ملخص system Digestive الجهاز الهضمي متبوع بتدريبات منهج انسباير

المزيد من الملفات بحسب الصف الثاني عشر العام والمادة علوم في الفصل الأول

Ministry of Education
Zayed AL-Thani school

Biology
G 12 Gen Term1
Digestive system

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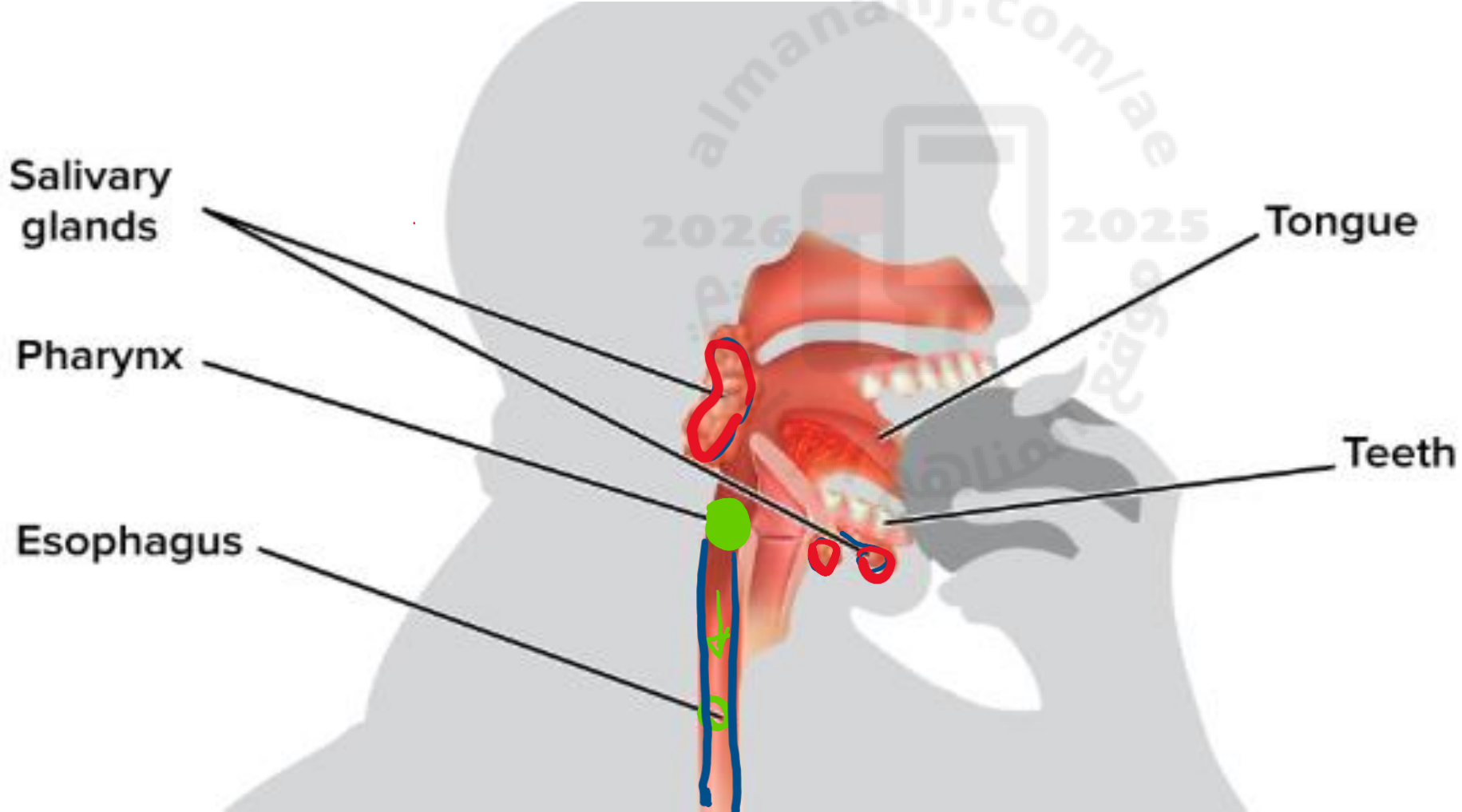
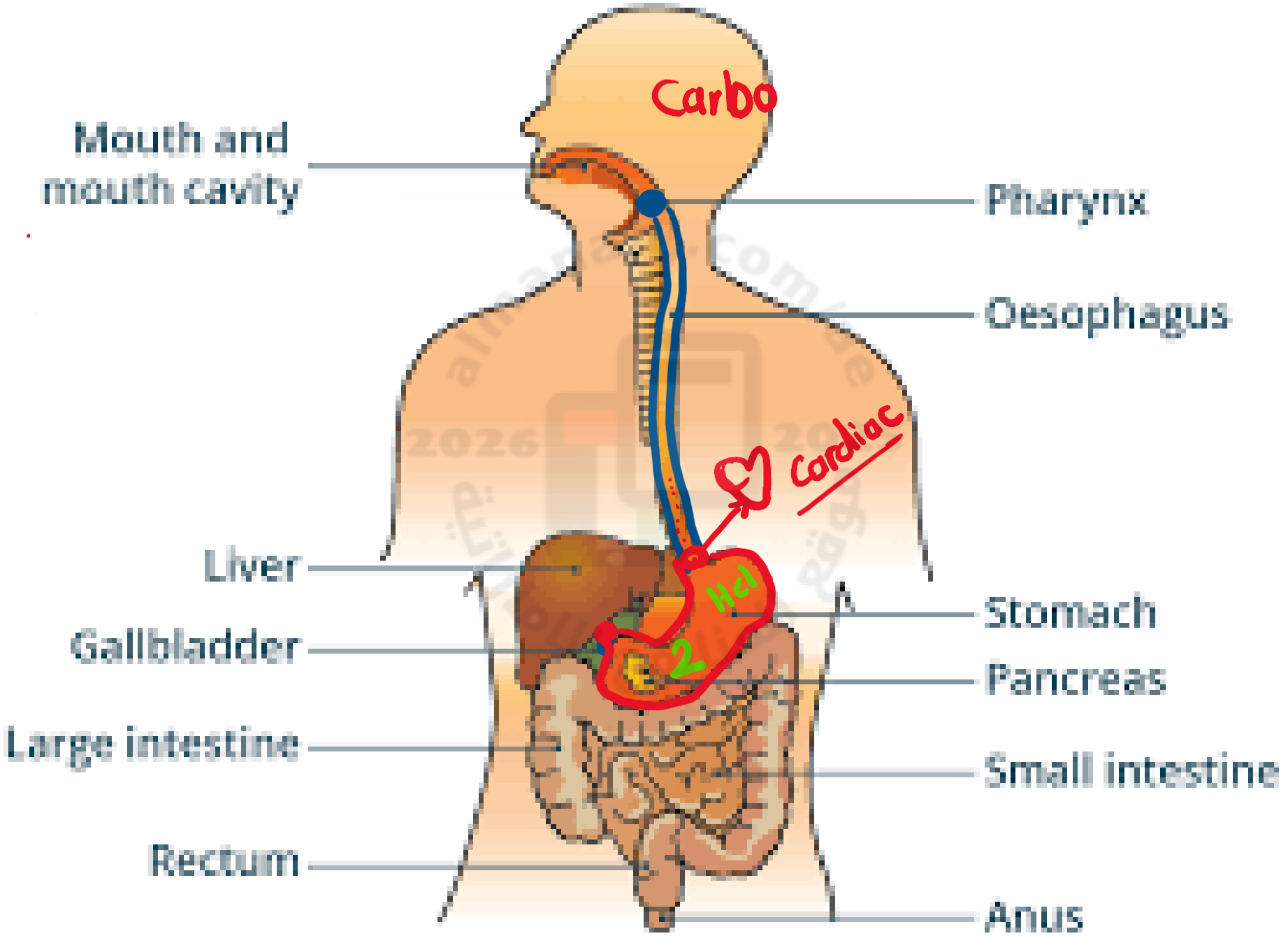
Functions of the Digestive System

1-ingests food,

2-breaks it down so nutrients can be absorbed,

3- eliminates what cannot be digested.




