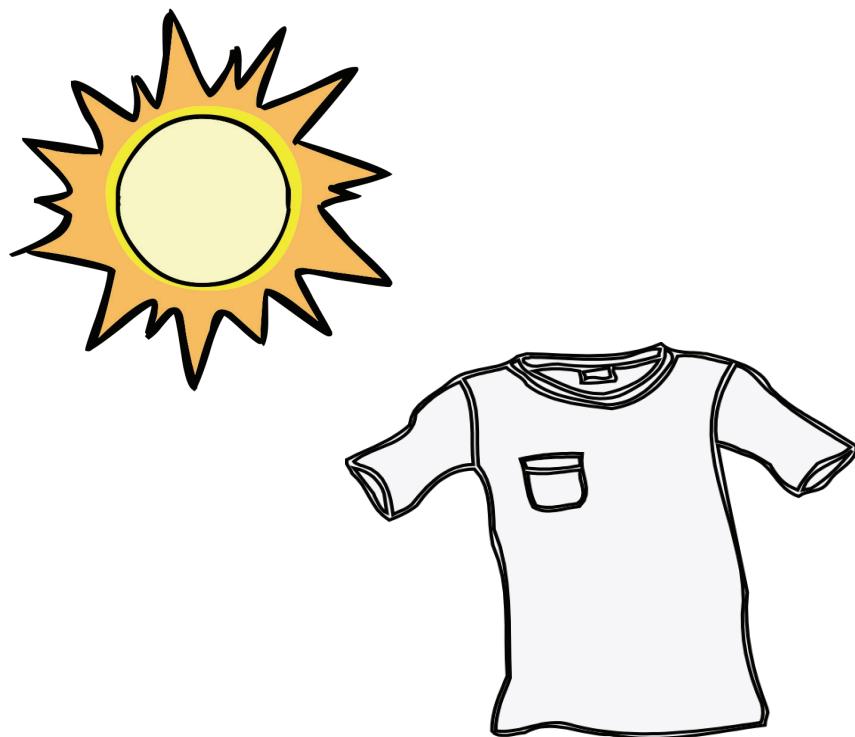




**centre de  
développement  
pédagogique**  
*pour la formation générale  
en science et technologie*

## Nice, but Hot!



## GUIDE

### CYCLE 1 OF ELEMENTARY

Spring 2013

**Thanks to :**

For testing the task, we would like to thank the following people:

- Marie-Josée Boisclair, teacher, and Marie-Claude Girard, pedagogical counselor, école Marie-Favery, Commission scolaire de Montréal
- Thérèse Martin, teacher, école des Merisiers, and Isabelle Beaulieu, pedagogical counselor, Commission scolaire des Phares

For linguistic review, in French:

- Lucie Brouillette

For English translation :

