



SCIENCE

STUDENT BOOK

▶ **8th Grade | Unit 4**

SCIENCE 804

Health And Nutrition

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Health And Nutrition

Introduction

“And God said, Let us make man in our image, after our likeness...” (Genesis 1:26).

When we truly believe we are made in God’s image, we really want to take good care of ourselves! Look at a mirror like the boy in the illustration. What do you see?

Is your skin clear? Are your eyes bright? Are your teeth shiny and white? Did you have a good breakfast today? Hmmm? Are you taking care of the temple of His Holy Spirit?

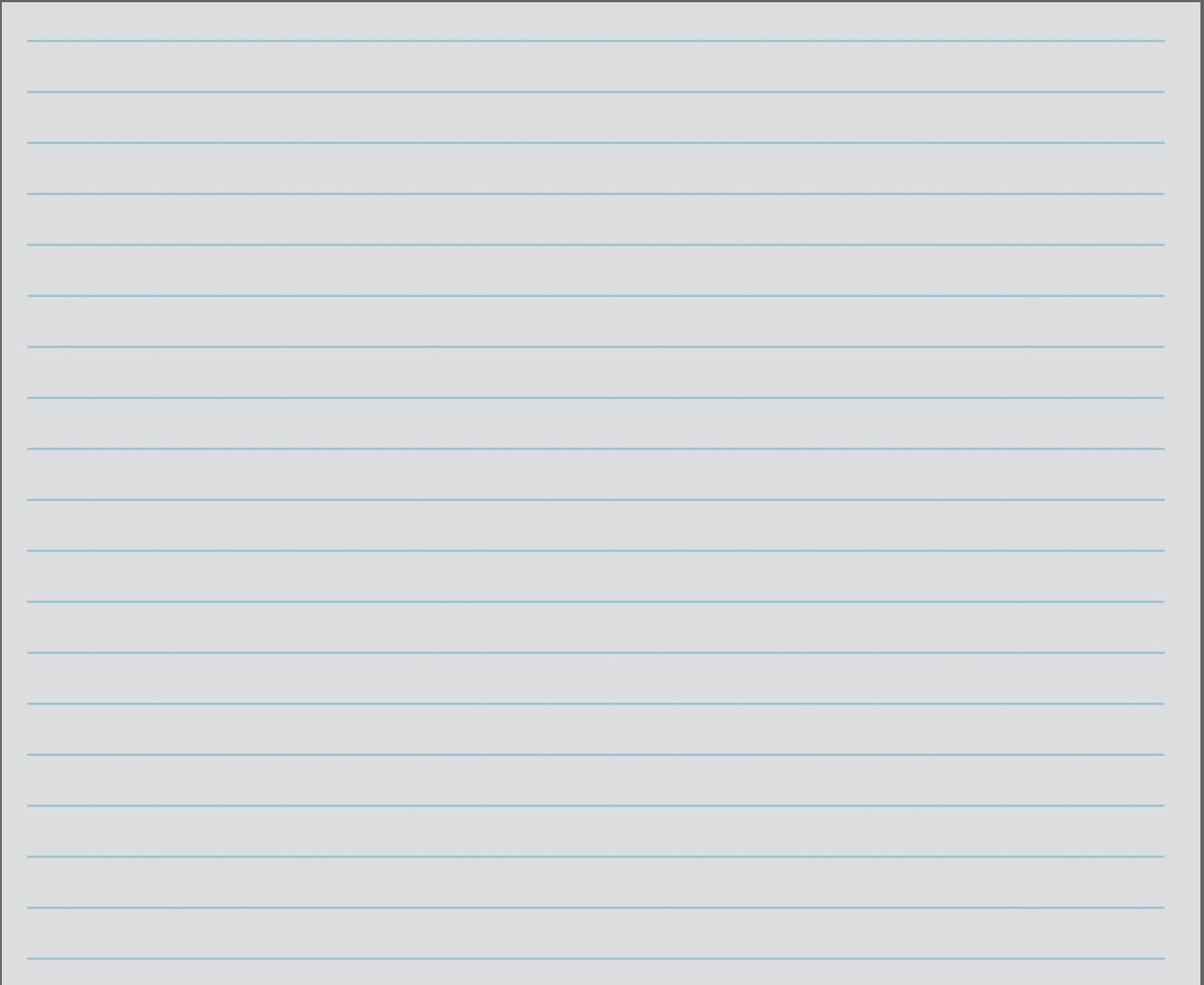
In this LIFEPAK® you will get some basic information about your body, good nutrition, nutritional diseases, and proper hygiene. You will enjoy learning about the miracle of your created body and how to care for it.

