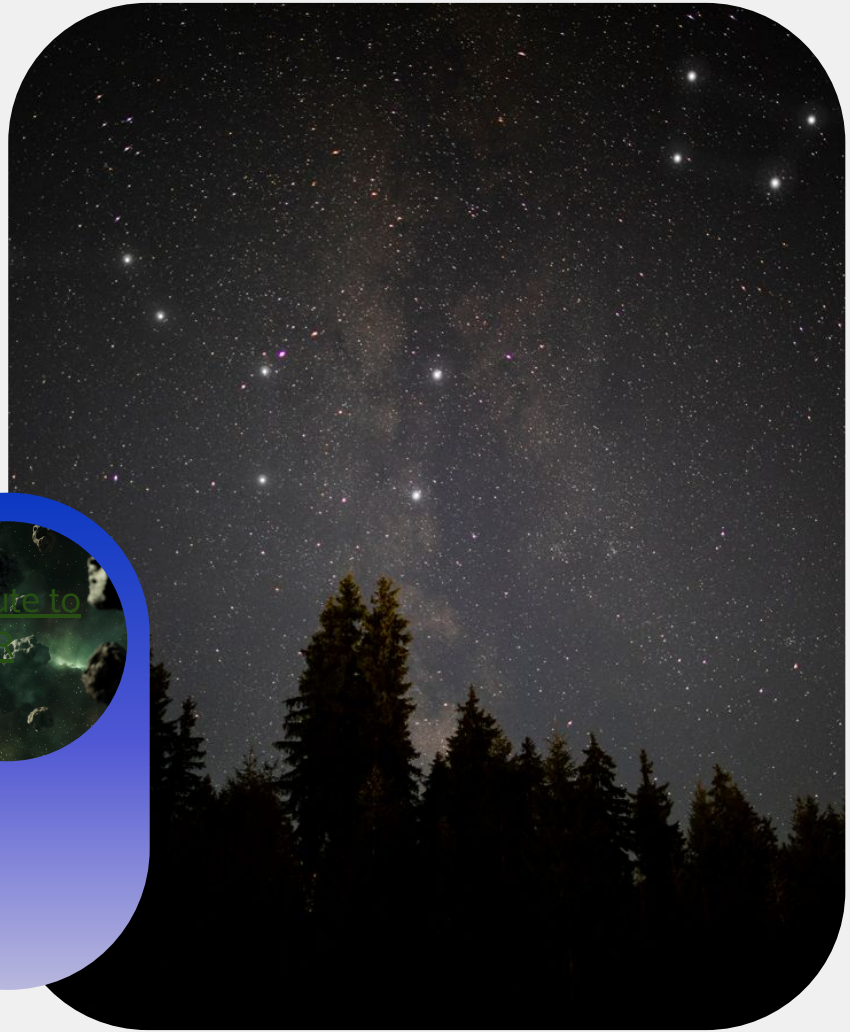
New Science Curriculum

Grade 6

Space

February 12, 2024



Facilitators
Chris Zarski
Ted Zarowny

Alberta Regional Professional Development Consortia
Adult learning for students' sake

Land Acknowledgement

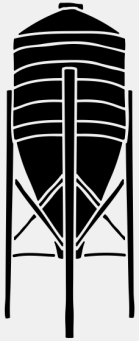
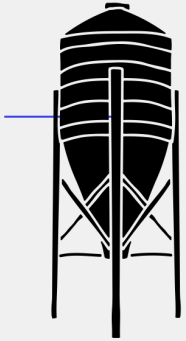
In the spirit of reconciliation, we want to acknowledge that this gathering is taking place on traditional lands across the province of Alberta, home to many diverse First Nations, Métis and Inuit peoples. We acknowledge that this land is a traditional meeting ground giving voice to its original peoples and the story of creation of this country in a way that history has forgotten.

“Canada's Indigenous people looked to the sky for guidance in practical endeavours but also spiritual identity. They look to the sky as a map, clock and calendar for thousands of years. The movement of celestial objects were observed and followed using the stars as a compass, for orientation and direction.” (ROA, University of Calgary)
Tipiskawi Kisik: Night Sky Star Stories by Wilfred Buck

Agenda

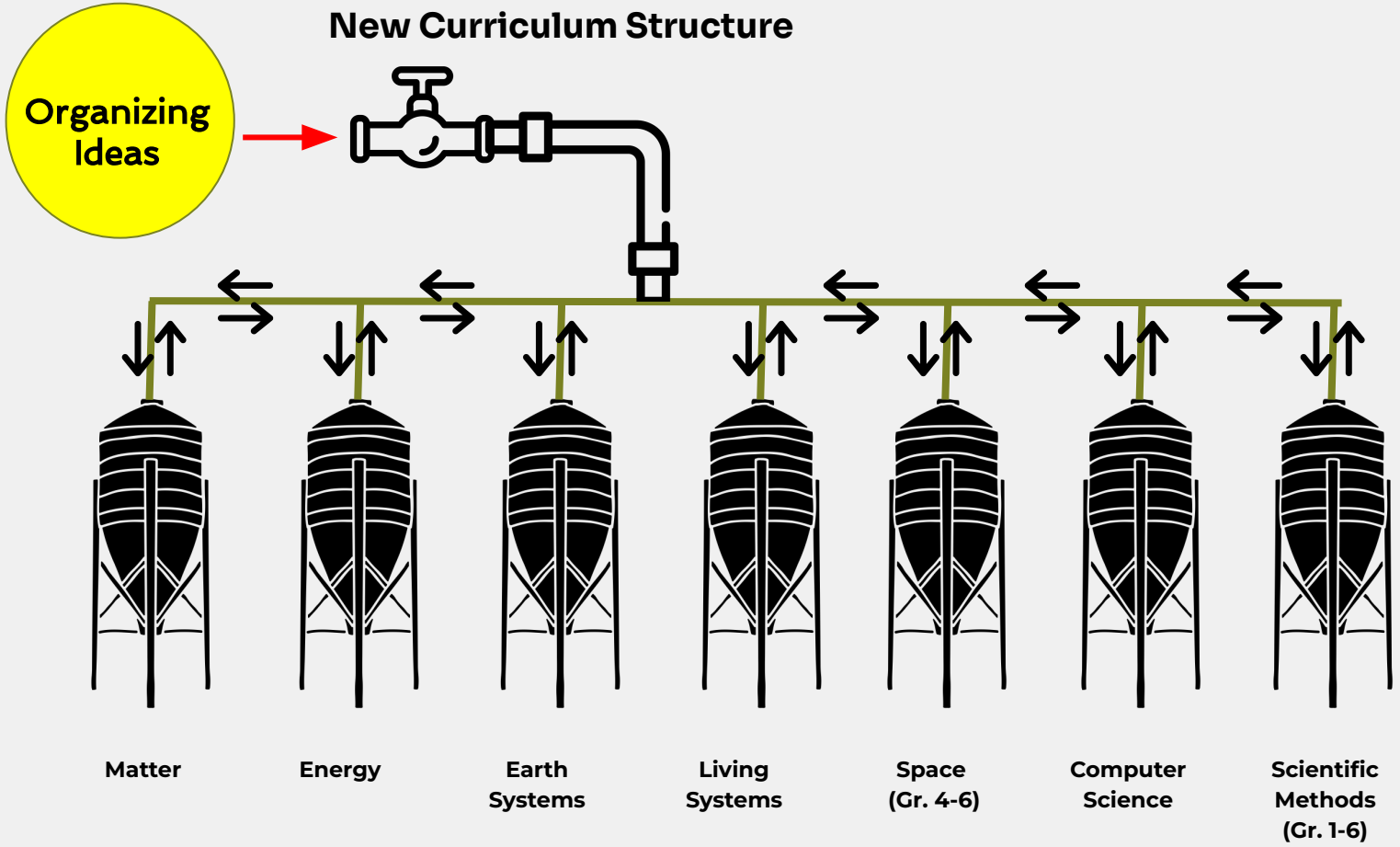
1. The New and Old Science Curriculum
2. What do Students need to Know?
3. What do Students need to be able to Do?
4. What do Students need to Know Understand?
5. Planning for Instruction (Surface - Deep - Transfer)
6. Sample Surface Level Activities
7. Sample Deep Level Activities
8. Transfer/Assessment
9. Resources

Previous Science Curriculum: Topics

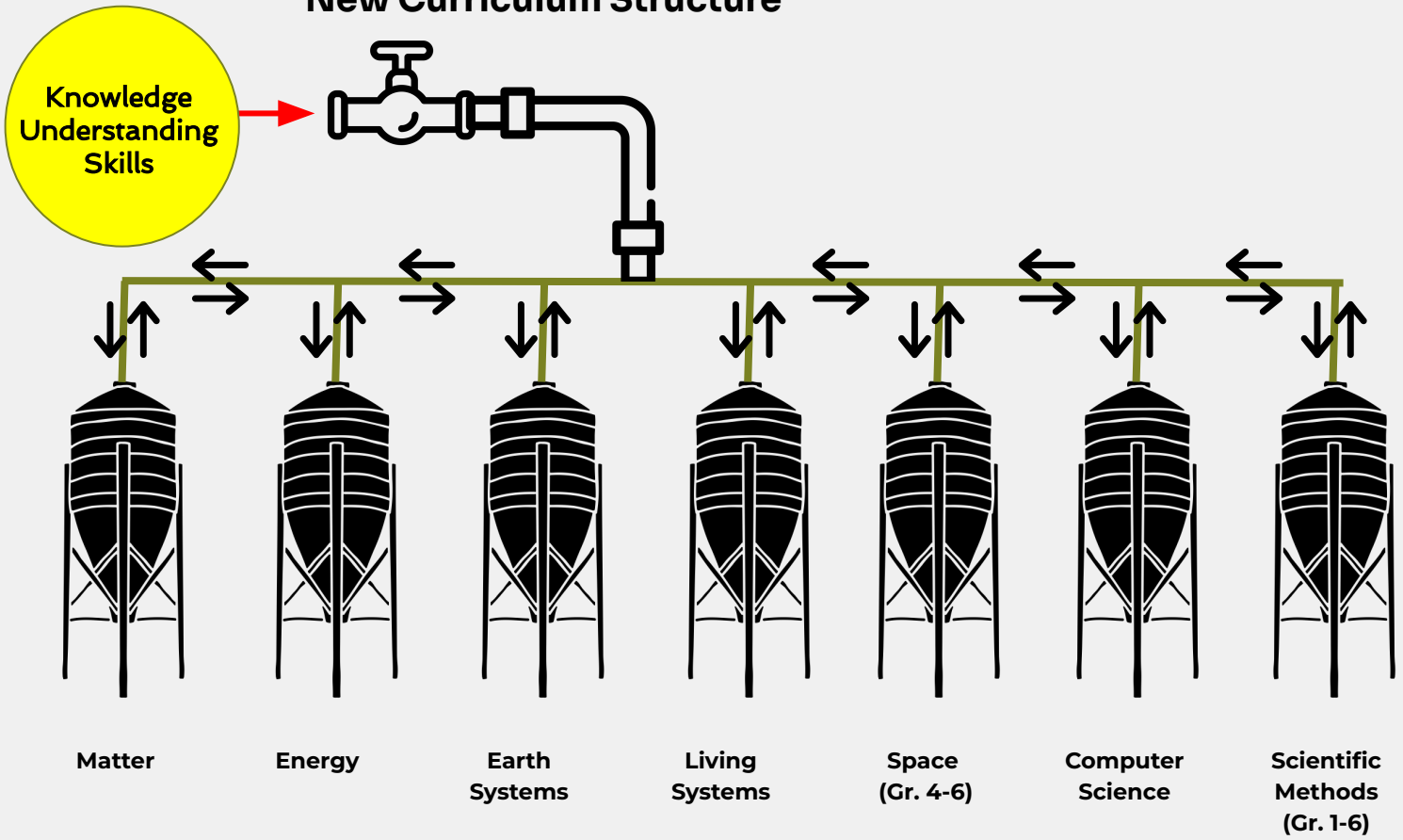




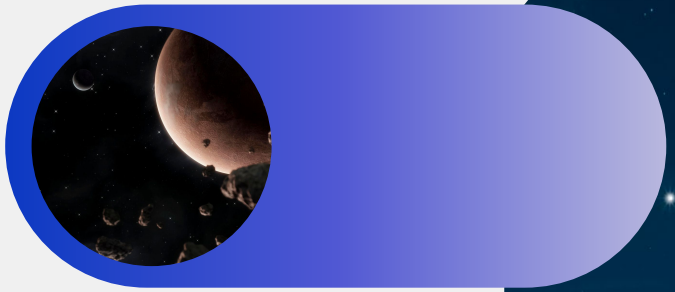
GR. 1	Seasonal Changes	Needs of Animals and Plants	Creating Colour	Building Things	Senses
GR. 2	Small Crawling and Flying Animals	Buoyancy and Boats	Magnetism	Exploring Liquids	Hot and Cold Temperature
GR. 3	Building with a Variety of Materials	Testing Materials and Designs	Rocks and Minerals	Hearing and Sound	Animal Life Cycles
GR. 4	Building Devices and Vehicles	Light and Shadows	Plant Growth and Changes	Waste and Our World	Wheels and Levers
GR. 5	Electricity and Magnetism	Mechanisms using Electricity	Classroom Chemistry	Weather Watch	Wetlands Ecosystems
GR. 6	Air and Aerodynamics	Flight	Sky Science	Evidence and Investigation	Trees and Forests

New Curriculum Structure



New Curriculum Structure





Learner Outcome:
Students analyze and represent celestial bodies of the solar system.

Guiding Question

In what ways can the solar system be explored?

What Do Students Need to Know?

KNOWLEDGE

Concept Knowledge

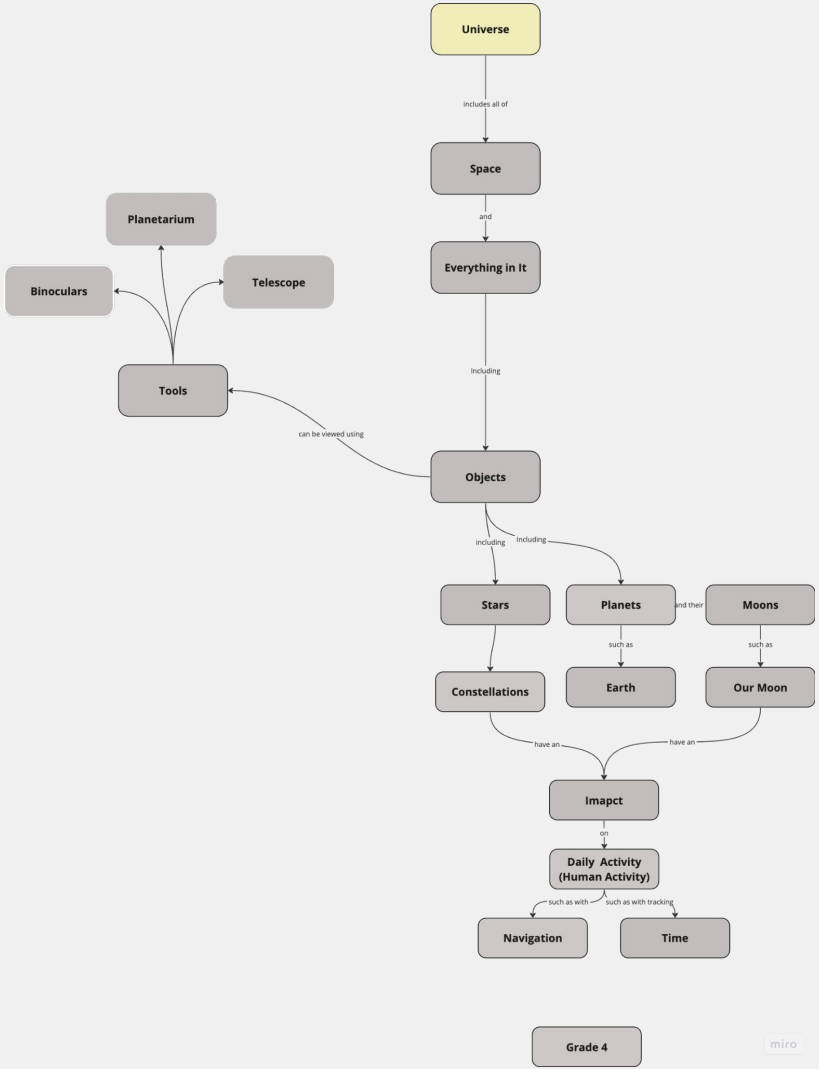
Students need to know certain concepts and their attributes related to space such as star and constellation. Some concepts are related to skills such as a prediction.

Facts

Facts are objective, verifiable pieces of information about the world such as “Earth revolves around the sun.”

Skill/Procedure Knowledge

Students need to know how to do certain skills and procedures such as the steps in an investigation, how to sort, or how to compare.

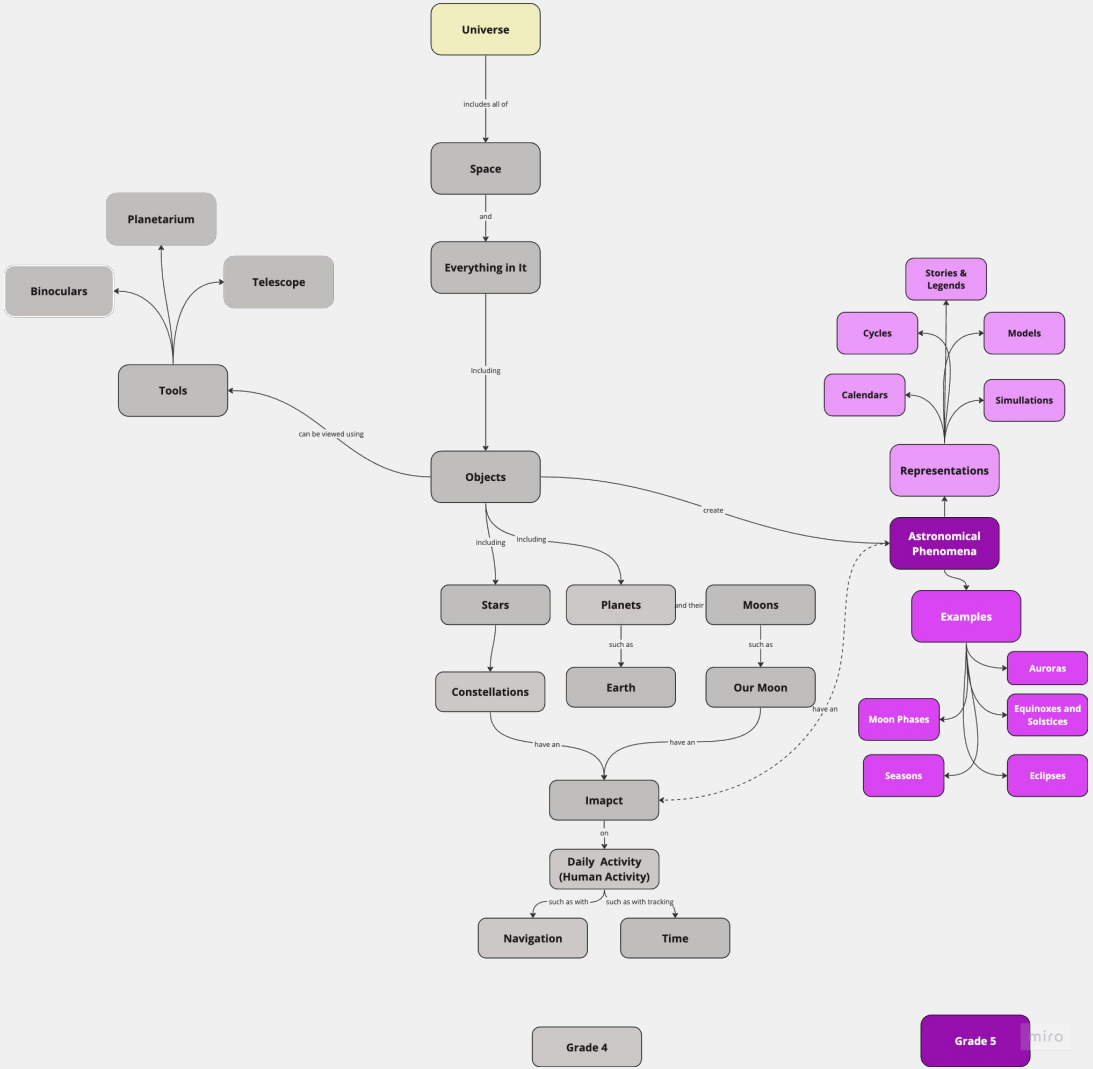


KNOWLEDGE

Grade 4 Science:Space Concept Map

"Grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully. To learn the structure in short, is to learn how things are related."