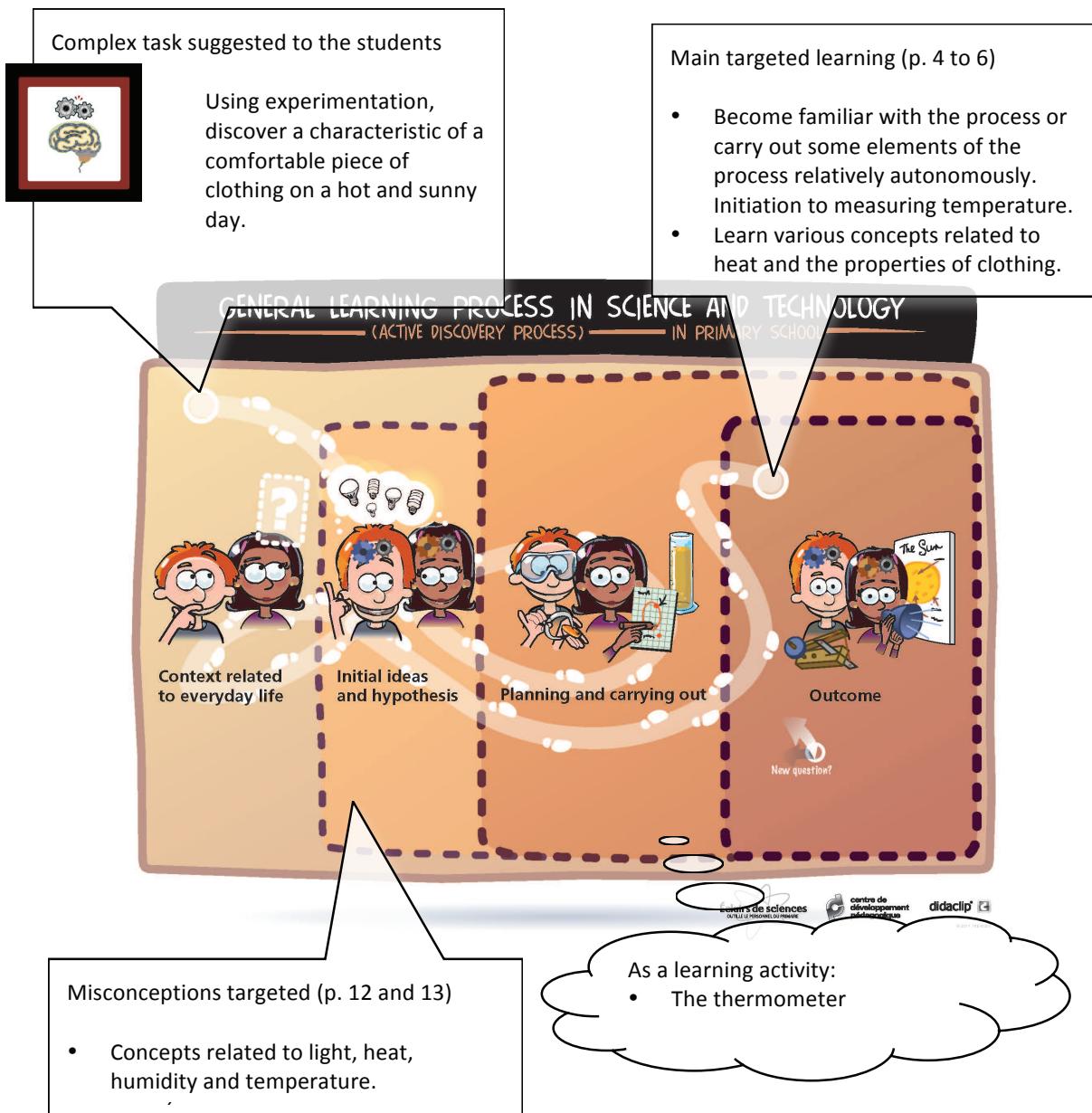
- Christine Tansey

Note:

For the purposes of brevity, the masculine form has been used.

## A quick glance at *Nice, but Hot!*

This LES was designed to support cycle 1 teachers in the appropriation of the general learning process in science and technology in elementary school. This appropriation will occur while the task is carried out with the students. The choice of the theme broaches the process of learning the some concepts in the *Progression of Learning* about heat and temperature within the framework of a complex ask where the student will have to implement a scientific experiment.



***Nice, but hot!***  
**Science and Technology – cycle 1**  
**Overview**

**Pedagogical aims**

- This learning situation allows the novice student to experience the learning process in science and technology in elementary school for the first time.
- It allows the student who has already experienced the process to attempt to resolve a problem of a scientific nature, more or less autonomously.
- It allows the student to use at least one measurement instrument.

**Proposed context**

Using the context of an outing on a hot, sunny day, the student will need to discover one or more characteristics of a comfortable piece of clothing.

**Broad Area of Learning**

**Health and Well-Being**

- Awareness of his/her basic needs: discover that certain characteristics of fabrics are associated to a feeling of comfort.

**Competency in Science and Technology (cycle 1)**

- Explore the world of science and technology

**Statements from the Progression of Learning – Science and Technology – Elementary school**

As a complement to the statements below, a lexicon and complementary references have been added on pages 6 and 7.

**Legend:**

- ★: Worked on during the LES
- : Previous cycle(s)
- +: Optional

**Material World**

- ★ A.1.a. Classifies objects according to their properties (e.g. colour, shape, size, texture, smell)
- + A.1.b. Classifies materials (e.g. fabrics, sponges, papers) according to their degree of absorption
- + A.1.c. Distinguishes between materials that are permeable to water and those that are not
- ★ D.1.b. Identifies the needs that an object was originally designed to meet
- ★ F.1.a. Appropriately uses terminology related to the material world
- ★ F.1.b. Distinguishes between the meaning of a term used in a scientific or technological context and its meaning in everyday language (e.g. source, matter, energy)
- + E.1.a. In addition, we broach certain elements from cycles 2 and 3:
  - Appropriately uses simple measuring instruments (thermometer)

## **Earth and Space**

- ★ D.4.b. Explains the sensations experienced (hot, cold, comfortable) with regard to temperature measurements
- + E.1.a. It is possible to broach certain elements from the cycles 2 and 3 :
  - Appropriately uses simple observational instruments (e.g. magnifying glass, binoculars)

### **Strategies**

- Exploration strategies
  - Discern the elements pertinent to the resolution of the problem
  - Remember previously resolved similar problems
  - Issue hypotheses (e.g.: alone, in a team, in a group)
  - Explore various avenues for a solution
- Instrumentation strategies
  - Resort to consignment tools (e.g. sketch, graphical protocol, keeping a notebook or a journal).
- Communications strategies
  - Exchange information

## **Interdisciplinary links**

### **In English Language Arts**

It is also possible for the students to work on works in youth literature, like books or documentaries, associated to the following key words:

- Heat
- Hot, cold
- Temperature
- Thermometer
- Clothing
- Heat wave

### **In mathematics**

The *Nice, but Hot!* LES is the ideal opportunity to initiate the students to the sense of temperature measurement. It is also possible to introduce them to the measurement of temperatures using conventional units.

H. Temperatures	1	2	3	4	5	6
1. Estimates and measures temperature using conventional units	→	→	→	→	→	★
Vocabulary Degree Celsius Symbol °C	→	★				

**Nice, but Hot!**  
1<sup>st</sup> cycle of elementary school

**The Vocabulary of the *Progression of Learning***

Comfortable, comfort  
Cold  
Colour  
Fabrics  
Heat  
Hot  
Light (artificial, natural)  
Magnifying glass  
Measure  
Need  
Observe  
Shape  
Sun  
Temperature  
Texture  
Time  
Timer, time  
Thermometer

**The vocabulary associated to the General Learning Process in science and technology**

Confirm, refute (the hypothesis)  
Experiment, to experiment  
Hypothesis  
Sample

**Complementary vocabulary**

While this vocabulary is not the subject of formal evaluation, we recommend that it be presented to the students.

