

We're into Pumpkins



LEVEL: Grades PreK-6

SUBJECTS: Mathematics, Science, Language Arts, Social Studies

SKILLS: Collaborating, collecting data, comparing similarities and differences, concluding, creating and interpreting graphs, describing, developing cultural awareness, developing vocabulary, estimating, generalizing, measuring, observing, predicting, recording

MATERIALS

Pumpkins; newspapers; knife; large spoons; paper plates to hold seeds; weight scale; rulers and flexible measuring tapes, with both metric and English units; writing and drawing materials; graph paper; transparencies or photocopies of the attached **Pumpkins!**, **Our Pumpkin**, and **Our Pumpkin Data** sheets. **Optional:** additional scales, pumpkin-cutting safety knives, vinyl mats.

VOCABULARY

blossom, centimeter, estimate, flesh, flower, fruit, grooves, harvest, inch, kilogram, pound, pulp, pumpkin, ribs, seed, shell, stem, vine **Add for older students:** circumference, diameter, height.

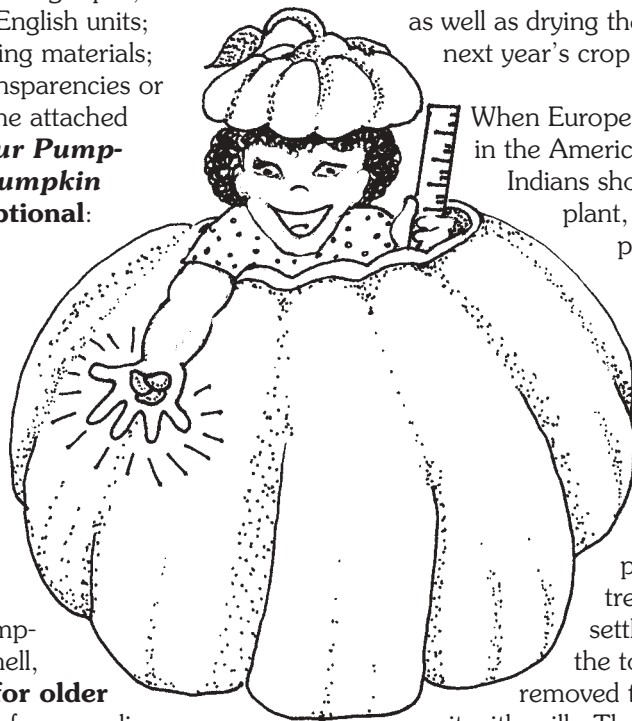
RELATED LESSONS

Seed Surprises
Fruits and Veggies

SUPPORTING INFORMATION

One great reason to get into pumpkins is that they are an original all-American (New World) food product. Pumpkins have been cultivated for at least 9,000 years in North America and South America. They are part of a large family of vined plants that includes cucumbers, squashes, gourds, melons, and others. Pumpkins were a staple in the diet of American Indians, who raised pumpkins as one of the three main crops - maize (corn), beans and squash. (Squash and pumpkins are in the same

plant family.) They baked or boiled the pumpkin flesh, toasted the seeds for tasty snacks, and ground the seeds into flour or meal for making bread and gruel as well as drying the seeds for planting next year's crop.



When European settlers arrived in the Americas, American Indians showed them how to plant, grow and use pumpkins. "We had pumpkins in the morning and pumpkins at noon. If it were not for pumpkins, we'd be undone soon," one settler wrote in 1683. Pumpkin pudding was a real treat for the early settlers. They sliced off the top of the pumpkin, removed the seeds, and filled it with milk. They baked it until the milk was absorbed, then scooped out the pumpkin flesh for good eating.

Good news travels, and today pumpkins are grown in almost every state and throughout the world. The United States does not ship raw pumpkins to other countries, but we do export some canned pumpkin. The pumpkin used to make pies is often grown and canned in California. Pumpkin and squash are members of the gourd family *Cucurbitaceae* and, therefore, the names (pumpkin and squash) are frequently used interchangeably. Squash in a can is sometimes labeled as pumpkin. Pumpkin is watery, so mixing pumpkin with other kinds of squash makes it firmer.

BRIEF DESCRIPTION

Through hands-on, interdisciplinary activities, students learn about pumpkins as fruits and as food sources.

