

Assessment Schedule – 2014

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

Evidence Statement

	Evidence	Achievement	Merit	Excellence
ONE (a)	<p>Skull A belongs to a herbivore because it has large flat molars and reduced canines or no canines and incisors. The large blunt molars indicate the animal has a need for an increased surface area to grind up plant material. Also has large diastema.</p> <p>Skull B – belongs to a carnivore, because the animal has large sharp incisors and canines, with sharp jagged blade-shaped molars for cutting through meat and bone. Lacks large diastema.</p>	<p>Identifies:</p> <ul style="list-style-type: none"> • Skull A – belongs to a herbivore/ rabbit. • Skull B – belongs to a carnivore/ cat. 	<p>Provides reasons to support the identification of ONE of the skulls.</p> <ul style="list-style-type: none"> • ONE for Skull A. • ONE for Skull B. 	
(b)	<p>Herbivores and carnivores both have teeth to aid in the first part of digestion. Teeth physically break down large food particles into smaller particles, in order for enzymes to then have an increased surface area to chemically digest the food particles. There are three basic tooth types: canines, which are sharp and used for tearing; incisors, which cut; and molars which grind. Mammals have different combinations of these teeth, depending on what their diet is and thus the food types that the teeth are required to break up.</p> <p>Herbivores eat only plant material and so their teeth are specially adapted to break down the tough cellulose wall of plant cells. The adaptations include large flattened molars, which increase surface area to grind the plant material on during chewing. They have large diastema or gap between their front and back teeth, which they use to pull through more plant material as they continue chewing. Canines are present in their lower jaw, but they are significantly reduced and blunt in comparison to the carnivores' razor-sharp canines.</p> <p>In contrast, carnivores have very sharp teeth and often their canines are large, which they use to catch</p>	<p>Identify the different combinations of teeth for each mammal:</p> <p>ONE for herbivores (Skull A):</p> <ul style="list-style-type: none"> • large molars to grind tough plant material • reduced number of incisors in upper jaw • no canines in upper jaw • incisors for cutting • canines in lower jaw reduced in size and not sharp • jaw chews from side to side. • has diastema <p>Any ONE for carnivores (Skull B):</p> <ul style="list-style-type: none"> • canines to catch • canines tear food • canine penetrates with great force • canine length can pierce vital organs 	<p>Explains why the different combinations of teeth are needed</p> <p>ONE for herbivores, eg:</p> <ul style="list-style-type: none"> • flattened wide molars/ large molars to increase the surface area for chewing and breaking up plant material • broad, flat incisors for cutting plant material • have a diastema to chew large amounts of food <p>AND</p> <p>ONE for carnivores</p> <ul style="list-style-type: none"> • long sharp canines to kill prey and tear meat • pointed incisors to scrape meat off bones • sharp, jagged, blade-like molars so can cut through meat and bone. • have no diastema because food does 	<ul style="list-style-type: none"> • Discusses the structure of teeth at least TWO types of teeth in a herbivore AND a carnivore. <p>Eg, the teeth play a major role in the physical digestion of the food consumed as part of each mammal's diet. Their shape, structure, number and position vary, depending on what the mammal's diet predominantly consists of. Herbivores have reduced canines and incisors, however they have much larger molars, with increased surface area, compared to carnivores, which have large sharp incisors and canines for cutting and tearing, and in comparison only small sharp molars with reduced surface area.</p>

	<p>their prey and tear flesh from bones. They need teeth that can tear and rip at the flesh of the other animals, so they can access energy stored in the meat to carry out life processes. Their molars are not as big as those of herbivores, because meat does not require as much grinding and chewing to be broken down, however they have sharp, razor-like edges and still have an increased surface area compared to the other teeth the carnivore has.</p>			<ul style="list-style-type: none"> incisors cut or scrape flesh away from bone molars are sharp jaw moves up and down. lacks diastema <p>Describes a similarity OR difference, eg all teeth are used for mechanical digestion.</p>		<p>not need to be chewed as much</p> <p>Explains why the similarities OR differences exist.</p> <p>Eg, herbivores and carnivores both have teeth to aid in the first part of digestion. Teeth physically break down of large food particles into smaller particles in order for enzymes to then have an increased surface area to chemically digest the particles.</p>		<ul style="list-style-type: none"> Justify why the similarities AND differences exist by linking to diet. <p>Eg, the function of the teeth is the same for both herbivores and carnivores, and that is to break large food particles up into smaller particles, as part of physical digestion. However, the teeth have different structural adaptations as the animals they belong to eat different foods. Each of the different teeth types is specialised to break up different foods, for example the herbivore has large molars with an increased surface area to grind plant material up and break down the tough cell wall, compared to carnivores, whose molars are much smaller but significantly sharper to aid in tearing, grinding meat into smaller molecules.</p> <p>Herbivores have a diastema so that large amounts of the tough plant material can be chewed at once while carnivores do not have a diastema because protein is more easily / softer to breakdown.</p>	
	Not Achieved			Achievement		Merit		Excellence	
	NØ = no response or no relevant evidence	N1 = 1 idea from Achievement	N2 = 2 ideas from Achievement	A3 = 3 ideas from Achievement	A4 = 4 ideas from Achievement	M5 = 2 explanations from Merit	M6 = 3 explanations from Merit	E7 = Discuss the teeth of herbivores AND carnivores OR Justify similarities & differences	E8 = 2 points from Excellence Discuss the teeth of herbivores AND carnivores AND Justify similarities & differences