Heat wave

## **Complementary references (available in French)**

### **Centre de développement pédagogique**

General learning process in science and technology in elementary school  
[http://www2.cslaval.qc.ca/cdp/UserFiles/File/previews/general\\_process/](http://www2.cslaval.qc.ca/cdp/UserFiles/File/previews/general_process/)

Vignettes (illustrations)  
[http://www2.cslaval.qc.ca/cdp/UserFiles/File/downloads/clipart\\_science\\_technology/](http://www2.cslaval.qc.ca/cdp/UserFiles/File/downloads/clipart_science_technology/)

Fact sheet on the concept of light (in French)  
<http://www2.cslaval.qc.ca/cdp/UserFiles/File/telechargement/lumiere.pdf>

### **Éclairs de sciences — <http://www.eclairdesciences.qc.ca/>**

Earth and Space World – cycle 3—Activity 3 – *The solar oven*: Scientific conceptual content, pages 4 and 5  
[http://www.eclairdesciences.qc.ca/files/pdf/Activities\\_EN/3E-3e.pdf](http://www.eclairdesciences.qc.ca/files/pdf/Activities_EN/3E-3e.pdf)

**Potvin, Patrice**, *Le froid existe*, web page from the *Démythifications scientifique* web site (<http://labmecas.uqam.ca/demythifications/index.php>)  
[http://labmecas.uqam.ca/demythifications/presentDemyth3.php?id\\_demyth=64](http://labmecas.uqam.ca/demythifications/presentDemyth3.php?id_demyth=64)

**Thouin, Marcel** (2004), *Enseigner les sciences et la technologie au préscolaire et au primaire*, Éditions Multimondes, Sainte-Foy.

Energy: page 29  
Light: pages 29 and 30  
Heat: pages 31 and 32

**Thouin, Marcel** (2001), *Notions de culture scientifique et technologique : concepts de base, percées historiques et conceptions fréquentes*, Éditions Multimondes, Sainte-Foy.

Energy: pages 40 à 42  
Light: pages 43 à 46  
Heat: pages 48 à 51

### **Video clips on the Web**

BrainPOP (in French)  
Light: <http://www.brainpop.fr/sciences/energie/lumiere/>  
Heat: <http://www.brainpop.fr/sciencesdelaterre/energie/chaleurettemperature/>

## Description of the learning situation

<b>Preparation phase</b>	<b>Pages in the student booklet</b>
<ul style="list-style-type: none"> <li>• Context related to everyday life           <ul style="list-style-type: none"> <li>○ Reformulation of the problem</li> </ul> </li> <li>• Initial ideas</li> </ul>	Page 1 Page 1 Page 2 (open)
<b>Performance phase</b>	
<ul style="list-style-type: none"> <li>• Hypothesis</li> <li>• Planning (Materials)</li> <li>• Planning (Protocol)</li> <li>• Implementation (Results)</li> <li>• Report (Readjustments)</li> </ul>	Page 2 Page 3 Page 4 Page 5 Page 6 (open)
<b>Integration phase</b>	
<ul style="list-style-type: none"> <li>• Report (Review of initial ideas and the hypothesis)</li> <li>• Report (Unforeseen events or problems encountered)</li> <li>• Report (Acquired knowledge)</li> </ul>	Page 6 Page 6 Pages 6 and 7
<b>Learning activities* (to be carried out when deemed appropriate)</b>	<b>Optional</b>
<ul style="list-style-type: none"> <li>• The thermometer</li> <li>• The timer</li> <li>• New words</li> </ul>	

\* For these learning activities, it is possible to use pre-existing activities, like, for example, the one found in the mathematics material for learning measurement. As far as the thermometer is concerned, the CDP has designed a learning activity and guide which are found as a complement to this LES. This file is on the memory key or on the CDP website.

## Animation guide Important!

The next pages in this guide relate to the student booklet. There are suggestions for the animation of the learning situation.

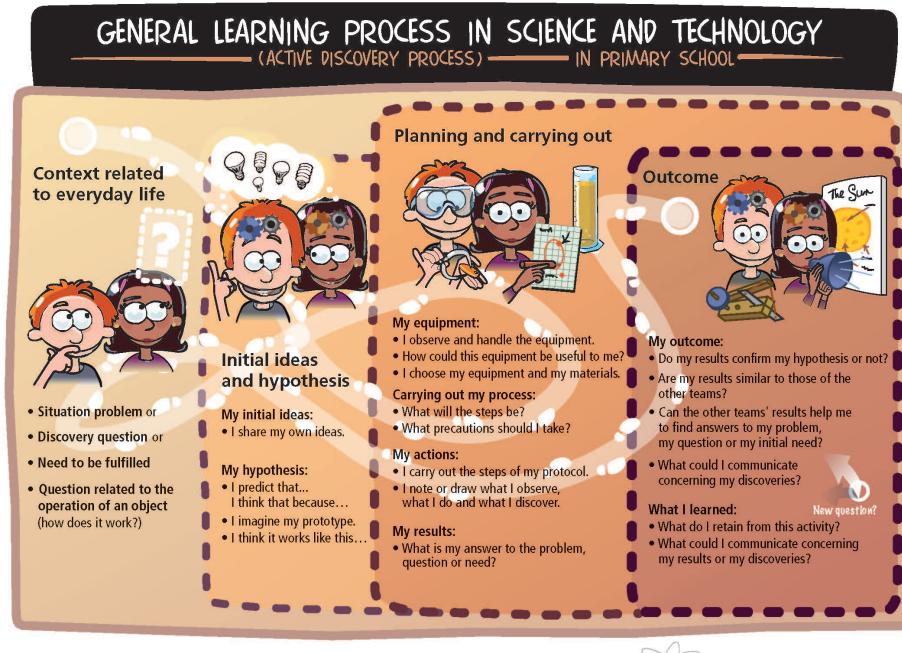
For the *Nice, but Hot!* Activity, there are four versions of the student booklet:

- A “directed” booklet;
- An “open” booklet. The extracts from this booklet can be differentiated from those of the “directed” booklet by a dotted outline;
- The same booklets, without the handwriting practice lines, for grade 2.

