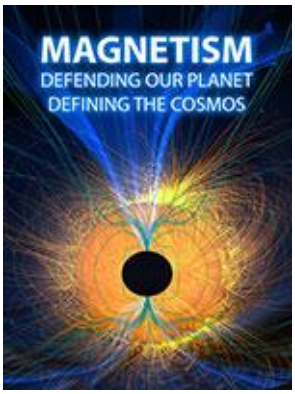
Educator Viewing Guide



Magnetism: Defending Our Planet, Defining the Cosmos (2017)
23 minutes

Magnetism demonstrates how the Earth's magnetic field protects our planet from energetic particles from the Sun and galaxy, and how the magnetic field also protects the water in our atmosphere from being swept away by the solar wind. It shows the first aurora seen simultaneously from the ground and from the ISS, and tells about the MMS mission (Magnetospheric Multiscale) and its quest to understand the magnetic connection between the Earth and the Sun.

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Topics covered:

Magnetism, magnetic fields, magnetospheres

Interdisciplinary connections: space weather, geology, animal science, cultural anthropology (aurora mythology)

Key Terms and Concepts:

Atmosphere, Auroras, Coronal Mass Ejection (CME), Galaxy, Magnetism, Magnetic Field, Magnetic Shield, Magnetosphere, Solar Wind, Supernova

Combine with these KidSpace Activities:

Engineering Lab
Discover the six simple machines and other engineering principles used in designing spacecraft while operating wheels, levers, pulleys, and more.

Magnetic Lab
Investigate the push and pull forces of magnetism while guiding the unique material, Ferrofluid, a nanometer-sized particle that acts like a magnetic solid and liquid.

PlaySpace!
Science begins with imagination. The space-themed playground offers many opportunities for space-themed play, space-related discoveries, and demonstrations of science concepts: gravity, friction, force, laws of motion, and more.

Learning Resources and Activities:

Create learning units designed around a visit to KidSpace! These web resources and activities are designed to illustrate concepts and ideas presented in the show. Many of these can be adapted to various age groups.

Magnetic Storm Activity with Teachers Guide; NOVA Teachers, PBS
This activity is designed to help learners understand the magnetic fields around different shapes of magnets. Includes objectives, materials list, procedure, answer sheet, additional resources, and national science standards.
http://www.pbs.org/wgbh/nova/education/activities/3016_magnetic.html

Exploring Magnetic Fields; American Association for the Advancement of Science (AAAS)
This site contains lesson plans and directions for two activities designed to explore magnetic fields. Includes material list, directions, student worksheets, assessment and extensions.
http://sciencenetlinks.com/lessons/exploring-magnetic-fields/

Exploring the Solar System: Magnetic Fields; NISE Network
This resource contains all downloads needed for participants to learn how scientists use tools to study the invisible magnetic fields of the Earth, Sun, and other objects in the universe. Includes learning goals and how-to videos (Spanish and English).
http://www.nisenet.org/catalog/exploring-solar-system-magnetic-fields-2018

Exploring Materials – Ferrofluid; NISE Network
This resource contains all downloads needed to prepare a hands-on activity demonstrating that a material can act differently when it's nanometer-sized. Includes learning goals and demonstration video.
http://www.nisenet.org/catalog/exploring-materials-ferrofluid-nanodays-08-09-10-11-14

NASA Space Place: Classroom Activities; NASA
This resource contains several space-related activities for the classroom. Must scroll down to find link to downloadable PDF of activity. Related activities include: *Tidy Up Those Sloppy Force Fields, Take a Cold, Clear Look at the Universe, Be a Cosmic Poet,* and more.
https://spaceplace.nasa.gov/classroom-activities/en/

Magnets!; PBS Learning Media (must create free account)
This site is designed to introduce learners to magnets, magnetic forces, and how magnets make things move. Designed for learners to access themselves, grade 2.
https://rmpbs.pbslearningmedia.org/resource/reach-with-stem-magnets/magnets/#.WtYsLy_Mx0s

Magnet Activities for Kids; Brainpop Educators
This site contains several activities designed for grades K-3. Activities include: *Gone Fishing, Make Your Own Compass, Magnet Test, Magnet Scavenger Hunt,* and *Magnets Everywhere*.
https://educators.brainpop.com/lesson-plan/magnets-activities-for-kids-2/

Comprehension Questions:

Help learners process the concepts and ideas presented in the show with these questions.

1. What role does magnetism play in protecting life on Earth?
2. What process causes the auroras?
3. How did the invention of the magnetic compass help sailors?
4. How do scientists know the magnetic poles have flipped more than once on Earth?
5. What are the dangers to Earth when the magnetic poles flip again?
6. Is the magnetic shield similar on all planets in our solar system? What factors account for differences?

Further Research and Discussion

Ask learners to research different cultural mythologies that are connected to seeing auroras. For example, in Northern Europe the aurora was Bifrost, a glowing archway of the gods. What myths existed in other cultures?

This show covers content that addresses Colorado Academic Standard in Science (Physical Science and Earth Systems Science). See Planetarium Show Academic Standard Chart for details by grade.