-Jerome Bruner



KNOWLEDGE

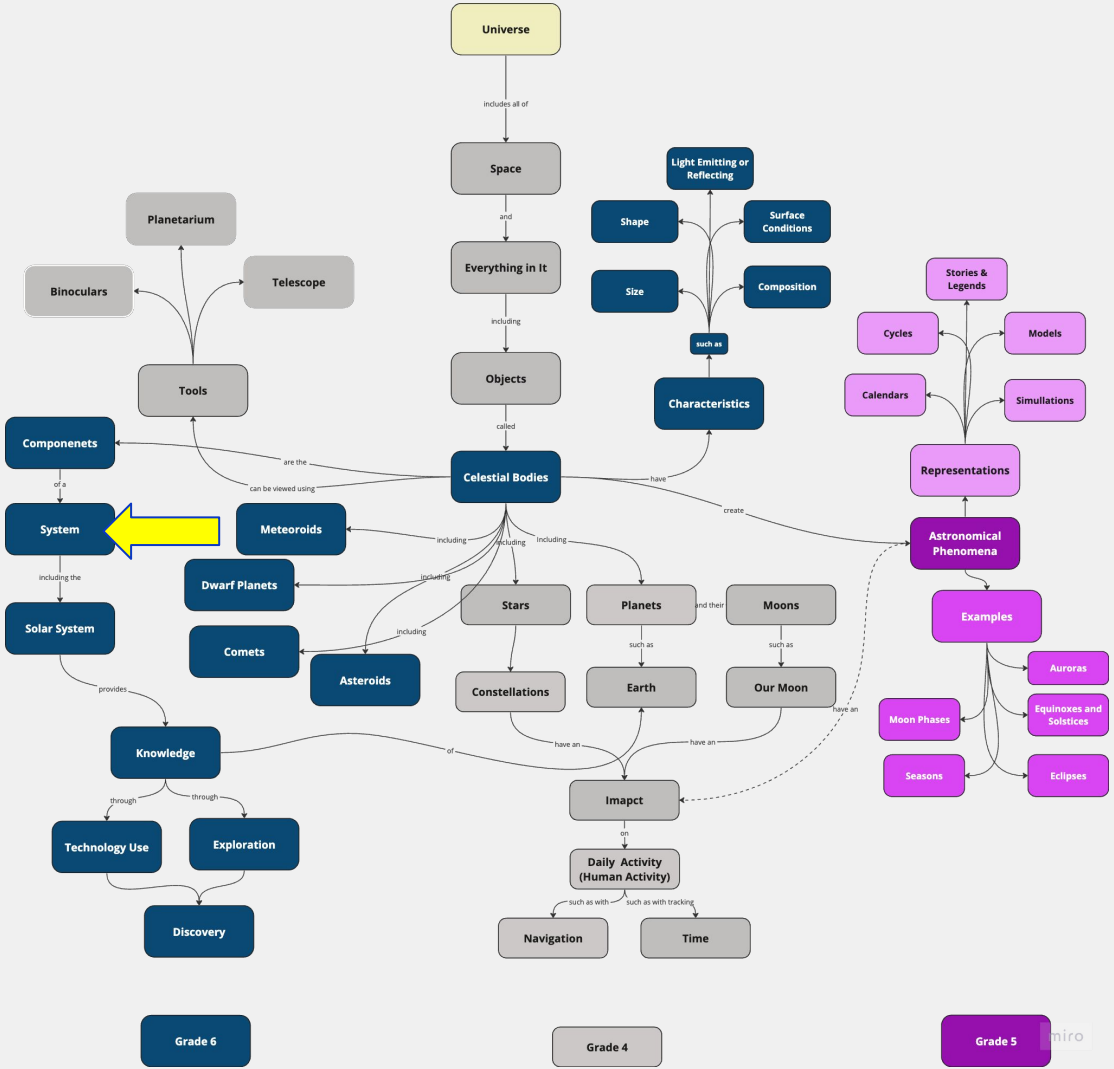
Grade 5 Science: Space Concept Map

"Grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully. To learn the structure in short, is to learn how things are related."

-Jerome Bruner

KNOWLEDGE

Grade 6 Science: Space Concept Map



"Grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully. To learn the structure in short, is to learn how things are related."

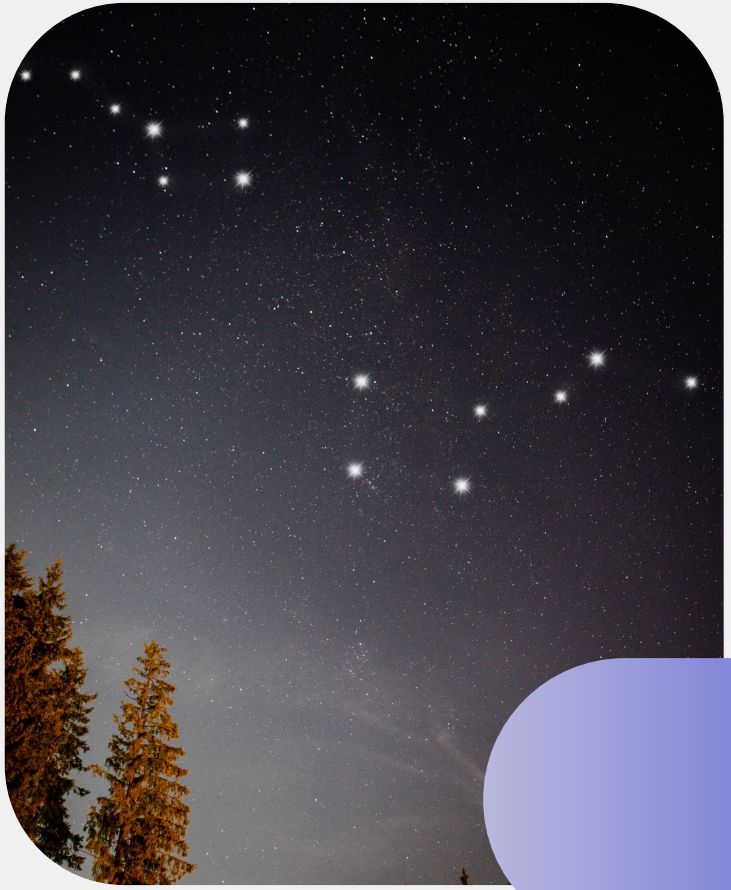
-Jerome Bruner

Grade 6 Skills and Procedure Verbs	
Skill/Procedure	Frequency
Discuss	13
Investigate	9
Compare	7
Relate	7
Examine	6
Identify	6
Describe	4
Represent	4
Explain	3
Apply	2
Classify	2
Design	2
Interpret	2
Test	2
Construct Graphs and Tables	1
Demonstrate	1
Divergent Thinking	1
Evaluate	1
Hypothesize	1
Order	1
Predict	1
Research	1
Use tools	1

What students do to demonstrate their learning.

Skills & Procedures

Grade 4-6 Skills and Procedure Verbs			
Skill/Procedure	Frequency	Skill/Procedure	Frequency
Discuss	30	Observe	3
Relate	22	Safety	3
Compare	20	Analyze	2
Investigation/Experiment	17	Collect Data	2
Examine	13	Record Observations	2
Explain	12	Measure	2
Identify	12	Test	2
Describe	11	Conclude	1
Represent	9	Decide	1
Create	6	Magnetize	1
Demonstrate	5	Test	1
Interpret	5	Construct Weather map	1
Design	5	Defend	1
Collaborate	4	Translate	1
Evaluate	4	Divergent Thinking	1
Explore	4	Hypothesize	1
Apply	3	Order	1
Classify	3	Predict	1
Plan	3	Research	1
Observe	3	Use tools	1



Skills from Scientific Methods

Investigation Progression

The steps of an investigation are introduced in **Grade 2 Scientific Methods.**

Grades 3, 4, 5 and 6 build on those steps.

Investigations 1-6 Progression

The information presented here is not intended to be a detailed summary of the Scientific Methods Organizing Idea. The intent is to highlight how the **steps of an investigation** grow in **complexity** and **depth** from Grade 1 to Grade 6

Grade 1

Steps followed during an investigation include:

1) Asking **Questions**
2) Making **Predictions**
3) Gathering **Data**
4) Forming **Conclusions**

Grade 2

Procedures scientists use to guide investigations include:

1) Asking **Questions**
2) Making **Predictions**
3) **Planning** the Investigation
4) **Observing** and **Recording Data**
5) **Analyzing** Data
6) Reaching **Conclusions**
7) **Discussing** Observations and Conclusions

Grade 3

Data

- Accuracy
- Objectivity
- Sources (Accurate & Trustworthy)

Analyzing

- Techniques

Grade 4

Data

- Descriptive (qualitative)
- Numbers (quantitative)
- Relevance

Evidence

- Data that supports the conclusion becomes evidence
- Reliability
- Validity

Système international d'unités

- international system of units

Grade 5

Phenomena

- facts or events that can be observed

Bias

Variables

- Manipulated (independent)
- Responding (dependent)
- Controlled

Experiment

- Controlled Experiment

Evidence

Communication

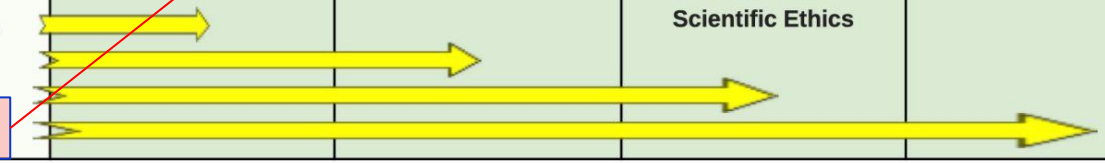
- Representation
- Clarity & Accuracy

Scientific Ethics

GRADE 6

Explanations

- Hypothesis
- Testable (falsifiable)
- Use of reliable objective data and evidence
- Describe natural phenomena
- Use of variety of texts and representations



Skills from Computer Science

Grade	Skills
K-1	Following/ Creating Instructions
2	Creativity - Originality
3	• Creativity - Divergent Thinking • Computational Thinking - Introduction
4	Design Thinking
5	Design Thinking - Creating Artifacts
	Computational Thinking - Abstraction

Computational Thinking (Gr. 3)

Sub-Skill
Break a task into smaller chunks. **(Decomposition)**
Identify the important details when reading or solving a problem. **(Abstraction)**
Find patterns and similarities in tasks. **(Pattern Recognition)**
Design instructions. **(Algorithmic Thinking)**
Working backward if a mistake is made. **(Debugging)**

Science Grade 3 Computer Science - Curriculum Planning & Assessment Resource.pdf

Application:

Create a set of instructions that could be followed by a human or a machine to complete a task.

Examples:

- Planning an Investigation.
- Planning the construction of something related to the organizing idea.

Design Thinking (Gr. 4)

A Problem-Solving Approach

Sub-Skill
Understand the Problem
Form Ideas *(Divergent Thinking)*
Plan
Create
Analyze
Test
Troubleshoot

Science Grade 4 Computer Science - Curriculum Planning & Assessment Resource.pdf

Design involves processes that can transform ideas into artifacts that meet needs by creating artifacts.

Application Example

Design can produce many artifacts, including

- algorithms (instructions)
- models
- prototypes
- blueprints
- programs
- experiments/investigations
- objects

Design Thinking ... continued (Gr. 5)

A Problem-Solving Approach

Sub-Skill
Understand the Problem
Form Ideas *(Divergent Thinking)*
Plan
Create
Analyze
Test
Troubleshoot

Science Grade 5 Computer Science - Curriculum Planning & Assessment Resource.pdf

*Students **apply** design processes when creating **artifacts** that can be used by a human or machine to address a need.*

Computational Thinking (Gr. 6)

Sub-Skill
Break a task into smaller chunks. **(Decomposition)**
Identify the important details when reading or solving a problem. **(Abstraction)**
Find patterns and similarities in tasks. **(Pattern Recognition)**
Design instructions. **(Algorithmic Thinking)**
Working backward if a mistake is made. **(Debugging)**

[Science Grade 6 Computer Science - Curriculum Planning & Assessment Resource.pdf]

Learner Outcome: *Students examine **abstraction** in relation to **design and coding**, and describe impacts of technologies.*

An **abstraction** is a simplified version of something complex (e.g., simple controls on appliances).

Using Verbs to deepen learning and demonstrate understanding.

Existing Skills and Procedure

6S1.1: Classify celestial bodies of the solar system as planets, moons, dwarf planets, asteroids, comets, meteoroids, or the Sun.

ALTERNATIVE TASKS

COMPARE celestial bodies of the solar system as planets, moons, dwarf planets, asteroids, comets, meteoroids, or the Sun.

Scientific Methods

Computer Science

Grade 4-6 Skills and Procedure Verbs

Skill/Procedure	Frequency	Skill/Procedure	Frequency
Discuss	30	Observe	3
Relate	22	Safety	3
Compare	20	Analyze	2
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Apply	3	Order	1
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Observe	3	Use tools	1

Understandings

Understanding is “how facts and knowledge fit together in a logical and meaningful order.”

Solar System

Information

Earth

Exploration

What is a logical and meaningful way these concepts can be related?

Grade 6 Space Understandings

6S1.1: Information about Earth can be acquired through exploration of the solar system.
6S1.2: Knowledge of the solar system continues to develop with further space exploration, discovery, and use of technologies.

Earth Systems Grade 4: Students investigate **the systems of Earth** and reflect on how their **interconnections** sustain life.

Grade 6: Students investigate climate, changes in climate, and the **impact of** climate change on Earth.

Living Systems Grade 6: Students investigate the characteristics and **components of and interactions within ecosystems.**

Space : Students analyze and represent celestial bodies of the solar system. ?

Space: Understandings of the living world, Earth, and space are deepened by investigating natural systems and their interactions.

In what ways can the solar system be explored?

Students analyze and represent celestial bodies of the solar system.

Knowledge	Understanding	Skills & Procedures
Scientific exploration of space has revealed that Earth is an interconnected part of a group of planets that orbit the Sun. The solar system is a complex group of celestial bodies that include • the Sun (a star) • planets and their moons • dwarf planets • asteroids • comets • meteoroids Celestial bodies are natural bodies located beyond Earth's atmosphere. Celestial bodies have characteristics that vary in many ways, including • surface conditions; e.g., temperature, gravity, and atmosphere • composition; e.g., gas, ice, or visible rings • size • shape; e.g., round or irregular	Information about Earth can be acquired through exploration of the solar system.	Name and order the planets in the solar system and identify the location of the main asteroid belt. Classify celestial bodies of the solar system as planets, moons, dwarf planets, asteroids, comets, meteoroids, or the Sun. Represent and describe the characteristics of celestial bodies in our solar system. Examine celestial bodies that emit or reflect light. Discuss the reclassification of Pluto. Interpret physical, pictorial, or digital models of the solar system. Investigate digital or non-digital resources that contribute to understandings of the solar system


PLANNING
Begin with the end in mind.

Summative Assessment

Assessment Sample #1

Create a representation that helps to explain how the solar system can be considered a system.

Assessment Sample #2

Choose one other system we studied in science (Earth Systems). Explain ways in which the solar system and your system of choice interact with each other.

Hattie, Fisher & Frey: *Visible Learning for Literacy* (2016)

Phases of Learning

Surface

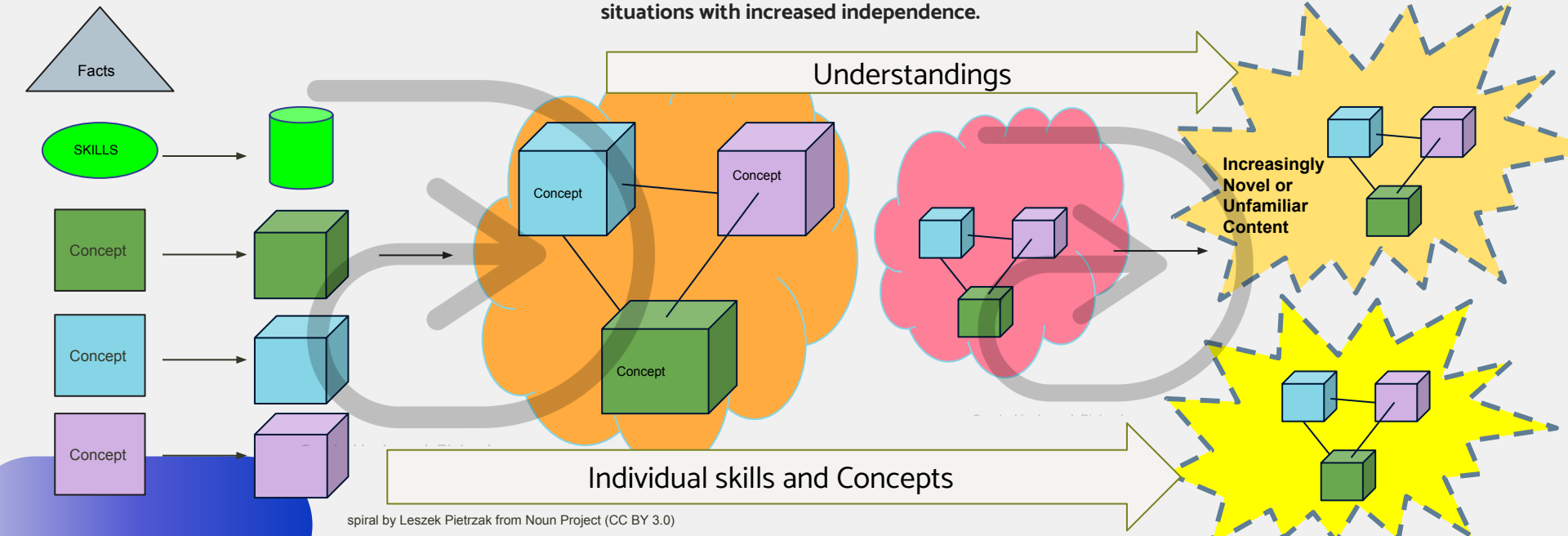
Students are first exposed to individual skills, concepts and their related knowledge.

Deep

Students make connections between concepts to create deeper understanding and appropriately skills/ procedures to new situations with increased independence.

Transfer

Students apply concepts, understandings and skills to a variety of novel and unfamiliar contexts.

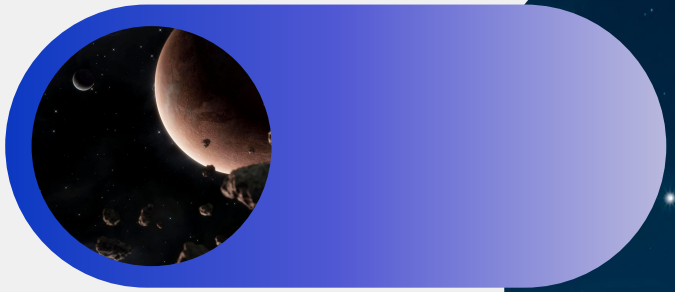


spiral by Leszek Pietrzak from Noun Project (CC BY 3.0)

01

Surface Level

Students are first exposed to individual skills, concepts and their related knowledge.



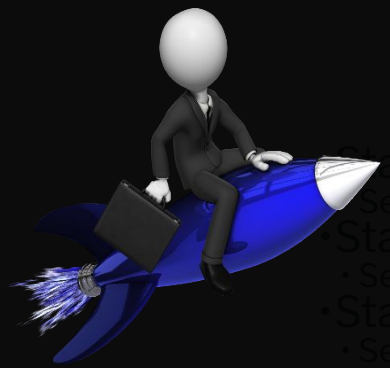
Learner Outcome:
Students investigate and describe objects in space in connection to daily life.

