CONNECTICUT SCIENCE CONNECTION

April 2020

THE CONNECTICUT BUILDING A PRESENCE FOR SCIENCE NETWORK IS SUSTAINED THROUGH THE ADVOCACY OF THE CCAT, CONNECTICUT SCIENCE SUPERVISORS ASSOCIATION, THE CONNECTICUT SCIENCE TEACHERS ASSOCIATION, AND THE CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING

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NAMES AND E-MAIL ADDRESSES OF OUR POINTS OF CONTACT AND KEY LEADERS ARE NOT SHARED WITH ANY OTHER ENTITY

Professional Development Opportunities! Are you interested in some distance learning ideas? This may help you to get through the difficult times we are experiencing. Visit CSTA.wildapricot.org and click on Opportunities. You will not be disappointed. Contact us if you have questions.
https://csta.wildapricot.org/

Join the CSSA!
www.cssaonline.org
All Teacher leaders welcome You do not have to be in a formal Supervisor Position, but should be interested in helping keep your colleagues informed on the latest in science education. At this time, we hope to provide support to teachers in a leadership situation.

BOOKMARK THIS SITE!

The Connecticut State Department of Education wants to provide valuable resources to the field and is continually working to make these resources easy to find in one central location. Therefore, beginning January 1, 2020, the CTCoreStandards.org website will no longer be operational. All of these resources have been moved to the CSDE website at https://portal.ct.gov/SDE. They can be accessed under K-12 Education, Academics, CT Core Standards. The direct link is https://portal.ct.gov/SDE/CT-Core-Standards. Please bookmark this for future reference.

In just one month, it is amazing to see the changes that have come to our society. It seems like a scenario in a disaster movie, and some films from earlier times seem to have been scripted for just such a happening as we are experiencing. Teachers are on the front line in coping with such a situation, and as always, stepping up for students first. This issue will focus on information and resources that may be helpful.

Many events announced in earlier newsletters have been postponed or cancelled, since it takes much planning and funding for organizations in holding events. The uncertainty about the future means that no dates can be set or events announced at the present. //

You may remember Jake Mendelssohn from his years at the Connecticut Science Center. Following is a message from Jake Mendelssohn:

I have been contacted by doctors at some local hospitals and they are in desperate need of some help and hope we can provide it.They are incredibly short of the best N95 masks and they need to make more on their own. They have sent me two STL files and hope that some of you can make new frames for the masks with your 3D printers.
Once they have the frames, they will use hot glue to attach fresh high quality filter paper to them.
This is not perfect, but it is better than nothing, which is what they have now. They do NOT care what materials you use (abs, pal, etc.) or what color the masks are.
Can you try making a few and we will see if they work?

The hospital will send someone to pick them up so you do NOT have to leave your house. Don't worry about where you live, they will make the trip.

Please let me know how well these files work.
The doctor in charge is Konstantin Kovalev kkovalev001@gmail.com.

Contact Jake or Dr. Kovalev to get the stl files.

Thanks,

-Jake jake@jakemendelssohn.name

CONNECTICUT STEM FOUNDATION SCHOLARSHIPS

Did you know that The CT STEM Foundation offers up to $1,000 in scholarships to encourage both middle school and high students to participate in STEM studies? But wait, there's more! The Foundation also offers two $1,000 scholarships to graduating seniors who participate in the CT STEM Fair.

In keeping with its mission to engage pre-college Connecticut students in multiple STEM activities, the foundation offers two summer scholarships to undergraduate science students planning to attend a college/university summer STEM course, a summer internship, an informal science education program or a tuition high school summer education program. Depending upon tuition and expenses, up to $500 is granted for each scholarship. One is awarded to a rising sophomore, junior or senior high school student. The other is awarded to a middle school student.

Another aspect of the foundation's mission is to provide support to graduating seniors planning to major in a STEM related field in college. Two $1,000 scholarships are awarded to applicants who participated in the current year's CT STEM Fair.

Additional information, including scholarship application forms and the deadlines for submission, are available on the CT STEM Foundation's website, https://ctstemfoundation.org/ , under the Scholarship section.

Science Teaching During Coronavirus School Closures—NSTA Is Here to Help

As tens of thousands of schools across the country close their doors in the wake of the coronavirus outbreak, teachers are scrambling to find materials and resources.

To support all educators during this difficult time, NSTA is offering a free 30-day membership, providing you with access to more than 12,000 digital professional learning resources and tools. Simply create an account here and start developing your own personalized digital learning experience.

Check out the online resources we have available, including our Interactive eBooks+, web seminars, and free book chapters. Or take advantage of our new lesson plans on the coronavirus for secondary and elementary students.

Check out the NSTA website daily for featured content and tips on how to use these resources.

About Young Women in Bio

Young Women In Bio (YWIB) gives girls the inspiration and support they need to become tomorrow's leaders in science, technology, engineering and math (STEM). As a nonprofit with 13 chapters across the U.S. and Canada, we partner with leading companies, universities, hospitals and organizations to develop engaging, educational and motivational programs. We aspire to be the "go to" organization for girls looking to shape and change the world through STEM, providing them with the tools and resources they need to build successful careers.

To learn more about YWIB, local chapters events or Spring into STEM, please visit: http://www.womeninbio.org/ywib

UCONN SUMMER PROGRAM FOR STUDENTS

https://nrca.uconn.edu/students/index.htm

Learn More & Apply Today!

UConnNRCA To find out the status of this project, please contact Nicole Freidenfelds **University of Connecticut** Natural Resources Conservation Academy (NRCA) Department of Natural Resources & the Environment	Voice: (860) 486-6933 Text: (860) 468-5359 Website: **https://nrca.uconn.edu/**
Teens	Teens & Adults
Week-Long Field Experience on Campus & Local Community Conservation Project	Two-Day Workshop with Partner & Conservation Project in Community
UConn Storrs Campus	Stamford, Waterbury &Eastford
July 19-25	June 13-14, 22-23 & 27-28
Sliding Fee	Free

The following are from the CSTA:

Many thanks to the many teachers who are putting together Distance Learning Activities during this unprecedented event. A page of possible resources - https://csta.wildapricot.org/Distance-Learning-Resources/ - that we are continually updating with your input. Thanks for your contributions.

We are sorry to announce that we will have to postpone our annual Awards Celebration. Although scheduled for May, there is a lot of work that goes into this and it is difficult to plan when we do not know what lies ahead. We will keep you updated on a future date.

WE ARE HAPPY TO ANNOUNCE SOME OF OUR EXCELLENCE IN SCIENCE TEACHING AWARDEES!

Excellence in Elementary Science Teaching 2020

- **Phaedra Taft, Westport, CT**

Excellence in Middle School Science Teaching 2020. Sponsored by Lab-Aids

- **Kristina Ngai, William J. Johnson Middle School, Colchester, CT**

Excellence in High School Science Teaching 2020

- **Diane Pintavalle, Glastonbury High School, Glastonbury, CT**

We have a new award this year - Ralph and Ruth Yulo Beginning Teacher Award 2020

- **Robert Wilkos, Middletown High School, Middletown, CT**

Other awardees will be announced in a future email.

