

Mandarins

1. Write a story describing the journey of a ripe citrus fruit from the farm to the consumer and how its nutrients are used in the human body.

Answers will vary.

A **nutrient** is any element or compound necessary for, or contributing to, an organism's metabolism, growth, or other functioning. Six nutrient groups exist, classifiable as those that provide energy and that otherwise support metabolic processes in the body: Some of them are essential because they cannot be synthesized in the body and must be obtained from a food source.

Substances that provide energy:

- Carbohydrates are compounds made up of sugars. The function of carbohydrates is to supply energy and provide bulk in the form of cellulose (needed for digestion).
- Proteins are organic compounds that consist of amino acids joined by peptide bonds. The body does not manufacture certain amino acids (termed essential amino acids); the diet must supply these. The function of proteins is to build and repair tissues; help make antibodies, enzymes, hormones, and some vitamins; and regulate fluid balance in the cells and other body tissues.
- Fats are needed to keep cells functioning properly, to insulate the body's organs against shock, to keep body temperature stable, and to maintain healthy skin and hair. The body does not manufacture certain fatty acids (termed essential fatty acids); the diet must supply these. Fats add flavor and satisfying quality to foods.

Substances that support metabolism:

- Minerals are generally trace elements, salts, or ions such as copper and iron. These minerals are essential to human metabolism. The function of minerals is to build bones, teeth, tissues, and body fluids, and to regulate body processes. (For example, calcium helps blood clot and keeps heart muscles and nerves working properly. Phosphorus helps balance the alkalies and acids in the blood. Magnesium helps keep the nervous system working properly, helps regulate the body's temperature, and helps muscles contract).

- Vitamins are organic compounds essential to the body. They usually act as coenzymes for various proteins in the body. Vitamins function as regulators needed in small amounts for growth, maintenance, and reproduction. The function of vitamin A is to help prevent night blindness, help keep skin clear and smooth, promote growth, and help mucus membranes stay healthy. The function of vitamin D is to help build strong bones and teeth. The function of vitamin K is to help clot blood. The function of vitamin C is to help the body fight infection, promote healthy gums and tissues, and help wounds heal. The B-vitamin thiamin helps promote normal appetite and digestion; it forms part of the coenzymes needed for breaking down carbohydrates, helps keep the nervous system healthy and prevents irritability, and helps the body release energy from food. The B-vitamin riboflavin helps cells use oxygen and forms part of the coenzymes needed to breakdown carbohydrates. The B-vitamin niacin helps keep the nervous system healthy and helps cells use other nutrients. Vitamins A, D, E, and K are fat-soluble vitamins that can be stored in the body. Vitamin C and the B-complex vitamins are water-soluble vitamins that cannot be stored by the body.
- Water is an essential nutrient and is directly involved in all the chemical reactions of life. Water aids in proper digestion; plays a role in cell growth, cell maintenance, and all chemical reactions in the body; lubricates the joints and body cells; and regulates body temperature.

2. What nutrients do citrus fruits provide and what are the levels recommended to help keep you healthy? Determine if you are getting these levels and, if not, make a plan to eat at least one citrus fruit each day.

Citrus fruits are known for their high vitamin C content. Vitamin C, also known as ascorbic acid, helps maintain strong gums and healthy body tissues, including the skin; aids in the absorption of iron in the body; and helps keep capillaries healthy (to avoid bruising). Vitamin C also helps prevent the disease called scurvy.

Following are the Dietary Reference Intakes levels for children (age 4) through adults.

Age	RDA for Vitamin C (mcg/day)
4-8	25
9-13	45
14-18 males	75

19-70 males	90
14-18 females	65
19-70 females	75

Some mandarin varieties are also a good source of vitamin A. Vitamin A helps in the process of cell reproduction and is a central component for healthy vision (it is required for the transduction of light into nerve signals in the retina).

Orange and yellow citrus fruits also contain carotenoids and bioflavonoids – two phytochemicals with antioxidant properties.

Age	RDA for Vitamin A (mcg/day)
4-8	400
9-13 males	600
14-18 males	900
19-70 males	900
9-13 females	600
14-18 females	700
19-70 females	700

- 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.)**

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)
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?

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

www.ucce.ucdavis.edu

www.en.wikipedia.org

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