MSTA Newsletter

A publication of the Michigan Science Teachers Association • Volume 70.3 • Summer

In this Issue

From the President's Desk

In his video address the MSTA President, Brian Peterson, shares how bees in a hive mirror the roles we play in schools. He reminds us all that, "You are a vital part of the education system. You are training our next generation to be scientists and engineers and to love science." He encourages teachers to consider sharing their ideas by presenting at the MSTA conference.

From the Desk of Your Executive Director

Betty Crowder and Robby Cramer, MSTA Co-Executive Directors

Summer 2018

The MSTA Executive Director Role Continues to Evolve

For the past year both Betty Crowder and Robby Cramer have served as Co-Executive Directors for the Michigan Science Teachers Association. We will continue to work together to support MSTA this year! As colleagues, we are honored to guide and support the MSTA leadership as they fulfill the mission of this respected organization: to stimulate, support and provide leadership for the improvement of science education throughout Michigan.

The MSTA Board Retreat April 2018

The focus of the MSTA board retreat was to reflect on the goals and accomplishments in 2017-2018 and to analyze the feedback from the 2018 MSTA State Conference. Each committee considered what worked well and what needs tweaking for next year. We carefully considered the feedback from attendees and vendors that was gathered through electronic surveys and comments at the conference. Our discussions were rich as perspectives were generated from all the data we collected from our members and vendors.

Based on the comments and reviews of the 2018 state conference, we have invited Samantha Johnson and Jim Clark from Next Gen Science Innovations to be our keynote speakers and to conduct several sessions at our conference in Grand Rapids, Michigan March 1 and 2, 2019. We hope that you will join us! Please consider sharing your expertise and ideas by being a session presenter.

We wish you all a great beginning to the 2018-2019 school year.

2019 MSTA Conference Update

Holly McGoran, MSTA Conference Chair

Michigan teachers will celebrate science and engineering at the **2019 Michigan Science Teachers Association Conference on March 1-2 at the Amway Grand Plaza Hotel in Grand Rapids**. You will not want to miss this opportunity to increase your ability to implement the Michigan Science Standards. Whether you choose to attend general sessions, share-a-thons, workshops, or special events, there is sure to be something for everyone!

The **Pre-Conference Institute** will be held on Thursday, February 28. These longer sessions will offer a more in-depth look at a variety of topics for all educators. Be sure to check out these offerings when conference registration opens.

We are thrilled to announce the return of **Jim Clark and Samantha Johnson**, Directors of Next Generation Science Innovations (https://nextgenscienceinnovations.wordpress.com/). These outstanding national presenters will explore various aspects of the science standards during workshops at our Pre-Conference Institute and sessions during the full day conference on Friday. We are delighted that they will deliver the keynote presentation on Friday morning as well.

You will also want to take time to visit the **Exhibit Hall** where you will find a large selection of science resources for your classrooms. The MESTA rock shop, NSTA bookstore, and MSTA store will be open on Friday and Saturday. And, of course, there will be chances to win raffle prizes at various booths throughout the exhibit hall.

Watch for upcoming emails, social media posts, and newsletter articles containing more details to make your conference an amazing experience. We hope that you will also consider sharing your educational experiences and expertise with others. We will begin accepting presenter applications in early September. Information will be posted at http://www.msta-mich.org/

We look forward to learning alongside each of you at the 66th annual Michigan Science Teachers Association Conference!

The Most Amazing Day

Jennifer Sherburn, Hesperia High School

Modeling instruction begins with a phenomenon and asks students to develop an explanation. Here I will describe one of the best days of modeling with my students.

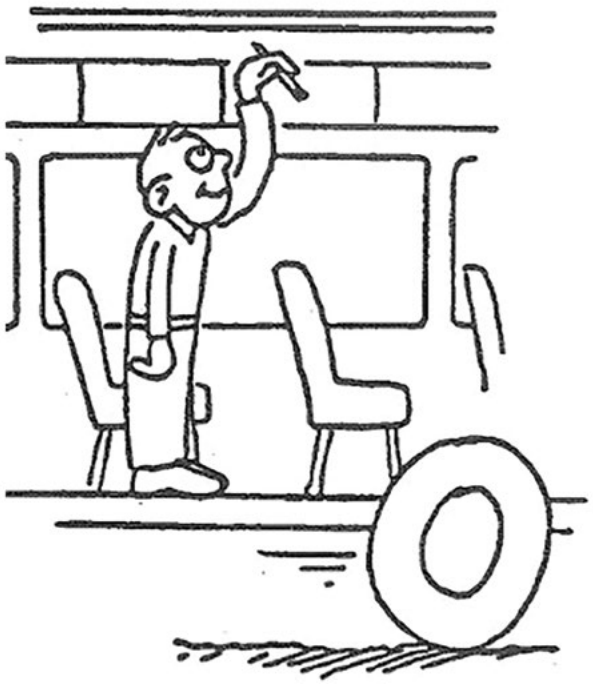
I began the lesson by presenting the following situation:

> *Suppose you are standing in the aisle of a bus that travels along a straight road at 55 mph, and you hold a pencil still above your head. Then suppose you release the pencil. Will the pencil strike the floor 1) behind you, 2) at your feet below your hand, or 3) in front of you?*

The class was very divided on their thinking—approximately half thought the pencil would land below the hand, the other half thought it would land behind you. Representatives for both "sides" shared their logic and a few students changed their thinking. One student said, "it would land behind you. Think about holding the pencil up and walking across the room right now and dropping it. It would land behind you." Another student countered, "That's not the same because you need to be on something that is moving." One vocal thinker suggested, "Mrs. Sherburn, someone should stand in your wheeled chair while holding a pencil. Then someone pushes it and we can see where it lands." Perfect! Except for the standing part.

The entire class walked out to the hall while the volunteer readied himself, cross-legged in my chair, to be pushed quickly down the smooth hallway floor. The two students, rider and pusher, made final adjustments with a tennis ball (easier for us to see) held directly in front of the rider's head. We counted them down and shortly after starting their motion, the ball was released. And clearly enough for all of us to see, the ball hit the rider in the chest. To myself, I thought, "well, I'll be darn!!! Not, what I was expecting." Our evidence was clear enough: the pencil on the moving bus would land behind you.

The bell rang. And yet, our observations, our evidence, still didn't align with my hypothesis. I quickly checked the answer key, which indicated that the pencil would land "at your feet below your hand." Well, now I was puzzled. What was going on with our evidence to indicate something different with my preconceived notion and the answer key? With only 5 minutes before my next class, I quickly shared the experience with another teacher and shared the answer key. His



response, "the answer key is wrong. The pencil should land behind you."
My time was up for the moment to process what just happened and my clear misconception. I had only just begun reviewing the agenda with students for my next class when a I heard a commotion in the hallway. I stepped outside my classroom only to see the teacher I had just conferenced with and his entire history class, along with a student sitting cross-legged in a wheeled chair. My heart was filled with so much excitement that I had puzzled another teacher enough that he had to investigate the situation with his non-science class.

