The Canada Science and Technology Museum presents:

Astronomy:
A Virtual Exploration Guide

Section 4
Astronomy, Canada, and Society
Introduction

There is more to Astronomy than scientific calculations and technological devices. Astronomy is also about people – how we have interpreted the night sky in the past, and how we continue to learn about our Universe. To fully appreciate Canada’s role in Astronomy, we need to examine how different cultures have practiced astronomical observation. We also need to recognize the origins of modern astronomy in Canada, appreciating the work of noted Canadian astronomers, and examining the history of Canada’s astronomical institutions.

Section 4 Content

The following is an outline of this section’s structure, and intended activity grade levels. For a comprehensive overview of the whole Exploration Guide, please see Section 1.

Primary (K-3)
4.1 Daily Rituals: The Sun in our Lives

Transitional (Grade 4 and up)
4.2 Canadian Astronomers: A Biographical Study
4.3 Native Canadian Perspectives
4.4 Across Cultures and Time: Comparing Constellation Myths

Intermediate/Senior (Grade 7 and up)
4.5 Canada’s Astronomical Institutions: A Research Activity

Distinctive icons throughout the Exploration Guide indicate its key features, helping you to find your way through the text quickly and efficiently.

Classroom Activity | Discussion or Essay Topic
--- | ---
Deeper Study | Website to Visit

Resources for the Activities

Many of the following activities require students to conduct research online. Worksheets for all activities are included at the end of this section. Teachers may request an answer package for the more detailed Activity Sheets by e-mailing virt_prog@technomuses.ca. Please allow about a week for us to reply.

*Note that, given the content of Section 4’s activities, there are no Section 4 Answer Sheets in the Answers Package.*
Activities

Activity 4.1: Daily Rituals: The Sun in our Lives
(Suitable for Kindergarten to Grade 3)

Review with your students how the Earth’s daily cycle results from its rotation on its own axis every 24 hours (as presented in Section 2 of this Exploration Guide). Further illustrate this principle using a revolving globe, a small (star) sticker, and a flashlight. Have your class find (or approximate the location of) your city, town, or village on the globe. Stick the sticker at this location. Point the flashlight at the sticker, and then spin the globe. Note how “day” and “night” pass as the sticker moves cyclically from the light into the shade.

Still using the globe and flashlight, engage your students in a discussion about the activities that they undertake over the course of a typical day. Encourage them to compare their daily rituals. For each phase of the day, note your community’s location in relation to the Sun.

Sunrise:
- waking in the morning (who wakes them?)
- bathing or showering
- dressing and breakfast routines
- going to school, and morning school routines (calendar activity, “circle time,” etc.)
- people (parents) going to work
- animals waking, birds starting to sing

Mid-day:
- lunchtime
- recess

Sunset:
- dinner (supper) time
- starting to feel sleepy
- bathing, brushing teeth
- reading a bedtime story

Following this class discussion, have your students complete the associated worksheet (two pages), associating daily events with the Sun’s location in the sky.
Activity 4.2: Canadian Astronomers: A Biographical Study
(Transitional – Grades 4 and up)

Have your students discover more about Canadian’s contributions of the field of astronomy. Have students select an astronomer to study, and complete an “Astronomer Profile” sheet. Several suggestions are listed below to help you tailor this activity to the skill set and interests of your students:

**Historical Focus (All Ages):** Discover how notable Canadian astronomers have contributed to the study of astronomy in the past.

Select one of the following historic Astronomers:
- Carlyle S. Beals
- Clarence Chant
- Andrew McKellar
- Peter Millman
- John Plaskett
- Helen Sawyer Hogg

**Contemporary Focus (Best for Older Students):**
When we examine how astronomy has been studied in Canada, it is easy to lose sight of the fact that astronomy is an innovative, fast-paced sector of the sciences and technologies. Discover present-day astronomers who work in Canada.

Select one of the following contemporary Canadian Astronomers:
- Arif Babul
- Joanne Brown
- Peter Brown
- Jayanne English
- Doug Johnstone
- Jaymie Matthews
- Jim Peebles
- John Percy
- Ian Short

These websites are a good starting point:

**Process for Younger Students:** Have students select an astronomer, and complete an “Astronomer Profile” factsheet. Sheets can be compiled in such a way that your class authors a “Big Book of Astronomers.” This “book” can be proudly placed in your class’s reading area as a resource.

**Process for Older Students:** The “Astronomer Profile” can serve as the first page of a larger research paper regarding that particular astronomer’s area of research.
Activity 4.3: Native Canadian Perspectives  
(Transitional – Grades 4 and up)

Canada’s Native peoples have unique interpretations of the night sky in each of its phases. Their understandings of the Earth, its origins, and its cycles, were informed by what they witnessed, year after year, in the sky above. According to Native beliefs, the Earth is seen to be flat. The Sun, stars, and other celestial bodies are believed to be moving overhead across a solid canopy. In many Native cultures, each star was believed to be a unique and powerful spirit. A selection of Native Canadian astronomy-related legends is available on the Virtual Museum of Canada’s “Canada Under the Stars” website at: http://astro-canada.ca/_en/a4101.html.

Depending on the age and abilities of your students, you could approach this material in a variety of ways:

- Break your class into small groups, and assign a legend to each group. Have each group pantomime their legend to the rest of the class, while one student reads the story aloud.

- Break your class into jigsaw groups. Have each group memorize one of the legends, and practice sharing it in a dramatic, storytelling style. Then reorganize the groups, such that one child in each group knows each story. Have students tell their stories in a sharing circle. You may choose to pass a stick between storytellers, as is customary in some Aboriginal groups.

