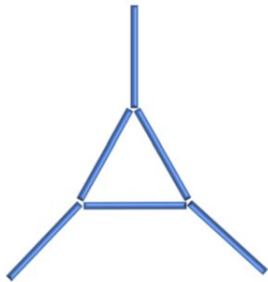


Math Club 2. Lesson 1

Are you good at giving directions?

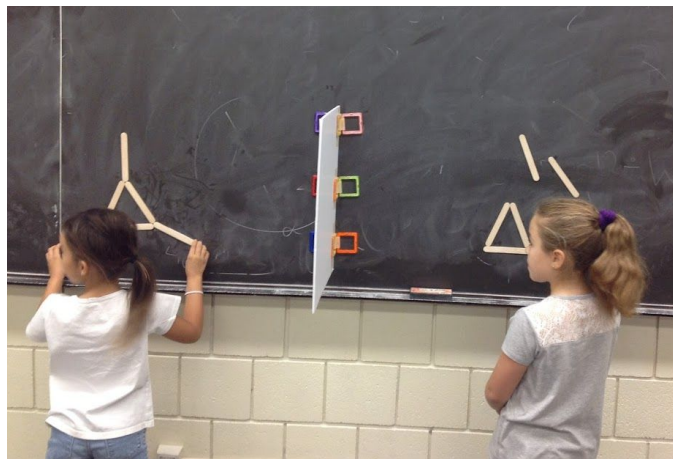
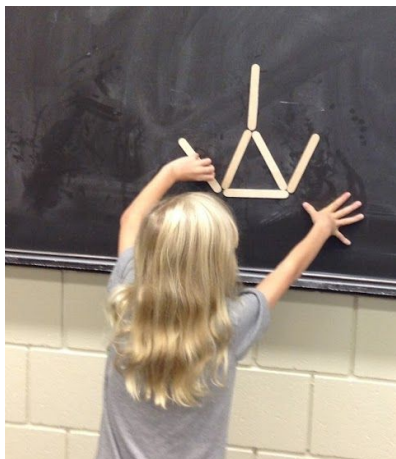
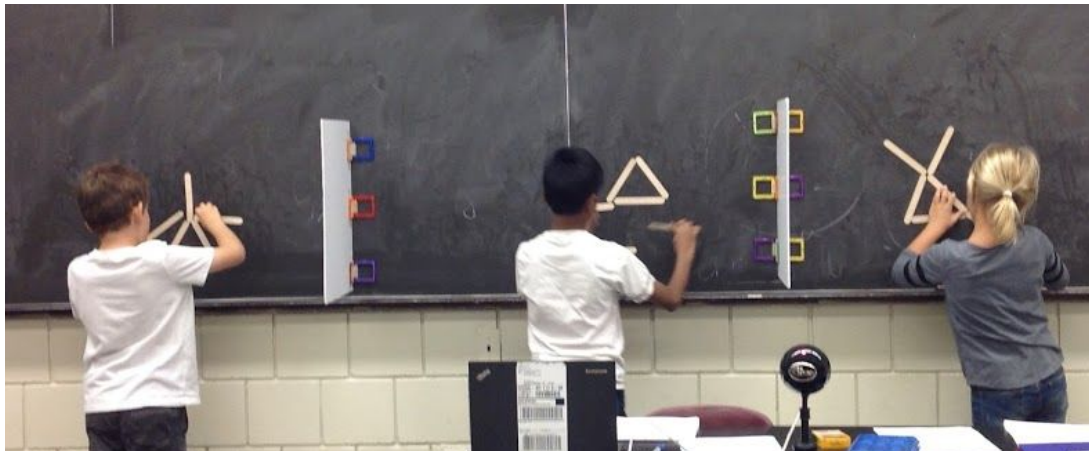
Today we will learn how to give **directions to someone**. Using a simple picture we will try to build the same figure using wooden sticks. Simple? Yes. But what if you are not looking at the picture, and instead someone is giving you the verbal directions to reconstruct the figure? The person giving instructions is not allowed to view and comment on how you are building until you are done.

