

A "Sour" Subject

Grade Levels

3 - 5

Purpose

In this lesson students will learn about the growth and production of citrus fruits and participate in an activity where they use skills of observation and mathematical computation to compare and contrast grapefruits and lemons.

Estimated Time

75 minutes

Materials Needed

Interest Approach – Engagement:

- Grapefruit
- Lemon
- *Lemon & Grapefruit Venn Diagram*

Activity 1:

- *Citrus Fruits Commodity Fact Sheet*
- *Lemon & Grapefruit Venn Diagram*

Activity 2:

- Grapefruit, one-half per group
- Lemon, one-half per group
- A "Sour" Subject student lab report
- Balance
- Calculators
- Hand lens, minimum 1 per group
- Small paper cups, 2 per group
- Paper towels

Essential Files (maps, charts, pictures, or documents)

- [A "Sour" Subject Student Lab Report](https://cdn.agclassroom.org/media/uploads/2018/03/26/A_Sour_Subject_Lab_Report_1.pdf)
(https://cdn.agclassroom.org/media/uploads/2018/03/26/A_Sour_Subject_Lab_Report_1.pdf)
- [Citrus Fruit Commodity Fact Sheet](https://cdn.agclassroom.org/media/uploads/2017/12/07/citrus_fruit_commodity_fact_sheet.pdf)
(https://cdn.agclassroom.org/media/uploads/2017/12/07/citrus_fruit_commodity_fact_sheet.pdf)
- [Lemon & Grapefruit Venn Diagram](https://cdn.agclassroom.org/media/uploads/2015/08/24/WorksheetWorks_Venn_Diagram_Graphic_Organizer_1.pdf)
(https://cdn.agclassroom.org/media/uploads/2015/08/24/WorksheetWorks_Venn_Diagram_Graphic_Organizer_1.pdf)

Vocabulary Words

citrus: a tree of a genus that includes citron, lemon, lime, orange, and grapefruit; cultivated in warm countries for their fruit, which has juicy flesh and a pulpy rind

evergreen: a classification of plant that has leaves throughout the year that are always green

pest: a destructive insect or other animal that attacks crops, food, or livestock

Did You Know? (Ag Facts)

- Citrus fruits are available yearly from the states of California, Arizona, and Florida. Florida ranks as the number one producer of citrus fruits and California is second.
- The nectar from oranges and lemons was used as a drink and as a medicine in the ancient days of the Middle East.
- California has approximately 271,000 acres of citrus trees.
- One orange alone can provide a full day's requirement of Vitamin C.

Background Agricultural Connections

Grapefruit, lemons, oranges, and limes are **citrus** fruits that are grown in warm climates including California, Arizona, and Florida. Florida is the top producing citrus state. Florida and Arizona most often produce oranges that are processed into juices. Most California oranges are of the navel variety, which is a seedless fruit.

Grapefruit, as do lemons, grow on **evergreen** trees whose leaves have a waxy cuticle covering. Grapefruit were given their name when people noticed that they grow in clusters, just like grapes grow in clusters. Grapefruit trees produce best when they are grown in places that have hot summers and winters that never get colder than 20°F (-6.66° C).

Lemons are a popular ingredient in many dessert dishes, but are most often recognized as the main ingredient in lemonade. Ventura County in California is the leading producer of lemons in the United States. Because of its unique coastal location, some lemon trees in this region can produce fruit three to four times per year.

Over the past several decades, more citrus varieties have been developed and commercialized. For example, the Pixie mandarin, a small, sweet, orange-colored fruit was developed by the University of California in Riverside. It is now a popular citrus fruit in stores today.

Farmers must protect their trees from winter frost and summer "sunburn." Perhaps you have seen some trees painted with white paint to protect the trunks from the sun. During the winter, growers must protect their trees from too much water. If this is a challenge, tree trunks are painted with a substance that is greenish-blue. This chemical prevents wet trees from getting diseases that are caused by bacteria and fungi that grow on wet citrus roots.

All citrus farmers must protect their trees from insects and other pests. The most common **pest** is the common garden snail. Copper rings are placed around citrus trunks. This produces a physical barrier that, if crossed by the snails, will emit an electrical shock. Garden snails are also controlled by the release of special types of carnivorous snails. These special snails eat the harmful snails and do not eat any plants. You may also research other citrus pests, such as the "citrus bud mite."

Lemons are usually smaller than grapefruit and are generally more sour than grapefruit. There is one exception to this, however. The Ponderosa lemon tree produces lemons that weigh approximately two pounds each! They have a very mild lemon flavor similar to the taste of the lemon flavor in lemonade.

Interest Approach - Engagement

1. Show the students a grapefruit and lemon. Pass the fruit around and have the students examine the shape, size, color, and smell of each fruit.
2. Tell the students they will be comparing and contrasting these two types of citrus fruits grown in California, Arizona, and Florida.
3. Pass out the *Lemon & Grapefruit Venn Diagram* found in the *Essential Files* and have students fill this out by comparing and contrasting what they notice while observing each fruit.