Carbo
Mouth and mouth cavity
Pharynx
Oesophagus
Cardiac
Liver
Gallbladder
Large intestine
Rectum
Stomach
Pancreas
Small intestine
Anus

Mechanical digestion

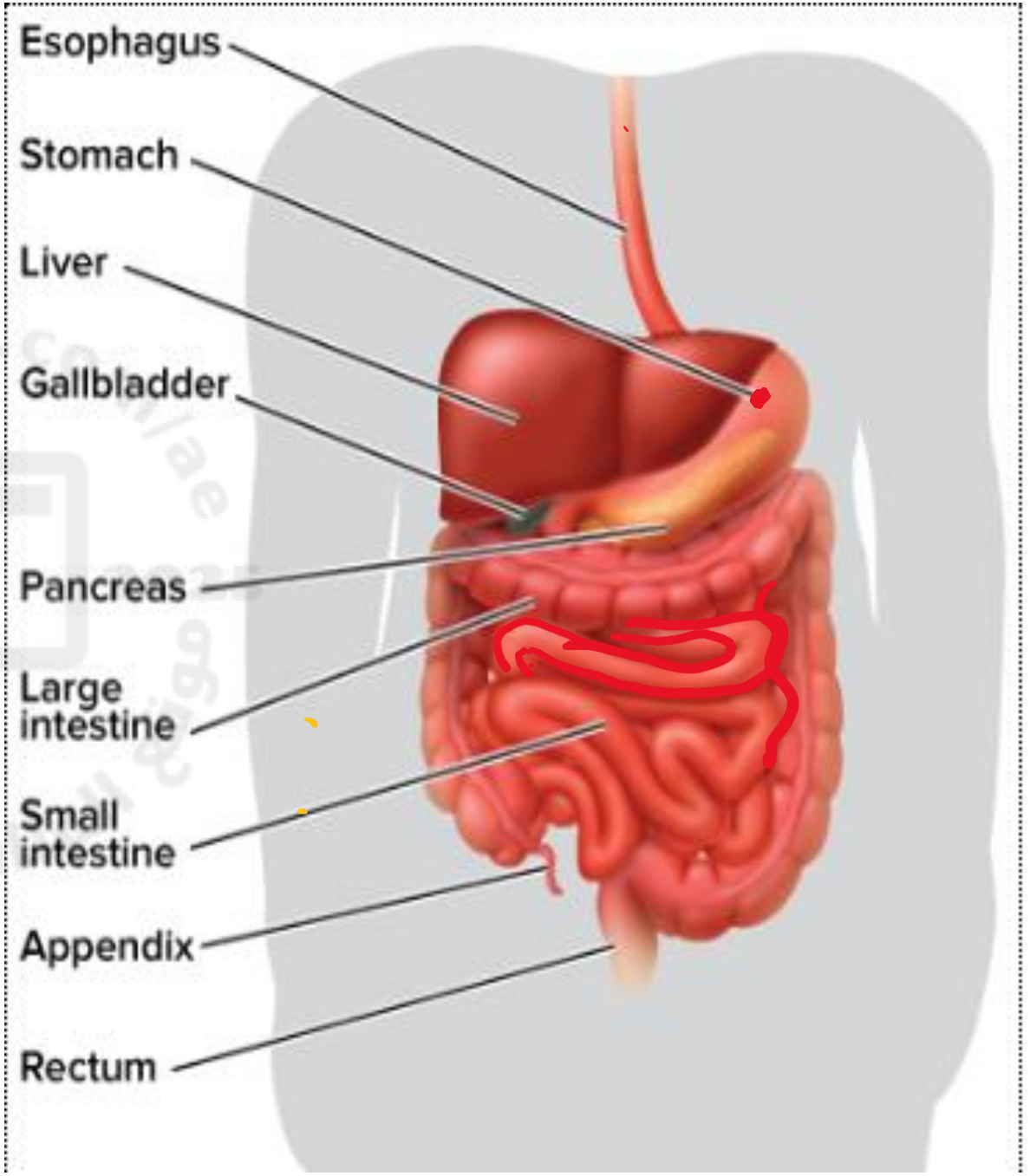
- involves chewing food to break it down into smaller pieces.
- It also includes the action of smooth muscles in the stomach and small intestine that churn the food.

Chemical digestion

involves the breakdown of large molecules in food into smaller substances by enzymes, proteins that speed up chemical reactions.
The smaller substances are absorbed into the body's cells.
When you chew food, amylase, an enzyme in saliva, begins the process of chemical digestion by breaking down starches into sugars

Esophagus

is a muscular tube that connects the pharynx, or throat, to the stomach, The wall of the esophagus is lined with smooth muscles that contract rhythmically to move the food through the digestive system in a process called **peristalsis**. Peristalsis continues throughout the digestive tract. Even if a person were upside down, food would still move toward the stomach. When a person swallows, the small plate of cartilage called the epiglottis covers the trachea. If this opening is not closed, food can enter the trachea and cause a person to choke. The body responds to this by initiating the coughing reflex in an attempt to expel the food to keep the food from entering the lungs.



Stomach

When food leaves the esophagus, it passes through a circular muscle called a sphincter, and into the stomach. The sphincter between the esophagus and stomach is the cardiac sphincter. The walls of the stomach are composed of three overlapping layers of smooth muscle that are involved with mechanical digestion.

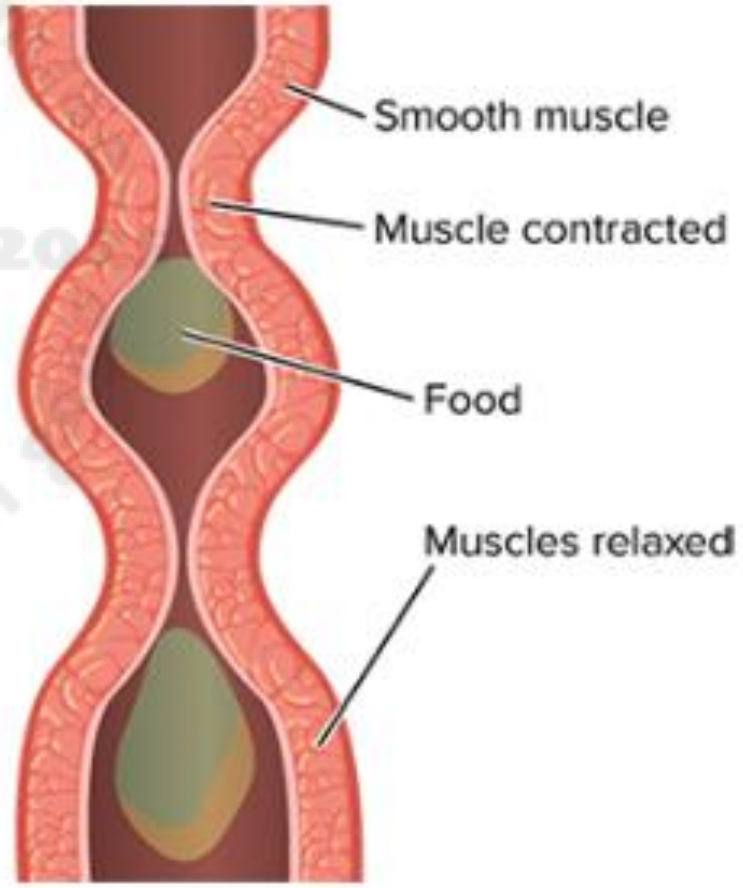
As the muscles contract, they further break down the food and mix it with the secretions of glands that line the inner wall of the stomach.