Grade 4 Background

Guiding Question

How do objects in space impact daily life?

Why do humans study and explore space?



Have students work with a partner and make a list.

What are the advantages and disadvantages of this exploration?

Advantages	Disadvantages
helps to address questions about our place in the Universe	danger/risk
history of our solar system	higher exposure to radiation
collaboration with other countries	cost
expands technology and create new industries	gravity, closed environment

What do we mean when we say “The Universe”?

The Universe is everything! It includes planets, stars, the smallest particles to the largest galaxy.

Photo: NASA Adapted from *The Universe*

What are some of the space objects we see in the sky?

- moon
- sun (is a star)
- stars
- planets (appear as stars without assistance to see them.

Create an infographic describing each.

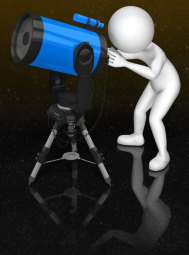
What technologies do we have to view objects in space?

- moon
- sun (is a star)
- stars
- planets (appear as stars without assistance to see them.

Can we see stars with our eyes just by looking up? (discuss when is the best time to see Stars (night); are there any safety concerns to be discussed (can't look at the sun directly sometimes a double layer of sunglasses allows you to see a solar eclipse)
What is light pollution?
What other technologies assist us in seeing objects in space?

Stargazing tips

Dreamstime.com ID#29143802



Dreamstime.com ID#6097954 Jeff Whyte

What are binoculars? How do they help us see stars?

How does a telescope work?

Compare the observations you would get from a telescope pictured above with the one at the Hesje Observatory at Miquelon Lake Provincial Park. (Dark Sky Reserve)

Telus World of Science

Research this centre or one closer to you and determine where and how you can view space objects.

4S1.2

Stars and constellations are recognizable from Earth and can be used for navigation and tracking the passage of time.

Resource- look to the bottom of each linked page for individual resources.

Astronomy: Student Resource

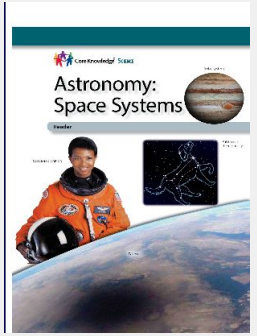
Chapter 6: Constellations

Astronomy :Teacher's Guide

Lessons 8, 11 & 12.
AP (Activity Pages located at the end of the Teacher's Guide.

Astronomy : Space Systems

Online resource links



Sun, Moon and Stars: Student resources

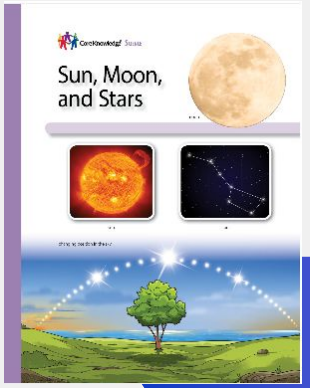
Chapters 5 & 6: How Does the Starry Sky Change? & Astronomers

Sun, Moon and Stars: Teacher's guide

Lesson 4

Sun, Moon and Stars

Online resource links

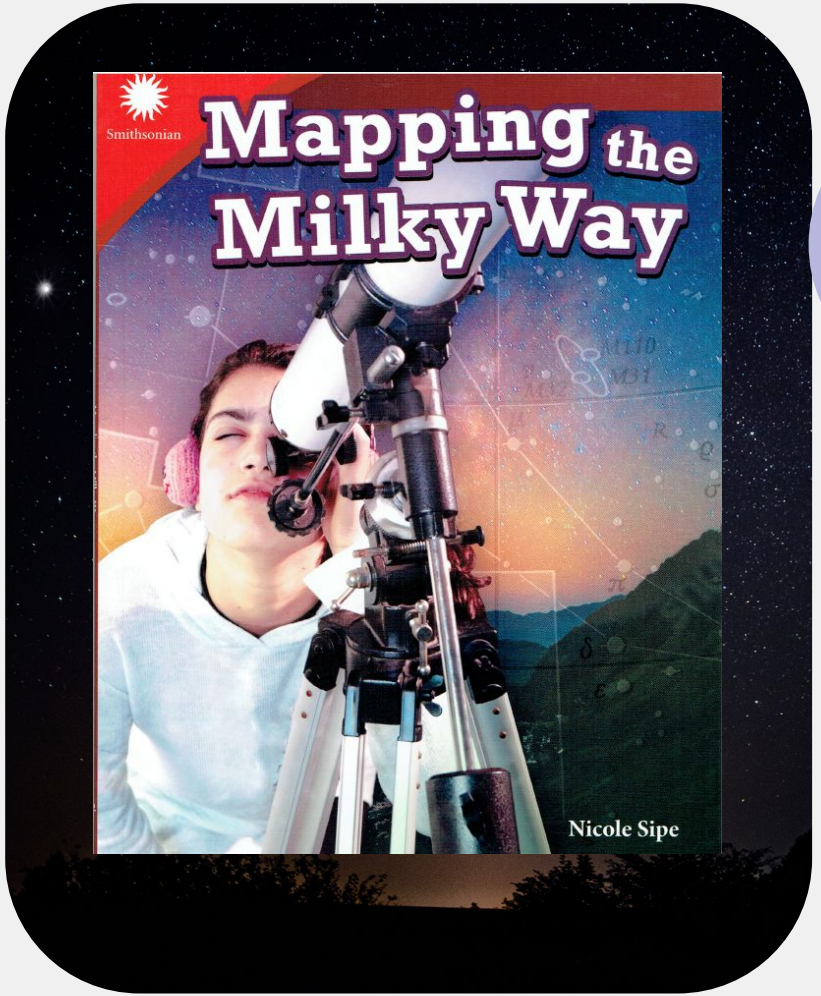


Other Sample Activities (Surface)

*While planning surface activities, keep in mind that many skills have related **concepts.***

Broad Concepts & Skills

- System (Under Revision)
- Relationship
  - Concept Map
  - Cause and Effect
  - Dependence
  - Affect/Effect
  - Interaction
  - Interconnection
- Change
  - What is Change?
  - What is Significant Change?
  - Change & Time
  - Physical Change
- Representation
- Human Activity
- Impact (Under Construction)
- Compare and Contrast
  - Criteria
  - Similarity and Difference
- Investigation Steps
  - Asking Questions (Notice and Wonder)
  - Observing (Using senses)
  - Analyzing
  - Prediction and Predicting
  - Conclusion
  - Sample Introduction to Research as an Investigation (Gr. 3)
    - One Point Research Rubric (Gr. 4-6)
    - Research Information Gathering
- Div 2 Discussing Checklist
- Evaluating (Under Construction)



When it comes to mapping the Milky Way, scientists know one thing for sure. They know that there is still a lot that they do not know! Discover how they study the Milky Way, and learn about the galaxy that we call home. Created in collaboration with the Smithsonian Institution, this Smithsonian Informational Text builds students' reading skills while engaging their curiosity about STEAM topics through real-world examples. It features a hands-on STEAM challenge that guides students through every step of the engineering design process and is perfect for makerspace activities. It makes STEAM career connections by providing a glimpse into the lives of real-life Smithsonian employees currently working in STEAM fields. Discover engineering innovations that solve real-world problems with this book that touches on all aspects of STEAM: Science, Technology, Engineering, the Arts, and Math!

EPIC

Compare Binoculars and Telescopes

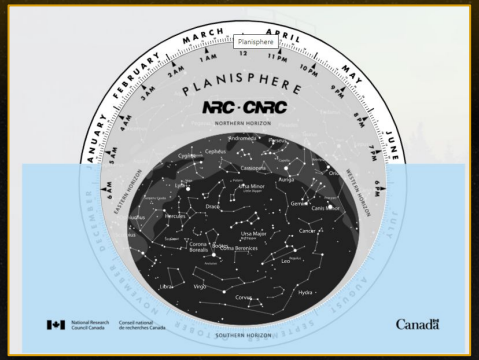
- What You Can See In A Telescope
  - https://www.youtube.com/watch?v=-gF0kp2EK20
  - https://www.youtube.com/shorts/pNhJwQzaHPM
- Telescope Expectation and Reality #1: https://www.youtube.com/watch?v=Z6NIBBldy8U
- Telescope Expectation and Reality #2 : https://www.youtube.com/watch?v=jI7IPPmu76U
- Binoculars: https://www.youtube.com/watch?v=b61hchvp8es (begin at 3:25)

Hubble Telescope

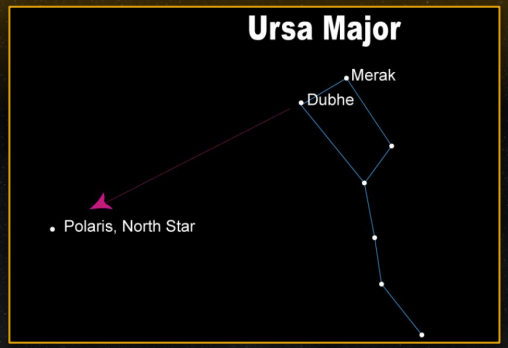
- Hubble: Tour: https://www.youtube.com/watch?v=XZ_WeTGCU90
- Visible Light vs. ultraviolet light: https://www.nasa.gov/content/explore-light
- Hubble https://www.nasa.gov/content/discoveries-hubbles-deep-fields
- Example of Hubble observation: https://www.youtube.com/watch?v=yfWYXY85mBk

How can stars and constellations be used for navigation and the passage of time?

Shutterstock: ID 1451142569



Canada Under the Stars © ASTROLab du parc national du Mont-Mégantic 2023



EarthSky.org

Record and compare observations of objects in space during the day and night.

Safety caution!

How do the objects in space change position over time?

Planisphere

Why is polaris an important star?

Do you know the name of any stars or constellations?
Who created the constellations? Why are they important?

Use if students did not engage in the research earlier.

Polaris is part of the Big Dipper. Why is it an important star to know how to find?
Orion also has an important star to help find locations. Explain?
Find one of the 88 constellations located along the belt used by scientists and research it. How did it gets its name, where and when would we see it?

Star Finder - Find Constellations based on date and time

First Nations & Other Cultures

Makinak: The Turtle by Wilfred Buck

Star Stories: The Never-ending Bear Hunt Smithsonian

Star Stories: Quillwork Girl and Her New Seven Brothers (Cheyenne Story)

Star Stories: The Girl and Her Seven Brothers (Native American)

Star Stories: The Star That Does Not Move (Paiute)

What is Inuit Mythology? |

Night Sky Network

Real Time Night Sky
[Planner]

Sky and Telescope
Interactive [Sky Chart] - enter your postal code

Virtual Planetarium provide a 27 minute overview of many of the key concepts contained in Grade 4. Could be used as an opening video to Grade 5 with no previous Space study.

Understanding Astronomical Phenomena

Space Grade 5

Anchoring Concepts

PHENOMENON & ASTRONOMICAL PHENOMENON

Guiding Question: How are astronomical phenomena observed and interpreted?

Learning Outcome Students investigate and interpret astronomical phenomena.

OBSERVATION

Click on the box for a sample surface-level activity.

HUMAN ACTIVITY

DAILY LIVING
(Daily Human Activity)

REPRESENTATION

INTERPRETATION

Key Skills

Learning Outcome Students **investigate** and **interpret** astronomical phenomena.

COMPARING

Criteria

INTERPRET

RELATING

Relationship

Concept Mapping

Click on the box for a sample surface-level activity.

Astro Who? What are Astronomical Phenomena?

Astronomical Phenomena are observable *events* that happen among objects in space.

events

Can be represented by

- Calendars
- Cycles
- Stories & Legends
- Artifacts
- Models
- Digital Simulations

predictable patterns & cycles

Auroras and Eclipses

Moon Phases

Seasons → Length of day and night

What are Your Interpretations?

How does the earth's rotation and revolution contribute to day and night?

What is the relationship between the earth's tilt and our seasons?

Design and Build!

How Can You Model Day and Night or the Seasons?

Problem: Design and build a device to model either day and night or the seasons.

Be an engineer:
generate possible solutions and choose one, identify tools and materials, construct, test, evaluate solution, make changes, collaborate

You will need:
- materials of your choice
- recording device (optional)

What to Do

1. Brainstorm a list of ways to model your choice. Then choose the best idea.
2. Make a list of tools and materials you will need.
3. Decide how you will test your device. How will you know if it works well? What criteria does it need to meet?
4. Carry out your plan. Test your device by demonstrating it to your classmates.
5. Use your observations and your classmates' feedback to improve your device. Build a final version of your device.

Record

Present your model to the class and explain it. Or, make a video of your model in action. Or, draw labelled sketches showing how your model works.

Explain and Conclude

What changes could you make to improve your model? How well did your device model Earth's motions? How might your model help a younger student understand day and night or the seasons?

Think of Another Question

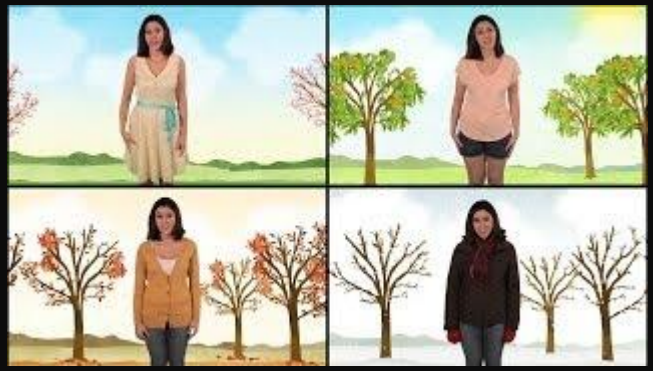
What else could you model about Earth and the Sun?

14

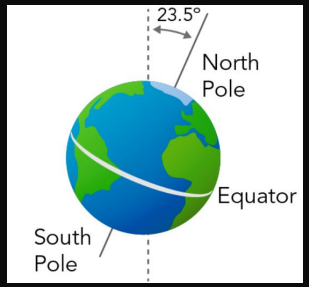
15

Chapman, A., Hayhoe, C., & Power, A. *Science 6 - Unit 1 Space*. Science Resource from Newfoundland and Labrador. Nelson Education Ltd. 2018.p 14-15

How do the seasons vary between the two hemispheres?



Why do we have Seasons? Spring, Summer, Fall, Winter - Science for Kids



Source: *Let's Talk Science* using an image by **shoo_arts via iStockphoto**.

Why do we have Seasons - Lessons & Google Classroom links (PBS in conjunction with NASA Learning Series)

What is the relationship between the earth's tilt and experiencing changes in the length of a day? How does this relate to the seasons? Model your thinking.

(Flashlight and a basketball)

or

Why do the northern hemisphere and southern hemisphere experience opposite seasons at different times of the year? Explain or model your thinking.

or

Relate the terms equinox and solstice to the seasons.

Deep Strategies: Concept Maps

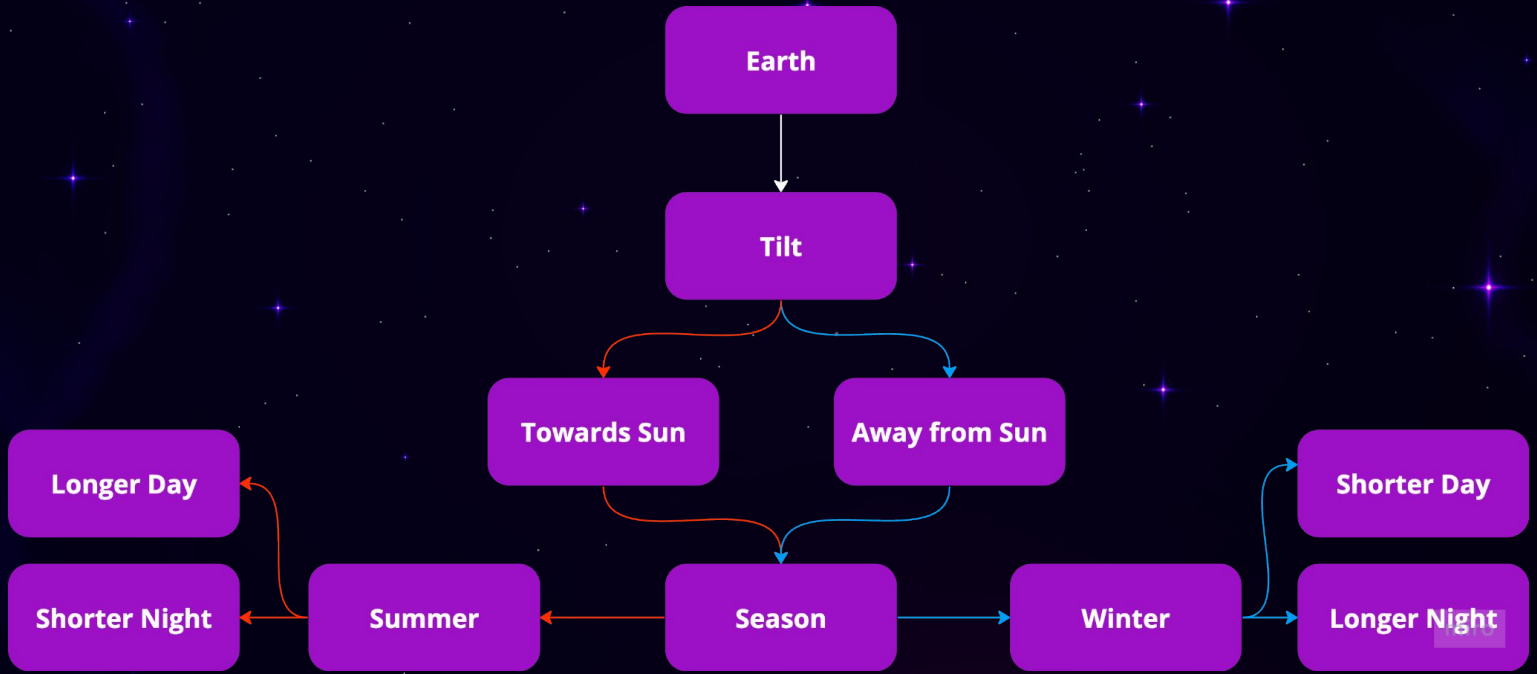
5S1.1: **Connect** the direction of **Earth's tilt** in relation to the **Sun** to the **length of day** and **night** in each **season.**

Example: *Show the connection between the direction of Earth's tilt in relation to the Sun to the length of day and night in each season by arranging the following ideas into a meaningful concept map.*

Shorter Day	Towards Sun	Winter	
Summer	Season	Longer Night	Shorter Night
Earth	Away from Sun	Longer Day	Tilt

Skills and Procedures: Connect

5S1.1: **Connect** the direction of Earth's tilt in relation to the Sun to the length of day and night in each season.



Let’s Explore the Moon and Its Phases

Photo by Rotheny Astrophysical Observatory, University of Calgary. *The Moon and Indigenous Skylore* .

The Moon's Phases

Phases of the Moon: Astronomy and Space for Kids - FreeSchool

What causes the phases of the moon?

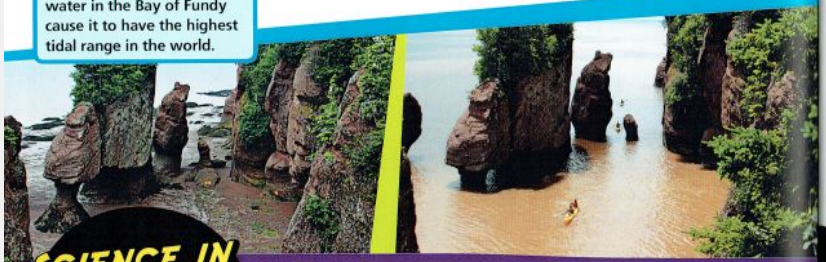
Makinak: The Turtle by Wilfred Buck

Lunar Cycle, Why The Moon Change Shapes, 8 Phases Of The Moon, Learning Videos For Children This video also has an interactive component to challenge students learning.

