2024 Eclipse Ontario Education Bundle

This bundle provides resources for teaching your students about solar eclipses, and specifically the 2024 Total Solar Eclipse that will pass through Ontario on April 8th, 2024. This bundle was created by the Education and Materials committee of the Ontario Eclipse Taskforce, consisting of astronomy and education professionals from across Ontario. The Ontario Eclipse Taskforce does not assume responsibility, liability, or ownership for any material linked in this document.

The Safety section contains essential information for students of all ages. The rest of the resources we have collected are roughly organized by grade. Resources are either content about solar eclipses or activities. Each resource is annotated with a short description and suggestions for how to use it. We recommend choosing a combination of activities and content. Where possible, English and French versions of resources are provided. Let us know what you think via our evaluation form or by reaching out to CJ at charles@discovertheuniverse.ca!

Safety

During the solar eclipse, only look directly at the Sun if you are wearing certified solar eclipse glasses. You must make sure that the glasses satisfy the ISO 12312-2:2015 safety standard.

Do not order eclipse glasses from places such as Amazon, as they may be fake or not up to standard. Certified glasses may be given out for free during solar eclipse events at your local university or science center. If you wish to order your own glasses, please order from a verified reputable source.

Looking directly at the Sun with the naked eye or through any device or filter other than ISO 12312-2:2015 certified eclipse glasses may cause permanent damage and even blindness.

Totality is the short time when the Sun is totally eclipsed by the Moon, which lasts a few minutes at the most. During totality, and ONLY during totality, it is safe to look directly at the Sun with the naked eye.

However, it might be hard to tell exactly when the Sun is 100% eclipsed. If you are using certified eclipse glasses or viewers and are in the path of totality, it is safe to take your glasses off and observe totality when you can no longer see any part of the Sun through your glasses. When any part of the Sun becomes visible after totality, you must put your glasses back on or look away. If you are not in the path of totality, even at 99.9% coverage, it is never safe to take your glasses off to observe the eclipse. If you are not sure if you will be in the path of totality or if you are not confident about knowing when and how it is safe to observe the eclipse, consider:

- attending an official eclipse event on April 8th, 2024 led by qualified experts, where you will be informed when it is safe to look at the eclipse directly;
- attending an Eclipse 101 training session through Discover the Universe (get up to date times and updates by signing up for their eclipse newsletter / infolettre éclipse), and;
- using the Event Planning Resources and Other resources below.

An alternative to eclipse glasses is projecting the Sun using a pinhole projector or box projector. You can make these on your own or order them online. Instructions on how to make these with your students are provided for every grade group in the “Activities” sections below.

Don't worry - watching the April 8th, 2024 total solar eclipse can be 100% safe if you make sure to follow these important guidelines.

Elementary

Grades 1-3

About solar eclipses (Videos)

What is an eclipse?

What is a solar eclipse? - NASA Space Place. 2 minutes. (English)

This video for younger students explains what an eclipse is in simple language and graphics. It includes some easy science terms such as the corona, partial and total eclipses, and the path of totality. It mentions the concepts of changes in the amount of light and in animal behaviour during a total eclipse. It has just the right amount of visual humour to keep the students connecting to the material. Add in the closed captioning for the verbal script on the screen so students can follow along. As it is only 2 minutes long it could easily be repeated and reviewed to consolidate the concepts. A banner at the top of the screen that remains throughout the video emphasizes the need for eye safety and highlights the website for more information. Highly recommended as an introduction activity for early grades.

What does a solar eclipse look like?

2019 total solar eclipse real-time video, La Silla Observatory - European Southern Observatory (ESO). 4 minutes.

This video shows the 2019 total eclipse in real time from a single camera set up at the La Silla Observatory in Chile from the moments just before the start of totality through the four minutes of totality and ending just after. During totality the moon covers the sun as a very small dot so it is not as realistic as in person or as you would see in a live-streaming presentation that would show close-up views. But the beauty of this video is that it shows the light gradually dimming in the sky, the stars coming out, and the audio of all the people shouting, clapping and enjoying the experience from the hills above the observatory. There is no voice-over or explanation so it requires a little patience from the watchers to follow through to the end. The audio is what makes the difference, though, and is well worth showing this video from middle to upper grade levels. If you are showing this to younger grades it would need to have commentary during the video from the teacher to ensure the students are alert to the subtle changes that occur and have some explanations of what is happening.

Indigenous knowledge and connections to eclipses

2021 Annular Solar Eclipse - First Nations and Inuit Peoples stories about Solar Eclipses. 4 minutes. Published by the Canada-France-Hawaii Telescope in English and French.

This video features Innu astrophysicist Laurie Rousseau-Nepton, now an Assistant Professor at the University of Toronto, sharing two First Nations and Inuit Peoples stories about Solar Eclipses. This video was created for the 2021 Annular Solar Eclipse, and

can be started at 0:25 to avoid student confusion. Subtitles are available for the English video in Inuktitut (Baffin), Inuktitut (Nunavik), James Bay Cree, Swampy Cree, Ojibway, Oji-Cree, Innu, Mi'kmaq, and likewise for the French video in Inuktitut (Baffin), Inuktitut (Nunavik), Cri de la Baie James, Innu, Mikmaq, Cri des marais, Ojibwé, Oji-Cri.

