



A "SOUR" SUBJECT

LESSON PLAN

Grade Level(s)

3 - 5

Estimated Time

75 minutes

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.

Materials

For the teacher:

- Knife

For each group of 3 to 4 students:

- One-half grapefruit
- One-half lemon
- Paper towels
- Balance
- Calculator
- Hand lens
- Small paper cups (2)

For each student:

- A "Sour" Subject student lab report
- Pencil
- *Citrus Fruit Commodity Fact Sheet*
- *Venn Diagram*

Suggested Companion Resources

- [An Orange in January](#) (Book/Booklet)
- [The Fruits We Eat](#) (Book/Booklet)
- [What is a Fruit? What is a Vegetable](#) (Poster)

Vocabulary

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

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

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

Interest Approach or Motivator

1. Show the students a sample of 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 *Venn Diagram* found in the *Essential Files* and have students fill this out comparing and contrasting what they noticed while handling each fruit.

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.

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 can produce fruit three to four times per year which is a unique characteristic of that region.

Over the past several decades (a decade is ten years), more citrus varieties have been developed and commercialized. For example, the Pixie mandarin, a sweet small 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 the snails will not cross, because if they do, they will receive 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.

Procedures

Activity One

1. Place the students in small groups. Ask them to "Popcorn Read" the [Citrus Fruits Commodity Fact Sheet](#).
 - *Popcorn reading is a practice used by teachers when wanting to hear each student read aloud in a random order. A student is chosen to begin reading until they no longer want to read. The reader calls out "popcorn" and selects the next reader. The reading continues until the passage has been read, entirely. Metaphorically, students pop in and out to create accountability in preparation to be called upon as the next reader.*
2. After reading about citrus fruits have the students work cooperatively to add more information to their *Venn Diagram* they began in the Motivator comparing and contrasting grapefruits and lemons.
3. Next, have the students go to an area in the classroom and sit in a circle for a *Text, Talk, and Time* discussion. Tell them to bring their *Venn Diagram* and their copy of the *Citrus Fruits Commodity Fact Sheet*. To see a demonstration of this teaching strategy, watch the video, [Analyzing Texts: Text, Talk, and Time](#). 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. The students will return back to their desks and add additional information to their Venn Diagrams that was gained from the class *Text, Talk, and Time* discussion. This completed document will account as their pre-lab research.

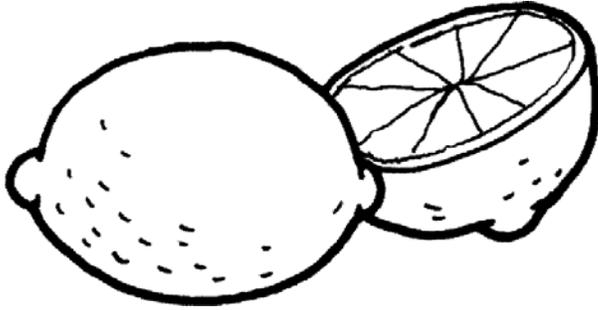
Activity Two

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.

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

- [A "Sour" Subject Student Lab Report](#)
- [Venn Diagram](#)

Essential Links

- [Citrus Fruit Commodity Fact Sheet](#)
- [Text, Talk, Time Video](#)

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.

Enriching Activities

- 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?*
- Compliment this lesson with reading, writing, and economics activities that incorporate research on the citrus industry in California.
- Using grocery ads, have students write and solve citrus math word problems.
- Invite a citrus grower to your classroom to discuss their operation.
- Discuss how increase in trade agreements and technology have enabled countries around the world to grow citrus much cheaper than Americans can. The importing of such goods does affect the American growers and the economy of the United States. Discuss the benefits and risks of international trade.
- Have students research how naval oranges, which do not have seeds, are cultivated.

Author(s)

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Organization Affiliation

California Foundation for Agriculture in the Classroom

- [Agricultural Literacy Outcomes](#)
- [Education Content Standards](#)
- [Common Core Connections](#)

Agricultural Literacy Outcomes

Culture, Society, Economy & Geography

- Provide examples of agricultural products available, but not produced in their local area and state

Science, Technology, Engineering & Math

- Identify examples of how the knowledge of inherited traits is applied to farmed plants and animals in order to meet specific objectives (i.e., increased yields, better nutrition, etc.)

Food, Health, and Lifestyle

- Identify food sources of required food nutrients