Objectives

Read these objectives. The objectives tell you what you will be able to do when you have successfully completed this LIFEPAK. When you have finished this LIFEPAK, you should be able to:

1. Name the six kinds of nutrients.
2. Define each nutrient.
3. Identify the function of each kind of nutrient and certain specific vitamins and minerals.
4. Draw a simple schematic of the human digestive system.
5. Select and categorize foods into the five food groups.
6. Plan a one-day menu using the correct amounts of food for each food group.
7. Match each digestive organ with its digestive function.
8. List five basic “do’s” in the care of your body.
9. Explain the importance of nutrition to healthy hair, skin, and teeth.
10. Identify specific nutritional diseases and their causes.
11. Compare nutritional adequacy of modern refined foods to the Lord’s original gifts of foods for us.
12. Explain what you believe about being the “temple of His Holy Spirit” in relation to the care of your body.

Survey the LIFEPAK. Ask yourself some questions about this study and write your questions here.

A large rectangular area with horizontal blue lines for writing. The lines are evenly spaced and extend across the width of the box, providing a template for students to write their questions.

1. FOODS AND DIGESTION

Nutrients are all those substances in foods that promote growth, repair body tissue, provide energy, and keep cells healthy and functioning properly. If your body does not get the correct amounts of all the nutrients it requires, certain parts will not function the way they should.

Disease may begin and remain unnoticed until it becomes serious.

The body must process foods both mechanically and chemically in order to get the good out of them. This process, digestion, and the body organs involved will be a part of what you learn in this section.

SECTION OBJECTIVES

Review these objectives. When you have completed this section, you should be able to:

1. Name the six kinds of nutrients.
2. Define each nutrient.
3. Identify the function of each kind of nutrient and certain specific vitamins and minerals.
4. Draw a simple schematic of the human digestive system.
5. Match each digestive organ with its digestive function.

VOCABULARY

Study these words to enhance your learning success in this section.

absorption (ab sôrp´ shun). The process of passing into the bloodstream or lymph system the materials of nutrition.

amino acid (u mē´ nō as´ id). Any of a group of essential substances containing nitrogen that form the building blocks of protein.

cell (sel). Basic unit of living things.

complex (kum pleks´). Intricate, not simple, composed of two or more related parts.

energy (en´ ur jē). Internal power available to do work.

enzymes (en´ zī mz). Complex chemical substances in the body which cause other substances to split up or form.

evaporation (i vap´ u rā shun). The process of losing moisture or drying out.

function (funk´ shun). To perform in the required way.

hormones (hor´ mō nz). Chemical substances formed in certain organs of the body; necessary for body growth and digestion.

metabolism (mu tab´ u liz um). Chemical and physical processes going on in the body breaking down food, releasing energy, and building up new cells.

molecule (mol´ u kyül). Smallest piece (particle) of any substance that still remains that substance.

schematic (skē mat´ ik). Having to do with a diagram or simplified drawing of something

soluble (sol´ yu bul). Able to be dissolved; able to go into solution.

Note: All vocabulary words in this LIFEPAK appear in **boldface** print the first time they are used. If you are not sure of the meaning when you are reading, study the definitions given.

Pronunciation Key: hat, āge, cāre, fār; let, ēqual, tērm; it, ĩce; hot, ōpen, ōrder; oil; out; cup, pūt, rüle; child; long; thin; /ʒh/ for then; /zh/ for measure; /u/ represents /a/ in about, /e/ in taken, /i/ in pencil, /o/ in lemon, and /u/ in circus.

SIX KINDS OF NUTRIENTS

Six basic kinds of nutrients are carbohydrates, fats, proteins, minerals, vitamins, and water. All foods will contain one or more of these nutrients.

Carbohydrates. Carbohydrates are foods containing carbon, hydrogen, and oxygen. Carbohydrates are found in sugar and starchy foods such as bread, cake, candy, cereal, potatoes, and many other foods. In fact, this nutrient is the easiest one to get because so many foods contain carbohydrates.

