

Montana Science Teachers Association



# NEWS JOURNAL

MSTA NewsJournal Page 1 Fall 2018

A publication of the Montana Science Teachers Association

# Fall 2018

## In this Issue:

**2018 Montana Educators Conference**  
**What's New with MSTA**  
**Science Lessons**  
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### Submitting Articles to the MSTA News Journal

When submitting articles, please adhere to the following criteria:

- Electronic submissions are preferred in Microsoft Word format. These can be attached to your email message.
- If in doubt about format, submit your work in .rtf format.
- If truly in doubt, paste your submission in the body of the email message.
- Lab activities may be mailed. Please cite any references.

### **Judy Boyle, Editor** Tentative Submission/Publication Dates

sagemountaintrail@gmail.com August/September (Fall Issue)

November/December (Winter Issue)

February/March (Early Spring Issue)

April /May (Late Spring Issue)

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## Montana Science Teachers Association Membership Application

Name \_\_\_\_\_ Date \_\_\_\_\_  
           Last                                  First

Address \_\_\_\_\_ Phone (\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_  
 City    County                                  State                                  Zip

School/Affiliation  
 \_\_\_\_\_

School Phone(\_\_\_\_) \_\_\_\_\_

Email \_\_\_\_\_

Grade Level                          Subject  
 \_\_\_\_\_ All sciences  
 \_\_\_ K-6                                  \_\_\_ Physics  
 \_\_\_ 6-9 MS or JH                      \_\_\_ Life Science  
 \_\_\_ 9-12                                  \_\_\_ Chemistry  
 \_\_\_ College/Univ.                      \_\_\_ Phys Science  
 \_\_\_ Sup/Admin.                         \_\_\_ Earth Science  
    \_\_\_ Biology  
    \_\_\_ Other

Dues Category  
 1 year                                  \$20.00 \_\_\_\_\_  
 MSTA/MCTM                          \$30.00 \_\_\_\_\_  
 MSTA/MEEA                          \$30.00 \_\_\_\_\_  
 3 years                                  \$50.00 \_\_\_\_\_  
 Life                                        \$150.00 \_\_\_\_\_  
 Student                                  \$5.00 \_\_\_\_\_  
 Retired                                  \$5.00 \_\_\_\_\_

Make checks payable to MSTA  
  
 Return to: Katie Capp  
 PO Box  
 Belgrade, MT 59714

## What's New?

Memberships can be renewed on-line at our web-site!

## From President Judy Boyle

I hope everyone's school year has started well! MSTA's presidential chain spent a busy summer going to the NSTA's National Congress on Science Education in Little Rock, AR. Much was discussed and learned. We were also busy presenting science workshop sessions at the Montana Behavioral Initiative in June and at the first Montana Summer Science Institute in August. The institute was very successful and inspirational. I highly recommend that everyone attends next summer!

In June, Past-President, Jessica Anderson was invited by Gov. Steve Bullock to attend the White House State-Federal STEM Summit in Washington, D.C. The Montana PAEMST recipients, Dacia Lackey (mathematics) and myself (science) were also in Washington D.C. for the awards ceremony. Part of our professional development was working alongside the amazing professionals Gov. Bullock sent to represent Montana and to work on the Whitehouse Five-Year Strategic STEM Plan. It was such an honor.

We have also been preparing for the 2018 MT. Educators Conference in Billings. Our keynote speaker will be Mr. Brett Molding and Ms. Nicole Paulsen. Brett Moulding is currently the Director of the Utah Partnership for Effective Science Teaching and Learning. He is a member of the National Academy of Sciences Board on Science Education and a member of the National Research Council (NRC) Committee developing the *Conceptual Framework for K-12 Science Education*. It will be an amazing keynote. They will also hold an extension session afterwards in room 239 to discuss their books. We are also offering many other wonderful science sectionals. Registration is now open and can be accessed with [http://www.meamft.org/educator\\_conference.aspx](http://www.meamft.org/educator_conference.aspx). And, don't forget to attend our luncheon meeting (\$5.00 per person). We will include more detail on our summer adventures!

See you in Billings!



Jessica Anderson, Tom Cabbage, and Judy Boyle in Little Rock, AR for NSTA's NCSE



# Professional Development and Student Opportunities

Oct. 11-15 – Regional NSTA Conference in Reno, NV.

Oct. 18 – 19 – MEA/MFT Conference in Billings

Nov. 20 – State Science Olympiad – MSU, Bozeman.

