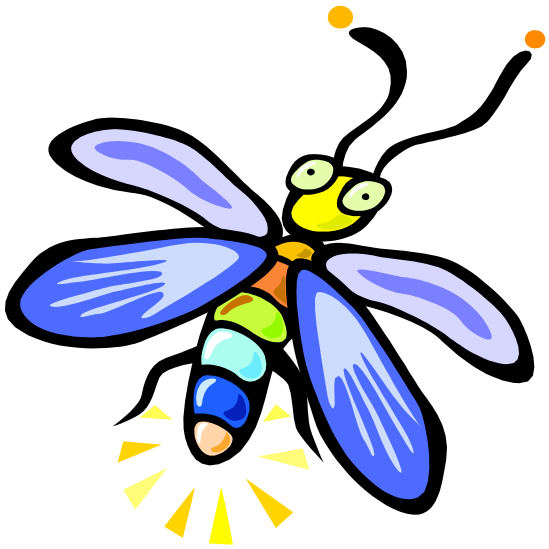
centre de développement pédagogique
pour la formation générale en science et technologie

EQUIPMENT PREPARATION GUIDE

(This document is intended for adults.)



Activity 1 Gathering arthropods

Equipment for each student or for each team:

- Transparent containers for capture
  - specific containers from the dollar store
  - medication vials with holes in the lids
  - Transparent plastic containers with holes in the lids
  - tulle to cover the holes if the captured arthropods are smaller than the holes made
- Gardening gloves or stir sticks to put the insects in the jar
- magnifying glass
- ruler
- coloured pencils
- observation sheet to note observations (see document entitled "Bug observation sheet" or link in the teacher's guide)

Equipment for the whole class:

- Various books about insects, see bibliography
- small shovel

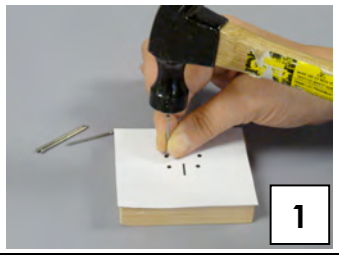
Activity 2 Placing the scientific concepts

The document entitled "Theoretical capsule" as well as books about insects (see bibliography).

Activity 3 Study of the mechanism to be used for the design of the insect

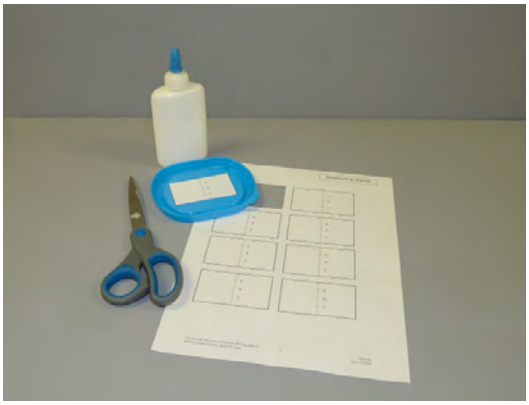
STEPS FOR THE PREPARATION OF THE WORK STATIONS

<table>
<tr><th colspan="2">1- Preparation of the folding templates (4X) for station 4</th></tr>
<tr><th>EQUIPMENT</th><th>EQUIPMENT for 4</th></tr>
<tr><td>❑ Pencil
❑ Ruler
❑ Mitre box
❑ Hand saw
❑ Hammer
❑ Folding template
❑ Sticky tack</td><td>❑ 4 wooden boards
❑ 16 -1½ in. finishing nails</td></tr>
<tr><td>FOLDING TEMPLATES

❑ Measure, trace and cut a board to the following dimensions: 90 mm x 80 mm
❑ Place and affix the template to the board using sticky tack.
❑ Affix the nails using a hammer. [1]
❑ Mark the guiding line before removing the template.
❑ Repeat the same three operations with the 3 other templates.</td><td>

1</td></tr>
</table>

Note: It is possible to perforate the folding template before placing it on the board. In that case, you must proceed thus:

- ❑ Using a finishing nail, perforate the four points on the template.
- ❑ Groove the guide line (either with a nail or with a retractable blade knife).
- ❑ Place and affix the template to the board using sticky tack.
- ❑ Using a pencil, mark the placement of the four nails on the board.
- ❑ Affix the nails.
- ❑ Mark the guide line with a permanent marker.

