

InterChange Newsletter

From the Regional Math & Science Center at Grand Valley State University

April 2017 | Volume 24, Number 3

THERE ARE MANY ACTIVITIES TO CELEBRATE EARTH DAY THIS YEAR! WHICH ONE(S) WILL YOU CHOOSE?



Plan to participate in the March for Science on Saturday, April 22, along with other West Michigan events.

[Full story](#)

CONNECTIONS FOR THE STEM CLASSROOM

GVSU faculty and area experts provide engaging ideas on current topics in research and education

The Moon's Shadow Approaches, by Dr. Doug Furton, GVSU Physics Department

[Full story](#)

CALENDAR OF EVENTS

[Calendar](#)



A GRATEFUL COMMUNITY WISHES KAREN MEYERS THE BEST AS SHE RETIRES AS RMSC DIRECTOR!

For the past 24 years, Grand Valley State University (GVSU) has benefitted from the work of Karen Meyers at the Regional Math and Science Center (RMSC). She has made a far-reaching impact on K-12 math and science education in the community, GVSU, and the state of Michigan.

[Full story](#)

REGIONAL NGSX PROFESSIONAL LEARNING OPPORTUNITIES IN 2017-2018

The Next Generation Science Exemplar System for Professional Development, or NGSX 2.0*, is a discourse based Professional Learning environment designed to engage teachers with the Science and Engineering Practices and Disciplinary Core Ideas, supporting teachers in the enactment of the Michigan Science Standards. The GVSU Regional Math and Science Center is collaborating with intermediate school districts in Kent, Montcalm, and Ottawa counties to bring NGSX professional learning to teachers and administrators.

[Full story](#)

FALL SCIENCE UPDATE CONFERENCE - NOVEMBER 15 - SAVE THE DATE AND CALL FOR PRESENTERS

The Regional Math and Science Center cordially invites you to attend Fall Science Update on Wednesday, November 15, 2017 on the Allendale campus. Take time to connect with colleagues and discover how to engage students in Science, Technology, Engineering, and Mathematics (STEM) learning.

[Full story](#)

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Each problem asks you to create shapes that meet certain constraints and to compare the shapes you made.

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On Wednesday, May 17, join science educators at Kent ISD for a one day conference with multiple break-out sessions.

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Through generous grant funding from BOSCH as well as the Lake MI STEM Hub, Kent ISD has been enabled to develop a library of **littleBits** electronics learning tools.

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SHAPE HEALTH PROFESSIONS CAMP - DEADLINE TO REGISTER APPROACHING SOON

sHaPe (Summer Health Activities and Professions Exploration) is a one-week day program introduction to the Health Professions for boys and girls currently in 7th and 8th grades.

[Full story](#)

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There are Many Activities to Celebrate Earth Day this year! Which One(s) Will You Choose?

EARTH DAY WILL BE CELEBRATED ON SATURDAY, APRIL 22. A NUMBER OF ACTIVITIES ARE PLANNED.

March for Science

The March for Science demonstrates passion for science and sounds a call to support and safeguard the scientific community. The primary march will be held at the National Mall in Washington DC and there are many satellite marches around the world and the US, including 11 in Michigan. Locate one near you! marchforscience.com

March for Science Grand Rapids

Science plays a vital role in our lives and our democracy. This event will illuminate, appreciate and support science. There will be speakers, followed by a march across the Blue Bridge to Rosa Parks Circle. Visit "[March for Science – Grand Rapids, Michigan](#)" on Facebook

Where: Meet at the Courtyard at 401 Fulton St. West on Grand Valley State University's downtown Pew Campus

Time: 10:30 a.m. – 12:00 noon

Cost: FREE TO EVERYONE

Blandford Nature Center: Grand Opening of Mary Jane Dockeray Visitor Center

Join the Blandford Crew as we unveil the new Mary Jane Dockeray Visitor Center to the Grand Rapids Community! Ribbon cutting ceremony, building tours, property tours, wildlife encounters and much more await you on Earth Day. Help us celebrate the the success of the Growing Up Blandford Campaign!

