Virtual Field Trips

Whirling Wonder

K-2 Investigating Earth and Sky Virtual Field Trip

This is a supplementary educator guide to assist parents and teachers with the asynchronous portion of the virtual field trip. To reserve your virtual exhibit exploration experience, please fill out the Virtual Field Trip Request Form.

All associated activity guides can be found with the attached documents found on our website.
Additional resources can be found at the end of this guide.

Why does the sky change?

There are many reasons to introduce the next generation of humans to the wonders of the cosmos. Our daily lives are guided by changes that we can observe in the sky. The sun rises and sets, indicating day and night. The sun's path across the sky changes, giving rise to the seasons that we experience in the mid-high latitudes of the northern and southern hemisphere. The moon's phases inform us of the passage of time in the form of a month.

The roots of astronomy stem from observations made about the sun, the moon, and the stars. Being familiar with the movements of the sun, moon, and stars brings with it a grand sense of wonder. Looking at a familiar star pattern in the sky and recognizing it can be as nostalgic as seeing your childhood home, in other words, the night sky can enrich our lives.

Connection to the Next Generation Science Standards

During this virtual field trip, your young scientists will use observations of the sun, moon, and stars that they see up in the sky. This field trip directly aligns with the Next Generation Science Standards and is a continuation from the lessons presented in Mystery Science. Together, *Whirling Wonder* and Mystery Science covers the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts from 1-ESS1-1.

After this field trip, your 1st grader should be able to explain these endpoints in their own words: Daylight is longer in the summer and warmer than in the winter because the Earth is tilted toward the sun; changes in the moon's phases are based on where it is in its orbit around Earth; the phases are caused by the amount of reflected sunlight and not by the Earth's shadow.

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.

Disciplinary Core Ideas: ESS1.A

Seasons are characterized by the amount of warmth we feel. Tracing the sun's path in the sky at different points of the year can give us clues as to why summer is warmer and winter is colder.

The moon's position in its orbit around the Earth shows different amounts of reflected sunlight, which we observe as the different phases of the moon.

Science & Engineering Practices: Analyzing and Interpreting Data

With the aid of the virtual planetarium, students will **analyze** the path of the sun on the summer solstice, winter solstice, and equinoxes and **interpret** how the paths are related to the seasons.

Students will also **conduct an investigation using a model** of the sun-Earth-moon system to investigate the relationship between the sun, the Earth, and the moon.

Crosscutting Concepts: Patterns

Students will recognize that the cycling of the seasons and phases of the moon are predictable **patterns** based on the positions of celestial bodies in space.

Nearpod Field Trip Outline

1. Welcome and Introduction to your Virtual Field Trip - Whirling Wonder (Slides 1-2)

   To start, we meet Shannon, an educator at the Michigan Science Center, and she poses the Driving Question, "Why does the sky change?" There are several examples of the sky changing that we can observe daily, and this virtual field trip seeks to provide students with the information to explain these changes in their own words. To explore these changes safely and relatively quickly, the Michigan Science Center's staff astronomer and planetarium director, Paulette, will use her virtual planetarium in Stellarium to set the scene for student observations.

2. The Sun's Path (Slides 3-7)

   a. Paulette introduces herself and presents our first **Open Ended Question**:

      Why do you think it is colder in the winter and warmer in the summer? What is the reason for the seasons?

      - Students will provide a response in the Open Ended Question slide that follows.
      - Additional questions to engage learners and learn more about your student's prior knowledge.
        - Do we have the same seasons all around the Earth?
        - When are the days longer and when are the days shorter?
      - Sample response: the sun is up longer in the summer.

   b. Paulette shows us where the sun will be at the same time of day on different days of the year.

      - What we can see is that the sun is in the sky LONGER during summer days, as its path throughout the day is HIGHER in the sky. Because of this the days of summer get more light and therefore more heat.