Possibilities for Summative Evaluation Projects:

- Have students select one of the featured legends, and rewrite it in the form of a children’s book. You may wish to review the conventions of various writing styles, particularly effective children’s literature (repetition, etc.). Don’t forget to have students illustrate their work! Students may wish to share their storybooks with younger classes in the school.

- Have your students read each of the legends, and write their own astronomy-related legend. Be sure to review the conventions of story writing, particularly legends.

- Discuss the use of symbolism and iconography in Native legends, comparing Native symbolism to European Judeo-Christian literary symbolism. Examine examples of Native Canadian artwork, discussing how art can tell a story. Have students create their own artwork, in a traditional Native style, to represent one of the legends that they read.
Activity 4.4:
Across Time & Cultures: Comparing Constellation Myths
(Transitional – Grades 4 and up)

A constellation is a grouping of stars in which people have “seen” a picture. Over time, different cultures have attached unique mythical and spiritual meaning to the constellations. For a brief introduction to constellations, and their cultural significance, read Ken Tapping’s article titled “That? A Crow?” on the National Research Council’s website:


Part 1: Ask your students if they can name any constellations. Make reference to popular culture. With some prompting, students might recognize that each of the Zodiac signs shares its name with a constellation. Have your students learn about the constellations, and how they move across the night sky. Visit the National Research Council’s Interactive Planisphere at:

http://www.nrc-cnrc.gc.ca/eng/education/astronomy/constellations/planisphere.html

With this interactive tool, students can view the night sky as it appears on any given night of the calendar year. Using the included worksheet, have students select five constellations, draw them, and provide a summary of their associated myth. Note that most of the referenced myths derive from Greek and Roman mythology.

Encourage students to look up significant dates (such as their birthdays) and read about the stars that appear in the sky at that time. As they read more about each of the constellations, older students might realize that they have heard references to these names in other places (on television, in literature, etc.).

Extension Activity: Have your students create their own planispheres (or star wheels). Planisphere plans are available on the Canada Science and Technology Museum’s website at:

www.scientech.technomuses.ca/english/whatson/astronomy-resources.cfm

Students can use these planispheres to examine the night sky at home. Younger students will enjoy this opportunity to “be an expert” by pointing out the constellations for their families.

Possible Project: There are many cultural myths and legends related to each of the constellations. Have your students conduct an online research project to discover stories related to the Ursa Major (or “Big Bear”) constellation.
Activity 4.5: Canada’s Astronomical Institutions: A Research Activity (Suitable for Grades 7 and up)

Astronomy-related innovation in Canada is largely due to the work of a number of science and technology institutions. These departments and organizations encourage innovation by operating and funding a variety of important programs.

Break your class into small groups, and have each group prepare a presentation about one of the following organizations. Each group will need to conduct research online, prepare a written draft of their presentation, and compile a bibliography of their online resources (on the provided template sheet). A space for a sample bibliographical entry is provided on the worksheet – complete this example together as a class. Be sure to stress the importance of using reputable online sources.

Provide students with the following questions to guide their online research:

- What does your organization do (what is its mandate)?
- What type of organization is it? (A government department? A not-for-profit organization?)
- When was the organization founded? By whom? Why?
- Why is this organization important to the study of astronomy in Canada?

If it is feasible, encourage students to use computer technologies (such as PowerPoint) to present their finding.

Optional: You may wish to have students format their presentations using the model of a five-paragraph essay. In this case, students would need to form a thesis (i.e. “The Hertzberg Institute is an important Canadian institution”), and support this thesis with three arguments based on their online research.

**Possible Astronomy Organizations & Institutions**

*Do not provide these addresses to your students right away – allow them to use their research skills to find the sites themselves!*

<table>
<thead>
<tr>
<th>Organization</th>
<th>Website</th>
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<tbody>
<tr>
<td>National Research Council (NRC)</td>
<td><a href="http://www.nrc-cnrc.gc.ca">www.nrc-cnrc.gc.ca</a></td>
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<tr>
<td>Canada Space Agency</td>
<td><a href="http://www.asc-csa.gc.ca">www.asc-csa.gc.ca</a></td>
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<tr>
<td>Canadian Astronomical Society (CASCA)</td>
<td><a href="http://www.casca.ca">www.casca.ca</a></td>
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<tr>
<td>Royal Astronomical Society of Canada</td>
<td><a href="http://www.rasc.ca">www.rasc.ca</a></td>
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<tr>
<td>Hertzberg Institute of Astrophysics</td>
<td><a href="http://www.hia-iha.nrc-cnrc.gc.ca">www.hia-iha.nrc-cnrc.gc.ca</a></td>
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</tbody>
</table>
The Sunshine in my Day

Cut out each of these pictures, and paste it to the chart.

- rising
- eating lunch
- high in the sky
- reading a bedtime story
- going to school
- setting
The Sunshine in my Day

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>the Sun is...</th>
<th>and I am...</th>
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<tbody>
<tr>
<td>In the morning</td>
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<td>At noon</td>
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<tr>
<td>In the evening</td>
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Canadian Astronomers: A Biographical Study

Astronomer Profile

Astronomer’s Name:

Astronomer’s Education:

Biography:

Achievements:
### Constellation Myths

<table>
<thead>
<tr>
<th>Image of Constellation</th>
<th>Summary of Constellation Myth</th>
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Canada’s Astronomical Institutions

Research Project Bibliography

Sample Entry:

First Website:

Second Website:

Third Website:

Fourth Website: