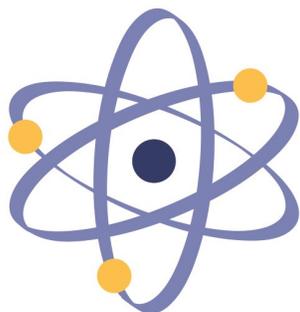


SPRING 2018



SDSTA

South Dakota Science Teachers Association

March 2018
Volume 148

Dear Members,

It is an honor to serve as the SDSTA President for 2018-2020, and I am eager to get to know more of you, along with your interests and concerns, in the coming years. The newly elected Executive Committee with Jen Fowler as our President Elect and Liz McMillan as our Past President, the Science Liaisons, and I want to help SDSTA make a difference in South Dakota's science education. As stated in our constitution "*The purpose of the South Dakota Science Teachers Association shall be the advancement, stimulation, extension, improvement, and coordination of science education in all fields of science at all educational levels.*" I will strive to make this my mantra for the next couple years. To accomplish this I have a few goals in mind.

- 1) Network of support for all levels of science education. South Dakota needs a network of people and resources to which we can rely for new ideas and support. There are a lot of really good things happening in classrooms across the state and SDSTA can be the place to showcase these things and assist those that need help. We want to tap into your talent and resources to, together, define our goals for teachers and students in South Dakota.
- 2.) Step into the spotlight and celebrate Science education! It's time we stepped into the spotlight and made a difference in the state. We have adopted a new logo, we have new leadership and we have a new focus. There are plans in place to start updating the website and getting apparel and accessories to show off our new look. We will have a presence on social media to showcase great practices and the great teachers across the state. A website with links to valuable lessons and ideas. A network of people willing to help. We're going to celebrate science in a whole new way!
- 3.) Provide meaningful professional development in addition to the annual Math/Science conference. To kick off this new focus, we have been working on creating a summer science academy. It will be hosted in Watertown this year and will have a focus on STEM education.

We have guest speakers, business partners, all kinds of swag, and some of the best presenters in the nation joining us for what will be the best summer PD you can find! More to come on this exciting new step for SDSTA! I am excited take the next step and make this the best year of Science in the state yet! It was good to see all of you in Huron again and hope you took some ideas back to your classroom. Good luck as we transition into testing season and holding the lid on while the temperatures and daylight hours begin to increase. Again, thank you for your support as I transition into this new position and I can't wait to see what we will achieve in the next couple years!

Best Regards,
Mark Iverson
SDSTA President

Table of Contents

Calendar of Events	14
Cell Membrane Models	5
Conference Awards	2
Events	8
Free Resources	10
Genetics PD	9
In the Classroom	12
NASA Space Place	13
Opportunities	6
SANFORD RESEARCH	4

Signs you are a high school teacher....You know what the most current prom dress styles are every year. And you know it by February.

Annual awards for math and science are presented and recognized at the annual conference. We are pleased to announce the following recipients of awards at the 2018 Math and Science Education Conference in Huron.



L-R Mark Iverson, SDSTA President; Katie Anderson, DSU and Rhea Waldman, SD Discovery Center represent SD EPSCoR; Sam Shaw, Ed Reports; and Liz McMillan, SDSTA Past-President.

SDSTA awarded **Sam Shaw**, current member and former SD State Science Supervisor, with the “**2018 Distinguished Service**” Award. This award recognizes the efforts and contributions from a member of SDSTA. In his work with the SD DOE Sam led the writing of the current SD Science Standards and supported teachers and SDSTA who recommended using the Framework for Science Education and Next Generation Science Standards as research based, best practice while creating the current set of standards. He established the SDSci leadership team and presented SD as a leader in science education with his National efforts through CS3 and the NSF ACESSE programs. To nominate a SDSTA member to receive the Distinguished Service award, contact President@sdsta.org.

SDSTA awarded **SD EPSCoR**, the SD NSF Experimental Program to Stimulate Competitive Research, with the “**2018 Friend of Science**” Award. This award is presented annually to an individual, group, or organization that works with SDSTA to enhance science literacy, supports SD science teachers, and provides partnership and experiences for SD teachers and students in science. SD EPSCoR has worked with students, teachers, and the community to lay a foundation for future science careers for our 21st century learners. To nominate a Friend of Science, contact President@sdsta.org.

The **2017 Outstanding Biology Teacher, Jeff Peterson**, was first presented his award in a surprise ceremony on May 24, 2017. He was also recognized for the award at the 2018 Conference. He received a \$1000 grant sponsored by Sanford Health to attend the national biology teachers convention in St. Louis in the fall. See the article in EDUCATIONOnline regarding Jeff’s award at: <http://doe.sd.gov/pressroom/educationonline/2017/June/>.

