Instructional Resources
Guidance Document

DeKalb County School District

TOTAL SOLAR ECLIPSE
AUGUST 21, 2017

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(Curriculum & Instruction)

DCSD will extend the school day by one hour on Aug. 21 due to solar eclipse

The DeKalb County School District (DCSD) will extend its school day by one hour on Monday, Aug. 21, 2017, to provide safe viewing and instructional opportunities related to the expected solar eclipse that day.

Dismissal will occur one hour later than usual, at the end of the extended learning period. Our three-tier dismissal system starts with elementary schools, followed by high schools, and finally middle schools. Parents are encouraged to contact their child's school to determine the exact dismissal time on Monday, Aug. 21.

According to NASA, the solar eclipse will occur across North America that day when the moon obscures 97.4 percent of the sun. The solar eclipse will be viewable around 1:02 p.m. and end at 4 p.m. DCSD reminds its community that it is not safe to stare directly into the sun without special glasses, and it is providing lessons that will allow students to safely take advantage of the moment.

Those lessons may include the distribution of special viewing glasses, and opportunities to view the eclipse using monitors and safe viewing options. Many teachers will also include information on the eclipse in their lessons that day, as appropriate.

An informational flyer is attached to this email.

Solar Eclipse Opt/In Form and Release of Liability

2017/2018 School Year

WRITTEN PERMISSION IS REQUIRED FOR STUDENTS TO PARTICIPATE

Please **return this form** to your child's school, to grant permission for your child/student to go outside to view the Solar Eclipse on August 21, 2017, with the use of proper eye protection. **Please Note**: The District will provide all students with CE certified and ISO 12312-2 compliant solar filters or safety glasses.

On Monday, August 21, 2017, a solar eclipse will be visible (weather permitting) across all of North America. DeKalb County School District's Science Instructors will engage the students in the investigation of the solar eclipse phenomena. These activities may include instructional lessons within all content areas, televised viewing of the eclipse, and actual viewing of the eclipse with the use of special purpose filters known as "eclipse glasses".

This permission form is used to inform and to gain signed permission for your child/student to opt-in to the outside viewing of the 2017 Solar Eclipse.

- Please check the **Yes (Opt-In)** box, if you do grant permission for your child/student to participate in the outside activities.
- Please check the **No** box, if you do not grant permission for your child to participate in the outside activities.
- A parent/guardian must also sign below and return to the classroom/science instructor. If you have any questions about the 2017 Solar Eclipse lesson(s), please contact your child's Science Instructor.
- **Should the District not receive this signed form, your child/student will not be allowed to participate in the outside viewing of the solar eclipse.**

Based on information provided by the school district in its parent letter, I understand the potential for damage to the eye if my child looks directly at the sun during this time without wearing the solar filters or safety glasses provided by the district. By signing below the parent/guardian understands the nature of this activity described and the risk associated with the activity. I agree not to hold the district liable in the event my student makes the decision NOT to wear the safety eye protection that is provided.

By signing this permission form, I agree to release DeKalb County School District, its schools, its school board, its employees and agents (the "Released Parties") from, and agree not to sue the Released Parties for, any and all claims, of any nature related in any manner to my child's participation in the outdoor viewing activities associated with the August 21, 2017 solar eclipse.

Activity	Schedule Period	**Yes** (Opt-In)	**No**
2017 Solar Eclipse Viewing	August 21, 2017		

Yes, I parent/guardian of: _____, hereby give consent for my child to participate in outdoor Solar Eclipse Viewing activities and agree to speak with my child about the importance of keeping their eclipse glasses on at all times during this event.

No, I parent/guardian of: _____, do **Not** consent for my child to participate in outdoor Solar Eclipse Viewing activities.

School: _____ **Science Instructor:**_____

***Parent/Guardian Signature(s):**_____ **Date:** _____

By signing this form, the parent/guardian acknowledges that they have read the **Solar Eclipse Opt In-Form/Release of Liability form and fully understand its contents and the consequences of signing this form.*

Solar Eclipse 2017 General Information:

Total Solar Eclipse

On Monday, August 21, 2017, all North America will be treated to an eclipse of the sun. Anyone within the path of totality can see one of nature's most awe-inspiring sights - a total solar eclipse. This path, where the moon will completely cover the sun and the sun's tenuous atmosphere - the corona - can be seen, will stretch from Lincoln Beach, Oregon to Charleston, South Carolina. Observers outside this path will still see a partial solar eclipse where the moon covers part of the sun's disk.

Image Credit: Rick Fienberg, TravelQuest International and Wilderness Travel

Figure 1- In this series of still from 2013, the eclipse sequence runs from right to left. The center image shows totality; on either side are the 2nd contact (right) and 3rd contact (left diamond rings that mark the beginning and end of totality respectively).

Who Can See It?

Lots of people! Everyone in the contiguous United States, in fact, everyone in North America plus parts of South America, Africa, and Europe will see at least a partial solar eclipse, while the thin path of totality will pass through portions of 14 states.

Image Credit: NASA's Scientific Visualization Studio

Figure 2- This map shows the globe view of the path of totality for the August 21, 2017 total solar eclipse. You can find more information at: https://svs.gsfc.nasa.gov/4518(link is external) (link is external)

What is It?

This celestial event is a solar eclipse in which the moon passes between the sun and Earth and blocks all or part of the sun for up to about three hours, from beginning to end, as viewed from a given location. For this eclipse, the longest period when the moon completely blocks the sun from any given location along the path will be about two minutes and 40 seconds. The last time the contiguous U.S. saw a total eclipse was in 1979.

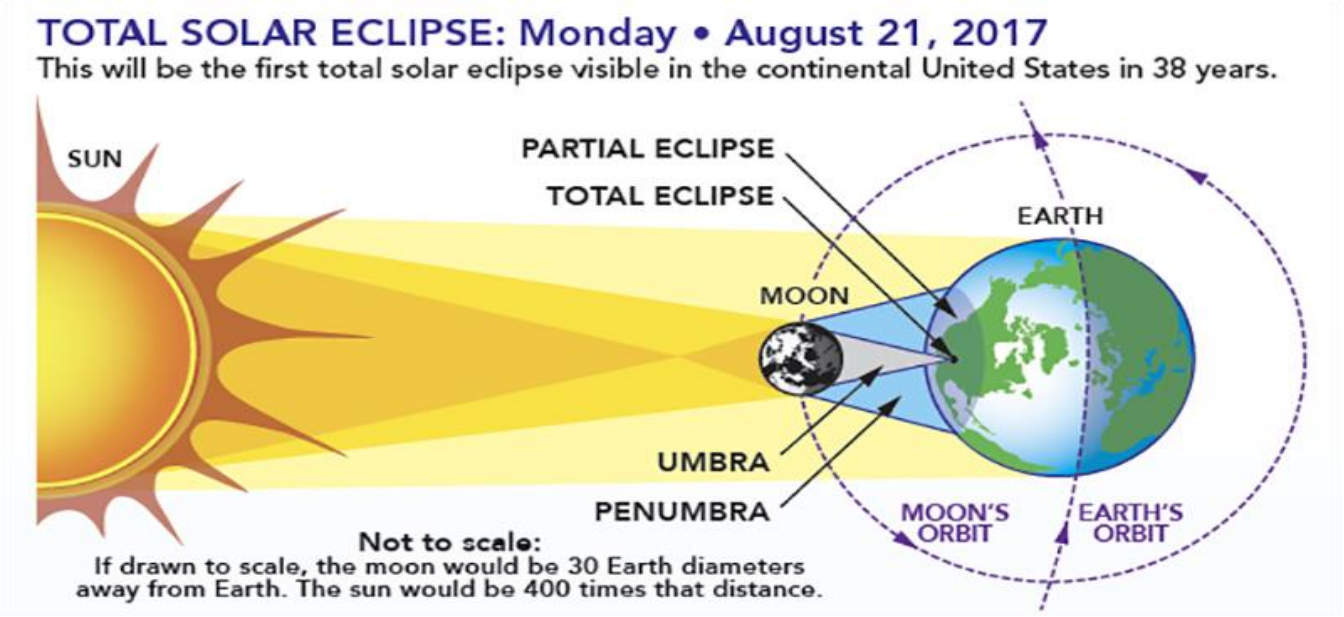
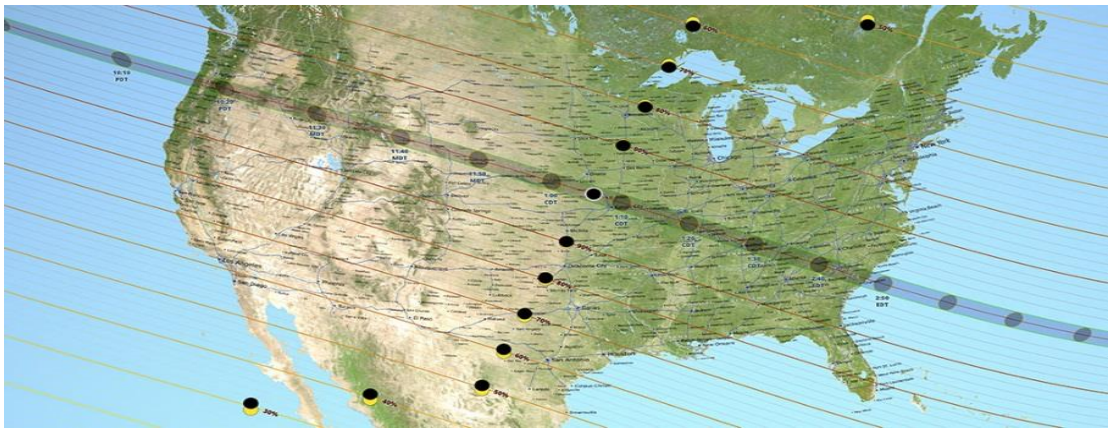


Figure 3 – Diagram showing the Earth-sun-moon geometry of a total solar eclipse. Not to scale: If drawn to scale, the Moon would be 30 Earth diameters away. The sun would be 400 times that distance.

Where Can You See It?

You can see a partial eclipse, where the moon covers only a part of the sun, anywhere in North America (see "Who can see it?"). To see a total eclipse, where the moon fully covers the sun for a short few minutes, you must be in the path of totality. The path of totality is a relatively thin ribbon, around 70 miles wide, which will cross the U.S. from West to East. The first point of contact will be at Lincoln Beach, Oregon at 9:05 a.m. PDT. Totality begins there at 10:16 a.m. PDT. Over the next hour and a half, it will cross through Oregon, Idaho, Wyoming, Montana, Nebraska, Iowa, Kansas, Missouri, Illinois, Kentucky, Tennessee, Georgia, and North and South Carolina. The total eclipse will end near Charleston, South Carolina at 2:48 p.m. EDT. From there the lunar shadow leaves the United States at 4:09 EDT. Its longest duration will be near Carbondale, Illinois, where the sun will be completely covered for two minutes and 40 seconds.

Figure 4 - A map of the United States showing the path of totality for the August 21, 2017 total solar eclipse.



When Can You See It?

Times for partial and total phases of the eclipse vary depending on your location. This interactive eclipse map(link is external) will show you times for the partial and total eclipse anywhere in the world

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	Eclipse Begins	Totality Begins	Totality Ends	Eclipse Ends	
Madras, OR	09:06 a.m.	10:19 a.m.	10:21 a.m.	11:41 a.m.	PDT
Idaho Falls, ID	10:15 a.m.	11:33 a.m.	11:34 a.m.	12:58 p.m.	MDT
Casper, WY	10:22 a.m.	11:42 a.m.	11:45 a.m.	01:09 p.m.	MDT
Lincoln, NE	11:37 a.m.	01:02 p.m.	01:04 p.m.	02:29 p.m.	CDT
Jefferson City, MO	11:46 a.m.	01:13 p.m.	01:15 p.m.	02:41 p.m.	CDT
Carbondale, IL	11:52 a.m.	01:20 p.m.	01:22 p.m.	02:47 p.m.	CDT
Paducah, KY	11:54 a.m.	01:22 p.m.	01:24 p.m.	02:49 p.m.	CDT
Nashville, TN	11:58 a.m.	01:27 p.m.	01:29 p.m.	02:54 p.m.	CDT
Clayton, GA	01:06 p.m.	02:35 p.m.	02:38 p.m.	04:01 p.m.	EDT
Columbia, SC	01:13 p.m.	02:41 p.m.	02:44 p.m.	04:06 p.m.	EDT

Table 1 – Example of eclipse times for cities in the path of totality.