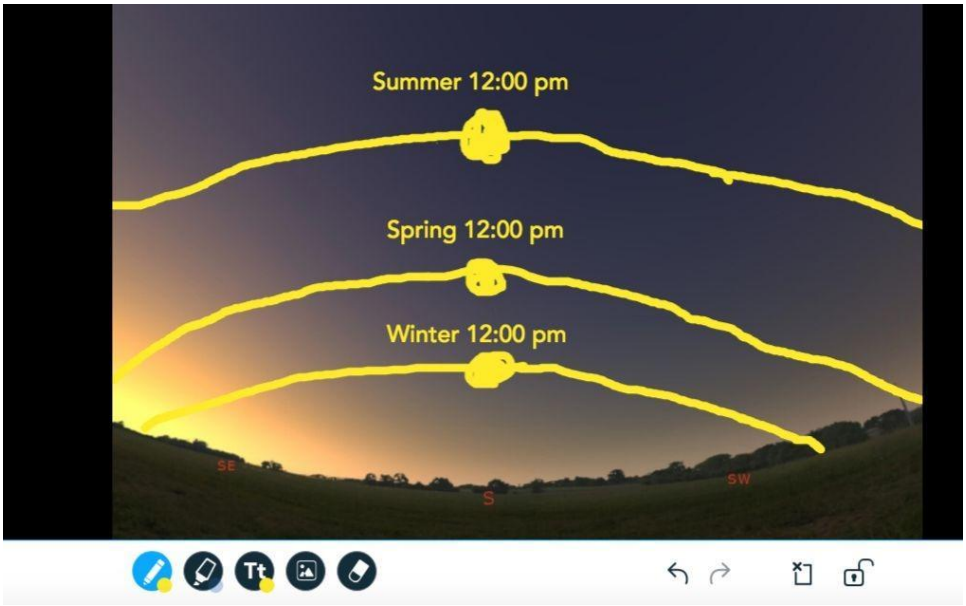
   c. **Time to Climb**

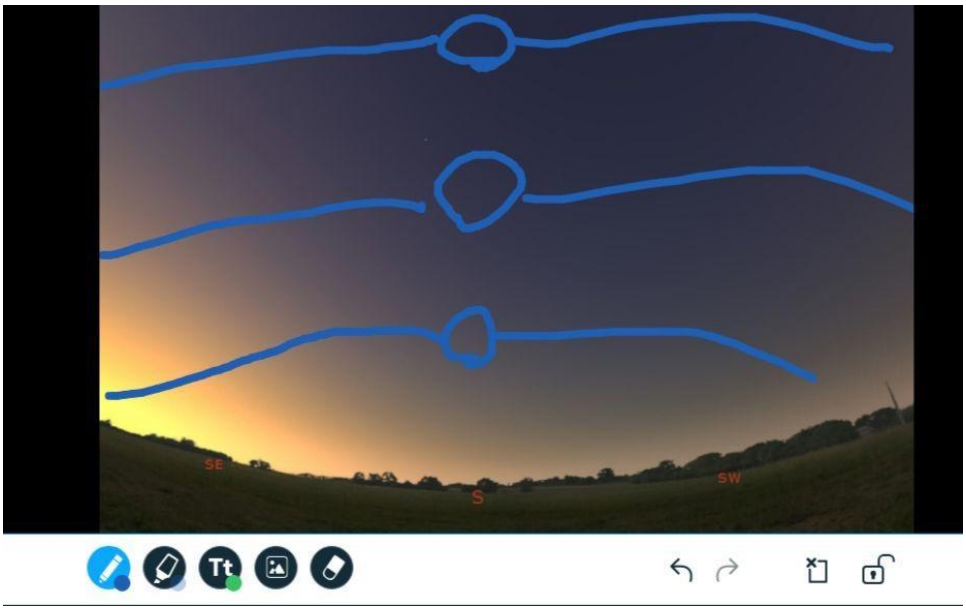
      - Q: Where does the Earth get its warmth?
        A: The sun
      - Q: What direction does the sun rise in?
        A: East
      - Q: What direction does the sun set in?
        A: West

- Q: What time of year is the sun highest in the sky?
  A: Summer
- Q: What time of year is the sun lowest in the sky?
  A: Winter

d. **Draw It**

- Students will draw the sun's relative positions at 12pm in the Winter, Spring, and Summer.
- The sun's path video is available for reference.
- Some examples of acceptable work:





2. The Earth's Axis (Slides 8-13)

    a. Now that the students are familiar with the sun's different paths across the sky, we will now explore why this is happening at different times of the year.

    b. **Open Ended Question**

        - When you spin a globe, what do you see? Does a globe spin straight up and down, or slightly on its side?

            - This question is meant to bridge the gap between the position of the Earth in space as it is modeled as a globe. A globe is tilted slightly to represent the tilt of the Earth's axis.

        - Sample responses: slightly on its side; it's tilted.

    c. Paulette explains that the Earth's axis of rotation is actually tilted slightly to 23.5° from center. The tilt of the Earth and its relative position to the sun gives us different seasons.

    d. **Draw It**

        - Students will draw the Earth's axis as a line through the Earth.

