



**EQUAL OPPORTUNITY  
IN EDUCATION** SINCE 1863

**Teaching “Human Body Systems” with  
Systems Thinking Approach**

Darüŝŝafaka  
1863 EĞİTİM  
KURUMLARI

# An Educational Program Design: Human Body System with Systems Thinking

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# Systems Thinking in Science Classes at Darussafaka (2022-2023 Academic Year)

## Human Body Systems

6<sup>th</sup> Grade Science

- Digestive System
- Respiratory System
- Circulatory System

## Motion in one Dimension

6<sup>th</sup> Grade Science

- Distance-Speed Graphs
- Distance-Speed Problems

## Heat and Temperature

5<sup>th</sup> Grade Science

- Introduction to Stella Online
- Heat Exchange

## Healty Life

6<sup>th</sup>-7<sup>th</sup>-8<sup>th</sup> Grade  
Science Project

- Energy Inputs
- Energy Outputs
- Obesity

# Human Body Systems & Systems Thinking

## Human Body System

6<sup>th</sup> Grade Science

- Digestive System
- Respiratory System
- Circulatory System

Life needs energy. That's why all living things contain various mechanisms that transfer energy to their cells to survive.

**“F.6.2 Systems in Our Body / Living Things and Life”** unit of Science program in the Ministry of National Education (MoNE) curriculum of Turkey is modelled conceptually and numerically by this approach and these activities are developed.

All 6<sup>th</sup> grade Classes

98 Students

7 Weeks (For teaching three human body systems)

# Objectives of Digestive System

## Human Body System

6<sup>th</sup> Grade Science

- **Digestive System**
- Respiratory System
- Circulatory System

F.6.2.2.1. Explains the functions of the structures and organs of the digestive system using models.

F.6.2.2.2. Makes the inference that nutrients must undergo physical (mechanical) and chemical digestion to pass into the blood.

F.6.2.2.3. Explains the functions of auxiliary digestive organs.

# Human Body Systems & Systems Thinking

## Human Body System

6<sup>th</sup> Grade Science

- Digestive System
- Respiratory System
- Circulatory System

In summary, **students** would be able to

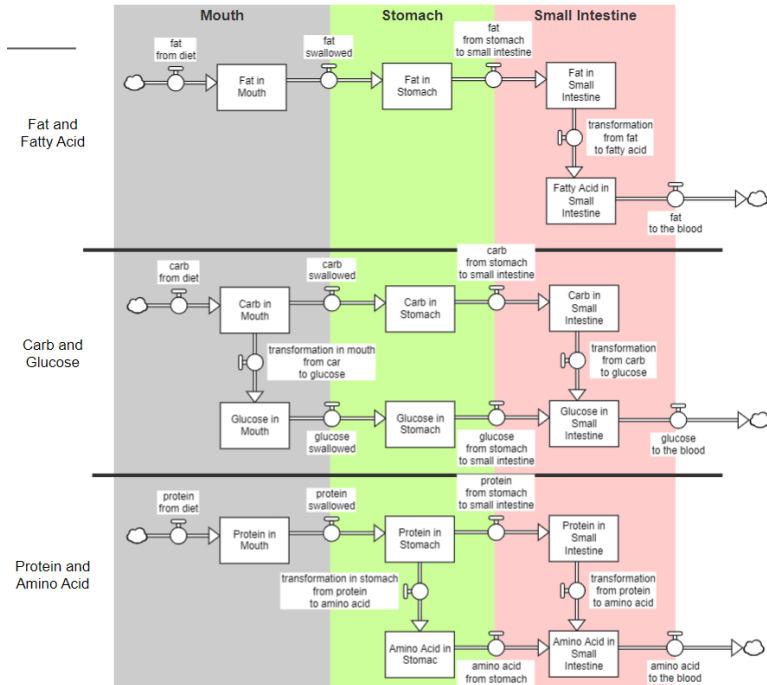
- Define systems in the human body,
- Identify the circulatory, digestive, and respiratory systems in the human body,
- Describe the essential functions of the circulatory, digestive, respiratory systems,
- Explore the ways the systems in the human body work together.

