



## Grades 6-12: Mathematica *Beyond Numbers!*

### Continuum Activities

Math is not just defined by numbers. It also involves patterns and relationships. Math is also considered the “mother of all sciences” and is heavily used in physics, chemistry and biology. Students will learn hands-on the importance of math with an assortment of activities dealing with topology, probability, and chirality just to name a few. Students will also get the opportunity to design their own game show involving math as a post-project.

### Chirality Activity (Pre – Activity #1)

Students will learn how to identify items that are considered chiral (when an object differs from its mirror image).

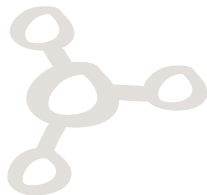
**Time:** 30-35 minutes

#### *Materials*

- Activity worksheet
- Pen or pencil
- Screw
- Glove
- Sock
- Ball (no writing)
- Picture of number ‘8’
- Picture of letter ‘H’
- Mirror

#### *Procedure*

1. Describe what chirality is. Have students work on Question 1 on the worksheet.
2. Discuss answers.
3. Work on Question 2. (Design a picture of something that will display chirality, test by using mirror, describe everyday uses of chirality.) (10 minutes.)
4. Have students present on question 2.
5. Make sure to bring the worksheet on the day of the virtual visit.





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Name

\_\_\_\_\_

Date



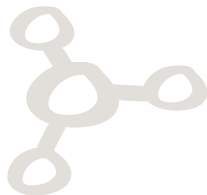
### Chirality Activity

To test whether an object displays chirality, one must look at the objects' mirror image and follow these simple rules:

- *If the object is identical to its mirror image than it is **not** considered chiral.*
- *If the object is not identical to its mirror image than it **is** considered chiral.*

### Activity

1. Below is a list of standard items that may or may not be considered chiral. With the help of your mirror, test to see whether or not the item is considered chiral. Place a "C" next to it if it is chiral and place an "N" next to it if it is not chiral.



- A glove
- A screw
- A sock
- A pen
- A ball (without writing)
- The number 8
- The letter H
- Your left hand

2. Once you are finished identifying the previous items, flip the paper over and design your own picture of something that would display chirality. The next step is to place a straight line next to your picture and draw the mirror image of your picture (You can use the mirror to test your design). Underneath your picture, come up with how we can use chirality in our everyday life.





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### Quick Design (Pre – Activity #2)

Students will design only one side of the strip of paper. (This will prepare students for the Mobius Strip activity.)

**Time:** 10 minutes

#### *Materials*

- Strip of paper approximately 1 by 11 inches.
- Crayons or Markers

### Professions in Math Worksheet (Pre – Activity #3)

Students learn that math is important in our everyday lives by actually making the connection to different professions that they may even aspire to become.

**Time:** 40-45 minutes

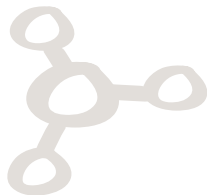
#### *Materials*

- Activity worksheet
- Pen or pencil

#### *What To Do*

1. Have the students sit at their seats and work on the first two parts of the worksheet. (Time allotted is 20-25 minutes or completed as homework).
2. After the first two questions are completed, have the student's pair up and work on question number 3 (Time allotted 10 minutes.)
3. Once the entire class is ready, have the pairs go to the front of the class and present each other's answers to question number 2. (Time allotted 10 minutes.)

*\* Have the students bring in their worksheet with their answers on the day of the Virtual Visit.*





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Name

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Date

### Professions Dealing with Math

1. Mathematics is integral in our everyday lives and essential for most types of work. Below is a list of different jobs that require knowledge of different topics in math. Write a description on how or why these professions use math.

- Pharmacist

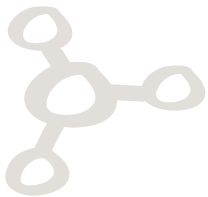
- Dietitian/ Nutritionist

- Plumber

- Chemist

- Roofer

- Fashion Designer





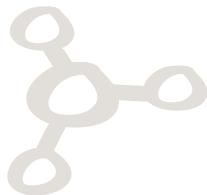
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- Construction



- Electrician

- Psychologist



- Lawyer

2. Once you finished the above task, take a few minutes to dream about what you might do for a living when you are an adult. Write a paragraph on how math will be used in your dream job.