April 3 – 6 – NCTM National Conference, San Diego

April 11-14 – NSTA National Conference, St. Louis

## TEACHER LEARNING HUB

Familiarize yourself with the Three Dimensions of the Montana Standards

Self-Paced:

Montana's New Science Standards: An Introduction 1 unit

Montana's New Science Standards 101 2 units

Montana's New Science Standards 201: 3D Learning 3 units

Montana's New Science Standards 301: Phenomena 2 units

Montana's New Science Standards 401: PBL 4 units

Facilitated:

Science 3D Implementation Mentorship 101 24 units

\*Six week course that works with you in your classroom

\*Course opens in fall, spring, and summer

Crosscutting Concepts: The Big Picture 20 units

\*Four week course that works with you in your classroom

\*Course opens in the fall, spring, and summer

Specialized Hub professional development tailored to meet your district needs is also available, contact Michelle McCarthy,

[MMcCarthy5@mt.gov](mailto:MMcCarthy5@mt.gov)

Dear MSTA teacher,

This is the 7th year!

For a number of years, the NCWIT (National Center for Women and Information Technology) has given national awards to high school girls. The **NCWIT Award for Aspirations in Computing** is for young women with aspirations and achievements in technology and computing.

This year will be the seventh year that there also will be a MONTANA contest for Montana girls. The time to submit applications is **Sept. 1 through November 5** and the application is found at [www.aspirations.org/participate/high-school](http://www.aspirations.org/participate/high-school)

There are many qualified high school girls that would apply if they just had a little push from a leader like you. Any interested female high school student would need to fill in the on-line application, and get a parent and a school official to approve it to be entered into both the national and Montana contests.

We have had winners from high schools in Absarokee, Anaconda, Arlee, Beaverhead, Bozeman, Bozeman Petra, Broadwater, Butte, Cascade, Cut Bank, Great Falls High, Helena Capital, Helena High, Jefferson High, Libby, Missoula Big Sky, Missoula Hellgate, Missoula Sentinel, Noxon, Park County, Seeley-Swan, Simms and Whitefish High Schools.

We hope your school will be represented on the winners list this year. But girls have to apply.

We are looking forward to recognizing Montana's talent, and hope that you would encourage the young women that you know to apply. Sometimes all they need is a little encouragement and you are the person to provide that.

Thank you,  
Steve Harper and Ted Wendt  
Computer Science  
Carroll College  
447-4466  
[sharper@carroll.edu](mailto:sharper@carroll.edu)

P.S. There also is a Montana educator award (**with \$1000 for professional development**) given each year. Do you know a good teacher that you should encourage to apply (maybe you)? Encourage them to go to:

[www.aspirations.org/participate/educators](http://www.aspirations.org/participate/educators)

Need help applying?

[Application Guide](#)

[Parent Approval Guide](#)

[Endorsement Guide](#)

[FAQs](#)

Insurance Institute for Highway Safety (<http://www.iihs.org/>) has a new education website for students (grades 5-12) and teachers exploring the STEM of car crashes and vehicle safety. It is called <https://classroom.iihs.org/> (<https://classroom.iihs.org/>). The site is completely free for all. It incorporates the original IIHS Understanding Car Crashes videos as well as a lot of new footage and student activities.

We designed a couple of special features on the site to especially help new teachers implement the videos and activities into their classroom. Of these, probably the most helpful are the Teacher Tips videos for each activity in which I give a brief overview of the activity's materials, safety notes, and expected results.

To gain full access to all the free teacher resources and answer keys be sure to create an educator account on the site.

We also provide detailed Teacher Lesson Plans for each activity. Here are the direct links to the new Teacher Activity Guides:

Teacher Guide 1 - It's Basic Physics <https://classroom.iihs.org/d/239>

Teacher Guide 2 - When Physics Meets Biology <https://classroom.iihs.org/d/240>

All the best,

Alyson

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Alyson Mike, Ed.D.

[alyson.mike@gmail.com](mailto:alyson.mike@gmail.com)

East Helena, MT406.431.7722

# MONTANA SCIENCE OLYMPIAD

On behalf of the Montana Science Olympiad (MSTO), I am very excited to announce that the 34th Montana Science Olympiad will be held the Tuesday before Thanksgiving, **November 20, 2018**, on the MSU-Bozeman campus! \*\*\* We are calling this the "2019" MSTO to be consistent with the year shown in the event rules, because this state competition leads to the National Science Olympiad in May/June 2019. \*\*\* Information about Montana Science Olympiad may be found at <http://www.montana.edu/ehhd/smrc/msto/index.html> .

