED, (and resistance ?) :
an 6 V motor,
a solar cell,
crocodile safety test leads,
a sunny day,
a solar calculator.

The children use one, then several small solar cells to power motors or light-emitting diodes (LED). The session begins with a discussion: do you know some applications of solar energy? Observe a solar calculator. On what energy does it run? Distribute a solar cell, a motor and some strings to each group. The following challenge is given: turn a motor using energy from the sun. Then the students can be asked to light a LED. This will not work with a single cell. If the students remember the electrical module well, maybe they will have the idea of putting several cells in series.

To use the LED, pay attention to the polarity.



Word from La main a la pat:

It is wise to plan more than one session in order to have time to recall the knowledge on electricity, to ensure that the students participate in drawing and designing the devices..

Solar cells also work with artificial light (as in the case of calculators) and it may be tempting, one day when there is no sun, to turn to electric lamps to supply the cell... which would amount to generating electricity from electricity.