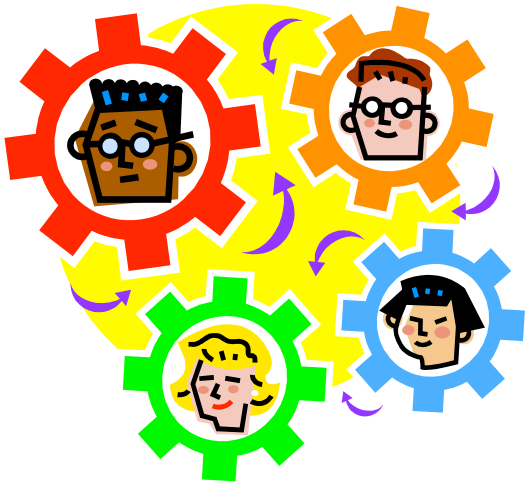
centre de développement pédagogique

pour la formation générale en science et technologie

My animated object



TEACHER'S GUIDE

August 2009

PREPARATION

Activity 1: Study of objects with mechanisms

Objectives: *Observe the object. Identify the mechanical parts and summarily describe the sequence of operations produced in the object.*

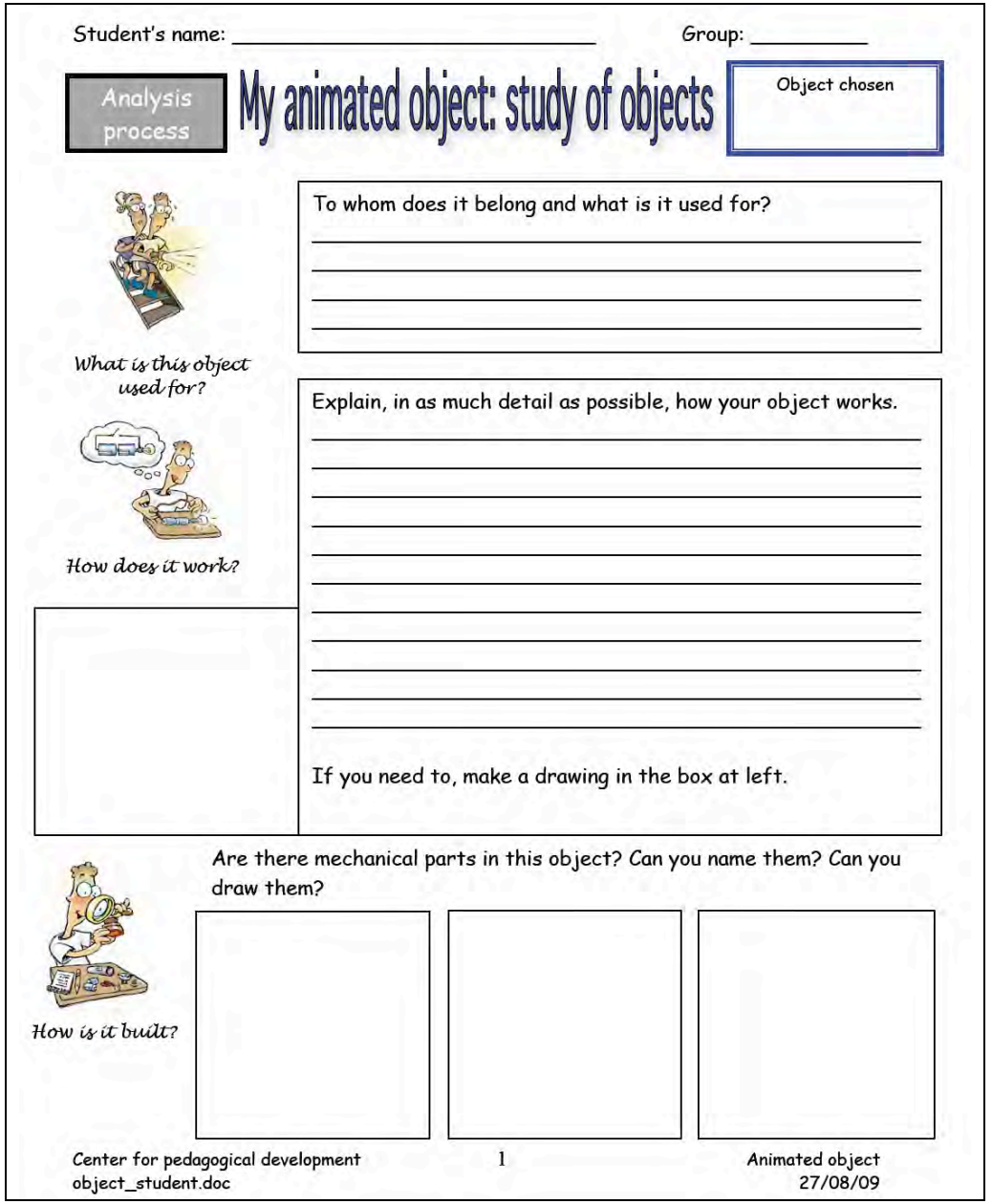
Material:

- *As many objects as there are students. (Toys, kitchen implements and tools are rich in mechanisms)*
- *Student booklet, pages 1 and 2*

Duration: 30 minutes

Beforehand, the teacher leads a discussion with the group using an object. (S)he explains what happens to make the object work and how the parts act in relation to one another. Consult page 1 of the "MECHANICAL OBJECTS"document to prepare your discussion.

The student observes and manipulates the object that he brought or that was supplied to him. He notes his observations by answering the questions from page 1 of the student booklet.



Student's name: _____ Group: _____

Analysis process

My animated object: study of objects

Object chosen

What is this object used for?

To whom does it belong and what is it used for?

How does it work?

Explain, in as much detail as possible, how your object works.

If you need to, make a drawing in the box at left.

How is it built?

Are there mechanical parts in this object? Can you name them? Can you draw them?

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Before completing the 2nd page, explain the various symbols to the students, using examples that you will find in the objects. This activity will allow the students to familiarise themselves with the symbols that they will find in the game in activity 2.

- *What are the new words?*
- *In which object did you see these mechanical parts?*

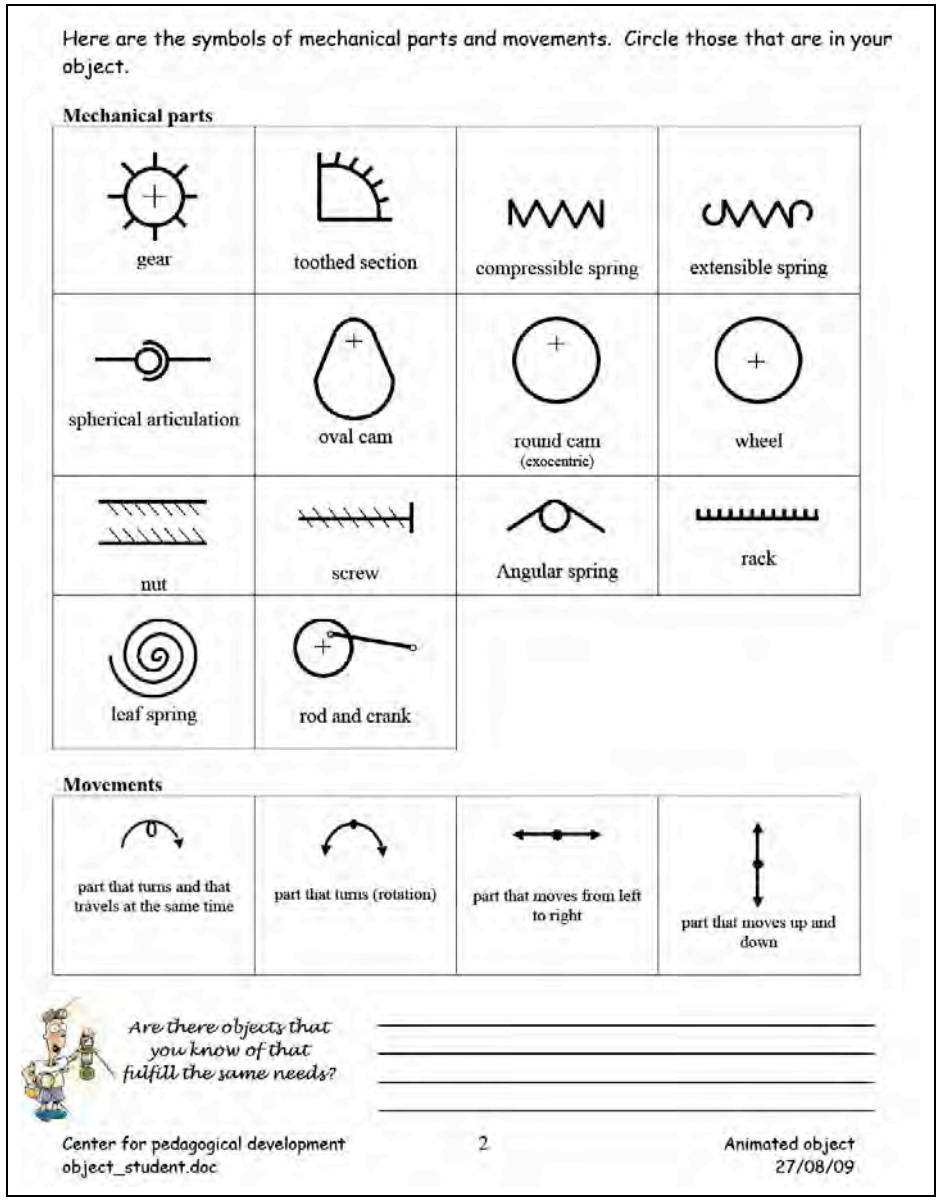
After the explanation of the various symbols from page 2, the student pinpoints those that are in his object and circles them.

The last question « Are there objects that you know of that fulfill the same needs » can be done individually or in a group.

*Example : **An ice cream scoop***

There are different models of scoops. They all fulfill the same function, which is to make scoops of ice cream. They are all, however, made out of different materials. They have different shapes and do not all function on the same principle.

See page 6 of the « MECHANICAL OBJECT » document for a comparison between different models of ice cream scoops.



PREPARATION

Activity 2 : Game about mechanisms

Objective: *To become familiar with the vocabulary and diagramming of mechanical parts.*

Material for one game (for 5 to 6 students)

- *Card games (ANNEX 1)*
- *10 to 14 objects containing several mechanical parts. A list is supplied. (ANNEX 2)*
- *Rules of the game (ANNEX 3)*

Duration: 30 minutes

The students manipulate the dozen or so objects that are supplied and discuss among themselves of the various parts that make up the objects, while looking at the game cards. Once the observation is done, they start to play according to the rules.

After the activity, a review may be made to discuss the newly acquired vocabulary.

N.B. *It may be pertinent to discuss the symbols and vocabulary beforehand in a group to ensure comprehension.*



PREPARATION

Activity 3: Association of diagrams to images

Objective: *To become familiar with the arrangements of symbols that make up diagrams.*