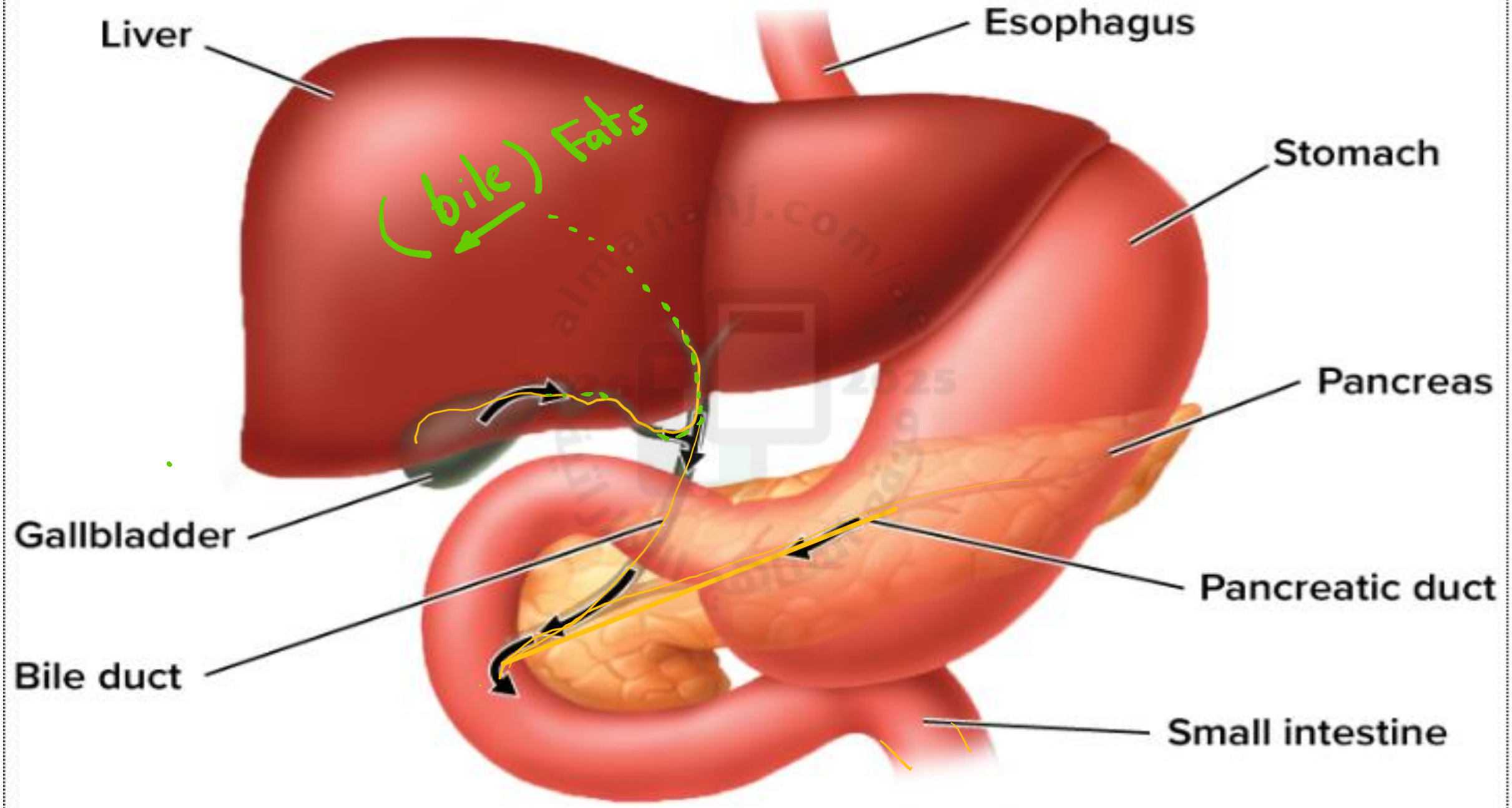
CHEMISTRY CONNECTION Recall that pH is a measure of a solulpn's acidity. The environment inside the stomach is very acidic. Stomach glands, called gastric glands, secrete an acidic solution, which lowers the pH in the stomach to about 2. This is about the same level of acidity as lemon juice. If the sphincter in the upper portion of the stomach allows any leakage, some of this acid might move back into the esophagus, causing what is commonly known as heartburn. The acidic environment in the stomach is favorable to the action of pepsin, an enzyme involved in the process of the chemical digestion of proteins. Cells in the lining of the stomach secrete mucus to help prevent damage from pepsin and the acidic environment. Although most absorption occurs in the small intestine, some substances, such as alcohol and aspirin, are absorbed by cells that line the stomach. While empty, the capacity of the stomach is about 50 mL. When full, it can expand to 2–4 L

The muscular walls of the stomach contract and push food farther along the digestive tract. As the result of chemical and mechanical digestion in the stomach, the consistency of the food resembles tomato soup as it passes through the pyloric sphincter at the lower end of the stomach into the small intestine

Small intestine

The small intestine is approximately 7 m in length and is the longest part of the digestive tract. It is called small because its diameter is 2.5 cm compared to the 6.5 cm diameter of the large intestine. The smooth muscles in the wall of the small intestine continue the process of mechanical digestion and push the food farther through the digestive tract by peristalsis,




Liver
Esophagus
(bile) Fats
Stomach
Pancreas
Gallbladder
Pancreatic duct
Bile duct
Small intestine

1-the pancreas,

1- produce enzymes that digest carbohydrates, proteins, and fats and

2-produce hormones

3- secretes an alkaline fluid to raise the pH to slightly above 7

2-liver

- is the largest internal organ of the body
- produces bile, which helps to break down fats.

excess bile is stored in the gallbladder to be released into the small intestine when needed next Figure shows gallstones, which are **cholesterol crystals**

Figure 5 Gallstones can obstruct the flow of bile from the gallbladder. Gallstones can be removed through surgery.

Chemical digestion is completed and most of the nutrients from food are absorbed from the small intestine into the bloodstream through fingerlike structures called villi (singular, villus)., increase surface area, giving the small intestine approximately the same surface area as a tennis court.

