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1

90929



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

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## Level 1 Biology, 2015

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

2.00 p.m. Friday 20 November 2015  
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 2–12 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.**

**Low  
Achievement**

**TOTAL**

**10**

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## QUESTION ONE: TEETH FOR LIFE

ASSESSOR'S  
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The pictures below show the skull of a carnivore and the skull of a herbivore. They have different structures to assist with the digestion of the different types of foods eaten.

Cat skull

Sheep skull

<http://illuminationstudios.com/wp-content/uploads/2011/10/catskull.jpg>

<http://www.cpr-savers.com/assets/images/prodimages/T30018.jpg>

- (a) Define the term digestion.

Enzymes breaking down large chunks of food to absorb nutrients

- (b) Explain how the teeth and jaws of cats and sheep are adapted to deal with their different types of food.

In your answer you should:

- name the type of digestion that uses the teeth
- explain how each animal's teeth are adapted to suit each animal's typical diet
- compare the teeth and jaw of the cat with the teeth and jaw of the sheep, and explain how and why they are different.

Teeth are used in physical digestion. Cats teeth have adapted to eating meat. This can be seen

As a ~~herb~~ has very sharp molars and incisors and large ~~to~~ canine teeth. But the Sheep has adapted to plants as it has flat ~~its~~ molars and incisors and no ~~to~~ canine teeth. This is because the sheep doesn't ~~to~~ need to rip off and tear pieces of meat, it just has to grind plants, ~~and~~ and the cat ~~needs~~ doesn't need flat teeth because it won't do anything against meat.

- (c) The rates of substrate breakdown by salivary amylase and pepsin were tested across a range of different pH values, and the results are shown in the graph below.

**Pepsin and Salivary Amylase Activity  
at Different pH Values**

<http://www.skill-guru.com/228/mcas-high-school-biology-test-spring-2011/questions>

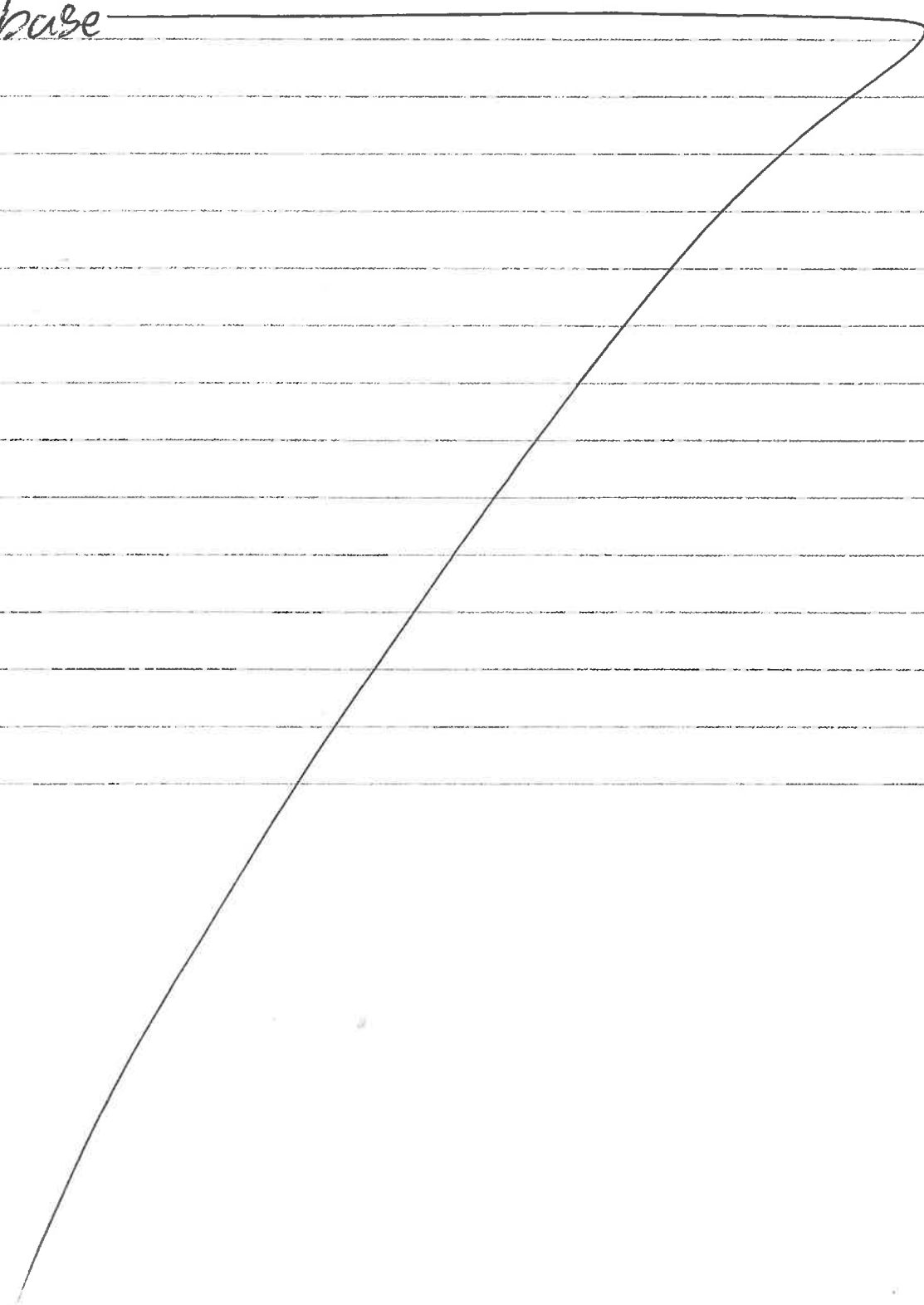
Referring to each of these enzymes, explain how these results relate to digestion in the mouth and in the stomach.