Activities

Solar Eclipses

Creating your own eclipses

Exploring the Solar System: Solar Eclipse (English, Spanish; NISE Network)

This hands-on activity from NISE Network demonstrates how the particular alignment of the Sun, Earth, and Moon can cause an eclipse. Students investigate the positions of these objects using models to create shadows and learn about solar eclipses without the models needing to be to scale. You can consider incorporating the Earth and Moon: Astronomy & Space Science Activity from Exploratorium by doing the first part of the Exploratorium activity before the NISE Network activity, where students select balls of different sizes and have to find their "partner" so that there is an "Earth" student paired with a "Moon" student. It may be helpful to only have 2 sizes of balls, so that you can focus on students understanding that the Earth is larger.

Recréer une éclipse en classe (French, Science in School)

This activity from Science in School is a great indoor activity for recreating an eclipse, with age-appropriate discussion prompts. The assembly of this activity may be overwhelming for younger students, and may be best done as a class demonstration.

Solar Eclipse model without materials

Eclipse Activity (English, Exploratorium)

This educational science "snack" from San Francisco's Exploratorium is a short, simple exploration of total, annular and partial eclipses for students in teams of two, and all you need is your thumb. One person is the sun while the other person moves a few meters away and extends their thumb out. Trying out different positions of the thumb, and differing distances makes this a fun and fast experiment to find out where your thumb needs to be to cover the other person's head totally or partially. Easy explanations and images are used in the directions and there are expanded notes for teachers at the end of the demonstration. Quick, easy and satisfying science.

Building a Pinhole Camera

How to make your pinhole projector for the eclipse? (English, French; Canadian Space Agency)

This activity from the Canadian Space Agency shows you how to construct a pinhole camera with a cardboard box and other simple household materials to observe the Sun safely. With adult help in cutting the holes out of the box, students can make this pinhole camera in about 10 minutes. The longer the box, the larger the projection will be but in

most cases the image is still quite small. The illustrations used often show a larger image than you will actually see. Encourage students to be creative and decorate their boxes.

How to make a pinhole camera to see the solar eclipse [Video] (English, CBC News)

This video gives you another look at how to make pinhole cameras. It is a quick overview and easy to follow. From CBC files with links to other CBC videos and eclipse content.

Viewing the Sun with Projection

Spot the Sun: Make a Pinhole Sun Viewer (English, Exploratorium)

Here is a science “snack” from Exploratorium that is quick and easy. Poking a hole through a stiff card, such as an index card, and projecting the image onto a white background, such as poster paper or a white wall will produce an image of the sun. The activity asks the students to change the size of the hole, the shape of the hole and to vary the distance the card is from the background, first hypothesizing what they think may happen, and then experimenting with the variations. The second section asks the students to use a small mirror to reflect the sun’s images onto the background but this part would need careful monitoring from adults for younger students and may be better recommended for older groups.

You can adapt this activity by making more holes in the projecting card in a design or pattern. Experiment with sizes and shapes to make eclipse “art”. Make your name in pinholes or write “Eclipse April 8th 2024” and take a picture. This would make a great memory of the eclipse!

Try using anything with holes from your home: a colander is perfect, a spatula with holes, a single sided grater or a pizza pan. Just turn your back to the sun and hold the item up so it is projecting the sunlight through the pattern of holes onto the ground in front of you. This works best when the eclipse is in a partial phase leading up to or after totality.

Eclipse Observation Log

Eclipse Observation Log - Activity (English, Queen’s University)

Here is one example of an eclipse observation log or journal that could be adapted to your student’s abilities in reading and recording observations. Doing this as a group activity would help in using various students' different skill sets. It might be asking a lot for younger students to be involved with using their eclipse glasses correctly and keeping track of timing or sensing differences in temperature and light conditions, particularly near the time of totality, but it might be useful in the longer time periods before totality and afterwords to have them record their observations and perceptions. Be sure to encourage them to record what they heard from others around them and how they felt after the eclipse as these are as important as the scientific notations.

Arts and Crafts

Predict the Corona - Art Project (English, NASA)

The solar corona is the outer atmosphere of the Sun and it's only visible during a total eclipse. It can look a bit different from one eclipse to another. You can start by showing pictures of eclipses from historical artwork and recent photographs and ask students to draw what they think the 2024 eclipse will look like. They can use pencil or chalk for this activity.

Earth-Moon-Sun System

Observing the sky

In the sky, I can see… (English, French; Discover the Universe)

This activity is part of Discover the Universe's Looking Up! Activity guide for teachers. This short activity allows students to reflect on what is visible in the sky during the day and at night. As a team, they complete the activity sheet by drawing or writing what they can see in the night sky and in the daytime sky. A class discussion is encouraged at the end. (French version of Looking Up!)

Grades 4-6

About solar eclipses (Videos)

What is an eclipse?

What is a solar eclipse? - NASA Space Place. 2 minutes. (English)

This video for younger students explains what an eclipse is in simple language and graphics. It includes some easy science terms such as the corona, partial and total eclipses, and the path of totality. It mentions the concepts of changes in the amount of light and in animal behaviour during a total eclipse. It has just the right amount of visual humour to keep the students connecting to the material. Add in the closed captioning for the verbal script on the screen so students can follow along. As it is only 2 minutes long it could easily be repeated and reviewed to consolidate the concepts. A banner at the top of the screen that remains throughout the video emphasizes the need for eye safety and highlights the website for more information. Recommended for early grades but could be used easily as an introductory activity for grades 4 to 6.

Solar Eclipse 101 - National Geographic. 5 minutes. (English)

This video is a quick overview of several concepts regarding eclipses: what causes eclipses, the different types, where and when you might see them, and a short section on what happens to the animals and plants during an eclipse. A very good "interruption" occurs about halfway through to stop and talk about safety aspects, showing proper use of glasses, and then how to use projection devices as well. The video covers a lot of ground in five minutes and probably could be shown a couple of times for students to

take in all the information available. A good place to start for vocabulary, science concepts and safety discussions.