1. First example: can you give directions to build this figure.



How should we describe this figure to another person?

- As a triangle with a stick pointing away from each corner?
- As 3 letter Y's joined together?
- As the 3-sided star?
- An Eiffel tower?
- Or in some other way?

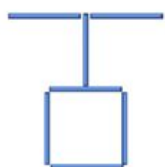


2. Our new vocabulary for describing shapes.

So to do a good job of instructing and building, we should first learn some “*new vocabulary*” to give directions that others can understand easily:

- making simplest shapes: a single stick,
 - 2 sticks - make 1 long stick, plus sign; 2 sticks - make a corner; 2 sticks - make a letter T
 - parts of shapes: top, bottom, left, right, center, middle
 - shapes using more sticks: triangle, square, rectangle (2-sticks long and 1-stick high OR 1-stick long and 2-stick high), 3,4,5 - sided star, pentagon
 - using letters as shapes: N, M, Z, Y, H, K, L - a corner, W, E, A, V - a corner, X – a plus sign
- Orientations of shapes:
- straight/flat/from left to right, tilted (left side tilted down), upright
 - corners and triangles can be pointing in a direction
 - a shape can be joined to another/extended at tips, corners, middle, middle or any combination of these

3. Now Anar will give us instructions and we can build the shape on his card:



- First, build a letter T that consists of 3 sticks: 1 stick pointing down and 2 sticks that form a 2-sticks-long top part of letter T.
- Next, build a square out of 4 sticks and connect it to the bottom of the letter T.
- Let's now connect the square to letter T by joining middle of the top side of square to bottom of letter T.



- This figure needs 5 sticks
- Let's make a triangle that is pointing downward out of 3 sticks
- Now let us make an upside-down letter T out of 2 sticks
- Let's take our letter T and attach it to the bottom of the triangle.



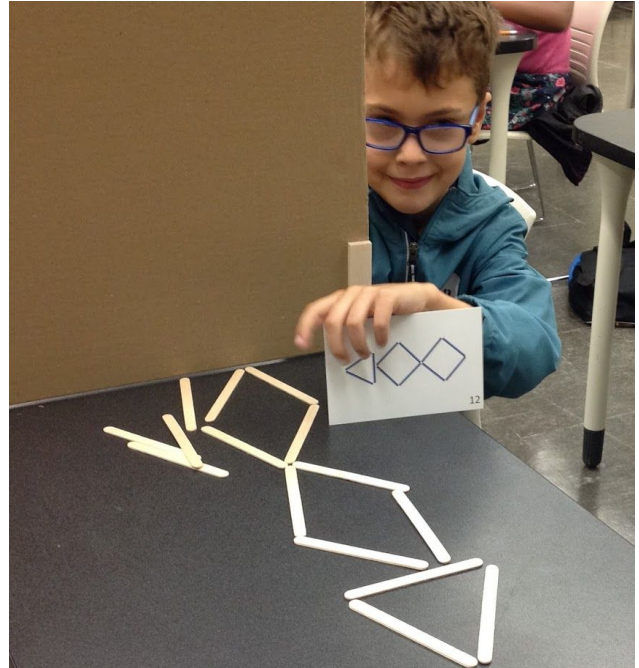
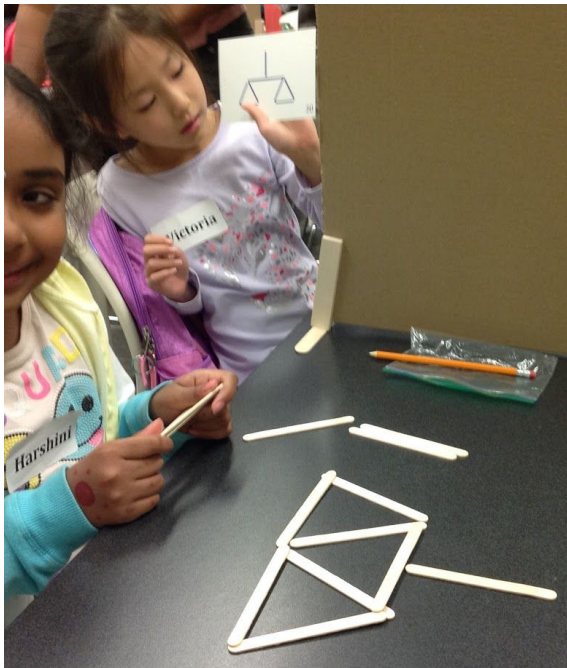
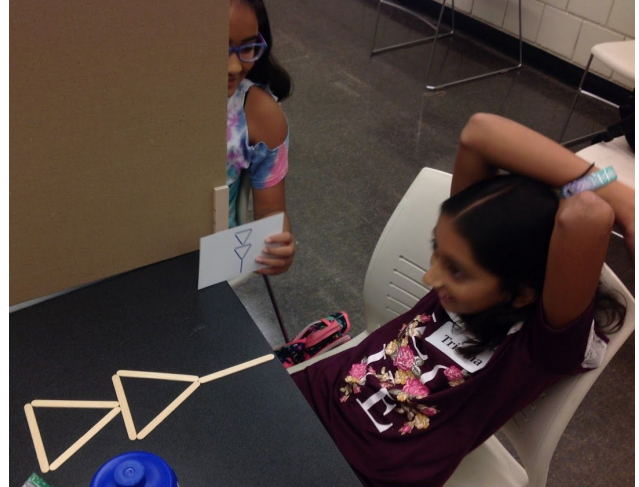
- This figure also involves 5 sticks.
- Let's first make a letter W out of 4 sticks.
- Now let's take the last stick and add it to the W to make a triangle in the middle of it.



