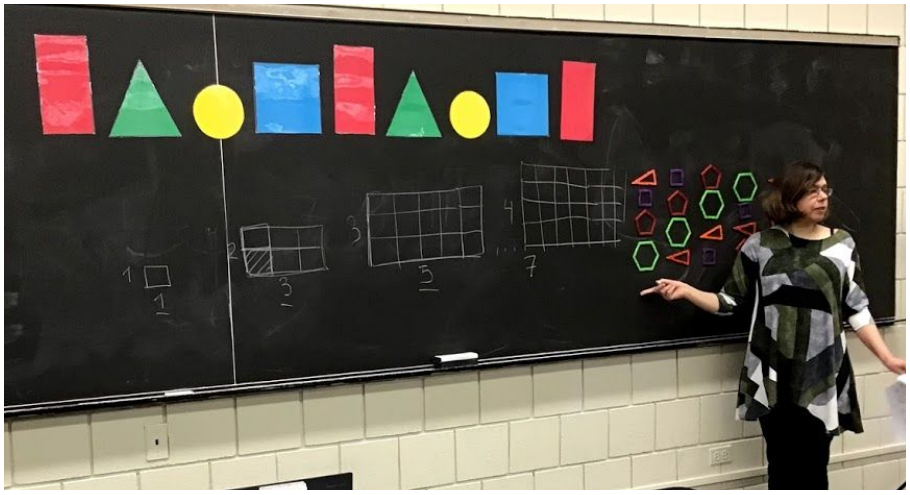
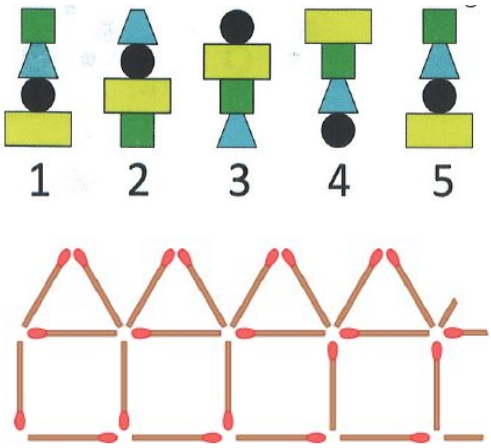
Math Club 1. Lesson # 13 **January 13, 2019**

Rings and chains.

Patterns. We started our lesson with set of problems related to patterns. One of the most useful strategies in math is problem solving by finding a pattern. Searching for visual patterns can be as simple as identifying the change from one item in a sequence to the next. We looked at problems that includes number patterns, changes in color and shapes, rotation, and more. You can find problems we worked on here.





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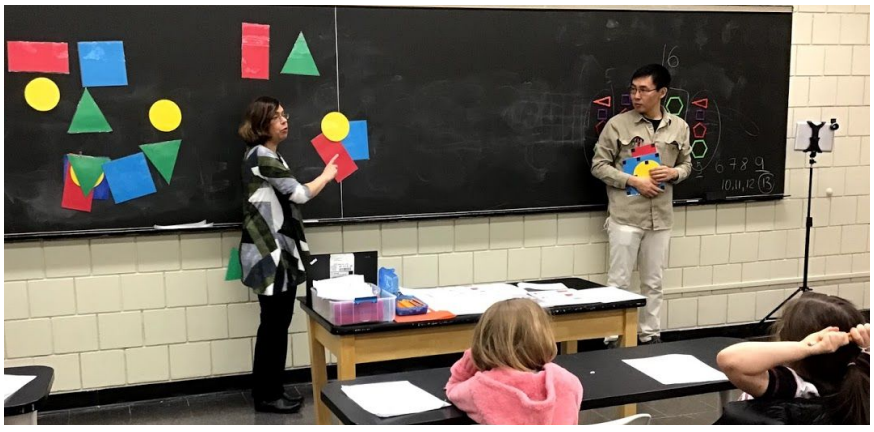
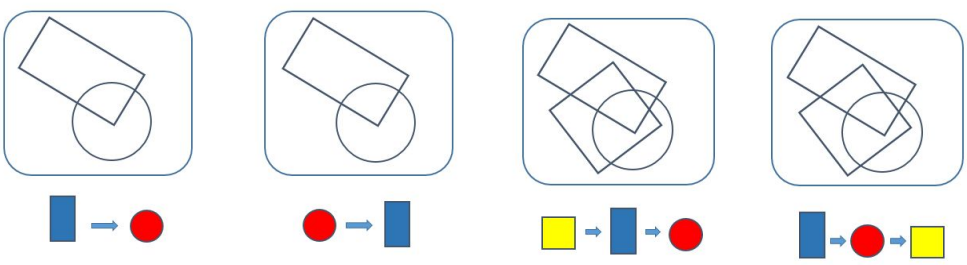
Objects on top of each other: first - see it. Let us play the game: close your eyes and we will put 3-4 geometrical shapes on top of each other. Now you can open your eyes. Can you tell us which object we put first? Second? Last? If we can see the full shape what does it mean?