3. Once you are finished, team up with a partner and talk about your paragraph and how it relates to mathematics. Once the two of you discuss your “dream job” scenarios you will present each other’s ideas to the class and listen to your classmates.





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### Mathematica Project Plan (Post – Activity)

Students will create their own game show using probability.

**Time:** (1) 45-minute session

#### Materials

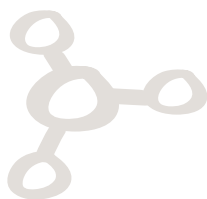
- Dependent on students needs, items should be approved by teacher. The school should supply items unless the student wishes to use his or her own personal items.
- Arts and crafts materials

#### Preparation/ Set up

- Students should be set up into cooperative learning groups. (Three to five students per group)
- When ready to present for the second Virtual Visit connection, it is recommended that the groups be already put in the order they wish to go.

#### Procedure

1. Open the discussion with game shows. What do The Price is Right and Deal or No Deal have in common? Probability. These shows use probability to make sure they stay in business. They often give contestants a low chance of winning. Discuss what was learned during the Virtual Visit.
2. The challenge is to design your own game show, creating three game elements. The games must involve probability. For example, you can create a spinner where the contestant needs to land on blue to win.
3. In one of your events, the contestant must have a low chance of winning.
4. There are some things to keep in mind:
  - How does each game work?
  - Describe how probability applies to each element in your game show?
  - What element creates a low chance of winning? Why?
5. Have each group take 15-20 minutes to brainstorm ideas for their game show as well as creating a composite materials list.
6. Once the materials list is approved, the students should begin formulating their show. All teams should have a backdrop with the name of their show. This should be created closer to the end to allow enough time for the creation of games.
7. When they have finished creating their game show and their three elements, have teams rehearse and prepare to show their game shows during the second Virtual Visit connection. They must show it in the form of a five-minute skit, where someone plays the host and the others play the contestants.
8. If possible, the students also have the opportunity to record an opener for their show or other media. (This will require extra time.) Send footage to [clawrence@nysci.org](mailto:clawrence@nysci.org), so we can broadcast for the students.





## Grades 6-12: Mathematica *Beyond Numbers!*

### National Standards

#### Pre-K–12

*NM-PROB.PK-12.1:* Build new mathematical knowledge through problem solving;

*NM-PROB.PK-12.2:* Solve problems that arise in mathematics and in other contexts;

*NM-PROB.PK-12.3:* Apply and adapt a variety of appropriate strategies to solve problems;

*NM-PROB.PK-12.4:* Monitor and reflect on the process of mathematical problem solving.

*NM-PROB.CONN.PK-12.1:* Recognize and use connections among mathematical ideas;

*NM-PROB.CONN.PK-12.2:* Understand how mathematical ideas interconnect and build on one another to produce a coherent whole;

*NM-PROB.CONN.PK-12.3:* Recognize and apply mathematics in contexts outside of mathematics.

*NM-PROB.COMM.PK-12.1:* Organize and consolidate their mathematical thinking through communication;

*NM-PROB.COMM.PK-12.2:* Communicate their mathematical thinking coherently and clearly to peers, teachers, and others;

*NM-PROB.COMM.PK-12.3:* Analyze and evaluate the mathematical thinking and strategies of others;

*NM-PROB.COMM.PK-12.4:* Use the language of mathematics to express mathematical ideas precisely.

#### Grades 6–12

- Formulate questions that can be addressed with data, and collect, organize and display relevant data to answer.
- Select and use appropriate statistical methods to analyze data.
- Apply transformations and use symmetry to analyze mathematical situations.
- Develop and evaluate inferences and predictions that are based on data.
- Understand and apply basic concepts of probability.

