



Just How Big is That Seed?



Focus/Overview

This lesson focuses on using the mathematical skill of measuring an object, in this case three varieties of summer squash seeds, to the nearest millimeter. As part of the introduction to the lesson, students identify the three types of summer squash — zucchini, yellow straightneck or crookneck, and patty pan — and examine the inside of each squash after it is cut in half. The purpose of the seed is discussed as well as the role of the fruit that surrounds it.

Learning Objectives

The learner will ...

- Correctly measure a squash seed to the nearest millimeter. (LO#1)
- Correctly select the purpose of a seed from three choices on a multiple-choice question. (LO#2)

Grade Level

4th grade

Duration

One 40-to-50-minute class

Subject Area

Science

Setting

Classroom

Vocabulary

Summer squash, winter squash

Next Generation Science Standards (2013)

4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
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Louisiana Student Standards for Science (2017)

4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
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Louisiana Student Standards for Math (2016)

4.MD.A.1	Know relative sizes of measurement units within one system of units, including feet and inches; kilometers, meters, and centimeters; kilograms and grams; pounds and ounces; liters and milliliters; and hours, minutes and seconds. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (Conversions are limited to one-step conversions.) <i>For example, know that 1 foot is 12 times as long as 1 inch. Express the length of a 4-foot snake as 48 inches. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), etc.</i>
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Advance Preparation

1. **Seed card preparation** (Elmer's glue, seeds, ruler, pen, 3-inch by 5-inch index cards)

- Purchase the following summer squash seeds: zucchini, yellow straightneck or crookneck, and patty pan (scallop). You will need enough seeds so that each child gets three seeds of each variety of squash.
 - Mark off three columns and a header row on each of the index cards.
 - Glue the seeds far enough apart so that a ruler can easily fit between the rows of seeds.
2. Preview the video (Extend, Step 2).



Blackline Masters

1. **DATA SHEET: Just How Big Is that Seed?**
2. **Check for Understanding (and Key)**

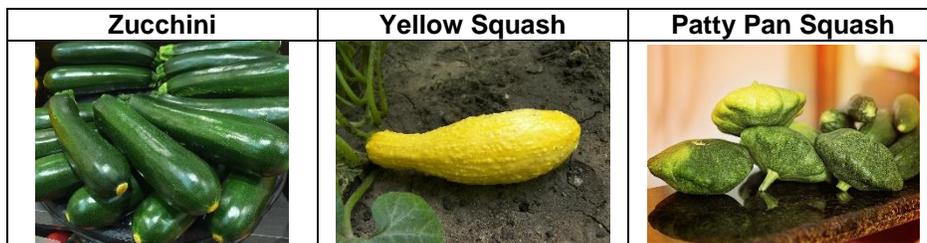
Background Information

The subject of this lesson is zucchini, which is one type of summer squash, which are known by the Latin name *Cucurbita pepo* (L.). The other commonly recognized types of summer squash are straightneck, crookneck, and scalloped. Summer squash fruits come in an array of colors and can be solid colors or speckled. These tasty fruits, which humans have been eating for 8,000 to 10,000 years, descended from wild squash that can be traced to Central America. Squash plants have both male and female flowers on the same plant (monoecious), with female flowers forming fruits. Pollinators, such as bees, are required to transfer pollen from the separate flowers for adequate fruit set and growth. Even the flowers of these fruits, both male and female, are delicious.

Summer squash are more delicate than winter squash as they are harvested while immature, have a soft skin, and are highly perishable. They are harvested only a few days (three to six days) after flower/bloom and cannot be kept very long after they are picked from the plant. Summer squash can be eaten raw with your favorite dip or salad or seasoned and cooked. They are low in calories and are a good source of fiber, vitamin C, and vitamin B6. These plants are in the same plant family as melons, watermelons, and cucumbers and are actually botanically considered fruits — not vegetables!