Another hour passed and it was lunch time. I was just sharing the morning events and my misconceptions with another teacher when the history teacher came in to further our discussion and investigation. I was still holding on to the idea that the pencil should land below you and he wasn't convinced. I posed a further question to him, "If you were in the bus and jumped up, would you land behind where you started?" He only thought for a moment and said, "yes!" His response reminded me of a Bill Nye momentum video I had to share. In the video

continued on page 4

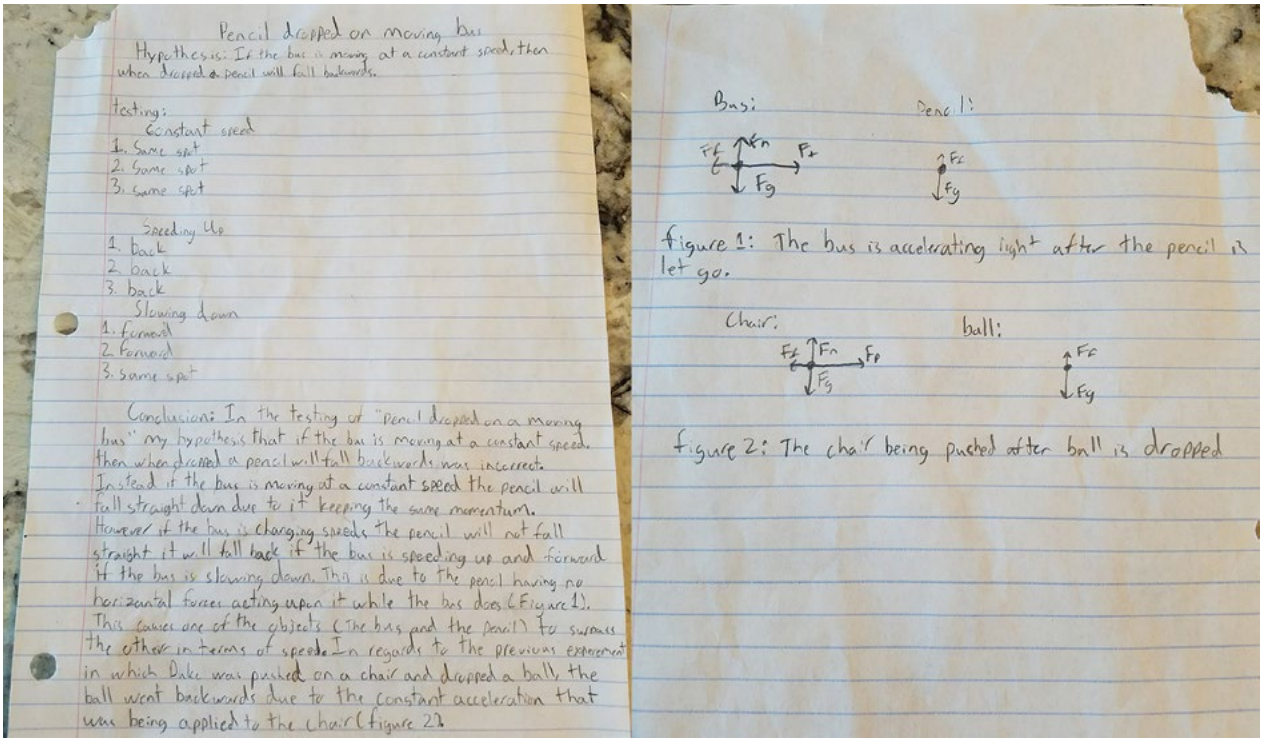
The Most Amazing Day *continued from page 3*

a ball is placed in the smokestack of a toy locomotive car. The car is pushed and the ball pops up while the train keeps moving. A moment later the ball falls right back into the smokestack. I looked up at the teacher and could see a light bulb turning on; I could see it on his face.

Lunch was almost over and one of my students from my morning class stopped in before heading to his vocational center class. He said he had been thinking about the wheeled-chair and tennis ball most of the morning. The other teacher, quickly shared our lunchtime discussion and added scenarios that had been posed since the original bus scenario. The teacher told this student, "I was with you until I saw this video." I replayed the video before the student had to leave for his afternoon classes.

At the end of the day, the student again stopped by my classroom. This time to give me a few sheets of paper (see below). He explained that he conducted a few trials on the bus to the vocation center. He dropped a pencil as the bus braked when a stop sign approached, when the bus traveled at a constant speed, and when the bus accelerated from a stop. He reported, "I was wrong. The pencil should hit at your feet as long as you were moving at a constant speed." He further explained his experimental results using force diagrams in his report. Then he explained what happened in our own class demo and why the ball didn't land in the rider's lap. He said, "The reason the tennis ball hit his chest was because he was accelerating. If he was traveling at a constant speed and released the ball, it would have landed in his lap."

This is a great example of how modeling instruction can engage students' curiosity and make learning fun. I don't think I could come close to describing the pride, appreciation and excitement I felt as a teacher at the end of this day. I have the best job ever!!!



Pencil dropped on moving bus

Hypothesis: If the bus is moving at a constant speed, then when dropped a pencil will fall backwards.

Testing:

Constant speed
1. Same spot
2. Same spot
3. Same spot

Speeding Up
1. back
2. back
3. back

Slowing down
1. forward
2. forward
3. same spot

Conclusion: In the testing of "pencil dropped on a moving bus" my hypothesis that if the bus is moving at a constant speed, then when dropped a pencil will fall backwards was incorrect. Instead if the bus is moving at a constant speed the pencil will fall straight down due to it keeping the same momentum. However if the bus is changing speeds the pencil will not fall straight it will fall back if the bus is speeding up and forward if the bus is slowing down. This is due to the pencil having no horizontal forces acting upon it while the bus does (Figure 1). This causes one of the objects (The bus and the pencil) to surpass the other in terms of speed. In regards to the previous experiment in which Jake was pushed on a chair and dropped a ball, the ball went backwards due to the constant acceleration that was being applied to the chair (figure 2).

Bus: Pencil:

figure 1: The bus is accelerating right after the pencil is let go.

Chair: ball:

figure 2: The chair being pushed after ball is dropped

MICHIGAN Science CENTER

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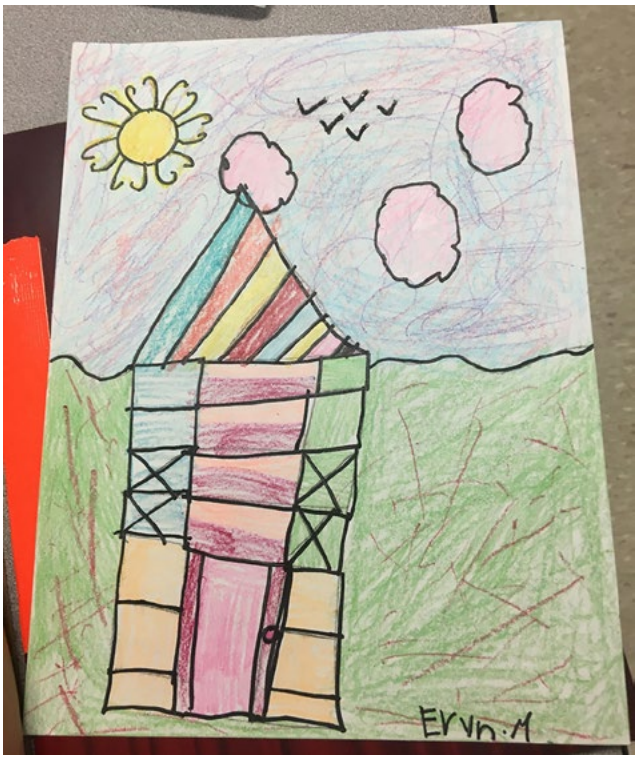
Engineering Principles and Elements of Art: Hand in Hand in the Elementary Classroom

Angie Herek, Visual Arts Teacher, Williamston Community Schools

Last summer, I was awarded a mini-grant focusing on arts integration combining NGSS engineering principles with National Art Standards to create an architectural unit for my elementary students. The results along the way were interesting and reinforced teamwork, cooperation, and communication between students.

The project ran ranged from 3-5 days with 45-minute class sessions. Each class started with a different international architectural wonder from Australia, Africa, or Japan. Students worked in groups of four to plan, build, and construct different structures which were then photographed and turned into two-dimensional art the following session. After deciding what type of structure they would design, they created them from a variety of building materials including: Keva Planks, Lincoln Logs, Lego Duplos, and wooden blocks. Bristle Blocks, Magnet Blocks, and Tinker Toys were used for decoration and additional elements. Each group was photographed with their structure once it was complete.