For more information on OBTA, and to apply or nominate a colleague, connect with Julie Olson: Julie.Olson@k12.sd.us. Further information can be found at: <http://www.doe.sd.gov/pressroom/educationonline/2017/Dec/print.html>. Nominees must complete applications by March 30 of each year. Awardees receive a \$1000 award, sponsored by Sanford Health, to be used toward professional development (attending the NABT National Conference) or classroom enhancements.



The **2018 Physical Science Teacher of the Year** Award goes to **Sandra Biddle** of Platte-Geddes High School . This award is supported by 3M and comes with a \$1000 award for professional development or classroom enhancements. To apply or nominate a PS teacher, visit: <https://www.sdstate.edu/physics/south-dakota-outstanding-physical-science-teacher-award>. This award alternates between large schools and rural districts.



Larry Browning (SDSU) names Sandy Biddle as Outstanding Physical Science Teacher.



Tracy Moody, Sanborn Central High School, receives a Sanford PROMISE Ambassador Award from Ben Benson, Sanford Research Education Specialist.



Kristen Maynard, Andes Central High School (left) receives a Sanford PROMISE Ambassador Award from Liz McMillan, president of SDSTA.



Lisa Cardillo, Harrisburg High School and Ramona Lundberg, PAEMST Science Coordinator



2018 Kelly Lane Earth and Space Science Grant winner Spencer Cody of Edmunds Central School District, Roscoe, SD pictured with Tom Durkin of the SD Space Grant Consortium.



2018 Daniel Swets Robotics grant winners Susan Rolfe of Vermillion Area Robotics Club and Alison Batie of Eureka Public School pictured with Tom Durkin of the SD Space Grant Consortium.

We are what we repeatedly do.
Excellence 
therefore, is not
an act, but a habit.
~Aristotle

An additional THANK YOU to the Conference Planning Committee which includes Kevin McElhinney, Cindy Kroon, Sheila McQuade, Jean Gomer, Jennifer Fowler, Steve Caron, and James Stearns.



While attending the February Conference, did one or more of your presenters post some information or handouts online at our free Wiki space? The quickest way to get there is <http://wiki.SDSTA.org>. For the last several years, we set up a spot at Wikispaces to allow presenters to upload things to share with conference attendees. If you would like a copy of any of that material, please make sure that you download any wanted materials before the end of July 2018. At that time, Wikispaces, which started in 2005, will be shutting down its free service.



THE SANFORD PROMISE

Inspiring the next generation of scientists.

LEARN MORE

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sanfordoutreach@sanfordhealth.org • (605) 312-6590

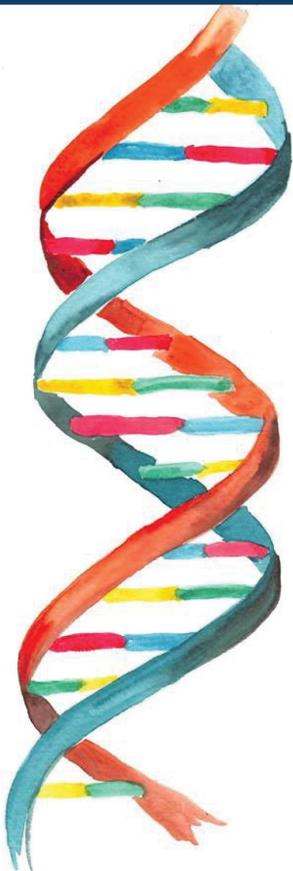


Sanford Research



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SANFORD
RESEARCH



PERSONAL GENETICS

What are you doing to prepare your students to make informed choices?

Join our effort to build awareness, respect and confidence through genetic discussions. Explore how genetics interconnects with issues of social justice, and as genetic technologies become more widespread, how our society can ensure that education and access to information is available to all people.

Learn more and join the conversation by visiting sanfordresearch.org/education or pged.org.

019059-01053 9/17



SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
Supported by the National Center for Research Resources,
a part of the National Institutes of Health.

SANFORD
RESEARCH

Submitted by Julie Olson

Adapted from: <http://nnhsbiology.pbworks.com/w/page/12388762/cell%20membranes>

The cell membrane is a dynamic, fluid structure that surrounds animal, plant and bacterial cells. The structure is composed mainly of phospholipid molecules aligned in two layers. Soap molecules form thin films that are also bilayer structures. Soap films can be used to understand many of the properties of cell membranes. Follow the verbal instructions and demonstration on making membranes with the materials provided. Then work your way through this list of cell membrane properties. Discuss what you see and think with your partner.