The outer protective layer of a vegetable or fruit is called the skin, peel, or rind. This layer is the first line of defense for protecting the inner part of the vegetable, especially its precious seeds, from the environment. For some squash, the skin/rind is tough and thick (like pumpkins and acorn squash), and so they last a relatively long time in storage. These are called winter squash, and they typically are harvested when the fruit is mature, often two months after pollination and fruit set. The rind is hard, and the fruit resists denting by thumbnail pressure. Winter squash (Hubbard, butternut, acorn) can be stored for many months if they are properly cured and stored. In the U.S., pumpkins are essentially a winter squash with a bright orange, hard rind that stores well.

In contrast, for summer squash, the skin is tender, especially when the vegetable or fruit is young as it is commonly found in grocery stores. The skin is very soft and can easily be damaged by rough handling after harvest and at home and can be cut with a thumbnail. So, the names summer and winter squash relate to different species and types of cucurbit plants, when they are harvested, and how long they can be stored.



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References

Green Mountain Farm-to-School. (no date). *Summer squash*. Available at http://www.vermontharvestofthemonth.org/uploads/2/8/9/6/28966099/squash_educator_2015.pdf

Materials List

Engage

- Examples of zucchini, yellow straightneck or crookneck, and patty pan (scallop). Note that all summer squash are warm-season vegetables. The activity can be done with two if not all varieties can be found in a store.
- Knife to cut squash open.

Explore

- Seed cards (see Advance Preparation) — one per student.
- Blackline Master 1 — one per student.
- Metric rulers — one per student.

Extend

- Sticky notes — Three sticky notes per student.
- Chalkboard or sentence strips (total of six sentence strips, two per graph).
- Tape.
- Projector for video.

Procedure

Engage

1. **Let's see how many of you know these fruits.**
 - Hold up a zucchini squash. **What is this one called?** (*Zucchini*)
 - Hold up a yellow squash. **What about this one?** (*Yellow straightneck or yellow crookneck squash*)
 - Hold up a patty pan squash. **How about this one?** (*Patty pan squash, also known as scallop squash*)
2. **I am going to cut each one of these open and pass the squash around. I want you to observe the following things: the skin, the seeds, and where they are located.** Give the students about three to four minutes to examine at least two of the three varieties of summer squash.
 - **Where are the seeds located in this squash fruit?** (*They are in the very center.*)
 - **Are the seeds large or small?** [*Answers will vary.*]
 - **What color are the seeds?** [*Answers will vary.*]
 - **What about the skin ... what did you notice?** Ask about the color, texture, etc.
3. **We've just spent a bit of time looking at the insides of three types of summer squash. Let's think about the seeds of the squash.**
 - **What is it that seeds do?** [*They sprout into new plants.*]
 - **Why are seeds important?** [*Without seeds we would not have any new plants.*]
 - **What is the purpose of the fruit (the flesh around the seeds)?** [*To protect the seeds.*]

Explore

1. Pass out **Blackline Master 1**, the Summer Squash Seed cards, and a metric ruler.
2. **Students, we need to be very careful with the Summer Squash Seed cards. The seeds are glued on and can easily pop off if you are not careful.**
3. **Let's review how to use our metric rulers. Everyone put your ruler on the table with the metric side up.**

- **How did you know which side is the metric side?** [Most metric/inches rulers will have the metric side labeled “mm” or “cm” on the metric side. Students need to look for the clue and make sure that they can read “mm” or “cm” right side up.]
- **Where is the “zero” mark on the metric side of the ruler?** [At the far-left end of the ruler.] IMPORTANT. Circulate and make sure students know where the zero mark is on their particular ruler. The seeds that they will measure are relatively small. Lining up the ruler in the wrong place will make a big difference in their results, not to mention that it is practicing the skill incorrectly.