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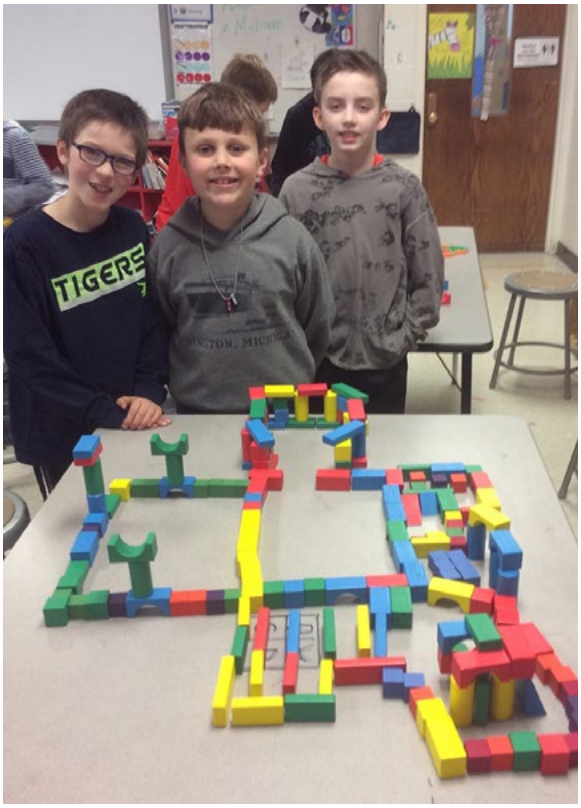
Engineering Principles and Elements of Art ... *continued from page 6*

During the project students asked each other questions, gathered information, organized and developed ideas, made a physical model, refined and reflected on their work, conveyed meaning, and worked together to build and complete their structure while connecting with international architectural structures along with literacy connections through books such as Roberto: Insect Architect, Iggy Peck Architect, and Rosie Revere Engineer (NGSS K-2 ETS1.1, K-2 ETS1.2, 3-5 ETS1.1, 3-4 ETS1.2 & NAS Anchor Standards #1, #5, #6, #11).

The following session students set to work putting their structure into a two-dimensional format which included drawing, painting, using architectural stamps, and found object collage (something known as junk art) to complete their individual architectural masterpiece.

Just as with any discipline there were successes and failures. Here are a few things that students gleaned from the experience:

- Teamwork and communication is key to success.
- Keva Planks on a shaky table fall every time.
- Dividing up the responsibilities ensures completion.
- Everyone can contribute.

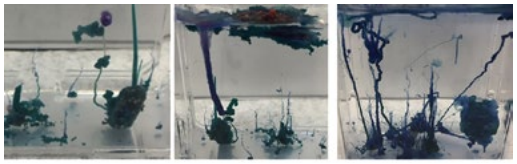


Through this project, students were able to strengthen their ideas of art and science while stretching their knowledge of structures and engineering through arts integration.

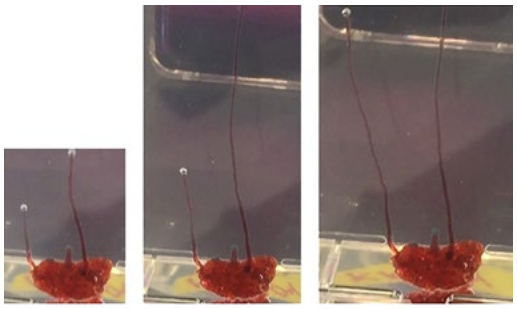
Chemical Gardens

Larry Kolopajlo and Colin Crowell, Eastern Michigan University

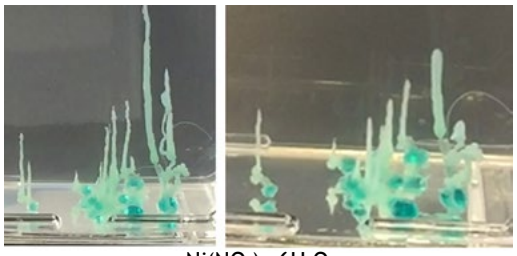
In 1646, John Glauber discovered the phenomenon that today is known as chemical gardens. The term chemical garden refers to the alien structures formed when transition metal salts, often as the hydrate, are dropped into a sodium silicate solution that has been diluted to half strength. Most chemical garden structures, colored hollow tubes, sprout from the surface of the seed dropped into the silicate solution within seconds. As the metal ions of the seed crystal dissolve in the silicate solution, they precipitate with the silicate and form interesting growing hollow structures that pass bubbles of air. Aside from posing an attention-grabbing demonstration, chemical gardens show disorder in macroscopic systems, since the growths are unpredictable. Below are some examples of chemical garden structures made in our lab for outreach presentations.



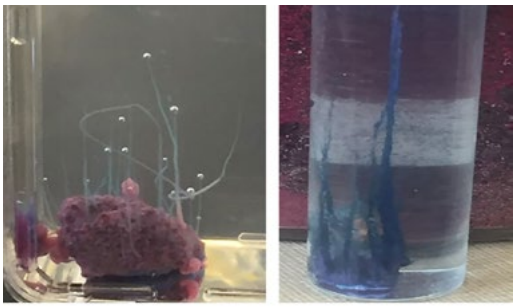
$CoSO_4 \cdot 7H_2O$ over 10 minutes →



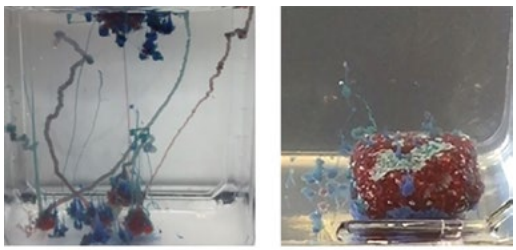
Growth of $Co(NO_3)_2$



$Ni(NO_3)_2 \cdot 6H_2O$

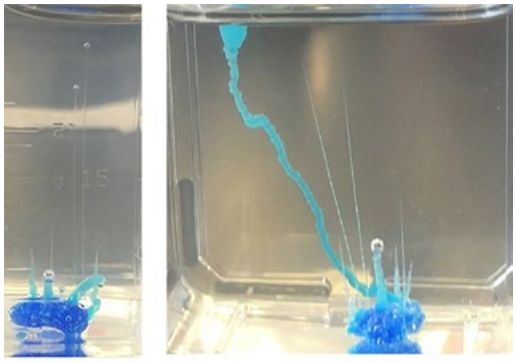


$CoCl_2 \cdot 6H_2O$

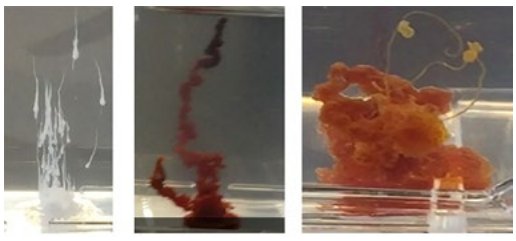


$Co(ClO_4)_2 \cdot 6H_2O$

$MnCl_2 \cdot 7H_2O$ $ZnSO_4$ $MnSO_4 \cdot 7H_2O$



$Cu(NO_3)_2 \cdot 6H_2O$



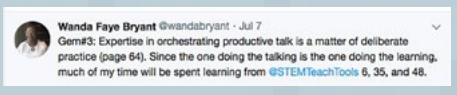
$CaCl_2$ $Fe(SO_4)_2NH_4 \cdot 6H_2O$

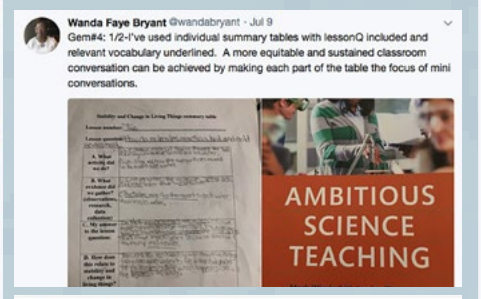
Summer: A time to get caught up on reading and reflecting!