SD State Standards Alignment:

HS-PS1-3 Plan and carry out an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (SEP: 3; DCI: PS1.A, PS2.B; CCC: Patterns)

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Practices:

Developing and Using Models—bubbles as a model for cells
Engaging in Argument from Evidence—How are they both a good and poor model for membranes?

Cross-cutting Concepts:

Patterns—cell packing

Cause and Effect - bubble by bubble, pores, cell wall,

Scale/Proportion—bubble vs cells—why don't cells get so big?

Structure/Function—orientation of the molecules in soap vs membranes related to function?

Membrane Fluidity

(make a flat bubble film using two straws connected by a length of yarn so it forms a square)

- Hold your soap membrane up to the light. What do you see that suggests that the membrane is fluid?

Membrane Flexibility

- Twist the two straws in opposite directions.
- Bend and flex your film.
- What happens to the soap film when you bend it?

Membrane Healing

- Push a clean straw through the soap film and note what happens.
- Dip the end of the straw in soap and then push it through the soap film.
- Is there a difference in the 2 outcomes? Explain why.
- Repeat steps #1 and #2 with a larger object such as your finger/hand.
- Is there a size beyond which the membrane is irreversibly affected?

Membrane Channels

- Obtain a bubble wand and coat it with soap solution.
- Place it in a flat film of bubble
- Pop the membrane on the inside of the loop of string.
- his is similar to a passive channel in the cell membrane. What happens when the loop is moved around the membrane?

Endo- and Exocytosis

- Repeat steps #1 and #2 in Membrane Channels above but do not pop the membrane inside the loop.
- Blow gently into the loop to form a bubble.
- What happens to the outer membrane as the bubble is forming?

Cell Division

- Take a 12" length of yarn and dip it in soap solution.
- Blow a bubble about 4" in diameter on the desk top or in a large pan.
- Gently press against the bubble with the soapy yarn. What happens? Can you divide the bubble into 2,4, or 8 "cells"/bubbles?

Prokaryotes, Eukaryotes and More

- Blow a bubble about 4' in diameter on the desk top/pan.
- This represents a prokaryotic cell or bacterium. Why?
- Blow a bubble inside a rigid object like a beaker. The rigid surfaces of the object represent the cell wall in a plant/bacteria/fungi.
- How hard can you blow the bubble? What happens if you exceed this threshold?
- A eukaryotic cell has a defined nucleus with a nuclear membrane. Can you make a model of this type of cell using your straw, beads, poms, and more bubbles? Sketch what this would look like.

Cell Fusion

- Blow two bubbles
- Move them together and try to get them to fuse
- Is the resulting bubble smaller, larger or the same size?

Cell Packing

- Make a number of bubbles inside a clear plastic tube.
- How are the bubbles packed?
- What is the advantage of this type of packing
- Apply a force laterally. How does cell packing and shape change?
- Apply a force vertically. How does cell packing and shape change?

Questions:

Membrane Fluidity

1. What do you see that suggests that the bubble "membrane" is fluid?

Membrane Flexibility

1. What happens to the soap film when you bend it?

Membrane Healing

1. Is there a difference in the 2 outcomes? Explain. Does the size of the object affect the outcome?
2. Is there a size beyond which the membrane is irreversibly affected?

Membrane Channels

1. What happens when the bubble wand is moved around the membrane?

Endo- and Exocytosis

1. What happens to the outer membrane as the bubble is forming?
2. Make a sketch of what it looks like.

Division

1. What does the membrane look like as the yarn is pressed against the bubble? When 2, 4, or 8 cells are formed, are they the same size or smaller? Why?

Prokaryotes, Eukaryotes and More

1. How hard can you blow the bubble in the rigid container?
2. What happens if you exceed this threshold?
3. Sketch the model of the eukaryotic cell\

Cell Fusion

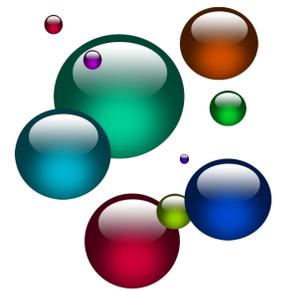
1. Is the resulting bubble smaller, larger or the same size?
2. Make a sketch of before, during and after fusion to illustrate the sizes of the bubbles.

