ACTIVITY 5

# WHAT MARKS THE BEGINNING OR END OF A SEASON?

## EXPERIMENT OBJECTIVES AND CONTENT

In this activity, students discover parts of nature that indicate the changing of the seasons. It also makes them aware of how seasonal changes affect our ways of life.

## ESSENTIAL KNOWLEDGE

**MATERIAL WORLD**
- Conservation of matter

**EARTH AND SPACE**
- Temperature (measuring instruments and seasons)
- Water in all its forms
- System involving the Earth, the Moon and the Sun

**LIVING THINGS**
- Animal's adaptation to its environment

## SUGGESTED MATERIALS

**Scientific equipment:**
- Thermometers
- Binoculars
- Graduated cylinders or beakers
- Funnels
- Digital cameras (optional)

**Household materials:**
- Small empty yogurt containers
- Plastic containers

**School supplies:**
- Pencils
- Paper
- Rulers

**School equipment:**
- Window

## CONTEXT: SITUATIONAL PROBLEM OR RESEARCH QUESTION

*It's fall. You look up at the sky and see lots of birds flying in the same direction. Your parents tell you these birds are flying south for the winter. This makes you wonder how the birds know that winter is coming without a calendar. You decide to uncover clues that will allow you to recognize the signs of the changing seasons as well.*

## SUGGESTED PREPARATORY ACTIVITIES (INTRODUCTION)

It would be a good idea to go outside with the students and observe trees (with or without leaves), the sun, clouds, snow, etc. This will give the students points of reference for the kinds of things that change outside from season to season.

## INITIAL IDEAS AND HYPOTHESES

Here are a few examples of hypotheses the students might formulate based on their initial ideas:

**Example 1**
I predict that the season is determined by the temperature. I predict this because in winter, my mother often sets the thermostat to a higher temperature, but in the spring, she lowers it.

**Example 2**
I predict that the strength of the wind can provide clues about what season it is. I predict this because the wind blows more in the fall, which makes all the leaves fall off the trees.

**Example 3**
I predict that the amount of rain and snowfall can provide clues about what season it is. I predict this because it rains more often in the fall than in summer. I noticed that we have to spend recess indoors more often in the fall than at the end of the school year.

**Example 4**
I predict that the start and end of a season are indicated by the behaviour of animals and the presence of plants. I predict this because in spring, we see more animals and plants grow. In winter, I only see a few pigeons.

Note: This last hypothesis is not a cause of seasonal change, rather a consequence of it.

## WORK PLAN AND EXPERIMENTATION

Here are a few examples of experiments the students can carry out to verify their hypotheses:

**Example A**
The students measure the outside temperature with a thermometer or by observing how people dress in the morning, or else by checking whether or not puddles of water have frozen over during the night.

RECORD ALL YOUR IDEAS AND OBSERVATIONS IN YOUR EXPERIMENT WORKBOOK.

**Example B**
The students measure the force of the wind by observing different aspects of nature. It is possible to evaluate an increase or decrease in the wind by observing trees. In this case, students could use an illustrated version of the Beaufort scale, or design one themselves.

**Example C**
The students measure the amount of precipitation (snow, rain, freezing rain, hail) that falls during a set amount of time. They can use a ruler to determine the height of accumulated snow in a container. Students may also opt to use a graduated cylinder to measure rainfall.

Note: To limit the evaporation of rain, a funnel can be placed in the collection container. To facilitate the reading of measurement instruments, they can be divided into colored sections to provide visual cues, which are better suited to this age group.

**Example D**
The students observe plants and animals over the course of a season and meticulously record their observations. They can take pictures of the same location for several days in order to observe changes in plant life. It is important to pay special attention to indirect signs of animals (tracks, nests, sounds, spoor, remains of meals, etc.).

Note: Recording the number of species rather than the number of individuals will help limit statistical errors.

IT IS SUGGESTED TO MAKE OBSERVATIONS DURING A PERIOD OF SEASONAL CHANGE AND TO SPREAD THEM OVER AT LEAST THREE WEEKS, WITH TWO SHORT OBSERVATIONS SESSIONS PER WEEK.

**EXPERIMENTAL FACTORS**
To ensure scientific rigor, the students should evaluate the experimental factors that might influence the experimental results.

- Evaporation of water
- Snow melt
- Climatic variations within the same season
- Precision of measuring instruments
- Sensitivity of skin
- Data collection location
- Animal camouflage
- Feeder or other human-created food source
- Time of day

## DISCUSSION: SUGGESTED INTEGRATION ACTIVITIES (CONSOLIDATION)

The teacher organizes a guided walk in a forest or large park so students can review and visualize the seasonal differences they studied.

## SUGGESTED ACTIVITIES FOR APPLYING KNOWLEDGE (APPLICATION)

The teacher has students research seasons in other countries. For example, near the equator there are only two seasons: the dry season and the rainy season.

## SCIENTIFIC CONCEPTUAL CONTENT

**Seasons**

The Sun always emits a more-or-less constant amount of energy into space. On Earth, we perceive this energy as light and heat. Because Earth is tilted on its axis (23.27°) and revolves around the Sun, the amount of solar energy received varies by region and period of the year. It is these variations caused by differences in the Earth's position in relation to the Sun that produce seasonal change. The more a hemisphere is tilted toward the Sun, the stronger (i.e., more direct) is the energy it receives. Hence, when it is summer in one hemisphere it is winter in the other.