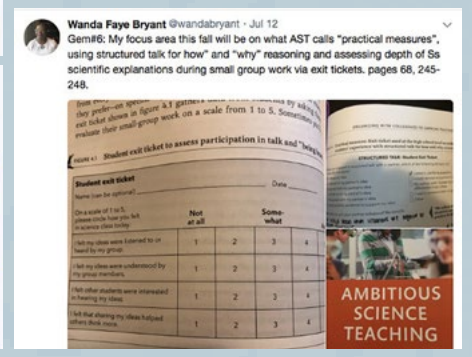
By Wanda F. Bryant @wandabryant, 7th grade science teacher, Detroit Public Schools Community District

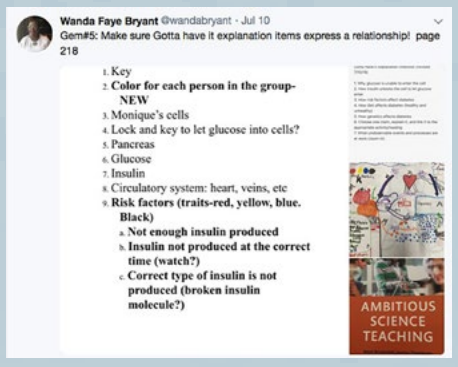
I This summer I read Ambitious Science Teaching by Mark Windschitl, Jessica Thompson, and Melissa Braaten.

I have also participated in Twitter chats about the book using the hashtag #ASTBookChat Twitter chats are a great way to network with other teachers and share ideas and resources. Below are some "gems" from the book that I tweeted.









Gem#7: AST recommends PDSA-PlanDoStudyAct as a means to identify problems of practice and organizing with colleagues to improve. I'll be using pages 74-75 on structured talk scaffold and chapter 13 to improve practice. A tool to help with structured talk can be found https://ambitiousscienceteaching.org/structured-talk-pdsa-data-snap-tool/

Gem#8: Subconsciously, I think I help Ss uncover observations and patterns and connect activity to anchoring event using BPQs. Prime Ss during small group work to prepare for whole group conversations is new goal. p180, 184, 196. A tool to support on-going changes in student thinking can be found at https://ambitiousscienceteaching.org/tools-planning/

Ideas for Productive Discussions at the Beginning of the School Year

By Laura Ritter, MSTA Region 6 Director & Physics Teacher at Troy High School

Student-to-student discussions are a regular occurrence in my classroom. As the school year nears, I am reminding myself of the work I will need to do to make sure that these discussions are productive. If you are looking for some ways to improve discussions in your own classroom, below are some ideas that might help.

- ☐ The first few days of the school year are critical for establishing the tone and norms for your class. Decide what norms you want to establish with the class every time you have a discussion. Will students have to raise their hands to talk? How will they be positioned around the classroom—in a circle, pods or in rows? Will they use a communication tool—like chart paper or whiteboards? Students already understand the expectations for the more traditional lecture-style class. They will need to clearly understand how your expectations for discussions might be different. You may want to introduce question prompts.

- ☐ Set aside some time to do some get-to-know-you and teambuilding activities. These activities might feel like wasted time because they are not academic, but they are critical for getting students comfortable talking about science to each other.

- ☐ Students also need to feel comfortable and safe expressing their ideas in front of you. They are used to being judged by their teachers. Many teachers use an IRE (Initiate-Response-Evaluate) approach to questioning students—even if IRE isn't their intent. Often we think we are avoiding judgment by using phrases like "that's an interesting idea" when a student's idea is incorrect. But, our students can easily crack that code. They are constantly watching body language and listening to tone of voice of the teacher. Once they know your "tells", they might stop participating altogether in order to avoid the potential embarrassment of being wrong or sounding stupid. Try to hold back from responding after every student's response and give the students the opportunity to respond to each other. Your students need more time to process than you do, so use wait time.

- ☐ It takes a lot of practice on the part of the teacher to steer students in the right direction without taking a more authoritative stance. Start the year with a low-stakes activity such as discussion that centers around a phenomenon that relates to the next unit of study. Have students debate a question that uncovers their preconceptions. A biology teacher might ask: "As a tree grows, where does it get most of its mass?" Give students options like "air, water, the Sun, soil…" and have each student choose what they think is the best answer and debate their ideas as a class. During this activity, you must pay attention to your own body language and try not to jump into the conversation. Your students will have fun debating the ideas with each other and will be eager to learn about the correct answer in the lesson that follows.

- ☐ The AAAS Project 2061 website (http:// http://assessment.aaas.org/topics) has common sense misconception assessment items organized by topic. This could serve as a resource for developing questions for students to discuss. Page Keeley's *Uncovering Student Ideas* series of assessment probes are also a great resource for phenomena related to common sense misconceptions.

Productive student discussions do not come easily. If you set the right tone at the beginning of the year, you might find that you will reach your goal of productive discussions sooner. Good luck!

Celestial Highlights

By Robert C. Victor, Abrams Planetarium

Abrams Planetarium at Michigan State University has provided the September and October issues of its Sky Calendar for this issue of the *MSTA Quarterly Newsletter*. The occasion is the presence of four bright planets in the early evening sky at the start of the new school year – provided you begin looking very soon after sunset, perhaps only half an hour after, very low in the west-southwest, for Venus. As the sky darkens slightly more, Jupiter becomes visible, to the upper left of Venus. Mars, faded some after its very close approach near the end of July, is still quite bright, in the south-southeast at dusk in September, while Saturn is in the south. Two diagrams on the September Sky Calendar (Sept. 15 and 24), and one on October (Oct. 1) show the broad panorama of four planets, Venus, Jupiter, Saturn, and Mars, in order from right to left across the sky. Diagrams for Oct. 14 and 28 also show four planets, Mercury having replaced Venus, but you'll need binoculars to have any chance to spot Mercury so low in bright twilight during this very unfavorable appearance.

Students can follow the Moon's eastward progress against the background of bright stars and planets. Have students attempt to observe the Moon each clear evening Sept. 10-24 and Oct. 9-24. The planets will make good markers for students to notice changes in the Moon's position from one night to the next. Sept. 11-20 are especially good dates, as are Oct. 10-12 (using Jupiter to help notice the Moon's changing position), Oct. 13-15 (using Saturn), and Oct. 17-18 (using Mars).

Abrams Planetarium has added an Extra Content Page to its website, to supplement the Sky Calendars. To view, visit http://www.abramsplanetarium.org/msta

The observing projects on the website have various levels of difficulty. A good activity for beginners is simply locating and observing the brightest stars and planets. Evening and morning twilight is a fine time to look for them. Scroll down to the twilight charts which plot only the naked-eye planets and the brightest stars, two charts for each month, August through November. Each chart is accompanied by a description. Before Daylight Saving Time ends in early November, the morning sky is available without having to get up unreasonably early. And every year in September and October, mornings are rich with bright stars. During November 2018, Venus will rocket upward into predawn skies, and attain exceptional brilliance by late that month (after we're back on Standard Time, but it'll be worth getting up to see Venus at its best).

So that you can make plans, we include information about the total eclipse of the Moon which will occur on the night of Sunday, January 20.