OBJECTIVES

The student will:

- describe pumpkins, including their parts, colors, sizes, and shapes;
- learn new words for describing pumpkins, pumpkin plant parts, and uses of pumpkins;
- explore uses of pumpkins in the past and present; and
- predict, measure or count, record, and draw conclusions about characteristics of pumpkins.

ESTIMATED TEACHING TIME

Two to three hours. (Can be taught in two or three sessions.)

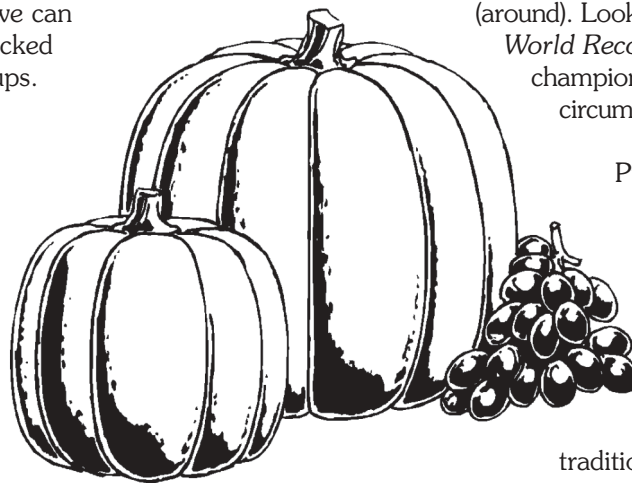
Pumpkins are a fruit. The botanical definition of a fruit is “the edible fleshy part of a plant that surrounds the seeds - a seed package.” (See the FLP lesson “Fruits and Veggies.”) Fruits, including pumpkins, develop from a fertilized blossom or flower. An interesting thing about pumpkin plants is their separate male and female flowers. You can identify the female blossoms by a bulge in the stem behind the blossom. The bulge looks like the miniature fruit into which it will develop. If the flower has no bulge behind it, it is the male flower - the one that provides the pollen, which will be carried by pollinators such as insects to the female blossom. When the pollen from the male flower reaches the right part of the female flower, pollination occurs. Blossoms pollinated by insects will generally lead to fertilization and fruit production. (For more about pollination and fertilization see the Supporting Information in the FLP lesson “Buzzy, Buzzy Bee.”) You might be surprised to learn that we can eat the blossoms. They can be picked like lettuce and taste sweet in soups.

The rind or shell protects the inner fruit, called flesh. The flesh holds, protects and nourishes the seeds inside the pumpkin - an important job because a plant’s seeds are the key to the survival of the plant species. (To learn more about the importance of seeds see the Supporting Information in the FLP lesson “Banking on Seeds.”)

For pumpkins to grow, the soil must be warm and the temperature above freezing. Pumpkins grow well in cooler and drier conditions and do not like rainy, damp places. They are not hardy enough to survive frost and grow only in regions (including most of North America and many other places in the world) where there is a growing season of at least 90 days without frost. It takes about 120 days for a pumpkin, depending upon the variety, to grow to full size. Three to four pumpkin seeds are planted in a “hill,” with the hills six to eight feet apart to let the vines spread out. One vine can grow as long as 100 feet. The pumpkin’s stem holds the fruit to the vine as it grows. Pumpkins turn orange when they are ripe. In the United States they are usually harvested in the fall before the frost sets in. If a pumpkin freezes and then thaws, the cells rupture. Mold and fungi quickly break down the tissue, and we say the pumpkin “rots.” In dry climates, it simply dries out. In this way, the nutrients in the pumpkin are recycled back into the soil. A compost pile is a good place for your old Halloween pumpkin.

Pumpkin stems are the shape of a hexagon or octagon. (You can tell the difference between a pumpkin and a squash by looking at their stems. Squash stems are generally more rounded, softer, and more flared where they are joined to the fruit.) Each vine usually produces two or three pumpkins.

There are dozens of varieties of pumpkins. Experts do not have an exact count because every year new varieties are grown. An annual contest for growing the largest pumpkin yields some whopping results. Some grow to an enormous size and can reach 800 pounds (360 kilograms [kg]). Today we also have ornamental miniature pumpkins about 2 inches (5 centimeters [cm]) in height for decoration and eating. Most pumpkins weigh 8 to 40 pounds (3.6-18 kg). They measure from 1 to 2 feet (30-60 cm) in diameter (across), and 28 to 48 inches (71-122 cm) in circumference (around). Look in a *Guinness Book of World Records* to find the current champion pumpkin in weight and circumference.