The Connecticut Science Teachers Association provides one or two small grants ($250-$500) each year to CSTA members to provide support for research, innovation, or enrichment activities not usually covered in normal school or institutional budgets. Grants will be used in the 2020-2021 school year. Applications are due by April 15 For more information about the grants, contact Louise McMinn lou.mcminn@gmail.com

The following comes from the Science Matters Coordinator in New York State, Nancy Ridenour (Wow and thanks!)
This list is a vast resource with many exciting ideas and materials

Tips for Online Science Learning using Project Look Sharp's Free Media Literacy Lessons and Materials

Consider using Project Look Sharp's free media literacy lessons for use in teaching online science and environmental studies. Lessons are based on inquiry-based decoding of engaging media documents – including video clips, web site excerpts, journal articles, charts and more – for integrating critical thinking about media messages into the teaching of core science content. Search by subject, grade, keyword, standard, or media type then apply some of these tips for online learning.

Asynchronous Online Ideas:

- **Push out to your students any media documents from the thousands available in the free Look Sharp collection, posing questions for discussion and analysis from our associated lessons. Have them respond individually or in a group forum using whatever classroom technology students are using for your class.**
  - **Share digitally with students the *Background Information*, *Document Notes, Additional Info,* or other text from the lesson plan that you would otherwise share orally with the class.**
  - **Create a simple graphic organizer, question guide or other handout using the questions in the lesson.**
- **Use one of the online annotation apps to have students communicate their analysis of media messages in Look Sharp lessons or messages from their current media use (e.g., Flipgrid or *Voice Thread* for audio/video sharing).**

More forwarded from Nancy:

Synchronous Online Ideas

- **Use an online platform like Zoom to facilitate a live group decoding of a media document from the free Look Sharp collection. This works really well (even in a large class) if the teacher shares their screen to show the media document, posing questions and asking students to raise their hands (in the participants list). The teacher can then call on someone, who can unmute themselves and respond.**
- **Start with the whole class together to lay out relevant background information and the context for the decoding, using the teacher guide or activity plan provided in the Look Sharp lesson. Show the media image, text, or video clip, giving students a chance to take notes. Then send students into smaller groups (e.g., in Zoom rooms) to discuss what questions they think are most important to ask about that media example – and what the answers might be to those questions – with one person designated to report-out when the class gets back together.**

Low Tech Ideas:

- **Give your students the handout Key Questions to Ask When Analyzing Media Messages and encourage them to apply these questions to the media that they see, read and hear in their homes and neighborhoods.**
    - **For younger students, this can easily be applied to food packages, books, online videos, and commercials.**
    - **For older students, asking key questions about news, advertising, and social media messages can help them step back a bit to gain new perspectives on how they know what they know.**
    - **Encouraging all children and teens to point out things they notice in the media, and to discuss different interpretations and perspectives among members of the family.**
- **Have your students keep journals (on paper or digitally) about their own media use, noticing changes in their media diet during the shutdown (compared to their use of media before).**
- **Have your students sign up for a free Project Look Sharp accountand find media literacy lessonsthat interest them. Many can be done independently.**

If you have other suggestions or feedback on how Project Look Sharp can support educators to prepare students for these unpredictable times using online learning tools please email us at looksharp@ithaca.edu

Sources of Short Science Online Instructional Videos (free)

Dr. Thomas O'Brien, Binghamton University,
Department of Teaching, Learning & Educational Leadership (TLEL)
tobrien@binghamton.edu 607-777-4877

American Museum of Natural History: https://www.amnh.org/explore/amnh.tv. 2-20 min videos (~300) on a wide range of science concepts & science-in-the-news topics.

Amoeba Sisters: https://www.amoebasisters.com/ "Two sisters on a mission to demystify science with humor and relevance through our hobby of creating free videos, #AmoebaGIFs, handouts, and comics" that demystify science concepts (utilizing free programs such as Windows Paint, Windows Movie Maker, and Audacity).
https://www.youtube.com/user/AmoebaSisters

AsapScience: https://asapscience.tumblr.com/ Mitchell Moffit & Gregory Brown creation of "a daily does of awesome science" – over 100, 2-5 minute cartoon-sketch answers to real-world relevant questions. See:
https://www.youtube.com/user/AsapSCIENCE/videos, asapscience@gmail.com and their book (2015): *AsapSCIENCE: Answers to the World's Weirdest Questions, Most Persistent Rumors, and Unexplained Phenomena.*

***The Atlantic* Video Series: https://www.theatlantic.com/video/#series**
https://www.theatlantic.com/video/series/atlantic-documentaries/

The Big Question: Ideas and insights from leaders in technology, education, business, design, and media series: https://www.theatlantic.com/video/series/the-big-question/
A 2-4 min "talking head" series inspired by *The Atlantic*'s back-page feature. Examples:
https://www.theatlantic.com/video/index/381238/what-letter-should-we-add-to-stem/ (2:47)
https://www.theatlantic.com/video/index/380990/what-crazy-tech-idea-could-become-real/ (2:12)
https://www.theatlantic.com/video/index/380280/is-technology-making-us-better-storytellers/(2:47)
https://www.theatlantic.com/video/index/379787/how-will-climate-change-transform-us-cities/
https://www.theatlantic.com/video/index/378956/is-technology-shifting-our-moral-compass/
https://www.theatlantic.com/video/index/374577/when-will-robots-take-over-the-world/

If Our Bodies Could Talk : Off-beat perspectives on health topics from Dr. James Hamblin:
~ 4-5 min: https://www.theatlantic.com/video/series/if-our-bodies-could-talk/
Investigators: Short documentaries about explorations, inquiries, and mysteries big and small:
https://www.theatlantic.com/video/series/atlantic-documentaries/ Example: Is Miami Beach Doomed?
https://www.theatlantic.com/video/index/460332/is-miami-beach-doomed/ (6:28 min)

BillsChannel: Wildlife Adventure Science Mystery : https://www.youtube.com/user/billschannel. "If you like outdoor adventure and animals this is the channel for you. Think of it as my own National Geographic Channel mixed with AnimalPlanet & DiscoveryChannel! Most of the videos are all original and produced exclusively for this channel." Real (science) vs Fake (pseudoscience & fraud). See also: Hoax-Slayer, MythBusters & Snopes.com Rumor Has It.

Bozemanscience: http://www.bozemanscience.com/. "Maintained by Paul Andersen, a science teacher… [who has created] hundreds of science videos that have been viewed millions of times by students and teachers around the world." All of these videos are also accessible from:
https://www.youtube.com/channel/UCEik-U3T6u6JA0XiHLbNbOw or click any of the links to view videos within specific content areas: AP Biology AP Chemistry AP Physics - NEW!! Anatomy & Physiology Biology Chemistry Earth Science Educational Next Generation Science Standards Physics Statistics & Graphing.