To respond to the adapted pedagogical aim, one or other of the booklet models may be used, depending on the targeted class, the timing in the cycle and on the experience (or autonomy) of the students. The use of the open booklet is the ideal to be reached, but the teacher must organise their teaching plan so as to allow the student to achieve at least a certain degree of autonomy.

We have produced a single pedagogical guide to avoid duplicating documents. So that the students may experience a learning situation in science and technology, in the next pages, we propose suggestions for the animation of one or other of the booklets.

The proposed animation may seem linear. Much as scientists and technologists do, however, it is possible and even recommended to allow the students to go back over certain elements in order to readjust them. The only elements we ask the students not to modify are their initial ideas and hypotheses.





**Preparation phase**  
**Context related to everyday life**  
**Estimated time: 15 to 30 minutes**

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Name : \_\_\_\_\_

Student booklet (1st year of cycle 1)

**Nice, but Hot!**

It's summer. The day dawns hot and sunny. You have the choice of wearing a black shirt or a white one. How will you make an informed choice?

Your mission  
You have to discover which shirt will be more comfortable on very hot, very sunny days.

Using a drawing, describe what you have to do.

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nicehot\_student1\_directed.docx

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Page 1

**1. Read the task: trigger and mission. Ensure proper understanding.**

- It may be useful to highlight the key words and new words. Then the students can circle them.
- In a group discussion, it will be necessary to agree on a common definition for the word "comfortable".
- By drawing, the child may illustrate his understanding of the problem. The implementation time for this part of the process will essentially depend on the time allowed to the students for the drawing.

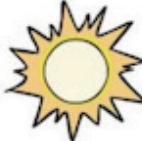
Note that right from this point, the students may begin to verbalise their initial ideas on the subject. They can be invited to keep their ideas in mind for the next step on page 2.

**2. For classes using the more open version of the problem**

The open version differs by the fact that it doesn't require the student to work only with the experimental factor of "colour", black or white.

The suggested approach is the same as in the "directed" version.

Student booklet (1st year of cycle 1)

**Nice, but Hot!**

It's summer. The day dawns hot and sunny. You have the choice of wearing a black shirt or a white one. How will you make an informed choice?

Your mission  
You have to discover which shirt will be more comfortable on very hot, very sunny days.



## Preparation phase and beginning the performance phase

### Initial ideas and hypothesis

Estimated time: 15 to 30 minutes



#### *Initial ideas and hypothesis*

My hypothesis:

The more comfortable shirt is:



I think that because:

---

---

---

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nicehot\_student1\_directed.docx

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Page 2

#### 1. Ask students to propose a hypothesis

- Regardless of the selected booklet, you must ensure the understanding of the word "hypothesis". An association may be made by analogy reminding students how we make hypotheses (anticipation) while reading.
- While on the subject of hypotheses, it is important to underline to the students that at this stage it isn't important to have the "right answer". It is the justification (the "I think that because...") that matters.
- In the justification section, the "I think that" is important to complete, but may be a significant challenge for some students, particularly younger ones. Here are some suggestions for strategies to put into place:
  - Do the "I think that" section orally.
  - Ask the students to relate a personal experience.

#### 2. What about the initial ideas?

In the directed booklet, the proposed task presents a problem that is so closed (a black shirt or a white shirt?) that it becomes superfluous to distinguish between the initial ideas and the hypothesis.

#### 3. Some surprising hypotheses

Students may sometimes, or even often, be surprised when comes the time to formulate a hypothesis. It is important to let the students formulate and note these hypotheses, even if they seem off the wall or without direct relation to the task. It is the justification (the "I think that") which will allow a judgement to be made as to the importance of a statement.

During the in class experiment of this task, some statements stood out from the others. As an example, here are some of them:

- I choose the white one because black attracts bugs.
- I choose the black one because I like being hot.
- I choose white because it reminds me of clouds and it's light.

#### 4. For classes using the more open version of the problem

##### 4.1 Initial ideas

The open version implies that the student will have to state one or more initial ideas which can influence the sensation of comfort. He will be asked to note these factors in the boxes intended to this end. If the student wants to suggest three elements, he may do so. It is not mandatory to supply three elements, since this part of the process allows us to find out what the student has in mind before starting the learning process.

##### 4.2 The hypothesis

The hypothesis must concern a single experimental factor. Here are some experimental factors for this activity:

- The colour of the shirt (dark or light)
- The texture of the fabric (tight or loose weave)
- The thickness of the fabric (thick or thin)

All the factors mentioned by the students during the elaboration of the initial ideas could be retained for the continuation of the task. With a relatively autonomous class, the experienced teacher may decide to work with several factors.

It is also possible to agree with the students to choose a single factor for the whole class. In addition, we recommend that you use factors presenting extreme characteristics (e.g. black and white, rather than dark and pale) in order to obtain interesting and noticeable results for the students.

In his booklet, the student will note under the "right" shirt, the characteristic that corresponds to his hypothesis. The strategies to use for this part of the task are the same as the ones recommended below for the "directed" version of the task.

##### 5. Misconceptions

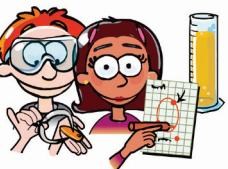
There are many misconceptions surrounding the concept of light, temperature and the sensation of comfort. It is recommended to review them, and to do so, we recommend that you refer to the book "Notions de culture scientifique et technologique" from Marcel Thouin whose full reference appears on page 8 of this document. Here are some examples of misconceptions:

- Black attracts heat.
- Heat is a substance that moves.
- The Sun (light) doesn't go onto white.
- And many other gems which will be stated by the students!

