

**Assessment Schedule – 2011**

**Biology: Demonstrate understanding of biological ideas relating to a mammal as a consumer (90929)**

**Evidence Statement**

**QUESTION ONE: DIGESTION AND ENZYMES**

N0	N1	N2	A3	A4	M5	M6	E7	E8		
No evidence or no relevant evidence.	Describes ONE idea.	Describes TWO ideas.	Describes THREE ideas.	Describes FOUR ideas.	Provides a named adaptation and a reason why it increases enzyme effectiveness.  Either enzyme action OR optimum pH OR length of digestive tract.	Provides TWO different adaptations and reasons why they increase enzyme effectiveness.  TWO of enzyme action OR optimum pH OR length of digestive tract	Discussion provides ONE adaptation and reasons why they increase enzyme effectiveness using named examples.	Discussion provides TWO adaptations and reasons why they increase enzyme effectiveness using named examples.		
<p><b>a. Examples of evidence for described answers may include:</b></p> <ul style="list-style-type: none"> <li>• Breaks down large food molecules (into smaller molecules).</li> <li>• Catalyses (speeds up) chemical reactions in the gut.</li> <li>• Breaks down food so it can be absorbed into the blood.</li> </ul>					<p><b>c. Examples of evidence for explained answers may include:</b></p> <ul style="list-style-type: none"> <li>• Jaw or teeth mechanically digest food by grinding it up into smaller pieces. This increases the surface area available for the enzymes to work so that the chemical reaction (digestion) is <b>more efficient / faster</b>.</li> <li>• Bile is made in the liver and stored in the gall bladder. It is secreted into the small intestines (duodenum), where it emulsifies fats / lipids and breaks them into smaller droplets. This increases surface area of the food that the enzyme (lipase) has to react on, so it can break down the fat</li> </ul>			<p><b>c. Explanation with named examples:</b></p> <ul style="list-style-type: none"> <li>• Teeth mechanically digest food using molars to grind into smaller pieces. This increases the surface area available for the enzyme, amylase to work on carbohydrates, so that the</li> </ul>		<p><b>c. Example of explanation with named examples and LINKING ideas:</b></p> <ul style="list-style-type: none"> <li>• Bile is produced in the liver and stored in the gall bladder. It increases the effectiveness of the enzyme lipase action in two ways. First it emulsifies fats, which</li> </ul>
<p><b>b. Refer to Appendix 1 for completed table</b></p> <p>Six aspects completed correctly in table for Achievement idea.</p>										

	<p>molecule into smaller molecules (fatty acids and glycerol) a lot faster.</p> <ul style="list-style-type: none"> <li>• Bile is an alkaline solution so it increases the pH of the small intestine by neutralizing the acid as food moves into the small intestines. The enzyme in the small intestine works <b>more efficiently in slightly alkaline pH</b> conditions.</li> <li>• Gut pH – Enzymes work most efficiently in <b>optimum pH</b> conditions. Different parts of the digestive system have different pH's. The reason the gut is separated is so that specific digestive enzymes can function <b>most efficiently</b> in their optimum conditions (pH). If the pH is <b>not optimum</b> it can prevent enzyme from working properly or even damage it.</li> <li>• Mouth pH – saliva works most efficiently in pH about 7 its optimum pH conditions. If the pH is <b>not optimum</b> it can prevent enzyme from working properly or even damage it.</li> <li>• Long digestive system increases enzyme efficiency because the enzymes have more time to act upon the food</li> </ul>	<p>chemical reaction (digestion) is more efficient / faster and breaking down into glucose/ more successful collisions.</p> <ul style="list-style-type: none"> <li>• Gut pH – Enzymes work most efficiently in optimum pH conditions. For example, amylase works best in a neutral pH environment (mouth 6.5–7.5), or lipase works best in alkaline pH conditions (&gt;7.0 in the small intestines). Different parts of the digestive system have different pH's, eg the stomach is acidic, pH 2.0. The reason the gut is separated is so specific digestive enzymes can function most efficiently in</li> </ul>	<p>means it breaks it into smaller droplets so that there is an increased surface area for lipase to react with, it is also an alkaline solution so it neutralizes the acidic food coming from the stomach into the duodenum. This is because lipase optimum reaction pH is alkaline (&gt;7.0), thus the increased surface area and the optimum pH ensures efficient enzyme activity.</p>
<p><b>c. Example of evidence of described answers:</b></p> <ul style="list-style-type: none"> <li>• <b>Jaw / teeth</b> crush / grind up food into smaller pieces</li> <li>• <b>Bile emulsifies</b> fat so enzymes can work better.</li> <li>• <b>Bile neutralises</b> pH so that enzymes can work properly.</li> <li>• The components of the gut with the enzyme have <b>optimum pH</b> so it works properly / efficiently.</li> <li>• <b>Length of gut</b> – increase surface area and separate enzymes so optimum conditions provided.</li> <li>• <b>Caecum</b> contains bacteria to digest cellulose.</li> <li>• <b>Length</b> of digestive tract means the enzymes spend longer time in contact</li> <li>• <b>Liver makes bile</b> / gallbladder stores bile to emulsify fats / change the pH</li> </ul>			