BrainPop: https://www.brainpop.com/. https://www.brainpop.com/science/. Elementary-Middle School. "In classrooms, on mobile devices, and at home, BrainPOP engages students through animated movies, learning games, interactive quizzes, primary source activities, concept mapping, and more. Our award-winning resources include BrainPOP Jr. (K-3), BrainPOP, BrainPOP Español, and, for English language learners, BrainPOP ESL. They cover topics within Science, Math, Social Studies, English Language Arts, Technology, Engineering, Arts, Music, Health, Reading, and Writing. Our content is carefully mapped to the Common Core, aligned to academic standards, and searchable with our online Standards Tool. We are also home to GameUp, an educational games portal for the classroom; Make-a-Map, an innovative concept mapping tool powered by Ideaphora®; and "My BrainPOP," which lets teachers customize assessments, incorporate gaming into instruction, spur meaningful reflection, and keep track of learning. BrainPOP Educators offers professional development and an array of lesson plans, video tutorials, graphic organizers, and a rich curriculum calendar." Free, limited access to animated movies or a *FEE-based service for full, unrestricted access*.

(The) Brain Scope at the Field Museum in Chicago: https://www.youtube.com/user/thebrainscoop/playlists. Emily Graslie hosts ~150 biology/animal science focused videos.

Brainiac Science Abuse: https://en.wikipedia.org/wiki/Brainiac:_Science_Abuse: "A British entertainment documentary show that aired on Sky One from 13 November 2003 to 30 March 2008. During each episode of the show, numerous experiments are carried out to verify whether common conceptions are true (such as whether it is possible to run across a pool of custard) or simply to create impressive explosions. The show centres on the three core branches of science for the key stages in British education: chemistry, physics and to a lesser extent, biology. The experimenters on the show are referred to as "Brainiacs", and each episode usually finishes with the destruction of a caravan." See also: http://www.tv.com/shows/brainiac-science-abuse/episodes/ (Topic Guide) and https://www.youtube.com/playlist?list=PL6Owjn0dcX5ztth-GcJKK9o2Nuq-boyDu. Full episodes are ~ 45 minutes, but cover multiple questions/topics in shorter segments. Compare to *MythBusters*.

ChemSTEM: http://www.chemstem.com/. Links to videos on many chemistry topics, such as atomic structure, isotopes, and reactions. There are also videos with chemistry problems for students to solve.

Crash Course: https://www.youtube.com/user/crashcourse. Brothers Hank & John Green's 10-15 min episodes cover topics such as: Crash Course Introduction, Anatomy & Physiology (47), Astronomy (47), Biology (40), Chemistry (46), , Ecology (12), Economics (35), Literature (24), Philosophy (21), Physics (16), Psychology (40), U.S. Government and Politics, US History (48) and World History 2. See: https://www.youtube.com/user/crashcourse/playlists. See also: Crash Course Kids.

CreatureCast: The Unexpected World of Biology: http://creaturecast.org/. "A collaborative blog produced by members of the Dunn Lab at Brown University, along with assorted friends. This project, which is focused on zoology in the broad sense, serves as a forum to present original content that we have produced and observations by others that we find interesting and beautiful – simple cartoon-like animations."

CSMTE (Dr. Thomas O'Brien/Binghamton University): https://www.binghamton.edu/tlel/resources/csmte/. This webpage contains hundreds of links sorted into 26 categories. The discipline-focused categories include links to discrepant event demonstrations, sims and animations (including videoclips). One of the categories: NSTA Press *Brain-Powered Science* Books links to all the URLs cited in the author's three BPS books that includes lots of great sites for demos, sims, etc.,

Edheads: Activate Your Mind: https://edheads.site-ym.com/default.aspx
"Edheads ignites imagination through engaging and interactive online science and math adventures by partnering with educators and industry. Our Vision: To bridge the gap between education and work, thus empowering today's students to pursue fulfilling, productive careers in science, technology, engineering, and mathematics". Membership for teachers/families with 1-30 students/children: $20/yr or school membership: $30/yr. Open, limited access to several free games. High school students promoting Edheads: https://www.youtube.com/watch?v=0PauOPHR-94

General Electric/GE's FOCUS FORWARD: https://www.focusforwardfilms.com/
***Short Films, Big Ideas* is an award-winning series of 30, three-minute stories about innovators—people who are reshaping the world through act or invention—directed by the world's most celebrated documentary filmmakers. Short 1-2 sentence descriptions of the 30 Titles can be found at: https://www.focusforwardfilms.com/#films.**

***Good Thinking! The Science of Teaching Science*: https://ssec.si.edu/goodthinking**
The Smithsonian Science Education Center, "SSEC was established in 1985 as the National Science Resources Center (NSRC) under the sponsorship of the Smithsonian Institution and the National Academy of Sciences. In 2012, our name changed to the SSEC to reflect our mission: to transform and improve the learning and teaching of science for K-12 students." *Good Thinking* is an animated web series of "short-format videos (6-12 min) that explore common student ideas and misconceptions about a range of science topics such as energy, chemical reactions, and natural selection, as well as pedagogical subjects like student motivation and the myth of left and right-brained people. Each episode is grounded in findings from peer-reviewed science and education research, has been vetted by experts, and was developed with national standards in mind. Subscribe to the YouTube Channel: https://ssec.si.edu/ or check out first sixteen videos at: https://www.youtube.com/watch?v=FzXxHYJnsqo&list=PLHWBid5WSAzT7PN4Q8Mnpk1ZwCb2g_5V. See also: https://www.youtube.com/channel/UC6dyNTnSopdgye2gQBVSNVg for these videos and the *Explore Smithsonian* series (short videos with Smithsonian scientists)

Hoax-Slayer: https://www.hoax-slayer.com/ "Debunking hoaxes and exposing scams since 2003. The goal of the Hoax-Slayer Website is to help make the Internet a safer, more pleasant & more productive environment by: Debunking email & Internet hoaxes - Thwarting Internet scammers - Educating web users about email & Internet security issues - Combating spam." This site is largely text-based with limited use of videoclips.

Howard Hughes Medical Institute/HHMI BioInteractive (high school & UG college):
https://www.hhmi.org/biointeractive/about-biointeractive: "Multimedia resources, including apps, animations, videos, interactives, and virtual labs, to bring the excitement of scientific discovery into your classroom. Our rich video resources range from a series of short films on evolution, hosted by an award-winning author-scientist, to lectures on the brain given by a Nobel-prize winner—all supplemented by teacher guides and classroom activities."
Short Films : Short (15 to 30 minutes long) broadcast-quality films designed to engage students. Each one tells a different scientific story and is supported by supplemental resources including teacher guides and activities.

Holiday Lectures: Each series contains full-length lectures on a specific topic given by top scientists working at the cutting edge of scientific research. The lectures include graphics and animations to help engage students and explain difficult scientific concepts.
Virtual Labs: Students use real scientific research techniques in a virtual lab environment and identify bacteria based on its DNA, construct a transgenic fruit fly, and measure traits in fossil fish to record evolutionary change.
Click & Learns: Interactive tutorials on particular topics that contains video clips, images, and animations to explain concepts.
Classroom Resources: A wide range of documents for use in the classroom to support our short films and Holiday Lectures. They include hands-on activities, bioinformatics exercises, classroom posters, and more.
Teacher Guides: Comprehensive guides to our resources written by a classroom teacher. Download the teacher guides and peruse through the pages to plan your lesson, download the hands-on activity instructions, and download animations or video clips to paste right into your PowerPoint presentation!