	<i>Initial ideas</i>
When it is very hot and very sunny, a comfortable shirt has the following characteristics:  _____	
	<i>My hypothesis</i>
	
The _____ shirt is more comfortable than the _____ shirt. I think that because: _____ _____ _____	

"Close the light!" is a common expression in everyday language. If, however, we are to be rigorous regarding the use the scientific meaning, we should be careful to use the expression "Turn off the lamp" instead.



	<p><b>Performance phase</b></p> <h2>Planning and carrying out— The materials</h2> <p>Estimated time: 30 minutes</p>
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Planning and carrying out I need the following materials:			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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Page 3

### 1. Make teams of two (2) students

The students can carry out the experiments in pairs. Each student will have to fill out his booklet individually. When sufficient materials are not available, it is possible to use workshops. For a certain period of time, one area in the class may be used to carry out the experiment.

### 2. Present the materials<sup>1</sup>

The students may use all the materials presented on page 3, but some elements may not be useful to them. The method we recommend requires two (2) thermometers. In addition to ticking the element, the student must write the quantity required.

It is recommended that you explain the meaning of the word “sample” to the students. They must work with samples made of cardboard, fabric or textiles. To make the cardboard samples, we suggest a procedure on the next page. This may be printed and given to the students.

### 3. The thermometer

The teacher can suggest a learning activity to the students who are experiencing their first contact with a thermometer. Useful information about this activity may be found in a document with the file name “aa\_thermomètre\_1er\_cycle.docx”.

### 4. For classes using the more open version of the problem

The only difference in terms of materials suggested to the students concerns the choice of samples. The list represents these samples in “white”. For example, the student may adequately colour what represents the sample if you decide to work on the experimental factor “colour”.

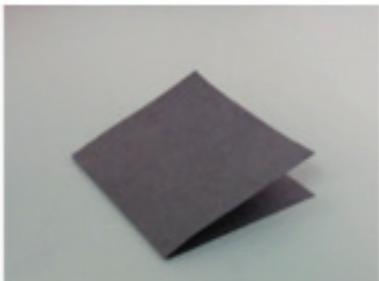
Planning and carrying out I need the following materials:		
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

<sup>1</sup> For detailed complementary information about all these items, please refer to the *Suggestions for materials* section at the end of this guide.

# **Hot, but Nice!**

## **Fabrication process for pouches**

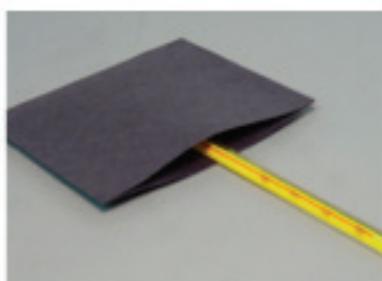
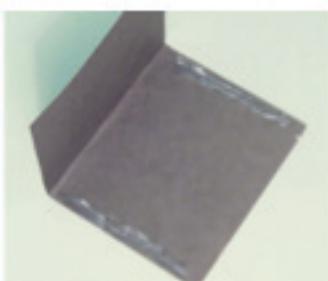
**1. Fold the cardboard in two.**

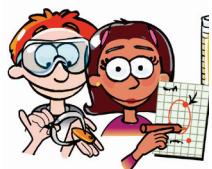


**2. Spread glue on two sides to make a pouch.**



**3. Fold over to glue the edges.**





**Performance phase (continued)**

**Planning and carrying out – The procedure (protocol)**

**Estimated time: 30 minutes for the directed version. At least twice that for the open version.**

### 1. Implementation with the whole class

<b>Planning and carrying out</b> The protocol	
--	---

- 1 -  I make the pouches.
- 2 -  I place the thermometer.
- 3 -  I trace the starting point of the temperature in blue.
- 4 -  At the adult's signal, I turn on the lamp.
- 5 -  I wait 5 minutes and turn the lamp off.
- 6 -  I trace the final point of the temperature in red.

This protocol may be followed “step-by-step” with the whole class. If this is the chosen way to work, read the steps one at a time, leaving the students enough time to carry out the manipulations.

### 2. Implementation in workshops

If the workshop option is retained, you must first ensure that the students understand each step and then supervise those who present specific needs (reading, motor skills, etc.) To make the work in workshops easier, we have designed a place mat. It is in the *Suggestions for materials* section.

### 3. Consigning the results

This part of the work will have to be prepared BEFORE starting the manipulations. In fact, the student needs to know where and how he will note what happens during the experiment. Instructions 3 and 6 on page 4 of the student booklet concern this note-taking. It is strongly recommended to present page 5 to the student so he has an idea what he will have to do. The details of the consignment is presented further in this guide.

### 4. For classes using the more open version of the problem

The planning challenge for the protocol is considerable. The teacher must judge the degree of autonomy and the capacity of the students to anticipate in order to suggest an appropriate way to them. Ideally, the student should be able to plan the manipulations to be carried out himself with the materials at his disposal. In many cases, it is necessary to accompany and guide the students through this process.

A blank page for planning the protocol is included to receive the thumbnails that the student will have cut out from the materials sheet (page 4 of the booklet) printed to this end. He will then be asked to place the thumbnails in a logical usage order. As needed, the students may be allowed to use additional thumbnails (a 2<sup>nd</sup> thermometer, for example).

<b>Planning and carrying out</b> My process Use the thumbnails to show the main steps.	
--	---



### Performance phase (continued)

## Planning and implementation — Results

**Estimated time:** This step is carried out at the same time as the protocol

### 1. Consigning the results

When a new measurement instrument is introduced, the sense of measurement needs to be developed. For the Hot, but Nice! task, we recommend that the starting and ending points of the alcohol columns in the thermometers be compared.