Your answer should include:

- a definition of chemical digestion
- a description of where each enzyme is produced, and where it carries out its function
- a discussion of how each enzyme's activity is affected by the pH changes that occur as food moves through the digestive system.

Chemical digestion is when chemicals are produced by the body to help break down particles even further. Pepsin is produced in the stomach and does most of its function there. Salivary amylase is produced up near the buccal cavity and functions in the mouth. Salivary amylase is a normal pH level enzyme that is only affected if it becomes too much of a base or too acidic it works at its best at pH level 7.

But pepsin is very acidic and works its best at pH ~~1~~ 2. It is only affected when the pH starts to become normal or a base



A4

**QUESTION TWO: DIGESTIVE SYSTEMS**ASSESSOR'S  
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[http://www.mirror.co.uk/news/uk-news/  
hero-bengal-cat-leo-scares-98886](http://www.mirror.co.uk/news/uk-news/hero-bengal-cat-leo-scares-98886)

[http://cache2.asset-cache.net/gc/dv1637031-studio-cut-out-of-  
a-sheep-gettyimages.jpg?v=1&c=IWSAsset&k=2&d=PbAEhI  
rzoCHBv40PPIGN5LT4ISBLbqOzsOGL5AT2frA%3D](http://cache2.asset-cache.net/gc/dv1637031-studio-cut-out-of-a-sheep-gettyimages.jpg?v=1&c=IWSAsset&k=2&d=PbAEhI<br/>rzoCHBv40PPIGN5LT4ISBLbqOzsOGL5AT2frA%3D)

<https://classconnection.s3.amazonaws.com/235/flashcards/2166235/jpg/picture11367354350876.jpg>

Compare and contrast the digestive system of the cat with the digestive system of the sheep.

In your answer you should:

- describe the similarities AND differences in the features of the cat's and sheep's digestive systems
- explain how the different digestive systems are suited to the dietary requirements of a carnivore and a herbivore.

The Similarities between these two digestive systems is that they both have a ~~small~~ ~~stomach~~ stomach. Small intestine and a large intestine. The differences are that the Sheep looks to have more than one stomach. ~~Its~~ Its ~~long~~ small intestines are long and thin compared to the cats short and fat one. ~~And~~ And the sheeps large intestine ~~are~~ are ~~short~~ long and small where as the cats is big and short. The digestive systems are different because they are eating completely different food. The cat has big ~~organs~~ organs because meat digestion is physically harder and the sheeps digestion system is longer because plants ~~are~~ are chemically harder to digest.

