Lesson #602

A "Sour" Subject

Grades 5-6

Editor
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California Foundation for Agriculture in the Classroom

Vision: An appreciation of agriculture by all.

Mission: To increase awareness and understanding of agriculture among California's educators and students.

California Foundation for
Agriculture in the Classroom

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California Foundation for Agriculture in the Classroom

A "Sour" Subject

Purpose

The purpose of this activity is for students to reinforce their skills of observation, mathematical computation, and written expression by comparing and contrasting grapefruits and lemons.

Time

One 50-minute session

One 20-minute follow-up session

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 worksheet
- Pencil

Procedure

1. Show the students the 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 folic acid)*
3. Have students individually complete the "Predictions" section of their worksheets.
4. As a class, read and discuss the "Introduction" section of the lesson.
5. Organize students into groups of three to four.
6. Have students complete the remainder of the lesson following your instructions, which should include:
   - Set-up and clean-up procedures
   - Special hints on how to complete the worksheet
   - Other appropriate information

Assessment

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?

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Content Standards

Grade 5

Reading/Language Arts
Reading 2.0, 2.1
Written and Oral Language Conventions 1.0, 1.4

Mathematics
Number Sense 1.0, 1.2
Statistics, Data Analysis and Probability 1.0, 1.3
Mathematical Reasoning 1.0, 1.2, 2.0, 2.3

Grade 6

Reading/Language Arts
Reading 2.0
Written and Oral Language Conventions 1.0, 1.4

Mathematics
Number Sense 1.0
Mathematical Reasoning 1.0, 1.3, 2.0, 2.4

Variations and Extensions

- Compare a non-citrus fruit, such as a banana, to a citrus fruit.
- Invite a citrus grower to your classroom to discuss their operation.
- Have the students design their own problems related to their data.
- Using grocery ads, have students write and solve citrus math word problems.
- Have students research how naval oranges, which do not have seeds, are cultivated.
- Compliment this lesson with reading, writing, and economics activities that incorporate research on the citrus industry in California.
- 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.

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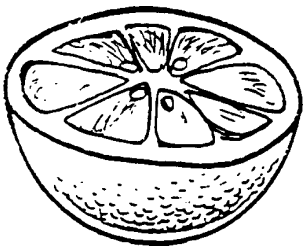
Name _____

Team Member Names _____

_____

_____



Today, we will continue our study of percentages as we compare and contrast a grapefruit to a lemon. "Compare" means to find similarities between items. "Contrast" means to find differences between two or more items.

Predictions

Complete the following sentences:

I think grapefruit and lemons are similar because _____

_____

_____

_____

_____

I think grapefruit and lemons are different because _____

_____

_____

_____

_____

Introduction

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 naval variety, which is a seedless fruit eaten fresh.

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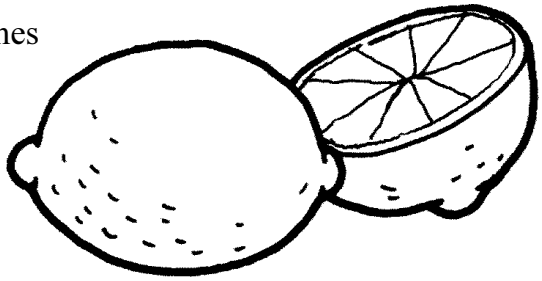
Grapefruit, as do lemons, grow on evergreen trees whose leaves have a waxy cuticle covering. Grapefruit were given their name when people noticed that they grow in clusters—just like grapes grow in clusters. Grapefruit trees produce best when they are grown in places that have hot summers and winters 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 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—this is unique to that region.



Over the past several decades (a decade is ten years), more citrus varieties have been developed and commercialized. 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 the 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. Perhaps you might be interested in researching other citrus pests, such as the "citrus bud mite."

Lemons are usually smaller than grapefruit and generally are 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.

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True or False?