Material: *Student booklet, page 3*

Duration: 20 minutes

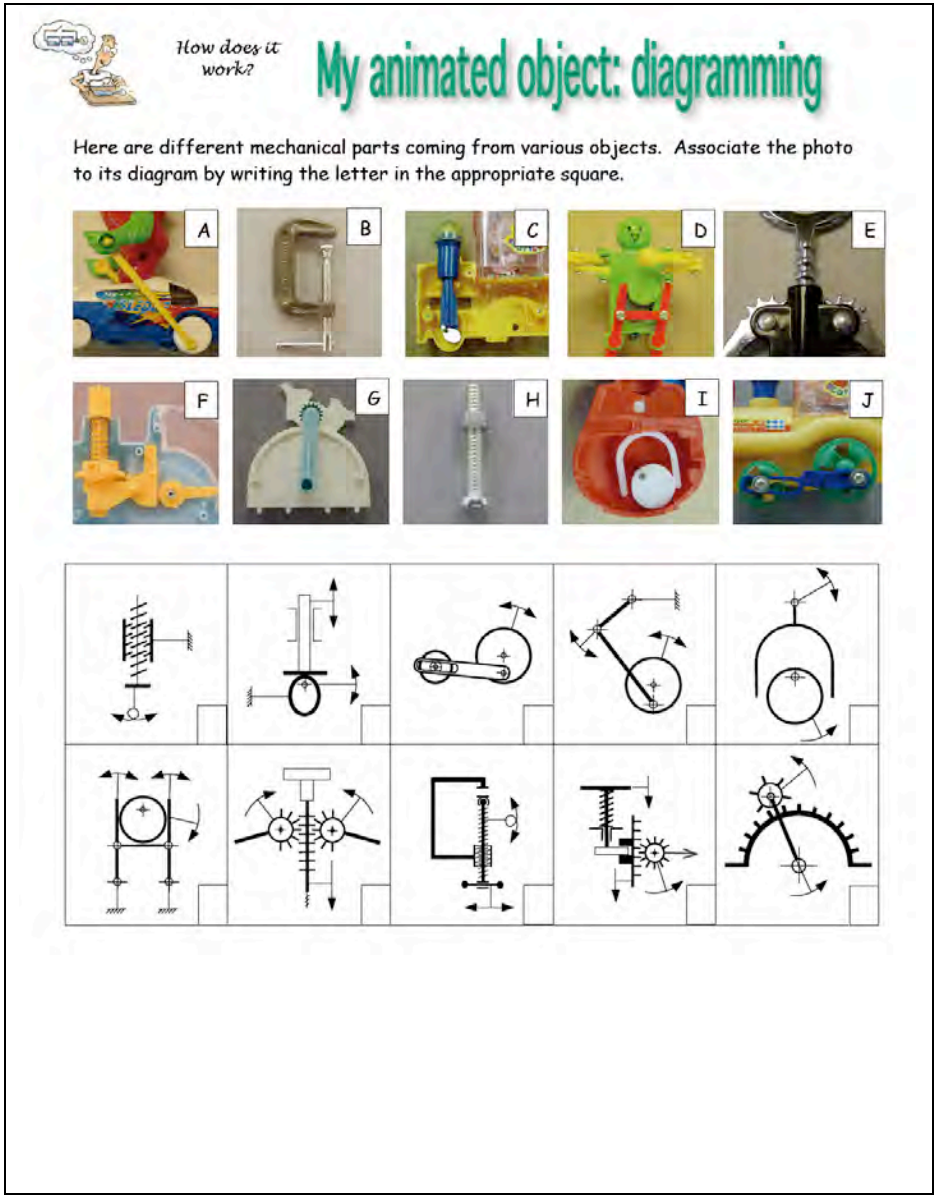
The students associate the symbols to the pictures. This exercise allows them to become familiar with the arrangement of symbols. The students will have to use diagramming in the design of their mechanism in the next activity.

A short presentation may be made at the end so that the students learn a few rudiments of diagramming.

What must a diagram contain?

- *Simplified lines*
- *A different colour for each element illustrated*
- *The names of the parts*
- *The symbols of the movements*

An example could be drawn on the board with an object you have chosen. See ANNEX 4 for 3 examples of simple diagrams.



