Cross-Curricular Activities Connected to Earth Science, Grade 5

The following activities from ***Earth and Space Systems,*** integrate math, social studies, English Language Arts (ELA), art, and more into earth science topics. These cross-curricular connections help students see how science is related to their lives, and the world they live in. These activities reinforce and extend ideas about patterns that can explain the interconnectedness of the systems on Earth and in space and are perfect for learning-from-home lesson plans. Permission is granted to incorporate these activities into teacher and parent lesson plans.

What's in a Billion? (Math)

Since you are dealing with immense size and scale in this unit, share some comparisons that can help students connect large numbers, like billions, to things they can experience. For instance, if you wanted to count from one to one billion, it would take you 95 years. One billion millimeters is 1,000 km (600 miles). The length of one billion $1 U.S. bills would measure about 155,945 km (96,900 miles), enough to circle Earth almost four times!

Exploring Space Careers (Social Studies)

Give students the opportunity to research different careers that are associated with space. They may want to learn more about astronauts, engineers, astronomers, and other experts who explore the universe. Have students create a visual to go with their research. Arrange for a guest speaker to come to your classroom or connect students with space experts online.

Volume Math Challenge (Math)

Prompt students to think about the Sun and Earth in terms of volume. Provide the formula for the volume of a sphere and give students the diameters of Earth (12,756 km) and the Sun (1,392,000 km). Challenge students to find the volumes of Earth and the Sun using this information.

- The volume of any sphere is calculated by this formula: V = 4/3 πr3
- The radius of a circle or sphere is one-half of the diameter. The value of π in this case is 3.14.

(Therefore, the approximate volume of the Sun is 4/3 × 3.14 × 696,0003 = 1.408 x 1018 km3; the approximate volume of Earth is 4/3 × 3.14 × 6,3783 = 1.084 × 1012 km3; the ratio is 1:1,304,000. So, it would take over 1,300,000 Earths to fill a space the size of the Sun!)

Solar System Walk (Math)

Using a scale model that is one 10-billionth of our solar system's actual size, take students on a solar system walk. You will need an area outside to walk a total of 600 meters and 8 pieces of cardstock, each labeled with the name of one of the planets and the Sun. Explain to students that a pace will equal two steps. Have a meterstick or measuring tape handy as well. Then use the following chart to take your walk!

Sun to Mercury	Mercury to Venus	Venus to Earth	Earth to Mars
About 6 paces	About 5 paces	About 4 paces	About 8 paces

Mars to Jupiter	Jupiter to Saturn	Saturn to Uranus	Uranus to Neptune
About 55 paces	About 65 paces	About 144 paces	About 163 paces

NASA Space Place (Social Studies)

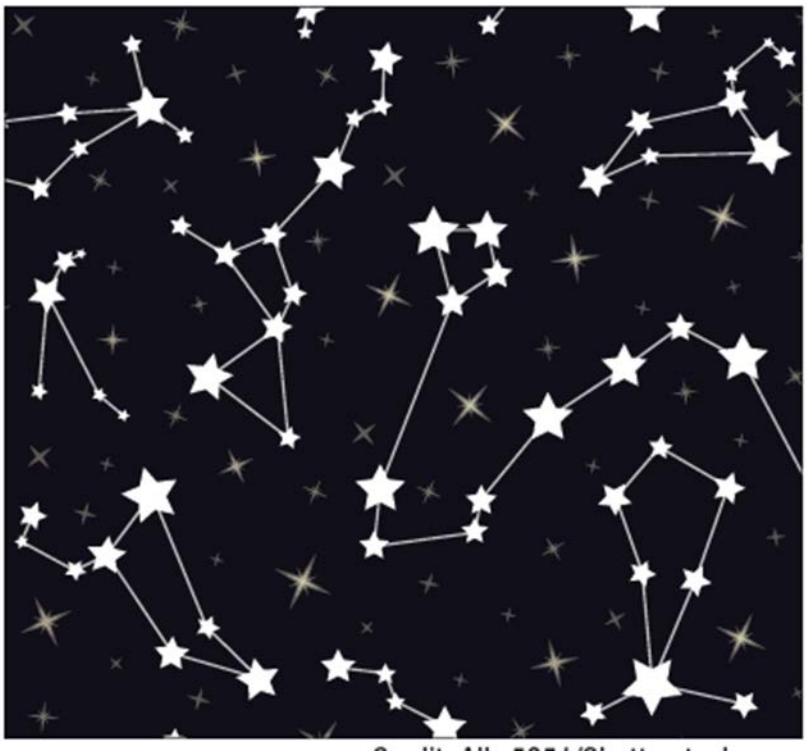
Visit NASA's Space Place to explore fun and educational activities for students. The site has suggestions for classroom activities, games, videos, and more. Just some of the activities students can explore include space weather, auroras, dark matter, and exoplanets.

