

HUMAN DIGESTIVE SYSTEM

Student's worksheet

Names:

Class:

Aims: to analyze the parts and functions of human digestive system; to explain the process of digestion and absorption of nutrients.

1st task - read the following text about digestion with your group.

Human digestive system consists of mouth together with teeth and tongue, pharynx, esophagus, stomach, small intestine, large intestine, and rectum. In addition, there are accessory organs of digestion, such as liver and pancreas, which secrete gastric secretions. The main function of digestive system is to break down food into smaller components, until they can be absorbed and assimilated into the body.

2nd task - observe the parts of human digestive system by using a model. Open at least one model for your group. Please make sure that there is Sketchfab app downloaded in your device(s). To open the model, scan the following QR-code:



Observe the model in augmented reality. To do that, you need to click on the



(Android devices) or



(Apple devices) button.



**Open the same model in 3D in another device. Do not click on the AR button.
You should have the following views:**



Model in 3D



*Model in augmented reality
(AR)*

Observe closely, where the digestive system's organs are located (the number in brackets indicates where the organ is located in 3D model). Observe the AR model from different sides, try to move inside the model. Use the 3D model to get the information about the following organs:

esophagus (1); stomach (2, 3, 7); liver (4, 5); gallbladder (8-10); small intestine (6, 13, 14); duodenum (6); pancreas (11); large intestine (12, 15-20); rectum (19); anus (20)

Next, you have to read the following text about how food is digested.

Digestion begins already in the **mouth**, where the food is chewed. Moreover, breaking down the carbohydrates by an enzyme called amylase, takes place here.



The food now moves forward to **pharynx**, then to **esophagus**, and then to stomach. There is no digestion in the pharynx and esophagus.

The process of digestion continues in the **stomach**, where the food is mixed with gastric acid. The enzyme pepsin begins the digestion of proteins there. The food moves forward to **duodenum**, where digestion of lipids takes place. The digestion of lipids is mediated by gastric enzymes and bile acids. The bile acid is secreted by the **liver**. In duodenum, the digestion of proteins and carbohydrates continues. The **pancreas** plays an important role here, by secreting some gastric enzymes.

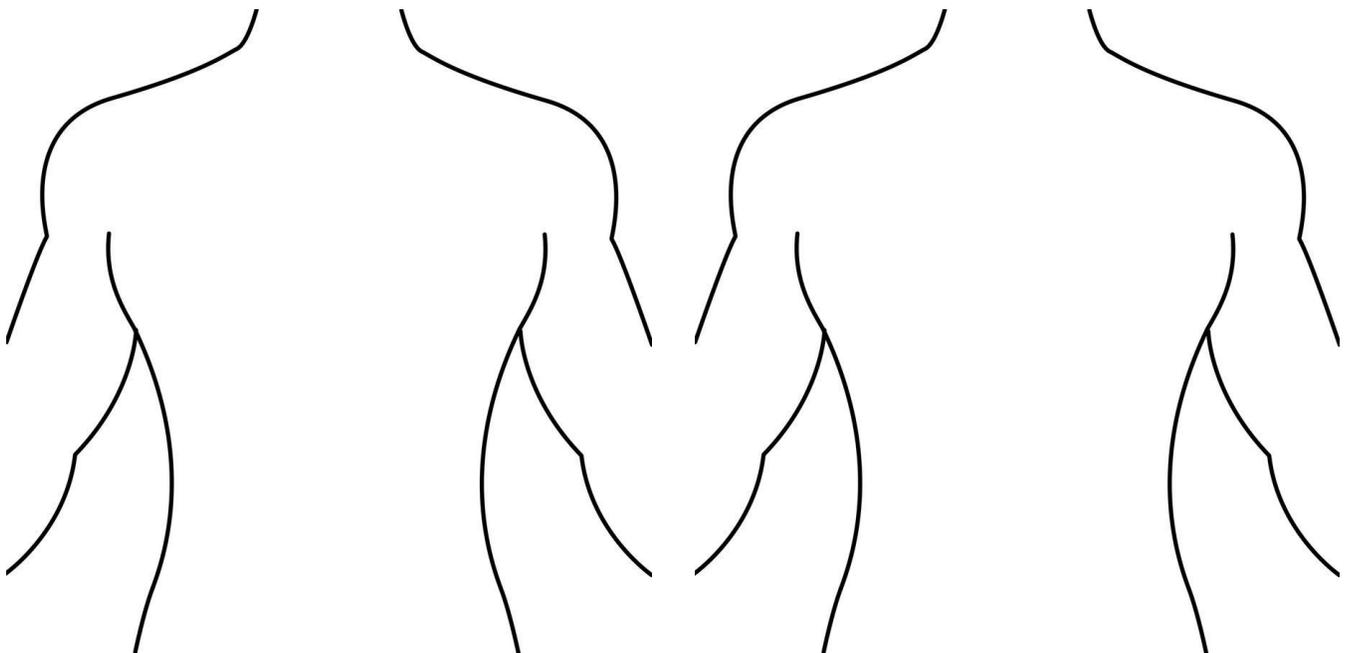
Duodenum is actually the first section of the **small intestine**. The digestion of proteins, lipids and carbohydrates ends in the small intestine. The absorption of nutrients also takes place there.