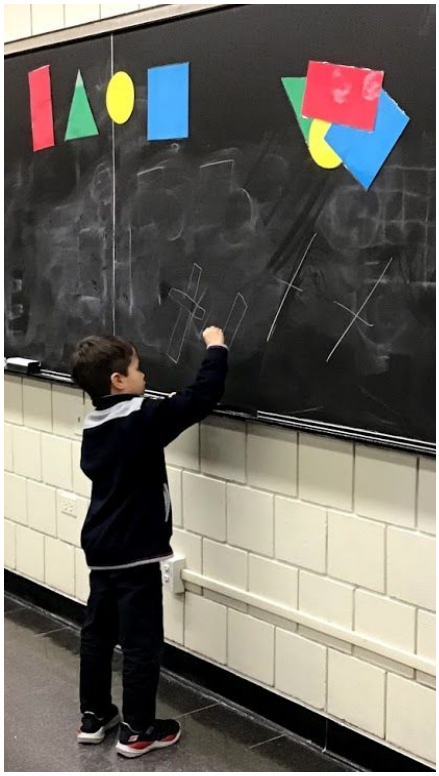


Objects on top of each other: second - color it. Now we know how it will look like. Can we color the picture using the scheme that shows us in what order we put shapes?



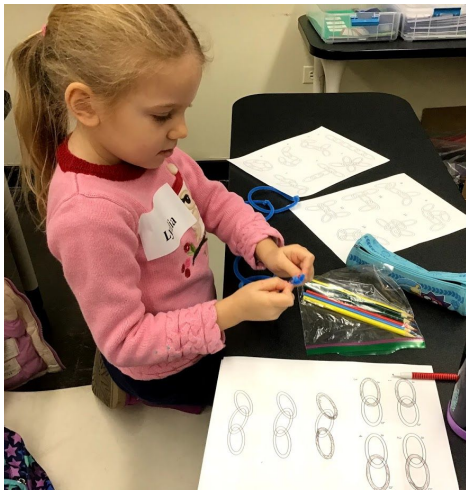
Objects on top of each other: third - draw it.

If we want to show 2 sticks - long and short, that are crossing, one on top of each other, how do we draw? Let us now play with rings and chains.



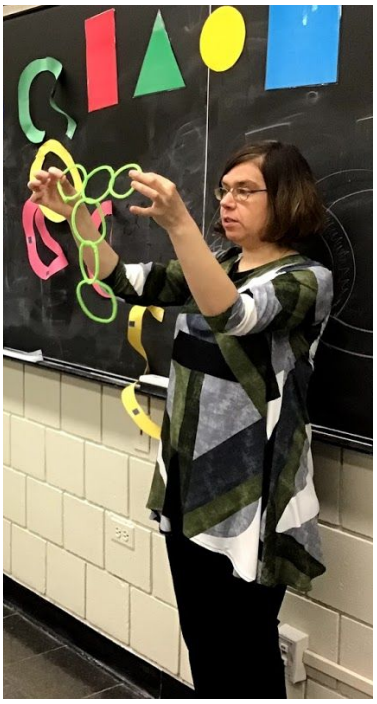
Rings on top of each other and connected

- Let's draw 2 overlapping rings, and color then as sitting on top of each other
- Let us now color them to be linked together
- How about 3 rings that are chained into a link? Or 3 rings that are not linked, just sitting on top of each other?


Problems on disconnecting and connecting chains Let us take a chain of 3 links. How many links do I need to break to disconnect the entire chain into 3 individual links? 2 - by breaking the leftmost and rightmost links? That works! But is there a "better" solution? What if we break just one link - the middle one? Does the chain break into separate links? If I have a chain of 7 links, by breaking how

many links can I turn it into 5 separate pieces? If we break the 1st and last links, we only get 3 separate pieces. Can we do better? What if we break the 2nd as well as 2nd last links? We then get



- 1st link alone
- 2nd broken link alone
- Links 3 through 5 together in one piece
- 6th (2nd last) broken link alone
- 7th, last link alone

Constructing connected rings

Let us now see if any of the chains we see are actually the same thing.

Is chain 1 the same as chain 2? No, chain 1 is a simple stretch of 6 links, and chain 2 has a more interesting shape.

How about chains 2 and 5, are they the same? Let's make them out of our fuzzy stick pipe-cleaners and compare by turning round playing with it. They both look like a chain of 5 links, with the 6th link connected to the 2nd link in the long chain.