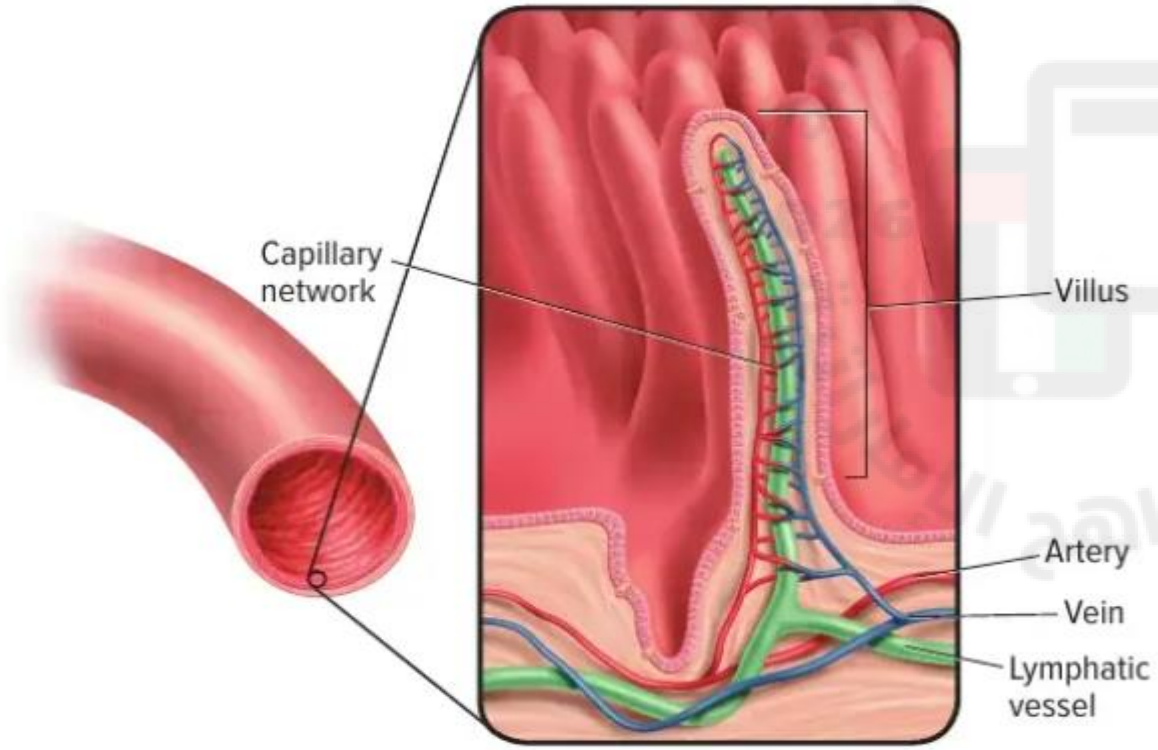


Figure 6 A villus is a fingerlike extension of the lining of the small intestine. Nutrients diffuse into capillaries in the villi and reach body cells by means of circulating blood.

the movement of digested food through the digestive system. Once digestion is complete, the remaining food, now in a semiliquid form called chyme (KIME), moves into the large intestine. Chyme is made up of materials that cannot be digested or absorbed by villi in the small intestine.

Large intestine (1-colon- 2- rectum-3- the anus)

is the end portion of the digestive tract. It is about 1.5 m long and includes the

1-colon A primary function of the colon is to absorb water from the chyme,

Some kinds of beneficial bacteria are normal in the colon to produce vitamin K and some vitamin B. The indigestible material then becomes more solid and is called feces

2- rectum, Peristalsis continues to move feces toward the rectum, causing the walls of the rectum to stretch. This initiates a reflex that causes the final sphincter muscle to relax, and the

3- anus feces are eliminated from the body.

4- appendix a small saclike appendage (no function) .

..

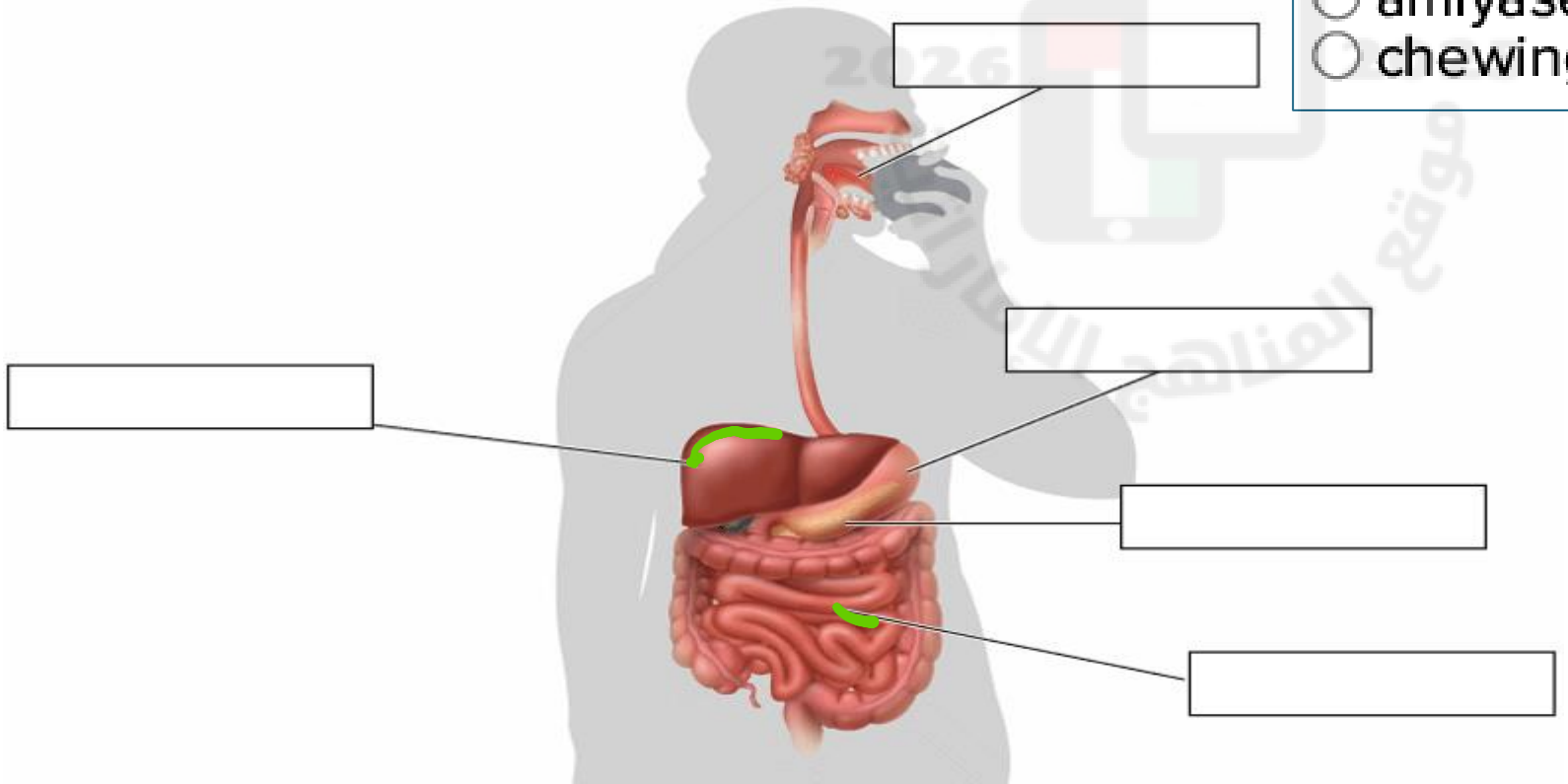
Digestive Structure	Primary Function	Time Food is in Structure
Mouth	Mechanical and chemical digestion	5–30 s
Esophagus	Transport (swallowing)	10 s
Stomach	Mechanical and chemical digestion	2–24 h
Small Intestine	Mechanical and chemical digestion	3–4 h
Large Intestine	Water absorption	18 h–2 days

organ	Mechanical digestion	Chemical digestion
Mouth	Chewing by teeth- churning food	Saliva that contain Amylase that digest Starch
Stomach	Muscles of stomach	Pepsin (protein) Gastric juice Stomach acid – (PH=2)
Small intestine	Peristalsis	Bile from liver digest fats Pancreatic juice (carbohydrates, proteins, fats)

Mirna is constructing a model of the human digestive system for health class. As part of the project, she must research the basic structures of the digestive system. What structures does she not research as parts of the digestive system?