The remaining undigested food accumulates in the large intestine. The remaining food is semi-solid in the beginning, but changes to solid because of the absorption of water. The remaining solid waste is removed by the **anus**.

Divide the tasks in your group and draw the following (use the text you just read and the AR model):

a) digestive organs in which the food passes through (frontal view)

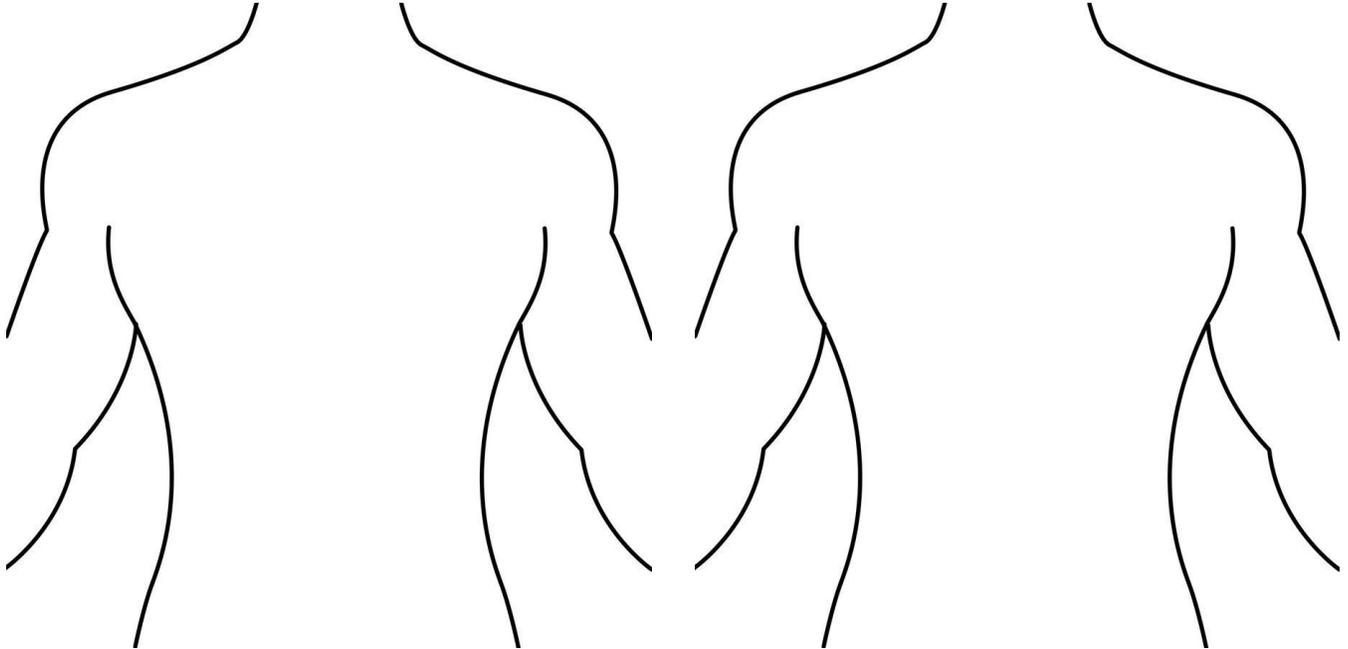
b) digestive organs in which the food passes through (back view)





c) digestive organs in which the food is being digested

d) digestive organs in which the food does not pass through



3rd task - answer the questions orally so that all of your group members have the opportunity to speak. Then write down your answers.

1. Which two organs are very important in digestion, but the food does not pass through them?

..... and

2. In which organ does the absorption of nutrients take place?

.....

3. Where begins and where ends the process of digestion?

The process of digestion begins in the and ends in the

.....

HUMAN DIGESTIVE SYSTEM

Teacher's worksheet

Aims: to analyze the parts and functions of human digestive system; to explain the process of digestion and absorption of nutrients.

Duration: 20-25 minutes.