Khan Academy: https://www.khanacademy.org/welcome is "a non-profit educational organization created in 2006 by educator Salman Khan to provide "a free, world-class education for anyone, anywhere". The organization produces micro lectures in the form of You Tube videos. In addition to micro lectures, the organization's website features practice exercises and tools for educators. All resources are available for free to anyone around the world.
Science Resources: Biology Organic chemistry Health and medicine Physics Cosmology and astronomy Discoveries and projects Chemistry

LSGScience Videos : https://www.youtube.com/user/LSGScience/featured
https://www.youtube.com/user/LSGScience/videos. Over one hundred, 1-10 minute videos (+ a few as long as 50 min)

Mind Trip of the Week: http://mindtrippingshow.com/category/mind-trips/
http://mindtrippingshow.com/category/mind-trip-of-the-week
~80 illusions & magic tricks that afford FUNdaMENTAL insights into human cognition; a few of these include videos.

MinutePhysics: https://www.youtube.com/user/minutephysics. 200+ videos provide an energetic and entertaining view of old and new problems in physics in 5 minutes or less.

Mr. Kent's Chemistry Page: http://www.kentchemistry.com/ NYS Chemistry Teacher has resources for Regents & AP Chem including labs, lecture notes, old exams, video clips of lessons (ChemGuy Video Chemistry Lessons) and My Chemical Demonstration Videos. This is an example of a large # such sites posted by individual teachers around the world. Many university science departments host more sites – see postings at my CSMTE and NSTA Press Extras sites.

My Favourite Scientists: http://www.favscientist.com/. Filmmaker Brady Haran asks leading researchers at Nottingham Trent University to pick & narrate 3-7 min cartoon clip biographies of their favorite scientists (~20). Also at: https://www.youtube.com/user/FavScientist/videos

***MythBusters*: https://www.discovery.com/tv-shows/mythbusters/ (to purchase videos) & https://www.youtube.com/results?search_query=mythbusters+full+episodes**
https://en.wikipedia.org/wiki/MythBusters: "a science entertainment television program created by Peter Rees and produced by Australia's Beyond Television Productions. The series premiered on the Discovery Channel on January 23, 2003… Each *MythBusters* episode focuses typically on two or more popular beliefs, Internet rumors, or other myths. The list of myths tested by the series is compiled from many sources, including the personal experiences of cast and crew, as well as fan suggestions… The *MythBusters* typically test myths in a two-step process. In early episodes, the steps were described as "replicate the circumstances, then duplicate the results" by Savage. This means that first the team attempts to recreate the circumstances that the myth alleges, to determine whether the alleged result occurs; if that fails, they attempt to expand the circumstances to the point that will cause the described result. Occasionally the team (usually Savage and Hyneman) will hold a friendly competition between themselves to see which of them can devise a more successful solution to recreating the results."

Naked Scientists: https://www.thenakedscientists.com/. "… a media-savvy group of physicians and researchers from Cambridge University who use radio, live lectures, and the Internet to strip science down to its bare essentials, and promote it to the general public."

https://www.youtube.com/user/NakedScientists à Video playlist collections include: Science Scrapbook (31 videos), Naked Engineering (22 videos), Science from the Sporran (11 B/W "old style" videos), Kitchen Science (2 videos), MaterialChef (6 videos)
See also: https://www.thenakedscientists.com/kitchenscience
https://www.thenakedscientists.com/get-naked/experiments/liquids
http://www.thenakedscientists.com/HTML/experiments/list-all-our-science-experiments/
(~130 descriptions & videos of science Demonstrations & experiments).

National Geographic Video Collection: https://video.nationalgeographic.com/
Search, sort & purchase thousands of videos by category (e.g., Animals, Environment, Science & Space & Technology). Many "free" excerpts appear on You Tube: https://www.youtube.com/results?search_query=National+Geographic+society

National Science Foundation's *Science Nation*: Advancing knowledge. Transforming our future. Video Collection (2009-present): Over 300, 3-5 minute episodes (with short, supplemental, written synopses) of exciting, cutting-edge, NSF funded research appropriate for grades 5-12 classrooms.
https://www.nsf.gov/news/special_reports/science_nation/videos.jsp

NBC Learn: http://www.nbclearn.com/portal/site/learn/resources. Free, long videos include titles such as: The Science of Golf, Science & Engineering of the 2014 Winter Olympics, Sustainability Water, Science of Innovation, Science of Summer Olympics, Science Behind the News, Chemistry NOW, Changing Planet…

Newton's Apple: http://www.newtonsapple.tv/TeacherGuides
Over 300 streaming video clips (from the retired, archived PBS series) can be sorted/searched by category (Animals and Plants Earth and Space Health and Medicine Chemistry and Food Technology and Invention Physics and Sports), key word search or question. The site also contains associated *Teacher Guides* and *Science Try Its*.

NYS Regents Review 2.0 PBS Learning Media:
https://ny.pbslearningmedia.org/collection/rr10/#.XiInlxdOmfU (50 short videos)

New York Times: https://www.nytimes.com/video/science

NYTimes *Animated Life* Videos: https://www.nytimes.com/video/opdocs-animated-life E.g.,
Seeing the Invisible: https://www.nytimes.com/2014/09/16/opinion/animated-life-seeing-the-invisible.html?_r=0 (6:35 min: animated documentary: Antonie van Leeuwenhoek ~1674)
Pangea: https://www.nytimes.com/2015/02/17/opinion/animated-life-pangaea.html (7:40 min Alfred Wegener).

How It Happens Videos: https://www.nytimes.com/video/how-it-happens. Understand the science behind the headlines in 1-2 min videos, which combines simple explanation and elegant animation to reveal the inner workings of the physical world.

Out There Videos: https://www.nytimes.com/video/out-there. It's not just Einstein's universe. It's your universe too. From the cosmic affairs desk, Dennis Overbye takes you on scenic tours through the Milky Way and beyond in 1-2 min clips.

RetroReport: Headlines Fade. The Stories Continue. The truth now about 175+ big stories then (*NY Times* Series: 12-15 min clips): https://www.retroreport.org/ "An innovative documentary news organization launched in 2013 as a timely online counterweight to today's 24/7 news cycle. Combining documentary techniques with shoe-leather reporting, we peel back the layers of some of the most perplexing news stories of our past with the goal of encouraging the public to think more critically about current events and the media." Categories include: Nature (7+) – Health (15+) – Science & Technology (15+) - … e.g., http://retroreport.org/how-dna-changed-the-world-of-forensics/

ScienceTake Videos: https://www.nytimes.com/video/sciencetake. Development & discoveries of science in the real-world: ~1-2 min clips (especially strong in biology).

NSTA Press Extras: https://www.nsta.org/publications/press/extras/. Offers free, extra online resources for variety of NSTA books. Dr. Thomas O'Brien's 3-volume *Brain-Powered Science* series-linked pages includes all of the URLs/Internet Connections (> 1000 updated & expanded) from the series and include a number of university centers that feature engaging discrepant event lecture-demonstrations (i.e., often as videoclips).

PBS Learning Media: http://www.pbslearningmedia.org/ (previously: *Teacher's Domain*)
"direct access to thousands of classroom-ready, curriculum-targeted digital resources… builds on the strength of public media & is designed to improve teacher effectiveness & student achievement. Resources are aligned to Common Core and national standards and include videos and interactives, as well as audio, documents, and in-depth lesson plans… browse by standards, grade level, subject area, and special collections. You can also favorite and share resources with your class & colleagues. Basic service is free for PreK-12 educators. " ~9000 SCIENCE items.