Pumpkins do not hold the importance in our lives that they did for early settlers, but they still have their place. We use pumpkin in breads, muffins, cookies, stews, and soups. What Thanksgiving holiday is complete without the traditional pumpkin pie? It’s an occasion to remember their importance in the diet of ancient civilizations and our forebears and to be thankful for the pumpkin’s rich flavor, high nutrient content, long storage capability, variety, and versatility.

GETTING STARTED

Make a transparency of **Pumpkins!** for use with younger students and photocopies for older students, one per student. Photocopy or make transparencies of **Our Pumpkin** and **Our Pumpkin Data** sheets for groups of students as appropriate. Teaching time for this lesson may vary considerably from group to group depending on the activities you choose. (Note: Decide whether you will use metric or English units of measure, or both. Circle your unit(s) choice on **Our Pumpkin Data** sheet before photocopying it.)

Decide the most appropriate way to proceed. The Procedure section describes working in small groups and using a data-recording sheet. Have younger students work in one large group with oral responses, or arrange to have older students assist small groups with their measuring, weighing, and recording.

Set up a pumpkin experiment station for each small group of students. Include a pumpkin on layers of newspaper along with a large spoon, flexible measuring tape, rulers, the data sheets (if appropriate), graph paper, and writing materials. The pumpkins are cut open in Step 6.

Set up a weight scale in a place easily accessible to all groups.

PROCEDURE

1. To introduce the lesson, explain to the students that this is a lesson about pumpkins. To find out what students already know, ask:

- What is a pumpkin?
- What do you know about pumpkins?
- Where do pumpkins come from?
- What do we use pumpkins for?

Continue to explore what students already know about pumpkins through a brainstorming activity in which students imagine all the possible uses for pumpkins, today and in the far past. Distribute copies of **Pumpkins!** for older students to list possible uses. You can record younger students' uses on the transparency. Ask them to start by looking at a pumpkin and pretending they have never before seen one and know nothing about it. They each take a minute to think of and list possible uses. Anything goes from a doorstop to a water vessel.

Invite them to take turns as they read one of the uses from their list. Anyone else with that use on their list crosses it off, so that students end up reading only uses that have not been previously named.

Did they come up with some imaginative ideas? Help them expand their lists by sharing facts and the early settler quotation from the Supporting Information. (Possible answers: *jack-o'-lanterns, decorations, pies, muffins, breads, cookies, cakes, soups, toasted seeds, cooked as a side dish, making flour, celebrations, and more.*)

Write down any questions generated from students'

brainstorming to launch further investigations. Read books about pumpkins, have students use reference materials, share the Supporting Information, or have them talk with adults to find their answers. Their questions may include:

- Where did pumpkins come from? (*The first pumpkins were grown by American Indians in North America and South America.*)
- To whom have pumpkins been important? (*Native Americans used pumpkins in many ways. Many early settlers were saved from starvation by eating pumpkins given to them by Native Americans.*)



- Where do pumpkins grow today? (*They are grown in gardens and pumpkin patches in all but the coldest areas of the world.*)
- Which parts of the pumpkin do we eat? (*Seeds and flesh. Blossoms also can be eaten or put into soups.*)

2. Divide students into small groups, one group for each of the experiment stations. Distribute copies or use the transparency of **Our Pumpkin** labeling diagram and vocabulary sheet to complete as appropriate for your group.

3. Ask students to examine their pumpkins carefully. Make a list of their observations and descriptions in a visible place. Ask:

- What do you notice about your pumpkin?
- What color(s) do you see on your pumpkin?
- What shape is your pumpkin?
- How can you tell which side of the pumpkin rested on the ground?
- What parts do you see? (*Top, side, stem, ridges, and more.*)
- How does the shell feel compared with the stem (if they have one)?
- How would you describe the smell of your pumpkin?
- (Run your fingers lightly over your pumpkin.) How would you describe the feel of the pumpkin? The feel of the stem? The shape of