What does a solar eclipse look like?

2019 total solar eclipse real-time video, La Silla Observatory - European Southern Observatory (ESO). 4 minutes.

This video shows the 2019 total eclipse in real time from a single camera set up at the La Silla Observatory in Chile from the moments just before the start of totality through the four minutes of totality and ending just after. During totality the moon covers the sun as a very small dot so it is not as realistic as in person or as you would see in a live-streaming presentation that would show close-up views. But the beauty of this video is that it shows the light gradually dimming in the sky, the stars coming out, and the audio of all the people shouting, clapping and enjoying the experience from the hills above the observatory. There is no voice-over or explanation so it requires a little patience from the watchers to follow through to the end. The audio is what makes the difference, though, and is well worth showing this video from middle to upper grade levels.

Indigenous knowledge and connections to eclipses

2021 Annular Solar Eclipse - First Nations and Inuit Peoples stories about Solar Eclipses. 4 minutes. Published by the Canada-France-Hawaii Telescope in English and French.

This video features Innu astrophysicist Laurie Rousseau-Nepton, now an Assistant Professor at the University of Toronto, sharing two First Nations and Inuit Peoples stories about Solar Eclipses. This video was created for the 2021 Annular Solar Eclipse, and can be started at 0:25 to avoid student confusion. Subtitles are available for the English video in Inuktitut (Baffin), Inuktitut (Nunavik), James Bay Cree, Swampy Cree, Ojibway, Oji-Cree, Innu, Mi'kmaq, and likewise for the French video in Inuktitut (Baffin), Inuktitut (Nunavik), Cri de la Baie James, Innu, Mikmaq, Cri des marais, Ojibwé, Oji-Cri.

A Time for Renewal - Navajo (Diné) Knowledge of Eclipses. 7 minutes. (English). Published by Exploratorium.

A video interview with members of the Diné (Navajo) people on eclipses in their perspective. Watch the video and have a discussion on the perspective of eclipses as a time of reverence and respect, and making one's own relationship with the event.

Activities

Solar Eclipses

Creating your own eclipses

Exploring the Solar System: Solar Eclipse (English, Spanish; NISE Network)

This hands-on activity from NISE Network demonstrates how the particular alignment of the Sun, Earth, and Moon can cause an eclipse. Students investigate the positions of these objects using models to create shadows and learn about solar eclipses without the

models needing to be to scale. You can consider incorporating the Earth and Moon: Astronomy & Space Science Activity from Exploratorium by doing the first part of the Exploratorium activity before the NISE Network activity, where students select balls of different sizes and have to find their "partner" so that there is a "Earth" student paired with a "Moon" student. It may be helpful to only have 2 sizes of balls, so that you can focus on students understanding that the Earth is larger. Then after doing the NISE activity, consider doing the second part of the Exploratorium activity as a "competition" between student pairs to see who best estimates the true relative distance between the Earth and Moon. If time allows, you can encourage students to try and create a to-scale solar eclipse if they can.

Recréer une éclipse en classe (French, Science in School)

This activity from Science in School is a great indoor activity for recreating an eclipse, with age-appropriate discussion prompts. Depending on the ability of your students, it may be pertinent to prepare some of the material ahead of time, such as the cut cardboard tubes.

Solar Eclipse model without materials

Eclipse Activity (English, Exploratorium)

This educational science "snack" from San Francisco's Exploratorium is a short, simple exploration of total, annular and partial eclipses for students in teams of two, and all you need is your thumb. One person is the sun while the other person moves a few meters away and extends their thumb out. Trying out different positions of the thumb, and differing distances makes this a fun and fast experiment to find out where your thumb needs to be to cover the other person's head totally or partially. Easy explanations and images are used in the directions and there are expanded notes for teachers at the end of the demonstration. Quick, easy and satisfying science.

Building a Pinhole Camera

How to make your pinhole projector for eclipse? (English, French; Canadian Space Agency)

This activity from the Canadian Space Agency shows you how to construct a pinhole camera with a cardboard box and other simple household materials to observe the Sun safely. With adult help in cutting the holes out of the box, students can make this pinhole camera in about 10 minutes. The longer the box, the larger the projection will be but in most cases the image is still quite small. The illustrations used often show a larger image than you will actually see. Encourage students to be creative and decorate their boxes.

How to make a pinhole camera to see the solar eclipse [Video] (English, CBC News)

This video gives you another look at how to make pinhole cameras. It is a quick overview and easy to follow. From CBC files with links to other CBC videos and eclipse content.

Viewing the Sun with Projection

Spot the Sun: Make a Pinhole Sun Viewer (English, Exploratorium)

Here is a science “snack” from Exploratorium that is quick and easy. Poking a hole through a stiff card, such as an index card, and projecting the image onto a white background, such as poster paper or a white wall will produce an image of the sun. The activity asks the students to change the size of the hole, the shape of the hole and to vary the distance the card is from the background, first hypothesizing what they think may happen, and then experimenting with the variations. The second section asks the students to use a small mirror to reflect the sun’s images onto the background, and requires some careful monitoring from adults so that they are using the mirrors properly.

You can easily adapt this activity by making more holes in the projecting card in a design or pattern. Experiment with sizes and shapes to make eclipse “art”. Make your name in pinholes or write “Eclipse April 8th 2024” and take a picture. This would make a great memory of the eclipse!