In the directed version of the task, the student may glue his paper strip or adhesive tape onto page 4 (see the *Suggestions about the materials* section for the details of the technique).

### 2. For classes using the more open version

If the students are autonomous and resourceful, it may be of value to suggest they find their own way to consign their results. If time is lacking or if the students are unable to come up with realistic proposals, it is possible to use the technique with the paper strips (see the *Suggestions about the materials* section for the details of the technique).

Planning and carrying out The results		
<p>Legend: Start temperature <input type="checkbox"/> Final temperature <input type="checkbox"/></p>		

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nicehot\_student1\_directed.docx

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Page 5

### 3. What if the students are able to read the conventional units of measurement on the thermometer?

If the students manage to take an adequate reading on the thermometer, it is possible to let them note these measurements. The students will then have to correctly write the starting and ending temperatures for each sample on the results consignment page, page 5.

The mathematical treatment to find the difference in temperatures is next. It will then be important to make the students observe that sometimes, thermometers do not all show the same starting temperatures.

Planning and carrying out The results		

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Page 5



## 5. Learning

To conclude, it is important to recognise and name what has been learned. The knowledge acquired may be of any order. Some are techniques (e.g. using to use a thermometer properly). Other learning may be vocabulary enrichment (e.g. recognise new words or various meanings for a word). There is also what has been learned about how to work in science and technology. A student may learn, for example, that it is not "bad" if his hypothesis is not the "right answer".

We suggest that you leave some time so the students can verbalise what they have learned.

Next, the vocabulary sheet on page 7 can be completed. The student can tick the new words learned and will also be invited to note his personal definition for the term and to illustrate the concept.

As far as the meaning of a word is concerned, it is critical that the definition be the student's own. In the 1<sup>st</sup> cycle, he will be asked to invent a sentence allowing him to illustrate the meaning of the word, as is intended in the *Progression of learning in English – Language Arts* (Page 9).

### About the "right answer"

It is possible that even after finishing the task, a student may still affirm, for example, that he prefers wearing the black shirt when it is very hot. If the student insists on keeping his initial choice and gives a valid justification (for example: I like being hot), the choice must be accepted, but be sure that the student understands the observed phenomenon correctly.

### About cold and heat

We frequently hear that to make a substance colder, we simply need to add cold to it. This concept is incorrect. The elementary school teacher can avoid giving credence to this notion by simply adjusting his words when speaking of cold and heat, even in everyday language.

In fact cold is simply the absence of heat. We may withdraw or add heat, but not cold!

For the curious among you, we recommend reading the following we site:

[http://labmecas.uqam.ca/demythifications/presentDemyth3.php?id\\_demyth=64](http://labmecas.uqam.ca/demythifications/presentDemyth3.php?id_demyth=64). It deals with demystifying cold.

Outcome What I learned	
 My definition	
<input type="checkbox"/> heat: ..... ..... .....	
<input type="checkbox"/> Hypothesis: ..... ..... .....	
<input type="checkbox"/> Temperature : ..... ..... .....	
<input type="checkbox"/> Thermometer : ..... ..... .....	
What else did you learn?	

## Evaluation

In the first cycle of elementary school, there is no obligation to communicate the evaluation of learning in science and technology. It is essential, however, to proceed with an evaluation to support the students' learning. To do so, we suggest you use the criteria in the evaluation framework of learning in science and technology for the 2nd and 3rd cycles of elementary school.

The table below allows the evaluation elements found in the student booklet to be retraced.

Evaluation criteria	Elements promoting the understanding of the criteria	Page
Cr1 Appropriate description of the problem	Reformulation of the problem	1
	Formulation of a tentative explanation or solution	2
Cr2 Application of an appropriate procedure	Planning of work	3 and 4
	Implementation of procedure	In action + page 5
	Readjusting the process, as required	4 (open task)
Cr3 Appropriate use of instruments, tools or techniques	Handling of objects, tools or instruments	In action
	Observance of safety rules	In action (wearing glasses)
Cr4 Appropriate use of scientific and technological knowledge	Production of explanations or solutions	6 and 7
	Use of terminology, rules and conventions specific to Science and Technology	Everywhere
Proficiency of subject-specific knowledge targeted in the <i>Progression of Learning</i> <sup>2</sup>	Material World	Page 7
	Strategies <sup>3</sup>	Everywhere

<sup>2</sup> It is important to remember to include learning related to techniques and instrumentation (section E) and appropriate language (section F) for each world.

<sup>3</sup> While feedback regarding this element must be provided to the student, it is not considered in the results communicated on the report card.