This fall, Abrams Planetarium Sky Calendar marks its 50th anniversary. In the next 50 years, we shall continue to strive to inspire teachers and students to go outdoors to enjoy the beauty of the changing night sky.

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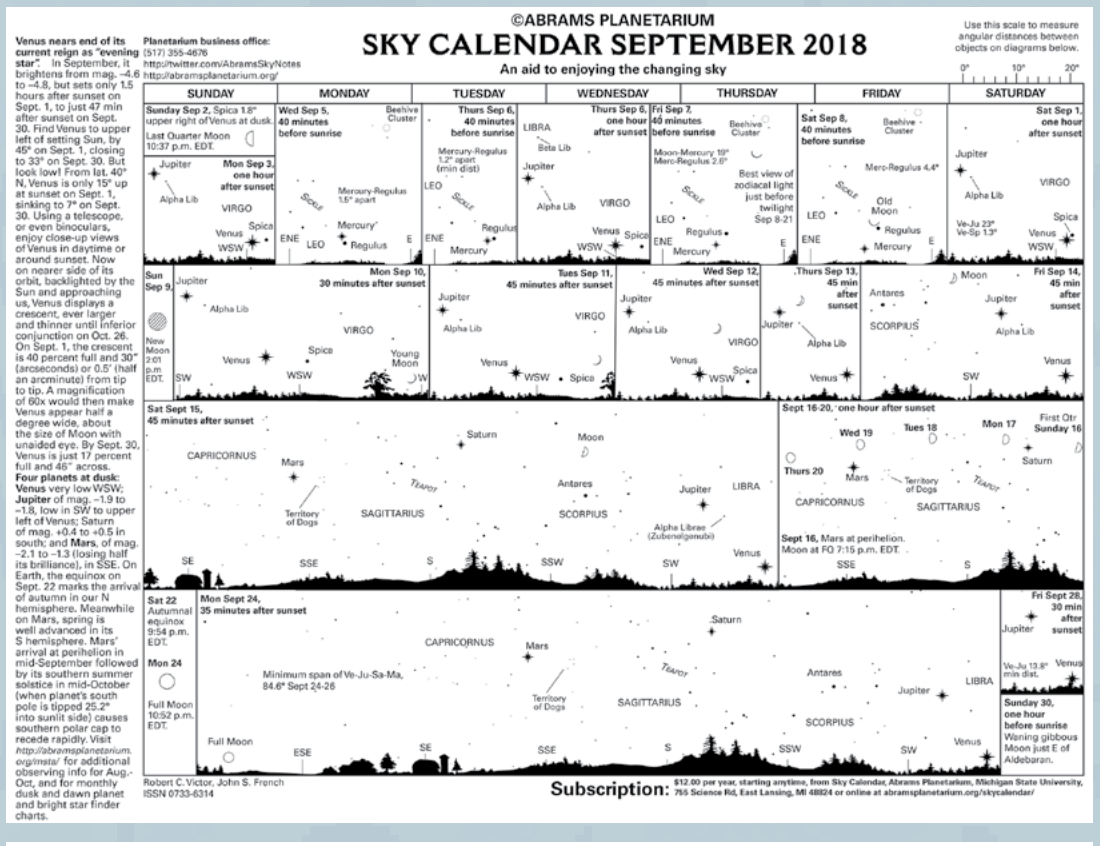
Celestial Highlights *continued from page 11*



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SKY CALENDAR SEPTEMBER 2018

An aid to enjoying the changing sky

Venus nears end of its current reign as "evening star". In September, it brightens from mag. –4.6 to –4.8, but sets only 1.5 hours after sunset on Sept. 1, to just 47 min after sunset on Sept. 30. Find Venus to upper left of setting Sun, by 45° on Sept. 1, closing to 33° on Sept. 30. But look low! From lat. 40° N, Venus is only 15° up at sunset on Sept. 1, sinking to 7° on Sept. 30. Using a telescope, or even binoculars, enjoy close-up views of Venus in daytime or around sunset. Now on nearer side of its orbit, backlighted by the Sun and approaching us, Venus displays a crescent, ever larger and thinner until inferior conjunction on Oct. 26. On Sept. 1, the crescent is 40 percent full and 30" (arcseconds) or 0.5' (half an arcminute) from tip to tip. A magnification of 60x would then make Venus appear half a degree wide, about the size of Moon with unaided eye. By Sept. 30, Venus is just 17 percent full and 46" across.

Four planets at dusk: Venus very low WSW; **Jupiter** of mag. –1.9 to –1.8, low in SW to upper left of Venus; Saturn of mag. +0.4 to +0.5 in south; and **Mars**, of mag. –2.1 to –1.3 (losing half its brilliance), in SSE. On Earth, the equinox on Sept. 22 marks the arrival of autumn in our N hemisphere. Meanwhile on Mars, spring is well advanced in its S hemisphere. Mars' arrival at perihelion in mid-September followed by its southern summer solstice in mid-October (when planet's south pole is tipped 25.2° into sunlit side) causes southern polar cap to recede rapidly. Visit *http://abramsplanetarium.org/msta/* for additional observing info for Aug.-Oct, and for monthly dusk and dawn planet and bright star finder charts.

Planetarium business office:
(517) 355-4676
http://twitter.com/AbramsSkyNotes
http://abramsplanetarium.org/

Use this scale to measure angular distances between objects on diagrams below. 0° 10° 20°

SUNDAY
Sunday Sep 2, Spica 1.8° upper right of Venus at dusk. Last Quarter Moon 10:37 p.m. EDT.
Mon Sep 3, one hour after sunset

MONDAY
Wed Sep 5, 40 minutes before sunrise

TUESDAY
Thurs Sep 6, 40 minutes before sunrise

WEDNESDAY
Thurs Sep 6, one hour after sunset

THURSDAY
Fri Sep 7, 40 minutes before sunrise

FRIDAY
Sat Sep 8, 40 minutes before sunrise

SATURDAY
Sat Sep 1, one hour after sunset

Sun Sep 9, New Moon 2:01 p.m. EDT.
Mon Sep 10, 30 minutes after sunset
Tues Sep 11, 45 minutes after sunset
Wed Sep 12, 45 minutes after sunset
Thurs Sep 13, 45 min after sunset
Fri Sep 14, 45 min after sunset

Sat Sept 15, 45 minutes after sunset

Sept 16-20, one hour after sunset

Sept 16, Mars at perihelion. Moon at FQ 7:15 p.m. EDT.

Sat 22 Autumnal equinox 9:54 p.m. EDT.
Mon 24 Full Moon 10:52 p.m. EDT.
Mon Sept 24, 35 minutes after sunset

Minimum span of Ve-Ju-Sa-Ma, 84.6° Sept 24-26

Fri Sept 28, 30 min after sunset

Sunday 30, one hour before sunrise Waning gibbous Moon just E of Aldebaran.