Why do we need this nutrient? We need it for **energy**. Carbohydrates quickly dissolve and enter the bloodstream, giving us quick energy.

Fats. A fat is an oily or greasy animal or vegetable substance. Fats are another source of energy, but this nutrient is not used by the body as rapidly as are carbohydrates. Healthy skin requires “essential fatty acids.” Vitamins A, D, E, and K are fat-**soluble** and must be carried by fat **molecules** in the bloodstream.

Fats are stored throughout the body as fatty **cells**. We need very little actual oil or fat in our daily diet. Peanuts, meat, butter, milk, cheese, and salad dressing contain fat.

Proteins. Proteins are foods containing carbon, hydrogen, oxygen, and nitrogen in **complex amino acids**. These amino acids are essential to the diet of all people and animals.

The building blocks of all cells are *amino acids*. Twenty-one different kinds are essential. They are only found in foods containing protein. Without the necessary amino acids, cells cannot reproduce or repair themselves. They are also needed to help form antibodies in the blood that fight infection. Protein aids in production of **hormones** and **enzymes** and provides energy when carbohydrates and fats are gone.

Meat, fish, poultry, eggs, milk, cheese, dried beans, peas, whole-grain cereals, and many other foods contain protein. Not all protein is “complete” (contains all the essential amino acids). Therefore, we need many types of protein foods daily.

**Complete these statements.**

- 1.1 *Carbohydrates* are needed by the body for _____ .
- 1.2 Fats can be used by the body for _____
_____ .
- 1.3 *Proteins* are necessary (essential) to the body for _____
_____ .
- 1.4 *Carbohydrates* can be found in bread, _____
_____ .
- 1.5 *Protein* is found in meat, _____
_____ .

TEACHER CHECK

_____ initials

_____ date

Minerals. Minerals are substances that are neither animal nor vegetable. Minerals are found all through earth, rock, and water. Minerals in foods are essential in the daily diet. These substances occur naturally in plants through **absorption** of dissolved minerals in water.

Many minerals are essential to our good health. They combine with other nutrients to perform a variety of **functions**. A few of the most necessary minerals your body needs are calcium, phosphorus, iron, and iodine.

Calcium is found in milk, cheese, and dark green vegetables (including broccoli, kale, and turnip greens). Calcium is used in the body to form bones and teeth. It helps blood to clot and helps keep the heart beating. Calcium helps muscles and nerves work and helps regulate the use of other minerals in your body.

Phosphorus is found in the same foods that supply calcium. Phosphorus is also found in seafood, meats, eggs, cereals, and most vegetables. It is needed by bones, teeth, and nerve fibers. Phosphorus is needed by all cells in

small amounts to help them use other nutrients for energy.

Iron is found in liver; eggs; meat; green, leafy vegetables; beets; raisins; dried apricots; dried beans and peas; and whole grain cereals. Iron is needed by all cells, but especially by red blood cells to help carry oxygen.

Iodine is only found in seafood, in plants grown in soil near the sea, and in iodized table salt. Iodine is absolutely necessary in the body to help control the rate of **metabolism** of your food.

Other minerals needed for your body to be healthy are small amounts of copper, magnesium, sulfur, and sodium.

Vitamins. Vitamins are complex organic substances in small amounts in the diet for normal growth and health. Unlike carbohydrates, fats, and proteins, vitamins do not supply energy. They are essential for the use of energy by the body and the regulation of metabolism. Without vitamins, normal growth and health are not possible. The main vitamins and their uses in the body are shown in the following table.

Vitamin	Principal Function	Foods
<i>Vitamin A</i>	Helps keep skin healthy, mucous membranes firm and resistant to infection; protects against night blindness, promotes healthy eyes.	Milk; butter; vegetables; egg yolk; cheese; liver
<i>The B Vitamins</i> B-1 Thiamin B-2 Riboflavin B-3 Niacin B-6 B-9 Folic Acid B-12	Major substances in the release of energy from food; helps the nervous system function properly, helps keep appetite and digestion normal, helps prevent anemia, helps enzyme and body chemistry to function normally.	Meat; fish; poultry; eggs; dried peas; dried beans; milk; cheese; whole grains; green, leafy vegetables; peanuts
<i>Vitamin C</i> Ascorbic Acid	Helps in forming blood cells, helps make walls of blood vessels firm, helps resist infection, helps prevent fatigue, aids in healing, prevents scurvy.	Citrus fruits, most fruits and vegetables (eaten raw)
<i>Vitamin D</i>	Helps the body absorb calcium from digestive tract, helps build calcium and phosphorus into bones.	Milk fortified with vitamin D; butter; fish liver oil; sunshine
<i>Vitamin E</i>	Helps cells to function normally.	Vegetable oils; wheat germ; liver; whole grains; lettuce
<i>Vitamin K</i>	Helps blood to clot.	Green vegetables

Water. Water is not always considered a nutrient, but you could live only a few days without it. Water is needed to carry nutrients to cells and to carry away their waste products. Your body is about 70 percent water.

