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Art of Patterns

Grades 6-8

Introduction

We talk about how mathematics is a creative open subject so this activity is an opportunity to connect some artwork with mathematics. Contemporary artist Sol LeWitt used lines, squares, and cubes to create wall drawings and three-dimensional structures.

Video

https://youcubed.org/weeks/week-3-grade-6-8/

Agenda for the activity

Activity	Time	Description	Materials
Mindset Message	5 min	Play the mindset video, ***Believe in Yourself***, *https://youcubed.org/weeks/week-3-grade-6-8/*	• Mindset Video day 4, ***Believe in Yourself***
Art and Math (Optional)	5-10 min	Introduction to artist, Sol LeWitt	
Explore Structure 12 x 23 x 12	45-60 min	1. Investigate case 3: • What does it look like? • How many Dots (connectors) do you need to model case 3? 2. Share findings from the challenge	• Art of Patterns Handout • Toothpicks • Marshmallows or Dots (gummy candy) • Graph or grid paper • Colored pencils • Multi-link cubes
Debrief Mindset Message	5 min	Ask students to reflect on the importance of believing in themselves. Ask for some volunteers to share a time when they believed in themselves during the activity or a time when they surprised themselves in what they could do during the activity!	Math Journal (optional)

Activity

Mathematics is all about patterns and connections. This activity makes space for students to explore multiple patterns and make connections in one art structure.

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You might start the activity with a short introduction about the artist, Sol LeWitt. Taking time to do this allows students to learn something about the artist and how he thought about the pieces he created. You might use the paragraph below:

> Starting from the simple but radical new idea that an artwork's concept is more important than its form, Sol LeWitt helped revolutionize the definition of art in the 1960s. Using straightforward lines, squares, and cubes as his building blocks, he created intellectually rigorous works of art that are often both visually surprising and stunningly beautiful. He invested much of his creativity in devising systems of variation and serialization that activate simple geometric forms and draw attention to their physical substance and their visual effects. Over the course of his career he made photographs, prints, artist's books, furniture, drawings, and sculptural works he called "structures". For LeWitt, each medium offered a distinct set of opportunities to set a concept in motion and let it run its course. LeWitt separated conception from execution, arguing that an idea alone can constitute a work of art.

For more information about the artist, Sol LeWitt you might explore the following articles:

http://www.theartstory.org/artist-lewitt-sol.htm
http://bombmagazine.org/article/2583/sol-lewitt
https://www.moma.org/learn/moma_learning/themes/conceptual-art/sol-lewitt-and-instruction-based-art (includes an activity with a set of LeWitt's instructions from 1971)

Set the students up to work in groups. You might project an image of the structure for the class to see and let them know they will be working with this art structure to solve some problems. Share with them that the first question they will explore is, If this was case 12 of a pattern, what does case 3 look like? You might give students some time to think about this individually in their math journals while you distribute the Art of Patterns Handout. We suggest giving each group two copies of the handout and asking students to record as they need to using their math journals.

Let students know about the materials available to them to explore the question about what case 3 would look like. You might organize materials on a supply table in the room so that groups can choose the materials they want to use to help them build and visualize case 3. Some materials you might want to have on the supply table are toothpicks, marshmallows or Dots (gummy candy), graph paper, colored pencils, multi-link cubes, etc.

Once students have had some time to think, invite them to share their way of seeing case 3 as a way of coming together and beginning to answer the questions. While groups start listen for who gets to talk and encourage all groups to just start with sharing so that each person in the group gets to describe how they see case 3.

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Encourage groups to make use of the materials. Share messages with them about how building case three will help them better understand the construction of the structure and open up different ways of seeing the structure and its many patterns. You might also say something about how building the structure is a way to really embody its construction and we want to make those connections between how it's built and the patterns we see.

As groups are working, something that might come up is what do they consider lines, squares, or cubes. You might want to decide that when talking about lines, squares, and cubes you are talking about the unit line, unit square, and unit cube. Another idea is to leave this ambiguous and let groups decide. This could lead to an interesting conversation later because the class will likely generate multiple answers. Then the class will have to wrestle with multiple answers and decide if it is okay to have different answers or something they should agree on.

Bring the class together to share their findings. You might start by collecting all of the different answers people got for the number of Dots (connectors) needed to model case 3. Ask for volunteers to share a justification for the number of Dots in case 3. Just like in a number talk, hopefully there is more than one answer which will lead to deeper mathematics because discussing mistakes is so powerful. Encourage students to share their pictures, diagrams, and toothpick structures of case 3 when they are explaining how they got the number of Dots. Have students continue the conversation until everyone is convinced about the number of Dots needed to model case three.