# Human Body Systems & Systems Thinking

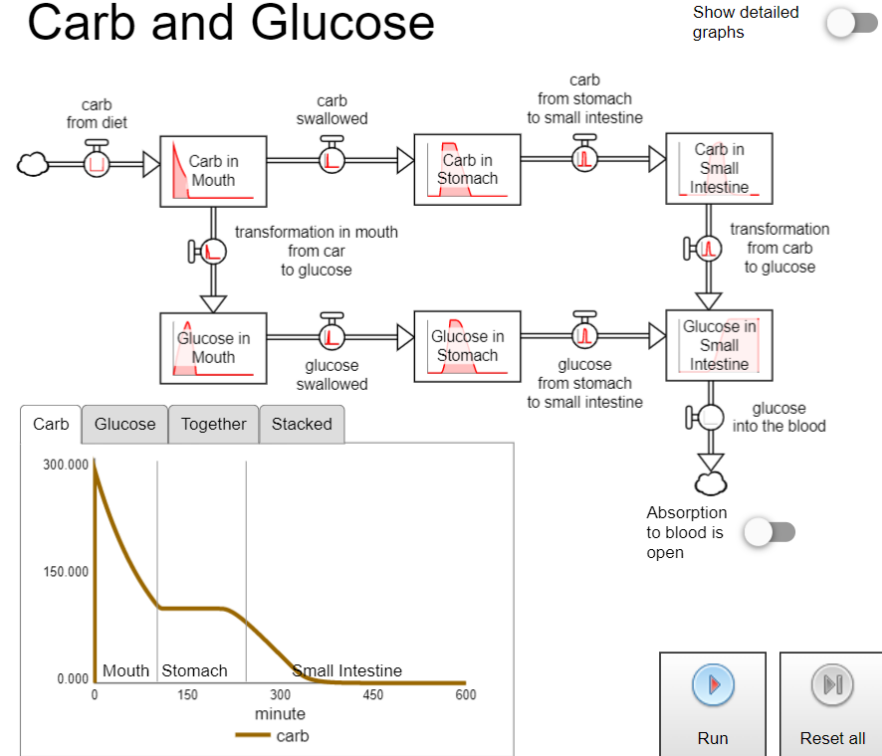
How did we use **System Thinking Tools** in science classes in this unit?

- We used them as a **concept map**,
- We used them to **improve graph reading skills**.
- We used them as **retrieval practices**.

