Spring 2016 Math Circle

1. A Note to Parents

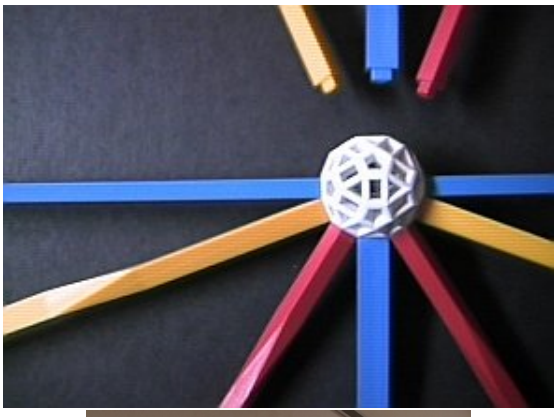
Thank you for participating in the Spring 2016 Shippensburg Area Math Circle. This was our biggest Math Circle yet with more than 20 kids registered! We really liked seeing students collaborating and working together alongside our Shippensburg University student volunteers. We really hope this was a positive experience for your child.

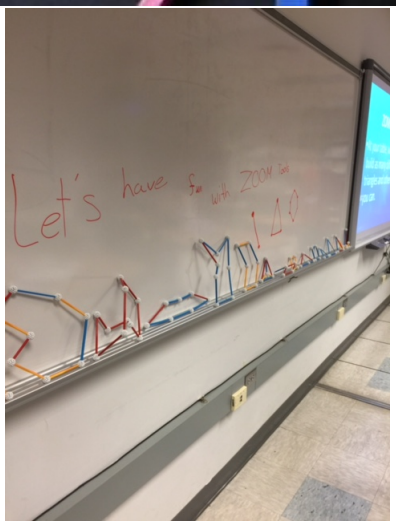
We will continue to build the Shippensburg Area Math Circle. We hope we can count on you to help spread the word on our future sessions. For more information about the Shippensburg Area Math Circle visit us at `http://webspace.ship.edu/lebryant/mathcircle`

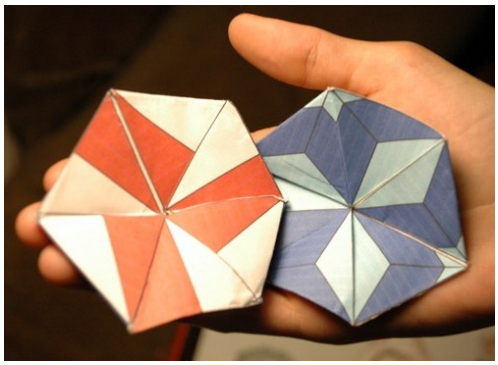
Below we include some notes about the activities we did along with some links to learn more.

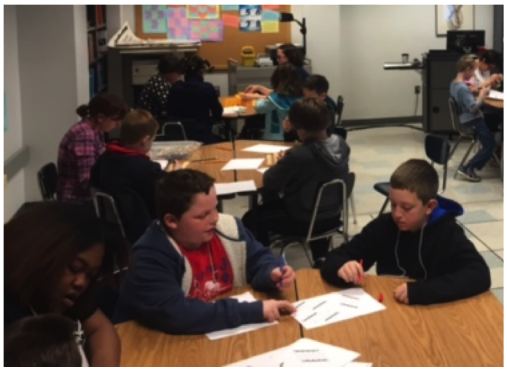
2. Activities

ZomeTools ZomeTool is a shape-building system that is highly adaptable and engaging. After making shapes of their own design, the SAMC kids built examples of polygons, skew polygons, and learned about the regular polygons. Using all sorts of creative approaches, the kids found the measures of the interior angles of all possible regular polygons up to 10 sides (the decagon). We then turned our attention to building regular polygons with the ZomeTool system. Along the way, people were building prisms and pyramids and other shapes. If you are interested in learning more about the powerful learning tool, check out the website `http://www.zometool.com`. These sets can be used to build models of molecules, bridges, and many geometric shapes. ZomeTools are sturdy and reusable, but if you just want to explore the concepts you could use a variety of other materials including toothpicks and marshmallows (yum)!