Background information:



- 1) students must be divided into groups (3-4 members in each group);
- 2) Sketchfab app and a QR-code reader must be downloaded in the devices (Apple devices must use the camera to scan the QR-code, no additional QR-code reader needed).

Materials: printed student worksheets, devices (phones or tablets) - at least two devices and one worksheet for one group.

Tasks on student's worksheet:

1st task - students read about the digestion.

Human digestive system consists of mouth together with teeth and tongue, pharynx, esophagus, stomach, small intestine, large intestine, and rectum. In addition, there are accessory organs of digestion, such as liver and pancreas, which secrete gastric secretions. The main function of digestive system is to break down food into smaller components, until they can be absorbed and assimilated into the body.

2nd task - students observe the parts of human digestive system by using a model. They need to open at least one model for their group. To open the model, they need to scan the following QR-code:





Model:

<https://sketchfab.com/3d-models/the-human-digestive-system-peristalsis-854775b61faa4825975180a2fc4092d7>

They need to observe the model in augmented reality. To do that, they need to click on the



(Android devices) or

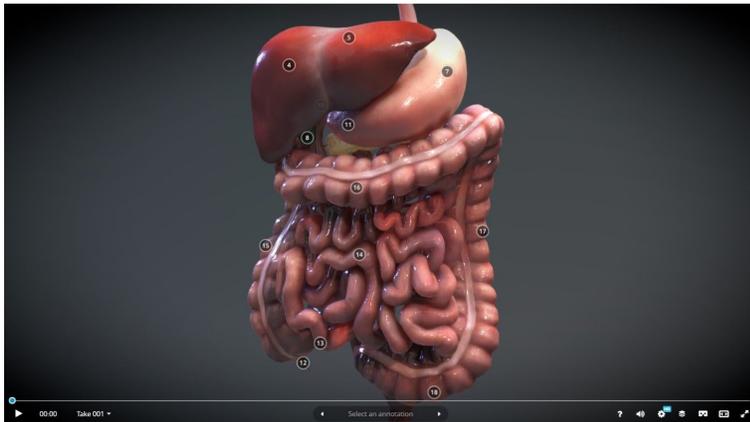


(Apple devices) button. If somehow the model does not open

after clicking on the AR button, then they should click on the settings and turn off the shadows (“AR Flood Shadow”).

To open the model in an Apple device, camera must be used to scan the QR-code.

Students have to open the same model in 3D in an another device. They need to open it by the same QR-code, but should not click on the AR button. They should have the following views:



Model in 3D



*Model in augmented reality
(AR)*



Students need to observe closely, where the digestive system's organs are located (the number in brackets indicates where the organ is located in 3D model). They have to observe the AR model from different sides, and also try to move inside the model. Students should use the 3D model to get the information about the following organs:

esophagus (1); stomach (2, 3, 7); liver (4, 5); gallbladder (8-10); small intestine (6, 13, 14); duodenum (6); pancreas (11); large intestine (12, 15-20); rectum (19); anus (20)

Next, students have to read the following text about how food is digested.

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The food now moves forward to **pharynx**, then to **esophagus**, and then to stomach. There is no digestion in the pharynx and esophagus.

The process of digestion continues in the **stomach**, where the food is mixed with gastric acid. The enzyme pepsin begins the digestion of proteins there. The food moves forward to **duodenum**, where digestion of lipids takes place. The digestion of lipids is mediated by gastric enzymes and bile acids. The bile acid is secreted by the **liver**. In duodenum, the digestion of proteins and carbohydrates continues. The **pancreas** plays an important role here, by secreting some gastric enzymes.

Duodenum is actually the first section of the **small intestine**. The digestion of proteins, lipids and carbohydrates ends in the small intestine. The absorption of nutrients also takes place there.

The remaining undigested food accumulates in the large intestine. The remaining food is semi-solid in the beginning, but changes to solid because of the absorption of water. The remaining solid waste is removed by the **anus**.

Then the students have to divide the tasks in their group and draw the following (using the text they just read and the AR model):

- a) digestive organs in which the food passes through (frontal view);
- b) digestive organs in which the food passes through (back view);



- c) digestive organs in which the food is being digested;
- d) digestive organs in which the food does not pass through.

Please make sure that every group member is involved in this task.

3rd task - students answer the questions orally so that all of their group members have the opportunity to speak. Then they write down their answers.

1. Which two organs are very important in digestion, but the food does not pass through them?

The liver and the pancreas.

2. In which organ does the absorption of nutrients take place?

In the small intestine.

3. Where begins and where ends the process of digestion?

The process of digestion begins in the *mouth* and ends in *the small intestine*.