

Fall 2016 Math Circle

1. A NOTE TO PARENTS

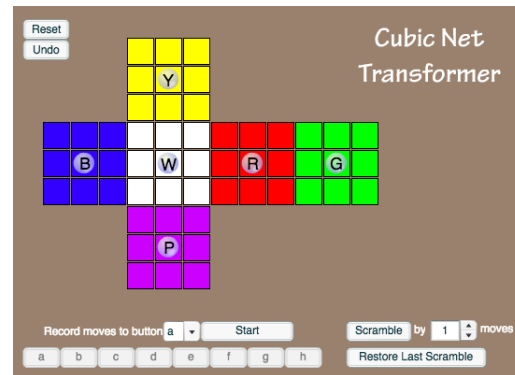
Thank you for participating in the Fall 2016 Shippensburg Area Math Circle. This was the start of our third year of Math Circle and we were thrilled to have 14 students registered and regularly attending Saturday morning math sessions. We really liked seeing students collaborating and working together alongside our Shippensburg University student leaders (Josue, Brad, and Drew). 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://webpace.ship.edu/lebryant/mathcircle>

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

2. ACTIVITIES

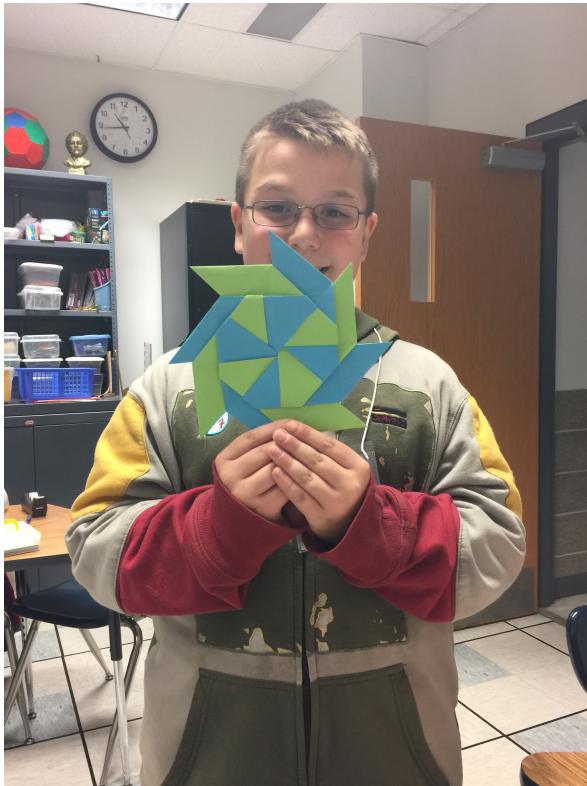
Nets: How Shapes Unfold In our first session of the Fall 2016 Math Circle, we improved our 3D visualization skills. By exploring the ways that a 3D shape's surface could be unfolded, we found that some shapes have many different 2D representations. See if you can remember how many ways there are to unfold a basic cube (hint: It's more than 5). In addition to matching shapes with their nets, we learned that not every shape has been proven to have a net (this remains an open problem in mathematics). For fun, we even unfolded a Rubik's cube and saw how the moves would change its net. Try to play this unfolded Rubik's cube again at this link: <https://nrich.maths.org/5802>.



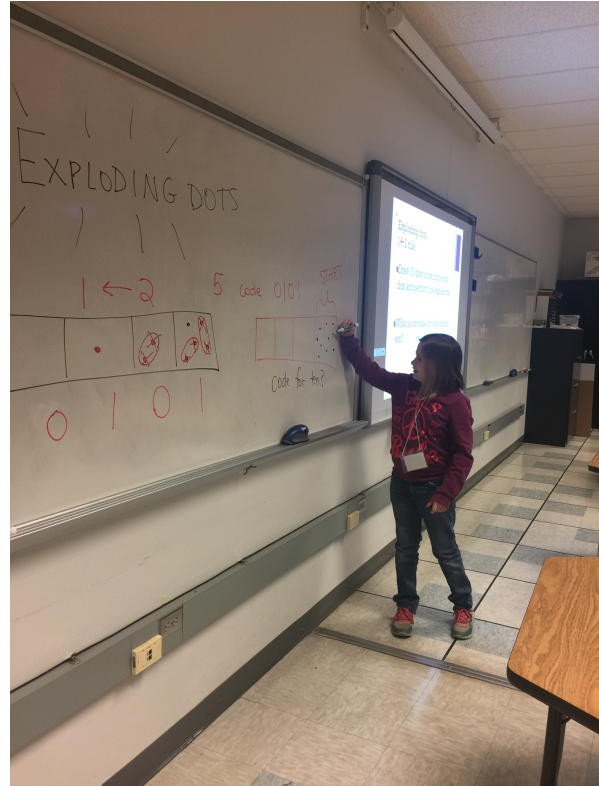


Math & Origami There are many beautiful shapes that can be made simply by folding paper. In groups, we covered three types of shape creations: modular origami, transforming origami, and paper cutting (kirigami). We are also sending him the instructions for these origami activities, see if you can recreate the shapes we made.

We also watched a video explaining some of the deep mathematical connections to origami. It turns out that origami is not just about making things that are beautiful, but also making things that are practical, and even life-saving. See the TedTalk video featuring Robert Lang, a physicist who is also one of the foremost origami theorists in the world: https://www.ted.com/talks/robert_lang_folds_way_new_origami).



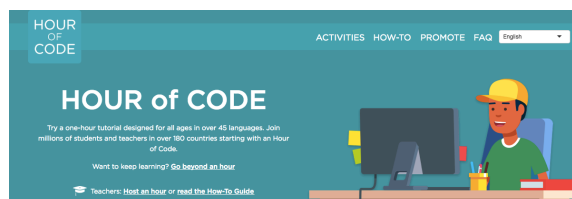
Exploding Dots Exploding dots is a lot safer than it sounds. In this topic, the main idea is really about changing bases. In our every day world, we think in base 10. After all, look at our hands...it's pretty natural for us to count things in groups of ten. However, computers don't have fingers and they think in terms of 0's and 1's. We learned that in a $1 \leftarrow 2$ machine, dots explode and let us change any number into a code number using only 0's and 1's. We used some of the shortcuts that this method revealed to do quick multiplication, too. There are many more activities and ways of playing with exploding dots at mathematician James Tanton's website: <http://gdaymath.com/courses/exploding-dots/>



Codes & Scavenger Hunt In our last session of Fall 2016, we got a sneak peek at a topic we will explore more in the spring-mathematical codes. We learned a little but about the Caesar Cipher and the Pigpen (or Masonic) Cipher. We also a reviewed the topics from the previous sessions in order to collect a prize!

3. SOME RECOMMENDATIONS

Math Kangaroo & Hour of Code Is your child interested in mathematical competitions or coding? Then we highly recommend checking out the international math competition “Math Kangaroo” for students in grades K-12. The website has lots of information, including registration instructions and testing sites. Registration ends December 15, and the competition is March 16, 2017. <http://mathkangaroo.org/mk/default.html> We also think your child might enjoy an Hour of Code, a computer science activity where students try one hour of computer coding, using one of the online tutorials at the following website <https://code.org/student> In our experience, after one hour your child will be excited to keep on going!



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!