## Suggestions for materials

Materials to be put at the students' disposal for a class of 22 students

Items	Notes
11 lamps	<ul style="list-style-type: none"><li>For the experiment, 60 watt incandescent light bulbs were used for 5 minutes.</li><li>Compact fluorescent bulbs are not recommended, since their use does not cause a noticeable temperature difference.</li><li>Lamp shades may become very hot. Be sure the lamps are turned on only for the time of the experiment and advise the students not to touch the lamp shade or the light bulb.</li><li>Some models of lamps only allow for the use of one thermometer.</li></ul>
11 samples of each colour, texture and thickness tested.	<ul style="list-style-type: none"><li>These samples represent the shirt.</li><li>They may be made out of paper, fabric or ideally, old shirts may be used.</li></ul>
11 or 22 thermometers	<ul style="list-style-type: none"><li>The thermometer will be used to measure the temperature difference under the sample when it is lit up by the lamp.</li><li>Plan for two (2) thermometers per team. One may be sufficient, but you must then have enough time for the thermometer to return to the ambient temperature before working with the 2<sup>nd</sup> sample.</li></ul>
22 pairs of safety glasses	<ul style="list-style-type: none"><li>Because a thermometer may break, we recommend that the students wear safety glasses.</li><li>This also initiates the student to wearing them.</li></ul>
22 timers	<ul style="list-style-type: none"><li>The timer is used to measure the exposure time of the samples to the light.</li><li>It may be activated by the teacher if the experiments are synchronised.</li><li>The digital versions of a smart board, a computer, a touch tablet or a watch may be used.</li></ul>
11 rulers	<ul style="list-style-type: none"><li>The ruler may be useful to measure the difference in height of the alcohol column for each thermometer.</li><li>It may also be used to measure the distance between the lamp and the samples.</li><li>Its use is optional, particularly if the students can easily read the temperature measurement.</li></ul>
Glue (stick or white glue)	<ul style="list-style-type: none"><li>The glue will be used to make the sample pouches.</li><li>The type of glue should be adapted to the texture of the sample.</li></ul>
11 red pencils and 11 blue pencils	<ul style="list-style-type: none"><li>The blue pencil is used to mark the starting point of the alcohol column in the thermometer.</li><li>The red pencil is to mark the end point.</li></ul>
11 pairs of scissors	<ul style="list-style-type: none"><li>The scissors will be used to cut out same-size samples.</li><li>They should be good quality in order to make the task easier.</li><li>The samples may be cut out ahead of time.</li></ul>
Matte adhesive tape or masking tape	<ul style="list-style-type: none"><li>The matte adhesive tape or masking tape may be used to mark the starting point and the end point of the thermometers' alcohol column.</li></ul>

### **Complementary notes:**

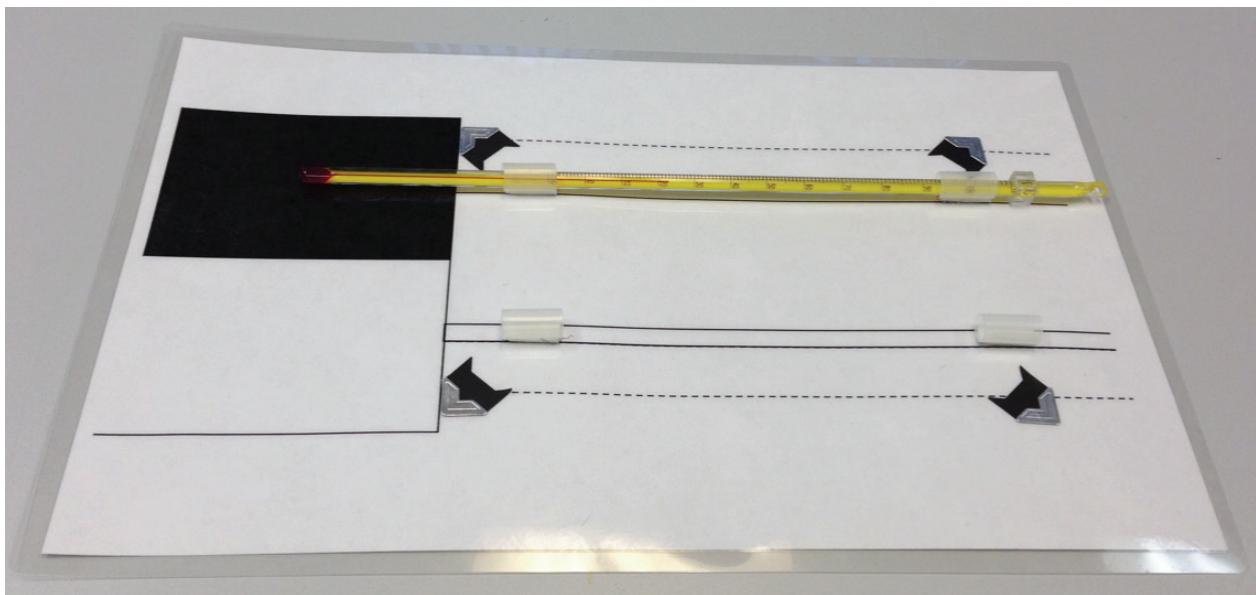
- **The Sun as a light source:** The experiment could, under ideal conditions, take place outside on a sunny day. The Sun, while listed in the materials list, is used as a pretext to explain the usefulness of the lamp for the experiment.
- **Experiment in workshops:** The experiment in workshops may be foreseen in some classes. The number of items could then be adjusted and the experiment limited to only a few work stations.

### **The place mat**

To work in workshops, it is possible to use one of the place mats presented on the following pages. Short plastic tubes glued onto the place mat allow the thermometer to be stabilised in order to prevent it from moving during the experiment. The use of the place mat is optional.

The place mat may be laminated in order to extend its lifespan. It would thus be easier to use the adhesive or masking tape.

When the number of thermometers in the class is limited, it is possible to opt for the “single thermometer” option.