_____ Grapefruit and lemons are grown on trees that stay green all year long.

_____ Lemons are *never* larger than grapefruits.

_____ Lemon and grapefruit trees can become sunburned.

_____ California farmers do not grow lemons or grapefruit.

_____ Grapefruits grow in clusters.

Procedure

1. Obtain ½ grapefruit, ½ lemon, and other supplies as indicated by your instructor.
2. Examine the fruit. Draw a cross section of each fruit. Make sure you illustrate the exact number of segments and any seeds you see. The more detail you can add, the better.

Grapefruit Cross Section	Lemon Cross Section

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3. Complete the chart below, using a balance, if necessary. Follow your teacher's instructions on set-up and clean-up procedures.

	Grapefruit		**Lemon**	
	One-half Fruit	Whole Fruit*	One-half Fruit	Whole Fruit*
A. Total Mass**				
B. Mass of Peel				
C. Mass of Juice				
D. Mass of Seeds				
E. Mass of Pulp				
F. Number of Seeds				

* The whole fruit masses can be estimated by multiplying the one-half fruit answers by two.

** B + C + D + E should equal A. Do you know why? Why do you suppose this may not be true with the actual data gathered?

4. Carefully observe several seeds of each fruit using a dissecting microscope or hand lens. In the space below, draw several seeds of each fruit.

Grapefruit Seeds	**Lemon Seeds**

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5. As a group, determine a procedure for finding the percentages of each part of the fruit. Describe how your group will find the percentages. _____

_____

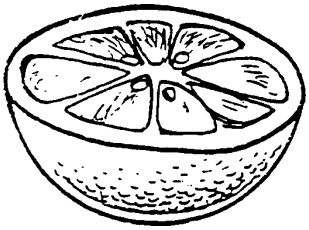
_____

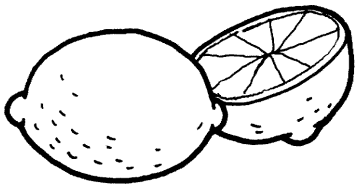
_____

_____

6. Using the procedure you described above, complete the chart below.

Percentages	Grapefruit	Lemon
% of Peel		
% of Juice		
% of Seeds		
% of Pulp		





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Conclusion

Skim over the introduction and your data.

1. In a well-written paragraph, compare grapefruit to lemons (similarities).

_____

_____

_____

_____

_____

_____

_____

_____

_____

2. In a well-written paragraph, contrast grapefruit to lemons (differences).

_____

_____

_____

_____

_____

_____

_____

_____

_____

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Teacher Resources and References

Brokaw Nursery

This nursery produces citrus and avocado trees. Their Web site provides information on a variety of citrus plants and links to other sites with citrus information.

Web site: www.brokawnursery.com

Citrus Fruits Fact and Activity Sheet

This California specific fact sheet includes information on citrus fruit production, history, nutrition, and economic value. The activity sheets provide specific lesson ideas and fun facts on citrus fruits. Fact sheets on other California products and resources are also available. Free.

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Web site: www.cfaitc.org

Dole 5 A Day Nutrition Education Materials

The 5 A Day Adventures CD-ROM program engages students in fun, action-packed adventures in 5 A Day Land where they can learn about nutrition, the importance of eating 5 to 9 servings of fruits and vegetables a day, physical activity and goal setting. Tapes and activities are also available. The Dole 5 A Day Web site has educationally compelling activities for both teachers and students. Free.

Dole Food Company
Nutrition and Health Program
100 Hegenberger Road, Suite 100
Oakland, CA 94621
(510) 639-5550
Fax: (510) 639-5556
Educator E-mail:
Nutrition_Program@NADole.com
Student E-mail: 5AdayFriends@NADole.com
Web site: www.dole5aday.com

Fruits and Vegetables for Me

At this Web site, you will find lots of great information on fruit and vegetables as well as sport, games, competitions, prizes, links to other sites.

Web site: www.fandvforme.com.au

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Teacher Resources and References

Inside an Orange: It's a Juicy Story

This colorful teacher's guide with blackline masters helps students understand the role of fruits and vegetables, particularly citrus, in maintaining a balanced diet. Four activities included. Student activities and other items available on the Sunkist Web site. Free.