Tentative events being offered in Montana can be found at <http://www.montana.edu/ehhd/smrc/msto/events.html> . Events are being called "Tentative" until the Science Olympiad Event Rules are released on September 4<sup>th</sup>. If the events are included in the rules, then they are "Official."

The 2018-2019 Event Rule Manuals from the National Science Olympiad will be available for **FREE** download on September 4<sup>th</sup>! In this manner, all teams get access to the rules at the same time.

The required fees for the 2018-2019 MSTO Tournament will remain the same as last year.

<i>Description</i>	<i>Cost</i>
Varsity Team of 11 – 15 Students	\$325
Varsity Team of 10 or Less Students	\$275
JV Team of 15 or Less Students	\$200

Schools must have a Varsity team in the division before they can have a JV team. As an example, a middle school can have both a Varsity and a JV team.

To **register**, please fill out a School Membership Form **electronically** at [http://www.montana.edu/ehhd/smrc/msto/school\\_teams.html](http://www.montana.edu/ehhd/smrc/msto/school_teams.html) . Registration is towards the bottom of the page.

In order to compete, all Membership Forms are due by **Friday, October 12, 2018** and all fees are due by **Friday, November 2, 2018**. Please check the MSTO website soon for the Avogadro (scoring system) registration updates!

New this year, by popular request, credit card payments will be accepted, in addition to timely payment by check.

**Please share this email** with the appropriate school teachers and don't hesitate to contact us with questions or concerns. Find the contact information below and note the email address.

Sincerely,

LeeAnn Swain

**Montana Science Olympiad**  
Science Math Resource Center  
PO Box 172804  
Montana State University  
Bozeman, MT 59717  
406-994-7476  
[mtscioly@montana.edu](mailto:mtscioly@montana.edu)



# Field Study Trips for Your Students

The Bozeman Children's Museum & STEAMlab is now scheduling their Fall 2018 Field Trips! CMB Field Trips are high-quality, standards-aligned STEM experiences designed for students K-12. The average field trip lasts 90 minutes and contains a structured program for students (although a general STEM and museum exploration option is available for K-3). We have several different trip topics to choose from, ranging from Bugs! (G1-3) to 3D Design (G4-8) and Photonics (G7-12). You can find the full listing on our website, call (406) 522-9087, or email Natalia Kolnik, [education@cmboze-man.org](mailto:education@cmboze-man.org).

Hello Educators,

With the new school year upon us, I'm sure you're all busy with lesson plans, new students, and the craziness of the fall. I wanted to remind you all that a field trip to Travelers' Rest State Park can add valuable first-hand experiences to supplement your students' explorations of Native American culture and history, Lewis and Clark, or natural history topics. Thanks to the incredible generosity of the donors at our annual auction, we will also be able to offer all school field trips through June 2019 **free of charge!**

If you're interesting in scheduling a field trip to the park, now is a great time to do so to make sure you get your preferred date! Field trip slots are available Tuesday-Friday during the upcoming season.

Please visit <http://www.travelersrest.org/events---education.html> to learn more about our current topic offerings, view our calendar of available dates, and submit a request for your class field trip!

Feel free to contact me with any questions, and we look forward to working with you this fall.

# Using Phenomena to Teach with a 3 Dimensional Approach

Are you using phenomena to anchor NGSS units and lessons? Here are some of the thoughts around the prior and current use of phenomena.

[Check out the full resource here.](#)

PRIOR THINKING ABOUT PHENOMENA	THINKING ABOUT PHENOMENA THROUGH THE NGSS
If it's something fun, flashy, or involves hands-on activities, it must be engaging.	Authentic engagement does not have to be fun or flashy; instead, engagement is determined more by how the students generate compelling lines of inquiry that create real opportunities for learning.
Anything students are interested in would make a good "engaging phenomenon"	Students need to be able to engage deeply with the material in order to generate an explanation of the phenomenon using target DCIs, CCCs, and SEPs.
Explanations (e.g., "electromagnetic radiation can damage cells") are examples of phenomena	Phenomena (e.g., a sunburn, vision loss) are specific examples of something in the world that is happening—an event or a specific example of a general process. <i>Phenomena are NOT the explanations or scientific terminology behind what is happening. They are what can be experienced or documented.</i>
Phenomena are just for the initial hook	Phenomena can drive the lesson, learning, and reflection/monitoring throughout. Using phenomena in these ways leads to deeper learning.
Phenomena are good to bring in after students develop the science ideas so they can apply what they learned	Teaching science ideas in general (e.g., teaching about the process of photosynthesis) may work for some students, but often leads to decontextualized knowledge that students are unable to apply when relevant. Anchoring the development of general science ideas in investigations of phenomena helps students build more usable and generative knowledge.
Engaging phenomena need to be questions	Phenomena are observable occurrences. Students need to <i>use the occurrence to help generate the science questions or design problems</i> that drive learning.
Student engagement is a nice optional feature of instruction, but is not required	Engagement is a crucial access and equity issue. Students who do not have access to the material in a way that makes sense and is relevant to them are disadvantaged. Selecting phenomena that students find interesting, relevant, and consequential helps support their engagement. A good phenomenon builds on everyday or family experiences: who students are, what they do, where they came from.

