

Minnesota Pumpkins

Purpose: Students will describe the process involved in producing pumpkins in Minnesota. In addition, pumpkins will serve as a manipulative for science and math exploration.

Time: 1 hour

Level: 3

Materials:

- Variety of pumpkins
- *Growing Pumpkins in Minnesota* Fact sheet
- *My Pumpkin Measurements* Data sheet
- String
- Rulers
- Bathroom scale



Minnesota Science Standards and Benchmarks

- 3.1.1.2.3 Maintain a record of observations, procedures and explanations, being careful to distinguish between actual observations and ideas about what was observed.
- 3.1.3.4.1 Use tools, including rulers, thermometers, magnifiers and simple balance, to improve observations and keep a record of the observations made.

Minnesota and Common Core Language Arts Standards and Benchmarks

- 3.2.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

Minnesota Math Standards and Benchmarks

- 3.1.3.1. Read and write fractions with words and symbols. Recognize that fractions can be used to represent parts of a whole, parts of a set, points on a number line, or distances on a number line.

Background

Pumpkins are a popular crop grown in Minnesota. Scientifically speaking, pumpkins are a fruit because they contain seeds. Pumpkins along with gourds, squash, cucumbers, and melons all belong to the cucurbit plant family. Members of this family all grow on vines, contain tendrils, are frost sensitive and need bees or humans to pollinate their flowers in order to produce fruit.

Pumpkins were first grown in North and South America about 9000 years ago. Today they are popular as a fall decorations and are used in traditional Thanksgiving desserts (pumpkin pie).

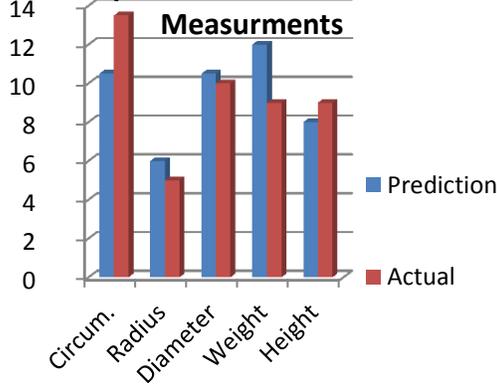
Pumpkin plants are relatively easy to grow. The seeds are planted directly in the garden when the soil temperature has reached about 65 degrees F. In Minnesota this is typically late May to early June. The seeds usually germinate or sprout in less than two weeks and then the vines start to grow. Female and male flowers develop on the pumpkin vines. The male flowers contain the pollen that must reach the female flower. Inside the female flower is a pistil. The pistil structure collects the pollen and starts to form seeds and the pumpkin fruit. Bees and humans are relied on to do a majority of the pollination (transferring pollen from male flower to the pistil of the female flower) about 8-10 weeks after planting. During the growing season the pumpkins are affected by water, temperature, insects, disease and weeds. Typically a pumpkin plant needs 6-8 hours of sunlight each day and one inch of water each week. Once the pumpkin shell is hardened and it is bright orange, it is ready to harvest. Most pumpkins need about 90-110 days between planting and harvesting. Pumpkin harvesting usually hits its peak in late October in Minnesota.