Where: Blandford Nature Center Visitor's Center

Time: 1:00–3:00 p.m.

Cost: FREE TO EVERYONE

Howard Christenson Nature Center - Spring Gala

Join us for an evening of Jazz provided by Swingtooth, appetizer tastings provided by local restaurants and a silent auction with items from local businesses like the Bauble Patch Jewelers. This fundraising event will help HCNC take the next step toward much needed updates and a more user friendly atmosphere. Purchase your tickets online now.

Special Guest Speaker Dr. R. Keys of Cornerstone University will be presenting "The Importance of Nature Centers in the 21st Century."

Where: Howard Christenson Nature Center, 16190 Red Pine Dr. Kent City, MI 49330

Time: 6 – 9:00 p.m.

Cost: \$15-30

Plaster Creek Stewards 2017 Spring Event Invitation

[Displaced Dirt: Keeping Sediment out of Streams](#)

What happens when our land use and urban development funnel stormwater into creeks at rates that lead to flash flooding? It means trouble for the creek and its aquatic organisms as stormwater accelerates the damage caused by sediment in the creek. Celebrate Earth Day with us by learning about the causes and effects of dirty storm water flowing into Plaster Creek. This brief talk will be followed by a morning of restorative activities aimed at keeping sediments out of the stream.

Time: 9:00 a.m. – 12:00 p.m.

Where: Meet at the [Calvin College Chapel Undercroft](#) for a short presentation followed by hands-on restoration activities in the watershed. Dress for the weather and bring work/garden gloves if possible.

Transportation to and from the work sites is available, just let us know ahead of time if you need a ride!

Please follow the link to RSVP.

Cost: FREE TO EVERYONE

Connections for the STEM Classroom

GVSU faculty and area experts provide engaging ideas on current topics in research and education

The Moon's Shadow Approaches

BY DOUG FURTON, GVSU PHYSICS DEPARTMENT

About midday on a plain old Monday near the end of August, a darkness will sweep across the United States, a darkness so deep that birds will chirp as if night suddenly fell, a chill will settle in, and the sky will fill with stars for those in the darkness' path. If that sort of thing sounds scary to you, then you should try to stay out of the way; but if it sounds exciting, you might start planning now to be in the right place at just the right time.

On the 21st of August this year the moon will pass exactly between the sun and Earth, producing what we call a solar eclipse. During a solar eclipse the moon completely blocks out the sun, turning day into night and revealing to an observer in the right place the sun's tenuous, wispy outer atmosphere, which is normally lost in the sun's daytime glare.

Solar eclipses are not all that uncommon. Each year there are at least 4 solar eclipses. And during some years there are even more. At first blush, we might expect as many as twelve solar eclipses each year: one each month, when the moon, in its orbit around Earth, slips between Earth and the sun. But the moon's orbit is slightly inclined (about 5 degrees) to the plane of Earth's orbit around the sun, causing the moon to more often than not drift unspectacularly above or below the sun from our Earthbound perspective. Yet still one might wonder: if there are at least 4 total solar eclipses every year, why haven't I seen one? Ask around... you'll find that very few people have ever seen a total solar eclipse. Surely such a spectacle cannot go unnoticed.

To understand why total solar eclipses are so rare it is helpful to consider the situation from a different perspective. The moon casts a shadow, as does every opaque body that is illuminated by the sun. The central part of any shadow—called the *umbra*—is very dark. Surrounding the umbra of a shadow, however, is a darkened, but not completely dark region called the *penumbra*.

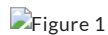


Figure 1

Figure 1: The central part of any shadow, called the umbra, is very dark. In the umbra of a shadow, the light source is completely obscured. The fuzzy part of a shadow is called the penumbra. In the penumbra of a shadow, the light source is only partially blocked. Photo by the author.

The moon's umbral shadow is shaped like a slender tapering cone that points away from the sun. By happenstance, the sizes of and distances to the sun and moon conspire to make it so the moon's umbral shadow just reaches Earth. So perfectly balanced are size and distance that on Earth's surface the diameter of the moon's dark umbra is only about 60 miles.

