# Flower Functions

## Pre-Program Notes:

Students participating in the Flower Functions program at the State Arboretum of Virginia will be exploring the parts of a flower using our dissecting microscopes and hand lenses. Once they have dissected a flower and looked at its parts up close, they will go for a walk to look at the diversity of flower part arrangement in different plants. Students will use a hand lens to identify and describe the parts of many different flowers in our gardens. The relationship between flowers and their pollinators will also be introduced. In order to get the most out of the activities, students should be familiar with the following vocabulary:

**Primary Vocabulary:**

***Sepal***- one of the green parts that surround and protect the flower before it opens

***Petal***- one of the colorful parts surrounding the reproductive portion of the flower

***Pistil***- the female, ovule-bearing organ of a flower, including the stigma, style, and ovary

***Stamen***- The pollen-producing reproductive organ of a flower

***Ovules***-the part of the flower that contains the egg cell and develops into the seed

**Secondary Vocabulary:**

*Parts of the pistil*

***Stigma***- The sticky tip of a pistil, on which pollen is deposited at the beginning of pollination

***Style***- usually slender part of a pistil, situated between the ovary and the stigma

***Ovary***- ovule-bearing lower part of a pistil that ripens into a fruit

*Parts of the stamen*

***Anther***- pollen bearing part at the end of the stamen

***Filament***-the stalk of the stamen

The primary vocabulary is most important and will be necessary for the identification of flower parts on many different flowers at Blandy. Secondary vocabulary may be used depending on the students' level of knowledge.

Before coming to Blandy, you might want to get the students excited about plants by designing and planting your own small garden at school, or having each student grow their own potted plant in the classroom.

If you are interested in incorporating gardening into your curriculum, we recommend the following resources:

Starbuck, Sara, Marla Olthof, and Karen Midden. *Hollyhocks and Honeybees: Garden Projects for Young Children*. St. Paul: Redleaf Press, 2002.

Also visit www.kidsgardening.com for ideas.

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We look forward to seeing you and your students soon! If you have any questions before your scheduled program, please do not hesitate to contact us at 540-837-1758 extension 242.

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## POST-PROGRAM ACTIVITY

Your students have observed many different kinds of flowers at the State Arboretum of Virginia. Hopefully, they also have seen some pollinators. What happens after a flower is pollinated?

Bring in a number of different fruits for the class (apples, berries, grapes, tomatoes, cucumbers, melons, peaches, plums, avocados, peppers, cherries…). If possible, try to find pictures of the flowers for each fruit, since students are probably not familiar with most of them. Talk about each fruit and its corresponding flower and ask students questions like:

- How do you think this flower is pollinated? Why?
- Which part of the flower turns into the fruit?
- Which end of the fruit had the stem? Which end was the flower attached to?

Let students dissect the fruit (or dissect it for them) to find the seed(s):

- How many seeds are inside the fruit?
- If you looked inside the flower for that fruit, how many ovules would you find in the ovary? (there would be as many ovules in the ovary as there are seeds in the fruit)
- How do you think the seeds are dispersed? (birds, mammals, wind)

You can also talk about classification by having the students organize the fruits into groups (such as number of seeds, shape of fruit [especially in cross section], type of flower, etc). Then you can talk about how scientists have classified the various fruits.

The bananas we buy in the grocery store do not produce viable seeds and may not be good for this exercise unless you are also prepared to talk about “exceptions to the pollination rule.” The small brown “seeds” in bananas are actually unfertilized ovules. Seedless grapes and watermelon will also require additional explanations. Humans have bred bananas, etc. to be seedless.

This activity could also be extended to math (for ex., determine the average weight of cherry pits) or social studies (Each student researches a different fruit: Where is it from originally? Where is it grown now? Which countries grow the most? Which countries export the most? Which consume most of what they grow? How many varieties are there? How much does it usually cost at the local supermarket? Can it be grown here?)

This activity was inspired by an article from *Science and Children*:
Produce Project by Donna M. Wolfinger. *Science and Children*, January 2005, p. 26-29.

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# Flower Functions

## Post-program Activity

Dear Teacher:

On your visit to Blandy Experimental Farm, your students explored the Arboretum observing flowers and visitors on the flowers. There are many ways to extend what they learned while at Blandy back in the classroom.

- The attached worksheet, 'Numbers in Nature' explores the Fibonacci sequence as found in nature. This website, http://www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/fibnat.html is a nice reference for learning more about the Fibonacci sequence. Scroll down to the section, 'Fibonacci Numbers, the Golden Section and Plants'.
  It is also a great way to integrate math and science!

For the activity, you will need pine cones for students to use. If you cannot collect any cones outside, craft stores may have them for purchase. You can't do this activity with every species of pine; test your cones before collecting or buying.
On the website, you can view the spirals drawn in both directions.

You could also use pineapples or make more observations of flowers outside to count the number of petals on different flowers. Keep in mind: it is best to use native flowers rather than cultivars that may be altered by humans.
If you do the above, have a class discussion where students share their observations of petals and talk about how many flowers matched with the Fibonacci sequence.

Please let us know if this activity was useful to you and how you adapted it for your classroom.
Thanks for visiting!

*Education Staff at the State Arboretum of Virginia*

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## Numbers in Nature Student Worksheet

Each student will need one pine cone.

### Introducing Fibonacci:

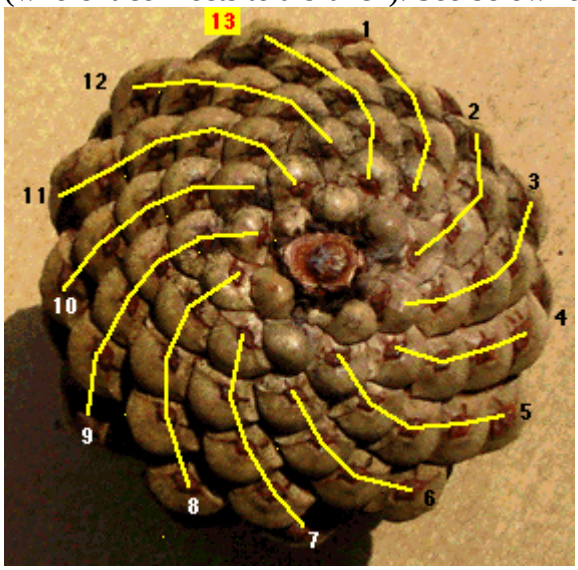
The Fibonacci sequence (named for the Italian mathematician Leonardo of Pisa who lived from about 1170-1240 AD) is:
0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144…
Each subsequent number is equal to the sum of the previous two numbers of the sequence. Try it and see!

In this sequence, the next number would be…?
89 + 144 = _____

### Practicing Fibonacci:

Fibonacci sequences appear in nature, such as branching in trees, arrangement of leaves on a stem, the fruitlets of a pineapple, flower petal numbers, an uncurling fern, a snail shell and the arrangement of a pine cone.

Look at your pine cone. Use a marker to trace the spirals from the base of the cone (where it connects to a branch). See below for an example.




How many spirals did you count? _____

Draw the spirals in the opposite direction. Now count them. How many did you count? _____

Do these numbers fit in the Fibonacci sequence? _____

### Extending Fibonacci

Look for the Fibonacci numbers in other places in nature.
Cut an apple crosswise and count how many chambers there are with seeds? Does your banana break in to sections lengthwise? How many? _____
Can you find Fibonacci outside in plants?

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