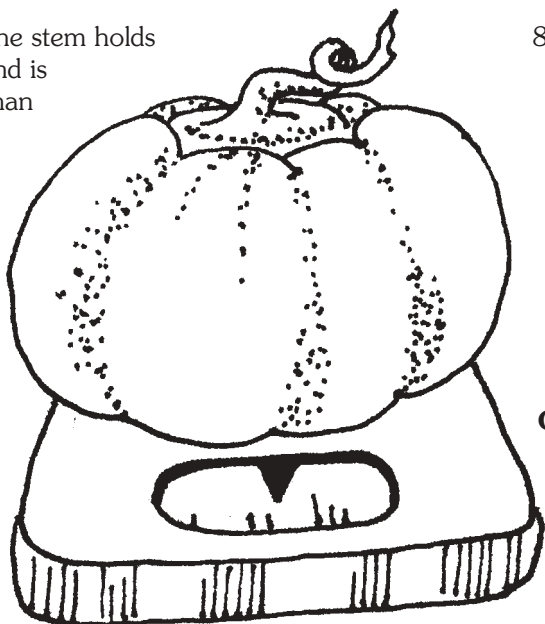
the stem? (Point out that the stem holds the pumpkin to the vine and is six- or eight-sided rather than round.)

4. Distribute copies or use the transparency of **Our Pumpkin Data** sheet. Collect “outside” pumpkin data by having students guess the answers and record them on their sheets. Ask:

- How many grooves are on your pumpkin? Guess first, then count and record on your data sheet. (The grooves are the “valleys” or indentations.)
- How many ribs does your pumpkin have? Again, estimate, count and record. (The ribs are the “mountains,” or raised parts, that look a bit like human ribs.)

Optional session break

5. How big are our pumpkins? Working together, have each group estimate circumference, diameter and height and fill in the “Our guess” column on their data sheets. See Extensions and Variations 1 for adaptations of this activity for younger students.
6. Each group then measures the circumference, diameter and the height of their pumpkin and records actual data in the “Real” column. Before they measure, demonstrate the following techniques. Students use the flexible tape measure to measure the pumpkin’s circumference (around the middle) where it is the biggest. To measure diameter, have students place rulers on both sides of the pumpkin at the widest place and measure the distance between the two rulers with the tape measure. For height, students measure the highest point of the pumpkin excluding the stem. Then let students perform their own measurements and record them using the English and/or metric units you have specified.
7. Ask students to write a guess about whether their pumpkin will float. Use a trash can partially filled with water to test a pumpkin. (*It will float.*) Try dunking several different-size pumpkins.



8. Next, groups bring their pumpkin to the “weigh-in center” and weigh it after they guess about the weight. Have groups compare who has the largest, heaviest, smallest and lightest pumpkin. Add other comparisons that your group notices. What other words do they use to describe their pumpkins?

Optional session break

9. Have an adult cut each pumpkin open horizontally across the top. Students continue to make observations. Ask:

- What is the outside of the pumpkin called? (*shell*)
 - What do you see inside? (Introduce terms: *flesh, stringy pulp, and seeds.*)
 - What do you think is the main job of the flesh? (*It holds, nourishes and protects the seeds from which the next generation of pumpkins will grow.*)
 - How do the hard shell and flesh together protect the seeds? (*The hardness and thickness provided by the shell and flesh help maintain a moist internal environment for the seed and create a barrier from external damaging effects such as hail or fallen tree limbs.*)
 - Are the seeds just scattered or are they arranged in some way? (*They are scattered throughout the inside of the pumpkin but connected to stringy pulp.*) What shape are the seeds? (*teardrop*)
 - How would you describe the feel of the inside of the pumpkin? (Possible answers: *squishy, stringy, wet.*)
 - How many seeds do you guess (estimate) your pumpkin has in it? (Guess, then count. Since there are a large number of seeds, ask students to group seeds by 10s for counting. Again, for younger students, gather the information on the transparency.)
10. Collect inside data for pumpkins. Make a chart analyzing and displaying the data. Notice the ranges.