2- Preparation of the drilling templates	
EQUIPMENT ❑ Scissors ❑ White glue ❑ Paper drilling template ❑ Hammer ❑ Martyr (old piece of wood) ❑ Finishing nail	**MATERIALS** ❑ Plastic covers
DRILLING TEMPLATE ❑ Cut out a drilling template. ❑ Glue the template onto a plastic cover. ❑ Cut the cover following the shape of the template. ❑ Place the template on the martyr and punch the three holes using the hammer and nail.	

3- Preparation of the paper clips (crankshaft)

EQUIPMENT	MATERIALS
❑ Needle nose pliers ❑ Ruler ❑ Permanent marker ❑ Folding template	❑ 8 paper clips (jumbo)

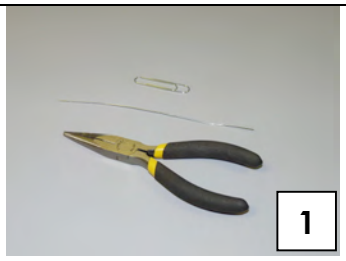
PAPER CLIPS (crankshafts)

❑ Unfold the paper clips using a pair of pliers. **[1]**

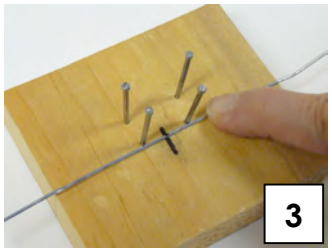
❑ Find and mark the center of the paper clips. **[2]**

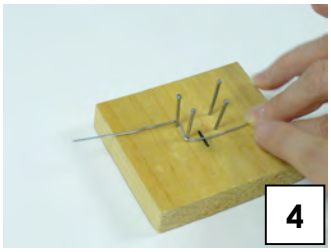
❑ Align the center of the paper clip on the marker of the template and fold it. **[3] [4] [5] [6]**

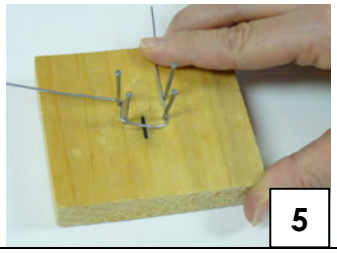
❑ As needed, reshape the crankshaft using the pliers.

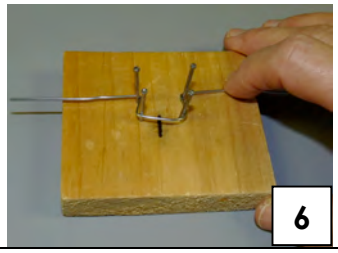












4- Preparing the milk cartons

EQUIPMENT	MATERIALS
❑ Scissors	❑ 8 milk cartons

MILK CARTONS

❑ Cut off the top part of each carton. **[1]**

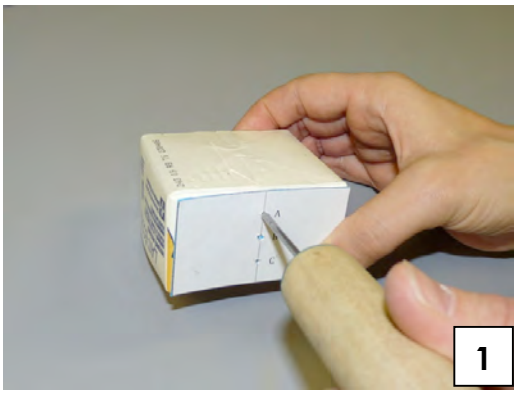


5- Preparation of station 1

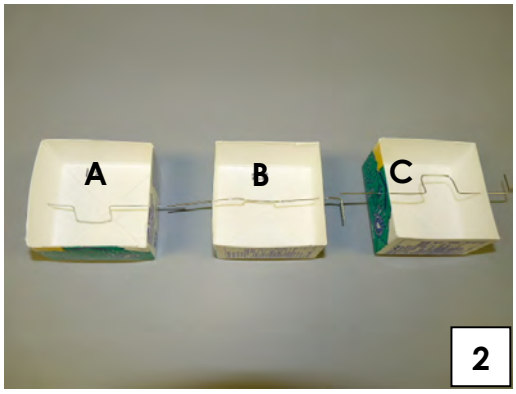
EQUIPMENT	MATERIALS
❑ Drilling template ❑ Finishing nails ❑ Permanent marker ❑ Needle nose pliers	❑ 3 milk cartons (already prepared) ❑ 3 crankshafts (already prepared) ❑ 3 wooden connecting rods (handle)

DRILLING AND ASSEMBLY

❑ Place the bottom of the carton upwards.
❑ Position the drilling template on the wall of the carton.
❑ Using a nail, punch a hole in position **« A ». [1]**
❑ Repeat these operations for the opposite side.



