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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.

Achievement

TOTAL 12

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QUESTION ONE: DIGESTION

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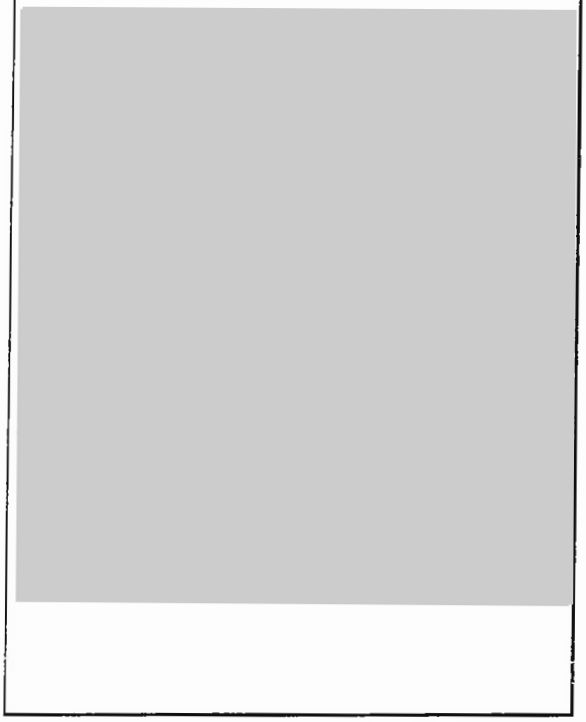
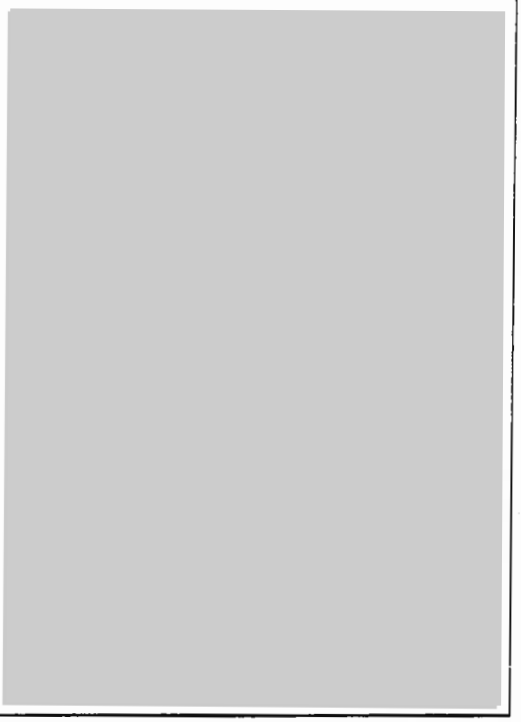
The diagrams below show the digestive system in the body and the pH of the different parts.

Digestive system



http://pulpbits.net/7-label-the-parts-of-the-digestive-system/the-digestive-system-with-labels/

pH of different parts of the digestive system



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 - SA - peristalsis
- 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. - bile

Both physical and chemical digestion occur in the human digestive system. Physical digesting begins in the mouth, where masacation takes place, then the food goes down the oesphagus by the process of peristalsis. The food the reaches the stomach, duodenum, ileum, colon, Rectum, Anus. Chemical digestion all starts in the mouth. Enzymes in the salivia known as amylase begin to help break down the large insoluble food molecules into small

Soluble ones. Chemical digestion also takes place in the stomach. The stomach wall is lined with gastric pits, which release three gastric fluids: Pepsin, mucus and hydrochloric acid. Enzymes such as protease are also found in the stomach. Protein, carbohydrates and lipids all begin as insoluble molecules, and in order for them to be absorbed into the blood stream they need to be broken down. The enzymes amyloses, proteases and lipases all help with this process. Once the substrate (protein carbohydrate, lipids) finds the enzyme, the substrate goes into the enzymes 'active site' which then causes the substrate to break (smaller molecules). once the enzymes have broken them down the can be absorped into the blood stream via villi and microvilli which line the wall ileum (small intestine). The pH of the digestive system is most acidic (1-2 pH) in the stomach. This is because bacteria needs to be killed. As the stomach pH is low, this means the enzymes in the stomach need to be able to work in this environment. Normally enzymes thrive at the optimum pH of 6-7 and would denature if it was higher/lower, but stomach enzymes thrive at the pH of 1-2. Bile which is produced by the liver and released by the bile duct, helps neutralise stomach acid and mucus lines the stomach so it does not digest itself. The start of the small intestine + colon are just under acidic and then for both they become more neutral. This is because the nutrients / water being absorped:

A4

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.