Robert C. Victor, John S. French
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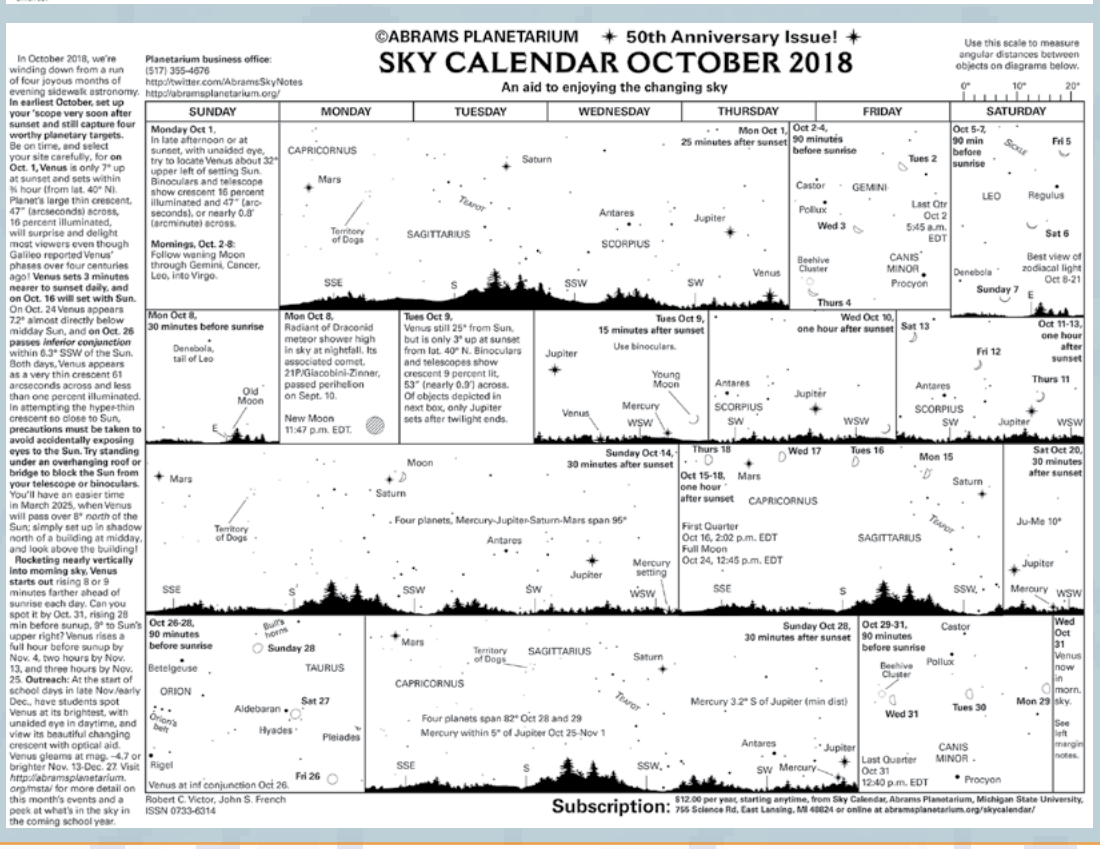

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SKY CALENDAR OCTOBER 2018

An aid to enjoying the changing sky

In October 2018, we're winding down from a run of four joyous months of evening sidewalk astronomy. **In earliest October, set up your 'scope very soon after sunset and still capture four worthy planetary targets.** Be on time, and select your site carefully, for **on Oct. 1, Venus** is only 7° up at sunset and sets within ½ hour (from lat. 40° N). Planet's large thin crescent, 47" (arcseconds) across, 16 percent illuminated, will surprise and delight most viewers even though Galileo reported Venus' phases over four centuries ago! **Venus sets 3 minutes nearer to sunset daily, and on Oct. 16 will set with Sun.** On Oct. 24 Venus appears 7.2° almost directly below midday Sun, and **on Oct. 26 passes *inferior conjunction*** within 6.3° SSW of the Sun. Both days, Venus appears as a very thin crescent 61 arcseconds across and less than one percent illuminated. In attempting the hyper-thin crescent so close to Sun, **precautions must be taken to avoid accidentally exposing eyes to the Sun. Try standing under an overhanging roof or bridge to block the Sun from your telescope or binoculars.** You'll have an easier time in March 2025, when Venus will pass over 8° *north* of the Sun; simply set up in shadow north of a building at midday, and look above the building!

Rocketing nearly vertically into morning sky, Venus starts out rising 8 or 9 minutes farther ahead of sunrise each day. Can you spot it by Oct. 31, rising 28 min before sunup, 9° to Sun's upper right? Venus rises a full hour before sunup by Nov. 4, two hours by Nov. 13, and three hours by Nov. 25. **Outreach:** At the start of school days in late Nov./early Dec., have students spot Venus at its brightest, with unaided eye in daytime, and view its beautiful changing crescent with optical aid. Venus gleams at mag. –4.7 or brighter Nov. 13-Dec. 27. Visit *http://abramsplanetarium.org/msta/* for more detail on this month's events and a peek at what's in the sky in the coming school year.

Planetarium business office:
(517) 355-4676
http://twitter.com/AbramsSkyNotes
http://abramsplanetarium.org/

Use this scale to measure angular distances between objects on diagrams below. 0° 10° 20°

SUNDAY
Monday Oct 1, In late afternoon or at sunset, with unaided eye, try to locate Venus about 32° upper left of setting Sun. Binoculars and telescope show crescent 16 percent illuminated and 47" (arcseconds), or nearly 0.8' (arcminute) across.
Mornings, Oct. 2-8: Follow waning Moon through Gemini, Cancer, Leo, into Virgo.

MONDAY
Mon Oct 1, 25 minutes after sunset

TUESDAY
Oct 2-4, 90 minutes before sunrise

WEDNESDAY
Wed Oct 10, one hour after sunset

THURSDAY
Thurs 11

FRIDAY
Oct 5-7, 90 min before sunrise

SATURDAY
Oct 11-13, one hour after sunset

Mon Oct 8, 30 minutes before sunrise
Mon Oct 8, Radiant of Draconid meteor shower high in sky at nightfall. Its associated comet, 21P/Giacobini-Zinner, passed perihelion on Sept. 10.
New Moon 11:47 p.m. EDT.
Tues Oct 9, Venus still 25° from Sun, but is only 3° up at sunset from lat. 40° N. Binoculars and telescopes show crescent 9 percent lit, 53" (nearly 0.9') across. Of objects depicted in next box, only Jupiter sets after twilight ends.
Tues Oct 9, 15 minutes after sunset
Sunday Oct 14, 30 minutes after sunset
Oct 15-18, one hour after sunset
First Quarter Oct 16, 2:02 p.m. EDT
Full Moon Oct 24, 12:45 p.m. EDT
Sat Oct 20, 30 minutes after sunset

Oct 26-28, 90 minutes before sunrise
Venus at inf conjunction Oct 26.
Sunday Oct 28, 30 minutes after sunset
Four planets span 82° Oct 28 and 29
Mercury within 5° of Jupiter Oct 25-Nov 1
Mercury 3.2° S of Jupiter (min dist)
Oct 29-31, 90 minutes before sunrise
Last Quarter Oct 31 12:40 p.m. EDT
Wed Oct 31 Venus now in morn. sky. See left margin notes.