Each day you lose about six pints (3 liters) of water. Water evaporates from your lungs and

skin constantly. This **evaporation** helps regulate your body temperature as food is oxidized (burned) for energy. You do not need to drink six pints (twelve cups) of water each day to replace your loss. Water is in every liquid you drink. Even solid food contains much water. Four to eight glasses of water, including milk and juices, is enough.



Memorize this poem. This fun poem may help you remember some of the vitamins and their functions.

Vitamin Values

Vitamin A
Keeps night blindness away,
And E helps regulate cells.
Vitamin D
Makes strong bones, you see,
While C heals scurvy quite well.
The vitamins B,
As you can tell me,
Are many and functionally varied.
So make sure you eat
Nuts, grains, and meat,
Vegetables, and foods from the dairy.

Memorize this poem and recite it to either a friend, your parents, or your teacher.

HELPER CHECK

initials

date



Match these nutrients with their functions. Put the letter of the nutrient on the blank beside the function.

	FUNCTION	NUTRIENT
1.6	_____ used by the body to form bones and teeth, helps blood clot, helps muscles and nerves work normally	a. Vitamin E b. iron
1.7	_____ similar to calcium; needed by all cells in small amounts to help them use other nutrients for energy	c. Vitamin C d. Vitamin A
1.8	_____ needed by all cells, especially by red blood cells, to help carry oxygen	e. calcium f. Vitamin B
1.9	_____ helps control rate of metabolism of food	g. iodine
1.10	_____ helps keep skin healthy, protects against night blindness, promotes healthy eyes	h. Vitamin K i. water
1.11	_____ helps release energy from food, keeps healthy nervous system, keeps healthy appetite and digestion, helps prevent anemia, helps body chemistry to function normally	j. Vitamin D k. phosphorus
1.12	_____ helps in forming blood cells, helps resist infection, helps prevent fatigue and aids in healing, prevents scurvy	
1.13	_____ helps body use calcium and phosphorus to form strong bones	
1.14	_____ helps blood to clot	
1.15	_____ helps cells function normally	
1.16	_____ necessary to carry nutrients to cells and carry away waste products	

Complete these statements.

1.17 The six basic nutrients are a. _____, b. _____, c. _____, d. _____, e. _____, and f. _____.

1.18 The definition of *carbohydrates* is _____.

1.19 The definition of (nutritional) *fat* is _____.

1.20 The definition of *protein* is _____
_____.

1.21 The definition of *minerals* is _____
_____.

1.22 The definition of *vitamins* is _____
_____.

Complete this table.

Nutrient	Supplied By Foods
1.23 Calcium	
1.24 Phosphorus	
1.25 Iron	
1.26 Iodine	
1.27 Vitamin A	
1.28 Vitamin D	
1.29 Vitamin E	
1.30 B vitamins	
1.31 Vitamin C	
1.32 Vitamin K	
1.33 Protein	
1.34 Carbohydrate	
1.35 Fat	

TEACHER CHECK



_____ initials

_____ date



Let's investigate.

These supplies are needed:

- heat source (electric hot plate)
- white bread
- cooked egg white
- paper towel
- bits of cheese
- glucose test strips (from drugstore to test for sugar in urine)
- dried milk
- soda cracker
- egg yolk
- aluminum foil
- potato slice
- any fruit
- iodine (colored, with dropper)
- bits of green or yellow vegetables
- bits of various food

Follow these directions. Put a check in the box when each step is completed.

The following tests can be done either at home or at school. In either case, share your results with your parents. Test each foodstuff for starch (carbohydrate), protein, minerals, sugar, and fat. Use only a small bit of food for each test. Immediately after each test, record your observations on the chart called Food Test Observations.