Try using anything with holes from your home: a colander is perfect, a spatula with holes, a single sided grater or a pizza pan. Just turn your back to the sun and hold the item up so it is projecting the sunlight through the pattern of holes and onto the ground in front of you. This works best when the eclipse is in a partial phase leading up to or after totality. Any of these projection activities can be done any time there is a sunny day so experiment with these before the eclipse to be familiar with what occurs.

Eclipse Observation Log

Eclipse Observation Log – Activity (English, Queen’s University)

Here is one example of an eclipse observation log or journal that could be adapted to your student’s abilities in reading and recording observations. It could be done individually or as a group activity. There will need to be some prior teaching of what the phases may look like, what changes in the conditions may occur, etc., before doing this activity.

It might be asking a lot for students to be involved with using their eclipse glasses correctly and keeping track of timing or sensing differences in temperature and light conditions, particularly near the time of totality but it might be useful in the longer time periods before totality and afterwords to have them record their observations and perceptions. Be sure to encourage them to record what they heard from others around them and how they felt after the eclipse as these are as important as the scientific notations. You might consider adding on to the log to include these extra observations.

Arts and Crafts

Predict the Corona - Art Project (English, NASA)

The solar corona is the outer atmosphere of the Sun and it's only visible during a total eclipse. It can look a bit different from one eclipse to another. Start by showing pictures of eclipses from historical artwork and recent photographs and connecting differences in how the eclipse looks to solar activity. Solar activity is measured with sunspots and there is an 11-year cycle. Tell the students that the solar maximum is expected to be in 2024/2025 and then ask them to predict what they think the 2024 eclipse will look like. After the eclipse, compare true photographs with the predictions and discuss.

Earth-Moon-Sun System

Observing the sky

How long is my shadow? (English, French; Discover the Universe)

This activity is part of Discover the Universe's Looking Up! Activity guide for teachers. In this activity, students use the length of their shadow to understand the apparent movement of the Sun in the sky. They must take measurements at different times of the day to notice the differences. The activity offers alternative methods if time cannot be taken to have students go outside multiple times a day to take these measurements. (French version of Looking Up!)

Why does the sky change colour?

Blue Sky: Waves & Light Science Activity (English, Exploratorium)

This activity is about how we perceive sunlight on Earth. The Sun gives off light that spans all the colours of the rainbow. When sunlight passes through Earth's atmosphere, tiny particles in the air can scatter the light (think of a beam of light in a dusty room where the tiny dust particles spread out the beam). Of all the colours, blue light scatters best, but what we see depends on where the Sun is in the sky. When the Sun is high in the sky, blue light scatters toward us making the sky look blue. When the Sun is low in the sky (e.g., during sunset), blue light scatters away from us making the Sun look red. This activity uses a tank of water and a flashlight to show how different angles give different colours. When you look at the flashlight beam straight on, it will look orangish, much like the Sun at sunset. When you look at the beam from an angle, you will see white-bluish light. As students look at the light from different angles, remind them of how the sky looks at different times of the day.

Grades 7-8

About solar eclipses (Videos)

What is an eclipse?

Solar Eclipse 101 - National Geographic. 5 minutes. (English)

This video is a quick overview of several concepts regarding eclipses: what causes eclipses, the different types, where and when you might see them, and a short section on what happens to the animals and plants during an eclipse. A very good “interruption” occurs about halfway through to stop and talk about safety aspects, showing proper use of glasses, and then how to use projection devices as well. The video covers a lot of ground in five minutes and probably could be shown a couple of times for students to take in all the information available. A good place to start for vocabulary, science concepts and safety discussions.

Why people get so excited about a total solar eclipse - Vox. 5 minutes. (English)

In this video from Vox, the differences between a solar and lunar eclipse is explained and why some believe that a total eclipse of the sun is the greatest natural phenomenon of them all. This video also touches on the likelihood of a total solar eclipse happening over any one location on Earth.

Why Don’t We Have an Eclipse Every Month? | Total Solar Eclipse - Exploratorium. 2 minutes. (English)

This Exploratorium video shows how you can make a 3-dimensional model of the Earth, Moon, Sun relationship using students in a large circle, some string, a hula hoop and different sized balls representing the Earth and Moon. The demonstration of the tilt of the Moon’s orbit (the hula hoop) around the Earth and how the nodes appear every 6 months is done fairly quickly but is well presented. There is captioning on the screen and a cheerful, well spoken host.

What does a solar eclipse look like?

2019 total solar eclipse real-time video, La Silla Observatory - European Southern Observatory (ESO). 4 minutes.

This video shows the 2019 total eclipse in real time from a single camera set up at the La Scilla Observatory in Chile from the moments just before the start of totality through the four minutes of totality and ending just after. During totality the moon covers the sun as a very small dot so it is not as realistic as in person or as you would see in a live-streaming presentation that would show close-up views. But the beauty of this video is that it shows the light gradually dimming in the sky, the stars coming out, and the audio of all the people shouting, clapping and enjoying the experience from the hills above the observatory. There is no voice-over or explanation so it requires a little patience from the watchers to follow through to the end. The audio is what makes the difference, though, and is well worth showing this video from middle to upper grade levels.

Indigenous knowledge and connections to eclipses

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Activities

Solar Eclipses

Creating your own eclipses

Exploring the Solar System: Solar Eclipse (English, Spanish; NISE Network)

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Yardstick Eclipse (English, Astronomical Society of the Pacific)

> This activity by the Astronomical Society of the Pacific, encourages students to create a to-scale model of the Earth-Moon system using common classroom materials. This activity is best done outside, but can be done indoors using a flashlight in place of the

Sun. Students are encouraged to create different kinds of eclipses using their model. Including construction time, this activity is short and simple, with possible extensions and discussion questions. You can also refer to the Exploring Lunar and Solar Eclipses via a 3-D Modelling Design Task (Miranda et al., 2016) for discussion questions and ideas on how to make the activity more inquiry-based.