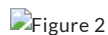


Figure 2

Figure 2: An image rendered to scale showing the extent of the moon's umbral and penumbral shadows. The image is from a frame of an animation produced by NASA's Scientific Visualization Studio.

Viewed from this perspective it becomes apparent why total solar eclipses are so rare. In order to see a total solar eclipse you have to be in just the right place precisely when the tiny tip of the moon's umbral shadow sweeps over you!

During the solar eclipse on August 21st, the moon's shadow will sweep from northwest to southeast diagonally across the full extent of the continental United States. The shadow makes landfall very nearly at the start of the eclipse near a town called Lincoln City, Oregon, just west of Salem, at about 1:20 pm EDT, and later slips off to sea near Charleston, South Carolina at about 2:50 pm EDT. The 60-mile wide blotch of darkness covers the almost

2,600-mile distance from Oregon to South Carolina in an hour and a half, moving then at a speed of about 1,700 miles per hour! For comparison, that is about equal to the top speed of an F-16 jet.

 Figure 3

Figure 3: The path of the moon's umbral shadow across the continental United States on August 21st. Image courtesy NASA's Scientific Visualization Studio.

The area across the U.S. swept out by the moon's shadow during the August 21st eclipse—60 miles wide by 2,500 miles long—is about 150 thousand square miles. The total surface area of Earth is about 200 million square miles. So, with a little bit of area added to each end of the eclipse path, it only covers about 0.1% of Earth's surface. That's why solar eclipses are so rare: you have to be in just the right place at just the right time to see one.

If you don't want to travel into the path of totality during the August 21st eclipse, the day here in Michigan will still be very unusual. Observers here will see a partial solar eclipse—the moon will only partially block the sun. But Michigan is deep within the moon's penumbral shadow, and at mid-eclipse, about 2:30 pm EDT, the moon will block just over 80% of the area of the sun's surface.

 Figure 4

Figure 4: The moon's shadow at mid eclipse. In Michigan, at this time, the moon will block just about 80% of the sun's surface. The image is from a frame of an animation produced by NASA's Scientific Visualization Studio.

If you want to learn more about the August 21st eclipse, there are many on-line resources. Three of the most comprehensive are listed below.

NASA's Eclipse 2017 website at <https://eclipse2017.nasa.gov/>

NASA's Scientific Visualization Studio: <https://svs.gsfc.nasa.gov/Gallery/suneclipse2017.html>

A vibrant website at <http://www.eclipse2017.org/>

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A Grateful Community Wishes Karen Meyers the Best as She Retires as RMSC Director!

For the past 24 years, Grand Valley State University (GVSU) has benefitted from the work of Karen Meyers at the Regional Math and Science Center (RMSC). She has made a far-reaching impact on K-12 math and science education in the community, GVSU, and the state of Michigan.



Karen served for 15 years as Assistant Director for the RMSC, under the leadership of Mary Ann Sheline, and has served as Director of the Center for the past nine years. Additionally, Karen serves as Administrative Coordinator for the GVSU Integrated Science Major.

Karen is respected throughout the university and the West Michigan educational community for her vision, inclusion, collaboration, and professionalism.

Dr. Frederick Antczak, Dean of the College of Liberal Arts and Sciences, shares, "Karen Meyers has given decades to the development of Michigan children and teachers. Her innovative work has opened doors for science and math instruction throughout the region, and her intellectual integrity and personal commitment has included and involved so many more students and teachers in the joys of learning. Grand Valley State University wishes her the very best on her next adventure. We will miss her."

Before coming to Grand Valley in 1993, Karen taught middle school science and adult education. Karen received B.A and M.A. degrees from Michigan State University in the Lyman Briggs College and the Honors College.

The programs that Karen has developed over her career at GVSU are too numerous to list, but have impacted countless teachers and students. Some of the highlights include:

- Building Science Leaders teacher leadership academy,
- Super Science Saturday open houses,
- Michigan Science Olympiad tournaments,
- Fall Science Update conference,
- STEPS and sHaPe summer science camps,
- Discovering STEM Kits lending program.