Periodic Table of Videos: https://www.youtube.com/user/periodicvideos.
http://www.periodicvideos.com/ A video about each element on the periodic table. And we upload new videos (currently over 500) every week about science news, interesting molecules and other stuff from the world of chemistry; hosted by University of Nottingham (UK). See:
https://www.youtube.com/user/periodicvideos/playlists including (for example): All Chemical Elements in Order - Extra videos -- Molecules -- Our YouTube Channel -- Sixty Symbols (physics) : videos about the symbols of physics & astronomy -- Numberphile (maths)

Periodic Table of Visualization Methods:
http://www.visual-literacy.org/periodic_table/periodic_table.html
An *interactive* table of over 100 different visualization methods/graphic organizers. A *static* pdf version of the table can be downloaded at: http://www.visual-literacy.org/periodic_table/periodic_table_as_pdf.pdf. The home site (http://www.visual-literacy.org/) also has a *Visual Literacy: An E-Learning Tutorial on Visualization for Communication, Engineering and Business*.

SciChannel: You Make Curiosity Contagious: https://www.youtube.com/user/scishow
https://www.youtube.com/user/scishow/playlists. "SciShow explores the unexpected. Seven days a week, Hank Green, Michael Aranda, and Olivia Gordon delve into the scientific subjects that defy our expectations and make us even more curious!" Hosts over 1500 short videos. See also: SciShow Kids and SciShow Space.

Science Friday: https://www.sciencefriday.com/
"your trusted source for news and entertaining stories about science. We started as a radio show, created in 1991 by host and executive producer Ira Flatow. Since then, we've grown into much more: We produce award-winning digital videos and publish original web content covering everything from octopus camouflage to cooking on Mars. SciFri is brain fun, for curious people.
The radio show is broadcast on many public radio stations Fridays from 2-4 p.m. Eastern Time. You can join the conversation by calling 1-844-724-8255 or tweeting us your questions @scifri.
To download a copy of our latest 990, please click here. "

Science with Tyler Dewitt: https://www.youtube.com/user/tdewitt451
100+ videos (3-20 min. each) on the full range of HS chemistry topics sorted by categories
"Need help with Chemistry? Whether you're in high school, college, AP or IB courses, these videos can help! They are also targeted to students studying for the AP Test, SAT, MCAT, DAT, and OAT exams, as well as students in nursing, nutrition, pre-med and pre-vet programs. We'll cover the introductory topics patiently and clearly, using lots of examples, analogies and practice problems. The main topics covered in this library are: Significant Figures, Scientific Notation, Density, Stoichiometry, Nuclear Chemistry, VSEPR Theory, Atomic Structure, Covalent and Ionic Bonding, Thermochemistry, and Gases." See also his TED talk: Tyler DeWitt: Hey Science Teachers – Make It fun (14:07 min): Former high school science teacher delivers a rousing call for science teachers to ditch the jargon and extreme precision, and instead make science sing through stories and demonstrations.
https://www.ted.com/talks/tyler_dewitt_hey_science_teachers_make_it_fun

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For a similar message about the "FUNdaMENTAL" nature of Mathematics, see:
Dan Meyer: Math Curriculum Makeover:
https://www.youtube.com/watch?v=BlvKWEvKSi8 (12:09 min)
https://www.ted.com/talks/dan_meyer_math_curriculum_makeover?language=en (11:39 min)
High school mathematics teacher says math class (including real-world physics-math problems) needs a makeover. Math makes sense of the world for patient (vs impatient) problem solvers. See also:
http://mrmeyer.com/ http://blog.mrmeyer.com/about/

Beauty of Mathematics (1:41): 3 videoclips running side by side w/o words:
https://www.upworthy.com/math-is-astoundingly-beautiful-and-weve-found-the-video-to-prove-it-4 or
https://www.youtube.com/watch?v=O6AFWXRqjes

Cédric Villani: What's so sexy about math? (16:23/Feb2016). Hidden truths permeate our world; they're inaccessible to our senses, but math allows us to go beyond our intuition to uncover their mysteries. In this survey of mathematical breakthroughs, a Fields Medal winner speaks to the thrill of discovery and details the sometimes perplexing life of a mathematician. "Beautiful mathematical explanations are not only for our pleasure," he says. "They change our vision of the world."
https://www.ted.com/talks/cedric_villani_what_s_so_sexy_about_math?utm_source=newsletter_weekly_2016-06-11&utm_campaign=newsletter_weekly&utm_medium=email&utm_content=talk_of_the_week_image

Playlists of Other TED Talks on Mathematics:
https://www.ted.com/playlists/189/math_talks_to_blow_your_mind (11 talks)
https://www.ted.com/playlists/251/talks_for_people_who_hated_mat (6 talks)
http://www.bachelorsdegree.org/2010/12/08/20-incredible-ted-talks-for-math-geeks/

(SciTech)^{Now}: https://www.scitechnow.org/news/ "Public media's nexus of new ideas SciTech Now brings you the latest breakthroughs in science, technology and innovation. Weekly program, ~ 30, ~30 minute episodes have been produced; each episode has ~5 clips. For example:
Episode #29: https://www.scitechnow.org/videos/teaching-science-through-stories/# (5:54 clip). This clip features The Story Colliders: Stories about Science: https://www.storycollider.org/shows
"We podcast one story a week. You can listen here, or subscribe on iTunes, or follow us on SoundCloud. "

Seeker: https://www.youtube.com/user/DNewsChannel "Seeker empowers the curious to understand the science shaping our world. We tell award-winning stories about the natural forces and groundbreaking innovations that impact our lives, our planet, and our universe." 3-12 min videos

Skunk Bear: https://www.youtube.com/skunkbear "NPR's science youtube channel, exploring the secrets of the universe, the wonders of nature, and answering your science questions. Submit questions here: http://www.npr.org/skunkbear Follow Skunk Bear on twitter: https://twitter.com/NPRskunkbear And tumblr!: http://skunkbear.tumblr.com. 2-9 min videos with animation & live movies.

Snopes.com Rumor Has It: https://www.snopes.com/ + https://www.snopes.com/whats-new/ "The definitive Internet reference source for urban legends, folklore, myths, rumors, and misinformation." See especially:
https://www.snopes.com/category/science/ NO Videos.

Study.com: ($): https://study.com/academy/course/index.html
"Study.com's self-paced video courses are created by the best teachers and designed to help you meet your educational goals. They will help you improve your grades, better understand concepts from class, and prepare for tests. Most video lessons are 10 minutes or less, so you get the information you need in a fast and fun format." Preview1st video-lesson based course for FREE.

https://study.com/academy/subj/science.html "Study.com has engaging science courses in biology, chemistry, physics, environmental science, and more! Our self-paced video lessons can help you study for exams, earn college credit, or boost your grades."