NOTE: If your students are not accustomed to the metric system, remind them that 10 millimeters is equal to 1 centimeter. Have them count the 10 lines between two centimeter marks on the ruler. You might also have them show you how much a millimeter is between their fingers versus a centimeter. Have them note that there are generally three sizes of lines on the metric side. The longest lines mark the centimeters. The shortest lines mark the millimeters. The middle-sized lines mark 5 millimeters — and they make it easier to count by fives.

4. **Your job today is to measure three types of summer squash seeds in millimeters. You are going record your data on the data sheet I handed out a little while ago. Be sure you line up the zero mark at the end of the seed and count the number of millimeters to the other end.** You may have to model this on an ELMO or other projection device.

Explain

1. Discuss the worksheet.
 - **Let’s talk about the zucchini seeds first. What was the shortest seed measurement you got for a zucchini? What was the longest seed measurement you found for a zucchini? Is that much of a difference? What other things did you notice about the zucchini seeds?**
 - Repeat these questions for yellow squash and patty pan squash.
 - **Which of the seeds had the biggest difference between longest and shortest?** [Answers will vary.]
 - **Which seed had the largest seeds? What other differences did you notice between the seeds?**

Extend

1. Divide the class into three groups. Give each student three sticky notes. Assign one group to write down their three measurements for zucchini, another group to write down each of their three measurements for yellow squash, and the remaining group to write down each of their measurements for patty pan squash. Draw the horizontal axis for the three graphs on the board or (use sentence strips and tape) to create the x-axis. Call the groups up one at a time to create a bar graph of the lengths that each group found for their squash. To do this, the horizontal axis will have measurements in millimeters. As students come forward, they put their sticky notes in the appropriate bar. Eventually you will have three graphs on the board or wall.
 - **Wow! Look at all the data that we collected! Each of you did a small part, and it adds up to a lot of data.**
 - **Look at the data for the zucchini squash group. Where on the graph do most of your sticky notes fall?** [Don’t forget the metric unit!]
 - **How about the yellow squash group? Where are most of your sticky notes?**
 - **How about the patty pan squash group? Where are most of your sticky notes?**
2. Your students will find it interesting to see how zucchini sprout from seeds. This particular time-lapse video is just under three minutes long and shows a boy planting a single zucchini seed in a pot and the germination of the seed over time.
 - MegaDodo (2011, May 26) *Wheatley’s zucchini plant* [video]. Available from <https://www.youtube.com/watch?v=dRkzpYNNGY8> (2:51 minutes; music from *Zombie vs Plants* video game can be muted)

Evaluate

1. A short evaluation (**Blackline Master 2**) is provided.

Resources

Oklahoma Ag in the Classroom. (no date) Pumpkins, squash and other cucurbits - Oklahoma Ag in the Classroom. Available at <http://aitc.okstate.edu/lessons/cucurbits.pdf>

A selection of lesson ideas (English-Language Arts, Math, Social Studies, Science, Visual Arts) and information on cucurbits.

USDA Healthy Meals Resource System. (no date). Summer squash and zucchini. Available at <https://healthymeals.fns.usda.gov/summer-squash-and-zucchini>

A selection of fact sheets, recipes and information on growing summer squash.

USDA SNAP-Ed Connection. (24 August 2018). Seasonal produce guide – What’s in season: Summer squash. Available at <https://snaped.fns.usda.gov/seasonal-produce-guide/summer-squash>

A selection of fact sheets, recipes and lessons on growing summer squash.

Recommended Children’s Books

Miller, P. Z. (2013). *Sophie’s squash*. New York, NY: Random House Children’s Books.

A children’s book about a young girl who selects a squash on a visit to a farmer’s market. She carries it everywhere she goes, and eventually learns what happens to squash over time. Winner of an Ezra Jack Keats New Writer Honor and a Charlotte Zolotow Honor. Lexile: AD55L. Age 3-7 years. ISBN-13: 9780307978967.

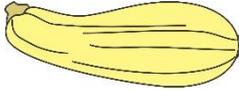
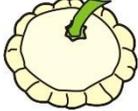
Pryor, K. (2015). *Zora’s Zucchini*. Bellevue, WA: Readers to Eaters.