Karen has worked to support the RMSC and these program through numerous grants including: Michigan Space Grant Consortium (NASA), Michigan Math and Science Partnership Grant, Michigan Department of Education Math and Science Centers Grant, and Eisenhower Higher Education Professional Development Grant Program.

Beyond the local community, Karen has been a leader in the state-wide Michigan Math and Science Center Network, a program of the Michigan Department of Education that supports the state with 33 centers. She currently holds the office of Secretary, where she is an advocate for science and math education for the state's teachers and students. Kathy Surd, President of the Network, remarks, "Karen Meyers has been a driving force behind the success of the Michigan Mathematics and Science Centers Network. Her passion for mathematics and science education and her tireless devotion to the Network has been instrumental throughout the years. As one of our officers on the Executive Committee, Karen has continually gone above the call of duty to bring the very best services to Michigan students and teachers. Karen will be greatly missed and we wish her all the best as she transitions to a new stage of life."

[Mr. Kris Pachla](#) will succeed Karen as director.

The community is welcome to congratulate and celebrate with Karen at a Retirement Open House in her honor at the RMSC on Thursday, May 4, 2-5pm. The RMSC is located at C-1-130 Mackinac Hall on the GVSU Allendale campus. [Open House flier](#)

Regional NGSX Professional Learning Opportunities in 2017-2018

The GVSU Regional Math and Science Center is collaborating with intermediate school districts in Kent, Montcalm, and Ottawa counties to bring NGSX professional learning to teachers and administrators for the 2017-2018 school year.

The Next Generation Science Exemplar System for Professional Development, or NGSX 2.0*, is a discourse based Professional Learning environment designed to engage teachers with the practices and disciplinary core ideas in the National Research Council's Framework for K-12 Science Education, supporting teachers in the enactment of the Michigan Science Standards.

In this workshop series, teachers will:

- Engage and deeply examine the Science Practices of Modeling, Explanation, and Argumentation;
- Develop and utilize tools to improve classroom practice towards achieving the vision of the [Framework for K-12 Science Education](#);
- Experience a blended learning pathway designed to take participants beyond simply "learning about" 3D learning to an understanding of how support 3D learning in their own classrooms.

For information on sessions by county, contact:

- Kent ISD, Wendi Vogel, wendivogel@kentisd.org;
- Montcalm ISD, April Holman, aholman@central-montcalm.org
- Ottawa Area ISD, Michael Fine, mfine@oaisd.org

Or visit the [RMSC NGSX webpage](#). For more information about NGSX in general and other opportunities around the state contact Kathy Agee, 616.331.3031 or ageek@gvsu.edu.

* NGSX is a copyrighted program designed by Clark University, Tidemark Institute, & Northwestern University. For more information please visit, www.ngsx.org.

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Fall Science Update Conference - November 15 - Save the Date and Call for Presenters

The Regional Math and Science Center cordially invites you to attend Fall Science Update on Wednesday, November 15, 2017 on the Allendale campus. Take time to connect with colleagues and discover how to engage students in Science, Technology, Engineering, and Mathematics (STEM) learning.

This year's theme is "Incorporating STEM by Design."

Join our keynote speakers, Ebiri Nkugba and Rick Mushing, Kent ISD STEM Consultants, on how to teach the Michigan Science Standards using STEM principles in collaboration with area business partners to prepare our students for their futures.

[flier](#)

CONFERENCE OVERVIEW

- All day format 8:00 a.m. - 3:00 p.m.
- Russel H. Kirkhof Center, GVSU Allendale Campus - Free parking in lots H & K
- Multiple hour-long breakout sessions
- Lunch included
- Cost: \$45 per person, \$20 for undergraduate students, \$10 for undergraduate students without lunch

CALL FOR PRESENTERS

You are welcome to present a session on the theme, but it is not required. If you have a topic or expertise to offer, please join us in presenting at this year's conference by submitting your proposal by September 15, 2017. More information and online submission form may be found [here](#). Thank you!