4. It seems we are ready now for a real challenge!

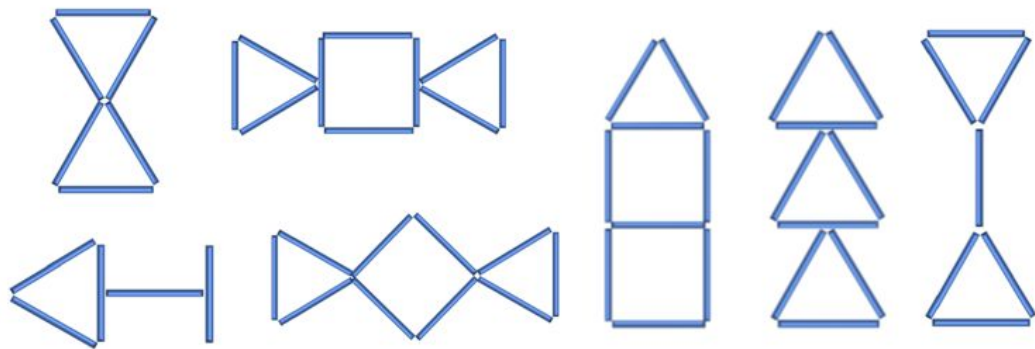
We will need cardboard dividers between 2 students sitting next to each other, cards with figures and plenty of wooden sticks. We will work in pairs: one student describing the picture to his friend, and the friend building based on his description.

- If you're building, make sure you don't peek at the card with the figure!
- And if you're describing, make sure you don't peek at how your friend is building!