How Can You See It?

You never want to look directly at the sun without appropriate protection except during totality. That could severely hurt your eyes. However, there are many ways to safely view an eclipse of the sun including direct viewing – which requires some type of filtering device and indirect viewing where you project an image of the sun onto a screen. Both methods should produce clear images of the partial phase of an eclipse. Click here for eclipse viewing techniques and safety.

Eclipse Viewing Recommendations

Figure 5 - Check with local science museums, schools, and astronomy clubs for eclipse glasses—or purchase an ISO 12312-2 compliant and CE certified pair of these special shades!

The whole continent will experience a partial eclipse lasting 2 to 3 hours. Halfway through the event, anyone within a roughly 70-mile-wide path from Oregon to South Carolina (http://bit.ly/1xuYxSu) will experience a brief total eclipse, when the Moon completely blocks the Sun's bright face for up to 2 minutes 40 seconds, turning day into night and making visible the otherwise hidden solar corona — the Sun's outer atmosphere — one of nature's most awesome sights. Bright stars and planets will become visible as well.

Looking directly at the Sun is unsafe except during the brief total phase of a solar eclipse ("totality"), when the Moon entirely blocks the Sun's bright face, which will happen only within the narrow path of totality (http://bit.ly/1xuYxSu). DCSD is **NOT** located within the path of totality. Protective viewers **SHOULD NOT** be removed during observation.

The only safe way to look directly at the uneclipsed or partially eclipsed Sun is through special purpose solar filters, such as "eclipse glasses" (example shown at left) or hand-held solar viewers. Homemade filters or ordinary sunglasses, even very dark ones, are not safe for looking at the Sun.

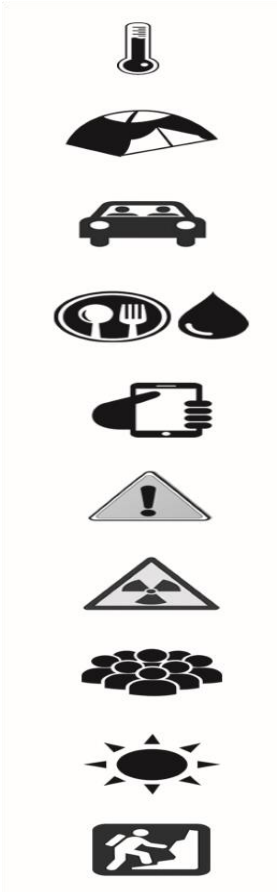
- Always inspect your solar filter before use; if scratched or damaged, discard it. Read and follow any instructions printed on or packaged with the filter. Always supervise children using solar filters.
- Stand still and cover your eyes with your eclipse glasses or solar viewer before looking up at the bright Sun. After glancing at the Sun, turn away and remove your filter — do not remove it while looking at the Sun.
- Do not look at the uneclipsed or partially eclipsed Sun through an unfiltered camera, telescope, binoculars, or other optical device. Similarly, do not look at the Sun through a camera, a telescope, binoculars, or any other optical device while using your eclipse glasses or hand-held solar viewer — the concentrated solar rays will damage the filter and enter your eye(s), causing serious injury.
- A solar eclipse is one of nature's grandest spectacles.

By following these simple rules, you can safely enjoy the view and be rewarded with memories to last a lifetime. More information: eclipse.aas.org eclipse2017.nasa.gov

This document does not constitute medical advice. Readers with questions should contact a qualified eye-care professional.