STARCH TEST #1

- 1. Chew a small piece of cracker for a few minutes. Do you notice a change? Starch is partly changed to sugar while it is chewed. Saliva in your mouth changes part of the cracker's starch to sugar.
- 2. Record your results on the chart.

STARCH TEST #2

- 1. Place bits of several food samples on a paper towel.
- 2. Drop one or two drops of iodine on each.
- 3. DO NOT EAT these samples.
- 4. Observe. Iodine on starchy foods will change from brown to blue-black. Foods with less starch may take several minutes.
- 5. Record your results on the chart.

SUGAR TEST

- 1. Place a smashed bit of food in a test tube.
- 2. Cover the food with water.
- 3. Heat the test tube in hot water for five minutes.
- 4. Test with a strip of glucose test strips. Check tape with color scale on tape container.
- 5. Record your results.



Food Test Experiment

- 6. Add a little saliva to the mixture in the test tube if there is no sugar reaction.
- 7. Wait a few minutes. If the food contains starch you may see a sugar reaction. Think about why this reaction has occurred.
- 8. Record your results on the chart.
- 9. Repeat Steps 1 through 8 with other foods.

MINERAL TEST

- 1. Put a small bit of crushed fruit or vegetable on a piece of foil. Curve the edges of the foil upward.
- 2. Heat over *low* heat until it stops smoking.
- 3. Take the foil off the electric hot plate very carefully. White or gray ashes left in the foil indicate minerals are present.
- 4. Record your results on the chart.
- 5. Repeat Steps 1–4 for other bits of food. Use new foil for each food.

FAT TEST

- 1. Mash some egg yolk on a single thickness of paper towel.
- 2. Place over a warm light bulb, on a warm surface, or in indirect sunlight.
- 3. After a few minutes scrape the food off and hold the paper up to the light. Foods with a fat will leave a spot of grease on the paper.
- 4. Record your results on the chart.
- 5. Repeat steps 1 through 4 for other foods, such as cheese, crushed peanuts, and butter.

PROTEIN TEST

- 1. Place a small amount of hair on a small piece of aluminum foil.
- 2. Place the aluminum foil and hair on a hot plate. Use high heat.
- 3. Be careful not to burn yourself on the work surface.
- 4. Note the odor. All burning protein tends to smell like burning hair.
- 5. Record your results on the chart.
- 6. Repeat Steps 1 through 5 for other foods, such as cheese and egg white. Use new foil each time.

My son or daughter has given me a full report
on the results of this investigation.

initials

date

TEACHER CHECK

initials

date



Food Test Experiment



Complete this Food Test Observations Chart.

1.36

Food	Tested for	Observation (What you saw, smelled, or tasted, Test #1)	Positive Results?	
			Yes	No
a.				
b.				
c.				
d.				
e.				
f.				
g.				
h.				
i.				
j.				
k.				
l.				
m.				
n.				
o.				
p.				
q.				
r.				
s.				
t.				
u.				
v.				
w.				

DIGESTIVE SYSTEM

If your stomach kept all the food you ate in a day and did not pass the food on, it would look like a basketball! Of course we know your stomach does not have whole hamburgers, whole apples, or neat-looking candy bars in it! You chew them up, right? Well, then what? You swallow, something happens, and in a few hours you feel like eating again.