# Digestive System & Systems Thinking



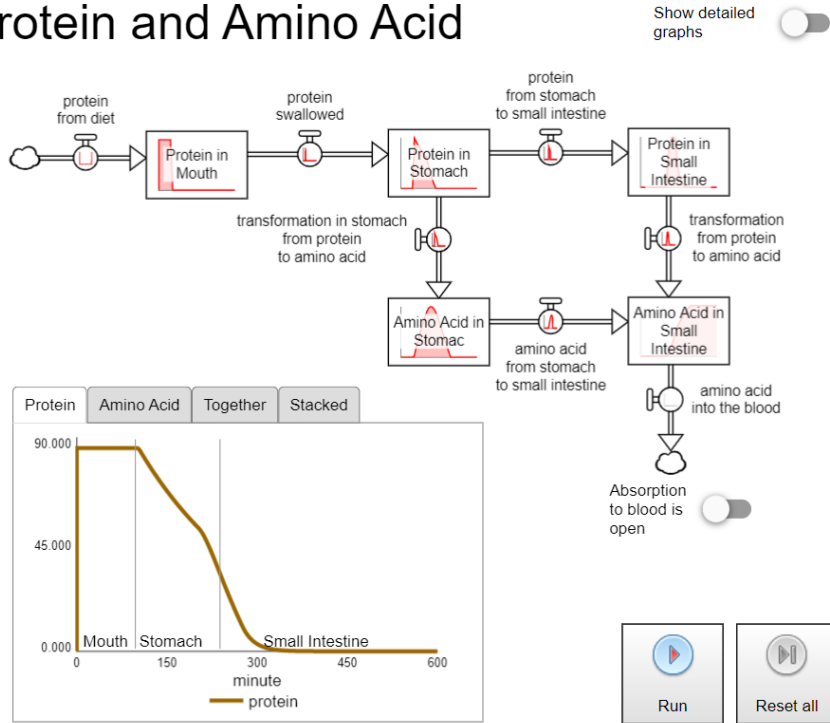
## Carb and Glucose



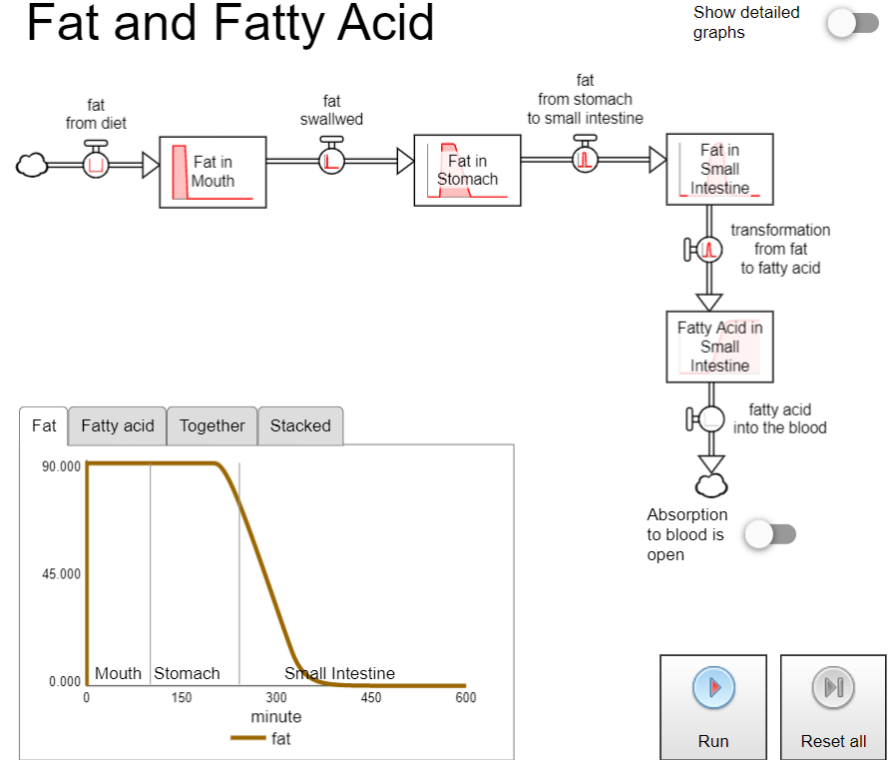


# Digestive System & Systems Thinking

## Protein and Amino Acid



## Fat and Fatty Acid

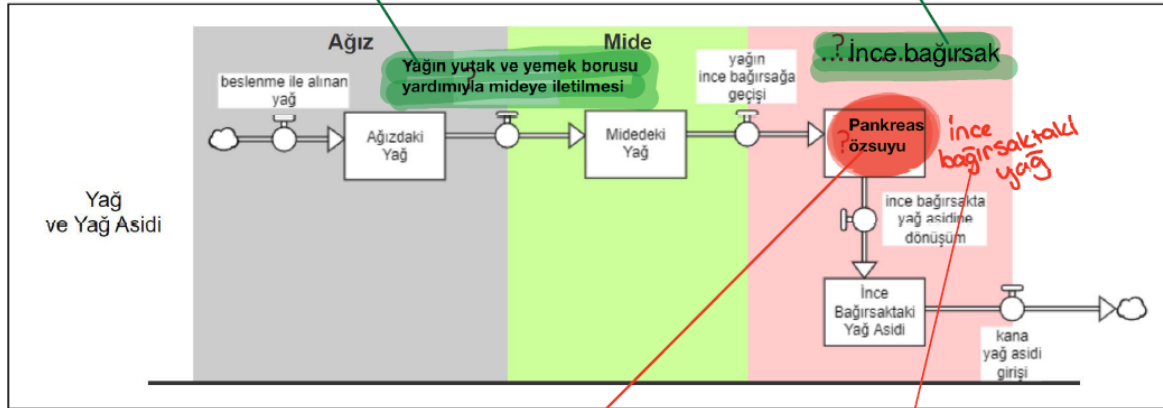


# Examples of Student's Worksheet

- 1) This diagram below, shows the stocks and flows of the chemical digestion of fats. Label the drawing with the missing names.

Student's correct answer :  
Transmission of fat to the stomach / Fat goes through swallow and esophagus

Students correct answer: Small intestine



Student's wrong answer : Pankreatic juice.