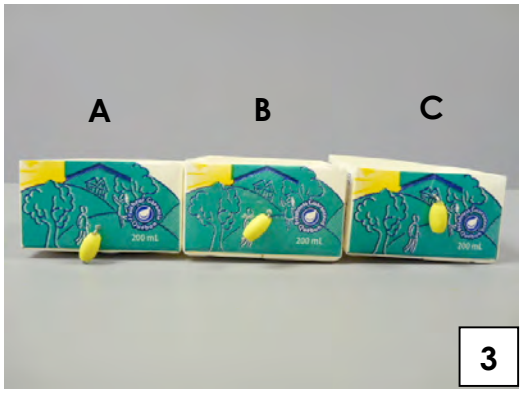
❑ Insert a crankshaft in the holes.
❑ Write the letter **« A »** on the bottom of the carton.



❑ Make another carton drilling at position **« B »** and write the letter **« B »** on the bottom.

❑ For the remaining carton, repeat these same operations but using hole **« C ». [2] [3]**

❑ Fold the outside ends of the crankshafts 90^0 (these folds will allow for a handle on one side, and to limit the translation movement on the other). Insert a wooden bead on the handle side.



6- Preparation of station 2

EQUIPMENT

- ❑ Drilling template
- ❑ Finishing nail (punch)
- ❑ Hole puncher (for paper)
- ❑ Permanent marker
- ❑ Scissors
- ❑ Ruler
- ❑ Martyr (old piece of wood)
- ❑ Hammer
- ❑ Needle nose pliers

MATERIALS

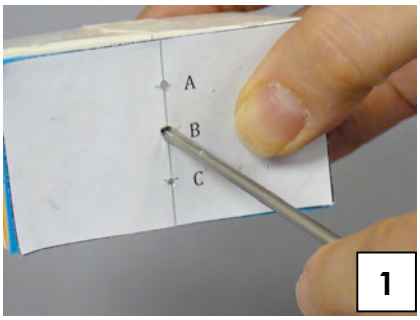
- ❑ 2 cartons (already prepared)
- ❑ 2 crankshafts (already prepared)
- ❑ Straws
- ❑ 2 wooden beads (handle)

DRILLING AND ASSEMBLY

❑ Place the bottom of the carton towards the top.
❑ Position the drilling template on the walls of the carton.
❑ Using a nail, punch the hole at position **« B ». [1]**
❑ Repeat the same operations for the two other sides.

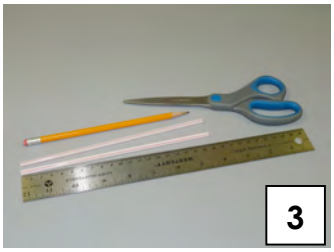
❑ On the side perpendicular to the two sides with holes, punch the hole again using the paper puncher, being careful to center the punch well. **[2]**

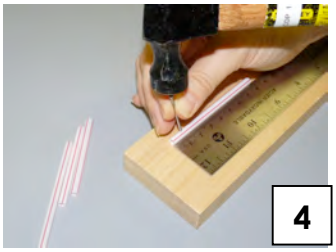
❑ Repeat these operations for the other carton.





❑ Cut one end of the straw to a length of 8 cm and another length 6 cm long. **[3]**
❑ At a distance of 1 cm from one extremity of each straw, make a small hole with a finishing nail. **[4]**

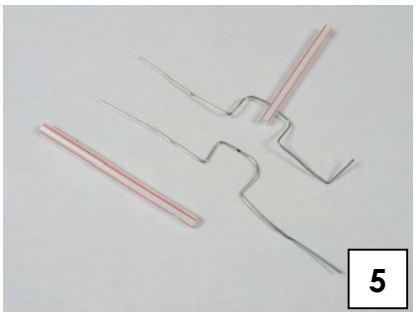




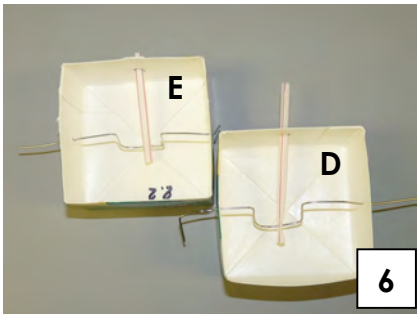
6- Preparation of station 2 (continued)

DRILLING AND ASSEMBLY (continued)

❑ Insert the straws onto the crankshafts. **[5]**
❑ Insert the crankshafts into the holes, putting the straw through the hole made by the paper puncher.