TED Ed Lessons Worth Sharing: https://ed.ted.com/lessons and https://www.youtube.com/user/TEDEducation. Range of categories (e.g., Design, Engineering & Technology, Health, Mathematics, Psychology, Science & Technology, Teaching & Education, Thinking & Learning … also sorted into playlists) of hundreds of K-college level videos ranging from 1-18+ minutes. "TED-Ed's commitment to creating lessons worth sharing is an extension of TED's mission of spreading great ideas. Within TED-Ed's growing library of TED-Ed *animations*, you will find carefully curated educational videos, many of which represent collaborations between talented educators and animators nominated through the TED-Ed website (http://ed.ted.com/)."

TED Talks (2100+, 3-20 min talks by "experts" on range of subjects): https://www.ted.com/talks Sorted into topic categories: https://www.ted.com/topics and playlists: https://www.ted.com/playlists.
https://www.ted.com/search?q=Science https://www.ted.com/playlists/181/the_most_popular_science_talks

The Kids Should See This: Smart Videos for Curious Minds of all Ages:
https://thekidshouldseethis.com/. TKSST "is a growing library of smart & super-cool, "not-made-for-kids, but perfect for them" videos that can be watched in the classroom or together at home. Enjoy 8-12 new vids each week, and search 2,400+ videos in the archives, curated by me, Rion Nakaya, with help from my 5 & 8 year olds… TKSST helps connect busy kids, parents, & teachers with a collection of short videos that can start conversations, spark questions, & inspire offline exploration for all ages… Our video selections are driven by wonder, enthusiasm, and "wow!" moments. We cover all topics under *and beyond* our sun, with a special focus on STEAM." Categories include: science technology space animals nature food diy music art animation Gift Guide (smart books, videos, toys, games, and more that we genuinely like and use, and/or have been featured on TKSST, and/or are on our wish list) saved videos. "Want the most-shared videos to arrive in your inbox? Get TKSST's free newsletter every week: Sign up here. "

The Science Channel: https://www.youtube.com/user/Best0fScience/playlists
Covers primarily astrophysics and evolution-focused videos (over 125, 2-15 min videos).

The Story of Stuff : https://storyofstuff.org/ "We're a community of problem solvers — parents, community leaders, teachers and students, people of faith, entrepreneurs, scientists and more — working to create a healthy &just world. The Story of Stuff Project's journey began with a 20-minute online movie about the way we make, use and throw away all the Stuff in our lives. Five years and 40 million views later, we're a Community of 750,000 change-makers worldwide, working to build a more healthy and just planet. We invite you to watch and share our movies, participate in our study programs and join our campaigns." See high school curricular materials at: https://storyofstuff.org/resources/. See videos at: https://www.youtube.com/user/storyofstuffproject/videos and Get the book today

Thoughty2: Answers to Life, The Universe & Everything: https://www.youtube.com/user/Thoughty2
"Thoughty2 (Arran) is a British YouTuber and gatekeeper of useless facts. Thoughty2 creates mind-blowing factual videos, on the weirdest, wackiest and most interesting topics. Combining fascinating lists with answers to life's biggest questions."
https://www.youtube.com/user/Thoughty2/videos https://www.youtube.com/user/Thoughty2/playlists

Upworthy: Things That Matter Pass'Em On: https://www.upworthy.com/
"Sensational and substantial. Entertaining and enlightening. Shocking and significant. That's what you can expect here: no empty calories. Just a steady stream of the most irresistibly shareable stuff you can click on without feeling bad about yourself afterwards… Every day, our curators scour the web to find compelling, meaningful media — stories, information, videos, graphics, and ideas that reward you deeply for the time you spend with them.
Video clips, photos, etc., -- Categories include: Education, Environment, Health, Science & Technology… culled from a large variety of sources, many of which are also on YouTube. Examples:
Climate Change (sample):
https://www.upworthy.com/stop-everything-and-watch-these-kids-publicly-shame-politicians-who-dont-believe-science-is-real?c=hpstream (2:06 min) See also:

Science Fair Nightmare à Climate Change Deniers (3:58 min): https://www.youtube.com/watch?v=7NMTzNazfTI#t=226
http://www.upworthy.com/leonardo-dicaprio-asks-everyone-in-the-world-to-stop-pretending-like-facts-dont-exist?c=reccon2 (3:58 min address to UN on climate change)
https://www.upworthy.com/leo-dicaprio-asks-everyone-in-the-world-to-stop-pretending-that-global-warming-facts-dont-exist?c=reccon2 (3:02 min cartoon style music video of motivational STEM teacher)
https://www.upworthy.com/an-acting-legend-explains-a-problem-a-hilarious-comedian-explains-how-to-fix-it-the-american-way?c=reccon3 (5:20 min)

Veritasium: An Element of Truth: https://www.youtube.com/user/1veritasium *Veritasium* is an English-language educational science channel on YouTube created by Derek Muller in 2011. As of 6 January 2015 it had 171 uploads and 2,112,281 subscribers. The videos range in style from interviews with experts such as Physics Nobel Laureate, 2011, Brian Schmidt, [1] to science experiments, dramatizations, songs, and interviews with the public to uncover misconceptions about science; a hallmark of the channel. The free subscription service & website hosts 5-10 min videoclips on a wide range of topics & questions. Similar to ASAPScience except w/o cartoon drawings. Home: https://www.youtube.com/channel/UCHnyfMqiRRG1u-2MsSQLbXA. https://www.youtube.com/user/1veritasium/videos (complete listing of videos).

Vsauce: https://www.youtube.com/user/Vsauce/videos MindField: "Our world is amazing" –
Over 130, 8-20 min Q&A videos created by Michael Stevens starting in the summer of 2010. Sorted into playlist/themes/categories at: https://www.youtube.com/user/Vsauce/playlists

Watch *NGSS*-Based Teaching in Action With New Videos From NSTA

What better way to learn about the *Next Generation Science Standards* (*NGSS*) than to see them in action in the classroom? NSTA's latest installment of videos features elementary teachers leading students in schoolyard investigations using many *NGSS*–based instructional strategies. Accompanying lesson plans coming soon! The four videos are free and add to a growing collection of resources and tools for science educators on the NGSS@NSTA Hub.

https://ngss.nsta.org/ngss-videos.aspx
NGSS in the Elementary Classroom
These four videos introduce elementary science educators to important strategies based on the Framework for K-12 Science Education for K-12 Science Education and the Next Generation Science Standards (NGSS). The class featured in the videos is made up of second- and third-grade bilingual students. This collection of videos demonstrates new instructional strategies in the elementary school classroom. The project was led by the National Science Teachers Association (NSTA) with funding from Disney.

Next Generation Science Standards: Introduction to Three Dimensional Learning, Funds of Knowledge, and Place-based Science
Next Generation Science Standards: Core Ideas and Crosscutting Concepts
Next Generation Science Standards: How Practices Change
Next Generation Science Standards: Supporting Talk

Sources of Demonstrations & Hands On Explorations for Minds-On Science Teaching

Dr. Thomas O'Brien, Binghamton University,
Department of Teaching, Learning & Educational Leadership (TLEL)
tobrien@binghamton.edu 607-777-4877

Supplemental Web-Resources for Dr. Thomas O'Brien's 3-volume NSTA Press book series:

Brain-Powered Science Teaching & Learning with Discrepant Events

https://www.nsta.org/publications/press/brainpowered.aspx
See also: https://www.nsta.org/publications/press/extras/ and
https://www.binghamton.edu/tlel/resources/csmte/.