Source: NASA Eclipse August 21, 2017 -who-what-where-when-and-how

Solar Eclipse 2017 - Links to Safety Information



Extreme heat safety
http://bit.ly/28LXx6e

Camping health and safety
http://bit.ly/2eg3dNl

Car safety (Fact Sheet for State and Local Departments of Transportation)
http://bit.ly/2eZZstP

Food and drink safety
http://bit.ly/1gh22Bu

Protection against distracted driving
http://bit.ly/2eBRdp0

Preparing for hazards
http://bit.ly/1K9LC2u

Safeguard against biological hazards
http://bit.ly/2eg2lYQ

Crowd safety
http://bit.ly/2eZXOZa

Stay safe in the sun
http://bit.ly/1hz2dsF

Tips for hikers
http://bit.ly/2eg14Bf

Suggested Activities for Students Who Remain in the Classroom during the 2017 Solar Eclipse

Webcast provided by Earth Science instructors from the Fernbank Science Center.
Fernbank Science Center will be offering professional development for 4th and 6th grade teachers in the week preceding the event. The training will include the science behind the eclipse, why eclipses are so special, and the proper procedure for viewing. There is a video clip, located at http://fsc.fernbank.edu/eclipse.htm, with the proper viewing procedures. The eclipse will be recorded for future instructional purposes.

During the event the public will be able to view the eclipse at the Center using telescopes with the proper solar filters, view live feeds from other sites in the US, and learn more about eclipses while viewing the Totality planetarium show.

Padcast provided from the DCSD Division of Information Technology: Here is a link to DCSD Padcaster resources: http://its.dekalb.k12.ga.us/Padcaster_2015521145826635.aspx

NASA

Elementary Level Activities

- Edible Model of the sun (link is external)
- How Can the Little Moon Hide the Giant sun – Scale Activity (link is external)
- K-4 focused lessons about the sun (link is external)
- K-4 Our Very Own Star Story (link is external)
- Layers of the sun Diagram (link is external)
- Make a sun on Paper Activity (link is external)
- NSTA's *Science & Children* - Jan2017 - Get Ready for the Great American Eclipse by Fulco
- NSTA's *Science & Children* - Feb2017 - Countdown to the Great American Eclipse by Fulco
- NSTA's *Science & Children* - Mar2017 - Preparing for the Eclipse, How to Safely Observe the sun with Young Children by Hurst, Plummer, Gurton and Schatz
- NSTA's *Science & Children* - Mar2017 - Eclipses and Eye Safety by Charles Fulco
- Playing with Magnetism; Exploring Magnetic Fields (link is external)
- Scale Model of the sun and Earth (link is external)
- Various phases of the moon throughout the month (link is external)

Middle School Level Activities

- Ball and String Earth-Moon Model (pp. 13-20) (link is external)
- Eclipse Cereal Box Viewer
- Eclipse Simulator(link is external)
- NASA Wavelengths and Sunspots(link is external), Esseacourses.strategies.org(link is external)
- NSTA's *Science Scope* - Mar2017 - The August 2017 Total Solar Eclipse, The Perfect Opportunity to Highlight Three-Dimensional Science Learning by Schatz and Fraknoi
- NSTA's *Science Scope* - Mar2017-Science Teachers as Community Eclipse Outreach Agents by Fraknoi and Schatz
- NSTA's *Science Scope* - Oct2016 - Exploring Lunar and Solar Eclipses via a 3-D Modeling Design Task by Miranda, Kruse and Hermann
- Solarscapes – plot and analyze Sunspots and sun's period of rotation.(link is external)
- Space Faring: The Radiation Challenge MS(link is external)
- The Last Total Solar Eclipse…Ever! Math (p.34)(link is external)
- The sun and Magnetic Fields(link is external)

High School Level Activities

- Change Pairs – Analyze and compare images taken by Solar Dynamics Observatory(link is external)
- Modeling Meaningful Eclipses(link is external)
- NSTA's *The Science Teacher* - Mar2017 - Total Eclipse. An Ideal Opportunity to Practice Three-Dimensional Science Learning by Schatz and Fraknoi
- NSTA's *The Science Teacher* - Mar2017- Becoming a Solar Eclipse Outreach Agent by Fraknoi and Schatz
- NSTA's *The Science Teacher* - Mar2017 - Modeling the Eclipse by Thornburgh and Tretter

Credit: National Science Teachers Association (Science Scope, Science & Children and The Science Teacher) permission granted by Mr. Ken Roberts, the Assistant Executive Director of NSTA Periodicals

Interdisciplinary Opportunities: Use these resources to explore the science, math, and literature associated with the eclipse and general astronomy.