<ul style="list-style-type: none"><li>• Enzymes gland in mouth releases enzymes in a <b>neutral pH</b></li><li>• <b>Enzymes named:</b> stating what they breakdown and what is produced. E.g. amylase breaks down starch into glucose</li></ul>		their optimum conditions (pH). If the pH is not optimum, it can prevent enzymes from working properly, or even denature it, which means it is damaged irreversibly.	
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**QUESTION TWO: FOOD AND ENERGY**

N0	N1	N2	A3	A4	M5	M6	E7	E8		
No evidence or no relevant evidence.	Describes ONE idea.	Describes TWO ideas.	Describes THREE ideas.	Describes FOUR ideas.	Provides an explanation of the <b>purpose</b> OR a <b>summary</b> of the process of cellular respiration.	Provides an explanation of the <b>purpose</b> AND a <b>summary</b> of the process of cellular respiration.	Discussion provides evidence as for M6 AND a <b>named example</b> .	Discussion <b>links the role of each of the systems</b> in cellular respiration.		
<p><b>a. Examples of what mammals need energy for (TWO needed for one Achievement idea):</b></p> <ul style="list-style-type: none"> <li>Growth, Reproduction, Excretion, Movement, Respiration, Cell Division, sensitivity, nutrition</li> <li>Active transport</li> </ul>					<p><b>c. Example of evidence for explained answers may include:</b></p> <p>An explanation of the purpose of cellular respiration, eg:</p> <ul style="list-style-type: none"> <li>The <b>purpose</b> of cellular respiration is to <b>convert</b> the chemical energy in glucose molecules to a form of energy that every cell in the body can use. This energy (ATP) can then be used by the mammal to carry out life processes.</li> </ul> <p>A <b>summary</b> process / systems / steps involved in cellular respiration, eg:</p> <ul style="list-style-type: none"> <li>Explains / summarises how cellular respiration involves the breakdown of glucose molecules and supplies oxygen via the circulatory system into the cells to release / produce / provide energy.</li> <li>Cellular respiration involves the breakdown of <b>glucose</b> molecules by specific enzymes involved in respiration.</li> <li>These enzymes catalyse (speed up) the reaction that <b>converts glucose</b> and oxygen into carbon dioxide and</li> </ul>		<p><b>Examples of evidence:</b></p> <p>This energy is essential as it is</p> <ul style="list-style-type: none"> <li>used to join small molecules together to make larger ones (metabolism)</li> <li>enables muscle cells to contract so that mammals can move</li> <li>necessary for the active transport of chemicals</li> <li>if these processes were not to happen, the animal would not survive, as it would be unable to move, feed, grow or repair</li> </ul>		<p><b>Must clearly discuss</b> how the <b>three processes</b> are linked together: i.e how digestion produces glucose which moves into the blood and is transported by the circulatory system to the cells AND oxygen is breathed in and moves into the blood in the lungs and is then transported by the circulatory system to the cells AND respiration is the converting of <b>glucose</b> and oxygen into energy (ATP) AND this energy is needed to</p>	
<p><b>b. Two systems that work together (Named AND description for one Achievement idea), eg:</b></p> <ul style="list-style-type: none"> <li><b>Digestive system</b> – organ system which breaks down food (into smaller pieces), so that the body can use it/ can be absorbed into the blood.</li> <li><b>Respiratory System</b> – organ system that its function is exchanging gases with the environment OR to get oxygen into the body and remove carbon dioxide. Do not accept breathing OR used the O<sub>2</sub> to release energy from food</li> </ul>										
<p><b>c. Examples of evidence for described answers may include:</b></p> <ul style="list-style-type: none"> <li>Completed cellular respiration equation – word or chemical</li> </ul> <p>eg Glucose (Food) + Oxygen → Water + Carbon Dioxide + Energy (ATP)</p> <p><b>OR</b></p> <ul style="list-style-type: none"> <li><b>Description</b> – Cellular respiration is a process where food molecules are broken down to <b>release</b> energy.</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li><b>Purpose</b> of cellular respiration is to convert / release chemical energy in food to a form that the body / mammal can use.</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>Reason mammals need energy, eg: build large molecules from small molecules / to break large molecules down/ muscles use energy to contract – move/</li> </ul>										