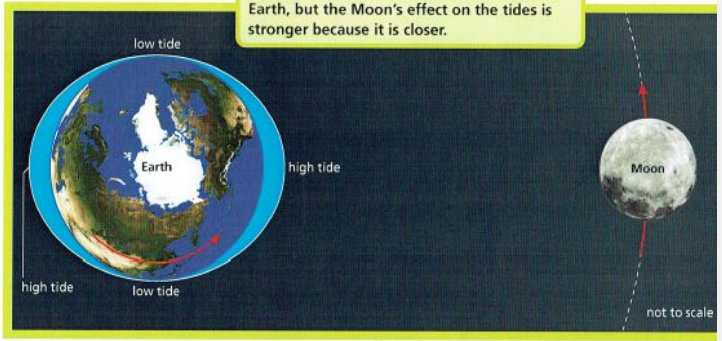
WHAT CAUSES TIDES?

If you live near a coastline, you know that the level of the ocean changes approximately every six hours. These regular changes in the level of the ocean are called **tides**. What do you think a high tide is? What is a low tide? What else do you know about tides?

The shape and movement of water in the Bay of Fundy cause it to have the highest tidal range in the world.



The gravitational pull of the Moon on Earth and Earth's oceans causes high and low tides. As Earth rotates, and as the Moon orbits Earth, the tides change. The Sun also pulls at Earth, but the Moon's effect on the tides is stronger because it is closer.



SCIENCE IN ACTION!

What Causes the Patterns of the Tides?

Be a scientist: conduct research, compile and display data, analyze data, draw conclusions

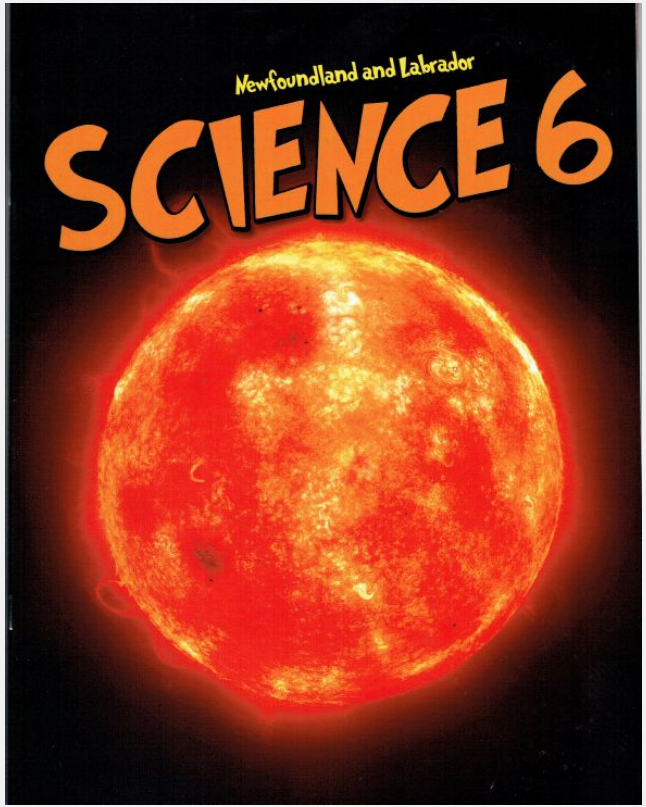
You will need: tide graph; Moon calendar; pencil; Internet access; computer (optional)

1. Examine the tide graph. What information does it tell you? Who might find this information important?
2. What patterns do you see in the tide graph?
3. Examine the Moon calendar. On what date is the full Moon? The two half Moons? The new Moon?
4. Sketch the phases of the Moon on your tide graph. Be sure to match the correct dates.
5. What patterns do you see? Infer a possible cause for the tides.

WHAT DO YOU THINK? 4C

1. Use words and sketches to explain what causes tides.
2. Interview a fisher to find out how tides affect his or her job. When is the best time to launch a boat? When is the best time to fish?
3. When do you think a higher tide would occur: when the Sun and Moon are lined up, as in the diagram or when the Sun and Moon are not lined up? Why?

Chapman, A., Hayhoe, C., & Power, A. *Science 6 - Unit 1 Space.* Science Resource from Newfoundland and Labrador. Nelson Education Ltd. 2018.p 22-23



Chapman, A., Hayhoe, C., & Power, A. *Science 6 - Unit 1 Space.* Science Resource from Newfoundland and Labrador. Nelson Education Ltd. 2018

Lunar Calendar

How the Moon Makes Calendars

What's the difference between lunar and solar years?

Gregorian Calendar

Turtle Island

You may wish to revisit the video of *Makinak: The Turtle by Wilfred Buck*

The full story of each Moon from a Cree Culture perspective can be found here.

Transfer:
What is the relationship between the lunar calendar and Makinak?

How do people use both the Solar and Lunar calendars at the same time? Explain.

“Traditional First Nations and Inuit ceremonial gatherings are tied to a seasonal time frame rather than specific dates. In the Pacific Northwest, First Nations held various ceremonies to celebrate the gift of salmon when the first fish of the year was caught. Similarly, eastern First Nations had regular ceremonies to show gratitude for the plants that fed them, with celebrations for green corn, strawberries, and the maple tree, for example.” (Walking Together. *First Nations, Metis and Inuit Perspectives in Curriculum: Symbolism and Traditions.* Government of Alberta. p.2 of 4*)*

Auroras

What are the [Northern Lights]

(Credits: Canadian Space Agency, NASA, Neil Zeller)

Many cultures connect observations of objects in space to time, place, and daily life in various ways.

What legends related to Astronomical Phenomena have you heard?
Research a legend or story and select a way to present your information.

STAR STORIES: The Pleiades

STAR STORIES: Orion

Star Stories: The Fox and the Stars

Additional Resources

NASA STEM Engagement

A brief history of Time Measurement.

Virtual Planetarium: Sun Moon Stars
In this show, we'll observe the sun's daily path across the sky, classify bright and faint stars, note shapes of common constellations, and learn more about the universe around us!

Native Skywatchers
This site provides both Native American and Canadian resources related to Indigenous Astronomy.

Relearning the Star Stories of Indigenous Peoples
Taylor, C. Science Friday: *Relearning the Star Stories of Indigenous People's. 2019.*

TRANSFER/ ASSESSMENT

Surface/Deep Strategies: Spectrum Sort

Moons

Comets

Sun

Other Planets

Dwarf Planets

Meteoroids

Asteroids

LEAST

MOST

Impact on Earth

Understanding 5S1.1

Observations and **interpretations** of **astronomical phenomena** can inform **daily living**.

Change the Understanding to a Conceptual Question

What is the relationship between **observations**, **interpretation**, and **astronomical phenomena** and **daily living**?

Sample “Deep” Learning Task

Skills & Procedures 5S1.1e (Surface)
Explore First Nations, Métis, and Inuit understandings of phases and cycles within astronomical phenomena that inform ways of living and community activities.

Conceptual Question (Deep)

1) What is the relationship between **observations,** **interpretation,** and **astronomical phenomena** and **daily living**? Justify your response using
   - your life and experiences and
   - what you learned after your First Nations, Métis, and Inuit exploration.

2) Choose a way to **represent** your understanding.

Resources

UNIVERSITY OF CALGARY

ROTHNEY ASTROPHYSICAL OBSERVATORY

The Rothney Astrophysical Observatory is located under the starry skies of the traditional territories of the peoples of Treaty 7, which include the Blackfoot Confederacy (comprised of the Siksika, the Piikani, and the Kainai First Nations), the Tsuut'ina First Nation, and the Stoney Nakoda (including Chiniki, Bearspaw, and Goodstoney First Nations). The City of Calgary is also home to the Métis Nation of Alberta (Districts 5 and 6).
This site offers a wealth of information for teachers and students to use in the study of Space.

Resource- look to the bottom of each linked page for individual resources.

Astronomy: Student Resource

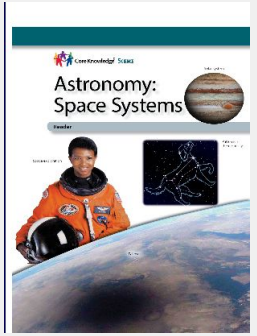
Chapter 6: Constellations

Astronomy :Teacher's Guide

Lessons 8, 11 & 12.
AP (Activity Pages located at the end of the Teacher's Guide.

Astronomy : Space Systems

Online resource links



Sun, Moon and Stars: Student resources

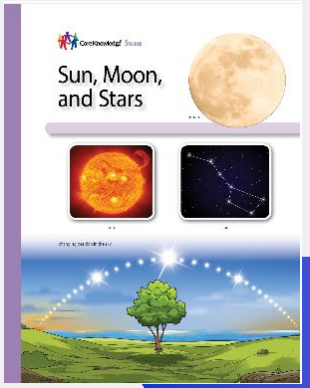
Chapters 5 & 6: How Does the Starry Sky Change? & Astronomers

Sun, Moon and Stars: Teacher's guide

Lesson 4

Sun, Moon and Stars

Online resource links



The Night Sky

Wilfred Buck
Melissa Purcell

Pearson

Contents

Stories in the sky

At night, the sky covers us like a blanket. From beneath this twinkling blanket come stories that remind us of who we are and where we came from. Our Elders have told us these stories.

Across Canada, Elders from First Nations, Métis, and Inuit communities share different stories about the sky at night. Stories differ from one community to another but they all help us to understand and learn about our **culture**.

Dans le ciel

Wilfred Buck
Melissa Purcell

Traduit et adapté par
Johanne Proulx

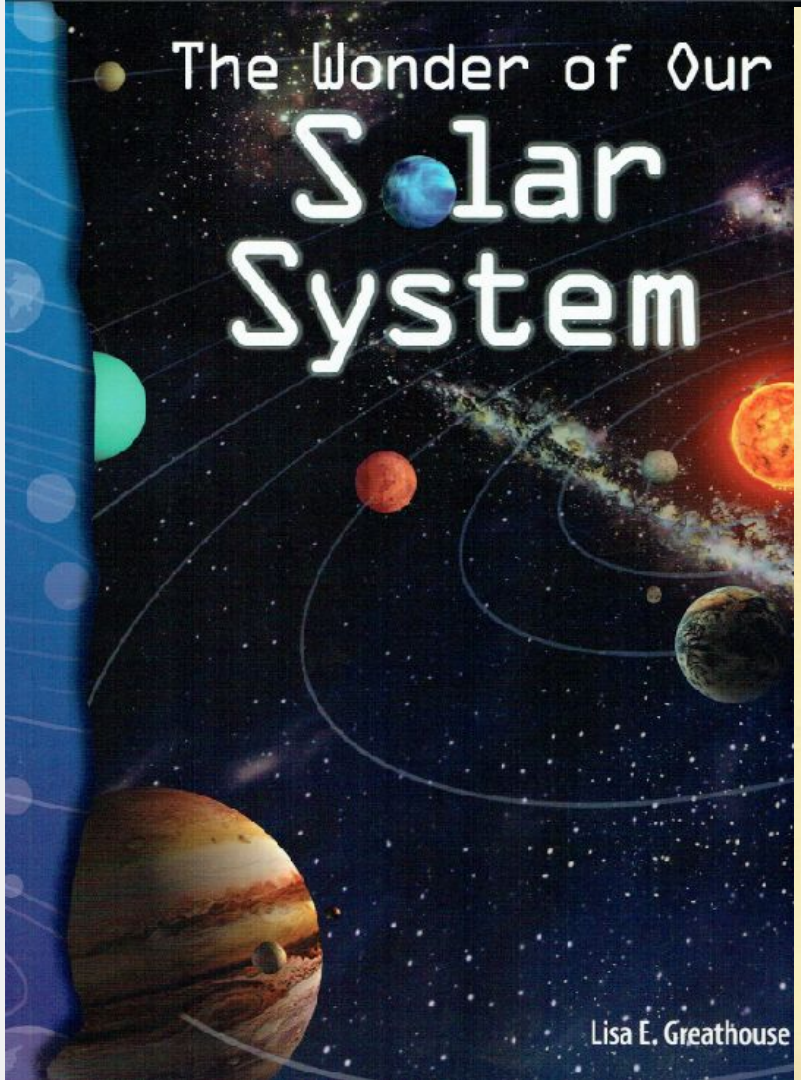
Vivre
AU CANADA

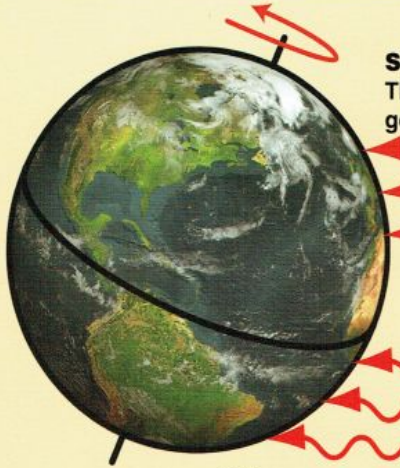
Table des matières

Les histoires dans le ciel

La nuit, le ciel nous enveloppe, comme une couverture. Les étoiles nous racontent des histoires sur nos **origines** et sur notre culture. Nos aînés ont raconté ces histoires.

Les aînés inuits, métis et des peuples des Premières Nations partagent des histoires sur les étoiles et les **constellations**. Les histoires sont différentes d'un peuple à l'autre. Chaque histoire contribue à notre culture.





Four Seasons

The way Earth is tilted causes the seasons. For part of the year, the northern half of Earth leans toward the sun and gets direct sunlight. So, it's summer there. At the same time, the southern half leans away from the sun and gets less sunlight. So, it's winter there.

The tilt doesn't change. It is the position of the planet around the sun that changes. As Earth goes around the sun, different parts get more sunlight. That makes the seasons.

Sources

Erickson, K & Doyle, H. NASA Space Place
https://spaceplace.nasa.gov/

Greathouse, L. The Wonder of Our Solar System. Teacher Created Materials. (2007). p.14

McClure, B & Macholtz, EarthSky: Polaris is the North Star. May 22, 2020
https://earthsky.org/brightest-stars/polaris-the-present-day-north-star/

Patel, Z.S., Brunstetter, T.J., Tarver, W.J. *et al.* Red risks for a journey to the red planet: The highest priority human health risks for a mission to Mars. *npj Microgravity* 6, 33 (2020).
https://doi.org/10.1038/s41526-020-00124-6

Taylor, C. Science Friday: *Relearning the Star Stories of Indigenous People's. 2019*
https://www.sciencefriday.com/articles/indigenous-peoples-astronomy/

Alberta Regional Consortia

Grade 6 Space Surface Level

Knowledge / Concepts		
System	Asteroid	Exploration
Celestial Body	Comet	Discovery
Solar System	Meteoroid	Technology
Star (the Sun)	Orbit	Interconnection
Planet	Satelite	Interaction
Dwarf Planet	Natural Satellite	Relationship
Moon	Artificial Satellite	Cause & Effect
		Representation

Skills / Procedures
Discuss (Checklist)
Compare & Contrast
Represent
Classify
Sort

To understand how the systems functions means we need to understand its individual components.

The solar system is a complex group of celestial bodies that include

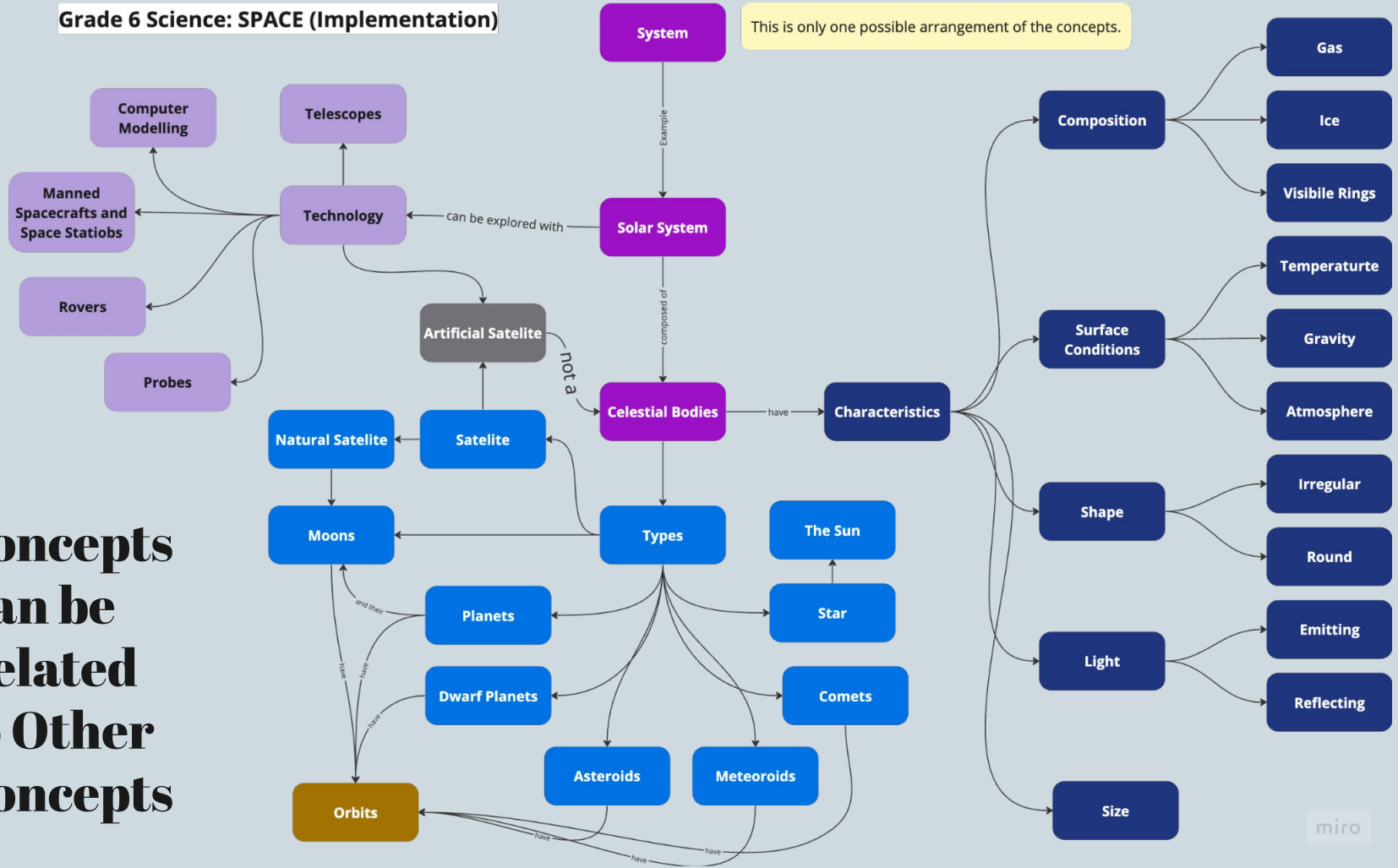
- the Sun (a star)
- planets and their moons
- dwarf planets
- asteroids
- comets
- meteoroids

Celestial bodies are natural bodies located beyond Earth's atmosphere.

In what ways can the solar system be explored?

6S1.1: Information about Earth can be acquired through exploration of the solar system.
6S1.2: Knowledge of the solar system continues to develop with further space exploration, discovery, and use of technologies.

Grade 6 Science: SPACE (Implementation)

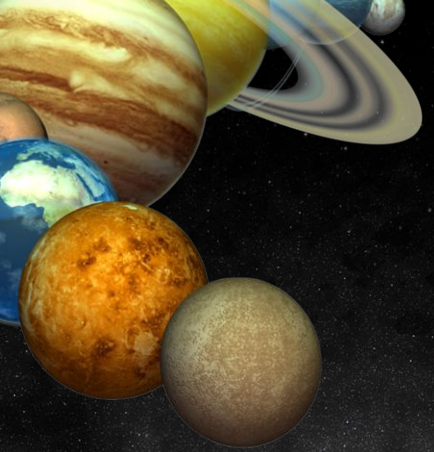


Concepts Can be Related to Other Concepts

Universe Unpacked - Our Place in the System

Study Jams! by Scholastic.com

Our Solar System consists of celestial bodies that include:



- the Sun (Star)
- planets and their moons
- dwarf planets
- asteroids
- comets
- meteoroids

Classify celestial Bodies
Represent and *describe* characteristics
Examine light emitters
Interpret physical, pictorial, or digital *models* of the solar system.