A4

### QUESTION THREE: DIGESTION AND TRANSPORT

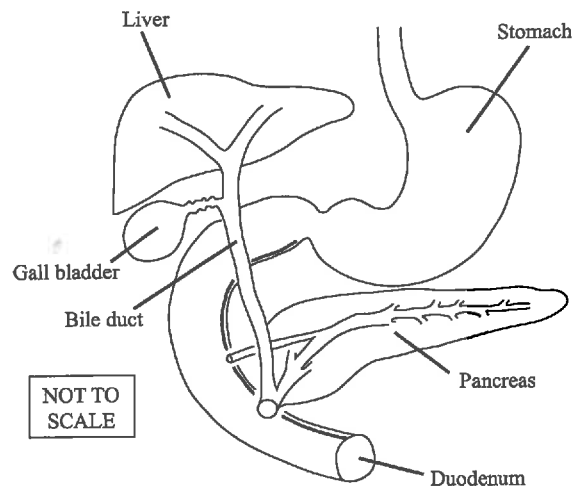
Once chyme (a thick semifluid of partly digested material) leaves the stomach, it enters the first part of the small intestine (duodenum), where further digestion can occur.

- (a) Explain how digestion occurs in the small intestine.

In your answer you should:

- complete the table below
- explain how digestion is carried out by named enzymes and other substances that are released into the small intestine, including the substrates used and the products formed.

#### Digestive tract from the stomach to the duodenum



Adapted from: <http://www.upmc.com/patients-visitors/education/gastro/Pages/ercp.aspx>

Table of digestive enzymes and their substrates

Substrate	Enzyme	Product(s)
Fats	Lipase	Fatty acids
Protein	Protease	Amino acids
Starch	<del>Amylase</del> Pancreatin	Carbohydrates

Digestion in the ~~small~~ small intestines occurs by ~~breaking~~ breaking down the undigested substrates from the stomach be digested by the enzymes that are in the small intestines this then makes the products left over be absorbed by the walls of the small intestines.



- (b) Discuss how the structures in the small intestine enable the nutrients to be effectively absorbed, then transported and assimilated into other cells around the body.

Adapted from: [http://www.daviddarling.info/images/small\\_intestine\\_cross-section.jpg](http://www.daviddarling.info/images/small_intestine_cross-section.jpg)

In your answer you should:

- explain how the structures in the small intestine help increase absorption and transport of named substances to other cells within the body
- discuss how the final products of digestion are transported to other regions in the body, and what these products are used for in the cells.

Villi help increase absorption by increasing the surface area that nutrients can be absorbed in. This helps to transport nutrients as the blood then has to go all the way to the top of the Villi to get all the nutrients. The blood is then brought back up to the heart where it is pumped around the body with the nutrients. These products are used for extra growth in cells.

Low Achieve exemplar for 90929 2015			Total score	10
Q	Grade score	Annotation		
1	A4	<ul style="list-style-type: none"> <li>a. Definition weak but OK = A</li> <li>b. Correctly identified that teeth do physical digestion = A Identified teeth types and describes molars in cats and sheep but hasn't linked them to their function therefore only achieve marks</li> <li>c. Definition of chemical digestion wrong Pepsin produced in stomach = A Salivary amylase produced in mouth = A pH of mouth = 7 A Pepsin acidic is incorrect but works best at pH 2 = A Only A points</li> </ul>		
2	A4	<p>Similarities between cats and sheep correct = A</p> <p>Sheep has more than one stomach = A</p> <p>Small intestines in sheep is long = A</p> <p>Long intestines in sheep is long = A</p>		
	N2	<ul style="list-style-type: none"> <li>a. Table fats and starch incorrect, Protein row correct = A Rest of part a. nothing, nothing about bile or pancreas juices</li> <li>b. Has correct idea about villi = A but talks about nutrients in rest of answer which isn't specific enough for marks</li> </ul>		

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**High  
Achievement**

TOTAL

13

ASSESSOR'S USE ONLY

**QUESTION ONE: TEETH FOR LIFE**ASSESSOR'S  
USE ONLY

The pictures below show the skull of a carnivore and the skull of a herbivore. They have different structures to assist with the digestion of the different types of foods eaten.

**Cat skull****Sheep skull**

<http://illuminationstudios.com/wp-content/uploads/2011/10/catskull.jpg>

<http://www.cpr-savers.com/assets/images/prodimages/T30018.jpg>

- (a) Define the term digestion.

Digestion is the process of turning food into smaller molecules that are able to be past through and into our blood this is done with physical or chemical digestion

- (b) Explain how the teeth and jaws of cats and sheep are adapted to deal with their different types of food.

In your answer you should:

- name the type of digestion that uses the teeth
- explain how each animal's teeth are adapted to suit each animal's typical diet
- compare the teeth and jaw of the cat with the teeth and jaw of the sheep, and explain how and why they are different.