Procedure

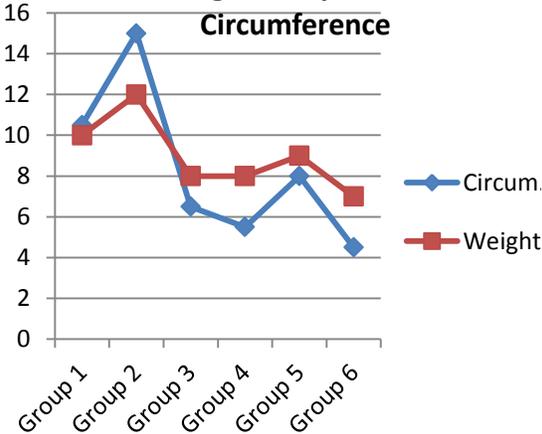


1. Collect pumpkins in a variety of shapes and sizes. Display these pumpkins and ask the students what they know about pumpkins. Be sure to ask if any students have ever grown their own pumpkins.
2. Read the *Growing Pumpkins in Minnesota* Factsheet aloud or have the students read this information on their own.
3. Have the students create a one-year timeline of pumpkin production, using the information from the factsheet. You could write the information on the white board with different students adding pieces of information, or have the students work in groups to create their own timeline on large sheets of paper. Assist the students to make sure they have included the following:
 - a. May/June – plant pumpkin seeds
 - b. June/July – seeds sprout, water and sunlight are needed, weeding, pumpkin vines grow
 - c. August – pollination, pumpkin fruits start to grow
 - d. September/Oct – pumpkin fruits grow and start to turn color
 - e. Late Oct – Harvest, pumpkins are used for decorations and food
4. Inform students that they are going to do some scientific investigation using the pumpkins today. Divide the class into groups of about 3. Give each student a pumpkin. (Pumpkins should be different shapes, sizes, etc.)
5. Ask students to look around at all of the pumpkins. Ask:
 - a. Which group has the largest pumpkin?
 - b. Which pumpkin do you think will weigh the most?
 - c. Do you think the smallest pumpkin will weigh the least?
6. Give students the *My Pumpkin Measurements* Data Sheet. Explain to the students that they are going to form predictions about five different aspects of their pumpkin. Introduce or review the terms Circumference, radius, diameter, weight, and height. If these are new terms for students, be sure to give many “real-life” examples for each term. Allow the students time to work as a group to record their predictions for their pumpkins. Instruct the students to record their predictions for circumference, radius, diameter and height to the nearest $\frac{1}{2}$ inch. They can record their prediction for weight to the nearest pound.
7. Inform students that we are going to test their predictions to see how accurate or close to the actual measurement they were. Model each measurement technique. Also model how you will record your measurements in the data sheet. Use the pictures on the data sheet as a guide:
 - a. Circumference – Use a piece of string to measure around the widest part of your pumpkin. Pumpkins are not perfect circles so students must try their best to find the widest part. Use your finger to mark on the string where the circumference ends. Measure this distance of string using a ruler. Record the measurement to the nearest $\frac{1}{2}$ inch
 - b. Radius – rest a pencil or another straight stick-like object against the side of the pumpkin, making sure it extends to the top of the pumpkin. Place the ruler at the center of the stem. Read the measurement on the ruler where it meets the pen. Record the measurement to the nearest $\frac{1}{2}$ inch.

Pumpkin Predictions vs Actual



Weight Compared to



- d. Diameter – Rest a pencil on each side of the pumpkin. Use the ruler to measure from pencil to pencil. Another option is to help your students understand that the diameter is two times the radius. Record the measurement to the nearest ½ inch
- e. Height – Rest the bottom of the ruler flat on the desk and the side of the ruler against the side of the pumpkin. Lay a pencil flat on top of the pumpkin. Record the measurement where the pencil meets the ruler to the nearest ½ inch.
- f. Weight – Place the pumpkin on a bathroom scale. Make sure nothing else is touching the scale or the pumpkin. Record the weight to the nearest pound.

Give each group a string, ruler, and scale (groups can share materials if needed). Assist all groups in taking their measurements and recording them as “actual” measurements.

8. Ask groups to share their measurements with the class. Also ask:
 - a. Were your predictions accurate?
 - b. Did the pumpkin with the largest circumference weigh the most?
 - c. Did the shortest pumpkin weigh the least?
9. Use the data collected by the students to create a graph or multiple graphs. Some ideas (see examples to the left) :
 - a. A bar graph comparing the predictions to the actual measurements for each group.
 - b. A line graph comparing circumference to weight for the entire class.
10. Ask the students what conclusions they can make after looking at the graphs. Ask students how a pumpkin producer or farmer might use this information (Should he/she sell their pumpkins by the pound? By size?)

