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NZQA

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Level 1 Biology, 2017

90929 Demonstrate understanding of biological ideas relating to a mammal(s) as a consumer(s)

9.30 a.m. Thursday 16 November 2017
Credits: Three

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of biological ideas relating to a mammal(s) as a consumer(s).	Demonstrate in-depth understanding of biological ideas relating to a mammal(s) as a consumer(s).	Demonstrate comprehensive understanding of biological ideas relating to a mammal(s) as a consumer(s).

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Excellence

TOTAL 22

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QUESTION ONE: DIGESTION

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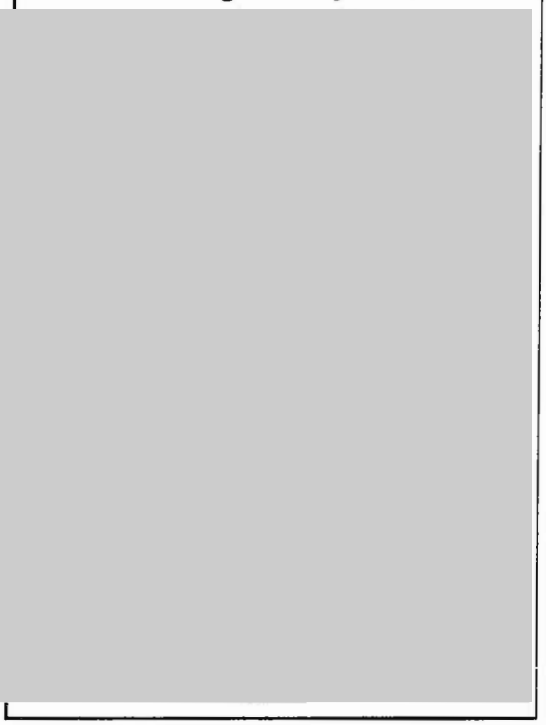
The diagrams below show the digestive system in the body and the pH of the different parts.

Digestive system	pH of different parts of the digestive system
	
http://pulpbits.net/7-label-the-parts-of-the-digestive-system/the-digestive-system-with-labels/	http://www.badgut.org/information-centre/a-z-digestive-topics/pill-coating/

Compare and contrast the physical and chemical digestion of proteins, carbohydrates and fats in the digestive system of a mammal such as a human.

In your answer:

- describe the purpose and location of the processes of physical and chemical digestion
- explain how digestion of proteins, carbohydrates, and fats occurs
- discuss why the pH of the different parts of the digestive system is important in the digestion of food, and how the pH is regulated.

Physical digestion is the process of mechanically breaking down large food molecules into smaller molecules. Physical digestion occurs in the mouth via mastication (chewing), in the oesophagus via peristalsis and in the stomach via mucle contraction. Chemical digestion is the process of breaking down large food molecules into smaller soluble

molecules with the use of enzymes. Chemical digestion occurs in the mouth with the enzyme salivary amylase, stomach with enzyme pepsin and in the duodenum (small intestine) with enzymes lipase, trypsin, pancreatic amylase and maltase. The digestion of carbohydrates first occurs in the mouth with chewing and then the carbs are chemically broken down by salivary amylase into glucose and maltose. The undigested carbohydrates and maltose molecules are then further chemically digested when they reach the duodenum. The maltose is broken down into glucose by the maltase and the carbs are broken down into glucose by the pancreatic amylase. The glucose molecules are then absorbed into the bloodstream in the ileum. Proteins are also physically broken down by mastication and by musele contractions (churning) in the stomach. Also in the stomach the proteins are chemically broken down by the enzyme pepsin into amino acids and polypeptides. When the amino acids and polypeptides reach the duodenum the polypeptides are further chemically digested by trypsin into amino acids. The amino acids are absorbed into the blood stream when in the ileum. Fats are also physically digested by mastication, stomach churning and peristalsis. When the fats are in the duodenum bile is added. Bile emulsifies fats goubles into fat droplets making the

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E7

extra on other pages

QUESTION TWO: HERBIVORE AND CARNIVORE DIGESTIVE SYSTEMS

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Herbivores and carnivores have differences in their mouths and guts which help them digest their different diets.

Rabbit gut (herbivore) **Dog gut (carnivore)**

http://www.vivahealth.org.uk/wheat-eaters-or-meat-eaters/length-digestive-tract

Rabbit (herbivore) skull

https://nz.pinterest.com/pin/299419075201863865/

Dog (carnivore) skull

http://www.angelfire.com/mi/dinosaurs/dogs.htm

Compare and contrast the differences in the digestive system and mouth of a herbivore and a carnivore.