Cell Packing

1. How are the bubbles packed?
2. What is the advantage of this type of packing?
3. Apply a force laterally. How does cell packing and shape change?
4. Apply a force vertically. How does cell packing and shape change?

Soap bubble vs Cell Membranes:

1. Research how a soap film is structured. How is it similar and different from a cell membrane?
2. How are soap bubbles like a cell membrane?
3. How are soap bubbles NOT like a cell membrane?



Presidential Awards for Excellent in Mathematics and Science Teaching Seeking K-6 nominations!

Jennifer Fowler, PAEMST 2015

It is time to nominate a great K-6 science teacher for the highest award for math and science teaching in the nation! The Presidential Awards for Excellence in Mathematics and Science Teaching is a White House program designed to honor superior teaching and accomplishment and is administered by the National Science Foundation.



As a 2015 Awardee, I found the application process rewarding and the benefits are still being presented to me. Each of the components allowed me the time to compile all the greatness in my classroom, and the information gathered during the reflection process has been incorporated in my subsequent lessons. I highly suggest completing an application for your own professional growth as the final product is truly something to cherish.

Submit your nomination before the April 1st deadline! Completed applications are due May 1st. (7-12 teachers should start planning for next year, as I suggest designing your lesson early!) Find your way to PAEMST.ORG to nominate a colleague, or yourself!

BioInteractive Online Professional Learning Course--Evolution

<http://www.hhmi.org/biointeractive/biointeractive-online-professional-learning-course-evolution>



This asynchronous course is designed to help teachers deepen their content knowledge in evolution, especially content required to teach evolution at the high school level. Unit 1, which requires at least 5 hours, focuses on the mechanisms of evolution. Units 2 and 3 combined require at least 5 hours. Unit 2 focuses on sources of evidence supporting evolutionary theory. Unit 3 focuses on patterns of evolution, including phylogenies and macroevolution.

Certificates documenting your completion of the course are available in two segments. You will receive one certificate after completing unit 1, which is estimated to require at least 5 hours. You will receive another certificate after completing both units 2 and 3, which together are also estimated to require at least 5 hours. You can complete the two segments independently.

We are looking for highly qualified, motivated, and committed applicants for the 9th Annual **Project Archaeology Leadership Academy**

Project Archaeology Leadership Academy
Montana State University
Bozeman, MT

June 25 – June 29, 2018

Applications are due by April 15, 2018.



Interested in connecting kids to the past?

Project Archaeology is seeking all-star teachers, museum educators, and archaeology educators to receive high-quality professional development to teach Project Archaeology's acclaimed inquiry-based curricula fulfilling many Common Core requirements.

Lodging and meals are provided for successful applicants! Travel stipends up to \$250 are available. Only a select few will be chosen for this incredible opportunity to protect archaeological sites through education. Come explore a buffalo jump and visit the renowned exhibits and living history farm at the Museum of the Rockies! Graduate credits are available.

<https://projectarchaeology.org/wp-content/uploads/2018/01/>

The Science of Modern Agriculture: Ag Microbials NSTA Learning Center Webinars

MONSANTO



http://learningcenter.nsta.org/products/symposia_seminars/ag/webseminar8.aspx

Join us on Tuesday, April 24, at 6:30 pm ET and learn more about plants' microbiome. This seminar will provide you with valuable information that you may incorporate into your classroom.

Microbes are microorganisms so tiny that millions can fit into the eye of a needle. They occur naturally in the environment and are found almost everywhere. Countless microorganisms live in the soil and in close relation to plants, making up the plants' microbiome. Many of these microbes have distinctive properties that can help control fungi, bacteria, nematodes, insects and weeds. They can also stimulate plant growth and yield by improving access to nutrients.

Ag Biologicals are one of Monsanto's five research and development platforms that provide farmers with tools to grow their crops in a way that use fewer resources – like land, water and energy.

Duration: 90 minutes **Note:** New users should log in 15 minutes prior to the scheduled start time for an introduction to NSTA web seminars.

Presenters: TBD

Project Underground Workshop

Jewel Cave National Monument

Project Underground is an educational workshop designed for teachers and educators, exposing them to different activities related to cave and karst resources. Complementing Project WILD and Project Learning Tree (PLT), this weekend course provides certification for participants ... giving them tools and resources for classroom programs, as well as the training to share these opportunities with others at their local school.



The workshop kicks off on Friday, September 21 with a tour of Jewel Cave after hours (7:00 p.m.), followed by a campfire near the park housing units. On Saturday, September 22, a mixture of classroom activities and cave adventures will take place ... with small group activities happening in the evening. [The workshop finishes on Sunday, September 23 with team activities and lesson plans, with participants departing no later than 11:00 a.m.](#)

More information and registration materials will be made public after August 1. The workshop will be limited to the first 20 participants. Academic credit (professional development credit) will also be made available.