Celestial Bodies

Surface Conditions

Composition

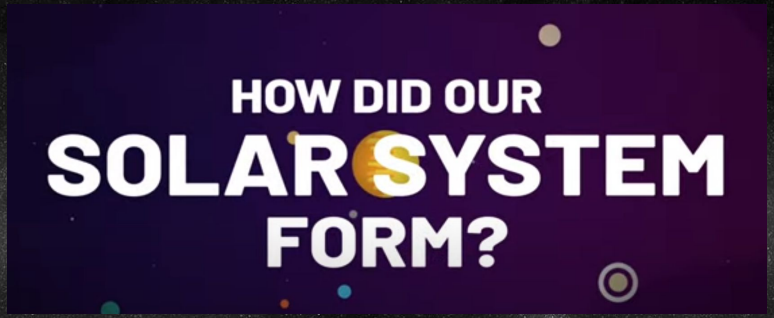
size

shape

emit light
reflect light

Solar System

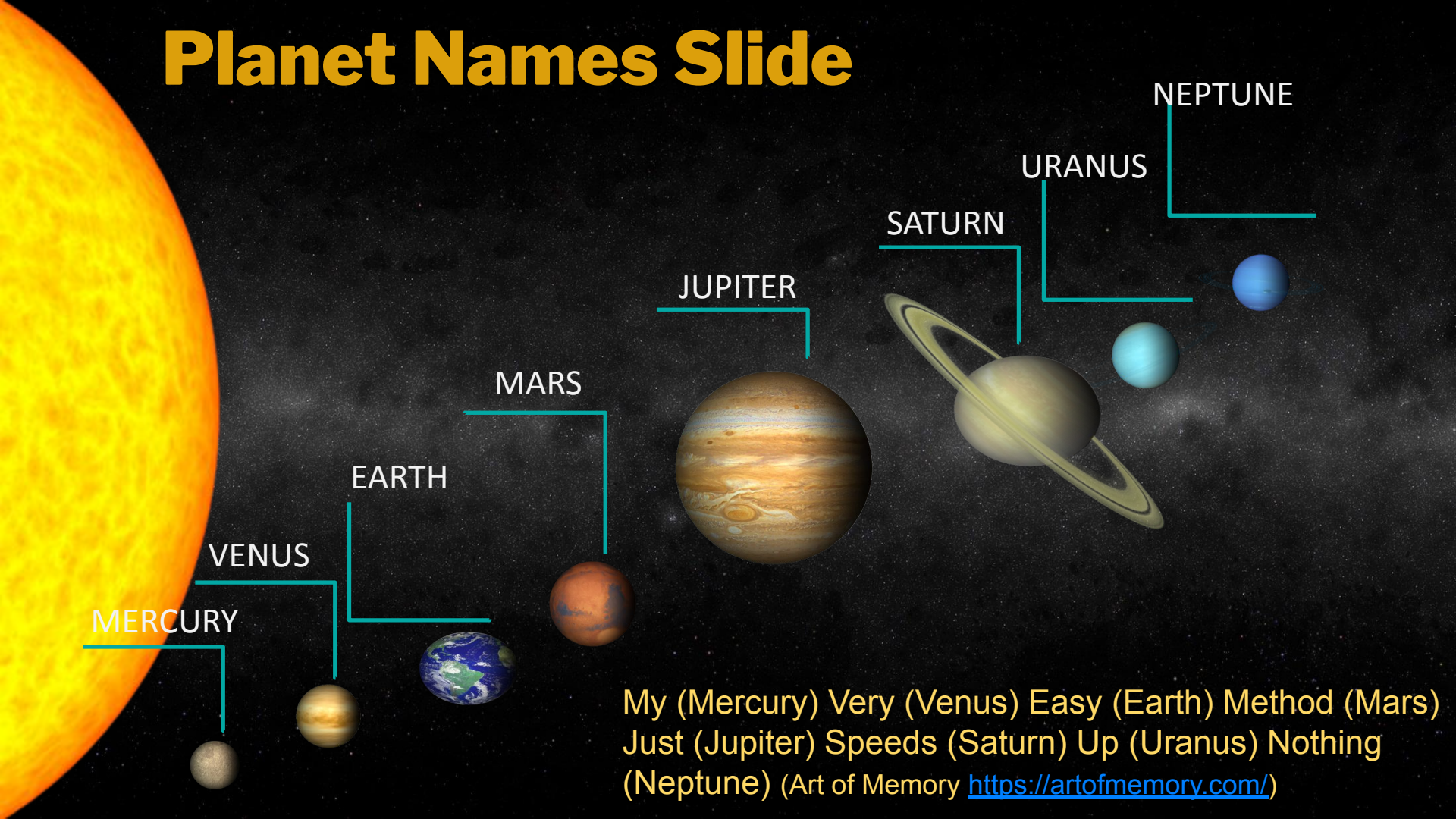
Astronimate - “makes learning about our vast universe with fun animations.”
Astronimate



Understanding our System:
How did our solar system form?

Why is the Sun such a key part of earth’s survival?

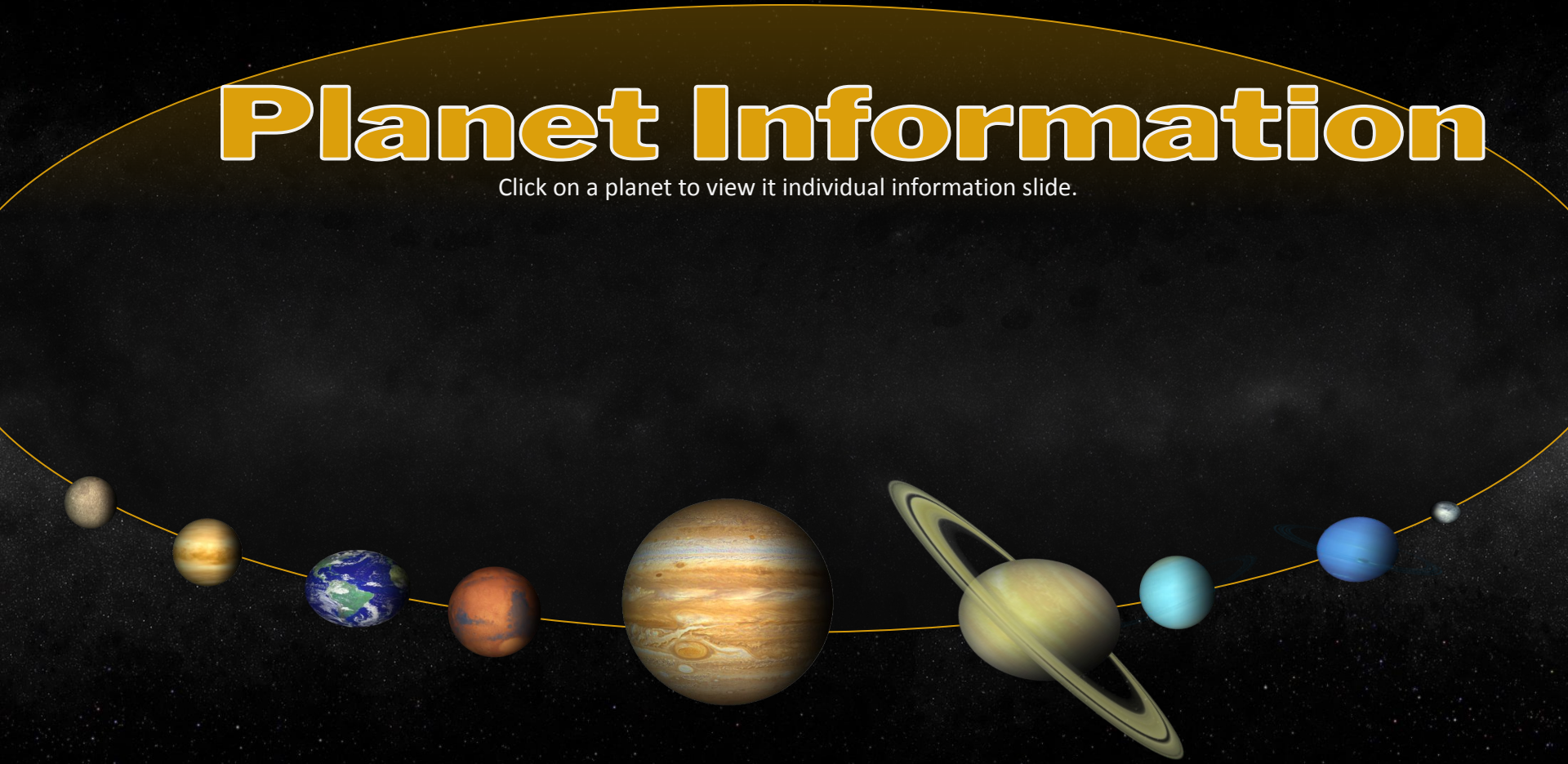
Planet Names Slide

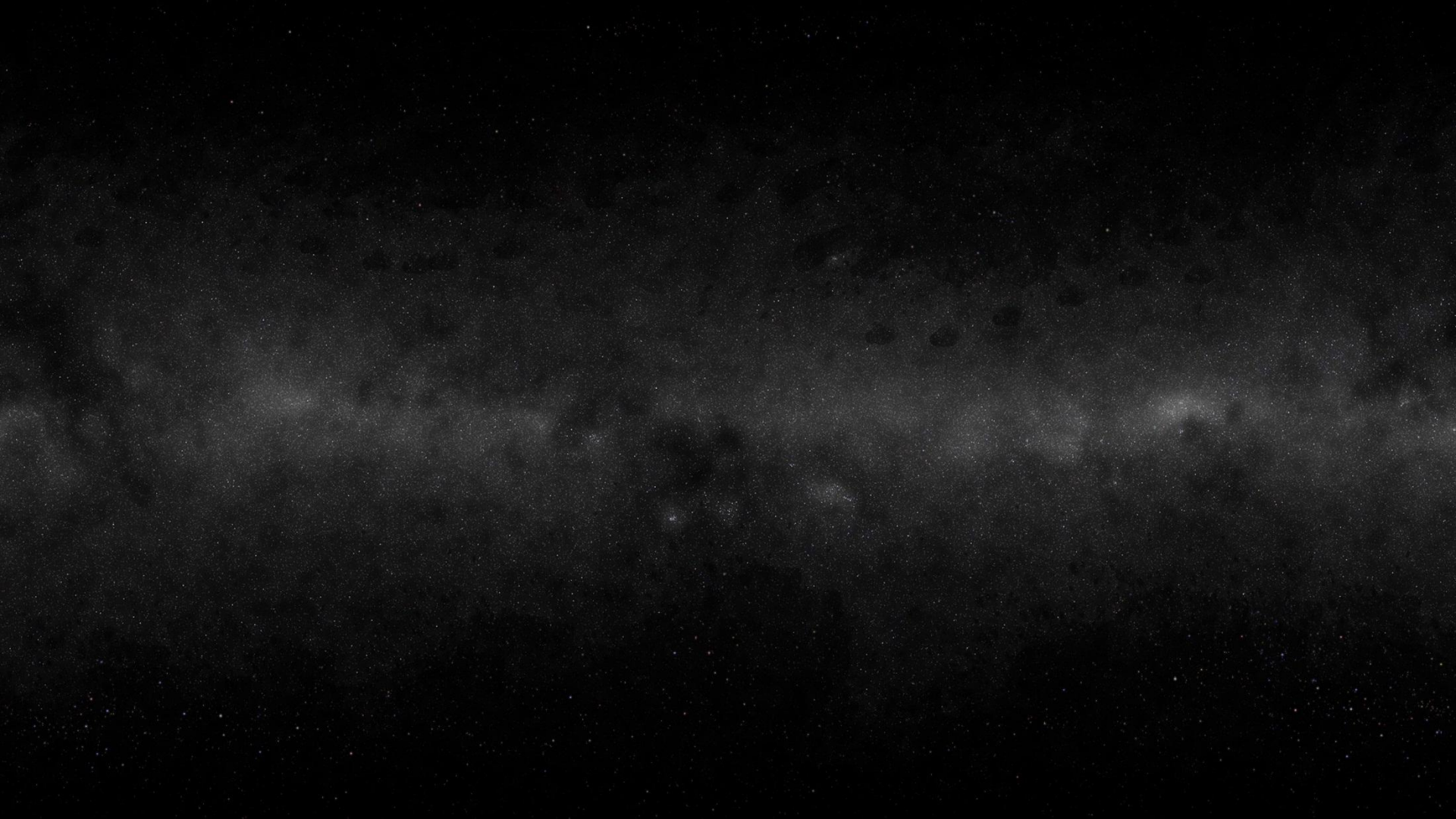


My (Mercury) Very (Venus) Easy (Earth) Method (Mars) Just (Jupiter) Speeds (Saturn) Up (Uranus) Nothing (Neptune) (Art of Memory https://artofmemory.com/)

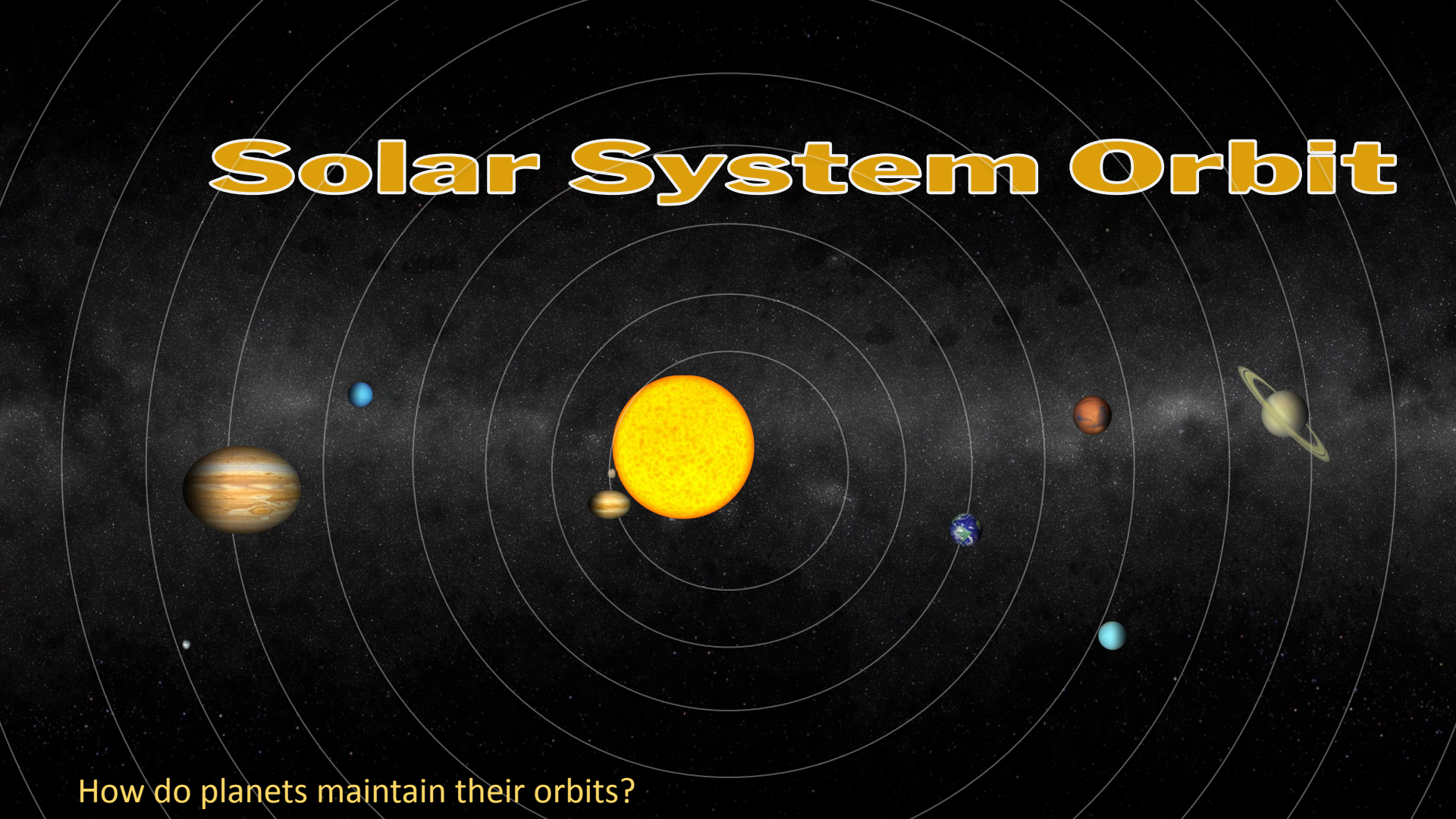
Planet Information

Click on a planet to view it individual information slide.



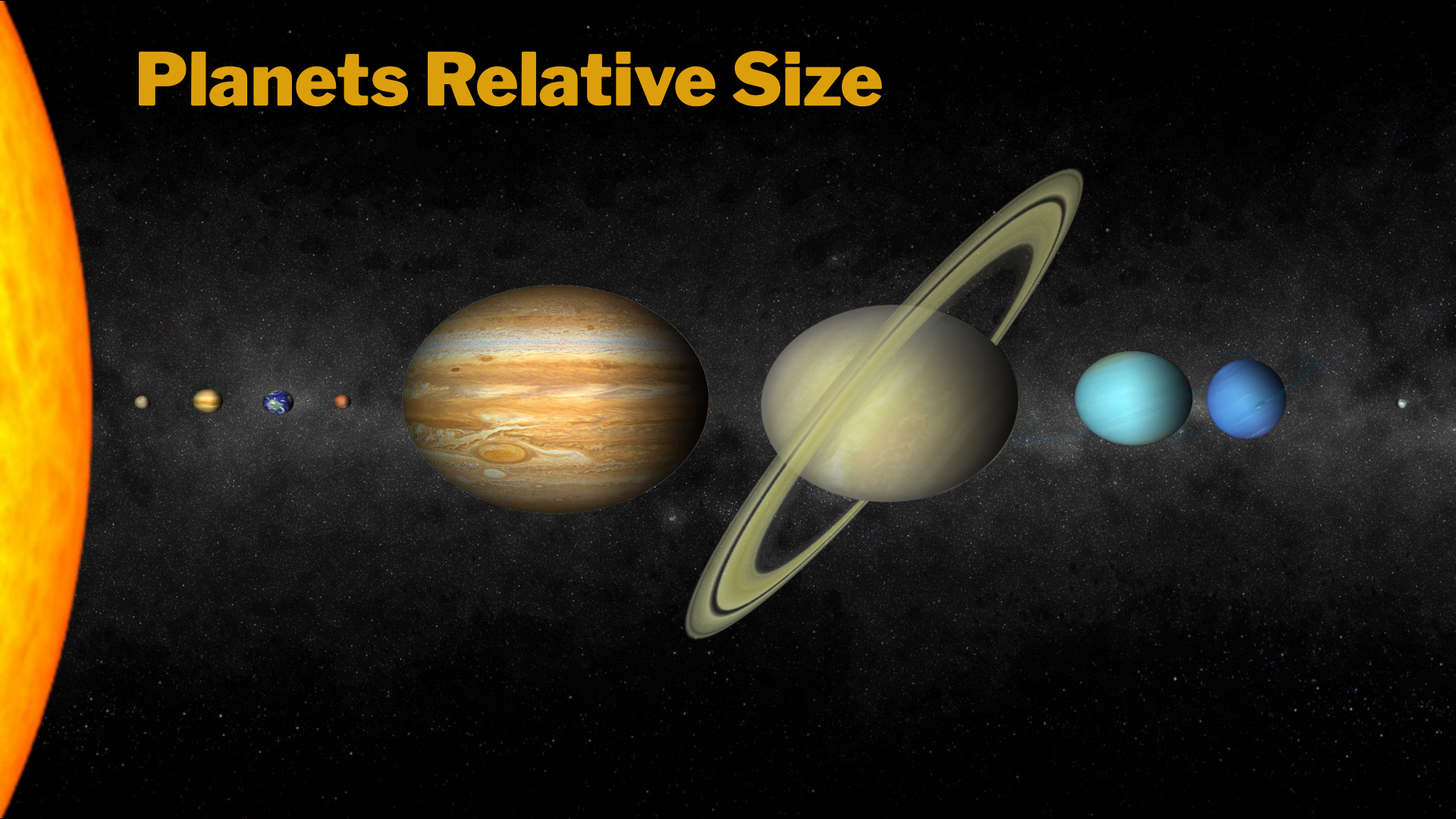


Solar System Orbit



How do planets maintain their orbits?

