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Progarm: Masters in Biology

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Course name: **Organisms, Nutrients and Digestion**

Course Objective: The objective of this course is to provide a comprehensive understanding of organisms, the nutrients they require, and the process of digestion in various organisms.

Course Description: This course will cover the diversity of organisms and their nutritional requirements. We will explore the different types of nutrients necessary for the proper functioning of organisms, including carbohydrates, proteins, lipids, vitamins, and minerals. Additionally, we will delve into the mechanisms and processes of digestion in different organisms, including the roles of enzymes, absorption, and elimination.

Multiple Choice Questions:

1. Which of the following is NOT a macronutrient?

a) Carbohydrate

b) Protein

c) Vitamin

d) Lipid

Answer: c) Vitamin

2. Which organ is responsible for the production of bile?

a) Liver

b) Stomach

c) Pancreas

d) Small intestine

Answer: a) Liver

3. Which nutrient is the main source of energy for most organisms?

a) Carbohydrate

b) Protein

c) Lipid

d) Vitamin

Answer: a) Carbohydrate

4. What is the function of villi in the small intestine?

a) Absorption of nutrients

b) Production of digestive enzymes

c) Storage of waste products

d) Secretion of bile

Answer: a) Absorption of nutrients

5. Which enzyme is responsible for breaking down proteins into amino acids?

a) Amylase

b) Lipase

c) Protease

d) Lactase

Answer: c) Protease

6. Where does the majority of nutrient absorption occur in the digestive system?

a) Stomach

b) Small intestine

c) Large intestine

d) Esophagus

Answer: b) Small intestine

7. Which of the following is an example of an essential mineral nutrient?

a) Vitamin C

b) Iron

c) Folic acid

d) Vitamin D

Answer: b) Iron

8. Which digestive process occurs in the stomach?

a) Absorption

b) Mechanical digestion

c) Chemical digestion

d) Elimination

Answer: c) Chemical digestion

9. Which nutrient category provides the most concentrated form of energy?

a) Carbohydrates

b) Proteins

c) Lipids

d) Vitamins

Answer: c) Lipids

10. What is the function of the pancreas in digestion?

a) Production of insulin

b) Storage of bile

c) Secretion of digestive enzymes

d) Absorption of nutrients

Answer: c) Secretion of digestive enzymes

Essay Questions:

1. Describe the different types of nutrients required by organisms and their functions.

Answer: Organisms require various nutrients for growth, energy production, and maintaining bodily functions. The main types of nutrients include carbohydrates, proteins, lipids, vitamins, and minerals. Carbohydrates provide energy, proteins are essential for tissue repair and growth, lipids serve as a concentrated energy source, vitamins play vital roles in metabolic processes, and minerals are necessary for enzyme function and other biological processes.

2. Explain the process of digestion in the human digestive system.

Answer: Digestion in the human digestive system involves several steps. It starts in the mouth, where food is mechanically broken down by chewing and mixed with saliva. The food then enters the esophagus and passes through the muscular contractions of peristalsis to reach the stomach. In the stomach, acid and digestive enzymes break down the food into a semi-liquid mixture called chyme. The chyme moves to the small intestine, where further digestion occurs through the action of pancreatic enzymes and bile. Nutrients are absorbed through the villi lining the small intestine. The remaining waste materials enter the large intestine, where water is reabsorbed, and solid waste is formed before elimination.

3. Discuss the role of enzymes in the digestive system.

Answer: Enzymes play a crucial role in the digestive system by facilitating the breakdown of complex molecules into smaller, more easily absorbed components. Digestive enzymes, such as amylase, protease, and lipase, are produced by various organs, including the salivary glands, stomach, pancreas, and small intestine. Amylase breaks down carbohydrates into simple sugars, protease breaks down proteins into amino acids, and lipase breaks down lipids into fatty acids and glycerol. These enzymes speed up the digestion process, enabling efficient absorption of nutrients.

References:

1. Cummings, J. H., & Macfarlane, G. T. (2002). Gastrointestinal effects of prebiotics. British Journal of Nutrition, 87(S2), S145-S151.

2. Tortora, G. J., Derrickson, B., & Gerard, J. (2008). Principles of anatomy and physiology (12th ed.). Wiley Global Education.

3. Whitney, E., Nesse, R., Rolfes, S., & Crowe, T. (2014). Nutrition for health and healthcare (5th ed.). Cengage Learning.