Make a Ring Light Eclipse: Science Activity (English, Exploratorium)

This activity from Exploratorium focuses on the shadows created for different kinds of eclipses, focusing on the difference between partial, annular, and total solar eclipses. Using a ring light as the Sun to better represent spread-out rays, students investigate the appearance of a shadow when a circular cardboard cut-out blocks some of the light. You can also consider using a sphere instead, such as a styrofoam ball.

Recréer une éclipse en classe (French, Science in School)

This activity from Science in School is a great indoor activity for recreating an eclipse, with age-appropriate discussion prompts. Consider exploring lunar and solar eclipses with your students.

Solar Eclipse model without materials

Eclipse Activity (English, Exploratorium)

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Why are solar eclipses rare?

Eclipse in a Cup (English, Exploratorium)

Solar eclipses do not happen every New Moon or every Full Moon because the Moon’s orbit is tilted. This science “snack” shows an easy way to build a model to demonstrate how the Moon’s orbit is tilted, and how this orbit tilt is the reason that we don’t have an eclipse every month. Construction of the model is fairly straightforward. Once the model is ready, there are different investigations to carry out; some of these may require some practice. There is much material for in-depth discussions of how the geometry of the Sun-Earth-Moon system affects eclipses.

Building a Pinhole Camera

How to make your pinhole projector for eclipse? (English, French; Canadian Space Agency)

This activity from the Canadian Space Agency shows you how to construct a pinhole camera with a cardboard box and other simple household materials to observe the Sun safely. Making this pinhole camera should take about 10 minutes. The longer the box, the larger the projection will be but in most cases the image is still quite small. The illustrations used often show a larger image than you will actually see. Encourage students to be creative and decorate their boxes.

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You can easily adapt this activity by making more holes in the projecting card in a design or pattern. Experiment with sizes and shapes to make eclipse "art". Make your name in pinholes or write "Eclipse April 8th 2024" and take a picture. This would make a great memory of the eclipse!

Try using anything with holes from your kitchen: a colander is perfect, a spatula with holes, a single sided grater or a pizza pan. Just turn your back to the sun and hold the item up so it is projecting the sunlight through the pattern of holes and onto the ground in front of you. This works best when the eclipse is in a partial phase leading up to or after totality. Any of these projection activities can be done any time there is a sunny day so experiment with these before the eclipse to be familiar with what occurs.

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Eclipse Observation Log – Activity (English, Queen's University)

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phases may look like, what changes in the conditions may occur, and what experiments could be done before doing this activity. Changes to the form may be made according to what you would like as outcomes.

It might be asking a lot for students to be involved with using their eclipse glasses correctly and keeping track of timing or sensing differences in temperature and light conditions, particularly near the time of totality but it might be useful in the longer time periods before totality and afterwords to have them record their observations and perceptions. Be sure to encourage them to record what they heard from others around them and how they felt after the eclipse as these are as important as the scientific notations.

Arts and Crafts

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The solar corona is the outer atmosphere of the Sun and it's only visible during a total eclipse. It can look a bit different from one eclipse to another. Start by showing pictures of eclipses from historical artwork and recent photographs and connecting differences in how the eclipse looks to solar activity. Solar activity is measured with sunspots and there is an 11-year cycle. Discussion of solar activity can also lead to a discussion about the Northern Lights and space weather. Tell the students that the solar maximum is expected to be in 2024/2025 and then ask them to predict what they think the 2024 eclipse will look like. After the eclipse, compare true photographs with the predictions and discuss.

Earth-Moon-Sun System

Why does the sky change colour?

Blue Sky: Waves & Light Science Activity (English, Exploratorium)

This activity is about how we perceive sunlight on Earth. The Sun gives off light that spans all the colours of the rainbow. When sunlight passes through Earth's atmosphere, tiny particles in the air can scatter the light (think of a beam of light in a dusty room where the tiny dust particles spread out the beam). Of all the colours, blue light scatters best, but what we see depends on where the Sun is in the sky. When the Sun is high in the sky, blue light scatters toward us making the sky look blue. When the Sun is low in the sky (e.g., during sunset), blue light scatters away from us making the Sun look red. This activity uses a tank of water and a flashlight to show how different angles give different colours. When you look at the flashlight beam straight on, it will look orangish, much like the Sun at sunset. When you look at the beam from an angle, you will see white-bluish light. Have the students consider the change in colour from different angles, from along the axis of the beam (0 degree) to an angle that is perpendicular to the beam (90 degree) and note the difference in colour using a protractor to estimate the angle that they are viewing from and compare what they see to what the sky and Sun look like at different times of day.

Day and night on Earth

Self-Centered Globe: Astronomy & Shadows Science Activity (English, Exploratorium)

This activity uses a globe (and the light of the Sun) to explore and demonstrate some of the basic mechanisms behind day and night (and shadows) for your specific location on Earth. The setup at first may seem daunting since it requires aligning a globe with the actual north pole of the Earth, but there are step by step instructions to achieve that. Once set up, the investigations are straightforward and insightful. This activity requires a clear day with lots of sunshine, and is typically an outdoor activity.

Secondary

Grades 9-10

About solar eclipses (Videos)

What is an eclipse?