	Evidence	Achievement	Merit	Excellence
TWO (a)	Enzymes are proteins that break down large food molecules into smaller ones, so they can be absorbed into the blood and used by the mammal. They do this by catalysing or speeding up chemical reactions in the digestive system.	<ul style="list-style-type: none"> • Describes the role of enzymes. Eg, breaks down large food molecules (into smaller molecules)/ Catalyses (speeds up) chemical reactions in the gut. 		
(b)	Because enzymes are specific (work on only one substrate) and there is more than one food group, need more than one enzyme. Enzymes function best in their optimum conditions. Some do not work at certain pH/ temperatures, therefore need more than one type of enzyme as conditions are different in different sections of the gut.	<ul style="list-style-type: none"> • Describes why more than one type of enzyme is required. Eg, enzymes are specific / work on only one type of food. 	<ul style="list-style-type: none"> • Explains why more than one type of enzyme is required. Eg, because enzymes are a specific shape they can only work on one substrate / food type and as there are more than one food group we need more than one enzyme. OR Eg, enzymes function best in their optimum conditions. Some do not work at certain pH/ temperatures, therefore need more than one type of enzyme as conditions are different in different sections of the gut. 	
(c)	A factor which influences enzyme activity is pH. Enzymes work most efficiently in their specific 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 (>7.0 in the small intestines). Different parts of the digestive system have different pH's, eg the stomach is acidic, pH 2.0. Because the different food types require specific digestive enzymes, which have different optimum pH's the digestive tract is separated into sections and the pH changes from basic/ neutral in the mouth to acidic, in the stomach, and then back to basic in the intestines, hence the separate sections of the gut provide specific conditions for the enzyme produced in that part of the	<ul style="list-style-type: none"> • Describes how pH influences enzyme activity. Eg, enzymes do not work when pH is too low or too high/ they have a narrow optimum pH. • Describes an example with its optimal pH. Eg, salivary amylase only works at pH 7 / neutral (or any other correct enzyme and its pH). 	<ul style="list-style-type: none"> • Explains how pH can influence enzyme activity. Eg, each enzyme works best at a particular pH. If the pH is too acidic or too basic, the enzyme will denature and therefore not work. 	<ul style="list-style-type: none"> • Discusses how the digestive enzymes are affected by pH as they carry out their functions in the digestive tract. Include at least TWO of amylase, pepsin or lipase as examples. Eg, 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 (>7.0 in the small intestines). Different parts of the

	gut to function in their optimum conditions and break down the specific food type. If the pH is either too basic or too acidic for the enzyme, it will denature, which means it is damaged irreversibly and will not be able to carry out its function in digesting that food type.							digestive system have different pH's, so you need different enzymes to work in these areas and digest the food types. Relates enzyme optimum pH to different parts of the digestive tract. Eg, the digestion of different food types requires specific digestive enzymes, which have different optimum conditions. For example the pH of the digestive tract changes from basic/ neutral in the mouth to acidic, in the stomach, and then back to basic in the intestines, hence the need for separate sections of the gut which provide the specific conditions for the enzyme produced in that part of the gut to function. If the pH is either too basic or too acidic for the enzyme it will no longer work (denature), which means it is damaged irreversibly and will not be able to carry out its function in digesting that food type.	
	Not Achieved			Achievement		Merit		Excellence	
	N0 = no response or no relevant evidence	N1 = 1 idea from Achievement	N2 = 2 ideas from Achievement	A3 = 3 ideas from Achievement	A4 = 4 ideas from Achievement	M5 = 1 explanation from Merit	M6 = 2 explanations from Merit	E7 = Discusses examples OR Relates pH to different parts of the digestive tract.	E8 = Discusses examples AND Relates pH to different parts of the digestive tract.