Planets Relative Size



Furthering Our Inquiry : Light Emitters

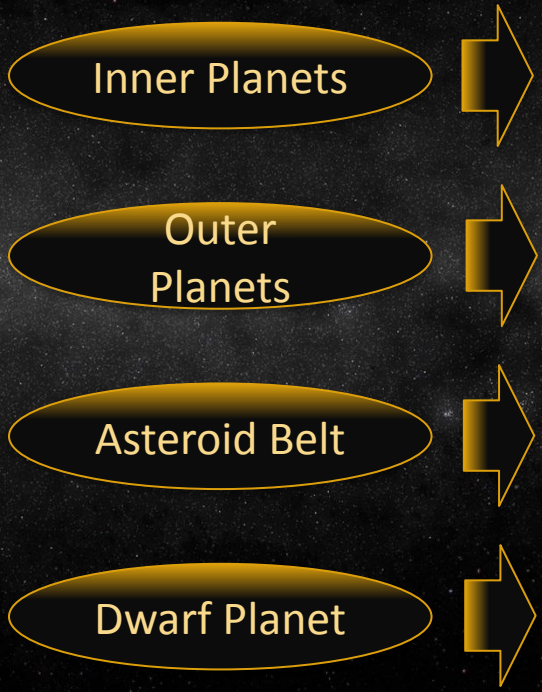
Objects That Emit and Reflect Light

Relate the characteristics of a Dwarf planet to the reclassification of Pluto.

Sky Science The Universe: Yours to Discover

Light: Crash Course Astronomy #24 (this video looks at light waves and how they move and are emitted)

Our Celestial Bodies



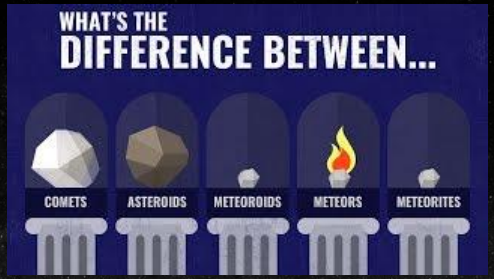
The four inner solar system planets (Mercury, Venus, Earth and Mars) fall under the category of terrestrial planets;

The four outer solar system planets are Jupiter and Saturn called gas giants (giant plants composed mostly of hydrogen and helium) while Uranus and Neptune are the ice giants (containing mainly elements heavier than hydrogen and helium).

The Asteroid Belt separates the Inner planets from the Outer planets. The belt lies between Mars and Jupiter.

A Dwarf Planet orbits the sun, has enough mass to maintain a round shape but has not cleared its neighborhood around its orbit; it is not a moon.

What Is The Difference Between An Asteroid, A Meteoroid, A Meteorite And A Comet? : this Video we will explain the difference between an Asteroid, a Meteoroid, a Meteorite and a Comet. (Physics Insights)



Less Than Five - What's the Difference Between Comets, Asteroids, Meteoroids, Meteors & Meteorites?

Comets, Asteroids, and Meteors: Comets Asteroids and Meteors are all over the solar system. But did you know that each are quite different? You may be wondering "What is a comet?", "What is an asteroid made of?", or "Where

How To Identify a Meteorite
University of Alberta

Finding Micrometeorites

Collecting Micrometeorites: how to carry out the investigation.(Home Science Tools Resource Centre)

Tiny meteorites are everywhere — here's how to find them

Let's Experiment

Lab: Collecting Micrometeorites

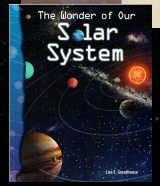
Did you know that items from outer space can be found in your own backyard? Tiny samples of space rocks float in our atmosphere. They float until dust and water carry them to the ground. These rock samples are micrometeorites. The best time to collect them is after a meteor shower.

Materials

- 2 shallow dishes (heat resistant)
- distilled water (about 2 cups enough to fill a dish)
- magnet
- plastic wrap or sandwich bag
- heat source for boiling water (optional)
- microscope or magnifying glass
- 2 microscope slides and covers
- mounting glue
- eyedropper
- sewing needle or large pin

Procedures

1. Place a dish outside to collect rainwater. Or leave the dish outside for a few days.
2. Cover a magnet with plastic wrap or a sandwich bag. Sweep the covered magnet through the water in the collecting dish, especially the bottom and sides. (Micrometeors are rich in iron, so they will stick to the magnet.)
3. Fill a second dish with distilled water. Place the covered magnet in the dish filled with distilled water. Remove the plastic from the magnet and gently swirl it around to allow the micrometeors to fall to the bottom of the dish.
4. Remove the plastic from the distilled water. Boil the water in the dish until it evaporates. (Ask an adult for help.) Or, let it evaporate naturally.
5. Magnetize a needle or pin by rubbing it on the magnet for about a minute. Drag the pin or needle along the sides and bottom of the dish.
6. Tap the needle or pin onto a microscope slide so samples fall onto the slide.
7. Glue down a cover glass. Examine the particles. Any rounded and pitted metallic particles are probably micrometeorites!



Greathouse, L. The Wonder of Our Solar System. Teacher Created Materials, 2007. pp. 28-29. ISBN 978-0-7439-0561-9

Available through Pearson Publishing

Image by vector pouch on Freepik

Distinguish features between Comets, Asteroids and Meteoroids.

Sample Natural Satellite

Credits:NASA image

Sample Artificial Satellite

Credits:NASA image

Compare and contrast natural satellites and artificial satellites.

Explore with Nasa - let's stay current!

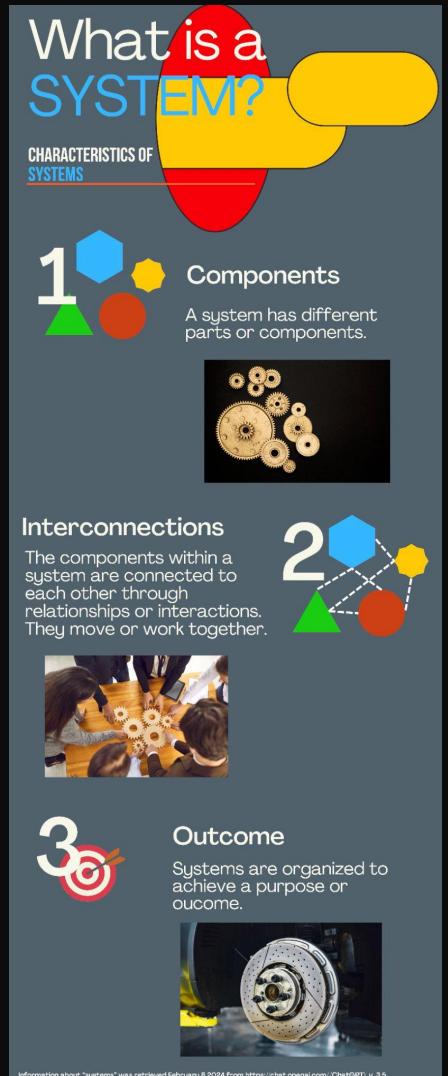
Skills and Procedures: Describe

6S1.1: Represent and **describe** the **characteristics** of celestial bodies in our solar system.

Describe means to communicate (orally or in writing) the **qualities, attributes or features** of a situation, pattern, process, or concept, etc.

Characteristic	Celestial Body 1	Celestial Body 2	Celestial Body 3
Surface Conditions			
Composition			
Size			
Shape			

Represent: Infographic



Example

- What is an Infographic?
- Infographic Examples
- 5 Key Elements of a Successful Infographic
- Common Sense- Education - Infographic Design Apps and Websites

Infographic

Surface Level Practice Ideas:

~ Best Sandwich Ever
~ Recess Do's and Don'ts
~ How to Watch a Hockey Game
~ etc.

How can DESIGN THINKING be used when creating a representation such as an infographic?

- Understand the problem.
- Form ideas (Divergent Thinking)
- Plan
- Create
- Analyze (Are there criteria or a rubric for an effective infographic?)
- Test (Peer editing & review)
- Troubleshoot (Revise)

Skills and Procedures: Represent

6S1.1: Represent and describe the characteristics of celestial bodies in our solar system.
Learner Outcome: Students analyze and represent celestial bodies of the solar system.

Represent means to effectively communicate one's understanding of a particular subject or topic to others, whether through writing, speaking, or some other form of expression.

(Some) Representation Ideas			
Concept Map	Infographic	Mind Map	Skit
Comic Strip	Podcast	Poem/Song	Dance
Diagram	Charts & Tables	Gif Animation	Model
Infomercial	Mash-Up	News Report	Puppet Show
Role Play	Board Game	Kahoot!	Diorama

Tips for Non-Linguistic Representations

1. Nonlinguistic representations come in many forms.
2. Nonlinguistic representations must identify crucial information [knowledge & understanding]
3. Students should explain their nonlinguistic representations.
4. Nonlinguistic representations can take a lot of time.
5. Students should revise their representations when necessary.

Marzano, R. J. The Art and Science of Teaching / Representing Knowledge Nonlinguistically. (Retrieved April 3, 2023 https://www.ascd.org/el/articles/representing-knowledge-nonlinguistically)

Skills and Procedures: Discuss (Div. 2 Checklist)

6S1.1: Discuss the reclassification of Pluto.

- https://www.youtube.com/watch?v=ewhw3NPH00w&t=4s
- https://www.sciencenews.org/article/pluto-planet-vote-status-definition-demotion

Discuss means to explore and examine a topic or issue by

- **talking** about a topic or issue with others, exchanging ideas and opinions in a collaborative and respectful manner
- provide a detailed and thorough analysis or examination of a particular topic or issue.

Examples of Discussion Formats			
Gallery Walk (Chat Stations)	Snowball Discussion	Conver-Stations	Concentric Circles
Pinwheel Discussion	Philosophical Chairs	Talk Moves	Fishbowl
4 Corners	Spectrum Sort	Silent Discussions (eg. Mentimeter, Padlet)	Color-Coded Conversations

Interactions

INTERACTION

- Craters (asteroids) https://www.youtube.com/watch?v=JGJFVuFEsBs&t=1s
- Tides
- Heat
- Light (night/Day)
- Time
- Spectacles
- Gravity/Orbits
- Others

Surface/Deep Strategies: Spectrum Sort

A Specific Planet

Dwarf Planets

Moons

Stars (Sun)

Meteoroids

Asteroids

Comets

LEAST

MOST

Most Interesting To Me

Think Like a Scientist

How do craters form on the moon? Experiment and find out!

What to Get

- candy sprinkles
- cocoa powder
- pie tin
- rocks of different sizes
- white flour

What to Do

1. Spread an inch of flour into a pie tin. This represents the rock that lies under the surface of the moon.

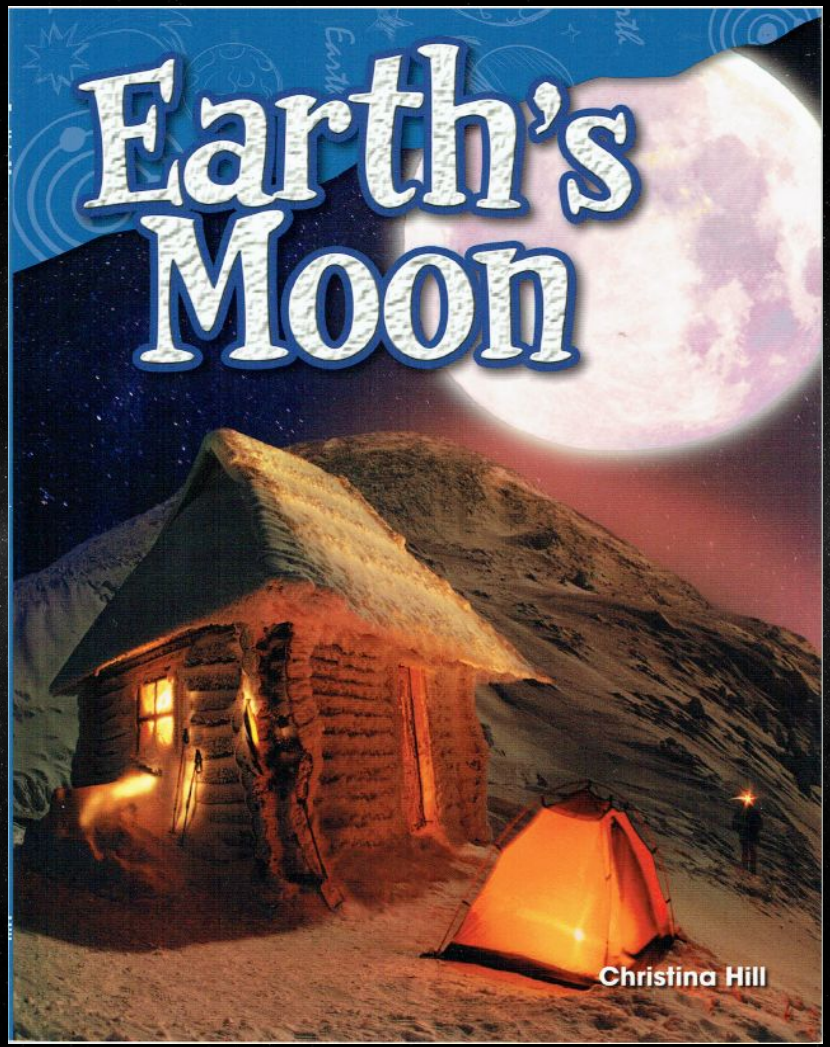
2. Sprinkle a spoonful of candy sprinkles across the flour. The sprinkles represent rocks and other material beneath the surface of the moon.

3. Shake a layer of cocoa powder on top of the sprinkles and flour. This represents the dusty and rocky surface of the moon.

4. Drop a rock into the pie tin. You can throw it at an angle or drop it straight down. Your rock represents a meteorite crashing into the surface of the moon. Repeat your experiment with different rocks at different angles. Record your notes in a log like the one shown below.

	Size of Rock	Angle of Impact	Changes in the Top (Cocoa) Layer	Changes in the Middle (Sprinkle) Layer	Draw the Impact Pattern
rock 1					
rock 2					

Hill, C. Earth's Moon. Teacher Created Materials.2015. pp. 28-29

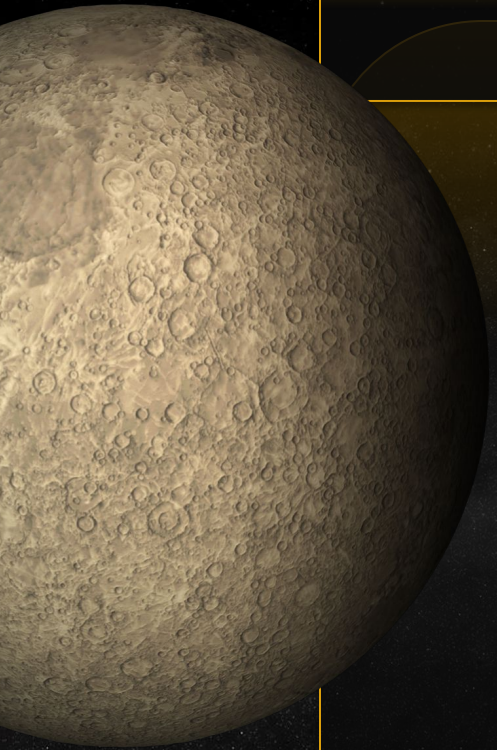


Earth's Moon *by* ***Christina Hill***

This high-interest informational text will help students gain science content knowledge while building their literacy skills and nonfiction reading comprehension. This appropriately levelled nonfiction science reader features hands-on, simple science experiments. Third grade students will learn all about the moon through this engaging text that supports STEM education.

Available through Pearson Publishing

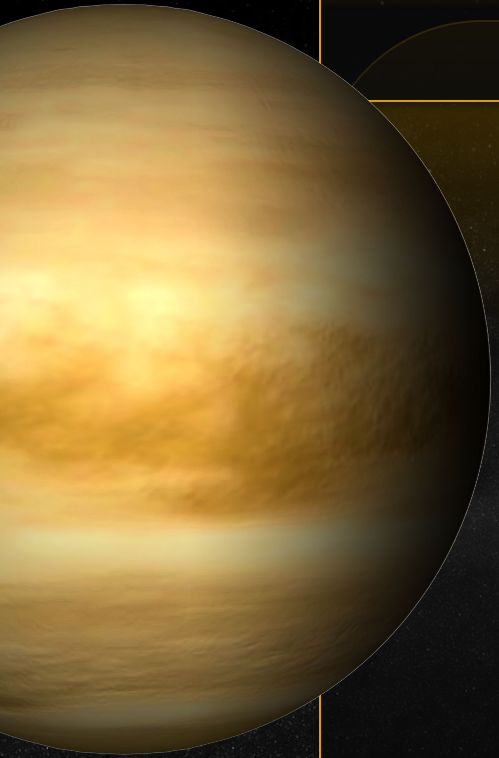
Mercury



- This planet is the smallest and closest to the Sun.
- Mercury only makes three revolutions for every two around its orbit.
- For every night that passes on Earth, a year goes by on Mercury.
- it has more than 350 craters
- in 1990’s, scientists discovered there is ice in the craters of the north and south poles. Tese poles never experience sunlight therefore remain permanently cold and frozen whereas the equatorial areas exceptionally hot.

Back to Main

Venus



- This planet is the second planet from the Sun.
- It is the brightest natural object in the sky after the Earth’s moon.
- It has a very dense atmosphere made up of carbon dioxide and a little amount of nitrogen.
- It is the planet most like earth in size and mass
- Surface temperatures average 450°C
- Venus completes an orbit every 224.65 Earth days.

Back to Main

Earth

- This planet is the third planet from the Sun and the one you probably call home.
- It is the fifth largest of the planets.
- Earth is home to millions of different species, including humans.
- Earth has one moon called Luna.
- There are 365 days in a year.

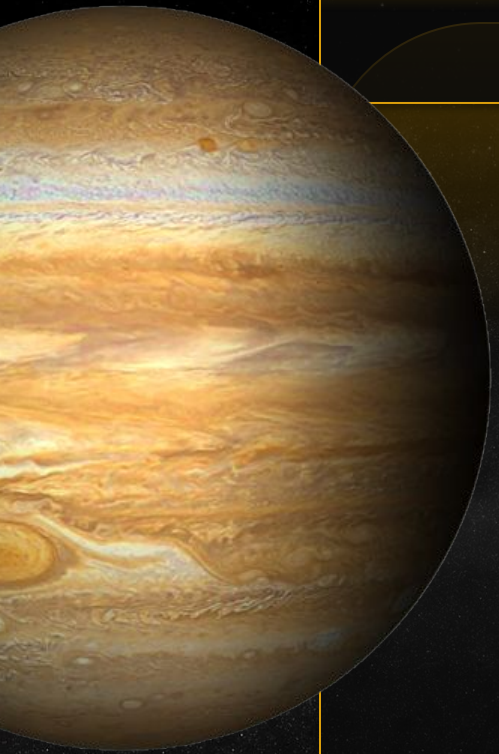
Back to Main

MARS

- This planet is the fourth planet from the Sun.
- It is the second smallest planet in the solar system.
- Mars has two small moons Phobos and Deimos.
- Bright areas on Mars are covered with fine, light-colored sand that gets blown around the planet by winds in its thin atmosphere.
- Dark areas, however, are not huge expanses of vegetation, as once thought, but instead vast volcanic deposits dating from the planet's early history.

Back to Main

Jupiter



- This planet is the fifth planet from the Sun.
- Jupiter is classified as a gas giant and is made up of primarily hydrogen and a quarter helium.
- Has the fastest rotation of all other planets. Completes a rotation every ten hours.
- It has 67 moons.

Back to Main

Saturn

- This planet is the sixth planet from the Sun.
- Saturn’s rings are made up of mostly ice particles and smaller particles of rocky debris and dust
- It takes Saturn 10,759 earth days to make one revolution around the sun.
- Saturn has 53 named moons.