Solar Eclipse 101 - National Geographic. 5 minutes. (English)

This video is a quick overview of several concepts regarding eclipses: what causes eclipses, the different types, where and when you might see them, and a short section on what happens to the animals and plants during an eclipse. A very good “interruption” occurs about halfway through to stop and talk about safety aspects, showing proper use of glasses, and then how to use projection devices as well. The video covers a lot of ground in five minutes and probably could be shown a couple of times for students to take in all the information available. A good place to start for vocabulary, science concepts and safety discussions.

Why people get so excited about a total solar eclipse - Vox. 5 minutes. (English)

In this video from Vox, the differences between a solar and lunar eclipse is explained and why some believe that a total eclipse of the sun is the greatest natural phenomenon of them all. This video also touches on the likelihood of a total solar eclipse happening over any one location on Earth.

Why Don’t We Have an Eclipse Every Month? | Total Solar Eclipse - Exploratorium. 2 minutes. (English)

This Exploratorium video shows how you can make a 3-dimensional model of the Earth, Moon, Sun relationship using students in a large circle, some string, a hula hoop and different sized balls representing the Earth and Moon. The demonstration of the tilt of the Moon’s orbit (the hula hoop) around the Earth and how the nodes appear every 6 months is done fairly quickly but is well presented. There is captioning on the screen and a cheerful, well spoken host.

What does a solar eclipse look like?

2019 total solar eclipse real-time video, La Silla Observatory - European Southern Observatory (ESO). 4 minutes.

This video shows the 2019 total eclipse in real time from a single camera set up at the La Scilla Observatory in Chile from the moments just before the start of totality through the four minutes of totality and ending just after. During totality the moon covers the sun as a very small dot so it is not as realistic as in person or as you would see in a live-streaming presentation that would show close-up views. But the beauty of this video is that it shows the light gradually dimming in the sky, the stars coming out, and the audio of all the people shouting, clapping and enjoying the experience from the hills above the observatory. There is no voice-over or explanation so it requires a little patience from the watchers to follow through to the end.

Indigenous knowledge and connections to eclipses

2021 Annular Solar Eclipse - First Nations and Inuit Peoples stories about Solar Eclipses. 4 minutes. Published by the Canada-France-Hawaii Telescope in English and French.

This video features Innu astrophysicist Laurie Rousseau-Nepton, now an Assistant Professor at the University of Toronto, sharing two First Nations and Inuit Peoples stories about Solar Eclipses. This video was created for the 2021 Annular Solar Eclipse, and can be started at 0:25 to avoid student confusion. Subtitles are available for the English video in Inuktitut (Baffin), Inuktitut (Nunavik), James Bay Cree, Swampy Cree, Ojibway, Oji-Cree, Innu, Mi'kmaq, and likewise for the French video in Inuktitut (Baffin), Inuktitut (Nunavik), Cri de la Baie James, Innu, Mikmaq, Cri des marais, Ojibwé, Oji-Cri.

A Time for Renewal - Navajo (Diné) Knowledge of Eclipses. 7 minutes. (English). Published by Exploratorium.

A video interview with members of the Diné (Navajo) people on eclipses in their perspective. Watch the video and have a discussion on the perspective of eclipses as a time of reverence and respect, and making one's own relationship with the event.

Activities

Solar Eclipses

Creating your own eclipses

Exploring the Solar System: Solar Eclipse (English, Spanish; NISE Network)

This hands-on activity from NISE Network demonstrates how the particular alignment of the Sun, Earth, and Moon can cause an eclipse. Students investigate the positions of these objects using models to create shadows and learn about solar eclipses without the models needing to be to scale. You can consider incorporating the Earth and Moon: Astronomy & Space Science Activity from Exploratorium by doing the first part of the Exploratorium activity before the NISE Network activity, where students select balls of different sizes and have to find their "partner" so that there is a "Earth" student paired

with a “Moon” student. Then after doing the NISE activity, consider doing the second part of the Exploratorium activity as a “competition” between student pairs to see who best estimates the true relative distance between the Earth and Moon. If time allows, you can encourage students to try and create a to-scale solar eclipse if they can. If time allows or in another lesson, expand on these activities with the Eclipse to Scale activity, where students make a smaller version of the Earth-Moon-Sun system and focus primarily on ensuring accurate relative sizes and distances.

Yardstick Eclipse (English, Astronomical Society of the Pacific)

This activity by the Astronomical Society of the Pacific, encourages students to create a to-scale model of the Earth-Moon system using common classroom materials. This activity is best done outside, but can be done indoors using a flashlight in place of the Sun. Students are encouraged to create different kinds of eclipses using their model. Including construction time, this activity is short and simple, with possible extensions and discussion questions. You can also refer to the Exploring Lunar and Solar Eclipses via a 3-D Modelling Design Task (Miranda et al., 2016) for discussion questions and ideas on how to make the activity more inquiry-based.

Make a Ring Light Eclipse: Science Activity (English, Exploratorium)

This activity from Exploratorium focuses on the shadows created for different kinds of eclipses, focusing on the difference between partial, annular, and total solar eclipses. Using a ring light as the Sun to better represent spread-out rays, students investigate the appearance of a shadow when a circular cardboard cut-out blocks some of the light. You can also consider using a sphere instead, such as a styrofoam ball.

Recréer une éclipse en classe (French, Science in School)

This activity from Science in School is a great indoor activity for recreating an eclipse, with age-appropriate discussion prompts. Consider exploring lunar and solar eclipses with your students, and really diving into the harder discussion questions.

Solar Eclipse model without materials

Eclipse Activity (English, Exploratorium)

This educational science “snack” from San Francisco's Exploratorium is a short, simple exploration of total, annular and partial eclipses for students in teams of two, and all you need is your thumb. One person is the sun while the other person moves a few meters away and extends their thumb out. Trying out different positions of the thumb, and differing distances makes this a fun and fast experiment to find out where your thumb needs to be to cover the other person’s head totally or partially. Easy explanations and images are used in the directions and there are expanded notes for teachers at the end of the demonstration. Quick, easy and satisfying science.

