



Cambridge Assessment
International Education

STUDENT'S WORKSHEET BASED ON PROBLEM BASED LEARNING

HUMAN NUTRITION



BIOLOGY
GRADE
X SCIENCE

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2020

A. IDENTITY

Subject	Biology
Class / Semester	X Science ... / 1
Time	90 Minutes
Date of The Day	
Group Members	1
	2
	3
	4
	5

B. BASIC COMPETENCE (K13 CURRICULUM)

3.7	Analyze the relationship between the structure of the tissues that make up the digestive system in relation to nutrition, bioprocess and functional disorders that can occur in the human digestive system.
4.7	Presenting reports on the test results of food substances contained in various types of foodstuffs related to the energy needs of each individual as well as food processing technology and food safety.

C. LEARNING OBJECTIVES (DUAL CURRICULUM)

Candidates should be able to :

Diet

- List the principal sources of, and describe the dietary importance of : carbohydrates, fats, proteins, vitamins, mineral, fibre, water
- Explain how age, gender and activity affect the dietary needs of humans including during pregnancy and whilst breast-feeding

Alimentary Canal

- Identify the main regions of the alimentary canal and associated organs, limited to mouth, oesophagus, stomach, small intestine, pancreas, liver, and large intestine
- Describe the functions of the regions of the alimentary canal listed above, in relation to ingestion, digestion, absorption, assimilation and egestion of food

Diseases / Disfunction

- Describe the effects of malnutrition in relation to starvation, constipation, coronary heart disease, obesity and scurvy
- State the causes of dental decay in terms of a coating of bacteria and food on teeth, the bacteria respiring sugars in the food, producing acid which dissolves the enamel and dentine, and describe the proper care of teeth in terms of diet and regular brushing
- Describe diarrhoea as the loss of watery faeces and outline the treatment of diarrhoea using oral rehydration therapy
- Describe cholera as a disease caused by a bacterium and the treatment

D. INSTRUCTIONS

1. Read the information about Human Nutrition from various sources
2. Read the available discourses
3. Discuss the answers to the questions in the discourses
4. Present the results of your discussion to the class

E. SUPPORTING INFORMATION

All living organisms need food. An important difference between plants and animals is that green plants can make food in their leaves but animals have to take it in 'ready-made' by eating plants or the bodies of other animals. In all plants and animals, food is used as follows: for growth, as a source of energy, and for replacement of worn and damaged tissues. In order to have a healthy life, all living organisms need to have a balanced diet. A balanced diet must contain enough carbohydrates and fats to meet our energy needs. It must also contain enough protein of the right kind to provide the essential amino acids to make new cells and tissues for growth or repair.

Feeding involves taking food into the mouth, chewing it and swallowing it down into the stomach. This satisfies our hunger, but for food to be of any use to the whole body it has first to be digested. This means that the solid food is dissolved and the molecules reduced in size. The soluble products then have to be absorbed into the bloodstream and carried by the blood all around the body. The alimentary canal is a tube running through the body. Food is digested in the alimentary canal. The soluble products are absorbed and the indigestible residues expelled (egested). The process of mechanical digestion mainly occurs in the mouth by means of the teeth, through a process called mastication. Digestion is mainly a chemical process and consists of breaking down large molecules to small molecules. The large molecules are usually not soluble in water, while the smaller ones are. The small molecules can be absorbed through the epithelium of the alimentary canal, through the walls of the blood vessels and into the blood.



Food

Source : <https://www.liputan6.com/health/read/3910868/makanan-4-sehat-5-sempurna-yang-telah-berganti-menjadi-pedoman-gizi-seimbang>

F. DISCOURSES
DISCOURSE 1
Problem Orientation

In an outlying areas, husband (50 years) and wife (30 years) live in a house on stilts. This husband and wife have two children which are under five (2 years and 4 years) and a baby in the mother's womb. They live in house on stilts surrounded by other residents' houses, some of which are permanent and semi-permanent construction. The land for the house is very narrow, estimated to be only about five meters long and six meters wide. This house on stilts only has one bedroom between the living room and kitchen. The house has a side entrance and a back door in the kitchen. The kitchen is covered with thatch leaves, with woven bamboo walls.



Wife and Her Daughters

Source : [181128bcmymalnutrition-editorial.family.malnutrition.getty](https://www.gettyimages.com/detail/photo/181128bcmymalnutrition-editorial-family-malnutrition)

The husband works as a rock-carrying laborer, the job is very hard even though he is old. Meanwhile, his wife does not work because she is pregnant and has a small child who is still breastfeeding. The income from working husbands is very low. Every day, this family only eats rice without side dishes because they have very little money for their monthly food needs. Apart from this, their family was tested with the condition of their two children who were not well. Never mind standing, even sitting must be supported. This physical condition had been experienced by her two children since birth, until finally the doctor told her that the cause of such a physical condition was malnutrition. How can they not suffer from malnutrition, they only get food sources from rice in the form of carbohydrates and calcium from their own mother's milk.

Organize Students

Students are grouped according to teacher's instruction.

Guide Investigation

Find out the information (book or internet) related to Discourse 1 above to solve problems.

Develop The Work

Then discuss the following questions.

1. Could you survive on a diet that contained only carbohydrate? Justify your answer.

Answer :

2. From the story above, which family member have special needs of energy requirements? Explain your answer!

Answer :

3. Explain how age, gender and activity affect the dietary needs of humans including during pregnancy and whilst breast-feeding!

Answer :

4. Describe the effects of malnutrition in relation to starvation, constipation, coronary heart disease, obesity and scurvy!