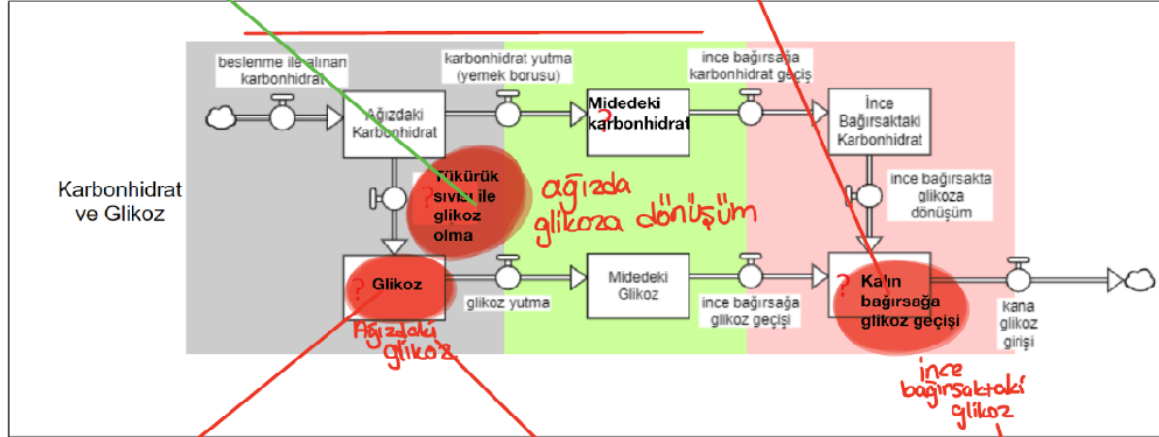
Student's corrected answer:  
Fat into small intestine

# Examples of Student's Worksheet

- 2) This diagram below, shows the stocks and flows of the chemical digestion of carbohydrate. Label the drawing with the missing names.

Student's correct answer :  
Transmission of glucose with saliva.

Student's wrong answer: large intestine



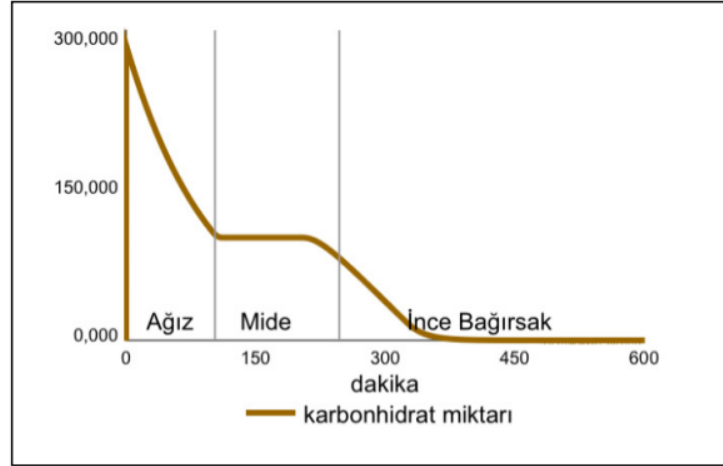
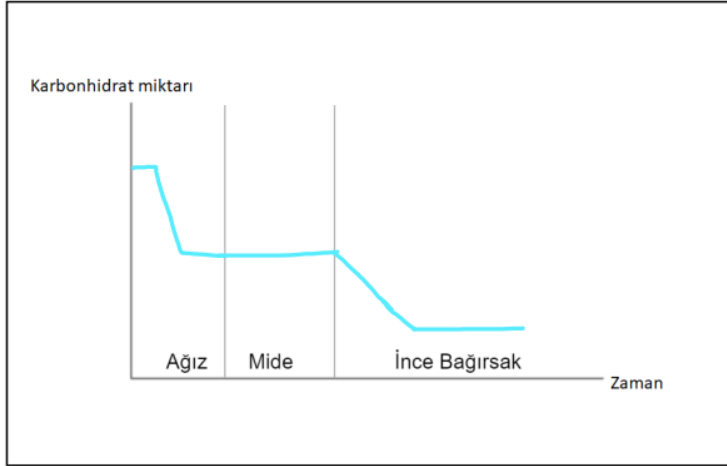
Student's wrong answer : Glucose