If you would like to be placed on a "waiting list" for the workshop, please contact the Visitor Center at (605) 673-8300 or send an email to jeca_interpretation@nps.gov.

Events

It's All About Science Festival

<http://itsallaboutscience.org/about/>

The 7th Annual It's All About Science Festival will be held on June 9th 2018 at the Sanford Center from 9am-5pm. The It's All About Science Festival is a community-led event and was initiated by Dakota science-based organizations to promote STEM education (science, technology, engineering and mathematics) for children and adults of all ages. The mission of the festival is to promote a science-centric community by showcasing "all things science" to the Northern Plains communities.

The all-day festival is **free of charge** and includes over 50 hands-on activities, demonstrations and exhibits from student groups, educators, and STEM industries, in addition to high-caliber performances.



There are many ways to be involved with the It's All About Science Festival!

Exhibitors showcase the STEM associated with their industry, company, organization, profession, and products. Visit the Exhibitor Page (<http://itsallaboutscience.org/festivalapplications/>) for registration and more.

K-8 Science Fair Project Exposition: Do you know a child K-8 that would be interested in showcasing or re-showcasing their science fair project? The festival hosts a K-8 Science Fair Project Exposition! Visit the Student Page (<http://itsallaboutscience.org/k-12-exhibitions/>) for registration and more.

Poster Competition: The festival boasts a poster competition for high school students, K-12 teachers, undergraduate students and graduate students/post-doctoral fellows. Visit the Student Page (<http://itsallaboutscience.org/k-12-exhibitions/>) for registration and more.

School/Group Exhibits: Regional school groups can present innovative projects that they have been working on throughout the previous school year. These exhibits should be presented by students (with guidance from their teacher/school staff) and represent either in-school or out-of-the classroom projects. All school/student group exhibits will be eligible to compete for special classroom grants. Visit the Student Page (<http://itsallaboutscience.org/k-12-exhibitions/>) for registration and more.

IDENTITY, GENETICS and HISTORY

Professional Development Workshop

July 25 – 27, 2018

Sanford Research Center

2301 E 60th Street N., Sioux Falls

Inspire your students to discover the exciting and diverse world of genetics with interactive lesson plans that explore the ethical and social issues affecting individuals, families and society.

Topics will include:

- Introduction to Personal Genetics
- American Eugenics Movement
- Ethics and Gene Editing
- Athletics and Genetics
- Race, Ancestry and Genetics

Who should attend?

- Workshop content is especially relevant for teachers of life science, health, social studies, law, genetics, psychology, biotechnology, physical education or bioethics. Teachers and non-educators are welcome to apply.



Travel scholarships, attendance stipends and graduate credit available.

Apply and find up-to-date workshop information at sanfordresearch.org/ARC.

This workshop is brought to you by: the Sanford PROMISE science exploration program at Sanford Research, the Personal Genetics Education Project (pgEd) and the National Institutes of Health's SEPA program.

For more information email sanfordoutreach@sanfordhealth.org or (605) 312-6417.

About Personal Genetics Education Project

pgEd creates interactive lessons for high school and college educators to engage their students in discussions of ethics and personal genetics. The program is part of the Department of Genetics at Harvard Medical School.



pgEd.org

Harvard Medical School

SEPA SCIENCE EDUCATION
PARTNERSHIP AWARD

Supported by the National Center for Research Resources,
a part of the National Institutes of Health.

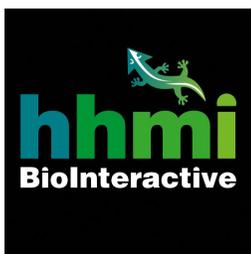
SANFORD
RESEARCH

Free Resources

[bioGraphic for Educators](#)

—<https://www.calacademy.org/educators/biographic-for-educators>

Infographics, data visualizations, and videos make great interactive learning resources for middle and high school students and science teachers. Produced by bioGraphic, the California Academy of Science's multimedia magazine, the resources highlight plant and animal survival strategies observed in nature and promising approaches to sustaining life on Earth. Learn from a bumblebee's flight in the video *Bumper Bees*; discover how giant sequoia trees transport nutrients from root to crown in the infographic *The Making of a Giant*; or read leveled news articles highlighting current research on the behaviors of dolphins, crested guan, green sea turtle, and alpine frogs.