In your answer:

- describe the diet of a herbivore such as a rabbit, and a carnivore such as a dog
- explain why and how the digestion that occurs in the mouths of a herbivore and a carnivore are different
- explain the main differences in structures and functions of the herbivore and carnivore gut
- evaluate the effectiveness of the digestive systems of a herbivore and a carnivore.

Rabits are herbivores so their diet consist of only plants. Whereas dogs are carnivores so their diet will consist of only meat products. Both rabbits and dogs

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have adaptations in there maths to suit the sort of diet they are eating. At the front of a herbivores mouth they have large incisors which are on an angle this is because herbivores need to be able to take food eg grass from its source and with these incisors can get as close to the source as possible. Herbivores like rabbits have a large diastema which is needed as herbivores like to chew their food as many times as possible. They have practically no canines as don't need them for their plant diet. At the rear of their jaw they have large flat molar that crush and grind the plant material. Herbivores many use a side to side chewing movement to break down the large cellulose layer on the plant material. On the other hand, carnivores like dogs have sharp pointed incisors at the front of their mouth to bit of meat. Canines have no diastema as they don't need to chew their food a lot of times. Carnivores have large canines so they can pierce and kill prey. Carnivores do have molars present in the back of their mouth however they are called carnassials as are pointed. The use an up and down chewing movement to bite the meat into chunks. Herbivores and Carnivores also have adaptations in their digestive systems to suit their diet. Carnivores have a short digestive track as proteins can be digested quickly, they also have a small caecum compared to herbivores as do not need to digest plant material. Herbivores have a very long digestive track as it takes a long period of time to break down plant material and the large

E7

more on other paper

QUESTION THREE: ABSORPTION, CIRCULATION, ASSIMILATION AND RESPIRATION

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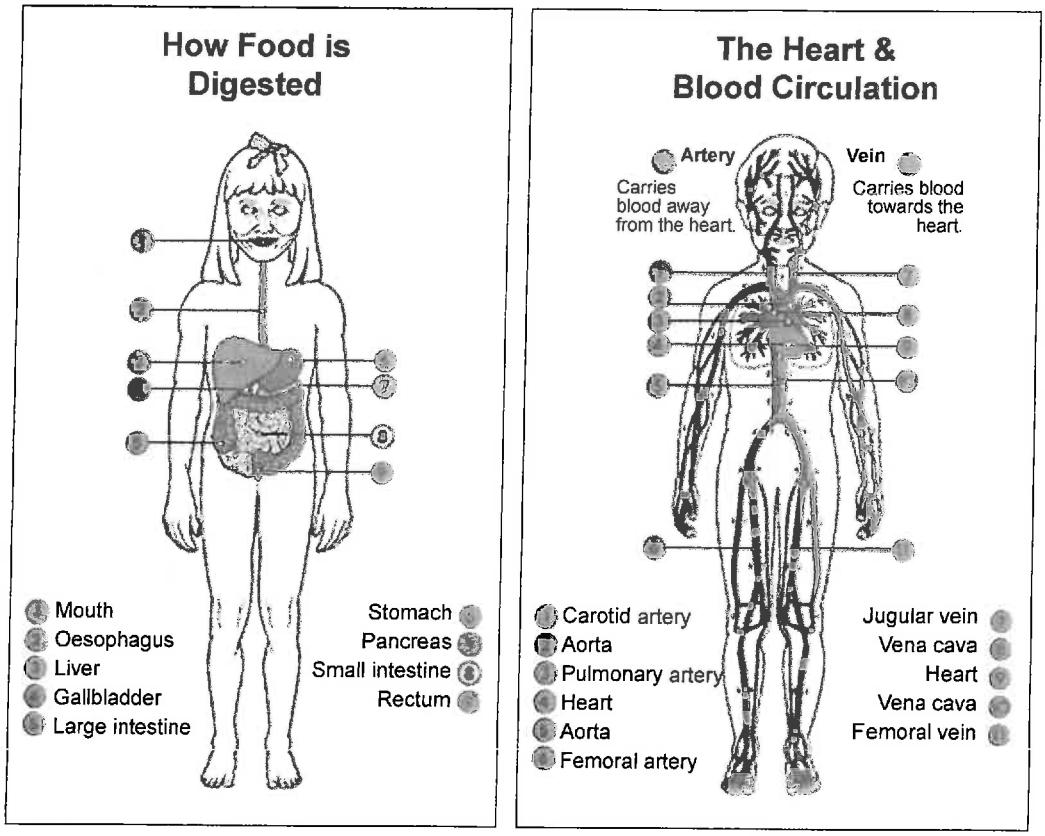
The pictures below show the main sites of digestion and how blood is circulated in the human body.



http://www.mentone-educational.com.au/how-food-is-digested-the-heart-and-blood-circulati

Discuss how the processes of absorption, circulation, assimilation, and respiration work together to ensure the products of food digestion are distributed around and used by the body.