Ask students to reflect on the importance of believing in themselves. Ask for some volunteers to share a time when they believed in themselves during the activity or a time when they surprised themselves in what they could do during the activity!

Extension

- What would case 43 look like? How many toothpicks would you need to model case 43?
- Design your own structure and write building directions. Give it to someone else to see if they can recreate your structure.

Materials

- Toothpicks
- Marshmallows or Dots (gummy candy)
- Graph or grid paper
- Colored pencils
- Multi-link cubes

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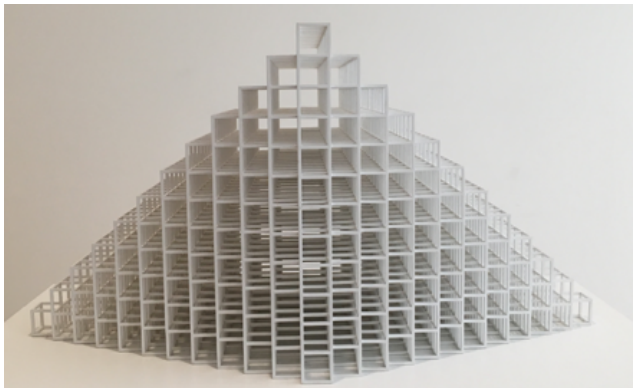
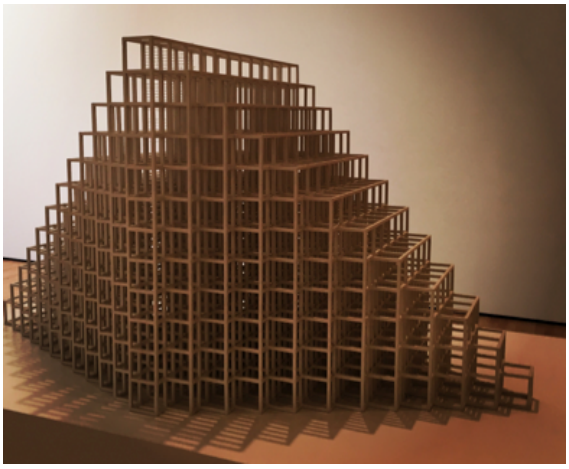
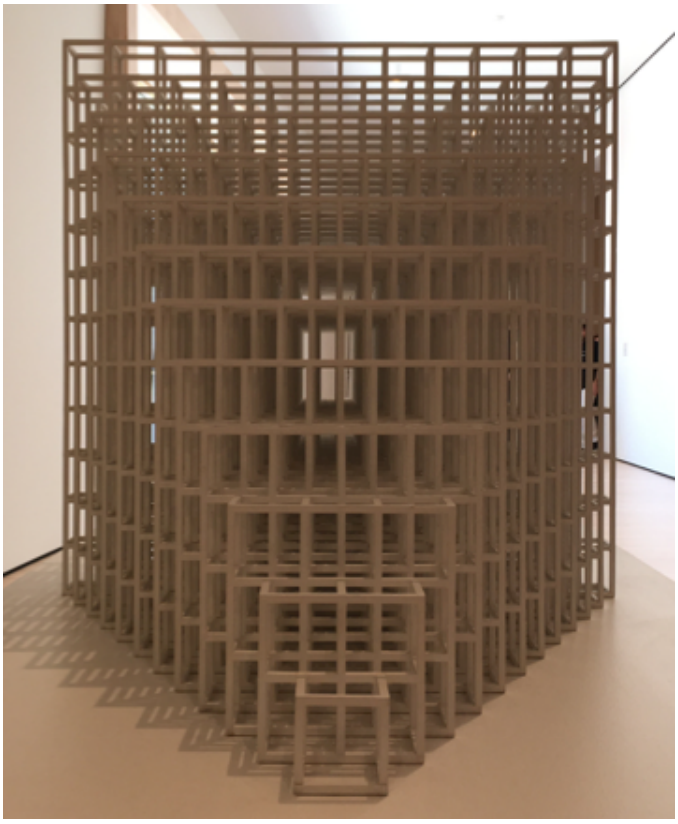
Art of Patterns
Handouts

"When artists make art, they shouldn't question whether it is permissible to do one thing or another."
– Sol LeWitt

Here is one of Sol LeWitt's structures, 12 x 23 x 12, 1996, Wood and paint:







Challenge

- If this was case 12 of a pattern, what does case 3 look like?
- If you modeled case 3 using toothpicks and Dots as connectors, how many Dots would you need? What about for any case of the structure?
- What are the instructions LeWitt could have left for someone else to build a structure like this of any size?

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