Sunkist Growers
Consumer Affairs MS 236
Post Office Box 7888
Van Nuys, CA 91409
(818) 379-7455
Web site: www.sunkist.com

Produce for Better Health Foundation

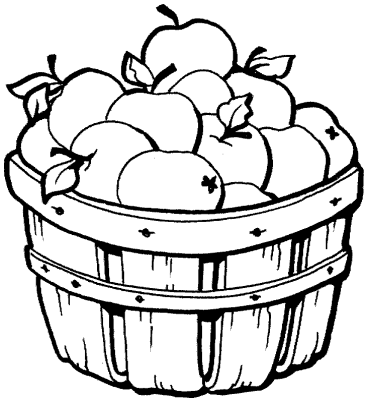
This organization promotes the "Eat 5 A Day" message and has a variety of materials available to educators, food service providers, athletic trainers, and retail stores. Many links for educators and students are available on the Web site. Many citrus activities and information are listed on the Web site.

Produce for Better Health Foundation
5301 Limestone Road, Suite 101
Wilmington, DE 19808-1249
(888) 391-2100
Fax: (302) 235-5555
Web site: www.5aday.com

Tall and Tasty Fruit Trees

This book describes a variety of fruits including citrus, apples, peaches, mangoes, and figs. It includes the history of each fruit and detailed pictures of planting, harvesting, and fruit anatomy. $26.60 plus shipping and handling.

Lerner Publishing Group
1251 Washington Avenue North
Minneapolis, MN 55401-1036
(800) 328-4929
Fax: (800) 332-1132
E-mail: custserve@lernerbooks.com
Web site: www.lernerbooks.com



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Content Standard Details

Content Standards for California Public Schools Addressed in *A "Sour" Subject**

Obtained from the California Department of Education

Grade 5	
Standard	**Standard Description**
Reading/Language Arts	
Reading 2.0	Students read and understand grade-level appropriate material.
Reading 2.1	Students understand how text features make information accessible and usable.
Written and Oral Language Conventions 1.0	Students write and speak with a command of standard English conventions appropriate to fifth grade.
Written and Oral Language Conventions 1.4	Students use correct capitalization.
Mathematics	
Number Sense 1.0	Students compute with very large and very small numbers, positive integers, decimals, and fractions and understand the relationship between decimals, fractions, and percents.
Number Sense 1.2	Students can interpret percents as a part of a hundred; find decimal and percent equivalents for common fractions and explain why they represent the same value, and can compute a given percent of a whole number.
Statistics, Data Analysis and Probability 1.0	Students display, analyze, compare, and interpret different data sets, including data of different sizes.
Statistics, Data Analysis and Probability 1.3	Students use fractions and percentages to compare data sets of different sizes.
Mathematical Reasoning 1.0	Students make decisions on how to approach problems.
Mathematical Reasoning 1.2	Students determine when and how to break a problem into simpler parts.
Mathematical Reasoning 2.0	Students use strategies, skills, and concepts in finding solutions.
Mathematical Reasoning 2.3	Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

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Content Standard Details

Grade 6	
Standard	**Standard Description**
Reading/Language Arts	
Reading 2.0	Students read and understand grade-level appropriate material.
Written and Oral Language Conventions 1.0	Students write and speak with a command of standard English conventions appropriate to this grade level.
Written and Oral Language Conventions 1.4	Students use proper capitalization.
Mathematics	
Number Sense 1.0	Students solve problems involving fractions, ratios, proportions, and percentages.
Mathematical Reasoning 1.0	Students make decisions on how to approach problems.
Mathematical Reasoning 1.3	Students determine when and how to break a problem into simpler parts.
Mathematical Reasoning 2.0	Students use strategies, skills, and concepts in finding solutions.
Mathematical Reasoning 2.4	Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

* For a complete listing of the Content Standards for California Public Schools, contact CDE Press, Sales Office, California Department of Education, Post Office Box 271, Sacramento, CA 95812-0271; (916) 445-1260, www.cde.ca.gov.