Mandarins

1. **Write a story describing the delivery of ripe citrus fruit from the farm to the consumer. Include information about the delivery and absorption of nutrients found in the citrus fruit in the human body, especially how these nutrients are used to keep the body healthy.**

   Primary-level response:
   Citrus fruit are not only tasty but they are also very nutritious; they are a rich source of vitamins, minerals, and fiber.

   Citrus fruit provide vitamin C (ascorbic acid), which is an antioxidant. Antioxidants help prevent damage to cells within our bodies. We need antioxidants to keep our eyes, immune systems, and hearts healthy. Citrus fruits also give us vitamin A to keep our eyes healthy and carbohydrates to give us energy.

   Vitamin A falls into two separate categories depending if it comes from an animal food source or plant food source. If it comes from an animal, it is absorbed in the form of retinol. Vitamin A from plant sources is absorbed as provitamin A and is then made into retinol by the body. Vitamin A is a fat soluble vitamin meaning it is absorbed, stored, and transported in fat. Your body stores vitamin A in fatty tissues so high intakes can be toxic.

   Vitamin C is a water soluble vitamin, which means it dissolves in water and passes into the blood during digestion. The body does not store vitamin C so you need to replenish it in the diet. Some plants and animals are able to make their own ascorbic acid. They have enzymes that change glucose to ascorbic acid. Unfortunately, humans do not have this ability and must get vitamin C through their diet.

   Secondary-level response:
   Citrus fruit are not only tasty but they are also very nutritious; they are a rich source of vitamins, minerals, and fiber. Citrus fruit are also a source of flavonoids that have antioxidant properties and can help prevent certain disease.

   Citrus fruit provide vitamin C, which is an antioxidant. Antioxidants help prevent damage to cells within our bodies. When cells are damaged it can lead to certain

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diseases like cancer. We also need antioxidants to keep our vision, immune systems, and hearts healthy. Vitamin A is also found in citrus fruit. We need vitamin A for healthy vision and to prevent night blindness.

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Citrus fruit have no sodium or cholesterol but provide carbohydrates, compounds made up of sugars. The function of carbohydrates is to supply energy and provide bulk in the form of cellulose (needed for digestion).

2. **Using MyPyramid, determine how much vitamin C you need daily. Are you getting enough vitamin C? List foods you eat that are rich in vitamin C.**

Primary/Secondary-level response:
Answers will vary. Students can use the following resources to help with their search.

- The MyPyramid Tracker (www.mypyramidtracker.gov) is an online dietary assessment tool that provides information regarding diet quality and allows you to put in a day's worth of dietary information and receive an evaluation of your nutrient intake.
- USDA Nutrient Database can be used to analyze nutrient content of snacks along with label reading: www.nal.usda.gov/fnic/foodcomp/search/
- Some examples of foods that provide vitamin C: guava, red peppers, oranges, orange juice, grapefruit, grapefruit juice, kiwi and strawberries.

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Recommended Dietary Allowance (RDA) for Vitamin C			
Life Stage	**Age**	**Males (mg/day)**	**Females (mg/day)**
Infants	0-6 months	40 (AI)	40 (AI)
Infants	7-12 months	50 (AI)	50 (AI)
Children	1-3 years	15	15
Children	4-8 years	25	25
Children	9-13 years	45	45
Adolescents	14-18 years	75	65
Adults	19 years and older	90	75
Smokers	19 years and older	125	110
Pregnancy	18 years and younger	-	80
Pregnancy	19 years and older	-	85
Breast-feeding	18 years and younger	-	115
Breast-feeding	19 years and older	-	120

Chart source: http://lpi.oregonstate.edu/infocenter/vitamins/vitaminC/

3. According to the USDA, there are three main citrus species and many hybrid cultivars. What are the three main species? What are the hybrid cultivars and what species were crossed to create these hybrids? (See *Adventurous Activities* on page 4 for follow-up activity.)

Primary/Secondary-level response:
Main species:

1. Mandarin – *Citrus reticulata*
2. Citron – *Citrus medica*
3. Pummelo – *Citrus maxima*

Hybrid cultivars:

1. Orange – Citrus x sinensis (mandarin and pomelo)
2. Grapefruit – *Citrus paradisi*
3. Tangelo – *Citrus tangelo* (mandarin and grapefruit)

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4. Tangor – *Citrus* x *reticulata* hybrid (King, Murcott, Temple mandarins)
5. Lemon – *Citrus* x *limon (citron and mandarin)*
6. Lime – *Citrus aurantifolia (pomelo and mandarin)*

4. How are seedless citrus fruit trees developed?

Primary/Secondary-level response:
Most citrus flowers contain both sexes within a single flower – the anthers containing the pollen hold the male sex cells (or sperm) and the pistil is the female part containing the ovary. The ovary also contains the ovules which will become seeds if pollinated and fertilized. Flowers that produce few or no pollen and few functioning ovules will have few, if any, seeds. Some citrus varieties can produce fruit without the stimulation of pollination and fertilization that results in seed development. Growers can then develop the seedless citrus fruits by grafting.

Sources:
www.cfaitc.org
http://ucce.ucdavis.edu
www.mypyramidtracker.gov
www.nal.usda.gov/fnic/foodcomp/search/

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