Design a Sundial (Engineering)

A sundial is an instrument that uses the Sun and shadows to tell time. Have students research the history and use of sundials, and then provide materials for them to create their own sundial. Encourage students to plan, build, and test their design, and then explain to classmates how their sundial works.

Life Cycles and Star Colors (Science)

Continue to explore stars by having students research the life cycle of a star as well as how surface temperature and the color of stars are related. Depending on the ability levels of your students, you may wish to share the Hertzsprung-Russell Diagram (H-R), which is used to classify the luminosity and temperature of stars.



Observing the Positions of Constellations (Science and Art)

Challenge students to further explore patterns in stars by using an interactive online sky map. Have students trace the apparent movement of a constellation for your location and study how the constellation changes hourly, monthly, and annually. Two recommended online sky maps are In the Sky and Neave's Interactive Planetarium. Encourage students to draw the changes in their constellation's position. You may want to display students' drawings for the class and further challenge students to investigate patterns of constellations in a different location in the world.

Eclipses (Science)

Have students visit NASA's website and search for info on eclipses. Encourage students to obtain data on past, current, and future lunar and solar eclipses. You may wish to assign groups to research different years of solar and lunar eclipses and present their information to the class.

Hometown Data (Math)

To extend their work in Investigation A, have students use an online sunrise and sunset calendar to get your local area's sunrise and sunset times for the 15th day of each month. Then have students calculate total daylight hours and graph the data to make comparisons to what they learned in the investigation.

Phases or Shadow Flip Book (Art)

Students can use a small pad of paper or sticky notes to design and make a flipbook that demonstrates what they learned in this lesson about patterns of change. Students should draw all the stages of a pattern of change, in correct order, with one illustration on each page of the pad. They might illustrate the Moon's phases and orbit around Earth or a shadow's changes as the Sun moves across the sky. When they flip the pad from beginning to end, they will see the complete pattern they illustrated in motion!

Tides (Science and ELA)

Encourage students to learn more about tides by accessing an online resource such as NOAA's Ocean and Coasts Education Resources site. Students can look at and analyze tidal maps, listen to a podcast about tides, and learn about research into changing patterns of tides and how to reduce coastal flooding.

Terrarium (Science)

Challenge students to model the interaction of Earth's spheres by designing terrariums. Divide the class into small groups and have each group research how to construct a terrarium. Provide groups the materials they need, making sure that each group uses the same type of plant, and allow students to build their terrariums. Have students monitor the terrariums and look for interactions between their model systems. Discuss how the plants in the terrarium are affected by the systems.

Biomes (Science and Art)

Have the class research Earth's biomes in small groups. As part of their research, have each group look for ways that each of Earth's systems interacts with their assigned biome. Encourage groups to create a visual showcasing their biome, the systems involved, and what environmental issues are facing their biome.

Ocean Issues (Science and ELA)

Engage students in the challenges facing our world's ocean. You may wish to consider topics such as ocean acidification, coral reef bleaching, overfishing, marine debris, or ocean pollution. NOAA, 5Gyres Institute, Thank You Ocean, and USGS are good starting places to look for research, lesson plans, and activities for students.

Water Cycle Art and Storytelling (Art and ELA)

Encourage students to create art or literary works about the water cycle or its effects. Have students produce a collage, video, or creative literary work such as a poem, script or short story. Encourage students to use their creativity in illustrating concepts while keeping those concepts scientifically accurate. Then have students share their creative works with

Conserving Water Math Challenge (Math)

Dentists advise you to brush your teeth for about two minutes each time you brush. Take the class to a faucet. Have one student place a large bucket under the faucet and turn it on. Have another student keep time and tell the first student to turn off the faucet when two minutes have passed. Using a beaker and a second bucket, measure (in mL) approximately how much water was collected in two minutes. Have students calculate the following (in mL):

- How much water is used if they brush their teeth twice a day and leave the water running.
- How much water is used by the entire class if everyone leaves the water running while they brush their teeth twice a day.
- How much water is used per month if all the students in the class leave the water running while they brush their teeth twice a day.

Give students the conversion factor of 1,000 mL in 1 L. Have them convert each of the above answers to liters.

Invite students to share this information with their families or the school community. Ask students to brainstorm ways they can conserve water.

Citizen Science (Science and Community)

Have students get involved with science in your local community. Many opportunities exist for students to collect and share data on their local environment, such as monitoring streams, observing bird migration, and reporting cloud and weather patterns. SciStarter and Journey North are good places to start your search for projects. Reach out to researchers in your community to find additional opportunities for students to contribute to scientific research.

For Further Research (Science and ELA)

Encourage students to explore topics related to Earth's systems that were not explored in this unit. Have students select and research a topic related to ways that one or more of Earth's systems affects humans and vice versa. Ideas include:

- climate change science
- industrial agriculture
- available freshwater for use
- increasing population
- alternative energy
- ocean acidification
- species reintroduction