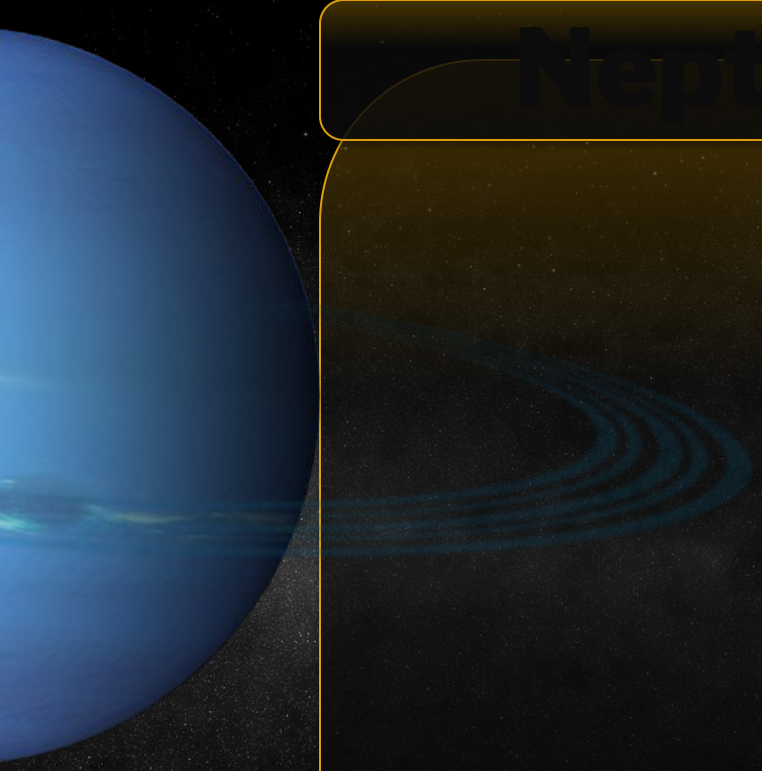
Back to Main

Uranus

- This planet is the seventh planet from the Sun.
- Uranus is classified as a ice giant and has the coldest planetary atmosphere in the Solar System.
- Every 84 earth years Uranus makes one revolution around the sun.
- Uranus has 27 moons.

Back to Main

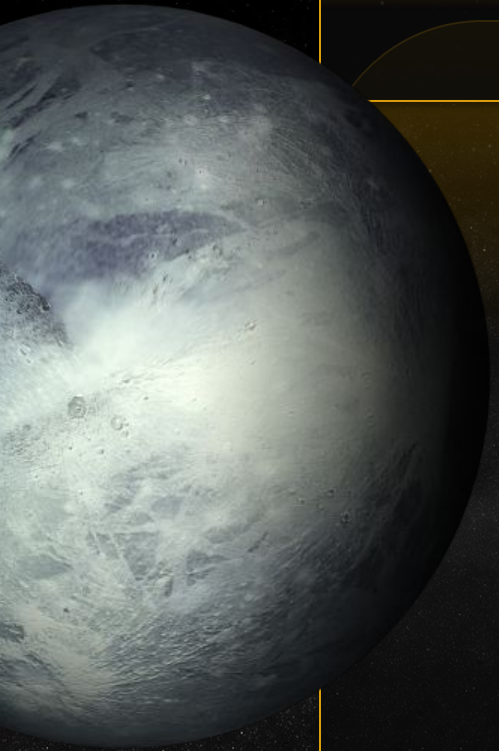
Neptune



- This planet is the eighth planet from the Sun.
- Neptune’s atmosphere is made up of 80% hydrogen and 19% helium.
- Neptune makes a complete revolution around the sun about every 165 earth years.
- Uranus has 13 moons.

Back to Main

Pluto



- This dwarf planet was originally classified as the ninth planet from the Sun.
- Pluto is made up of mostly rock and ice.
- Every 248 Earth years Pluto makes one rotation around the sun.
- Pluto has five moons.

Back to Main

Stargazing tips

Dreamstime.com ID#29143802

Dreamstime.com ID#6097954 Jeff Whyte

What are binoculars? How do they help us see stars?

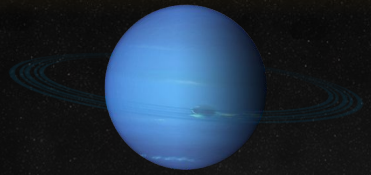
How does a telescope work?

Compare the observations you would get from a telescope pictured above with the one at the Hesje Observatory at Miquelon Lake Provincial Park. (Dark Sky Reserve)

Telus World of Science

Research this centre or one closer to you and determine where and how you can view space objects.

Space Exploration



Andrew Bodrov at Dreamstime.com

NASA Stock Image

Exploring the Planets

What tools do we use?

How do scientists explore the solar system?

Solar System Exploration - satellites

Our World in Data

MARS Exploration

National Air and Space Museum

Artemis 1

Deepen the Learning

Ask Conceptual Questions

Transform the **understanding** into a **question** that includes the **key concepts** such as on the next slide.

Understanding 6S1.2: Knowledge of the solar system continues to develop with further space exploration, discovery, and use of technologies.

Photo by Rad Pozniakov on Unsplash

Photo by Uriel Soberanes on Unsplash

Photo by The New York Public Library on Unsplash

Sample Conceptual Question

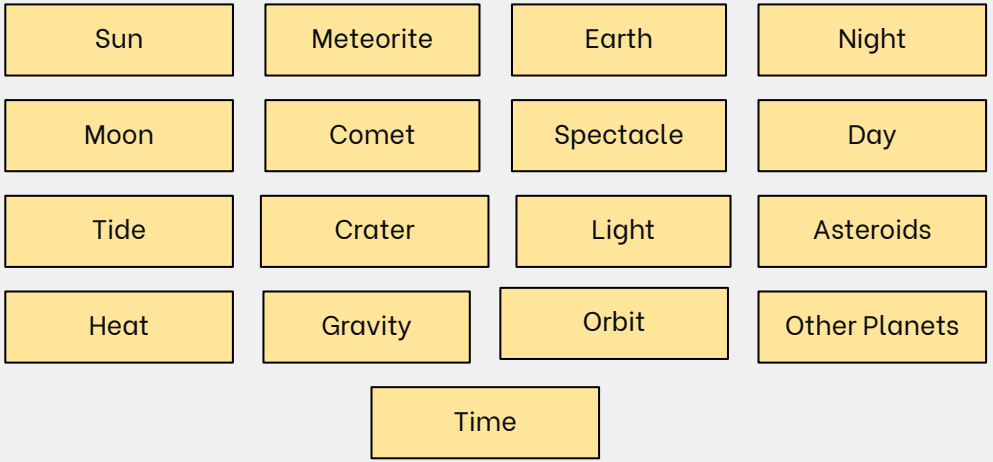
What is the relationship between knowledge of the solar system, space exploration, discovery, and use of technologies? Support your thought with an example.

Make Concept Maps

Task: Organize the ideas below into a meaningful concept map. Be prepared to explain your relationships.

"Grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully. To learn the structure in short, is to learn how things are related."

-Jerome Bruner



Transfer & Assessment

Assessment Sample #1

Create a representation that helps to explain how the solar system can be considered a system.

Assessment Sample #2

Choose one other system we studied in science (Earth Systems). Explain ways in which the solar system and your system of choice interact with each other.

Transfer & Assessment

What Verbs will students use to demonstrate their understanding?

Grade 4-6 Skills and Procedure Verbs			
Skill/Procedure	**Frequency**	**Skill/Procedure**	**Frequency**
Discuss	30	Observe	3
Relate	22	Safety	3
Compare	20	Analyze	2
Investigation/Experiment	17	Collect Data	2
Examine	13	Record Observations	2
Explain	12	Measure	2
Identify	12	Test	2
Describe	11	Conclude	1
Represent	9	Decide	1
Create	6	Magnetize	1
Demonstrate	5	Test	1
Interpret	5	Construct Weather map	1
Design	5	Defend	1
Collaborate	4	Translate	1
Evaluate	4	Divergent Thinking	1
Explore	4	Hypothesize	1
Apply	3	Order	1
Classify	3	Predict	1
Plan	3	Research	1
Observe	3	Use tools	1

Resource- look to the bottom of each linked page for individual resources.

Astronomy: Student Resource

Lessons 1, 2 & 3
Exploring Space

The Solar System

The Vastness of Space

Astronomy :Teacher's Guide

Lessons 1, 2 & 3
Exploring Space

The Solar System

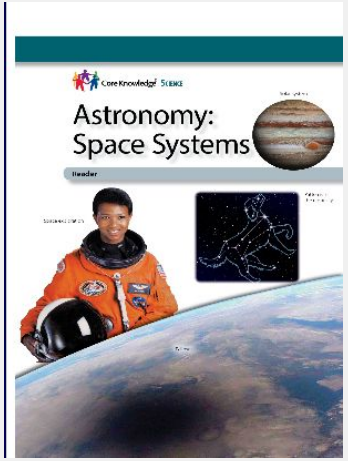
The Vastness of Space

Astronomy : Space Systems

Online resource links

Section: Part A

[VIDEOS] Space technology
Telescopes
Space probes
Rovers
Satellites
International Space Station

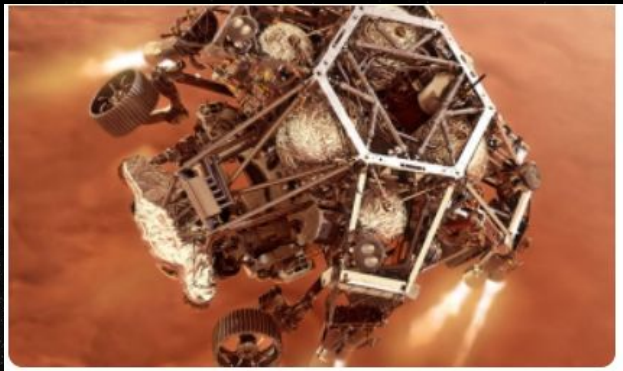


View of Earth from the ISS

Natural and Artificial Satellites

Recycling Air and Water

Fun Facts About ISS

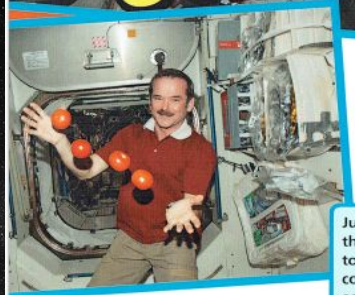


Exploration of the Planets in the Solar System

Let's Talk Space Exploration Resources

Let’s Talk Science - [Space Exploration] - this site provides an extensive selection of video, lessons, and factual information sites for students to explore and gather information from.

How Have Canadians Contributed to Space Exploration?



Many Canadian astronauts have travelled to space as part of international space missions.

Julie Payette was the first Canadian to visit the ISS. Chris Hadfield was the first Canadian to walk in space and the first Canadian commander of the ISS. What other Canadian astronauts have you heard about?

A Canadian company made the landing-gear systems that were used on all the missions that took humans to the Moon. What kind of job do you think the people who made these systems had?

The Canadian Space Agency and Canadian companies have developed many important technologies that have been used in space exploration.

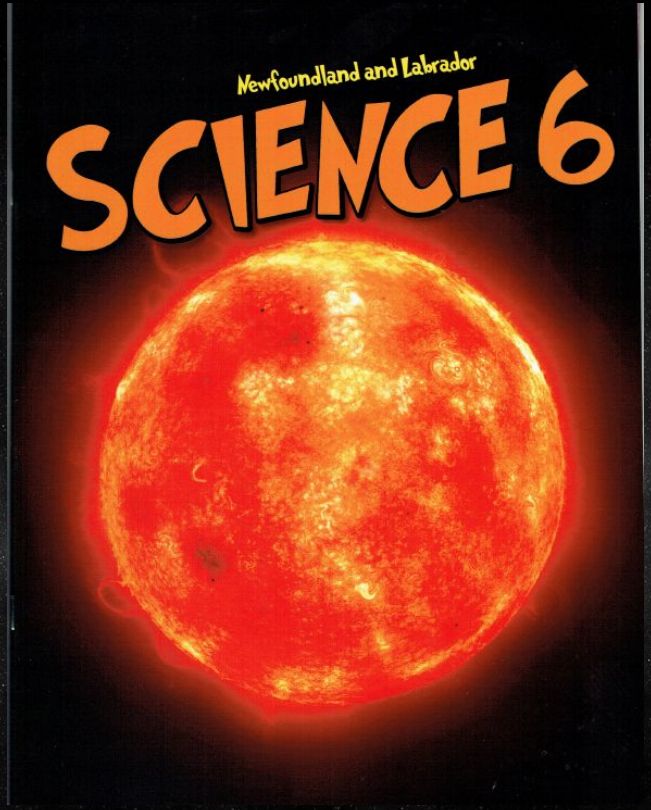
Canadarm2 is a large, Canadian-built robotic arm attached to the ISS. How might a robotic arm be useful to astronauts on the ISS?

Dextre is a Canadian robot with two arms that is used on the ISS. Because of its two arms, Dextre can perform many tasks.

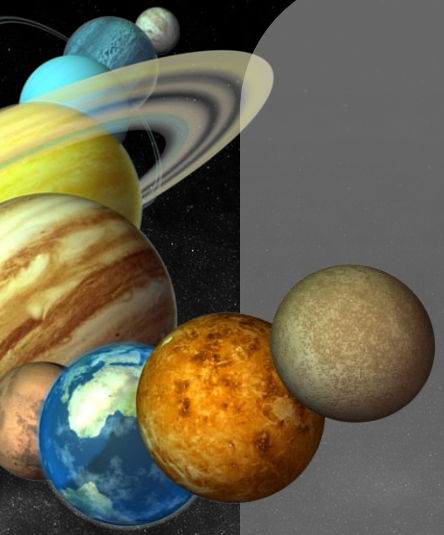
WHAT DO YOU THINK? 4C

1. Canada does not have its own rocket-launching site. Do you think this means that Canada cannot participate in space missions? Explain why you think so.
2. What are two different ways you could participate in space missions when you grow up? Use the examples in this Exploration for ideas.
3. Canada's NEOSSat is the first experimental microsatellite. It will look for asteroids near Earth. It will also look for "space junk," bits of human-made technology and garbage. Why is it important to look for asteroids and "space junk" near Earth?

Chapman, A., Hayhoe, C., & Power, A. *Science 6 - Unit 1 Space.* Science Resource from Newfoundland and Labrador. Nelson Education Ltd. 2018



Chapman, A., Hayhoe, C., & Power, A. *Science 6 - Unit 1 Space.* Science Resource from Newfoundland and Labrador. Nelson Education Ltd. 2018



Additional Resources

Science Resources for Space

Ducksters: Astronomy for Kids

Nine Planets

Astronomy

NASA STEM Engagement - several activities (look in NASA Audiences)

Curriculum Resources

STAR Date- Moon Phase Calculator

Explore the Wonders of the Solar System: Fascinating Facts About the Planets!

Exploring Our Solar System: Planets and Space for Kids - FreeSchool

Why isn't Pluto a planet anymore?

Resources

Temming, M. Sky & Telescope: Essential Guide to Astronomy: *how many planet are in our solar system?*. July 15, 2021.

Ducksters: Astronomy for Kids

Nine Planets - further exploration of the celestial bodies.

Astronomy - provides additional information sites on all aspects of this organizing idea. Excellent pictures that culd be used for a compare and contrast question.

NASA STEM Engagement - several activities for students in Grades 5-8 (look in NASA Audiences)

Additional Resources Continued:

Curriculum Resources

STAR Date- Moon Phase Calculator

Explore the Wonders of the Solar System: Fascinating Facts About the Planets!

Exploring Our Solar System: Planets and Space for Kids - FreeSchool

Why isn't Pluto a planet anymore?

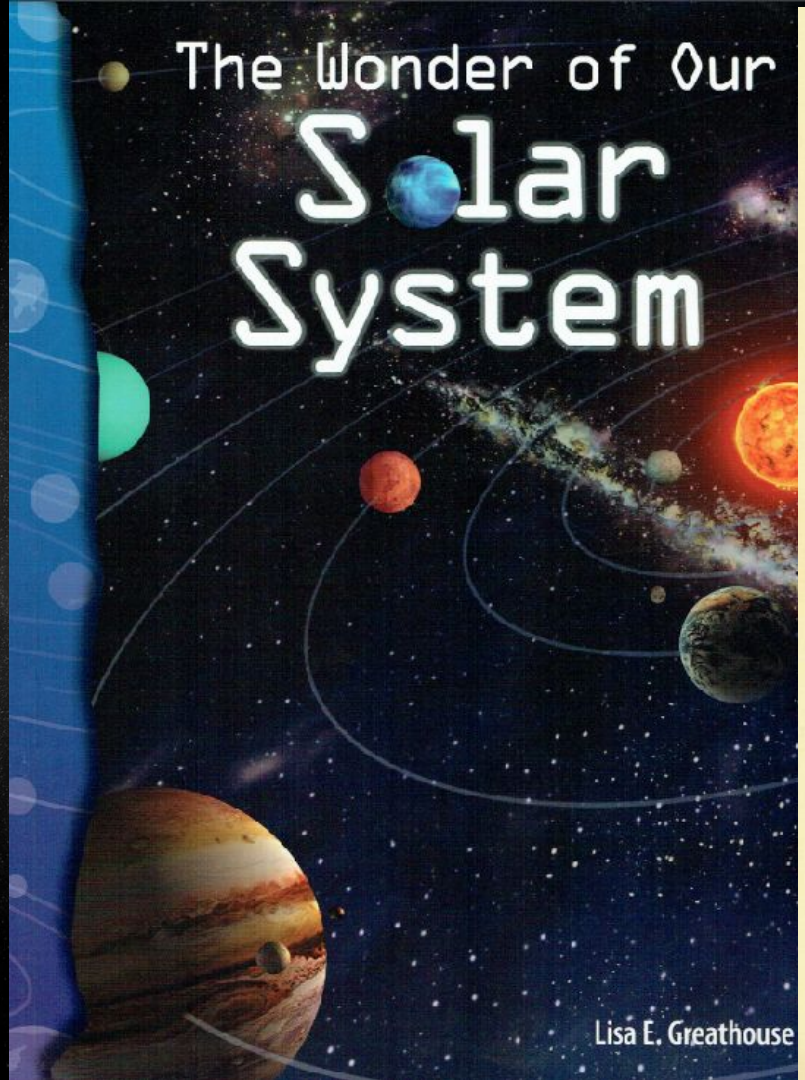
Temming, M. Sky & Telescope: Essential Guide to Astronomy: *How many planet are in our solar system?*. July 15, 2021.

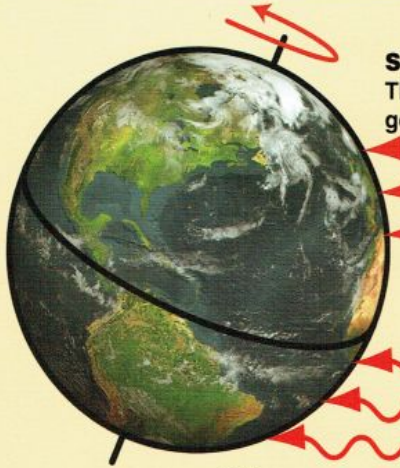
Learn71 - Science links recommended by Comox Valley Schools

Earth and Space - Earth and Space Grade 6 (BC)

Backyard Science - Learning the L'nu Way

National Geographic - Videos and resources to cover most aspects of this Organizing idea.