- ○ liver, pancreas, and gallbladder
- ○ mouth and esophagus
- ○ skeleton and joints
- ○ stomach and intestines

Place the labels on to the correct structures of the digestive system.



Which is an example of chemical digestion?

- ○ churning food in small intestine
- ○ excreting undigested food as waste
- ○ amlyase in saliva breaks down food
- ○ chewing food to break it down

Arrange the following organs in the order in which food passes through them in the digestive system.

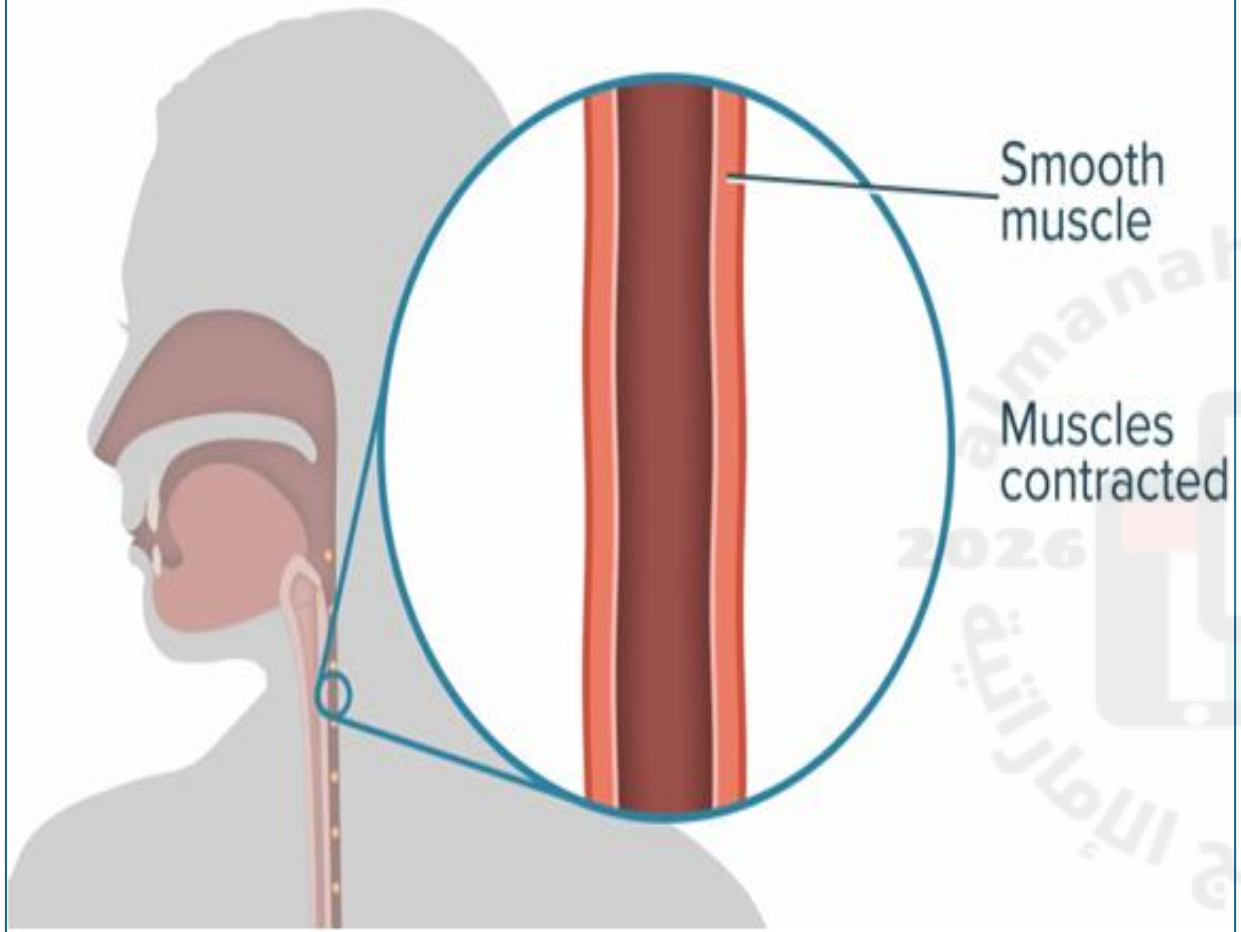
mouth	1) _____
stomach	2) _____
esophagus	3) _____
large intestine	4) _____
small intestine	5) _____

) The process that allows smooth muscles to contract rhythmically to move food through the digestive system is called _____.

Where does mechanical digestion occur? Select all that apply.

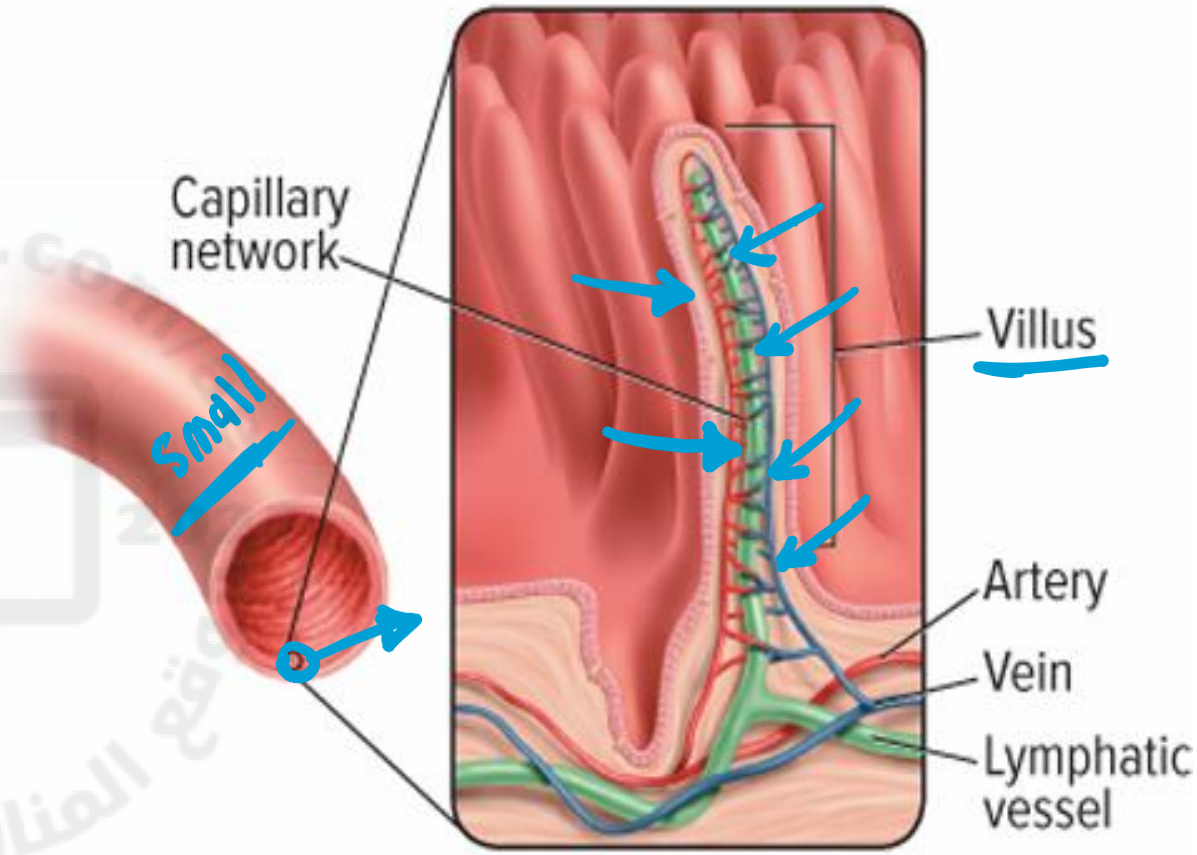
- ☐ esophagus
- ☐ small intestine
- ☐ stomach
- ☐ large intestine

What type of digestion is shown here?