Answer :

Every morning, Ade (10 years old) is very happy when his mother prepares breakfast for him. "Mother's cooking is very delicious," said Ade. Ade's mom is a housewife who is very good at cooking. That morning, the food made by Ade's mom was her favorite dish. Mother's special fried rice, complete with shredded chicken, eggs and cucumber, and don't forget to have a glass of chocolate milk for Ade. Without reading the prayer again, Ade voraciously ate the breakfast. A few tablespoons of fried rice went into his mouth. Suddenly, Ade choked on eating too fast. Ade's mother patted Ade's shoulder and gave him a drink. After finishing eating, Ade felt that his stomach was very full. He said, after eating that he became more enthusiastic about studying at school. Moreover, that morning, there were sports subjects. When Ade took sports lessons, suddenly his stomach felt very painful. It seems that because he was too full to eat earlier, Ade wanted to defecate. Why is the process of food in the body so fast, thought Ade. Finally, after defecating, Ade didn't feel any pain in his stomach anymore.



Ade's Illustration

Source : <https://www.healthyfamiliesbc.ca/home/articles/get-your-child-eat-breakfast-children>



A Child Alimentary Canal

Source : <https://parenting.firstcry.com/articles/babys-digestive-system-when-and-how-it-develops/>

Organize Students

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Guide Investigation

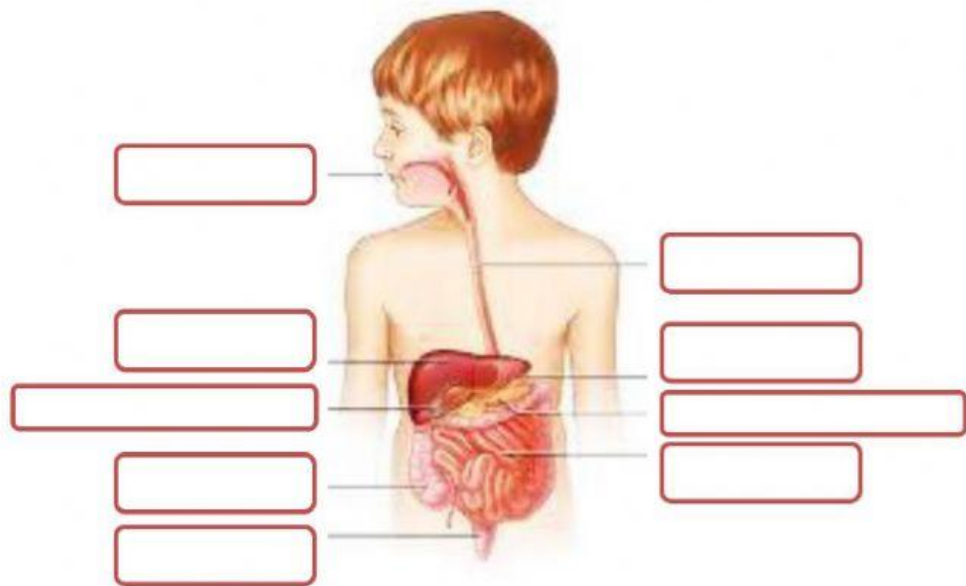
Find out the information (book or internet) related to Discourse 2 above to solve problems.

Develop The Work

Then discuss the following questions.

1. The diagram below shows the human digestive system and associated organs. Identify regions of the alimentary canal of human digestive system !

Answer :



2. Explain how the food is being processed by the alimentary canal !

Answer :

Result from The Basic Health Research (Riskesdas) shows that the dental health conditions of Indonesian people tend to be not good. From the results of a health survey involving 2,132 dentists, 57.6% of Indonesians admit that they experienced dental and mouth problems and only 10.2% received dental medical treatment. Head of Public Health Efforts of the Ministry of Health, Joko Irianto, said that provinces with the highest dental health problems were Central Sulawesi, 75.3% and only 8.2% received services from dental medical personnel. He said that dental health problems are closely related to proper tooth brushing behavior. Meanwhile, from the riskesdas it is known that the proportion is very small namely 2.8% of Indonesia's population aged three years and over who brush their teeth properly.



Child Tooth Decay

Source : <http://www.dentalnews.com/2017/06/28/fact-sheet-tooth-decay/>

"The prevalence of dental caries or cavities in children and adults is also quite high," he said at the launch of the 2018 Riskesdas results at the Ministry of Health, Jakarta on Friday (2/11). He said the prevalence of cavities in early childhood is very high at 93%, meaning that only 7% of Indonesian children are free of dental caries. That number is still far from the target of the World Organization (WHO) which wants 50% of children aged 5-6 years free from dental caries. The average dental caries in children aged 5-6 years as many as 8 teeth or more. "It requires preventive promotive efforts to reduce the number of teeth and mouth pain. One of them is to improve the way to brush teeth. The recommended time for brushing is after breakfast and at night before going to sleep," Joko said.

He said the condition of dental caries in children will affect when they are adults. It was also shown from the results of Riskesdas, for population aged 35 to 44 years, the average there were 7 teeth in adults who experienced problems or cavities. Riskesdas data collection was carried out on 300 thousand household samples (1.2 million people). The results describe data and information that show the face of health in Indonesia. The data, will be used as a reference for preparing work plans from national development or health strategic plans.

Organize Students

Students are grouped according to teacher's instruction.

Guide Investigation

Find out the information (book or internet) related to Discourse 3 above to solve the problems.

Develop The Work

Then discuss the following questions.

1. Identify the types of human teeth!

Answer :

2. Describe the structure of human teeth!

Answer :

3. Explain the cause of dental decay in the terms of a coating of bacteria and food on teeth!

Answer :

4. Describe the proper care of teeth in terms of diet and regular brushing!

Answer :