The type of digestion that is used by the teeth is physical digestion this is because we chew our food. Cat's teeth are adapted in a way that is suitable for a carnivore. Carnivores normally have sharp insisors

used for cutting and biting prey. They also have extremely sharp canines for gripping, tearing and puncturing prey. This is because cats are carnivores that normally hunt and catch their prey. Their canines are also designed to be able to break bones. Cats also have sharp molars to grind and chew tough meat. Sheep are herbivores meaning they only eat plants. Their teeth are especially designed to suit this diet. Sheep have incisors at the front of their mouths so they are able to cut and bite plants. They also have a set of molars to grind down their food. The teeth of a cat and the teeth of a sheep are very different this is because cats need teeth that work with catching and eating meat where sheep need teeth that cut and grind plants. The jaws of these two animals are also very different. Cats must have a stronger jaw because they have to be able to grip onto struggling prey. Sheep would have weaker jaws because they do not need to catch or grip onto plants.

- (c) The rates of substrate breakdown by salivary amylase and pepsin were tested across a range of different pH values, and the results are shown in the graph below.

**Pepsin and Salivary Amylase Activity  
at Different pH Values**

<http://www.skill-guru.com/228/mcas-high-school-biology-test-spring-2011/questions>

Referring to each of these enzymes, explain how these results relate to digestion in the mouth and in the stomach.

Your answer should include:

- a definition of chemical digestion
- a description of where each enzyme is produced, and where it carries out its function
- a discussion of how each enzyme's activity is affected by the pH changes that occur as food moves through the digestive system.

Chemical digestion is digestion with the help of different enzymes like pepsin, amylase and lipase. Salivary amylase is produced in salivary glands in the mouth, this is where salivary amylase carries out its function in the mouth. Pepsin is found in the stomach where it breaks down proteins into amino acids. Proteins are produced in the pancreas, but do most of its work in the stomach. Each enzyme likes to work at a different pH level. If the pH is too low the enzyme activity decreases. If the pH level is too high the enzymes start to denature. The salivary amylase likes to work in a neutral environment in the mouth as it breaks down carbohydrates into starch.

When we move down the body the pH level changes the pepsin in the stomach likes to work at a Acidic pH level when breaking down proteins into amino acids. Further down the body in the small intestines lipase works in a very ~~but~~ basic enviroment as it breaks down lipids into fatty acid and glycerol. The basic enviroment also nutrizes anything that has come from the stomach which is a very acidic enviroment.

**QUESTION TWO: DIGESTIVE SYSTEMS**ASSESSOR'S  
USE ONLY

[http://www.mirror.co.uk/news/uk-news/  
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rzoCHBv40PPIGN5LT4ISBLbqOzsOGL5AT2frA%3D](http://cache2.asset-cache.net/gc/dv1637031-studio-cut-out-of-a-sheep-gettyimages.jpg?v=1&c=IWSAsset&k=2&d=PbAEhI<br/>rzoCHBv40PPIGN5LT4ISBLbqOzsOGL5AT2frA%3D)

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Compare and contrast the digestive system of the cat with the digestive system of the sheep.

In your answer you should:

- describe the similarities AND differences in the features of the cat's and sheep's digestive systems
- explain how the different digestive systems are suited to the dietary requirements of a carnivore and a herbivore.



The similarities between the sheep's digestive system and the cat's is that they both have stomachs, small intestines and large intestines. The differences between the cat's digestive system and the sheep's is that the sheep's stomach is oddly shaped like it has three parts to it. The small intestine of the sheep is much longer than the cat's. The cat's large intestine is also shorter looking than the sheep's this could be because the sheep's caecum is larger. The reason for the sheep having larger digestive organs could be because the sheep is larger than the cat. The systems of the animals could also be because their diets are different. The sheep will have a larger caecum because it is a herbivore and eats a lot of plants that contain cellulose. In the caecum there is a microbe that can produce the enzyme cellulase that can break down cellulose. This is because animals can not produce this enzyme on their own. The cat properly has a very small untociable caecum because it does not eat cellulose ~~th~~-plants there for doesn't consume any cellulose. There for has no use for a caecum that has microbes that break down cellulose.