Why are solar eclipses rare?

Eclipse in a Cup (English, Exploratorium)

Solar eclipses do not happen every New Moon or every Full Moon because the Moon's orbit is tilted. This science "snack" shows an easy way to build a model to demonstrate how the Moon's orbit is tilted, and how this orbit tilt is the reason that we don't have an eclipse every month. Construction of the model is fairly straightforward. Once the model is ready, there are different investigations to carry out; some of these may require some practice. There is much material for in-depth discussions of how the geometry of the Sun-Earth-Moon system affects eclipses.

Building a Pinhole Camera

How to make your pinhole projector for eclipse? (English, French; Canadian Space Agency)

This activity from the Canadian Space Agency shows you how to construct a pinhole camera with a cardboard box and other simple household materials to observe the Sun safely. Making this pinhole camera should take about 10 minutes. The longer the box, the larger the projection will be but in most cases the image is still quite small. The illustrations used often show a larger image than you will actually see. Encourage students to be creative and decorate their boxes.

How to make a pinhole camera to see the solar eclipse [Video] (English, CBC News)

This video gives you another look at how to make pinhole cameras. It is a quick overview and easy to follow. From CBC files with links to other CBC videos and eclipse content.

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Spot the Sun: Make a Pinhole Sun Viewer (English, Exploratorium)

Here is another science "snack" from Exploratorium and one that is quick and easy. Poking a hole through a stiff card, such as an index card, and projecting the image onto a white background, such as poster paper or a white wall will produce an image of the sun. The activity asks the students to change the size of the hole, the shape of the hole and to vary the distance the card is from the background, first hypothesizing what they think may happen, and then experimenting with the variations. The second section asks the students to use a small mirror to reflect the sun's images onto the background but be aware of the safety aspects that are indicated in the directions so that the mirrors are used properly.

You can easily adapt this activity by making more holes in the projecting card in a design or pattern. Experiment with sizes and shapes to make eclipse "art". Make your name in pinholes or write "Eclipse April 8th 2024" and take a picture. This would make a great memory of the eclipse!

Try using anything with holes from your kitchen: a colander is perfect, a spatula with holes, a single sided grater or a pizza pan. Just turn your back to the sun and hold the

item up so it is projecting the sunlight through the pattern of holes onto the ground in front of you. This works best when the eclipse is in a partial phase leading up to or after totality. Any of these projection activities can be done any time there is a sunny day so experiment with these before the eclipse to be familiar with what occurs.

Earth-Moon-Sun System

The Sun

The Solar Cycle (English, French; Discover the Universe)

The purpose of this activity is for students to explore the changing appearance of the Sun over periods ranging from days to decades. Students will use real data from space-based solar observatories, including the Solar Dynamics Observatory (SDO) and the Solar and Heliospheric Observatory (SOHO). In this activity, students are guided through a series of exercises to familiarize themselves with the Helioviewer tool for exploring archival observations of the Sun. This activity incorporates an inquiry component, where students are given the freedom to follow their curiosity and direct their own learning. Students should be in pairs or small groups, and will need access to a computer with an internet connection. The activity should be planned for more than one class, as it will take 1-2 hours to complete.

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This activity is about how we perceive sunlight on Earth and explains why the sky is blue during the day and sunsets look red. When sunlight passes through Earth's atmosphere, tiny particles in the air can scatter the light (think of a beam of light in a dusty room where the tiny dust particles spread out the beam). This process, called Rayleigh scattering, is most efficient for bluer colours than for redder colours (the Sun gives off all colours of the spectrum). When the Sun is high in the sky, the blue light scatters toward us making the sky look blue. When the Sun is low in the sky (e.g., during sunset), blue light scatters away from us making the Sun look red. Note that without an atmosphere, the sky would appear black (consider images of the lunar sky from the Moon's surface). Using a tank of water and a flashlight, the students can explore Rayleigh scattering and see how the flashlight colour changes for different viewing angles. Scattered light is also polarized, much like how scattered sunlight from snow is polarized. This is why skiers need to use special polarizing sunglasses. Students can test that at 90 degrees, the polarization is most significant using a polarizing filter and rotating to see the degree at which light is polarized. For an eclipse connection, sunlight can pass through Earth's atmosphere during a lunar eclipse, but due to blue light scattering away, primarily red light passes through and makes the Moon look red.

Day and night on Earth

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This activity uses a globe (and the light of the Sun) to explore and demonstrate some of the basic mechanisms behind day and night (and shadows) for your specific location on Earth. The setup at first may seem daunting since it requires aligning a globe with the actual north pole of the Earth, but there are step by step instructions to achieve that. Once set up, the investigations are straightforward and insightful. This activity requires a clear day with lots of sunshine, and is typically an outdoor activity.

Grades 11-12

About solar eclipses (Videos)

What is an eclipse?

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This video is a quick overview of several concepts regarding eclipses: what causes eclipses, the different types, where and when you might see them, and a short section on what happens to the animals and plants during an eclipse. A very good “interruption” occurs about halfway through to stop and talk about safety aspects, showing proper use of glasses, and then how to use projection devices as well. The video covers a lot of ground in five minutes and probably could be shown a couple of times for students to take in all the information available. A good place to start for vocabulary, science concepts and safety discussions.