The digestion starts in the mouth for both herbivores and carnivores. Herbivores are plant eaters, so they

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digest plantation which is high in cellulose, man to break down cellulose the enzyme cellulase is needed, but mammals do not produce this. So herbivores have amylase enzymes in their salivia to aid with the digestion of cellulose. Compared to carnivores which are meat eaters, they eat lots of protein so there are no enzymes in their salvia. Both herbivores and carnivores have teeth: incisors, canines and molars. Herbivores have large and sharp incisors as they use these to cut plantation, large flat molars which grind up the plantation; increasing the surface area of the food and allowing it to chemically digested by the amylase. And canines are sometimes present in herbivores, but not as sufficent as they are in carnivores. In herbivores incisors are often present in the bottom lower jaw at the front, and with the use of a bony plate on the upper jaw can be used for a clean cut. Carnivores however have large pointed canines, which tear flesh and pierce vital organs of their prey and large / sharp molars (carnissals) that cut up the meat. Incisors are also present and are used to scrape meat off the bone of prey. Molars in both herbivors and carnivores are located at the back of the jaw. Herbivores can either have a ruminat (4 chamber) stomach or a hindgut stomach (e.g rabbits). Carnivores have a foregut stomeach. The hind gut compared to the foregut is a lot more complicated. As carnivores only eat meat (protein) their digestive track is not as complicated as herbivores who digest plantation (cellulose). A

QUESTION THREE: ABSORPTION, CIRCULATION, ASSIMILATION AND RESPIRATION

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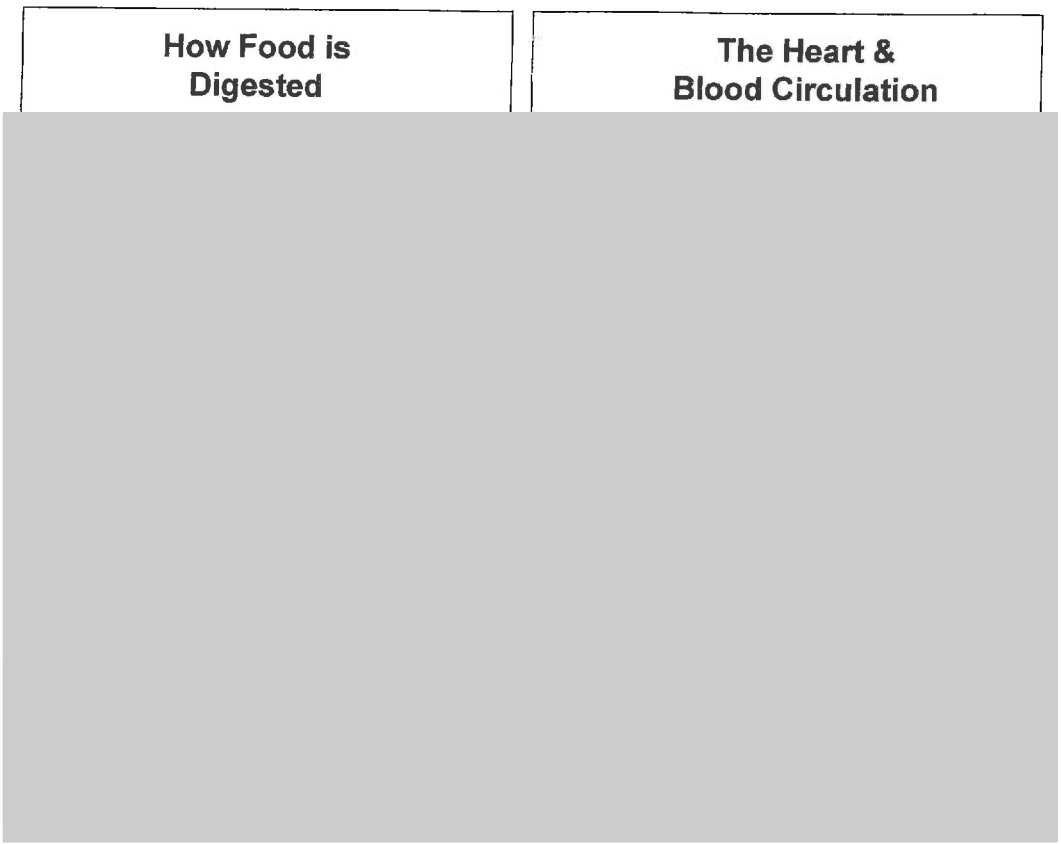
The pictures below show the main sites of digestion and how blood is circulated in the human body.