In the matter of physics, the first lessons should contain nothing but what is experimental and interesting to see. A pretty experiment is in itself often more valuable than twenty formulae extracted from our minds. --Albert Einstein

About.com àThoughtCo.: Astronomy: https://www.thoughtco.com/astronomy-4133558
Biology : Demonstrations, Experiments & Tutorials: https://www.thoughtco.com/biology-4133580
Chemistry: https://www.thoughtco.com/chemistry-projects-4133589
Geology: https://www.thoughtco.com/geology-4133564
Physics: https://www.thoughtco.com/physics-4133571
Weather & Climate: https://www.thoughtco.com/weather-and-climate-4133550

ActionBioscience: www.actionbioscience.org/education

Amateur Scientist: http://amasci.com/amateur
Bill B's Physics Demos & Videos: http://amasci.com/scied.html#demo

American Association for Chemistry Teachers (K-12/$50/yr linked to ACS)
https://www.teachchemistry.org/content/aact/en.html

American Society for Microbiology: Lesson Plans: https://www.asm.org/Browse-By-Content-Type/Lesson-Plans + Podcasts: https://www.asm.org/podcasts + https://www.youtube.com/user/MicrobeWorld/videos

Arbor Scientific's Cool Stuff (Physics & Chemistry): https://www.arborsci.com/cool/

Association for Astronomy Education: Resources: http://www.aae.org.uk/

Astronomical Society of the Pacific, Education: http://www.astrosociety.org/education/

(The) Astronomy Café: http://sten.astronomycafe.net/the-astronomy-cafe/

Awesome Science Teacher Resources by Nancy Clark: Biology & Chemistry Activities, Labs and Links: www.nclark.net

Biology Corner: https://www.biologycorner.com/
"resource site… contains a variety of lessons, quizzes, labs, web quests, and information on science topics for all levels, including introductory life science and advanced placement biology.

Boston Museum of Science: https://www.mos.org/educator-resource-center

Catalyst: Chemistry Resources for the Secondary Education Teacher: http://www.thecatalyst.org/

Cornell Institute of Biology Teachers (K-12): https://blogs.cornell.edu/cibt/

Daryl's Science (all sciences: Biology, Chemistry, Earth Science, Physics): www.darylscience.com à
http://www.darylscience.com/DemoMain.html
http://www.darylscience.com/DemoBio.html

DIY Science: https://www.instructables.com/id/DIY-Science/ Build your own science demos
https://www.youtube.com/watch?v=qKmHkkd8ATc: Science Experiments To Do When Bored
https://www.popsci.com/diy (*Popular Science*)
https://www.lifehack.org/articles/lifestyle/20-awesome-diy-science-projects-with-your-kids.html

Earth2Class: https://earth2class.org/site/ (Lamont-Doherty Earth Observatory of Columbia University)
Earth Science Curriculum Units & Teaching Tips: https://earth2class.org/site/?page_id=3912
Select Earth Science Websites: https://earth2class.org/site/?page_id=3916
Integrating Education Technologies (e.g., Google Earth): https://earth2class.org/site/?page_id=3923

Educational Innovations (science supply co., all sciences, K-12)
http://blog.teachersource.com/lesson-ideas/

Flinn Scientific: https://www.flinnsci.com/resources/safety-reference/ Bio, Chem, Physical Science and Safety Fax sheets distributed for free at workshops; some are online. A science supply co. that is especially known for its extensive resources on safety (e.g., even its catalog!).
https://www.flinnsci.com/resources/biology/
https://www.flinnsci.com/resources/chemistry/

Fun Science Gallery: The Amateur Scientist Site: http://www.funsci.com/texts/index_en.htm

Exploratorium (museum of science, art and human perception): https://www.exploratorium.edu/snacks/ *Science Snacks* (gr.6-12 activities for all sciences):

Illinois State University Physics and Astronomy Lecture Demonstrations:
https://learning.physics.iastate.edu/

James Madison University, Dept. of Chemistry & Biochemistry's: Chemistry Demo Website: http://sites.jmu.edu/chemdemo/ (includes lesson plans, problem sets, demos with videos & VA SOL for K-12)

Life Science Teaching Resource Community: https://www.lifescitrc.org/
" an online community for life science educators at all levels. The community and educational resources found on this site are free and open to educators worldwide, although free registration may be required to participate in some community activities, such as posting comments. Registration information is never bought or sold."

Michigan Technological University, Physics Lecture Demonstration Facility:
http://www.phy.mtu.edu/LECDEMO/websit/lecdem.htm

Minnesota Science Teacher Education Project: Activity Collection (K-college; all sciences & math):
https://serc.carleton.edu/sp/mnstep/index.html

Molecular Expressions: Digital Video Gallery, Streaming Videos & Downloads: Movie Gallery:
http://micro.magnet.fsu.edu/moviegallery/index.html. "animated videos of selected samples from our various photomicrograph collections. These videos are actually time-lapse digital image sequences that explore the effect of rotating polarization, sample rotation, and crystallization as it actually appears under the microscope. Cells in Motion Chemical Crystals Pond Life QX3 Microscope Time-Lapse Movie Gallery Nikon MicroscopyU Digital Movie Gallery. See for example: *Secret Worlds: The Universe Within* (~classic *Powers of Ten* movie)
http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/

Montana State University, Dept. of Physics, Lecture & Video Demos:
http://www.physics.montana.edu/demonstrations/index.html

Mr. Kent's Chemistry Page: http://www.kentchemistry.com/
NYS Chemistry Teacher has resources for Regents & AP Chem including labs, lecture notes, old exams, video clips of lessons (ChemGuy Video Chemistry Lessons) and My Chemical Demonstration Videos . This is an example of a large # such sites posted by individual teachers around the world. Many university science departments host more sites – see postings at my CSMTE and NSTA Press Extras webpages.

Museum of Science and Industry-Chicago: https://www.msichicago.org/experiment/

Naked Scientists: http://www.thenakedscientists.com/. "… a media-savvy group of physicians and researchers from Cambridge University who use radio, live lectures, and the Internet to strip science down to its bare essentials, and promote it to the general public."

https://www.youtube.com/user/NakedScientists à Video playlist collections include: Science Scrapbook (31 videos), Naked Engineering (22 videos), Science from the Sporran (11 B/W "old style" videos), Kitchen Science (2 videos), MaterialChef (6 videos)

See also: https://www.thenakedscientists.com/kitchenscience (experiments to try at home)
http://www.thenakedscientists.com/HTML/experiments/list-all-our-science-experiments/
https://www.thenakedscientists.com/get-naked/experiments/liquids
(~130 descriptions & videos of science Demonstrations & experiments).