Science

Ages 4-11	Ages 10-14	Ages 13-18
Big Sun, Small Moon (link is external) Use a paper plate and coin to investigate how a much smaller moon can eclipse the large sun. (Lawrence Hall of Science, DIY sun Science)	**Measuring Angular Size and Distance (link is external)** Build a shoebox solar eclipse simulator. Explore distance and proportions between the Earth, moon, and sun and investigate angular size and paths of totality. Good math connections. (NASA CONNECT, Path of Totality)	**Eclipses and Moon Phases (link is external)** Investigate how Einstein needed a total eclipse in order to demonstrate how the sun's mass bends the light from a faraway star. Good history connection and use of source documents – newspaper article from 1919. (NASA GSFC)

Math

Ages 10-14	Ages 13-18
Ancient Eclipses and Length of Day (link is external) Math activity comparing track of a solar eclipse in Babylonian times to calculate the rate at which the day is lengthening over time. (NASA SpaceMath problem #7, see page 24 of PDF document).	**Moon orbits the Sun (link is external)** Construct a model to demonstrate the moon's orbit around the sun. Learners will also compare the strengths of the gravitational forces exerted on the moon by the sun and by the Earth. (PUMAS – Practical Uses of Math and Science)
Earth's Orbit activities (link is external) Build a pin-hole camera out of a shoe box to calculate the size of the sun (NASA's Eye on the sun, p 21)	**Pinhole Projector** (link is external) Construct a pinhole projector to project an image of the sun, observe and record the size of the projected image, and calculate the diameter of the sun using the measurements and a known distance to the sun. (*Touch the sun,* Chabot Space Science Center, pg 64)

Language Arts, History, and Social Studies

Part of a larger unit on the sun, this site includes lots of activities about the sun with Language Arts and Math connections. Learners can construct a model of the sun, Earth, and moon motions, observe and manipulate the 3-D models, and simulate the movement of these bodies during an eclipse. Activities culminate with a book of all the student work – including wonderful art projects – great for portfolios. (University of California, Berkeley – Project FIRST)

Our Star the Sun (link is external)

Explore folklore about the sky from native America as language arts and history connections. Those specific to the sun include Raven and the sun, Three-legged Rabbit, Coyote and Eagle Steal the sun and moon, Boy and the sun, sun and Her Daughter, Spider and the sun, Little Brother Snares the sun, One Who Walks all Over the Sky, Fifth World.

Native American Folklore (link is external)

Many cultures around the world have interesting myths about the sun and the moon, reflecting their importance to daily life. Discover some of the interesting beliefs of early civilizations. Compare and find similarities between different myths and cultures.

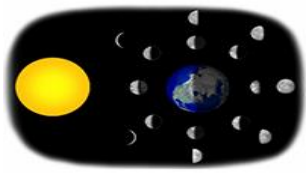
Cultural Myths about the Sun and Moon (link is external)
https://www.windows2universe.org/mythology/planets/Earth/moon.html(link is external)

This collection from the Chabot Space Center offers great activities for the whole family- such as making an ancient calendar with sidewalk chalk. This resource introduces the basics of Earth and Sun motion and provides great connections to math, and Native American history (pages 15-30).

Continue the activities throughout the year and track the equinox in September and March and the solstice in December. Additional activities include an Indoor Solar Calendar (pages 31-44) and Birthday Beam (pages 45-56). Both are great family activities for building a family birthday calendar.

Medicine Wheel Solar Calendar and other explorations in Archaeoastronomy (link is external)

Science lessons beyond the Eclipse



The eclipse offers an engagement point to explore the motion of the Earth, sun, and moon and improve spatial and causal reasoning of celestial motions. These activities connect familiar phenomena such as seasons, eclipses, and moon phases from both an Earth and space perspective to improve understanding of how rotation and revolution can change the appearance of the sun and moon.