Additional Activities

- Cut open the pumpkins and have the students wash and count the seeds. Compare the number of seeds in relationship to the size and weight of the pumpkins.
- Wash the pumpkins seeds, season and bake them for a healthy fall snack.
- Make pumpkin pie in a bag. A simple recipe can be found at: <http://aitc.oregonstate.edu/resources/pdf/activity/pumpkin.pdf>

Resources

- Books that could be read to go along with this lesson:
 - Pumpkin Circle by George Levenson
 - Harvest Year by Chris Peterson
- Minnesota’s From Farm to Table website has information on Minnesota pumpkins and other locally grown foods <http://www.mda.state.mn.us/food.aspx>

Adapted from Oregon Agriculture in the Classroom and Utah Agriculture in the Classroom.

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Growing Pumpkins in Minnesota

Pumpkin seeds can be planted directly in the soil of a garden. The seeds will grow best when the soil has warmed up to 65 degrees Fahrenheit. In Minnesota, most pumpkins are planted in late May or early June. Once the seeds sprout, the plants will start to “run.” When pumpkins run, it means that their vines start to spread out and take up lots of space.

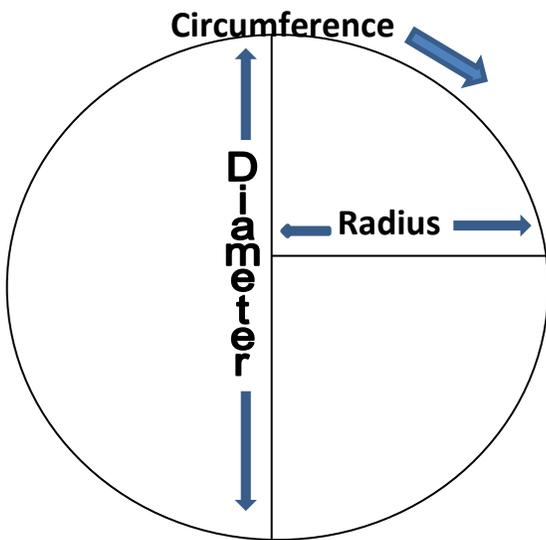
As the pumpkins are growing, they need lots of sunlight and water. Most pumpkin plants need at least six hours of sunlight every day. Pumpkin plants also need at least one inch of water every week. Farmers sometimes provide water through irrigation systems if there has not been enough rain. Farmers also need to get rid of weeds that are growing around the pumpkin vines. Weeds soak up water and nutrients from the soil that the pumpkins need to grow. Pulling the weeds lets the pumpkin plants get as much water and nutrients as possible.

Scientifically speaking pumpkins are fruits because they have seeds inside of them. In order for the pumpkin plants to start to grow fruit, bees need to pollinate the flowers that grow on the vines. The flowers on the pumpkin vines produce pollen. When a bee flies to a flower the pollen sticks to the tiny hairs covering the bee’s body. Then the bee flies to another flower and the pollen is transferred from the bee’s body to the new flower. This is the pollination process. The new pollen helps a pumpkin start to grow. Pumpkins will be very small and green when they first start to grow on the vines. Overtime, the pumpkins will grow larger and turn color from green to orange.

When the pumpkins are fully grown and bright orange in color they are ready to be picked. Most farmers pick their pumpkins in late October. This picking process is called harvesting. Farmers cut the pumpkins from the vines leaving a stem several inches long.

There are many uses for pumpkins. They can be carved, painted, and used in many fall decorations. Pumpkins can also be used for food. Many people enjoy making pumpkin pie and other pumpkin desserts. Pumpkin can also be used in bread and soup.

My Pumpkin Measurements



	Prediction	Actual
Circumference		
Radius		
Diameter		
Weight		
Height		

Circumference- The distance around your pumpkin. Measure at the widest spot using a string.

Radius- Distance from the center to a point on the outer edge. It is half the diameter.

Diameter- Any straight line that passes through the center of the circle and goes to the edges of the circle (pumpkin). The diameter is the radius multiplied by two.



Measuring Circumference



Measuring Radius



Measuring Height