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## WAYFINDER Scientific Inquiry

The following North Carolina State Science Standards are relevant to this Wayfinder:

<b>Grade 8</b>	<b>1.01, 1.02, 1.04, 1.05</b>
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### Introduction

Learning to follow the scientific method is important for new scientists. Without careful adherence to the steps of the scientific method, one can not do verifiable science. The more practice that students have, the better they will be able to understand science. This Wayfinder takes you to *Catch the Wind*, our outdoor exploration environment and challenges students to perform an experiment at our Seed Tower. Keep an eye out for other exhibits around the Museum that allow students to experiment and test variables as they explore.

### Before your visit

Conduct experiments and explorations in the classroom during which students follow the scientific method:

- Observe and describe the world around you
- Create an hypothesis based on your observations
- Use your hypothesis to make predictions
- Conduct a planned, controlled experiment
- Accept or reject your hypothesis after analyzing data

Review the steps of the scientific method to ensure students' understanding.

Review the meaning of the words: *independent variable*, *dependent variable* and *control*.

Review or discuss for the first time the three different methods of seed dispersal: air, water, animals. Discuss examples of seeds that use each method. For instance, some seeds are closely associated with fruit so they can be dispersed when animals eat and excrete them. Other seeds have hooks that latch on to fur. Water seeds are built to float and seeds that use air can glide, float or flutter as the wind blows. All of these seeds use different mechanisms to detach themselves from their parent plant so they have their own space to grow. Have students begin thinking about how a seed that uses air would be built to best use the wind to its advantage. Brainstorm a few ideas.

### During your visit

Visit the seed tower in *Catch the Wind*. Imagine that the tower is the parent plant to the seed that you will be creating.

*Observe and describe the world around you*

- 1) What method of seed dispersal does this "plant" (the orange tower) use? *Air*.
- 2) Look at the geometric shapes that can be tested at this exhibit (square, triangle,

etc.). Do any remind of you of other items (natural or manmade) that use the wind to get around?

- 3) Looking at the shapes provided at this station, think about how each one may fall and how far from the “parent plant” it may go.
- 4) Discuss as a group what questions you can ask and answer here at the seed tower.

*Create a hypothesis and make predictions*

- 1) Predict which geometric shape will fall most successfully. Make sure to think about what “successful” means to you.

*Conduct a controlled experiment*

- 1) If you wanted to conduct an experiment that asked which seed shape was most successful (based on how far away it lands) what steps might you take to find this out? *If you use the data sheet given, the experiment consists of dropping all geometric shapes, placing the red “seed pod” in approximately the same spot on each shape (e.g. in the center, on the edge midway between corners, etc.). Students can determine if they will drop each shape three times in a row or if they will conduct the first trials with each shape, then their second trials, then their third.*
- 2) What might be the independent variables in this experiment? What might be the dependent? *If you choose to use the data sheet given, the independent variable is the shape of the chosen seed. The dependent variable is based on student’s definition of successful (e.g. distance from tower, slowest fall, etc.).*
- 3) What would you have to do to make sure this experiment is controlled? *If you choose to use the data sheet given, each shape should be dropped the same number of times. If the wind is variable, each shape should be dropped for its first trial to try to get drops at the same wind speed. The red seed pod should be in approximately the same location on each shape.*
- 4) If you choose, use the data sheet below. Have students drop and observe how each of the seed geometric shapes fall. Note the location where each falls and the manner in which it falls. Drop each shape numerous times to make multiple observations. Each shape should be dropped the same number of times.

*Accept or reject your hypothesis*

- 1) After conducting your experiment think about these following questions:
  - Did your predicted shape do as well as you thought? Why? Why not?
  - Was there a particular shape that seemed to be the most successful or were they all the same?
  - How do you think your results would change if you chose a different location for the seed pods?
  - Can you think of something (natural or man-made) resembling your winning shape that uses the wind to move around?

**After your visit**

Discuss the results of the experiments. How many students made a correct prediction? How many students had to reject their hypotheses? Is it bad to make a wrong prediction? Why or why not?

Have students share their findings of the experiment at the seed tower. Which seed shape

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they did you find to be the best? Discuss what their definitions of a “successful seed” were. Are there shapes that were successful when the seed pod was in the center for example, that did not do as well when the seed pod was in a different location?

Look at picture examples of wind-dispersing seeds. Have small groups build a “seed” in the classroom. Materials can include: paper, cardstock, washers, plastic bags, tape, etc. Be sure to have something with weight to it that can represent the actual seed pod. Determine a class definition of the most successful seed. Have students drop their seeds from the launching site multiple times so that they can perfect their seed each time. It may take multiple trials to figure out the best conditions for dropping your seed. Once each group feels they have the best possible seed, have a dropping contest to determine the class winner.

Have students draw the most successful seed that they can imagine. They should be able to include a diagram that locates the seed itself and all other features that may help it disperse the best. How does each feature help the seed disperse?

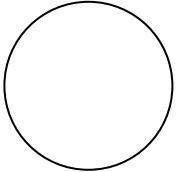
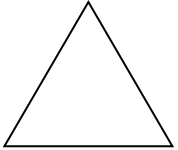
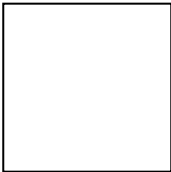

**Please see  
Seed Tower Activity on next page...**

# Seed Tower Activity

My definition of a “successful” seed:

\_\_\_\_\_

I predict that the \_\_\_\_\_ shape will be the most successful

Draw the location of the “seed pod” on each shape.	Trial #	Describe the fall: How many steps from the base of the tower did it go (use the same person for each measurement)? Did it catch the wind or fall straight down? What other things did you observe?	Give this fall a letter grade (A-, C, D+, etc.)
	1		
	2		
	3		
	1		
	2		
	3		
	1		
	2		
	3		
	1		
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	3		