- ○ mechanical
- ○ enzyme
- ○ chemical
- ○ cardiac

What is the function of this structure?



- ○ releases amylase
- ○ performs peristalsis
- ○ absorbs nutrients in small intestine
- ○ releases bile

Amylase is an enzyme found in the..... that begins chemical digestion.

a) stomach
b) Mouth
c) Small intestine
d) Esophagus

The enzyme involved in protein digestion in the stomach is called .....

a) Amylase
b) Pepsin
c) Carbohydrase
d) Bile

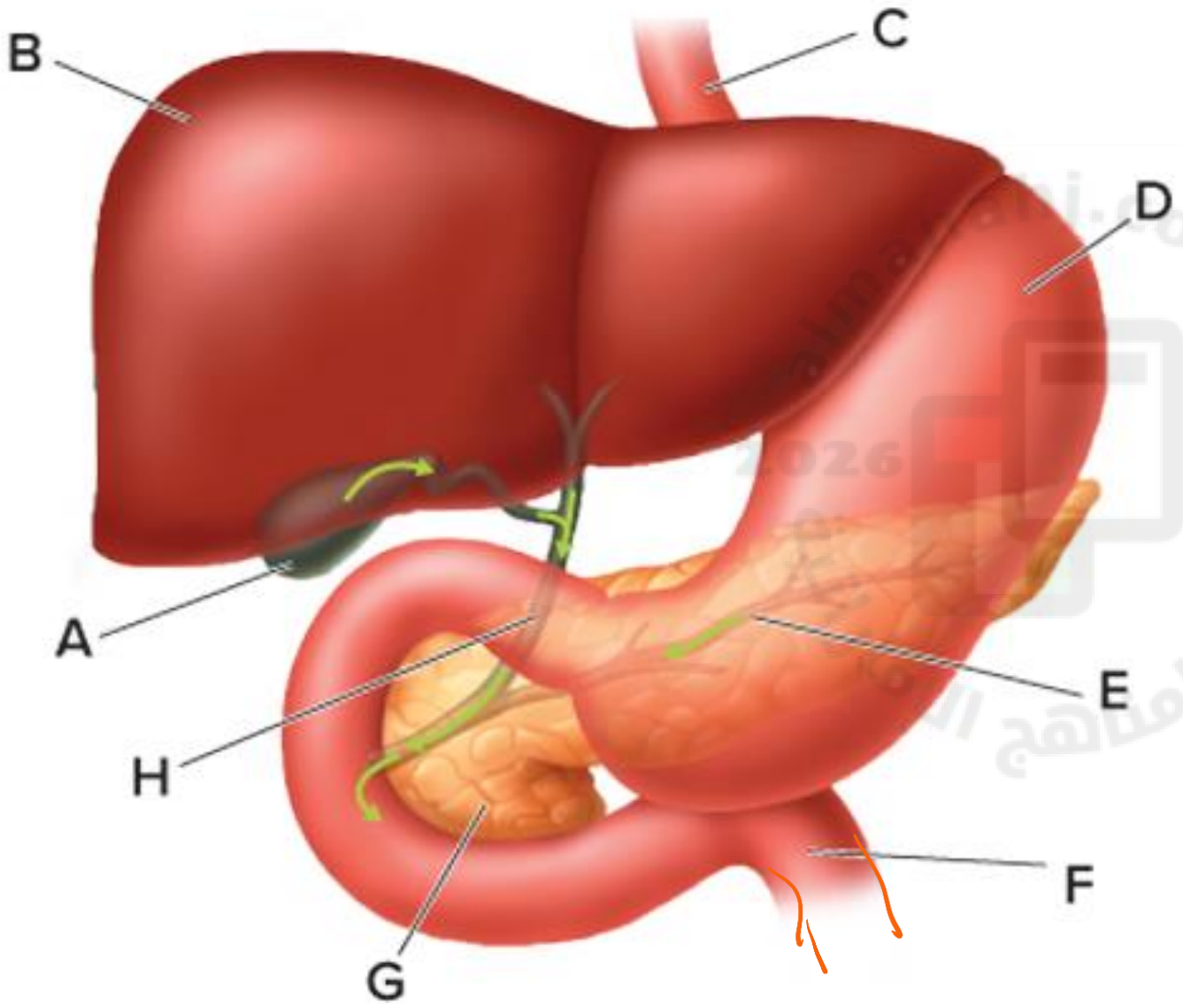
What is broken down into sugars and absorbed into blood in the small intestine?

a) proteins
b) Carbohydrates
c) fats
d) acids

Which is the primary function of the colon?

- ○ completing mechanical digestion
- ○ absorbing water from chyme
- ○ completing chemical digestion
- ○ absorbing nutrients from chyme

Match the following terms to the correct letters (A-H).



_____ stomach

_____ pancreas

_____ esophagus

_____ pancreatic duct

_____ gallbladder

_____ liver

_____ bile duct

_____ small intestine

The undigested material in the large intestines becomes .

Water Feces blood urine

An enzyme involved in the process of chemical digestion of proteins is called __.

villus amylase peristalsis pepsin

When you chew food, an enzyme in saliva called begins the process of chemical digestion by breaking down starches into sugars.

villus amylase peristalsis pepsin

Rhythmic, wavelike muscular contractions that move food throughout the digestive tract is called .

villus amylase peristalsis pepsin

A	definition	B	Organ
A	end portion of the digestive tract that is involved primarily in water absorption		large intestine
B	muscular tube that connects the pharynx to the stomach		small intestine
C	largest internal organ of the body that pro duces bile		esophagus
D	longest part of the digestive tract that is involved in mechanical and chemical digestion		liver
F	produce enzymes that digest carbohydrates, proteins, and fats		Pancreas

Calories

Nutrition is the process by which a person takes in and uses food. Foods supply the building blocks and energy to maintain body mass. The daily input of energy from food should equal the amount of energy a person uses daily.

A Calorie (with an uppercase C) is the unit used to measure the energy content of foods. A Calorie is equal to kilocalorie, or 1000 calories (with a lowercase c).

A **calorie** is the amount of heat needed to raise the temperature of 1 mL of water by 1°C.

For example, one gram of carbohydrate or protein contains four Calories. One gram of fat contains nine Calories.

To lose weight, more Calories must be used than consumed. The opposite is true to gain weight. Table compares average Calorie usage with different activities. The exact number of calories burned will vary depending on weight and gender.

Activity	Calories Used Per Hour	Activity	Calories Used Per Hour
Baseball	282	Hiking and backpacking	564
Basketball	564	Hockey (field and ice)	546
Bicycling	240–410	Jogging	740–920
Football	540	Soccer	540

Carbohydrates 1 gm	protein 1gm	Lipid 1 gm
4 C	4 C	9 C

To lose weight, more Calories must be used than consumed. The opposite is true to gain weight.