REALISATION

Activity 4: Study of the cam and roller mechanism

Objective: *Understand the function of a cam and roller system.*

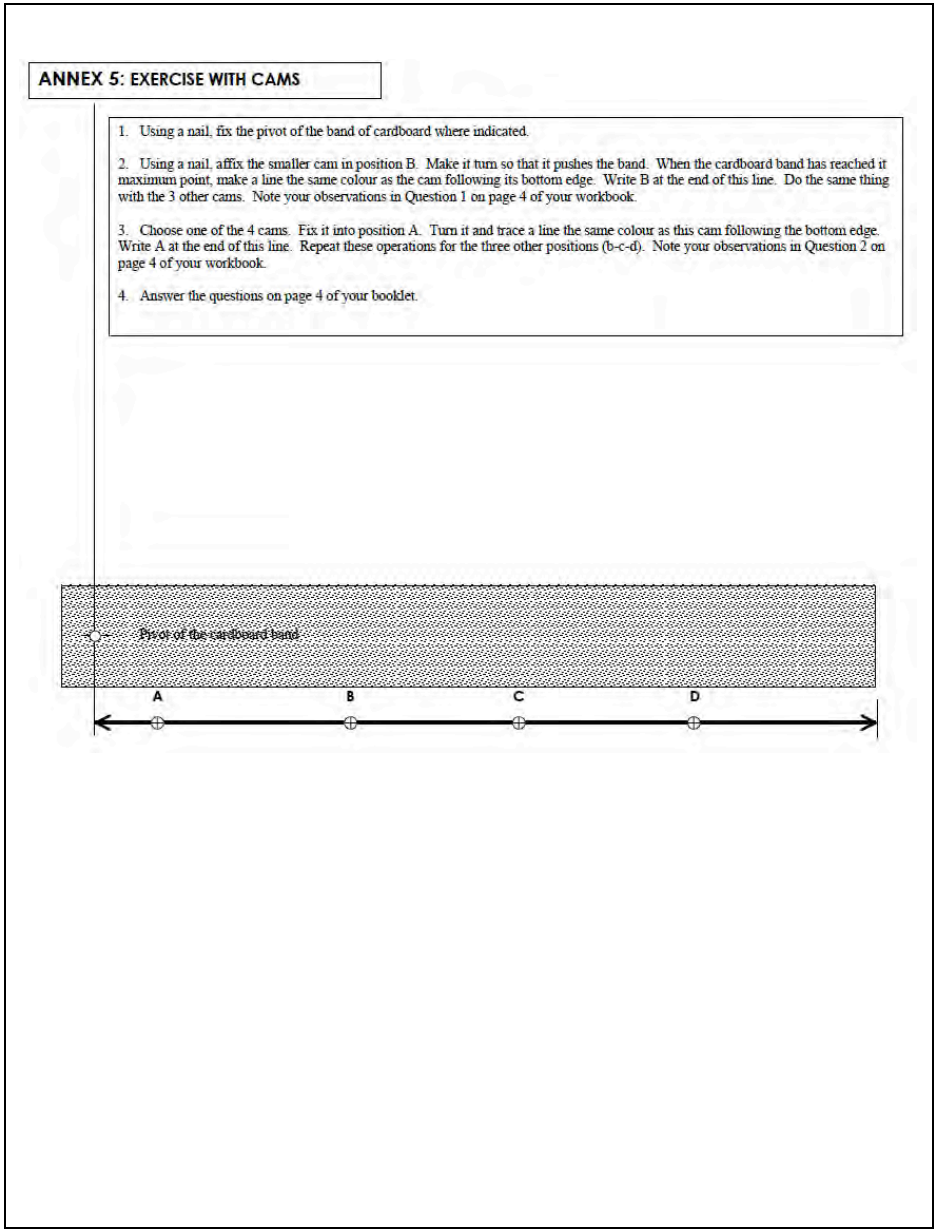
Material per team:

- Panel of fibre board
- 2 thumbtacks
- 2 nails with heads
- 2 different size cams made from the tops of juice bottles
- 1 cardboard band made from a box (3 X 24 cm)
- Worksheet (ANNEX 5)
- Blue pen or pencil
- Red pen or pencil

Basic materials

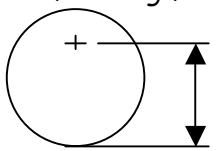
- Student booklet, page 4
- Hammers

The students carry out the manipulations required in ANNEX 5: "EXERCISE WITH CAMS", in teams of two. They answer the questions on page 4 of the student booklet.