North Carolina State University: Physics demos + links to other university online demo manuals:
http://demoroom.physics.ncsu.edu/resources.html

Physics Instructional Resource Association (K-12): http://physicslearning2.colorado.edu/pira/
"an association of professionals dedicated to the support and advancement of physics education… to develop effective teaching tools and techniques to aid and promote physics education." PIRA uses the DCS indexing system that gives a standard name to demonstrations that is used by all PIRA members For lecture demo & links see:
https://physicslearning.colorado.edu/Bib/bibMain.asp and
https://physicslearning.colorado.edu/ldl/ (Lecture Demonstration Laboratory)

PhysLink.Com: Physics & Astronomy Online Portal: https://www.physlink.com/Index.cfm

Purdue University Division of Chemical Education:
http://chemed.chem.purdue.edu/genchem/demosheets/index.html

Science Buddies (special focus on science fair project ideas): https://www.sciencebuddies.org/

Science Hobbyist/Amateur Scientist (from *Scientific American*): http://amasci.com/

Science Spot (Middle School/junior high -- all sciences): https://sciencespot.net/

Serendip: Hands-on Activities for Teaching Biology to High School or Middle School Students:
https://serendipstudio.org/sci_edu/waldron/

Smithsonian Institution National Museum of Natural History: https://naturalhistory.si.edu/
Department of Paleobiology: https://naturalhistory.si.edu/research/paleobiology

Sprott's *Physics Demonstrations: A Sourcebook for Teachers of Physics* (online book):
http://sprott.physics.wisc.edu/demobook/intro.htm and "The Wonders of Physics": http://sprott.physics.wisc.edu/wop.htm

Steve Spangler Science (supply co; K-12, all sciences):
https://www.stevespanglerscience.com/lab/experiments/

Terrific Science (supply co; K-12, all sciences): Freebies: www.terrificscience.org/freebies

The Biology Project: Problem sets, tutorials & activities: http://www.biology.arizona.edu/site.html

The National Science and Technology Centre: Questacon: ~50 chemistry & physics demos:
https://www.questacon.edu.au/outreach/programs/science-circus/videos

University at Albany College of Nanoscale Science & Engineering:
https://sunypoly.edu/k12-outreach.html

University of California Museum of Paleontology, K-12 Teacher Resources (inc., Evolution):
http://www.ucmp.berkeley.edu/education/teachers.php
http://www.ucmp.berkeley.edu/geology/tectonics.html (animations)

University of Illinois at Urbana-Champaign, Department of Physics: Lecture Demos & Links:
https://physics.illinois.edu/outreach/

University of Iowa Physics and Astronomy Lecture Demonstrations, Links, Humor…: http://faraday.physics.uiowa.edu

University of Maryland, Physics Lecture Demonstrations (pictures + descriptions):
https://lecdem.physics.umd.edu/demonstration-services/demonstrations.html

University of Michigan Physics Demonstrations:
https://sharepoint.umich.edu/lsa/physics/demolab/Lists/Demonstrations/SubCategories%20On%20View.aspx

University of NC Learning/NC Lesson Plans (K-12; all sciences - Archived):
http://soe.unc.edu/resources/technology/support/learn/index.php?standards

University of Southern California, Dept. of Physics & Astronomy (simple descriptions + pictures):
http://physics.usc.edu/demolab/index.html

University of Virginia Physics Department:
Lecture Demonstrations Laboratory: https://demolab.phys.virginia.edu/demos/demolab.asp

University of Wisconsin-Madison Physics Lecture Demonstrations:
https://wiki.physics.wisc.edu//facultywiki/PiraScheme
https://wiki.physics.wisc.edu/facultywiki/Demonstrations

Wake Forest University Physics Department (demonstration videos):
http://physics.wfu.edu/demolabs/demos/avimov/bychptr/bychptr.htm
http://physics.wfu.edu/demolabs/demos/index.html

Whelmers (both free & for small fee demo writeups; all sciences):
https://www.whelmers.com/catalog/free-whelmers

*** Please inform the instructor of defunct or changed URLs & of any new, great sites you discover**

Animations & Simulations for Teaching Science

Dr. Thomas O'Brien, Binghamton University,
Department of Teaching, Learning & Educational Leadership (TLEL)
tobrien@binghamton.edu 607-777-4877

Cell Biology Animations: www.johnkyrk.com

Concord Consortium : http://mw.concord.org/modeler/. 100's free downloadable simulations & curriculum modules for physics, chemistry, biology, biotechnology, and nanotechnology

Google Earth: https://www.google.com/earth/

JAVA Applets for Physics: http://www.walter-fendt.de/html5/phcz/
Mechanics (17) + Oscillations & Waves (9) + Electrodynamics (13) + Optics (6) + Thermodynamics (1) + Relativity (1) + Physics of Atoms (2) + Nuclear Physics (2). See also Astronomy (3) + Mathematical (25) Applets

NetLogo: http://ccl.northwestern.edu/netlogo/

"multi-agent programmable modeling environment. It is used by tens of thousands of students, teachers and researchers worldwide. It also powers HubNet participatory simulations. It is authored by Uri Wilensky and developed at the CCL. You can download it free of charge."

The SimScientists: http://simscientist.org/about/index.php program in WestEd's Science, Technology, Engineering & Mathematics (STEM) program is comprised of a suite of research and development projects that focus on the roles that simulations can play in enriching science learning and assessment. The overall goals of our research program are to bring together the latest research findings and best practices from model-based reasoning, cognition and learning, e-learning design, intelligent tutoring and educational measurement to design and test innovative ways of supporting student learning and instructional practice in middle school science.

University of Colorado-Boulder, PhET Interactive Simulations (K-college; all sciences + math): https://phet.colorado.edu/

University of Toronto, Dept. of Physics: Flash Animations for Physics (~100):
https://faraday.physics.utoronto.ca/GeneralInterest/Harrison/Flash/#em
See also: Virtual Physics Bookshelf: https://faraday.physics.utoronto.ca/PVB/PVB.html

Wolfram Demonstrations Project (all ages, sciences & subjects): http://demonstrations.wolfram.com/ " an open-code resource that uses dynamic computation to illuminate concepts in science, technology, mathematics, art, finance, and a remarkable range of other fields… Its daily growing collection of interactive illustrations is created by Mathematica users from around the world who participate by contributing innovative Demonstrations… All Demonstrations run freely on any standard Windows, Mac, or Linux computer. In fact, you do not even need Mathematica. You can interact with any Demonstration using the free Wolfram CDF Player—for most platforms this happens right in your web browser. If you have Mathematica you can also experiment and modify the code yourself.

What Is Science Matters? Science Matters is an initiative by the National Science Teachers Association (NSTA) to bring content, news, and information that supports quality science education to parents and teachers nationwide. Science Matters builds on the success of the Building a Presence for Science program, first launched in 1997 as an e-networking initiative to assist teachers of science with professional development opportunities. Building a Presence for Science—now Science Matters—reaches readers in 34 states and the District of Columbia. Why does Science Matter? Science is critical to understanding the world around us. Most Americans feel that they received a good education and that their children will as well. Unfortunately, not many are aware that international tests show that American students are simply not performing well in science when compared to students in other countries. Many students (and their parents!) believe that science is irrelevant to their lives. Innovation leads to new products and processes that sustain our economy, and this innovation depends on a solid knowledge base in science, math, and engineering. All jobs of the future will require a basic understanding of math and science. The most recent ten year employment projections by the U.S. Labor Department show that of the 20 fastest growing occupations projected for 2014, 15 of them require significant mathematics or science preparation to successfully compete for a job. This is why Science Matters. Quality learning experiences in the sciences—starting at an early age—are critical to science literacy and our future workforce. Feel free to publish this information in school newsletters and bulletins, and share it with other parents, teachers, and administrators.