What do you do when your garden produces more than you can possibly eat? Zora’s solution is a garden swap! Winner of the Growing Good Kids Book Award (Junior Master Gardener & The American Horticultural Society) and the Whole Kids Foundation Book Club Selection. Age 4-8 years. ISBN-13: 978-0998436616 (paperback).

DATA SHEET: Just How Big Is That Seed?

Gathering Data

1. Measure the length of each of your three seeds to the nearest millimeter (mm) with your ruler. Record your measurements in the spaces below.

Zucchini Squash	Yellow Squash	Patty Pan Squash
		
_____ mm	_____ mm	_____ mm
_____ mm	_____ mm	_____ mm
_____ mm	_____ mm	_____ mm

Analyzing Data

2. Zucchini Squash Seeds

- The longest length of my zucchini squash seeds was _____ mm.
 The shortest length of my zucchini squash seeds was _____ mm.
 The difference between the longest and shortest of my zucchini squash seeds was _____ mm.

3. Yellow Squash Seeds

- The longest length of my yellow squash seeds was _____ mm.
 The shortest length of my yellow squash seeds was _____ mm.
 The difference between the longest and shortest of my yellow squash seeds was _____ mm.

4. Patty Pan Squash Seeds

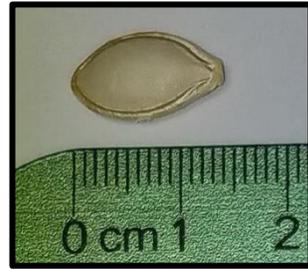
- The longest length of my patty pan squash seeds was _____ mm.
 The shortest length of my patty pan squash seeds was _____ mm.
 The difference between the longest and shortest of my patty pan squash seeds was _____ mm.

5. The seed with the longest length was _____ squash. It was _____ mm in length.
6. The seed with the shortest length was _____ squash. It was _____ mm in length.
7. Where are the seeds located in the fruit? _____
8. What is the purpose of a seed? _____
9. What is the purpose of the fruit? _____

Check for Understanding: Just How Big Is That Seed?

Write the letter of the correct answer on the line in front of the question.

- _____ 1. A seed's most important purpose is to _____. (LO#2)
 A. provide food for squirrels.
 B. make a new plant.
 C. create a design in the middle of the fruit.
- _____ 2. There are _____ millimeters in a centimeter. (LO#1)
 A. 0
 B. 5
 C. 10
- _____ 3. How many millimeters is this zucchini squash seed?
 A. 14 millimeters
 B. 14 centimeters
 C. 1.4 millimeters



-----cut here-----

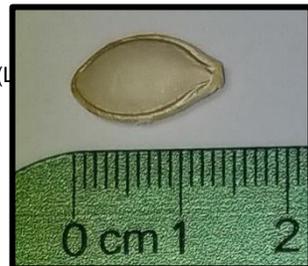
Name _____

Date _____

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 A. 14 millimeters
 B. 14 centimeters
 C. 1.4 millimeters



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Write the letter of the correct answer on the line in front of the question.

 B 1. A seed's most important purpose is to _____. (LO#2)

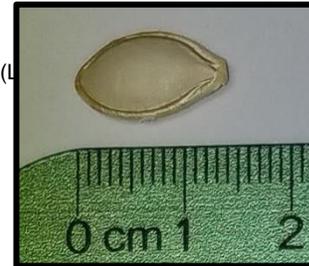
- A. provide food for squirrels.
- B. make a new plant. **CORRECT**
- C. create a design in the middle of the fruit.

 C 2. There are _____ millimeters in a centimeter. (LO#1)

- A. 0
- B. 5
- C. 10 **CORRECT**

 A 3. How long is this zucchini squash seed?

- A. 14 millimeters **CORRECT**
- B. 14 centimeters
- C. 1.4 millimeters





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