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Celestial Highlights

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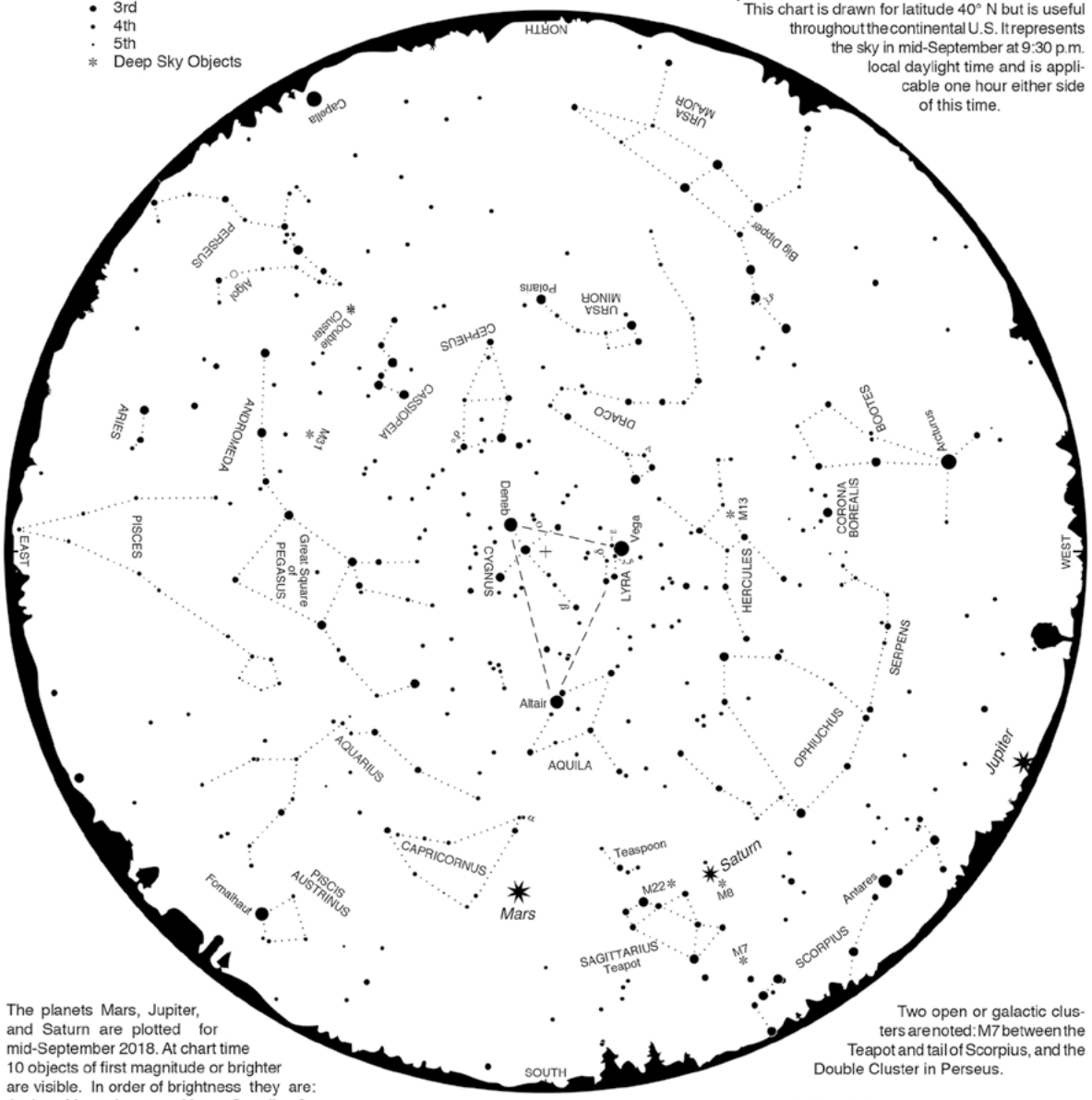
September Evening Skies



The planets Mars, Jupiter, and Saturn are plotted for mid-September 2018. At chart time 10 objects of first magnitude or brighter are visible. In order of brightness they are: Jupiter, Mars, Arcturus, Vega, Capella, Saturn, Altair, Antares, Fomalhaut, and Deneb.

Our usual monthly maps are designed for stargazers just beginning to find their way around the sky. This month's map is useful for serious stargazing from dark locations. It contains many more stars, inclusive to magnitude 4.5, and some fainter stars as needed to complete patterns or assist in locating special objects.

A selection of double stars (labeled with Greek letters) and "deep sky objects" is also plotted. All are visible with modest equipment; most are within the range of the unaided eye or binoculars.

The double stars, in order of decreasing angular separation, are ζ UMa, δ Lyr, α Cap, ο Cyg, ε Lyr, ν Dra, ζ Lyr, β Cyg.

Two open or galactic clusters are noted: M7 between the Teapot and tail of Scorpius, and the Double Cluster in Perseus.

Two globular clusters, more compact concentrations of hundreds of thousands of stars, can be found: M13 in Hercules and M22 in Sagittarius.

M8 in Sagittarius is the Lagoon Nebula, a gas and dust cloud from which stars are forming.

M31 is the famous Andromeda Galaxy, a collection of 300 billion stars located 2.5 million light years from Earth. It is barely visible to the unaided eye.

Celestial Highlights *continued from page 13*

October Evening Skies

This chart is drawn for latitude 40° north, but should be useful to stargazers throughout the continental United States. It represents the sky at the following local daylight saving times:

Late September	11 p.m.
Early October	10 p.m.
Late October	9 p.m.

This map is applicable one hour either side of the above times.

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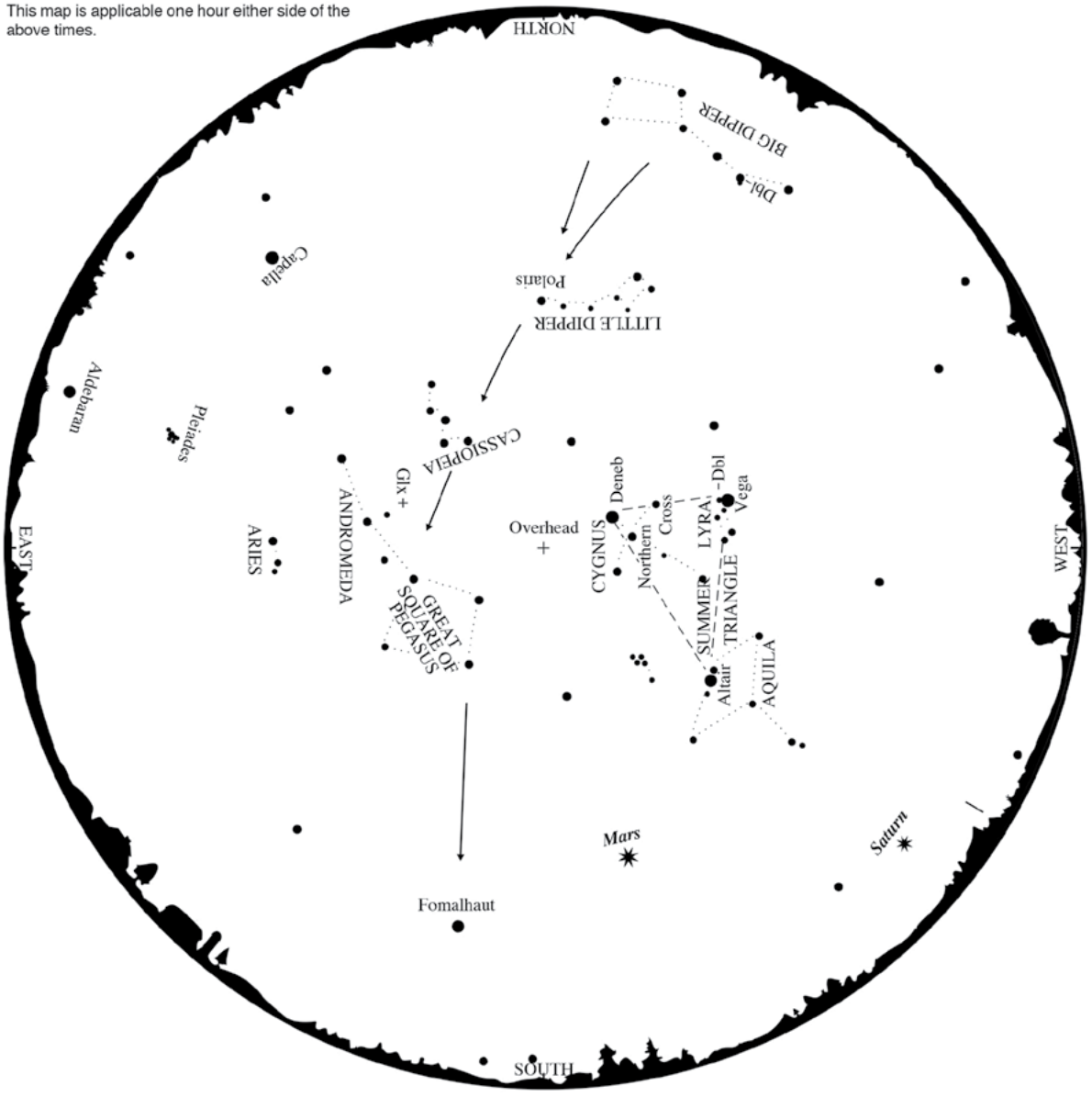

The planets Mars and Saturn are plotted at map time, mid-October 2018. Eight objects of first magnitude or brighter are visible. In order of brightness they are: Mars, Vega, Capella, Saturn, Altair, Aldebaran, Fomalhaut, and Deneb. In addition to stars, other objects that should be visible to the unaided eye are labeled on the map. The double star (Dbl) at the bend of the handle of the Big Dipper is easily detected. Much more difficult is the double star near Vega in Lyra. Low in the east-northeast, the Pleiades is a very attractive open or galactic star cluster. The position of an external star system, called the Andromeda Galaxy after the constellation in which it appears, is also indicated (Glx). Try to observe these objects with unaided eye and binoculars.