	Evidence	Achievement	Merit	Excellence
THREE (a)	<p>Aerobic respiration uses oxygen to release lots of energy / ATP. Eg glucose + oxygen → carbon dioxide + water + lots of energy. Compared to anaerobic respiration, which does not use oxygen and releases only a small amount of energy. Eg glucose → lactic acid + little energy.</p> <p>Both aerobic and anaerobic respiration release energy for the mammal to use to carry out its life processes such as movement and reproduction, from the glucose they eat. Both types of cellular respiration occur inside the cell and require the raw material glucose, which they get from eating and digesting food.</p> <p>These two processes are different however, as aerobic respiration requires oxygen as a raw material to produce the maximum amount of energy (ATP) possible from one glucose molecule. In comparison, anaerobic respiration is where oxygen is not required or used to break down the glucose to release energy for the animal. However in contrast to aerobic respiration, only a small amount of energy is produced during anaerobic cellular respiration from one glucose molecule.</p>	<p>Describes aerobic respiration and the raw materials and products.</p> <ul style="list-style-type: none"> • Aerobic respiration uses oxygen <p>OR</p> <ul style="list-style-type: none"> • releases lots of energy. <p>OR</p> <ul style="list-style-type: none"> • Glucose + oxygen → carbon dioxide + water + lots of energy. <p>OR</p> <ul style="list-style-type: none"> • Slow release of energy <p>Describes anaerobic respiration and the raw materials and products.</p> <ul style="list-style-type: none"> • Anaerobic respiration does not use oxygen <p>OR</p> <ul style="list-style-type: none"> • releases only a small amount of energy. <p>OR</p> <ul style="list-style-type: none"> • Glucose → lactic acid + little energy. <p>OR</p> <ul style="list-style-type: none"> • Lactic acid is produced. <p>Describes a similarity—between the two types of respiration Eg, both produce energy / ATP / use glucose / produce waste products.</p>	<p>Explains a similarity OR differences between the two types of respiration.</p> <p>Eg:</p> <ul style="list-style-type: none"> • Both aerobic and anaerobic respiration breaks down food / glucose to release energy. • Aerobic respiration produces lots of energy from each glucose molecule, and the products carbon dioxide and water. • Anaerobic respiration produces a small amount of energy from food / glucose and the waste product lactic acid. 	<p>Compares and contrasts the two different types of respiration.</p> <p>Eg:</p> <p>Both aerobic and anaerobic respiration release energy for the mammal to use from the glucose they eat. Both processes occur inside the cell and require the raw material glucose. These two processes are different however, as aerobic respiration requires oxygen as a raw material to produce the maximum amount of energy (ATP) from one glucose molecule, in comparison to anaerobic respiration, where oxygen is not required to break down the glucose, however only a small amount of energy is produced from one glucose molecule as well as lactic acid.</p>

(b)	<p>The most likely type of respiration that a cheetah will use when accelerating is anaerobic, or respiration without oxygen. This is because for a cheetah to accelerate they need fast, instant energy, and anaerobic respiration gives them this fast energy by breaking down glucose molecules without oxygen as there is not enough time to get the oxygen to release the energy aerobically. This is why the cheetah can hold their speed for only a short period of time when chasing their prey.</p> <p>The problem with anaerobic respiration is it does not release much energy from each glucose molecule (eg, 2 ATP per molecule) compared to aerobic respiration, (which releases eg, approx. 36 ATP per molecule). It also can last for only a short time, because waste products like lactic acid build up because there is no oxygen to break it down further. However because the energy is released very quickly, the cheetah can accelerate and reach high speeds fast.</p>			<p>Describes the type of respiration the cheetah is most likely using while accelerating.</p> <p>Eg:</p> <ul style="list-style-type: none"> • Anaerobic respiration / respiration without oxygen. • Could accept aerobic with good reason. E.g. aerobic because more energy is released OR aerobic because there is a lot of oxygen to start with. 		<p>Provides reasons for answer.</p> <p>Eg:</p> <ul style="list-style-type: none"> • Anaerobic because for a cheetah to accelerate they need fast, instant / quick energy 		<p>Discusses the type of respiration the cheetah is using to release energy while chasing their prey.</p> <p>Eg:</p> <ul style="list-style-type: none"> • Anaerobic because for a cheetah to accelerate they need fast, instant energy, and anaerobic respiration gives them this fast energy by breaking down glucose molecules without oxygen as there is not enough time to get the oxygen to release the energy aerobically. This is why the cheetah can hold their speed for only a short period of time when chasing their prey. <p>OR</p> <p>Links the named respiration to the type and amount of energy released.</p> <p>Eg:</p> <ul style="list-style-type: none"> • Anaerobic respiration does not release much energy from each glucose molecule (e.g. 2 ATP per molecule) compared to aerobic respiration, (which releases eg, approx. 36 ATP per molecule). It also can last for only a short time, because waste products like lactic acid build up because there is no oxygen to break it down further. However because the energy is released very quickly, the cheetah can accelerate and reach high speeds fast. 	
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Cut Scores

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 7	8 – 13	14 – 18	19 – 24