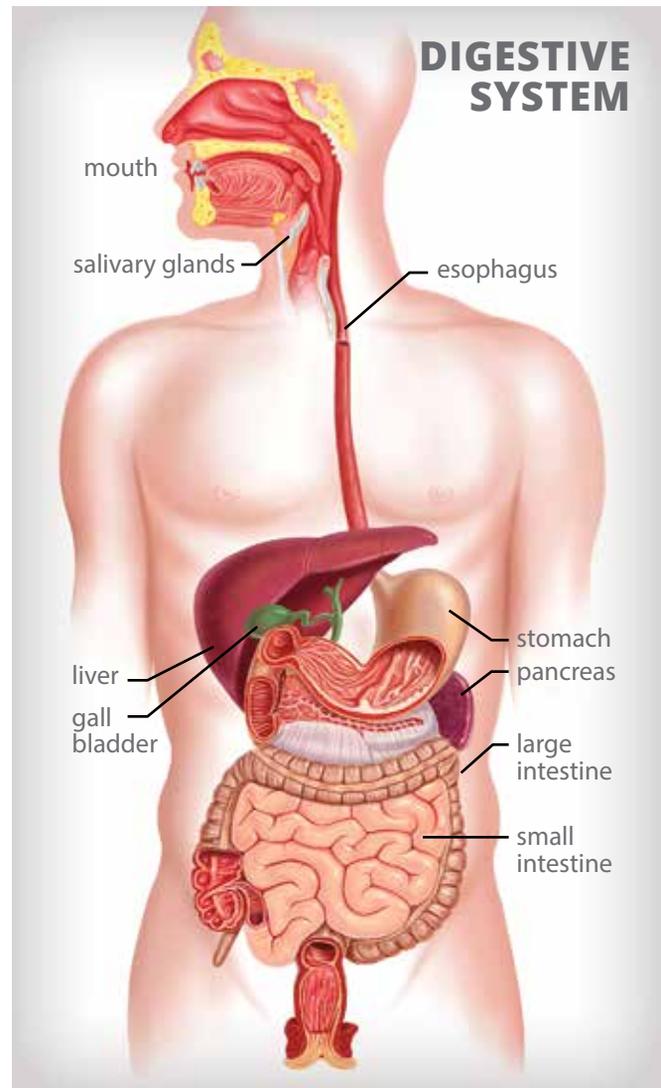
Another of God's miracles of creation is found in the way we digest food. Through some complex processes, both mechanical and chemical, food becomes usable by the body for energy, cell building, and maintenance of good health. These processes at first seem simple. We can even draw a **schematic** of the digestive system. However, when we consider the way our bodies are so completely *interrelated*, the marvel of God's creation is really exciting.

Digestion. Digestion is the process of breaking down food into particles small enough to be dissolved in the juices of the digestive system. The digested food is carried by the bloodstream to be absorbed by all the cells of the body. Also, part of digestion is changing food, through chemical processes, into other more simple substances that can then be used by the cells.

Mouth. The first step in digestion takes place in the mouth. *Saliva* contains a digestive **enzyme** that begins the change of carbohydrates into sugar. Then the sugar can dissolve. The other kinds of nutrients taste good, and your teeth grind them up, but digestion of protein and fat has not begun.

The tube leading from your mouth to your stomach is called the *esophagus* (ee sof' uh gus). The esophagus has ring-like muscles that squeeze the food and push it down into the stomach.

Stomach. The stomach has thick walls of muscles that squeeze and churn the food into a thick pasty lump. The stomach makes enzymes



and other chemicals; and, as it churns, it continues the process of digestion.

Your food, by now, is in a very liquid state. Saliva from your mouth and stomach and such chemicals as *hydrochloric* (hie' druh klor' ik) acid (chemical symbol is HCl) and *pepsin* have begun to break down protein. Fats stay fats until they reach the *small intestine*.

Small intestine. After food is broken down and partially dissolved in the stomach, the stomach muscles push the food on into the small intestine. Two small organs, the *gall bladder* and the *pancreas* (pan' kree us) produce juices and enzymes that enter the small intestine in small

amounts and complete the digestion of your food.

Your food is now completely liquid and contains amino acids from the proteins, digested fats called *fatty acids* and *glycerine*, and simple sugars—mostly *glucose*. Vitamins and minerals do not change. They are in the digested liquid and pass directly into the bloodstream.

Large intestine. Even though the digested food is in liquid form, some particles of food will not dissolve into tiny enough particles to enter the bloodstream. Some particles are as small as molecules. The undissolved particles are waste products which pass into the large intestine. This waste then leaves the body.

Plasma. An earlier LIFEPAK mentioned that each cell has to be nourished and that your bloodstream carries nutrients to each cell. The liquid part of the blood, *plasma*, is what carries

the dissolved nutrients from digested food. As the heart pumps the blood throughout the entire body, red blood cells bring *oxygen* to all other cells and carry away *carbon dioxide*. This process goes on continuously.

Nutrients and water pass into the bloodstream as it flows through blood vessels in the small intestine. At the same time some blood collects *oxygen* from the lungs and gets rid of *carbon dioxide*. Waste products from cells are taken care of by the *kidneys* or pass out through the skin pores. Cells are nourished by nutrients for reproduction and repair.

Imagine! That all these processes, and many more we have not studied, are going on at the same time really boggles the mind! How wonderful the Lord is! (Psalm 40:5) "Many, O LORD my God, are thy wonderful works which thou hast done..."