BioInteractive En Español <http://www.hhmi.org/biointeractive/spanish-biointeractive>

We're excited to announce our new [Spanish-language website](#)! It features a large collection of the BioInteractive resources you know and love, translated into Spanish and available through Spanish-language webpages and navigation. The current collection includes more than 70 resources, including short films, animations, Click & Learns and hands-on activities, and will continue to grow. The design allows users to toggle seamlessly between Spanish and English sites, providing maximum flexibility for educators in the U.S. to support English Learner students who speak Spanish as their home language.

RISE AT DUKE: [HTTPS://SITES.DUKE.EDU/RISE/ABOUT/](https://sites.duke.edu/RISE/about/)

RISE was developed in 2005 by Rochelle Schwartz-Bloom, Professor of Pharmacology, to provide validated and engaging resources for teachers and students in biology and chemistry.

THE ALCOHOL PHARMACOLOGY EDUCATION PARTNERSHIP (APEP)

A-PEP is a parallel curriculum to PEP (see next item), but devoted to alcohol. This high school program includes a series of modules that presents basic concepts of biology and chemistry in the context of alcohol pharmacology. Funded by a science education award from the [National Institute on Alcohol Abuse and Alcoholism](#), high school teachers across the US contributed to development of curriculum activities to accompany APEP. Teachers field-tested APEP in their classrooms (over 13,000 students)—results indicate that students

THE PHARMACOLOGY EDUCATION PARTNERSHIP (PEP)

PEP is a partnership with Duke University Medical Center, North Carolina School of Science and Mathematics, and biology and chemistry teachers to produce and share standards-based inquiry teaching materials and activities with high school teachers. The purpose is to provide biology and chemistry teachers with practical applications of basic concepts from both biology and chemistry disciplines using pharmacology topics of interest to high school students. Funded by a Science Education Partnership Award from the [National Institute on Drug Abuse](#), this curriculum has been tested nationwide in over 15,000 students; results show that

SCIENCE EDUCATION ENHANCES KNOWLEDGE (SEEK) ABOUT TOBACCO

Funded by the [National Institute on Drug Abuse](#), we have developed a science education module for use in high school health education classes to address the science behind addiction and development of cancer from tobacco products, whether smoked or smokeless. It can also be used in Biology classes. Health Ed teachers throughout NC participated in field-testing the module in their classes. Use of the module increased student knowledge about addiction and perceived risk of addiction. The SEEK module is now available to the public.

Free Resources

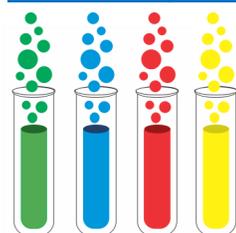
Fire Weather

<http://learn.weatherstem.com/modules/learn/lessons/121/index.html>

How can weather affect wildfire activity? Explore this question and more through this interactive online lesson from WeatherSTEM. In the lesson, elementary and middle level students learn why fire is an important part of the ecosystem and how weather can contribute to the spread of wildfires. Students then apply new understandings to interpret weather data and evaluate whether conditions would have helped spread or stop a fire.



Science Experiments for Children Ages 5–9



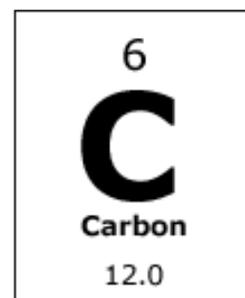
<https://www.gotscience.org/wp-content/uploads/2018/01/Science-experiments-5-9.pdf>

Originally developed in collaboration with the Marie Curie Alumni Association as part of its My Science Super Heroes project, this downloadable e-book from Science Connected has 27 pages of science experiments for adults and children to conduct together using items commonly found around the home or hardware store. The experiments cover a range of topics in physics, biology, chemistry, and Earth science, and with sections explaining What's It About, What You Need, Useful Words, What to Do, and Science to Know, each experiment provides enough guidance for teachers or parents to successfully conduct the activities in the classroom or at home. Titles include Demonstrating the Forces of Flight; Make It Move: Measuring the Static Friction of a Shoe; How Do Different Materials Affect Temperature?; How Are Colors Created?; How Can You Turn Saltwater Into Drinking Water?; How Can Geckos Climb Walls?; How Does a Solar Cell Create Electricity?; and How Is the Aurora Borealis Created?