NOTES TO THE TEACHER

The purpose is for the students to understand the following facts :



- *The greater the distance between the point of rotation of the cam and the furthest point of the circumference of the circle, the greater the displacement of the cardboard band. (See diagram to the right).*
- *Using the same cam, the further the cam is from the pivot of the cardboard band, the slighter the displacement of the cardboard band will be.*
- *The displacement of the cardboard band corresponds to the distance between the rotation point of the cam and the point furthest from the circumference of the circle. (The length of the arrow in the above diagram).*
- *Regardless of the position, for the same cam, if a perpendicular is drawn between the points of rotation of the cam and the top side of the cardboard band, the perpendicular will have the same measurement.*
- *When the cam is too close to the pivot of the cardboard, it is impossible for it to carry out a full rotation.*

See ANNEX 6 for an example of results.
See ANNEX 10 for a correction of student booklet page 4.

N.B.

- #3 on page 4 of the student booklet could be done as a demonstration if the teacher judges that this stage is more difficult for the students.
- An additional manipulation, with a hole in the middle of the circle, could be carried out to demonstrate the difference between a wheel and a cam.



How does it work?

My animated object: cam and roller system

VOCABULARY:

CAM: _____

_____

ROLLER: _____

_____

Carry out the experiment on the « EXERCISE WITH CAMS » sheet.

MY OBSERVATIONS

1. What I observe when the cam changes size (diameter).

_____

_____

2. What I observe when the cam changes positions.

_____

_____

3. You have four perpendicular lines. For these lines, trace a perpendicular line as indicated in the following table. Measure and note the length of the perpendiculars.

Measure the perpendicular line	From line A passing by point A ☐	From line B passing by point B ☐	From line C passing by point C ☐	From line D passing by point D ☐

What do you notice about the length of the perpendiculars? Explain.

_____

4. If we bring the hole (the pivot) closer to the center of the circle, what will happen with the band of cardboard?

_____

_____

5. If the cam was placed above the band of cardboard, the band would remain inclined after the passage of the cam. What could you do to bring it back to its initial position? Make a drawing and explain.

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PREPARATION
Activity 5: Choosing a tale

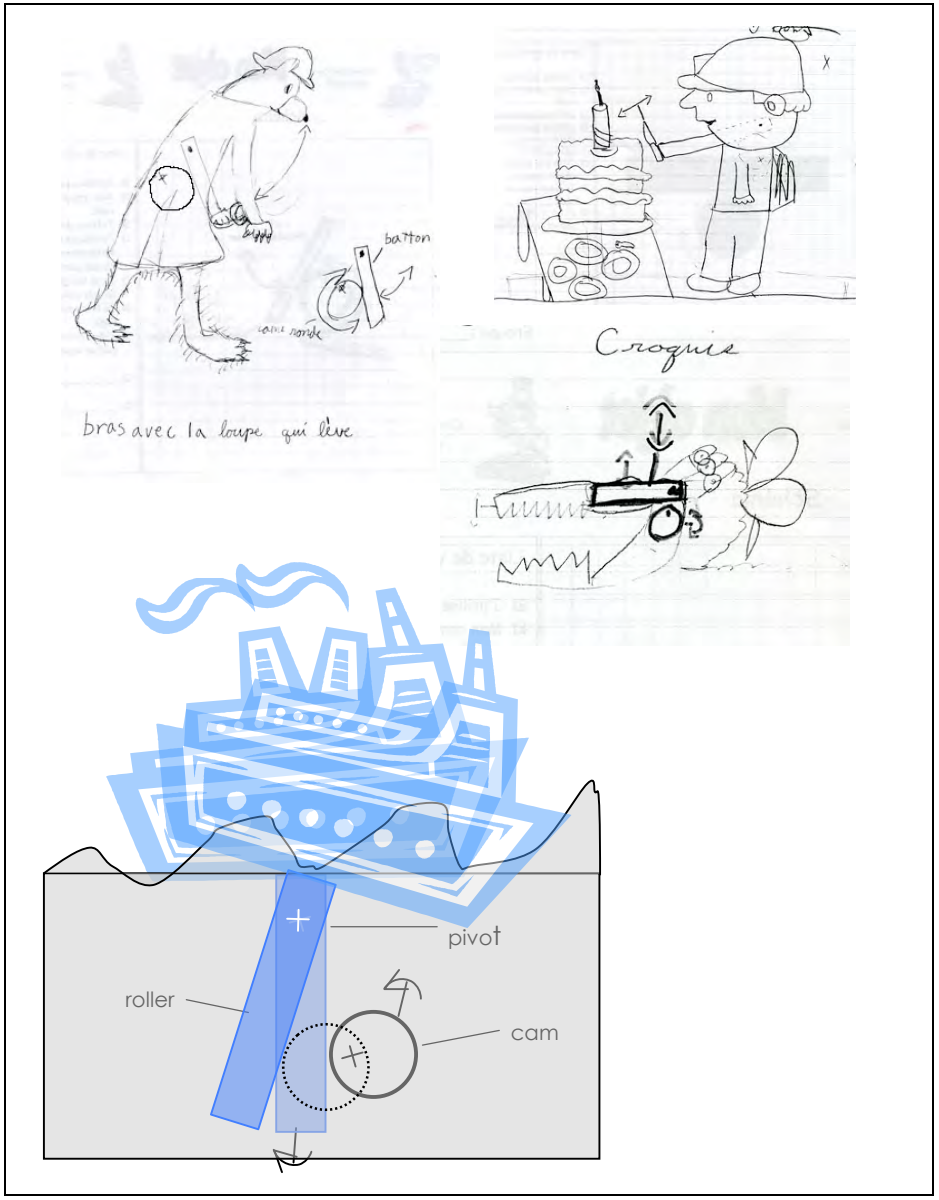
This task could be associated to reading a tale to kindergarten students. Before making their object, the students could choose a story in which there is a mouse or crocodile character.