Carbohydrates

Type	examples	Found
Simple carbohydrates	glucose, fructose, and sucrose,	fruits, soda pop, and candy.
Complex carbohydrates	Starches, cellulose and glycogen	Potato , rice and bread

Complex carbohydrates are broken down into simple sugars in the digestive tract. Simple sugars these every day. are absorbed through villi in the small intestine into the bloodstream and circulated throughout the body to provide energy for cells.

Figure 7 Your body needs carbohydrate-rich foods like these every day.

Cellulose(fiber) helps keep food moving through the digestive tract and helps with the elimination of wastes.in (Bran,whole,beans)

Fats are broken to (Fatty acid + Glycerol)

1. the most concentrated energy source available to the body,
2. they are building blocks for the body.
3. protect some internal organs
4. help maintain homeostasis by providing energy and by
5. storing and transporting certain vitamins.

	saturated	unsaturated
State	Solid	Liquid
Heart problems	Yes	No
Source	Animal	Plants
EX	Meats, cheeses, dairy products	olive oil, plant oils

Figure 8 The oils here are sources of unsaturated fat. The butter is a source of saturated fat.

Proteins are broken-down to (Amino Acids)

1. basic structural components of all cells.
2. Enzymes, hormones, neurotransmitters.
3. membrane receptors
4. Form muscles
5. -body structure and functions

Figure 9 Beans and rice can be combined to provide all the essential amino acids.

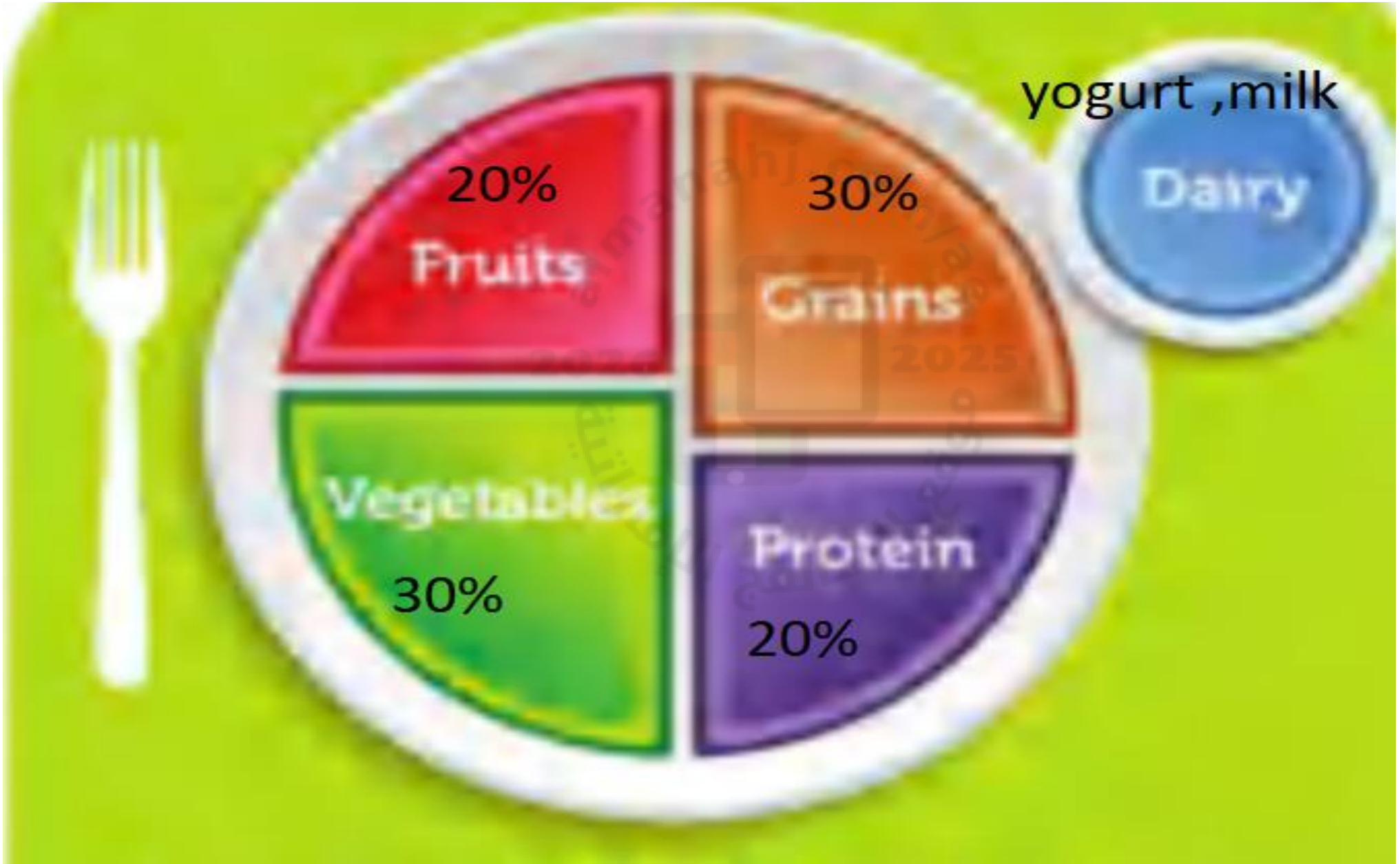
Amino Acids(20)

1- Essential (8) body cannot produce and must be included in a person's diet. Animal products, such as eggs and fish, and plant products such grains and fruits.

2- Nonessential (12) human body can produce for cellular respiration

MyPlate

not in EOT



Vitamins and Minerals

Vitamins are **organic** compounds that are needed in small amounts for metabolic activities. help enzymes function properly

- Some vitamins are produced within the body. Vitamin D is made by cells in your skin.
- Some B vitamins and vitamin K are produced by bacteria living in the large intestine.
- However, sufficient quantities of most vitamins cannot be made by the body,
- but a well-balanced diet can provide the vitamins that are needed.

do not get enough of the vitamin or mineral to maintain homeostasis.

children who do not get enough vitamin D can suffer from rickets

People who do not get enough iodine may develop problems with their thyroid.

Minerals are **inorganic** compounds used by the body as building materials, and they are involved with metabolic functions.

iron is needed to make hemoglobin.
Calcium, another mineral, is an important component of bones.

Nutrition Labels

that food labels list the following information:

- name of the food
- the net weight or volume
- the name and address of manufacturer, distributor, or packager
- the ingredients
- nutrient content

Figure 12 When you read a nutrition label, notice how many servings are in each food container. The percent daily values are based on an individual serving, not the entire package.

Charlotte is learning about nutrition from her parents in an effort to eat a more healthful diet. Her father shows her how to read a nutrition label on a can of soup, and he points out the unit used to measure the energy content in food. Which unit does he show her?

- gram
- Calorie
- milliliter
- serving

Why is it essential to eat proteins even though the body produces them?

- The body makes only 12 of the 20 necessary amino acids.
- Only digested proteins can function in cells.
- The body only makes harmful proteins.
- Proteins made in the body are not composed of amino acids.

What is broken down into sugars and absorbed into blood in the small intestine?

- proteins
- carbohydrates
- fats
- acids

Which is the number of calories needed to raise 10 mL of water 10°C?

- 10
- 1
- 1000
- 100

The undigested material in the large intestines becomes . .....