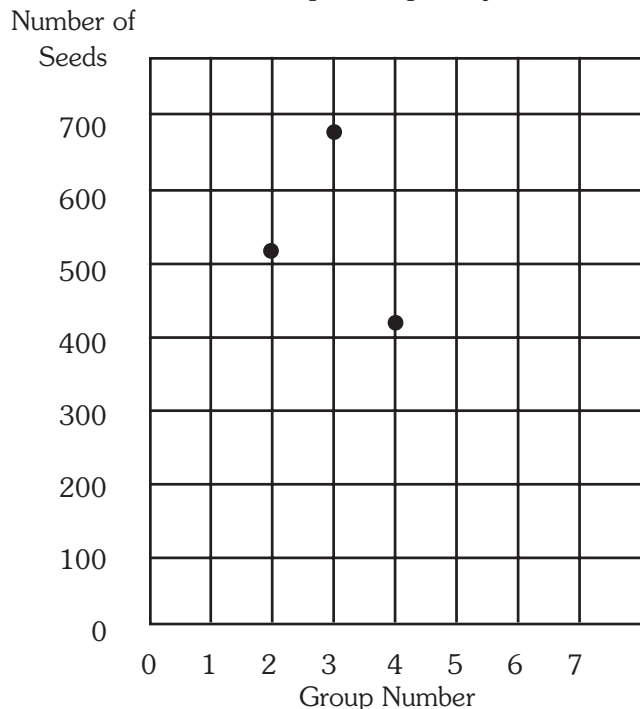
Sample Pumpkin Data Chart

Measure/Count	Group			
	1	2	3	4
# of seeds	508	681	436	529
Weight	3 lbs (1.4 kg)	9 lbs (4 kg)	16 lbs (7.2 kg)	2 lbs (0.9 kg)
Circumference	16 in (41 cm)	29 in (74 cm)	42 in (107 cm)	18 in (46 cm)
Height	7 in (18 cm)	10 in (25 cm)	9 in (23 cm)	7 in (18 cm)

(Note: One pound equals 0.45 kilograms [kg] and 1 inch equals 2.54 centimeters [cm]. The previous metric figures have been rounded up to even numbers.)

With older students, make four graphs, each comparing one of these characteristics: weight, circumference, height, and number of seeds in each group's pumpkin. If graphing with younger students, consider letting one seed symbol represent every ten seeds counted, as some pumpkins may have more than 700 seeds.

Sample Graph Layout



With all groups ask:

- Which pumpkin had the most seeds? Fewest?

- Which pumpkin was the biggest around? Smallest?
- Which pumpkin was the tallest? Shortest? Heaviest? Lightest?

With older students ask:

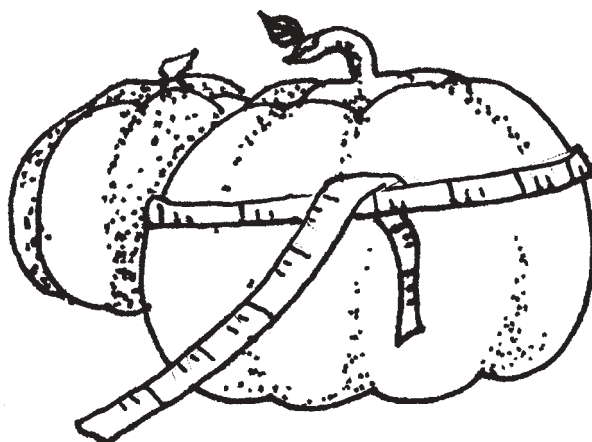
- Did the "biggest-around" pumpkin have the most seeds?
- Did the tallest pumpkin have the most seeds?
- Did the heaviest pumpkin have the most seeds?
- Did the "biggest-around" pumpkin weigh the most?
- Did the shortest pumpkin weigh the least?

Have students draw conclusions by asking:

- What is the relation, if any, between weight and the number of seeds? Between height and number of seeds?
- What is the relation, if any, between weight and distance around? Between weight and height?

11. Summarize the lesson by having students answer these questions:

- Where did pumpkins come from?
- Where do pumpkins grow today?
- How did people long ago use pumpkins?
- How do we use pumpkins today?



12. Direct each group to clean up their areas carefully after their pumpkin experiments. But the discoveries do not have to stop here. Decorate the pumpkins, collect the seeds for roasting, or watch them decompose in a compost pile. See Extensions and Variations for ideas and procedures.

EVALUATION OPTIONS

1. Have students tell or write at least five words describing pumpkins.
2. Have students draw a pumpkin and label at least two or more parts of it.
3. Have students tell or write a story about how pumpkins were used in the past and today.