Student's corrected answer:  
Glucose in mouth

Student's corrected answer :  
Glucose in small intestine

# Examples of Student's Worksheet

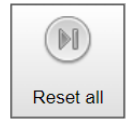
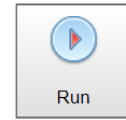
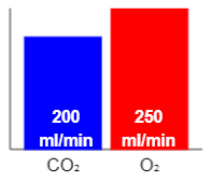
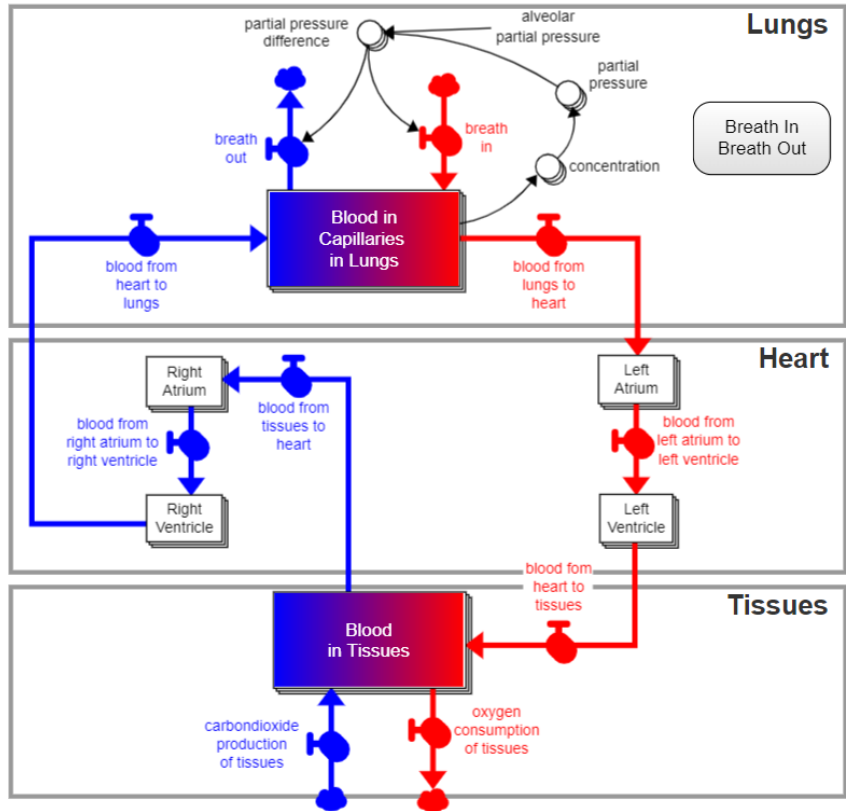
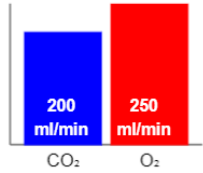
- 5) Please think about the stock and flow diagram that shows the chemical digestion of carbohydrate and draw a graph of total amount of carbohydrate when they goes into organs which makes a chemical digestions. After you draw the graph, please check the graph on the model and copy-paste the screenshot of it.



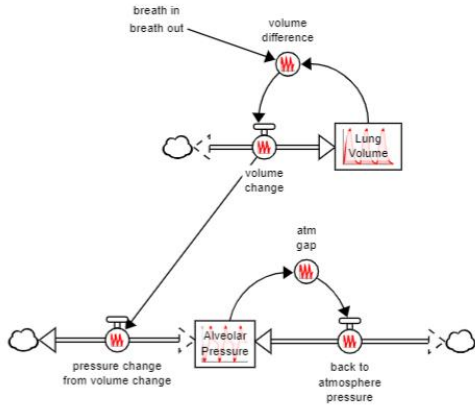
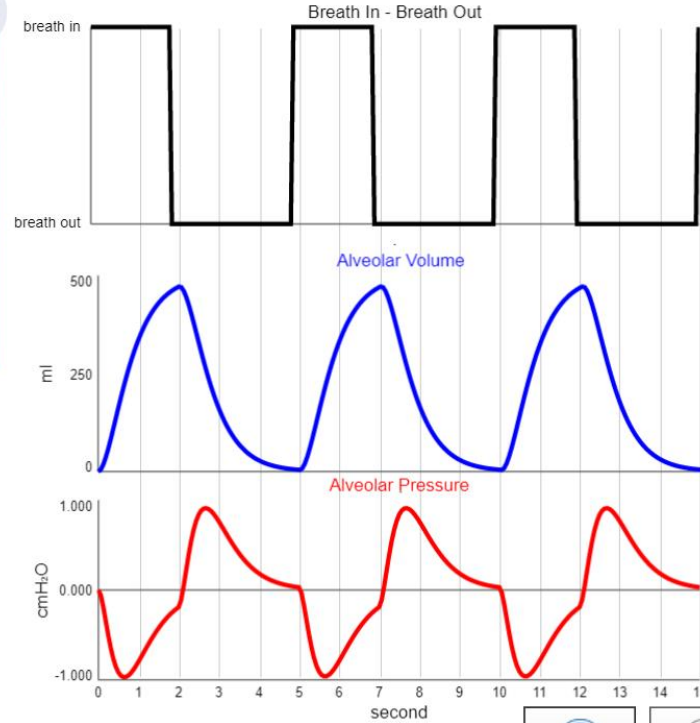
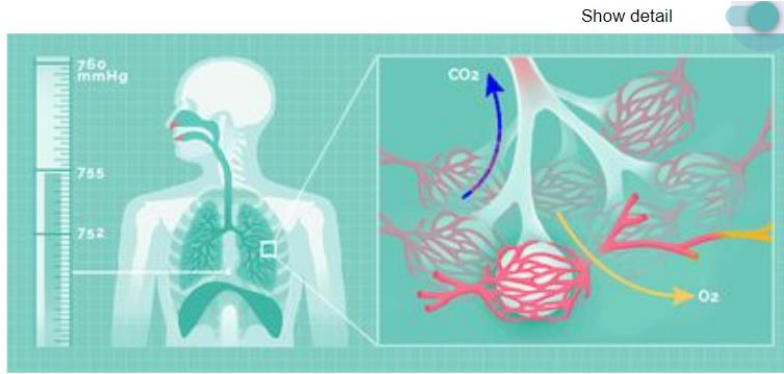
İki grafik arasındaki farkların sebebi: ... İnce bağırsaktan sonra besinin tamamen bittiğini gösterseydim grafiğim daha doğru olurdu.