        - Sample response:

    e. Paulette shows us how the tilt of the Earth and its position relative to the sun gives us different seasons.

f. **Time To Climb**

- Q: In the northern hemisphere, it is summer when the Earth's axis is tilted…

  A: Toward the sun

- Q: It is summer in the southern hemisphere when the Earth's axis is tilted…

  A: Away from the sun

- Q: It is winter in the northern hemisphere when the Earth's axis is tilted…

  A: Away from the sun

- Q: When it is winter in the northern hemisphere, what season is it in the southern hemisphere?

  A: Summer

Need a break?
This is a great time during the virtual field trip to take a break if you or your students need to get away from the screen. Don't worry, when you return, Shannon will recap what we've learned so far and jump back into the virtual field trip!

3. The Phases of the Moon (Slides 14-18)

   a. Shannon summarizes that the Earth orbits around the sun, and asks the student to think about what orbits the Earth. She then recounts her experiences of the moon when she was growing up, including how she wondered about how the phases of the moon were created.

   b. Paulette presents us with our next **Open Ended Question**:

   When you take a look at the moon does it always look the same or does it change?

   - Students will provide a response in the Open Ended Question slide that follows.
   - Additional questions to engage learners and learn more about your student's prior knowledge.
     - How does it get its light?
     - Is this pattern predictable?
   - Sample responses: it changes; sometimes it looks different.

c. Paulette takes us through one complete LUNAR CYCLE which takes 29.5 days to complete.
    - A month, or moonth, is based on the complete cycle of the moon's phase.
d. Paulette shows us that the moon reflects light from the sun.
    - We learn the names of the phases of the moon:
        - New moon
        - Waxing crescent
        - First quarter
        - Waxing gibbous
        - Full moon
        - Waning gibbous
        - Third quarter
        - Waning crescent

4. Modeling Moon Phases (Slide 19-24)
    a. Shannon shows students how to make a working model of the sun-Earth-moon system to explore the phases of the moon up close.
        - It is encouraged that students follow along with the demonstration; however, students can explore the model separately after completing the lesson.
        - The *Moon Phase Mechanics* activity guide can be downloaded from the Additional Resources under this Virtual Field Trip.
    b. **Collaborate**

        You just made a model!

        In your own words, how would you explain what a model is or what it does? Use this board to enter sentences or images that explain your answer. While you're here, check out what your peers think the answer is!
        - Students are asked to share their thoughts and think aloud about models. Other students who participate in the lesson can also leave their thoughts and compare their answers to the ones that are posted.

c. **Matching Pairs**

   - Students will match the items used in the model to what they represent in outer space.

     - The light source = the image of the sun
     - The small ball = the image of the moon
     - YOU! = the image of the Earth

d. **Flocabulary**

   - A music video that summarizes the phases of the moon.

e. **Time to Climb**

   - Q: The moon…

     A: Reflects the sun's light.

   - Q: As the moon seems to get bigger, we call that a…

     A: Waxing moon

   - Q: What do we call it when the moon isn't visible?

     A: A new moon

   - Q: When the moon is getting smaller that's called a…

     A: Waning moon

   - Q: A crescent moon that is getting bigger is called a…

     A: Waxing crescent

f. Shannon shows the students how to make a snack that demonstrates the different phases of the moon.

   - Students are encouraged to try this on their own, but it can be done together with the class!

   - The *Oreo Moon Phases* activity guide can be downloaded from the Additional Resources under this Virtual Field Trip.

Additional Resources

Download Stellarium onto your computer, tablet or smartphone to explore the stars at home or on the go! Stellarium is a free, easy to use, planetarium software and includes a search function to locate anything in your sky.

Check the library of Astronomy Simulations and Animations from the University of Nebraska-Lincoln.

The Old Farmer's Almanac is a resource that people have been using for hundreds of years! Visit the website to learn more about the moon phases and track when they will be happening.

For additional activities, information, and resources, check out MiSci's Junior Astronomer Educator Guide.

Activity Guides

The following Activity Guides have been included with the Virtual Field Trip. We recommend that you look through them and decide how and when to incorporate them within your schedule.

Moon Phase Mechanics 10 Minutes

Materials:

- Round object
- Bright lamp or flashlight
- Open floor space
- Second person (optional)

Oreo Moon Phases 20 Minutes

Materials:

- 4-8 Oreos, or Glutino Gluten Free option
- Kid friendly knife or butter knife
- Plate
- Napkin or paper towel
- Adult supervision

Curriculum Connections

This virtual field is designed to be paired with the Mystery Science: Spinning Sky curriculum.