<p>energy used to keep mammals warm (body temperature).</p> <p><b>OR</b></p> <p>Recalls / summary of how TWO systems (digestion / circulation / respiration) work together to release / produce/ provide energy from glucose and oxygen in the cell.</p>	<p>water, thus <b>releasing energy</b> from the chemical bonds in the glucose molecule.</p> <ul style="list-style-type: none"> <li>• This produces ATP molecules, which are a form of energy every cell in the mammal’s body can use.</li> <li>• brief outline of steps showing that they realise that it is a series of reactions that produce / release ATP / energy from the food. Do not need to have all the steps e.g. Glucose → Glycolysis → pyruvic acid → respiration → ATP + CO<sub>2</sub></li> </ul>	<p>itself.</p>	<p>support life processes and thus the overall survival of the mammal.</p> <p>The blood in the circulatory system takes <b>glucose</b> from the digestive system and oxygen from the respiratory system to all cells that require energy, so that they have the resources to carry out cellular respiration. The converting of <b>glucose</b> and oxygen into energy (ATP) AND this energy is needed to support life processes and thus the overall survival of the mammal.</p>
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**QUESTION THREE: DEALING WITH DIFFERENT DIETS**

N0	N1	N2	A3	A4	M5	M6	E7	E8
No evidence or no relevant evidence.	Describes ONE idea.	Describes TWO ideas.	Describes THREE ideas.	Describes FOUR ideas.	Provides an explanation of a difference for BOTH mammals (herbivore & carnivore) OR a similarity for each. Must relate to the diet – <b>tough grass OR</b> the need to <b>catch</b> / <b>kill</b> their food	Provides an explanation of a difference for BOTH mammals (herbivore & carnivore) AND a similarity. Must relate to the diet – <b>tough grass AND</b> the need to <b>catch</b> / <b>kill</b> their food	Discussion compares and contrasts both herbivores and carnivores and links / relates the adaptation to ONE of the mammals diet	Discussion links / relates the adaptation to BOTH mammals diet.
<p><b>Examples of evidence for described answers may include:</b>  <b>Must name the teeth type.</b></p> <p><b>Similarities, eg:</b></p> <ul style="list-style-type: none"> <li>• have same (3) types of teeth: incisors, canines and molars (premolars)</li> <li>• tooth structure / parts the same consist of enamel, dentine, pulp, cement</li> <li>• teeth are firmly anchored into jaw bone.</li> </ul> <p><b>Differences, eg:</b></p> <p><b>Carnivore</b></p> <ul style="list-style-type: none"> <li>• canines to catch and digest other animal</li> <li>• canines tear food</li> <li>• canine penetrates with great force</li> <li>• canine length can pierce vital organs</li> <li>• incisors cut or scrape flesh away from bone</li> <li>• molars are sharp</li> <li>• jaw moves up and down.</li> </ul>					<p><b>Examples of evidence for explained answers may include:</b></p> <p><b>Similarities, eg:</b></p> <p>Teeth of herbivores and carnivores have the same basic structure, because they both carry out the role of physical digestion, to break large food molecules up into smaller food molecules to provide increase surface area for enzyme action.</p> <p><b>Reason for Differences, eg:</b></p> <p><b>Carnivore</b></p> <ul style="list-style-type: none"> <li>• Animals they eat are alive so teeth need to have adaptations to <b>catch</b>, kill and digest animals.</li> <li>• Molars are sharp and work like scissors to cut meat as chewing.