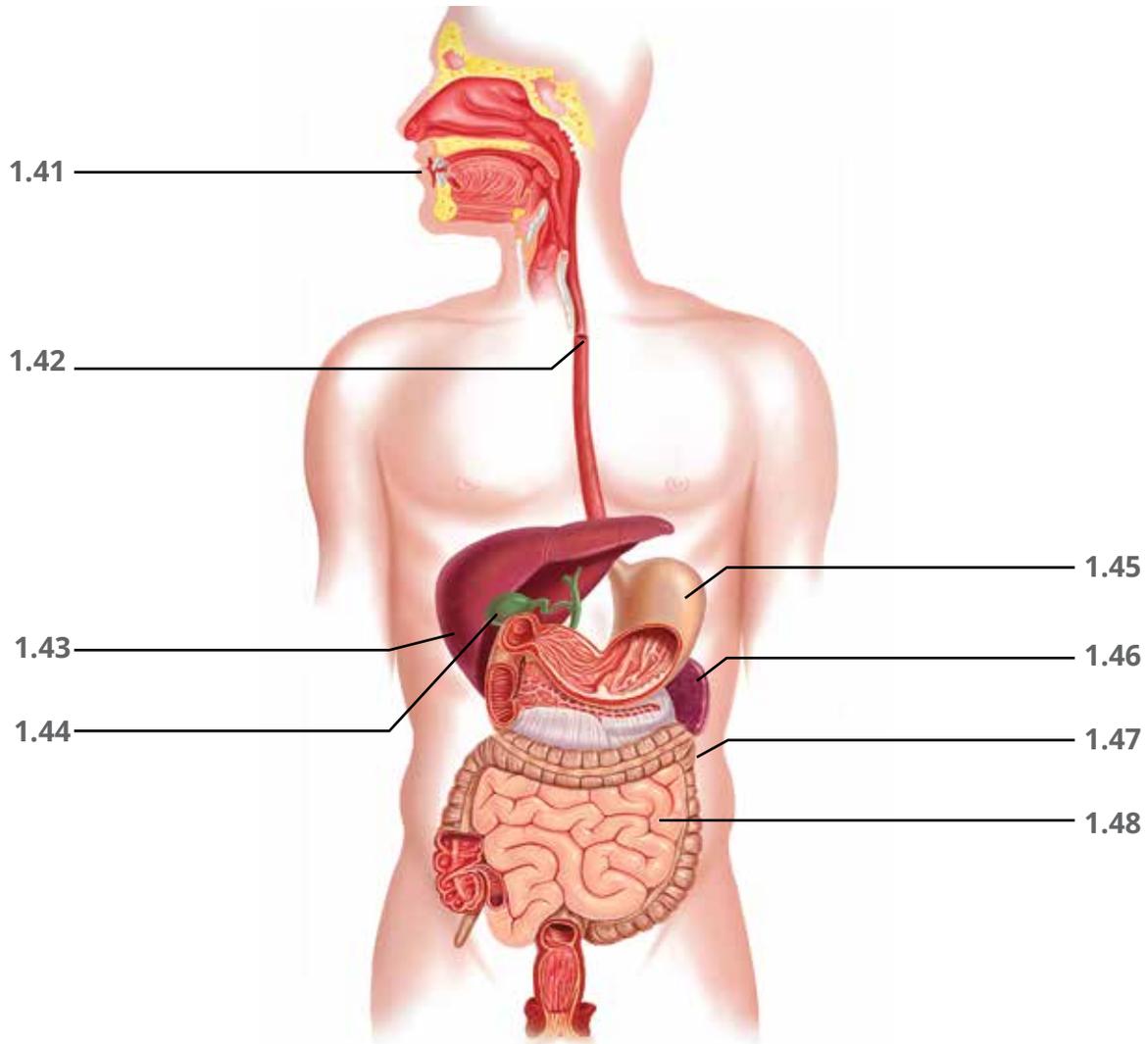


Complete these activities.

- 1.37 Digestion is the process of a. _____ and b. _____ food so that it can be carried by the c. _____ to all cells in the body.
- 1.38 Digestion begins in the mouth with an enzyme in _____ .
- 1.39 Food moves from the mouth to the a. _____ where b. _____ and c. _____ begin the digestion of protein.
- 1.40 In the small intestine, food completes digestion and the a. _____ pass into the b. _____ of the bloodstream.