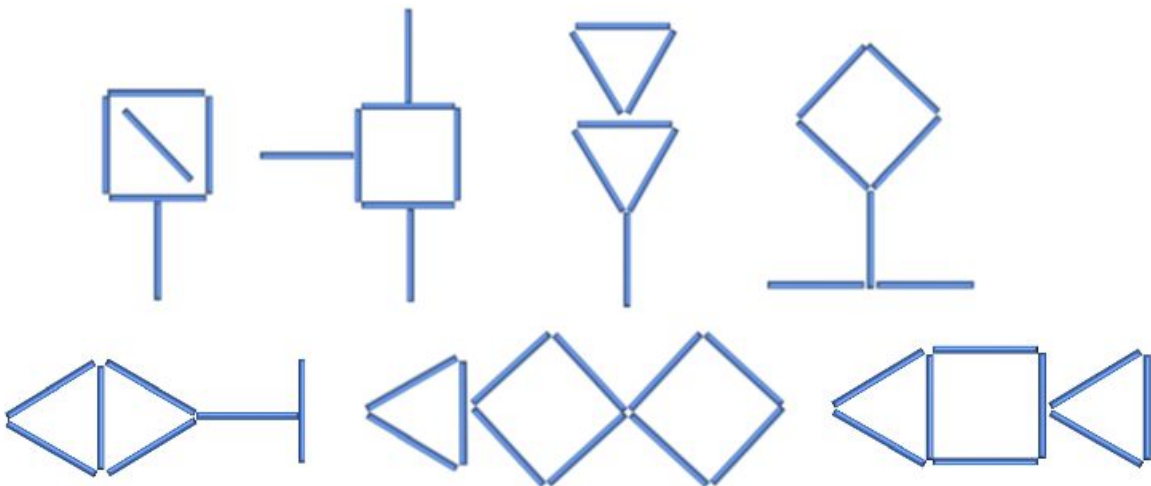


Some figures to describe to each other:

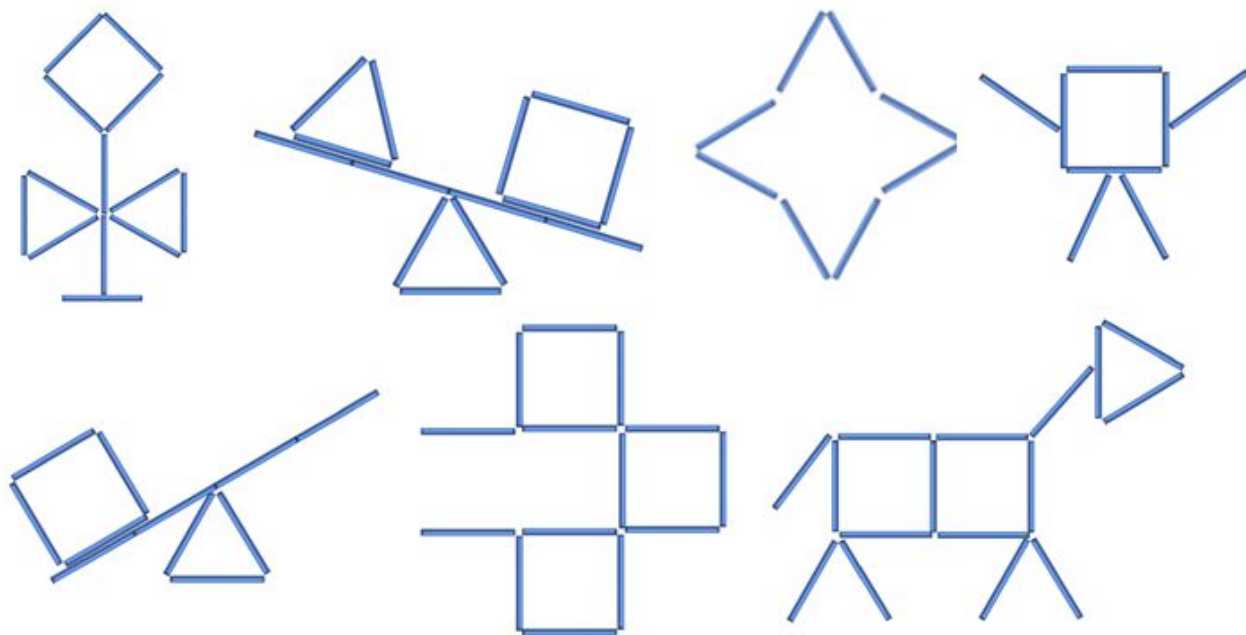
Level 1.