</li> </ul> <p><b>Herbivore</b></p> <ul style="list-style-type: none"> <li>• Molars are large and flat to grind the tough plant material and break</li> </ul>		<p><b>Examples of evidence of discussed answer may include:</b></p> <p>The structures involved in the process of digestion that is found in the mouth of both carnivores and herbivores are teeth. Both mammals have three types of teeth present, incisors, canines and molars.</p> <p>The teeth play a major role in the physical digestion of the food consumed as part of each of the mammal’s diet. The teeth are firmly anchored into sockets of the jawbone and they consist of the same basic parts of enamel, dentine, pulp and cement. However their shape, structure, number and position vary, depending on what the mammal’s diet predominantly consists of.</p> <p>Carnivores eat meat and so they can efficiently do this, their teeth have adapted in several ways to aid with catching, killing and eating other animals. Firstly their canines are long, sharp, and together with the jaw can generate great force. Their</p>	

<p><b>Herbivore</b></p> <ul style="list-style-type: none"> <li>• plant material tough</li> <li>• reduced number of incisors in upper jaw</li> <li>• no canines in upper jaw</li> <li>• canines in lower jaw reduced in size and not sharp</li> <li>• molars are large and flat to grind plant material</li> <li>• jaw chews from side to side.</li> </ul>	<p>it up so chemical digestion can work efficiently.</p>	<p>length allows them to puncture vital organs and their sharpness effectively tears and rips flesh from their prey's bones. The incisors are sharp and used to cut and scrape flesh from bones. The molars are also sharp and act like scissors to cut meat up as the carnivore chews.</p> <p>The herbivore in contrast has adapted teeth to allow it to break up tough plant material. They generally have fewer incisors in their upper jaw and canines are absent. Canines are present in the lower jaw, but significantly reduced and blunt in comparison to the carnivore's razor sharp canines. They are used to bite only when chomping plant material. The large, flat, molars have a large surface area to grind and break plant material.</p> <p>The adaptations compared in this discussion allow the mammals to extract energy from the food they consume in order for them to survive. Herbivores need to break down the tough cellulose cell wall of plant to access the available energy. Their modified molars and jaw allows them to do this. Carnivores on the other hand need to be able to catch, kill, tear, and rip flesh off other animals. Thus they need teeth that can tear and rip at flesh so they can access energy stored in the food to carry out life processes.</p>
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**Appendix 1: Completed Table Question 1**

<b>Name of enzyme</b>	<b>Where enzyme produced</b>	<b>Where enzyme carries out chemical reaction</b>	<b>What type of food it digests</b>	<b>Product of enzyme reaction</b>
Amylase	Salivary glands / mouth	Mouth	Carbohydrates	Glucose
Amylase	Pancreas	Small intestines / duodenum	carbohydrates	Glucose
Pepsin (a protease)	Stomach	Stomach	Protein	Amino acids
Lipase	Pancreas	Small intestines / duodenum	Lipids / Fats	Fatty acids and glycerol

**Judgement Statement**

	<b>Not Achieved</b>	<b>Achievement</b>	<b>Achievement with Merit</b>	<b>Achievement with Excellence</b>
<b>Score range</b>	0 – 6	7 – 12	13 – 18	19 – 24