If I shows that the nutrient run out completely it would be correct answer.

# Respiratory System & Systems Thinking



# Respiratory System & Systems Thinking

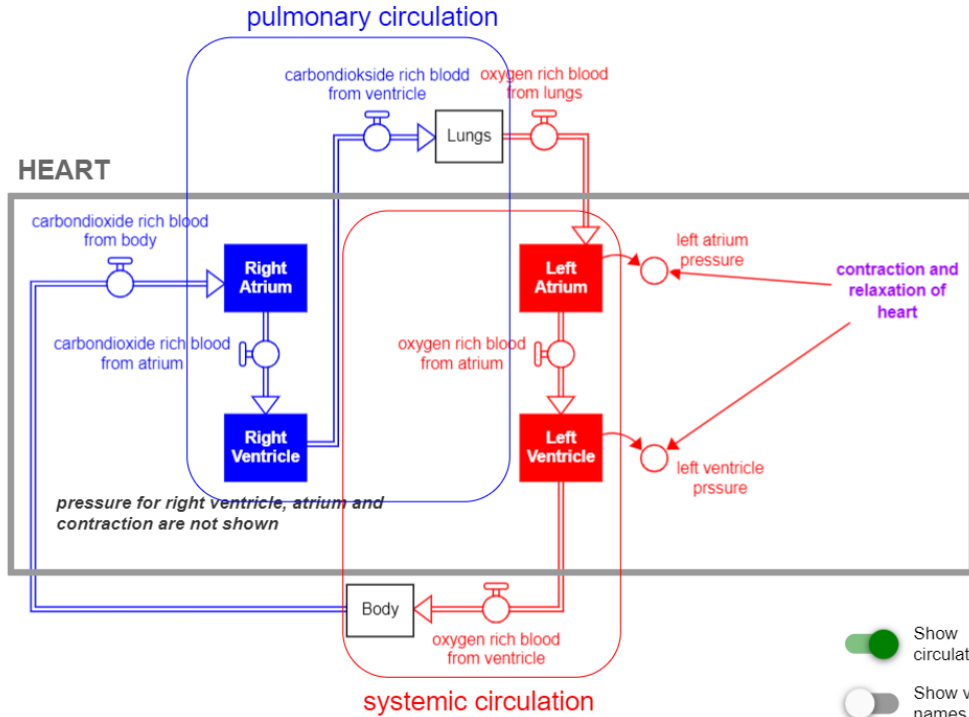


Run

Reset all

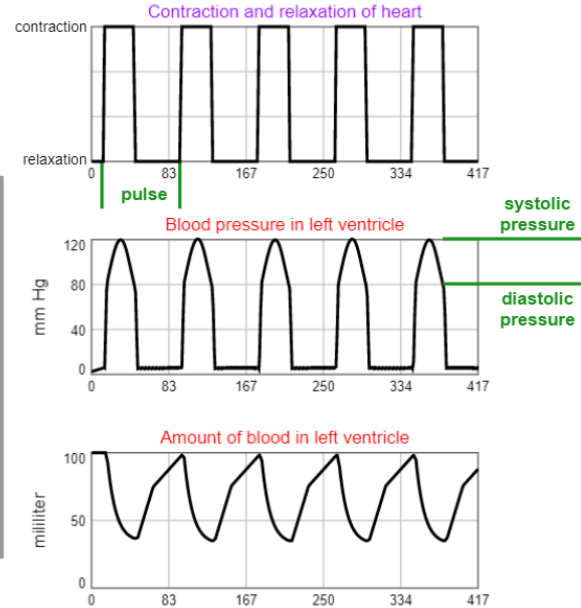
Two control buttons are located at the bottom right of the figure. The first button, labeled 'Run', features a blue play icon. The second button, labeled 'Reset all', features a grey square icon with a double vertical bar.

# Circulatory System & Systems Thinking



Reference

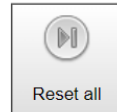
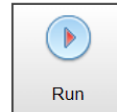
Time unit in graph is one percent of one second (100 = 1 second)



Show circulations