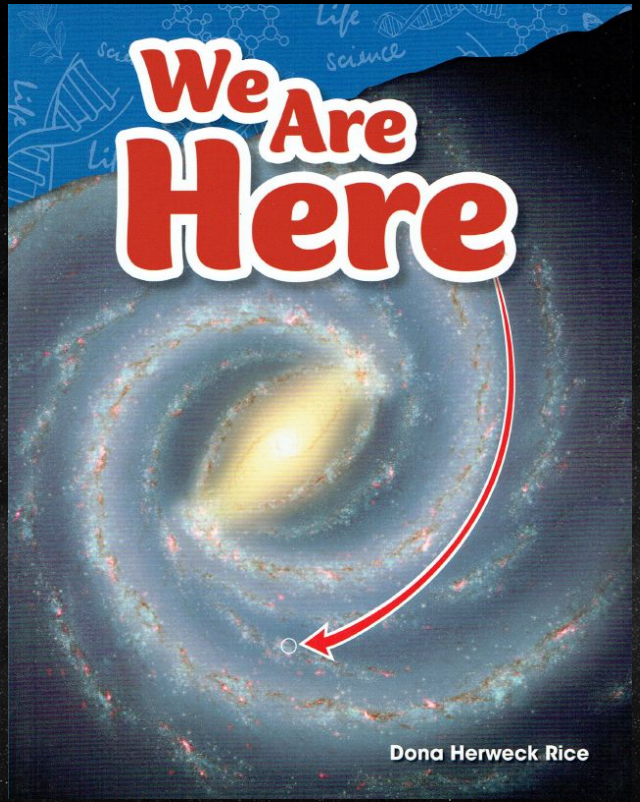




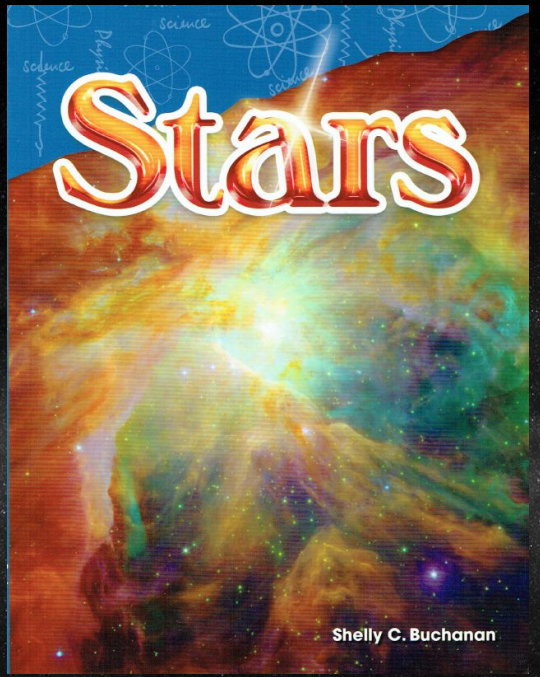
Four Seasons

The way Earth is tilted causes the seasons. For part of the year, the northern half of Earth leans toward the sun and gets direct sunlight. So, it's summer there. At the same time, the southern half leans away from the sun and gets less sunlight. So, it's winter there.

The tilt doesn't change. It is the position of the planet around the sun that changes. As Earth goes around the sun, different parts get more sunlight. That makes the seasons.



Available through Pearson Publishing



We Are Here *by* ***Dona Herweck Rice***

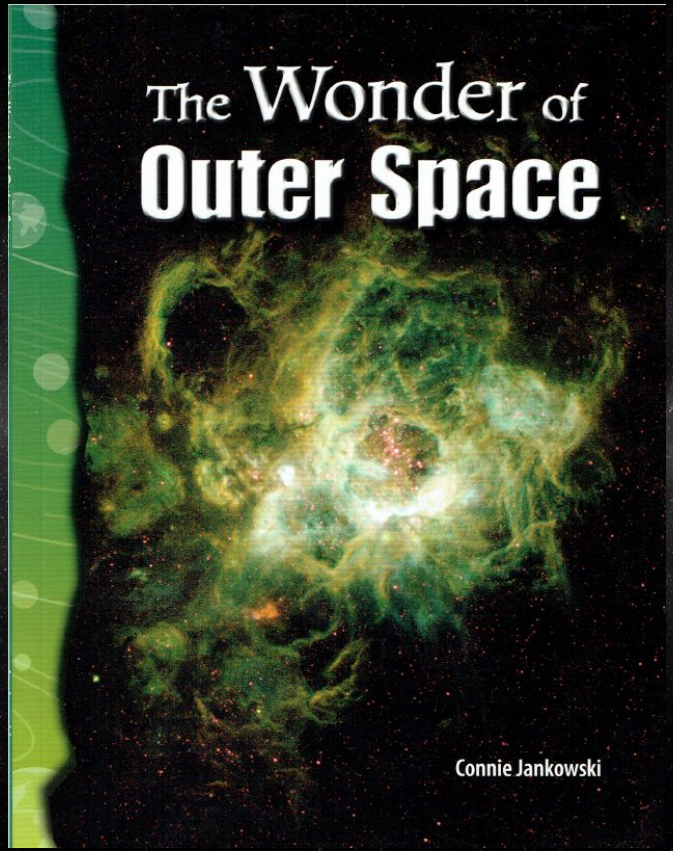
This high-interest nonfiction reader will help students gain science content knowledge while building their literacy skills and reading comprehension. This appropriately levelled text features hands-on, simple science experiments and full-colour images and graphics. Fourth grade students will learn all about the solar system and the universe through this engaging text that supports STEM education.

Stars *by* ***Shelly C. Buchanan***

This nonfiction science reader will help fifth grade students gain science content knowledge while building their reading comprehension and literacy skills. This purposefully leveled text features hands-on, challenging science experiments and full-color images. Students will learn all about stars, the solar system, galaxies, and much more through this engaging text that supports STEM education. Important text features like a glossary and index will improve students' close reading skills.

The Wonder of Outer Space *by* ***Connie Jankowski***

Come explore the wonders of space in this intriguing title that uses numerous vivid images, fascinating facts, and easy-to-read text to both delight and engage readers! From satellites to space food, observatories to Sputnik, readers will learn all about space and the various ways people have explored and learned about astronomy for years! A creative hands-on lab activity is featured to encourage children to explore astronomy even further!



Outer Space** by **Ruth Strother

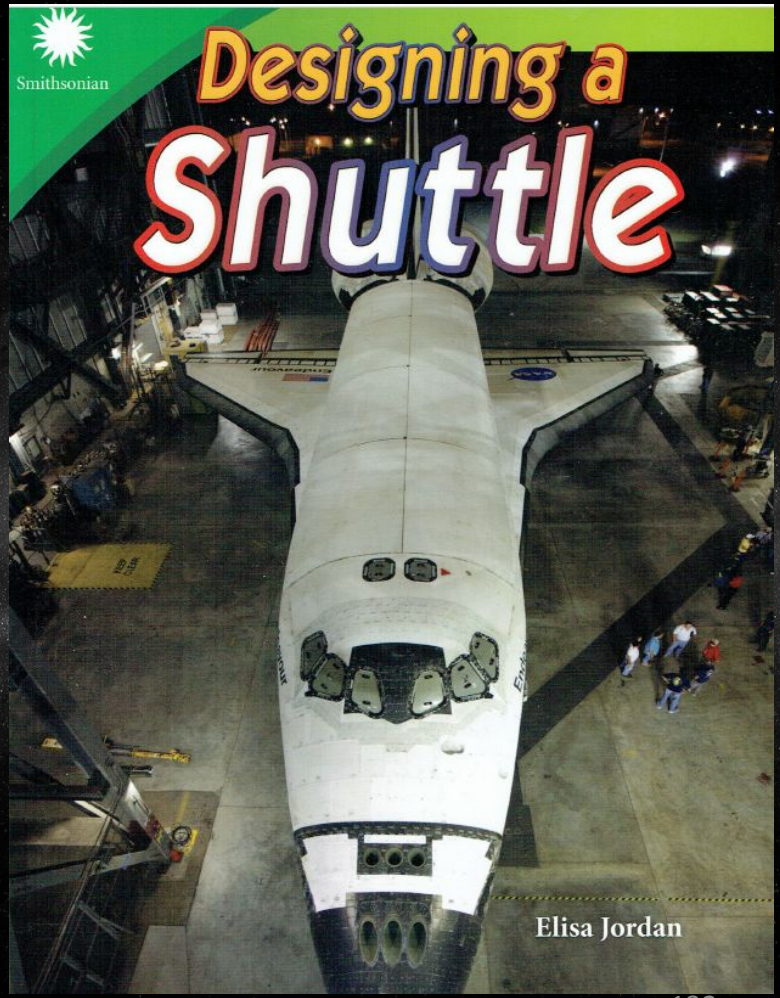
This levelled reader supports STEM learning and introduces the planets, stars, galaxies, space exploration, and more. Developed in collaboration with the Smithsonian and esteemed literacy expert Dr. Adria Klein, Smithsonian Kids All-Star Readers: Outer Space Level 1 includes a carefully designed levelling structure for early readers. Covering STEM-oriented topics such as comets, asteroids, moons, and more, the concepts in this reader are reinforced by photos and include vocabulary familiar to kindergarteners and first-graders. After reading this introduction to nonfiction, children can use the included quiz and glossary to reinforce their reading comprehension.

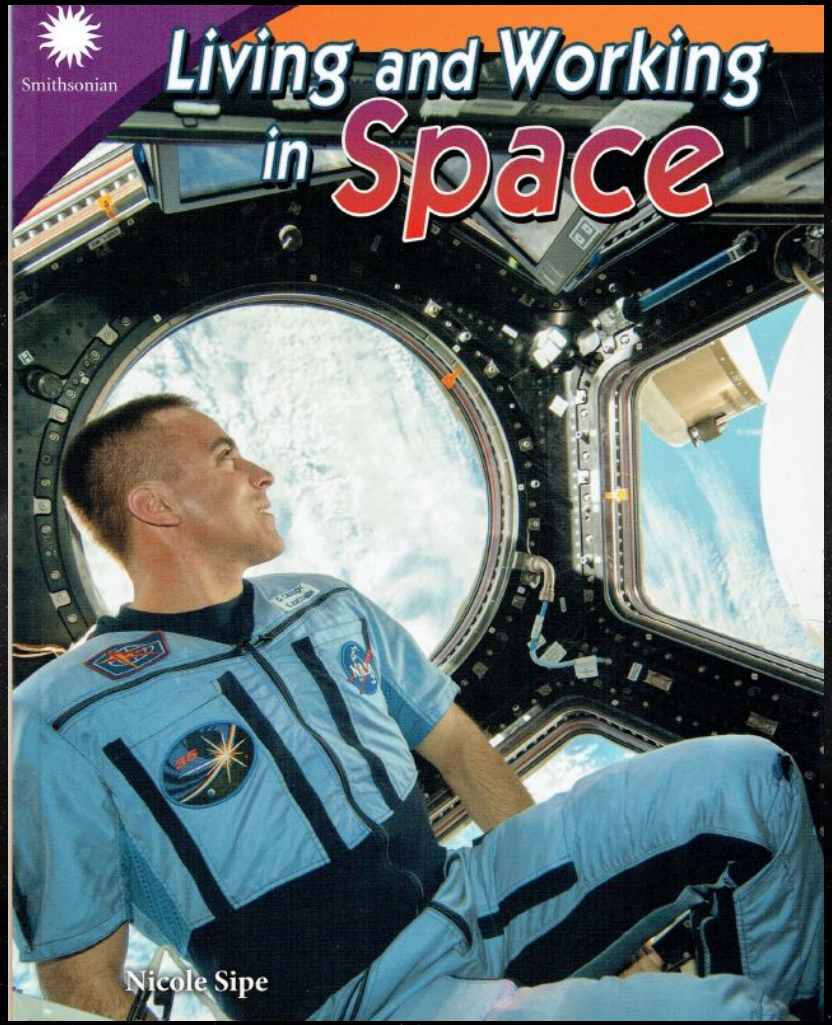
Available through Pearson Publishers

Designing a Shuttle *by* ***Elisa Jordan***

In the 1970s, NASA wanted to build a new kind of spacecraft that could be used over and over again. The Space Shuttle Program was born, and NASA engineers and scientists were tasked with designing and creating the first shuttle. Nine years later, the first space shuttle was launched. Learn the history of the Space Shuttle Program and the many issues and problems that the engineers faced. Created in collaboration with the Smithsonian Institution, this Smithsonian Informational Text builds reading skills while engaging students' curiosity about STEAM topics through real-world examples. Packed with factoids and informative sidebars, it features a hands-on STEAM challenge that is perfect for use in a makerspace and teaches students every step of the engineering design process. Make STEAM career connections with career advice from actual Smithsonian employees working in STEAM fields. Discover engineering innovations that solve real-world problems with content that touches on all aspects of STEAM: Science, Technology, Engineering, the Arts, and Math!

Available through Pearson Publishing





Living and Working in Space *by* ***Nicole Sipe***

The first astronauts in space only stayed for brief periods of time. But now, NASA scientists have developed technologies that allow astronauts to live in space long term. Learn about the challenges that astronauts face living in zero gravity and cramped quarters with this fascinating Informational Text created in collaboration with the Smithsonian Institution! Build reading skills while engaging students' curiosity about STEAM topics through real-world examples. Packed with factoids and informative sidebars, this book features a hands-on STEAM challenge that is perfect for use in a makerspace and teaches students every step of the engineering design process. Make STEAM career connections with career advice from actual Smithsonian employees working in STEAM fields. Discover engineering innovations that solve real-world problems with content that touches on all aspects of STEAM: Science, Technology, Engineering, the Arts, and Math!

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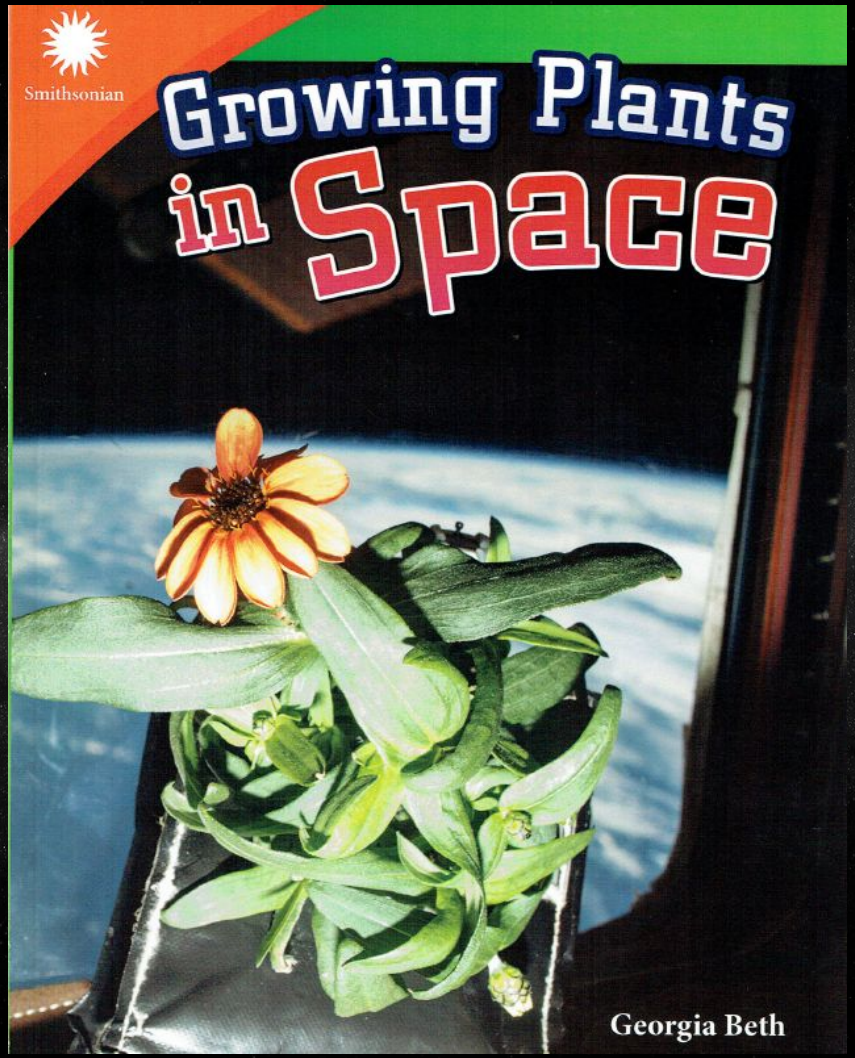


Growing Plants in Space *by* ***Georgia Beth***

Have you ever heard of a space farmer? Space farmers are astronauts who have received special training to learn how to grow plants in outer space. Learn about the challenge of farming in outer space with this high-interest STEAM book created in collaboration with the Smithsonian Institution. It features a hands-on STEAM challenge that is perfect for makerspaces and that guides students step-by-step through the engineering design process. Make STEAM career connections with career advice from Smithsonian employees working in STEAM fields. Ideal for school reports and projects, this informational text will appeal to reluctant readers and ages 6-8. Ignite a curiosity about STEAM topics with this high-interest text!

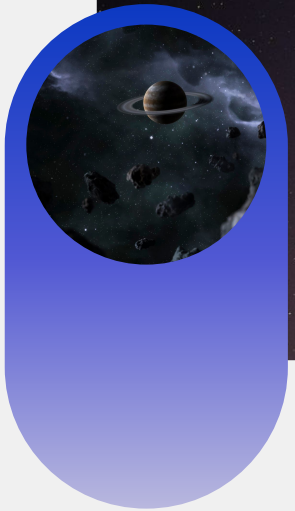
Available through Pearson Publishing

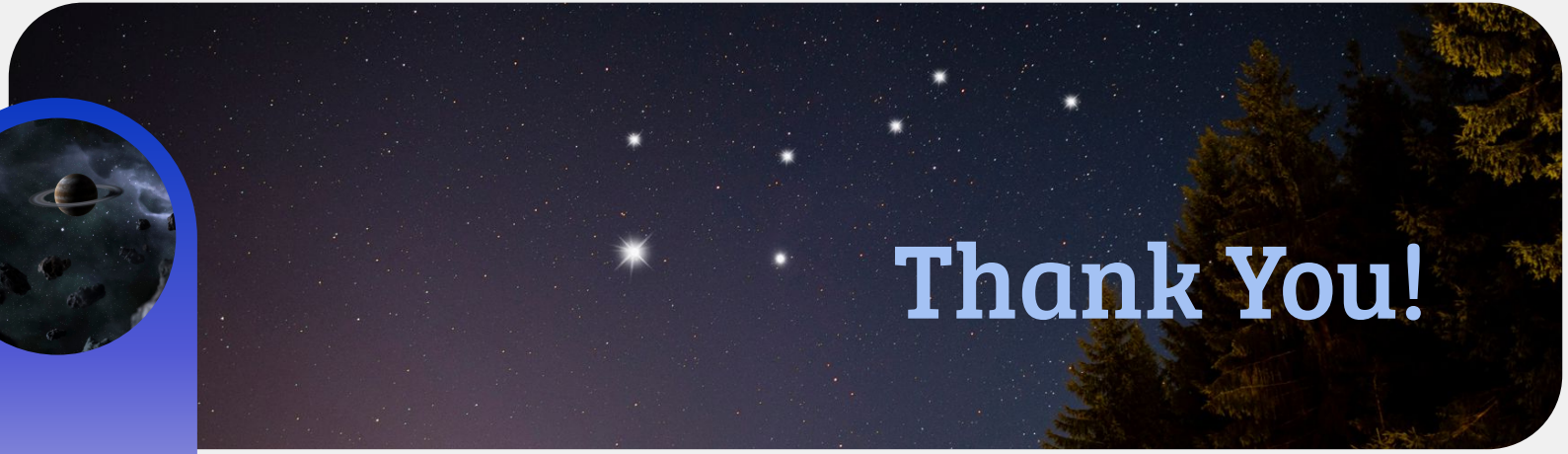
Computer Science Links

- Introduction: Exploring Computer Science (Grade 6)
  - Video
  - Slide Deck

- Curriculum Planning and Assessment Resource (CPAR)
  - Grade 6 Computer Science CPAR

- Integrating Computer Science into Grade 6 Space
  - Video
  - Slide Deck





Assessment in Grade 6 Science (February 28 & April 10) - full days
This session will be one of two sessions in which we will look at Transfer (Summative) Assessment development to meet the new Grade 6 Science Curriculum. It would be helpful to have Piloted or Optionally Implemented the Grade 6 Science Curriculum or parts thereof. Participants will collaborate as a large group and in smaller breakout groups as we work through and review each Organizing Idea. Come and share your great thinking!

Ted Zarowny **ted.zarowny@arpdc.ab.ca**
Chris Zarski **chris.zarski@arpdc.ab.ca**