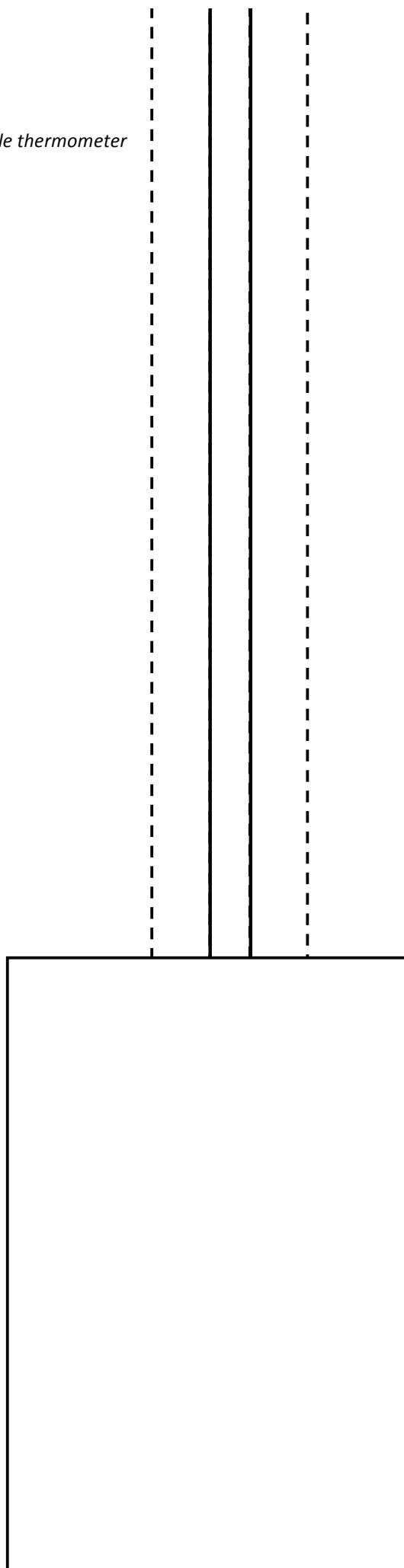


*Nice, but Hot!—  
Directed*



*Nice, but  
Hot!—  
Open*

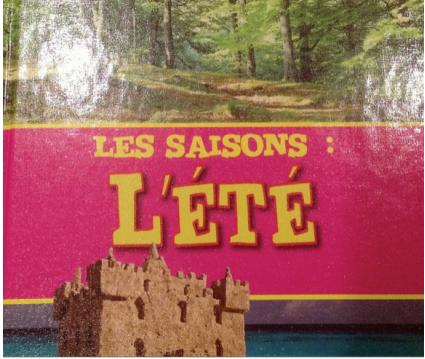
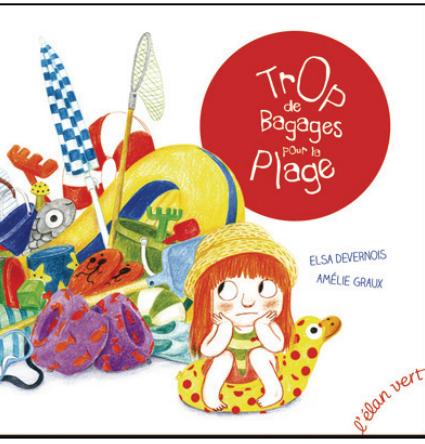
*Nice, but Hot!— Single thermometer*

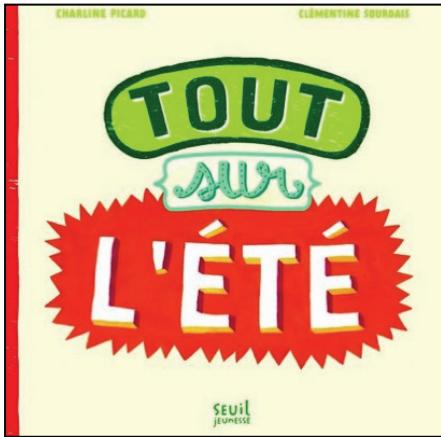


## Suggestions for youth literature

Before proposing this task to students, or after having completed all the in-class activities, it is possible to enter into the world of a book, a novel or a tale related to the theme of heat and comfort when it is hot. Unfortunately, books directly related to this theme are few and far between. It is therefore recommended that teachers pay attention to new releases in youth literature. For certain themes, foreign books may be good resources. In other books, however, the cultural landmarks may pose a problem. Here is some information we discovered during our research:

- There are several books or novel intended for children 6 to 8 with a theme of summer or vacation;
- The theme of intense heat is rare or non-existent;
- Certain European books are well structured and interesting, but contain elements not present in the students' everyday life (plants, animals, vocabulary, national holidays, etc.)

	<p><b>Les saisons : l'été</b></p> <p>Author: Nick Winnick Editor: Weigl, 2012 ISBN: 978-1-7707-1527-1, 29,95\$</p> <p>Documentary Translated from US English Rather expensive for what it offers Busy graphics Dense text</p> <p>Interesting for certain elements regarding heat waves.</p>
	<p><b>Trop de bagages pour la plage</b></p> <p>Author: Elsa Devernois Illustrator: Amélie Graux Editor: L'élan vert, 2012 Collection: Les petits m ISBN: 978-2-8445-5230-3, 16,95 \$</p> <p>Back cover: Zoe has only just arrived, and obviously, she wants to go to the beach! She just can't go without the net, the ball or the rackets...But she only has two arms! She will have to make some choices!</p> <p>May serve as an introduction to the LES if the teacher wants to tie the theme of baggage and apply it to clothing. The text is well-written and the pictures, likeable. Particularly attractive for girls.</p>

	<p><b>Tout sur l'été</b></p> <p>Author: Clémentine Sourdais      Illustrator: Charline Picard      Editor: Seuil Jeunesse, 2012      ISBN: 978-2-0210-1333-1, 29,95 \$</p> <p>French: Many French cultural references (animals, mountains, vocabulary)      Interesting concept with a new presentation on each page: information, comic strips, poetry, colour plates, frescoes.      Nice graphics      The page entitled "What to put in my luggage" on pages 48 and 49 could be linked to the LES.</p>
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