Show vessel names

Show valves



# Human Body Systems & Systems Thinking

**What are the differences in the applications of the human body systems unit between the 2021-2022 and 2022-2023 academic years?**

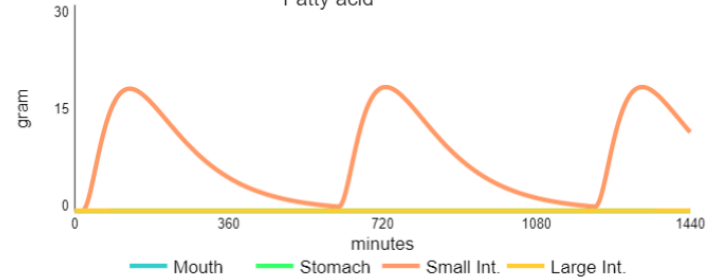
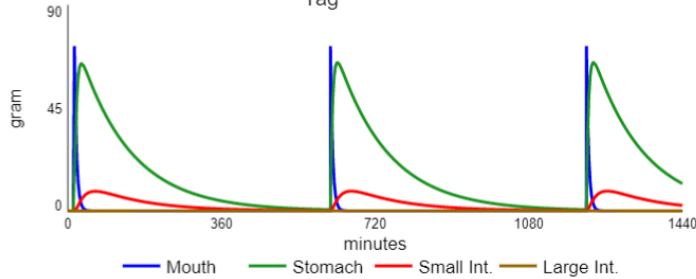
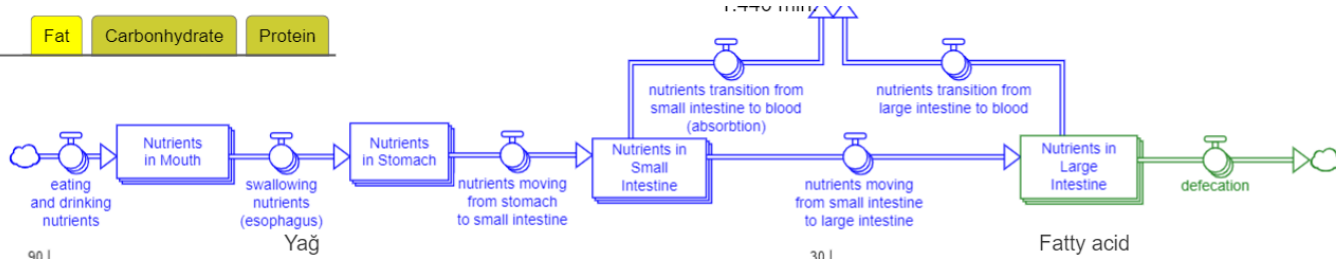
- We tried to simplify the stock & flow diagrams in each human body system.
- We focused on a specific concept, such as chemical digestion and its graphs.
- We applied the human body systems unit with System Thinking Approach for all 6<sup>th</sup> grade students. Whereas the previous year, we had applied it only for a specific group of 6<sup>th</sup> grades students.