Carbon: Transformations in Matter and Energy (CTIME) Curriculum

<http://carbontime.bsccs.org/units>

Created as part of the CTIME project—a collaborative effort of scientists, teachers, graduate students, and IT specialists to refine K–12 frameworks and assessments for learning progressions that lead to environmental science literacy—these NGSS– supported teaching units for middle and high school science levels focus on processes that transform matter and energy in organisms, ecosystems, and global systems: combustion, photosynthesis, cellular respiration, digestion, and biosynthesis. Four units—Systems and Scale, Plants, Animals, and Decomposers—examine matter and energy in flames and individual organisms. The Ecosystems and Human Energy Systems units address carbon and energy at ecosystem and global scales. Each three-week unit includes formative assessments, hands-on investigations supported by videos, molecular modeling activities, animations and simulations of carbon-transforming processes and carbon cycling, posters, and graphic organizers.



Anchoring Phenomena for Middle Level

<https://docs.google.com/document/d/14ZIFwhXXJxAKPcpVLQGsJffNhjI9WNfgQwk4Kf5iC6w/edit>
Looking for help in shifting to NGSS–supported science instruction? Check out these real-world anchoring phenomena and supporting materials, developed by Vermont educator Wendy Moore for seventh- and eighth-grade physical and life science units. The anchoring phenomena—which reflect a range of resources including still images, video clips, demonstrations, and student investigations—are the foundation for NGSS–supported units in Forest Ecology, Light and Color, Evolution by Natural Selection, Static Electricity, Air Pressure/Phases of Matter, Density, Photosynthesis, and more.

Engineering Everywhere

<https://www.eie.org/engineering-everywhere>

If you need content for an after-school science program, check out Museum of Science, Boston's Engineering Everywhere curriculum for grades 6–8. Ten hands-on activity–filled curriculum units let students tackle real-world engineering problems using the Engineering Design Process, along with creativity and collaboration. Explore agricultural engineering in Vertical Farms, or learn about biomechanical engineering achievements like bike safety helmets and fish prosthetics in units such as Put a Lid on It and Go Fish. In Outbreak Alert! (biomedical engineering), students investigate pandemic response, while in It's in the Bag (materials engineering), students design gear inspired by nature. Other units include It's About Time (timers/mechanical engineering), Plants to Plastics (bioplastics/chemical engineering), Don't Runoff (urban landscapes/environmental engineering), Here Comes the Sun (insulated homes/green engineering), and Food for Thought (ice cream/process engineering).



In the Classroom

Real Science Challenge—<http://realsciencechallenge.com/>

Submitted by Tiffany Kroeger



Want to build science skills and engage in competitions?

You can gather a group of students who are excited about science and its implementation and compete in the 4 separate challenges throughout the school year. There is a small fee per student to participate. If you are not necessarily interested in participating in the challenges, the website offers a resource center where there are currently 29 different inquiry activities in a variety of content areas. Many focus on claim, evidence and reasoning surrounding interesting questions or science articles and who doesn't need more of that in their curriculum!

Story Behind the Science— <https://storybehindthescience.org/>

Submitted by Tiffany Kroeger

It is partially supported by the National Science Foundation and contains articles explaining how scientific discoveries occurred. Each article contains higher order thinking questions imbedded throughout which lend well the discussion. There is a link with suggestions on implementation in the classroom as well as ways to improve classroom discussion. With the constant encouragement to incorporate language skills into our curriculum, here is a great resource to do just that as well as teach our content!

Growth Mindset: The Difference Between Defeat and Success Dr. Debra Teplow

<https://www.instituteforwellness.com/makewellnessthenorm/blog/>

What teachers and parents communicate to students about their intelligence, capacity to learn, talents, and traits has profound impact on student success. The language adults use and the feedback they give to youngsters shapes their mindsets, which directly impacts how well they do at school and in life. The concept that mindset affects success has been proven through rigorous research over decades. A “growth mindset” reflects the belief that intelligence and talent can be developed. A “fixed mindset” says that intelligence and talent are something you're born with and can't be changed. Students with a growth mindset do better in school; and embrace challenges and bounce back after setbacks far more readily than students with fixed mindsets. They are able to seek help, use available resources, identify strategies that produce the results they want, and persist until they reach their goals. This mindset also enables them to do better later in life as students in college and adults in the workforce.



What Is the Ionosphere?

By Linda Hermans-Killiam

High above Earth is a very active part of our upper atmosphere called the ionosphere. The ionosphere gets its name from ions—tiny charged particles that blow around in this layer of the atmosphere.

How did all those ions get there? They were made by energy from the Sun!

Everything in the universe that takes up space is made up of matter, and matter is made of tiny particles called atoms. At the ionosphere, atoms from the Earth's atmosphere meet up with energy from the Sun. This energy, called radiation, strips away parts of the atom. What's left is a positively or negatively charged atom, called an ion.