Hexagons Hexagons are one of nature's coolest shapes- ask any bee! One thing that makes hexagons special is their ability to tile a plane, covering any surface efficiently. Hexagons are also very strong, as we found when we "built" a beehive out of hexagonal prisms. We also saw a way to make a regular hexagon using only a compass and straightedge (though many of us were rusty on our compass skills- including me). Many of the activities we did this day were based on the mathematical writings of Martin Gardener, a famous popularizer of recreational mathematics. The Trihexaflexagon and the Game of Hex are both topics he covered in his career. In the 1950s, Gardener said of the game "Hex may well become one of the most widely played and thoughtfully analyzed new mathematical games of the century." And it's true that Hex has captured the interest of mathematicians for years! Try playing a game and see if you can win (for a printable board go to `http://www.hexboard.com/prints.htm`).

Pancake Flipping We were very fortunate to have Dr. Katie Haymaker, Assistant Professor of Mathematics at Villanova University, as a guest for this topic. We know Dr. Haymaker through the National Association of Math Circles Mentoring and Partnership Program. If you have ever had a delicious breakfast of pancakes, you know that it's nice to have them arranged from largest on the bottom to smallest on top. But what if they don't start out that way and the only tool you have is a spatula to make flips? What a delicious problem- with cool mathematical applications, including to the field of DNA analysis. If you want to learn more, read the paper by Dr. Haymaker (starts on page 16): `http://www.mathteacherscircle.org/assets/legacy/newsletter/MTCircularWS2016.pdf`

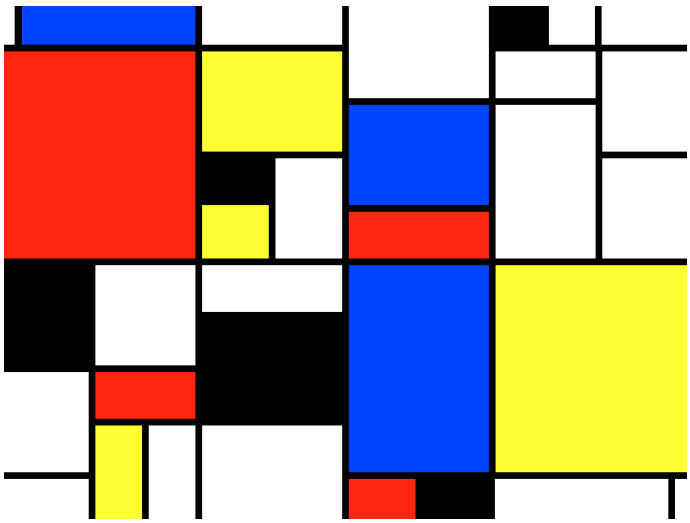
FIGURE 1. Can he read your mind?

FIGURE 2. The power of 37

MatheMAGIC Sometimes math can be so mysterious it seems like MAGIC. By noticing some patterns, we were able to impress and amaze with our ability to multiple double digit numbers (as long as our pal 37 was involved). We could also form Fibonacci sequences and then add up the first ten terms in no time at all. And that magic gopher? Well, he is cute but it turns out he's not magical at all. If you want to retry the Magic Gopher mind reading, go to `http://www.learnenglish.org.uk/games/magic-gopher-central.swf` and see if you can explain how he always knows the symbol. Thanks to math4love for the notes for portions of this topic `http://mathforlove.com/lesson/the-power-of-37/`

Math and Mondrian Mondrian's paintings are famous for their bold colors and use of lines to divide up the space on the canvas. Posing as evil bosses, we impose new rules on Mondrian and try to find the "cheapest" art possible. Along the way we are thinking about topics like area, perimeter, optimization, and map coloring. Complete notes are included at `http://mathpickle.com/wp-content/uploads/2015/08/Mondrian-Art-Puzzles.pdf`

Please be like Dr. Pickle and do not give out answers! A puzzle is only a puzzle if we are working towards our own solution.



3. Some Recommendations

There are *many* games and books out there that promote mathematical and logical thinking. Here are a few of our favorites. Tell us about yours and we can add them to the list!