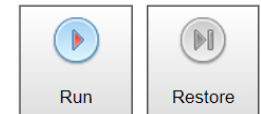
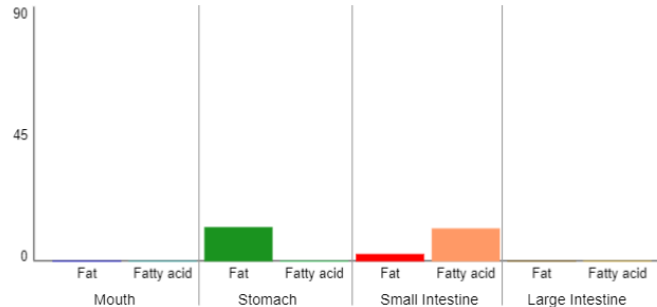
# Digestive System & Systems Thinking

## (2021-2022 Academic Year)

Food: Fat Carbohydrate Protein

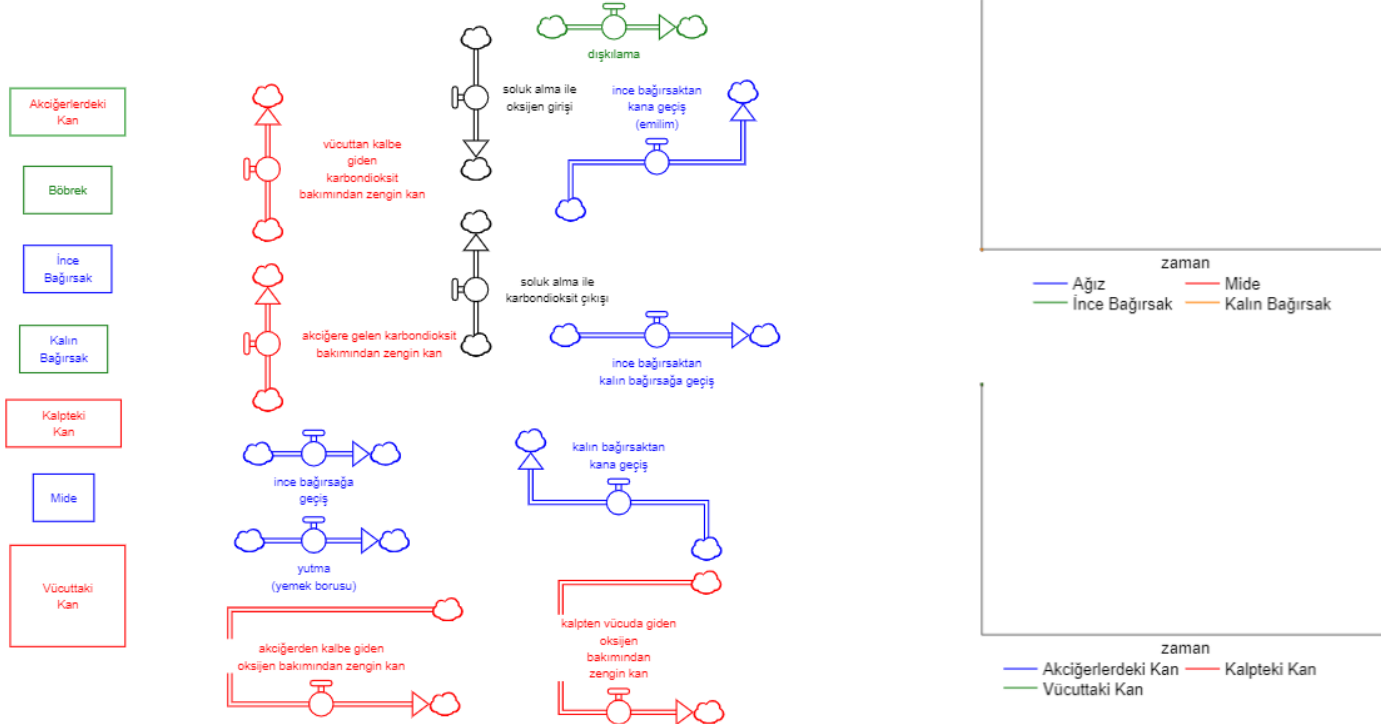


Fat  
and  
Fatty acid



# Digestive System & Systems Thinking

## (2021-2022 Academic Year)



# Limitations and Future Challenges

## Limitations

- Anecdotal evidences

## Future Challenges

-Existing topics can be deepened:

- a. Preparation of working papers for all subjects
- b. Excretory system

-New topics can be added:

- a. Support and Movement System
- b. Supervisory and Regulatory systems
- c. Health of Systems

-Academic research can be conducted



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**Thank you**

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