The ionosphere is filled with ions. These particles move about in a giant wind. However, conditions in the ionosphere change all the time. Earth's seasons and weather can cause changes in the ionosphere, as well as radiation and particles from the Sun—called space weather.

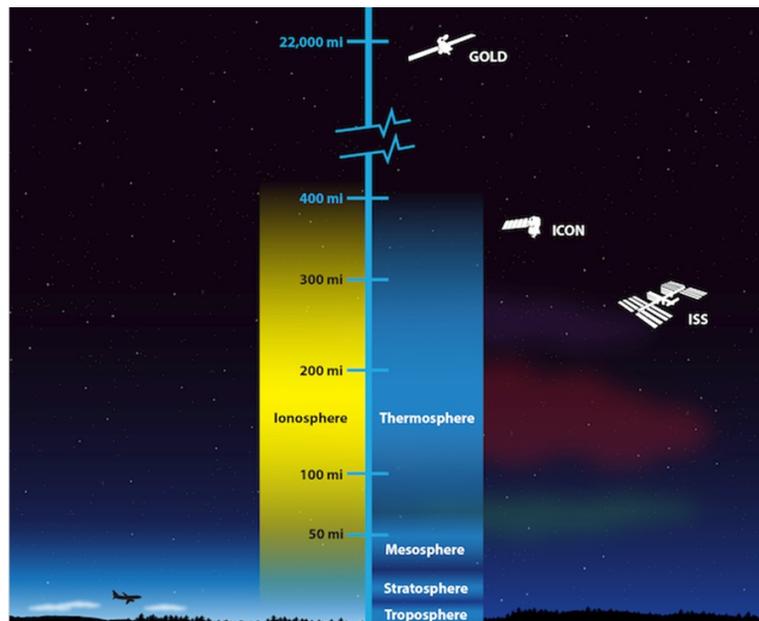
These changes in the ionosphere can cause problems for humans. For example, they can interfere with radio signals between Earth and satellites. This could make it difficult to use many of the tools we take for granted here on Earth, such as GPS. Radio signals also allow us to communicate with astronauts on board the International Space Station, which orbits Earth within the ionosphere. Learning more about this region of our atmosphere may help us improve forecasts about when these radio signals could be distorted and help keep humans safe.

In 2018, NASA has plans to launch two missions that will work together to study the ionosphere. NASA's GOLD (Global-scale Observations of the Limb and Disk) mission launched in January 2018. GOLD will orbit 22,000 miles above Earth. From way up there, it will be able to create a map of the ionosphere over the Americas every half hour. It will measure the temperature and makeup of gases in the ionosphere. GOLD will also study bubbles of

charged gas that are known to cause communication problems.

A second NASA mission, called ICON, short for Ionospheric Connection Explorer, will launch later in 2018. It will be placed in an orbit just 350 miles above Earth—through the ionosphere. This means it will have a close-up view of the upper atmosphere to pair with GOLD's wider view. ICON will study the forces that shape this part of the upper atmosphere.

Both missions will study how the ionosphere is affected by Earth and space weather. Together, they will give us better observations of this part of our



This illustration shows the layers of Earth's atmosphere. NASA's GOLD and ICON missions will work together to study the ionosphere, a region of charged particles in Earth's upper atmosphere. Changes in the ionosphere can interfere with the radio waves used to communicate with satellites and astronauts in the International Space Station (ISS). Credit: NASA's

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UPCOMING EVENTS

April 5	Stem Cell Augmentation in ACL Surgery Sanford Center, SF
April 17	Women in Science—Pierre www.sd-discovery.org
April 22	Earth Day
April 25	DNA Day
June 9	It's All About Science Festival Sanford Research Center—Sioux Falls
July 11-13, 2018	7th Annual STEM Forum Expo (NSTA) Philadelphia, PA
February 7-8 & 9, 2019	SD STEM Ed Conference Huron, SD

The SDSTA Newsletter is published four times a year. The March issue (this one) is e-mailed to 105 paid members and several school science departments. The Membership year in SDSTA starts with the February conference and ends the thirty-first of January. Dues are due at each conference for member discount rates. SDSTA members may give a one year free membership to their student teachers by submitting the student teacher's name & address. One paid conference registration may be given to the SDSTA member that has made a submission to the newsletter (or given a presentation at the conference) and has referred at least three new members. Members may also earn a 10% finder's fee for any science related ads placed in the newsletter. Our rates are \$50 per page (or 3 to 4 quarter pages).



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