**Solstices and equinoxes**

The spring equinox almost always occurs on March 20 or 21, the summer solstice on June 20 or 21, the fall equinox on September 22 or 23, and the winter solstice on December 21 or 22. The dates vary because of a difference between the Gregorian calendar year, which determines the dates of our calendar (365 or 366 days), and the tropical year (365.2422 days), which corresponds to how long it takes Earth to revolve around the Sun. The winter and summer solstices are the times in the year when difference between night and day are at their greatest. The spring and fall equinoxes are the times in the year in which day and night are equal in length.

### Plants and animals

Fall is the season when animals try to store food, build up fat reserves or migrate. Trees have grown their buds for the next spring. Only a few mammals and birds remain active in winter, such as gray and red squirrels, voles, black-capped chickadees and mourning doves. Insects, frogs and turtles hibernate, while some animals such as bears, raccoons and skunks sleep all winter long.

### Wind

The Beaufort scale is used to measure wind speed without measurement instruments. The scale is based on environmental observations at sea or on land. The scale has 12 levels.

### Climate

A region's climate is defined by several factors such as amount of sunshine, precipitation (type and amount), temperature, humidity and winds. Southern Québec has a temperate climate characterized by warm, often humid summers and cold winters.

## CULTURAL REFERENCES

### History

There are dates for each season, but they can vary by a day or two from year to year because of the Gregorian calendar (from Pope Gregory XIII) we use today. This calendar, adopted in 1582, aimed to redefine the dates of the solstices and equinoxes so that the date of Easter would not drift too far off.

### Famous person

The Beaufort scale was developed by Admiral Francis Beaufort in 1805.

### Effects

The seasons affect the ways of life of all living things. In Québec, we grow plants adapted to our climate, such as corn and apples, rather than sugar cane and oranges. In summer, when it is warm, we can swim outside. In winter, we can ski or skate because of all the snow and ice.

FOR MORE CULTURAL REFERENCES, VISIT THE ÉCLAIRS DE SCIENCES WEBSITE:

**www.eclairsdesciences.qc.ca**

## REFERENCES

Beysson, Jean-Pierre. *Guide pratique de la météorologie*. Montréal: Sélection du Reader's Digest, 1996.

Cosgrove, Brian. *Comprendre la météo*. Chamalières: Éditions Proxima, 2001.

Javelle, Jean-Pierre, Michel Rochas, Claude Pastre, Michel Hontarrède, Michel Beaurepaire and Bruno Jacony. *La météorologie: du baromètre au satellite*. Paris: Delachaux et Niestlé S.A., 2000.

Maynard, Christopher. *Pourquoi les saisons changent ? Et autres questions sur le temps*. "Dorling Kindersley" collection. Markham: Éditions Scholastic, 1998.

Vigneault, Gilles. *Les quatre saisons de Piquot*. Montréal: Nouvelles Éditions de l'Arc, 1979.

Walpole, Brenda. *Le temps et les saisons*. Paris: Éditions Nathan, 1997.

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# PROCESS OF ACTIVE DISCOVERY

## GENERAL LEARNING PROCESS IN SCIENCE AND TECHNOLOGY (IN ELEMENTARY SCHOOL)

### Context related to everyday life

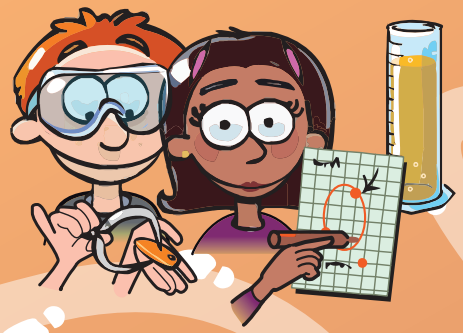
- **Situation problem** or
- **Discovery question** or
- **Need to be fulfilled**
- **Question related to the operation of an object** (how does it work?)

### Initial ideas and hypothesis

**My initial ideas:**
- I share my own ideas.

**My hypothesis:**
- I predict that... I think that because…
- I imagine my prototype.
- I think it works like this…

### Planning and carrying out



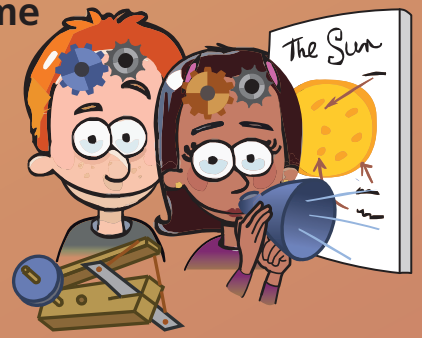
**My equipment:**
- I observe and handle the equipment.
- How could this equipment be useful to me?
- I choose my equipment and my materials.

**Carrying out my process:**
- What will the steps be?
- What precautions should I take?

**My actions:**
- I carry out the steps of my protocol.
- I note or draw what I observe, what I do and what I discover.

**My results:**
- What is my answer to the problem, question or need?

### Outcome




**My outcome:**
- Do my results confirm my hypothesis or not?
- Are my results similar to those of the other teams?
- Can the other teams' results help me to find answers to my problem, my question or my initial need?
- What could I communicate concerning my discoveries?

New question?

**What I learned:**
- What do I retain from this activity?
- What could I communicate concerning my results or my discoveries?

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