Use of 3D demonstrations can enrich explanations of celestial motion that can difficult to interpret from illustrations alone. Developing a spatial reasoning behind Earth, moon, and sun motions can help with understanding more complex concepts such as the causes of seasons.

Earth, Sun, and Moon motions (Earth-based observations)

Ages 4-11	Ages 10-14	Ages 13-18
Cookie Moon Phases (link is external) Use a classic sandwich cookie (like Oreo brand) to illustrate the phases of the moon and connect to observations. See also: Lunar(link is external) Phase Sheets(link is external) (Lunar and Planetary Institute)	**Phases of the Moon** (link is external) Illustrate the phases of the moon with paper plates. Create a three dimensional model of the lunar phases relative to the Earth and sun. Children construct a conceptual model through kinesthetic activities. (Lunar Planetary Institute)	**Golf Ball Phases** (link is external) Explore the dynamics of lunar phases to develop an understanding of the relative positions of our moon, Earth, and sun that cause the phases of the moon as viewed from Earth. Using a golf ball glowing under the ultraviolet light ("blacklight") makes it easier to see the phases of the moon. (Lunar and Planetary Institute)

Earth, Moon, and Sun motions (space-based perspective)

Ages 4-11	Ages 10-14	Ages 13-18
Modeling Motions of the Earth, Moon, and Sun. (link is external) This kinesthetic activity invites learners to use their bodies to model how these celestial bodies move relative to each other. Offers a 3D demonstration for understanding of the causes of the day/night cycle, the seasons and the cycle of lunar phases. (PUMAS)	**The Cause of the phases of the Moon (link is external).** This learner-centered activity invites the child to figure out the positioning of a ball (moon) to a light source (sun). The child constructs their knowledge of what causes the lunar phases. This activity can also be preceded with a month of moon-watching and recording first hand observations. (PUMAS)	**The Moon Orbits the Sun.** (link is external) Construct a model to demonstrate the moon's orbit around the sun. Learners will also compare the strengths of the gravitational forces exerted on the moon by the sun and by the Earth. (PUMAS)

Seasons

Ages 4-11	Ages 10-14	Ages 13-18
MY NASA DATA – Seasons (link is external) In this data analysis activity, students connect the idea of the tilt and orbit of the Earth (changing of seasons) with monthly snow/ice data. Children under 8 may need additional assistance. (MY NASA DATA)	**Science of the Sun** (link is external) Multiple activities exploring how the Earth's tilt, orbit, and angle of the sun's rays influence temperature between seasons and latitudes. Investigate how Earth's orbit as an ellipse (p. 27), construct a sun angle analyzer (p. 33), and act out the rotation and revolution motions of Earth around the sun (p.51) in kinesthetic Astronomy (NASA, Science of the sun)	**The Solstices (link is external)** In this data analysis activity, students compare near surface temperature at the time of the solstices in two different hemispheres, and see how the tilt of the Earth's axis in relationship to the sun contributes to temperature differences across the planet. (MY NASA DATA)
Reasons for the Seasons (link is external) Compare the seasons though identifying seasonal activities and drawing scenes in each season. Then, they compare the temperature on thermometers left under a lamp for different lengths of time to explore how Earth heats more when the sun is in the sky for longer periods of time. Finally, learners use a flashlight and a globe to investigate how the spherical shape of Earth causes the seasons to be opposite in each hemisphere. This hands-on activity is an additional lesson as part of the book, Adventures in the Attic (link is external).	**Why is Summer Hot?** (link is external) This activity, effective outdoors or indoors, demonstrates how insolation is affected by latitude by using a pair of thermometers, each taped to some cardboard, placed outside on a sunny day. (PUMAS)	**Plotting the motion of the Sun** (link is external) Learners will examine the location and height of the sun relative to the seasons. (Astronomical Society of the Pacific)

For a curated list of these lessons and more science resources for instructional needs, both in the classroom and at home, visit http://nasawavelength.org/list/1811