Note that this project could be modified using a tale chosen by the teacher. Another character could be chosen and used instead of the mouse or crocodile in our documents.

You will find on the right 3 solutions drawn by students during our experiments along with another model we suggest.

Movements of characters or objects that could be made:

- Raise an arm
- Open a mouth
- Wag the tail
- Give the impression of navigating the waves
- An element that jumps out of a box
- Lift a head to look out a window
- Swing
- A fish jumping out of the water
- …



REALISATION

Activity 6: Designing the articulated model

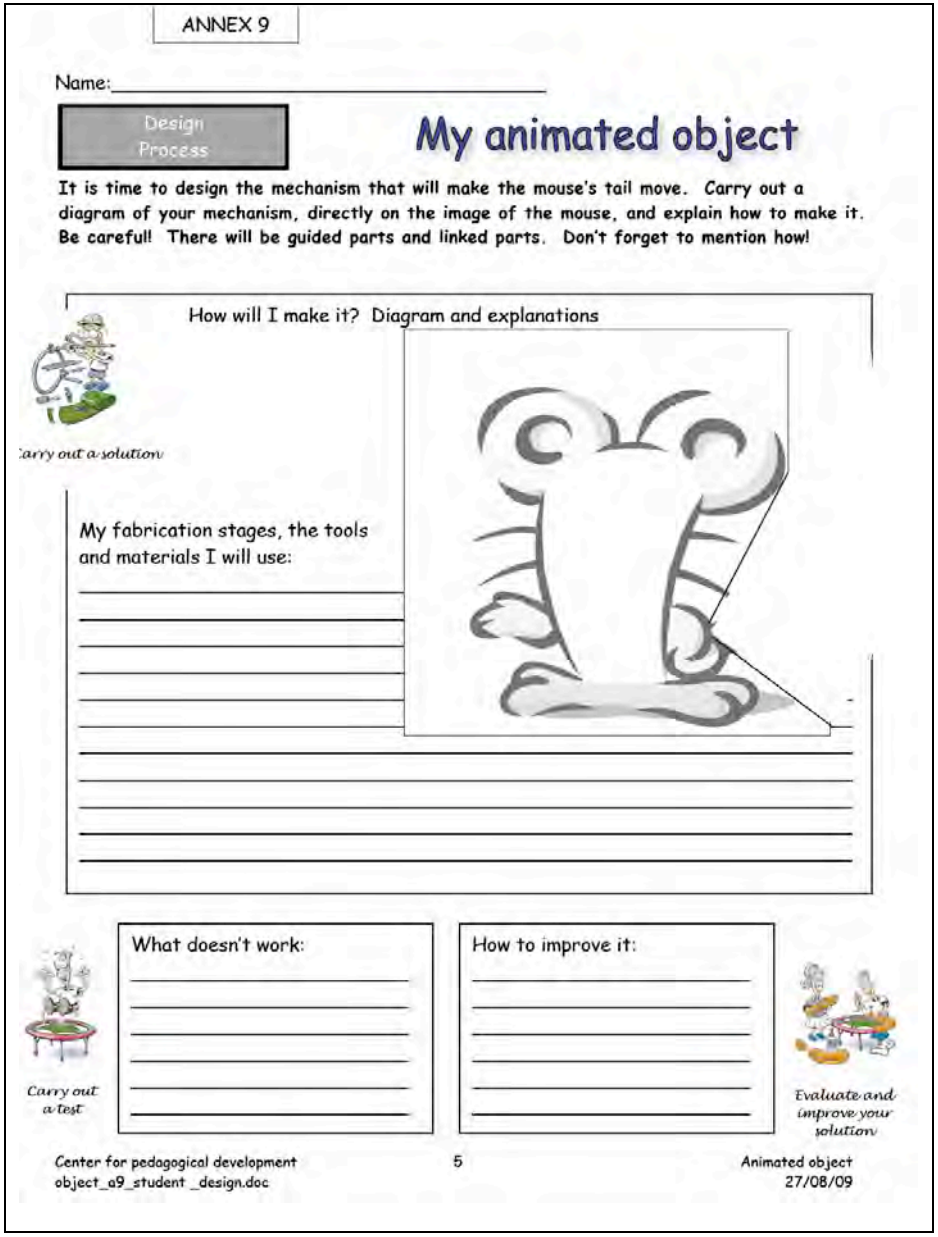
Objective *: Resolve a design problem*

Material

- Mouse or Crocodile model sheet (ANNEXES 7 and 8)
- Mouse or Crocodile design sheet (ANNEXE 9)
- Cardboard from boxes to be recycled
- Covers from plastic containers of a diameter between 4 and 7 cm
- Styrofoam plates (meats and fruit)
- Corks
- 6/32 Nuts and bolts
- Metal washers
- Metal clips (like in a Duo-tang)
- Flat head nails
- Pencil stubs
- Transparent flexible tubing (aquarium style)
- Any other materials you judge to be appropriate

Tools:

- Scissors or utility knife (X-acto)
- Cutting mat
- Scrapbooking hole punches
- Pieces of plywood or other material to protect the tables while using the punches
- Hammers
- Hot glue guns
- Sandpaper



ANNEX 9

Name:_____

Design Process

My animated object

It is time to design the mechanism that will make the mouse's tail move. Carry out a diagram of your mechanism, directly on the image of the mouse, and explain how to make it. Be careful! There will be guided parts and linked parts. Don't forget to mention how!

How will I make it? Diagram and explanations

Carry out a solution

My fabrication stages, the tools and materials I will use:

What doesn't work:

How to improve it:

Carry out a test

Evaluate and improve your solution

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The teacher prepares the students to make their diagram. (S)he reminds them of the symbols to be used:

- + sign: to indicate pivots;
- rectangle: to represent the extension of the mouse's tail or the crocodile's mouth;
- round cam;
- movement symbols;
- names of parts (roller, cam, pivot…).

On the facing page, you will find an example of what we expect from the students.

Once the solution has been drawn, the students plan the fabrication stages indicating materials, links and the tools that they will use.

The teacher verifies the student's written fabrication stages and authorises the start of fabrication. The students note function problems in their articulated object and suggest ways to improve upon it.