MS

### QUESTION THREE: DIGESTION AND TRANSPORT

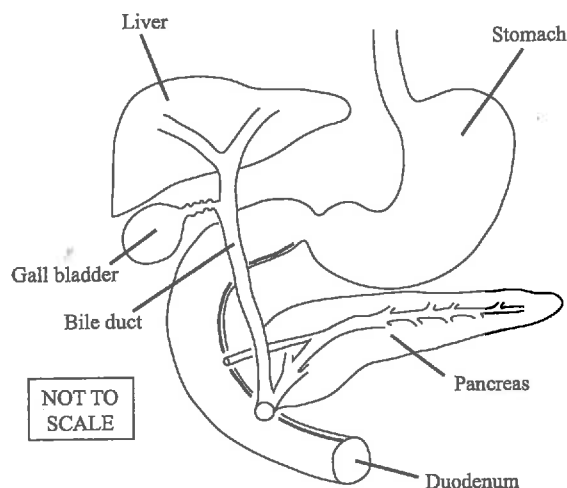
Once chyme (a thick semifluid of partly digested material) leaves the stomach, it enters the first part of the small intestine (duodenum), where further digestion can occur.

- (a) Explain how digestion occurs in the small intestine.

In your answer you should:

- complete the table below
- explain how digestion is carried out by named enzymes and other substances that are released into the small intestine, including the substrates used and the products formed.

#### Digestive tract from the stomach to the duodenum



Adapted from: <http://www.upmc.com/patients-visitors/education/gastro/Pages/ercp.aspx>

Table of digestive enzymes and their substrates

Substrate	Enzyme	Product(s)
Lipids	Lipase	Fatty acids & Glycerol
Protiens	Pepsin	Amino acids
Starch	Salivary amylase	Glucose

Digestion that occurs in the small intestine is normally the digestion of Lipids. Lipase found in the intestine helps break down lipids into fatty acids and glycerol. Bile that is produced in the liver and is stored in the gall bladder ~~also~~ breaks down lipids. This turns the lipids into fat droplets that emulsify through tiny finger like projects called villi. This increases the surface area so more absorption can be done. The surface area is increased even more through micro-villi. Pepsin helps to break down protein into amino acids in the stomach there is also gastric juices.

that also helps to break down food in the stomach. A process called peristalsis also helps churn food in the stomach this is physical digestion. In the mouth Salivary amylase helps break down carbohydrates into starch this is aided by chewing which is physical digestion.

**Question Three continues  
on the following page.**

- (b) Discuss how the structures in the small intestine enable the nutrients to be effectively absorbed, then transported and assimilated into other cells around the body.

Adapted from: [http://www.daviddarling.info/images/small\\_intestine\\_cross-section.jpg](http://www.daviddarling.info/images/small_intestine_cross-section.jpg)

In your answer you should:

- explain how the structures in the small intestine help increase absorption and transport of named substances to other cells within the body
- discuss how the final products of digestion are transported to other regions in the body, and what these products are used for in the cells.

The small structures in the small intestine are called villi. These tiny finger like projections are covered with micro-villi. This increases the surface area of the small intestine so more absorption. The final products of digestion are used in many cells. Glucose is used as energy so that the cells can live out their daily routines i.e. reproducing and feeding. Proteins are used to help create new cells and tissue. Lipids fatty acids and glycerol are also used ~~to help~~ as energy for cells lives.

AA

High Achieve exemplar for 90929 2015			Total score	13
Q	Grade score	Annotation		
1	A4	<p>a. Definition incorrect</p> <p>b. Correctly identified that teeth do physical digestion = A Identified teeth but not accurate on description and what they do, e.g. canines are also designed to break bones X, that's the job of the jagged molars/ carnassial, which do not grind they cut/ slice</p> <p>c. Definition of chemical digestion correct = A Salivary amylase produced in mouth = A but doesn't say what it does Pepsin produced in stomach = A If pH low enzyme activity decreases (are they confusing pH with temperature not clear)</p> <p>Only A points</p>		
2	M5	<p>Similarities between cats and sheep correct = A</p> <p>Small intestines in sheep is long = A</p> <p>Sheep have a larger caecum because it houses microbes that produce the enzyme cellulose which breaks down cellulose = M</p>		
	A4	<p>a. Table fats and starch correct = 2A Protein row incorrect, pepsin is in the stomach Rest of part a. nothing, has identified bile produced in the liver and stored in the gall bladder but hasn't said why it's important to emulsify fats therefore not M</p> <p>b. Has correct idea about villi = A but talks about final products in rest of answer which isn't specific enough for marks</p>		