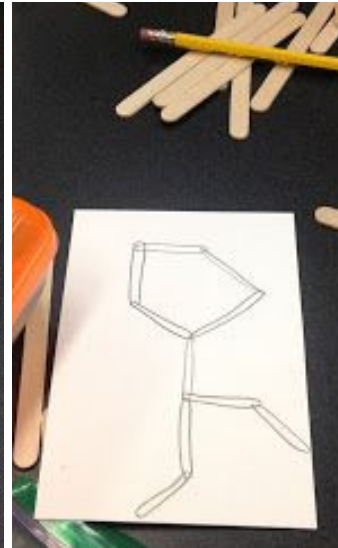
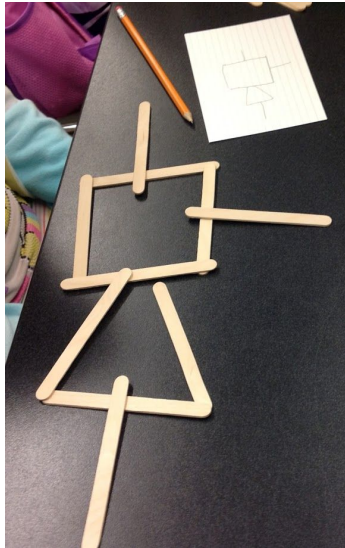
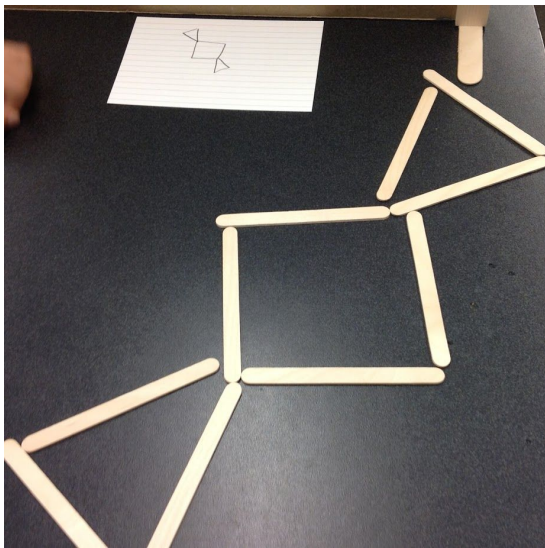
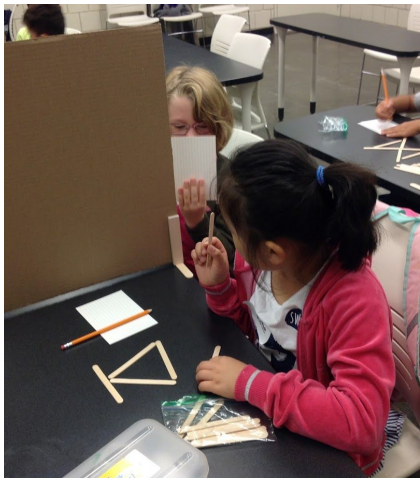
Level 2:



Level 3.



5. Now, let us think about our own figure, draw it and then give the partner directions how to build it!



6. Next challenge: Draw your own figure and give the directions to build it to the whole class!



7. Now at 3D!

- How can we take 10 identical small cubes and make 3 cubes out of them? Is it even possible?
- Now that we have a cube made out of 8 cubes and 2 separate “single” cubes, can you make “a house with chimney” out of them? Maybe just put the 2 small cubes on top of the large cube?
- Can anyone quickly make an uppercase letter L out of 3 cubes? Easy?
- How about a tower of 2 cubes?
- Can you now make a doorway out of your letter L and tower of 2 cubes? Very good!
- Can everyone make 2 separate doorways out of their 10 cubes?
- Using your 2 separate doorways, can you guys make any alphabetical letters?
 - Letter O is easy,
 - Letter H also works,
 - Can someone make the 1st letter of English alphabet?
 - Is there a way to make a letter C, but using both “doorways”? What if we “stack” them and get one very thick letter C?
- Can you guys give me a letter W, but only using 5 cubes this time? A bit hard?
- Now that you have letter W, is making a letter M easy?
- Using only 4 cubes, let’s make a “3-way joint” that looks like a corner of a cube?
- What if you stack 2 of these together? Something that looks like a Teddy bear?



See you next Sunday!