EXTENSIONS AND VARIATIONS

1. Use string for students too young to manage tape measures. Each student cuts a piece of string he or she estimates will encircle the pumpkin. They wrap their strings around the fattest part of the pumpkin to see if they are correct and decide if their strings are “too short,” “too long,” or “just right.” If their strings are not “just right,” have them cut new strings and try again.

For weight, students decide if their pumpkin is more than or less than a 5-pound bag of sugar or another familiar object you bring for them to lift.

2. As a math extension for older students, have them determine the capacity (volume) of their pumpkins. Share small group data and look for relationships between capacity and circumference. Have students estimate how big a circumference the largest pumpkin in the *Guinness Book of World Records* would have.
3. What happens to the classroom pumpkin after your studies are finished? Wait and see! Put it on top of some old newspapers in a warm corner. Keep it out of direct sunlight and moisten with water. Watch, smell and touch the pumpkin for the next several weeks. Use a hand lens to examine the mold.

Bury or compost the pumpkin remains to recycle nutrients to the soil by lining an old aquarium with foil, putting some soil in the bottom, laying the pumpkin on the soil and covering with more soil. Cover the aquarium. Make a list of predictions that students make about what will happen. Leave it where you

can look at it until spring. Students will be excited to see that they can put their hands in after uncovering and find their pumpkin has “turned into soil.” Use the soil to plant more pumpkin seeds so students will have plants to take home. (To learn more about composting see the FLP lesson “From Apple Cores to Healthy Soil.”)

4. Enjoy a taste treat of toasted pumpkin seeds. Wash the seeds, sprinkle lightly with salt or Creole seasoning and toast on a greased cookie sheet at 325 degrees for about 20 minutes, or until golden brown. Cool and eat!
5. Open a can of pumpkin and compare the looks and taste of it to cooked, fresh pumpkin flesh from your class pumpkins. Make pumpkin pie, pudding or bread with students.
6. Make a class pumpkin book with covers and pages in the shape of a pumpkin. Have students use new vocabulary words and descriptive observation words to write about pumpkins. On covers draw and write about outside characteristics. On inside pages, draw and write about a pumpkin’s inside characteristics. Invite students to add additional pages with a theme of their choice. (Using copies of the **Pumpkins!** sheet provided will get your project off to a fast start. Just cut around the outline to make your covers and pages.)
7. Decorate pumpkins using markers and paints. Here’s a trick. Prepare pumpkins by washing them with mild soap and water. Dry completely. Give the paint “holding power” by mixing a half teaspoon of powdered kitchen cleanser with each tablespoon of poster paint in a small paper cup. Features can be lightly drawn on the pumpkin to guide young painters. Students can follow with storytelling sessions about their creations.
8. Visit a pumpkin patch to see pumpkin-growing



conditions. Examine the vines, stems, leaves, male and female flowers, and other pumpkin parts.

9. Have students draw and color a cross section of a pumpkin cut horizontally. Post their **Our Pumpkin Data** sheets along with their drawings.
10. Enjoy poems, stories, celebrations, and legends about pumpkins. There are many stories and legends about how jack-o'-lanterns came to be. One says that Irish Jack, a mean and crabby old man, was being chased by the devil, who wanted his soul. Jack tricked the devil and got him stuck in a tree. The devil promised to never take Jack's soul, if Jack would let him down. Years later, Jack died. He wasn't allowed in Heaven because he was so mean and ornery. He didn't go into hell because of his agreement with the devil. But the devil tossed a hot coal at him at the same time Jack was eating a turnip. Jack caught the coal, put it in his turnip for a lantern, and has ever since wandered the world looking for a place to stay. Over the years, pumpkins have taken the place of turnips, and faces are carved in jack-o'-lanterns to scare off anyone who wishes to harm, scare or play tricks on Jack.