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.

Once the food in the human body is in the ileum (small intestine) the nutrients (glucose ect.) are absorbed into the blood stream via the villi on the ileum walls. Then through the systemic circulation circuit those nutrients are delivered to the cells of the body. The blood is pumped around by the heart. oxygenated blood in arteries is taken away from the heart, and deoxygenated blood is taken to the heart via the veins. The circulatory

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System (pulmonary) delievers oxygen to the heart through the pulmonary vein, from the lungs after we inhale oxygen, lungs → bronchus → bronchioli → Alveoli where gas exchange occurs. This is where the oxygen goes to the low concentrated area, and the waste (CO_2) does the same but vice versa so it can be exhaled. Respiration is the way our bodies get chemical energy. There are two types of respiration anaerobic and aerobic. Aerobic respiration requires oxygen and gives you energy slower, but last longer. glucose + oxygen → carbon dioxide + water + ATP(38). Anaerobic does not require oxygen, and works faster but can only be used for a short period of time as lactic acid is produced and toxic to muscles. glucose → lactic acid + ATP(2). If all these function correctly all the correct oxygen, nutrients ect can be delivered to our cells. The harder our bodies work the faster our systems go to deliever to the cells. We breathe faster, our heart pumps faster, start to use energy, get hungry / thirsty as our body needs more nutrients. So in order of us to survive we need our body to be functioning quickly and efficently. Capillaries also help during these processes. Diffusion of the capillaries occur where the O_2/nutrients or CO_2/waste go from a high concentration to a low concentration to be delivered to the cells. All systems digestive, circulatory, ~~respiratory~~ respiratory and more all function together to keep our body going.

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

QUESTION NUMBER

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2 Carnivore has a stomach with a low pH which helps with killing bacteria and helps break down the protein. A herbivores stomach in the hindgut has helpful bacteria which helps break down the cellulose. Then in both stomachs the food travels to the small intestine, then the caecum. The caecum in the hindgut is larger than the foregut. The caecum helps with reabsorption of waterions and in a herbivores helps with the caecal pellets. Then the waste products leave the body via the anus. However the rabbit also has caecal pellets which are reingested. This is because the nutrients from the plantation can't all be broken down so it is reingested. Both digestive systems are effective for each animal. Both a dog (foregut) and a rabbit (hindgut) have different diets so therefore need different systems to function properly

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Subject:	Biology	Standard:	90929	Total score:	12

Q	Grade score	Annotation
1	A4	Described what physical digestion is, and where it occurs. (A points) Describes where chemical digestion occurs and implies that it uses enzymes, then goes on to describe the digestive system – mouth to small intestines, naming enzymes (A points) but not always saying that food group they digest or what is produced. Describes the pH of the stomach and say normal enzymes work at pH 6-7 (A points) but hasn't explained why they need the correct pH and what happens if the pH isn't correct and how each part of the digestive system is compartmentalised and regulated so optimum pH can be provided for the enzyme to work.
2	A4	Tells us that herbivores eat plants high in cellulose (A point) but hasn't told us that cellulose is hard to digest and therefore they have special adaptations. Tells us that carnivores eat meat (A point) Describes some teeth and tells us what they do, but hasn't linked their function to the toughness of the cellulose (so only A point) Describes the caecum as large (A point) but incorrectly described its use. Hasn't described more differences between the two guts or explained what these organs do to help them get optimum nutrients out of their specific diet.
3	A4	Told us that absorption occurs in the villi of the ileum (A point) Told us that these nutrients move into the blood (A point) Told us circulation moves the nutrients to cells (A point) Told us blood is pumped by the heart (A point) then outlines where the heart pumps blood to which isn't needed. Gives the equation for aerobic respiration (A point). Hasn't given enough explanation of each of these processes of discussed how they are linked together so the organism can carry out some "life processes"