In your answer:

- describe the processes of absorption, circulation, assimilation, and respiration, and where these processes occur
- explain how and why the processes of absorption, circulation, assimilation, and respiration occur in the body
- discuss how the processes of absorption, circulation, assimilation, and respiration work together to ensure the healthy functioning of the body.

Absorption is the process of absorbing nutrients into the bloodstream so nutrients can be used around the body. Absorption occurs in the large intestine (ileum) as nutrients is absorbed through the villi and into the bloodstream or lymphatic system. Circulation is the process of transporting blood (that contains oxygen and nutrients) around the body to the cells so they can respire.

Circulation occurs in all the blood vessels (arteries, veins and capiliaries) and in the heart. Respiration is the ~~food~~ process of using glucose and oxygen to produce energy. Respiration occurs in all body cells. Assimilation is the process of transporting nutrients around the body so the nutrients can be used. Assimilation occurs in the liver. Absorption happens in the ileum, the soluble nutrients (glucose and amino acids) are absorbed through the villi walls and into the capiliary network. They are taken to the liver via the hepatic portal vein (in the blood) where they are assimilated. The glucose is transported to the body cells in the blood via the circultory system where it is now use for cellular respiration to produce energy. Amino acids are assimilated to the cells via the circultory system and are made into proteins (building blocks of cells). Fatty acids and glycerol are absorbed through the villi walls and into the lymphatic system. From there they are assimilated and some are used for energy and the rest is stored as fats. All four processes work together to ensure the body has a healthy life. Without these processes are body would not have the right things to be able to produce energy, to be able grow or even to be able to repair itself.

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Extra paper if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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1. fat have a larger surface area. This allows the enzyme lipase in the duodenum to efficiently break down the fats into fatty acids and glyceral. The fatty acids + glyceral are then absorbed into the lymphatic system. Different areas of the digestion system have different pH's as enzymes have an optimum pH they work best at, so faster reactions per unit time. Salivary amylase ~~xxxx~~ optimum pH is 7 so this is why the mouth has neutral pH. Pepsin works best at an acidic pH 1-2 so this is why the stomach has pH of 1-2 and HCl is present. Lipase, Trypsin, pancreatic amylase and maltase all have optimum pH of 7 so this is the small intestine has neutral pH and sodium bicarbonate is added to neutralise the chyme.

2. cellulose layer on plant material. This is why herbivores have a large caecum as this is where the cellulose is broken down by an enzyme called cellulase. For the types of diets that rabbits (herbivore) and dogs (carnivore) are eating the adaptations in their mouth and digestive tracks have made are very effective and are best suited to their diets.

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Subject:	Biology	Standard:	90929	Total score:	22

Q	Grade score	Annotation
1	E7	Described what physical digestion is, and where it occurs. (A points) Describes where chemical digestion occurs and implies that it uses enzymes, Naming specific examples of enzymes, describing where they work, what they breakdown and the products. (M points) Also outlines the pH of the areas some of the enzymes work best in. But still only outlining the digestive system mouth to small intestines. Explains what happens to enzymes if the pH isn't at its optimum (M point) Discuss why each part of the digestive system is compartmentalised and regulated so optimum pH can be provided for the enzyme to work. Statements like " pepsin works best at an acid pH 1-2 so this is why the stomach has pH of 1-2 and HCl is present"….. Needed to discuss how at least two parts of the digestive system are regulated to get this E point. The second E point isn't really done by this student – compare and contrast physical and chemical digestion, therefore not E8.
2	E7	Tells us that herbivores eat plants high in cellulose (A point) and told us that cellulose is hard to digest and therefore they have special adaptations. Tells us that carnivores eat meat (A point) Outlines in detail the adaptation of the teeth, what they are and how they help the organisms gain maximum nutrition out of their diet (E point) Only outlines and explains (in limited detail) some of these adaptations in both organisms, so does not get E8.
3	E8	Outlines where absorption occurs and that the nutrients/ glucose moves through the villi into the blood stream then goes on to discuss what happens to it in the liver. (E point) Outlines what happens to the insoluble molecules in the lymphatic system. Demonstrates how these processes are used to deliver the required molecules to the cells in the body so the organism can function. (E point)