—D. David Batch

Dan Wolz Clean Water Education Grant

The Michigan Water Environment Association (MWEA) is pleased to announce the "Dan Wolz Clean Water Education Grant" for this year. The Dan Wolz Clean Water Education Grant was established eight years ago to heighten public awareness of the career opportunities our industry has to offer and to improve the quality and quantity of Clean Water community education in Michigan's public schools. Dan Wolz was a true environmental steward of the earth. Thus, in recognition of the passion Dan had for education, this award continues to reach hundreds of Michigan students.

Details:

The MWEA partners with the Michigan Science Teachers Association to identify those teachers who have a great program and are in need of financial assistance to execute a project within a curriculum focused on water environment issues.

As a grant recipient, a teacher will be provided with:

- Complimentary conference registration and one night stay in a hotel for both the MSTA Annual Conference (to accept the award in the year given and to attend/present at the following year's conference).
- Your school employer's cost for substitute pay will be covered both years.
- Complimentary conference registration and one night stay in a hotel for attendance at the Michigan Water Environment Association's Annual Conference, the year following award. Mileage for travel to this conference is reimbursed.
- $1500.00 cash award for purchase of classroom and project supplies.

Following the use of the Dan Wolz Education Funds and implementation of classroom projects the following school year, the recipient is expected to:

- Give a 30-40 minute presentation as a featured speaker at the MSTA Annual Conference.
- Give a 15-20 minute presentation at the MWEA Annual Conference.
- Write an article for both the MSTA newsletter and the MWEA magazine describing your experiences implementing the classroom project.

Grant Application Process:

Grant applications are published in the fall issue of the MSTA newsletter, with an October 31, 2018 submission deadline. Determination of the award recipient will be made in November. The award will be presented at the MSTA conference in March 2019 at the awards banquet. This year, the award will be given to one K-12 MSTA science teacher.

Process and Procedures for Applying:

1. The Dan Wolz Clean Water Education Grant application is available in this newsletter.
2. Submit the application by October 31, 2018 to: susantate@whitehallschools.net with "Dan Wolz Award" in the subject line.
3. The MSTA Awards Committee and MWEA will make determination jointly.
4. Determination of the award winner will be made by end of November 2018, with notification occurring in December. Applications can be considered for at least two years.
5. The Award recipient will be introduced at the MSTA Conference at the awards banquet in March 2019.

Expectations of the award recipient:

- Be available to accept this award at the MSTA State Conference Awards Banquet March 2019
- Write an article for both the MSTA and MWEA newsletters
- Give presentations at both the MSTA (March) and MWEA (June) state conferences in 2020

Past Recipients of the Dan Wolz Education Grant:

2007 – Mary Lindow, Battle Creek
2008 – Emily Curry, Jackson Public Schools
2009 – John Martin, Waterford School District
– Don Hammond, Flint Beecher High School
2010 - Gary Cousino, Rochester Community Schools
- Douglas Morrison, Manistique Middle School
2011 – Susan Tate, Whitehall Middle School
2012 – Chris Groenhout, Grandville High School
2013 - Dave Chapman, Okemos High School
2014 – Tammy Coleman, Lowell High School
- Randy Cook, TriCounty Schools
2015 - Josh Nichols, Heritage Elementary School
- John Travis, Williamston Community Schools
2016 - Connie Atkisson, Thirkell Elementary-Middle School, Detroit Public Schools
- Lea Sevigny, Central Middle School, Forest Hills Public Schools
2017 - Sarah Geborkoff, Houghton Middle School
2018 - Holly Hereau, Thurston High Achool

Need more Information?

- For more information about the award go to: http://www.mi-wea.org/weg.php
- For more details regarding the grant itself, contact MWEA representativeusan_tate@msta-michi.org
- For more information about the Michigan Water Environment Association go to http://www.mi-wea.org

Dan Wolz Clean Water Education Grant Rubric

Criteria	Unsatisfactory (0 - 9 points)	Basic (10 - 14 points)	Average (15 - 19 points)	Above Average (20 - 25 points)	Distinguished (26 - 30 points)
Project Description	Project not clearly defined	Project description is marginal.	Adequate project description.	Proficient project description.	Superior description of project
Connection to GLCE and/or HSCE	No Connection to Michigan Science Standards	Marginal reference to Michigan Science Standards	Adequate reference to Michigan Science Standards	Reference to Michigan Science Standards is proficient.	Detailed connection to Michigan Science Standards
Dissemination Plan	Does not articulate a dissemination plan	Marginal evidence of dissemination plan	Adequate evidence of dissemination plan	Proficient evidence of dissemination plan	Detailed dissemination Plan
Sustainability	No evidence of sustainability	Marginal evidence of sustainability	Adequate evidence of sustainability	Evidence of sustainability is proficient	Details evidence of Sustainability
Links to Grant Goals and Results	Application does not have a link to the stated goal and intended results of the grant	Poor attempt to link to the goal and intended results of grant	Adequate attempt to link to the stated goal **or** intended results of the grant.	Application is linked to the stated goal **and** intended results of grant.	Distinguished link to the stated goal and intended results of grant.

The goal is to enable Michigan teachers to be **aware and promote careers in water environment, water quality, and wastewater management** not only to their students but also to the science community.

The results we are seeking would be students throughout Michigan who will have a much **greater awareness and appreciation of the contribution this great industry makes to our society** and maybe even become inspired to choose a career path that would make them a part of that contribution.

Dan Wolz Clean Water Education Grant Application

The mission of the Michigan Water Environment Association:

Michigan Water Environment Association will be a recognized authority on and advocate for preserving, restoring, and enhancing Michigan's water resources

Grant Narrative:

- Describe your project and share how this project relates to your curriculum and teaching practice with students and or science teachers (Maximum one page.)
- Purpose of Grant: Give your statement of how you can share with others in your community as well as other educators in the state of Michigan what you have implemented with your students. (Maximum one page.)
- Provide a summary of why you are interested in Michigan's water resources Identify the locations and contact information for the nearest water treatment plant(s) in the school district where you teach. Do these facilities offer tours? (Maximum one page.)
- Rubric used in the selection process will be available on the MSTA web site http://www.msta-mich.org/

Contact Information:

Name: _____

Home Address: _____

City: _____ State: ____ Zip: _____

Phone Number: _____ Email Address: _____

School District: _____

School Name: _____

School Address: _____

City: _____ State: ____ Zip: _____

Position/Title: _____ Grade Level (s): _____

Completed Applications must be received by MSTA by October 31, 2018.

Email completed applications to: susantate@whitehallschools.net with "Dan Wolz Award" in the subject line.