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This Exploratorium video shows how you can make a 3-dimensional model of the Earth, Moon, Sun relationship using students in a large circle, some string, a hula hoop and different sized balls representing the Earth and Moon. The demonstration of the tilt of the Moon’s orbit (the hula hoop) around the Earth and how the nodes appear every 6 months is done fairly quickly but is well presented. There is captioning on the screen and a cheerful, well spoken host.

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Earth-Moon-Sun System

The Sun

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The purpose of this activity is for students to explore the changing appearance of the Sun over periods ranging from days to decades. Students will use real data from space-based solar observatories, including the Solar Dynamics Observatory (SDO) and the Solar and Heliospheric Observatory (SOHO). In this activity, students are guided through a series of exercises to familiarize themselves with the Helioviewer tool for exploring archival observations of the Sun. This activity incorporates an inquiry component, where students are given the freedom to follow their curiosity and direct their own learning. Students should be in pairs or small groups, and will need access to a computer with an internet connection. The activity should be planned for more than one class, as it will take 1-2 hours to complete. In particular, consider Part 8 of the activity, where students conduct independent research on how solar activity impacts Earth

Why does the sky change colour?

Blue Sky: Waves & Light Science Activity (English, Exploratorium)

This activity is about how we perceive sunlight on Earth and explains why the sky is blue during the day and sunsets look red. When sunlight passes through Earth's atmosphere, tiny particles in the air can scatter the light (think of a beam of light in a dusty room where the tiny dust particles spread out the beam). This process, called Rayleigh scattering, is most efficient for bluer colours than for redder colours (the Sun gives off all colours of the spectrum). When the Sun is high in the sky, the blue light scatters toward us making the sky look blue. When the Sun is low in the sky (e.g., during sunset), blue light scatters away from us making the Sun look red. Note that without an atmosphere, the sky would appear black (consider images of the lunar sky from the Moon's surface). Using a tank of water and a flashlight, the students can explore Rayleigh scattering and see how the flashlight colour changes for different viewing angles. Scattered light is also polarized, much like how scattered sunlight from snow is polarized. This is why skiers need to use special polarizing sunglasses. Students can test that at 90 degree, the polarization is most significant using a polarizing filter and rotating to see the degree at which light is polarized. For an eclipse connection, note that sunlight can reach the Moon due to refraction with Earth's atmosphere. But due to scattering, redder colours preferentially manage to pass through as bluer colours scatter away, making the Moon appear red.

Day and night on Earth

Self-Centered Globe: Astronomy & Shadows Science Activity (English, Exploratorium)

> This activity uses a globe (and the light of the Sun) to explore and demonstrate some of the basic mechanisms behind day and night (and shadows) for your specific location on Earth. The setup at first may seem daunting since it requires aligning a globe with the actual north pole of the Earth, but there are step by step instructions to achieve that. Once set up, the investigations are straightforward and insightful. This activity requires a clear day with lots of sunshine, and is typically an outdoor activity.

Event planning resources

Eclipse2024.org resources (English)

Teacher timeline and checklist (English, French; Discover the Universe)

Message to school administrators (English, French; Discover the Universe)

Maps

Interactive Google Map from Eclipse2024.org, with links to community pages, videos, and more.

Interactive map from TimeAndDate.

Live Streams (in case of clouds)

Time and Date

Providing livestreams since 2016 by partnering with astronomers across the globe, Time and Date brings you images from the best locations with fascinating commentary. Stream will start at noon eastern daylight time. LIVE Stream: Total Solar Eclipse April 8, 2024 , and on YouTube: Total Solar Eclipse (Great North American) - April 8, 2024

Exploratorium

For the last 20 years, Exploratorium has partnered with NASA to livestream solar eclipses. For this eclipse, they will be streaming from Texas starting at 2:00 pm eastern daylight time. Watch Live Solar Eclipse Broadcasts | Exploratorium

NASA

NASA's live broadcast will include coverage from Texas, Indiana, and Ohio. The broadcast will provide a front-row seat to the eclipse and will feature NASA experts across the country explaining the science behind the eclipse and how NASA studies it. NASA Live: Official Stream of NASA TV

Other resources

About solar eclipses

Great American Eclipse

Eclipse: Who? What? Where? When? and How? | Total Solar Eclipse 2017 (NASA)

2024 Total Eclipse - NASA Science

Eclipses - NASA Science

When is the next solar eclipse? | Canadian Space Agency

How Do You Tell the Difference Between Total, Annular, Solar, and Lunar Eclipses? | Britannica

How Often Do Solar Eclipses Occur? (TimeAndDate)

Educational websites and organizations

Montreal planetarium

Information and graphics for the October 14, 2023 annular solar eclipse in English and French as well as for the April 8th, 2024 total solar eclipse in English and French.

Discover the Universe

Discover the Universe supports science education by providing free, bilingual, easily accessed resources for nation-wide teacher training in astronomy. Information and resources are updated regularly for the 2024 Eclipse in English and French. Subscribe to the 2024 Eclipse newsletter to stay informed on all things 2024 Eclipse.

AstroLab

Located in the exceptional landscape of Mont-Megantic National Park, the ASTROLab is an astronomy activity centre devoted to making science accessible. They are providing a remote school program in French as well as other remote and in person activities. (English, French).

Éclipses

An educational website developed by a network of experts in astronomy and science communication. (English, French)

Citizen Science - GAVRT Solar Patrol

Goldstone Apple Valley Radio Telescope - Solar Patrol, GAVRT Solar Patrol — Zooniverse

Citizen Science - Dynamic Eclipse Broadcast (DEB) Initiative

Dynamic Eclipse Broadcast Initiative

Other activities:

Universe in a box Activity Book