 Fall Science Update - Save the Date

NCTM problem of the month: Solve It - Little Problems with Big Solution

BY ANNIE PERKINS AND PAMELA J. WELLS

Shapes and Sizes

Each problem asks you to create shapes that meet certain constraints and to compare the shapes you made.

1. Parallelograms

a. Create at least two parallelograms that meet the following constraints:

- The parallelogram is not a rectangle.
- The parallelogram has an area of 24 square centimeters.
- The base of the parallelogram is 6 centimeters.

b. Which of these parallelograms has the largest perimeter? Explain why that makes sense.

2. Triangles

a. Create at least three triangles that meet the following constraints:

- The triangle is scalene.
- The triangle has an area of 12 square centimeters.
- The base of the triangle is 4 centimeters.

b. Which of these triangles has the smallest perimeter? Explain why that makes sense.

3. Trapezoids

a. Create at least two noncongruent trapezoids that meet the following constraints:

- The trapezoid is isosceles.
- The trapezoid has a perimeter of 20 centimeters.

b. Which of these trapezoids has the largest area? Explain why that makes sense.

CCSSM: 5.G.B.3, 5.G.B.4, 6.G.A.1, 7.G.A.2, 8.G.B.7; SMP: 1, 2, 3, 5, 6, and 7

The solutions to this Solve It problem, online at <http://www.nctm.org/mtms>, are available to NCTM members only.

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Plan to Attend SCICON 2017

On Wednesday, May 17, join science educators at Kent ISD for a one day conference with multiple break-out sessions.

This year's theme is "Building Student Curiosity by Changing Classroom Practices" and the keynote speaker is Wendy Johnson. Wendy works on the Carbon Time curriculum development for CREATE for STEM, a national, life science curriculum.

For more information and registration, visit <http://kentisdscicon.weebly.com/>.

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Kent ISD Offers STEM Thinking: 100 Fun Lessons with littleBits

(COME PLAY WITH CIRCUITS)

Through generous grant funding from BOSCH as well as the Lake MI STEM Hub, Kent ISD has been enabled to develop a library of [littleBits](#) electronics learning tools. Attendees will *have fun* while experimenting with various circuits, sensors, apps, power sources, and tools to create solutions to modern day problems with these kits. Over 100 lessons for classroom use around design thinking, engineering, and core content standards will be shared. Come learn to use this amazing tool, and then use them in your classroom!

May 9, 2017 from 8:00 a.m. - 3:00 p.m.

Location: Kent ISD - Educational Service Center, Parking Lot #11- Cedar, 2930 Knapp Street NE, Grand Rapids, MI 49525.

Go to the [Kent ISD website](#) to register for this free workshop.

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sHaPe Health Professions Camp - Deadline to Register Approaching Soon!

sHaPe (Summer Health Activities and Professions Exploration) is a one-week day program introduction to the Health Professions for boys and girls currently in 7th and 8th grades.

Students in sHaPe have the opportunity to study anatomy, physiology, and personal health and fitness. They explore the professions of medical lab science, nursing, occupational therapy, physical therapy, physician assistant, public health, radiation therapy, sonography, sports medicine, and therapeutic recreation. Sessions are taught by Grand Valley State University faculty.

This hands-on camp includes activities such as exercising in fun ways, eating nutritious meals, collecting data in a laboratory setting, using modern medical equipment, understanding different types of therapies for various injuries and disabilities, and experiencing a field trip to Mercy Health - Saint Mary's Hospital.

Sessions will be held at the GVSU Cook-DeVos Center for Health Services in downtown Grand Rapids July 17-20, 2017. Participants must be between the ages of 12-15 and currently in 7th or 8th grade. Preference will be given to students living in the Grand Rapids Public School district.

sHaPe camp is FREE and lunch is provided each day. Transportation is available based on need.

For more information, including the brochure and registration form, visit www.gvsu.edu/shape. **Applications are due April 28.** For questions on the camp, please contact the RMSC at (616) 331-2267 or Kathy Agee at ageek@gvsu.edu.

 sHaPe Camp 2015

 sHaPe Camp

 sHaPe Camp