❑ Write the letter **« D »** on the bottom of the carton containing the 8 cm straw.
❑ Write the letter **« E »** on the bottom of the carton containing the 6 cm straw **[6]**



❑ Fold the outside ends of the crankshafts 90^0 (these folds will allow for a handle on one side, and to limit the translation movement on the other).
❑ Insert a wooden bead on the handle side.

7- Preparation of station 3

EQUIPMENT

- ❑ Drilling template
- ❑ Finishing nail (punch)
- ❑ Paper puncher
- ❑ Permanent marker
- ❑ Scissors
- ❑ Retractable blade knife
- ❑ Ruler
- ❑ Martyr (old piece of wood)
- ❑ Hammer
- ❑ Needle nose pliers

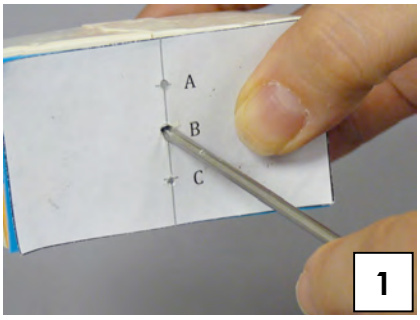
MATERIALS

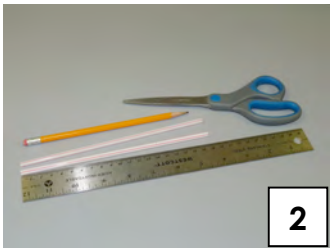
- ❑ 3 cartons (already prepared)
- ❑ 3 crankshafts (already prepared)
- ❑ Straws
- ❑ 3 wooden beads (handle)

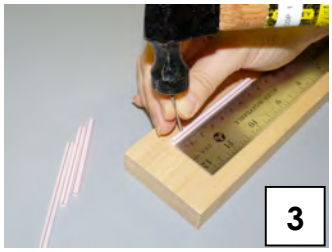
DRILLING AND ASSEMBLY

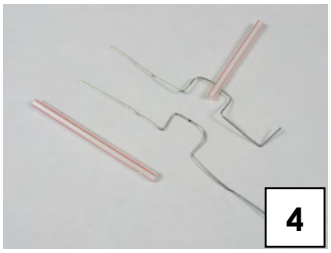
- ❑ Place the bottom of the carton towards the top.
- ❑ Position the drilling template on the wall of the carton.
- ❑ Using a nail, punch a hole at position **« B ». [1]**
- ❑ Repeat these same operations on the opposite side.
- ❑ Repeat all these operations for the 2 other cartons.

- ❑ Cut three pieces of straw 8 cm long. **[2]**
- ❑ At 1 cm from one extremity of each straw, punch a small hole with a finishing nail. **[3]**
- ❑ Insert the straws onto the crankshafts. **[4]**









7- Preparation of station 3 (continued)

For carton **« F »**: **See the method and photo [2] from station 2.**

❑ Insert the crankshafts into the holes, putting the straw through the hole made by the paper puncher. **[5]**

❑ Write the letter **« F »** on the bottom of the carton. **[11]**

For carton **« G »:**

❑ Drill a hole on the bottom of a carton using the drilling template at position **« A »**, as shown. **[6]**

Enlarge the hole to: 15 mm X 10 mm, using a retractable blade knife **[7]**

❑ Insert the crankshaft in the holes, putting the straw through the hole made with the knife. **[8]**

❑ Write the letter **« G »** on the bottom of the carton. **[11]**

For carton **« H »**

❑ Punch a central hole on the bottom of the carton as shown. **[9]**

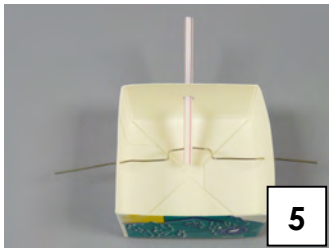
Enlarge the hole to 10 mm X 10 mm, using the retractable blade knife.

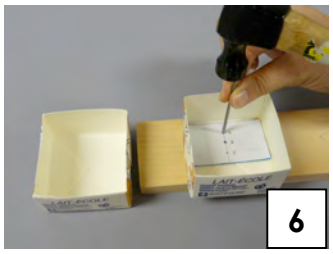
❑ Insert the crankshaft in the holes putting the straw through the hole made by the knife. **[10]**

❑ Write the letter **« H »** on the bottom of the carton. **[11]**

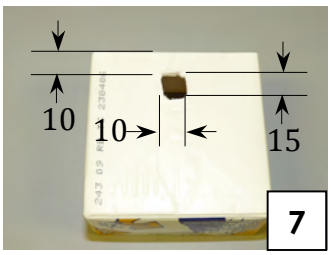
❑ Fold the outside ends of the crankshafts 90^0 (these folds will allow for a handle on one side, and to limit the translation movement on the other).