Calcium and iron found in the body are called .

a) **Vitamins**
b) **Carbohydrates**
c) **Minerals**
d) **proteins**

Rhythmic, wavelike muscular contractions that move food throughout the digestive tracts called .

a) Chemical digestion
b) Peristalsis
c) Chyme
d) Appendix

1. Which of the following is not a function of the digestive system?

A. Ingest food B. Absorb nutrients
C. Transport oxygen D. Eliminate waste

2. Mechanical digestion begins in the _____.

- A. Mouth B. Stomach C. Esophagus D. Small intestine

3. The enzyme that breaks down starch into sugars in the mouth is _____.

- A. Pepsin B. Amylase C. Lipase D. Trypsin

4. The movement of food through the digestive tract by muscular contractions is called _____.

- A. Peristalsis B. Digestion C. Absorption D. Secretion

5. The muscular tube connecting the throat to the stomach is the _____.

- A. Trachea B. Esophagus C. Pharynx D. Intestine

6. The epiglottis prevents food from entering the _____.

A. Esophagus B. Trachea C. Stomach D. Small intestine

7. The enzyme that digests proteins in the stomach is _____.

A. Pepsin B. Amylase C. Lipase D. Maltas

8. The pH inside the stomach is approximately _____.

9. The cardiac sphincter is located between the _____.

A. Mouth and esophagus B. Esophagus and stomach
C. Stomach and small intestines D. Small and large intestines

10. The semi-liquid food in the stomach is called _____.

A. Bolus B. Chyme C. Bile D. Mucus

11. The process that mixes food in the stomach is an example of _____ digestion.

A. Mechanical B. Chemical C. Enzymatic D. Absorptive

12. The enzyme pepsin is active in a _____ environment.

A. Acidic B. Basic C. Neutral D. Slightly alkaline

13. Which of the following protects the stomach lining from acid?

A. Mucus B. Pepsin C. Bile D. Amylase

14. The pyloric sphincter controls the passage of food from the stomach into the _____.

A. Esophagus B. Small intestine C. Large intestine D. Rectum

15. The longest part of the digestive tract is the _____.

A. Stomach B. Small intestine C. Large intestine D. Colon

16. The small intestine is called “small” because of its _____.

A. Length B. Diameter C. Function D. Thickness

17. The organ that produces bile is the _____.

A. Liver B. Pancreas C. Gallbladder D. Stomach

18. The gallbladder's function is to _____.

A. Produce enzymes B. Store bile
C. Absorb nutrients D. Digest protein

19. The pancreas produces enzymes that digest _____.

A. Carbohydrates, proteins, and fats B. Only carbohydrates
C. Only fats D. Only proteins

20. The small intestine absorbs nutrients through tiny fingerlike projections called _____.

A. Alveoli B. Villi C. Papillae D. Folds

21. Villi increase the surface area of the small intestine to improve _____.

A. Absorption B. Digestion C. Movement D. Secretion

22. The semiliquid mixture that passes into the large intestine is called

A. Bolus B. Chyme C. Mucus D. Bile

23. The main function of the large intestine is to _____.

A. Absorb water B. Digest starch
C. Produce bile D. Secrete enzymes

24. Beneficial bacteria in the large intestine produce _____.

A. Vitamin C B. Vitamin D C. Vitamin K D. Vitamin A

25. Feces are stored in the _____ before elimination.

A. Colon B. Rectum C. Anus D. Appendix

26. The appendix is a small, saclike structure attached to the _____.

A. Small intestine B. Large intestine C. Rectum D. Stomach

27. The rhythmic contractions that move feces toward the rectum are called

27. The rhythmic contractions that move feces toward the rectum are called

A. Peristalsis B. Churning C. Absorption D. Mixing

28. Which of the following nutrients provides the most energy per gram?

A. Carbohydrates B. Proteins C. Fats D. Vitamins

29. One Calorie (with a capital C) equals _____ calories.

A. 10 B. 100 C. 1000 D. 10,000

30. A calorie is defined as the heat needed to raise the temperature of ____

A. 1 mL of water by 1°C B. 1 L of water by 1°C
C. 1 g of water by 1°F D. 100 mL of water by 10°C

31. To lose weight, a person must _____.

A. Eat more calories than used B. Use more calories than consumed
C. Eat equal calories to use D. Stop eating carbohydrates

32. Complex carbohydrates are broken down into _____.

A. Amino acids B. Simple sugars C. Fatty acids D. Proteins

33. Fiber helps the body by _____.

A. Producing enzymes B. Aiding digestion and elimination
C. Storing energy D. Absorbing water only

34. Proteins are broken down into _____.

A. Sugars B. Fatty acids C. Amino acids D. Vitamins

35. Which nutrient is the most concentrated energy source?

A. Fat B. Protein C. Carbohydrate D. Water

36. Fats help maintain homeostasis by _____.

A. Providing quick energy B. Protecting organs and storing vitamins
C. Producing enzymes D. Aiding peristalsis

37. Amino acids that must be obtained from food are called _____.

A. Essential amino acids B. Nonessential amino acids
C. Fatty acids D. Enzymes

38. Vitamin D is produced by _____.

A. Liver cells B. Skin cells exposed to sunlight C. Muscle cells D. Blood cells

39. Vitamin K is made by bacteria in the _____.

A. Small intestine B. Large intestine C. Stomach D. Pancreas

40. Minerals differ from vitamins because they are _____.

A. Organic B. Inorganic C. Living compounds D. Enzymes

41. Iron is needed by the body to make _____.

A. Hemoglobin B. Calcium C. Bile D. Enzymes only

42. Calcium is essential for _____.

A. Energy production B. Bone strength
C. Fat storage D. Enzyme activity

43. Iodine is necessary for proper function of the _____.

A. Thyroid gland B. Pancreas C. Liver D. Stomach

44. The pancreas secretes an alkaline fluid that _____.

A. Neutralizes stomach acid B. Lowers pH

C. Stops enzyme activity D. Destroys bacteria

45. The large intestine is about _____ meters long.

A. 7 B. 1.5 C. 4 D. 10

46. The small intestine has a surface area equal to approximately a _____.

A. Football field B. Tennis court C. Classroom D. Room floor

47. Which organ is the largest internal organ in the human body?

A. Heart B. Stomach C. Liver D. Lungs

48. The gallstones are crystals of _____.

A. Salt B. Cholesterol C. Calcium D. Iron

49. Which of the following substances is absorbed in the stomach?

A. Proteins B. Alcohol and aspirin C. Starch D. Fatty acids

Question 1: Match the digestive organ to its function.

N	Organ	Function
	Mouth	1 -Produces bile
	Esophagus	2-Absorbs most nutrients
	Stomach	3-Secretes acid and enzymes to digest proteins
	Small intestine	4-Transports food to the stomach
	Large intestine	5-Secretes digestive enzymes and alkaline fluids
	Liver	6-Begins mechanical and chemical digestion
	Gallbladder	7-Stores bile
	Pancreas	8-Absorb water and forms feces
	Rectum	9-Eliminates waste from the body
	Anus	10-Stores feces before elimination

N	Nutrient / Vitamin	Function or Source
	Fiber	1-Provide energy for the body
	Proteins	2-Build and repair tissues
	Iron	3-Store energy and protect organs
	Carbohydrates	4-Aids digestion and waste removal
	Vitamin D	5-Produced in skin; helps absorb calcium
	Fats	6-Produced by large intestine bacteria
	Iodine	7-Needed for bone strength
	Vitamin K	8-Needed for hemoglobin production
	Calcium	9-Required for thyroid function