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## Phenomena Resources & Examples

[Phenomena for NGSS](#)

[Paul Andersen resources for phenomena](#)

Phenomena Examples from other teachers:

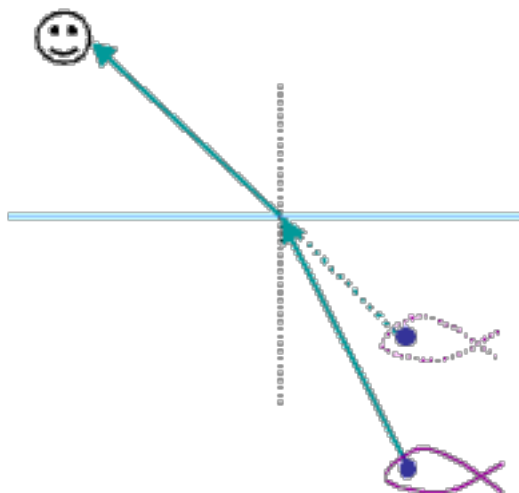
*I typically teach physics and the curriculum doesn't much about heat or temperature (I think the physics teachers at my school have generally decided to skip this chapter because students learn much of it in chemistry the next year.) But when I taught an introductory science course for freshmen I had more leeway in what to cover so I sometimes opted to do quite a bit with energy conservation with heat and work. To give the students a shared experience to refer to when differentiating between heat, temperature, and our perception of hot or cold, I set up the following activity:*

*Each group is given three tubs of water; one cold, one room temperature, one hot (but still safe for putting your hands in.) There are variations of what can be done with these, but a basic starting place is to leave one hand in the cold water and one hand in the hot water for about a minute. Students should be discussing what they feel in their hands as they wait for the minute to pass. Then, take both hands in put them in the warm water.*

*The unexpected phenomena is that although both hands are now in the same temperature of water (room temp), the left hand will sense a different temperature than the right hand. Students quickly explain this to the sensation of temperature having more to do with a difference in temperature between your hand and what you are touching, rather being like what a thermometer does when it measures temperature on a scale. Students can think of other examples of this phenomena, such as jumping into a pool after you've been in the shade vs right after sitting in the sun for a while, or standing on the bathroom floor in the winter before and after a hot shower. To follow up with these observations, I give them different materials which are at the same temperature yet feel variously cool or warm. [Veritasium has a video](#) I sometimes show.*

*Or if I have time in the class, I will have a styrofoam cooler cover and an aluminum frying pan and some ice cubes so students can predict where the ice will melt the fastest, then be shocked by their observations. They will agree the pan feels cooler and typically predict this will keep the ice frozen longer. Again, the perception of temperature is more about the transfer of energy between the object and your hand than it is about absolute temperature. This is a interesting way to start investigating specific heat. Catherine Bergeron*

An example of a phenomenon that I have used in class is based on Snell's Law -  $n_1 \sin(\theta_1) = n_2 \sin(\theta_2)$ . The problem I give them is I like to go fishing, but I can never catch the fish. I am over fishing (throwing the line in front) or under fishing (by throwing the line behind them). One outcome of refraction is the illusion that things appear closer to the surface than they actually are; that is their apparent depth.



In the diagram above, the fish appears to be much closer to the surface than it actually is. In general, when light emerges perpendicularly to the surface of a liquid, the submerged object's apparent depth equals its true depth divided by the liquid's index of refraction.

Kaitlyn Bondy

I like to share homopolar motors with students. I talk about magnets first, then I talk about batteries and energy. Then with a demonstration I show them a copper wire figure that has been bent that I place on the battery and neodymium magnets. The copper wire starts spinning wildly and sometimes falls off. I have them draw the phenomenon, then I have them try to explain how it works with diagrams, after this, I let them have a piece of copper wire design their own and try it with me. It is pretty interesting seeing their ideas change, and thoughts on how it works. Eventually after a few students get it to work, I explain what is going on. Then I let everyone have a new piece and try one to success.

[Resource Link](#)

Dylan Buhler





Montana Science Teachers' Association