❑ Insert a wooden bead on the handle side.

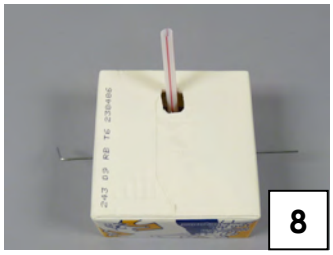

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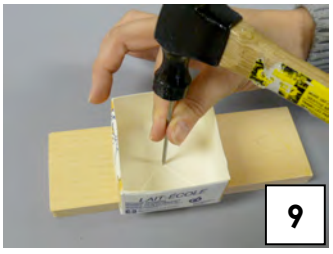

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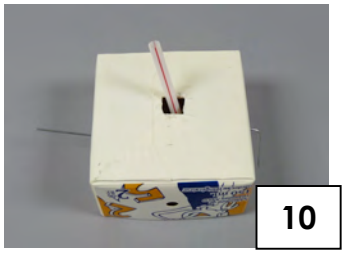
Place the template on the wall perpen-dicular to the two holes already drilled.

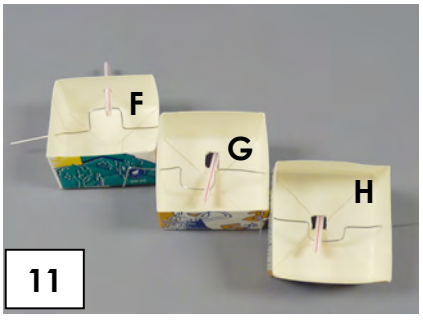


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9


10



11

Activity 4 Tools, materials and techniques

Equipment for each student:

- Student booklet
- 1 milk carton whose top has been cut off
- 1 straw
- Scissors
- 1 unfolded jumbo size paper clip or a jumbo size paper clip made into a crankshaft

Equipment for the whole class:

- Folding template for the paper clips (if the crankshafts were not made while at the work stations)
- Hammers, nails, punches and martyrs
- Paper puncher
- Hot glue guns
- Craft materials: plastic eyes, tissue paper, cellophane paper, pompoms, corks, pipe cleaners, necklace beads, feathers, decorative glass lozenges, etc.

Activity 5 Testing the function of their insect

Insects made in activity 4.

Safety capsule

(3) Retractable blade knife







1. Be careful of injury. Never place the hand holding the part in the trajectory of the blade.
2. Use a metal, shaped ruler to guide straight cuts.
3. Use a clean, rigid, non slippery surface that may become somewhat marked (hard board or panel).
4. Use a sharp blade, without which the necessary effort may cause injury.
5. Take the time to think about each of your gestures.
6. Use pliers to break and remove ragged blade ends.

Ensure that any modification to this capsule does not compromise student safety. Any person at fault must assume the consequences of his choices.







Interesting links for teachers

Light equipment
http://www2.cslaval.qc.ca/star/Le-sciage-le-decoupage-et-le

In case of minor injury (Info-Health)
http://wpp01.msss.gouv.qc.ca/appl/m02/M02RechInfoSante.asp

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Safety capsule

(2) Hot glue gun





1. Watch for burns: guns usually attain temperatures between 120°C and 195°C.
2. Wear appropriate clothing to protect against accidental drops (protection on thighs, for instance).
3. Wear safety glasses to avoid projections of burning glue.
4. Place the glue gun on a safe surface between uses, since it tends to leak. An aluminium plate is ideal.
5. Do not work close to sources of water (tap, drinking fountain etc.). Water and electricity are not a good combination.
6. Do not heat the glue to a temperature higher than that foreseen by the manufacturer (in a flame, for instance). Glue may release toxic emanations.





Ensure that any modification to this capsule does not compromise student safety. Any person at fault must assume the consequences of his choices.

Interesting links for teachers

Hot melt glue
http://www.sasolwax.com/en/Applications/Adhesives+_+Polymers/Hot+Melt+Adhesives.html
http://en.wikipedia.org/wiki/Hot_Glue

In case of minor injury (Info-Health)
http://wpp01.msss.gouv.qc.ca/appl/m02/M02RechInfoSante.asp

Information files about chemical substances
http://www.rapidonline.com/netalogue/specs/87-0405h.pdf