Procedures

Activity One:

1. Project the [Citrus Fruits Commodity Fact Sheet](https://cdn.agclassroom.org/media/uploads/2017/12/07/citrus_fruit_commodity_fact_sheet.pdf) (https://cdn.agclassroom.org/media/uploads/2017/12/07/citrus_fruit_commodity_fact_sheet.pdf) onto a large screen. Arrange the students so they can see and participate in a shared reading of the fact sheet.
 - *Shared reading is an instructional strategy used by teachers as an interactive reading experience. Students join in or share the reading responsibilities on an enlarged text while guided and supported by an experienced reader or teacher.*
2. After reading about citrus fruits, organize the students into small groups and have the groups work cooperatively to add more information to the Venn diagrams they began in the *Interest Approach – Engagement*.
3. Bring the students back together as a whole group and have them sit in a circle to participate in a *Text, Talk, and Time* discussion using their Venn diagrams and the *Citrus Fruits Commodity Fact Sheet*. To see a demonstration of this teaching strategy, watch the video, [Analyzing Texts: Text, Talk, and Time](https://www.teachingchannel.org/videos/analyzing-text-as-a-group). (<https://www.teachingchannel.org/videos/analyzing-text-as-a-group>) Refer to the reminders below to emphasize the rules of this strategy:
 - Thumbs up: Share new information
 - Two fingers: Add to an answer
 - Teacher's hand up: Students are quiet, the next question is asked.
4. Have the students add additional the information gained from the class *Text, Talk, and Time* discussion to their Venn diagrams.

Activity Two:

1. Show the students grapefruit and lemons. Discuss what a cross-section is and cut the fruit in half.
2. Ask the students what they already know about these fruits:
 - "What are the names of the fruit?" (*grapefruit and lemons*)
 - "What kind of fruit are they?" (*citrus*)
 - "What nutrients are they high in?" (*Vitamin C and Olic Acid*)
3. Have students individually complete the "Predictions" section on page one of their A "Sour" Subject lab report.
4. As a class, read and discuss the "Introduction" section of the lab report.
5. Organize students into groups of three to four students.
6. Have students complete the remainder of the lab report following your instructions, which should include:
 - Set-up and clean-up procedures
 - Special hints on how to complete the worksheet
 - Other appropriate information

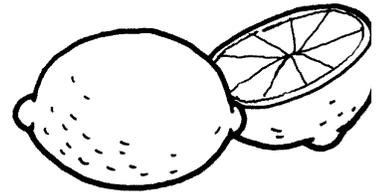
Concept Elaboration and Evaluation

After conducting these activities, review and summarize the following key concepts:

- Grapefruit, lemons, oranges, and limes are citrus fruits. They grow on trees in warm climates such as California, Arizona, and Florida.
- Scientists help citrus farmers develop new and improved varieties of citrus fruits.
- Citrus fruits provide an abundant source of vitamin C.

Variations

- Compare a non-citrus fruit, such as a banana, to a citrus fruit.
- Have students design their own problems related to their data.



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Enriching Activities

- Have students research how naval oranges, which do not have seeds, are cultivated.
- Discuss how increase in trade agreements and technology have enabled countries around the world to grow citrus much cheaper. The importing of such goods affects the American growers and the economy of the United States. Discuss the benefits and risks of international trade.
- Invite a citrus grower to your classroom to discuss their operation.
- Using grocery ads, have students write and solve citrus math word problems.
- Compliment this lesson with reading, writing, and economics activities that incorporate research on the citrus industry in California, Arizona, or Florida.
- Using a "standard" set of data available to all students, have them answer questions such as the following:
 - *If a grapefruit's total mass is 98 grams and the peel, juice, and pulp have a total mass of 96.9 grams, what is the total mass of the seeds?*
 - *If the pulp of a lemon is 42 grams and the total lemon had a mass of 202 grams, what percent of the fruit is pulp?*

Suggested Companion Resources

- [An Orange in January](https://agclassroom.org/matrix/resource/172/) (https://agclassroom.org/matrix/resource/172/)
- [Fruit Bowl](https://agclassroom.org/matrix/resource/1108/) (https://agclassroom.org/matrix/resource/1108/)
- [The Fruits We Eat](https://agclassroom.org/matrix/resource/203/) (https://agclassroom.org/matrix/resource/203/)
- [When Grandma Gives You a Lemon Tree](https://agclassroom.org/matrix/resource/1016/) (https://agclassroom.org/matrix/resource/1016/)
- [What is a Fruit? What is a Vegetable? Bulletin Boards](https://agclassroom.org/matrix/resource/221/) (https://agclassroom.org/matrix/resource/221/)

Author

Pamela Emery

Organization Affiliation

California Foundation for Agriculture in the Classroom