CREDIT

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ADDITIONAL RESOURCES

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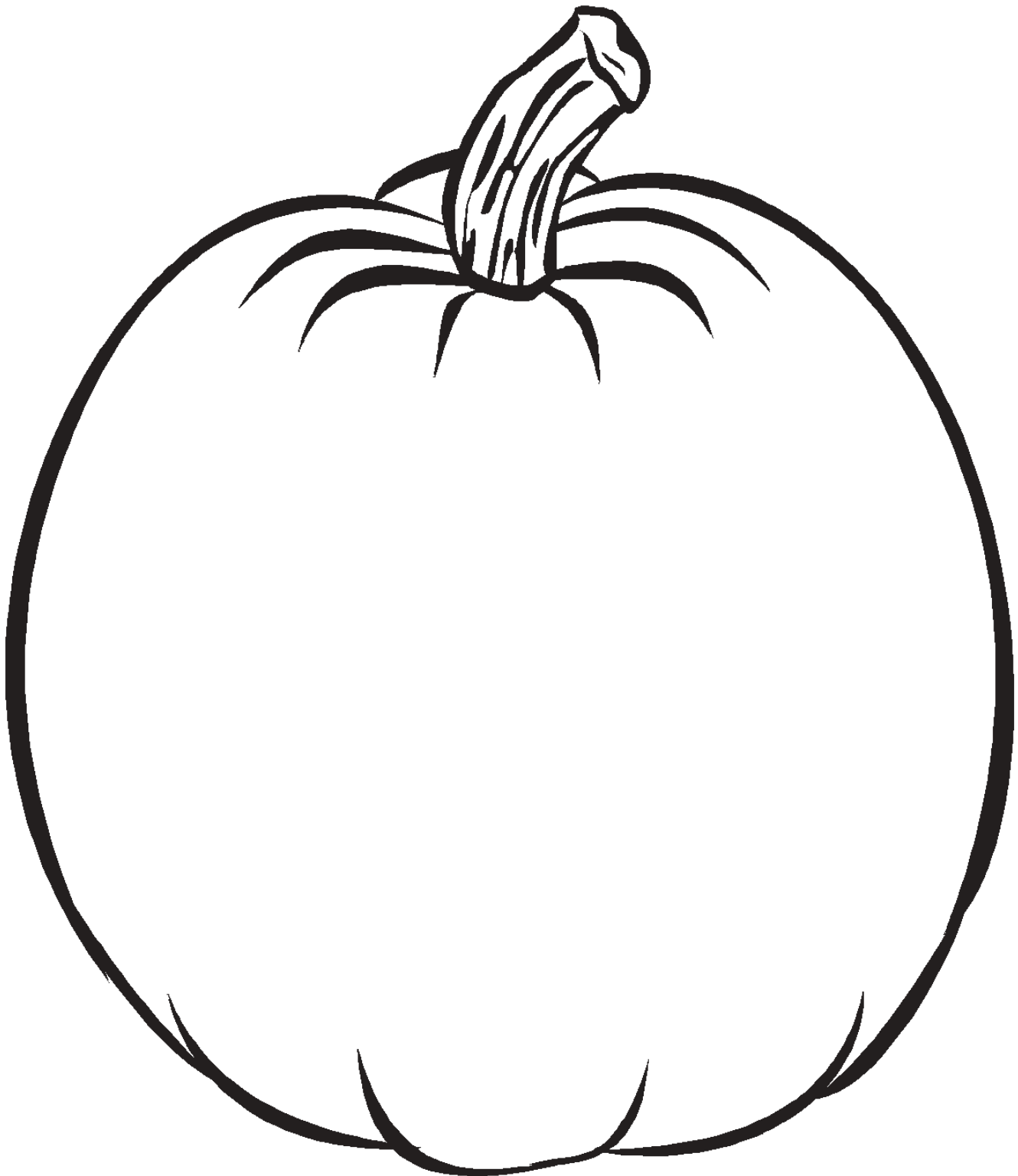
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EDUCATOR'S NOTES

PUMPKINS!

Name: _____

Directions: Use this sheet to list possible uses for pumpkins, today and in the far past.



OUR PUMPKIN

Names: _____

What colors do you see on your pumpkin?

Using the following words, draw a line from each word to the correct part of the pumpkin.

stem

shell

flesh

seeds

grooves

ribs

top

side

vine

leaf



OUR PUMPKIN DATA

Names: _____

(Use English and/or metric measurements.)

How many?	Our guess	Real
Grooves		
Ribs		
Circumference (inches or centimeters around)		
Diameter (inches or centimeters across)		
Height (inches or centimeters high)		
Do you think your pumpkin will float?		
Number of seeds		
Weight (pounds or kilograms)		

Some new things we learned about pumpkins are:

- 1.
- 2.
- 3.
- 4.