Label this schematic of the digestive system.



TEACHER CHECK

initials

date



Review the material in this section in preparation for the Self Test. The Self Test will check your mastery of this particular section. The items missed on this Self Test will indicate specific areas where restudy is needed for mastery.

SELF TEST 1

Match these nutrients with their definitions or functions (each answer, 2 points).

- | | | | | |
|-------|-------|--------------|----|---|
| 1.01 | _____ | carbohydrate | a. | food containing carbon, hydrogen, oxygen, and nitrogen in complex amino acids; essential in the diet as “building blocks” |
| 1.02 | _____ | fats | b. | mineral necessary to help control the rate of metabolism in the body |
| 1.03 | _____ | protein | c. | complex organic substances necessary in small amounts for normal growth and health |
| 1.04 | _____ | minerals | d. | major substances to help release of energy from food, healthy, nervous system, healthy body enzyme and chemistry function, to help prevent anemia |
| 1.05 | _____ | calcium | e. | substance that helps form blood cells, keeps walls of blood vessels firm, resists infection, helps prevent fatigue, aids healing, and prevents scurvy |
| 1.06 | _____ | phosphorus | f. | substance that helps blood to clot |
| 1.07 | _____ | iron | g. | substance that helps cells function normally |
| 1.08 | _____ | iodine | h. | mineral needed by red blood cells to help carry oxygen |
| 1.09 | _____ | Vitamin A | i. | mineral needed for bones and teeth; helps muscles and nerves work properly and regulates use of other minerals |
| 1.010 | _____ | B vitamins | j. | substance needed for healthy skin and eyes |
| 1.011 | _____ | Vitamin C | k. | mineral needed by bones, teeth, nerve fibers, and by all cells to help them use other nutrients for energy |
| 1.012 | _____ | Vitamin D | l. | foods containing oily or greasy animal or vegetable substances |
| 1.013 | _____ | Vitamin E | m. | foods containing carbon, hydrogen, and oxygen; includes sugar and starch |
| 1.014 | _____ | Vitamin K | n. | substances, neither animal nor vegetable, necessary in our diet; plants obtain these substances through absorption of water from the earth |
| 1.015 | _____ | vitamins | o. | substance necessary to help body absorb calcium and to build calcium and phosphorus into the bones |

List the following foods under the proper headings (each answer, 2 points).

All foods contain several nutrients. List these foods under the main nutrients they contain. Some foods may be shown under more than one nutrient.

Proteins Food List

1.016 _____

1.017 _____

1.018 _____

1.019 _____

1.020 _____

1.021 _____

1.022 _____

1.023 _____

Carbohydrates

1.024 _____

1.025 _____

1.026 _____

1.027 _____

Fats or Oils

1.028 _____

1.029 _____

1.030 _____

Vitamins

1.031 _____

1.032 _____

Minerals

1.033 _____

1.034 _____

1.035 _____

- a. butter
- b. cake
- c. cereal
- d. cheese
- e. citrus fruits
- f. dried beans
- g. eggs
- h. fish
- i. green vegetables
- j. iodized salt
- k. liver
- l. meats
- m. milk
- n. peanuts
- o. potatoes
- p. poultry
- q. raisins
- r. salad dressing
- s. whole grain bread

Complete these statements (each answer, 3 points).

- 1.036 Digestion is the a. _____ of b. _____ and changing food so that it can be carried by the c. _____ to each cell.
- 1.037 The mouth starts starch digestion due to an enzyme in the _____ .

Number these statements in proper order (each answer, 2 points).

- 1.038 _____ Nutrients pass into the bloodstream.
- 1.039 _____ Food is churned by the stomach.
- 1.040 _____ Hydrochloric acid (HCl) and pepsin break down protein.
- 1.041 _____ Saliva breaks down starch to sugar.
- 1.042 _____ The small intestine has digestive juices and enzymes present. Food is mostly liquid.

Draw a diagram (a schematic) of the digestive system (this answer, 5 points).

- 1.043 Draw a simple schematic of the digestive system. Show the mouth, salivary glands, esophagus, stomach, liver, gall bladder, pancreas, small intestine, and large intestine. Label each part.

	SCORE _____	TEACHER _____	initials _____	date _____
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