Assessment Schedule – 2023

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

Assessment Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate ***understanding*** involves: ● defining, using annotated diagrams, and giving characteristics of, or an account of, a mammal(s) as a consumer(s).	*Demonstrate* ***in-depth understanding*** involves: ● explaining the life processes and biological ideas relating to a mammal(s) as a consumer(s).	*Demonstrate* ***comprehensive understanding*** involves: ● linking biological ideas relating to a mammal(s) as a consumer(s); and may involve elaborating, applying, justifying, relating, evaluating, comparing and contrasting, or analysing.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8-13	14-19	20 – 24

Evidence

Question One

Achievement	Achievement with Merit	Achievement with Excellence

Describes (simple ideas):
 	
Digestion may include:
• The purpose of digestion is to break up food into small pieces, (which helps absorption).
 	
Physical digestion may include:
• It is the breakdown of food from large pieces to smaller pieces / providing an increased surface area.
• Physical digestion occurs by muscle action (churning) to break food down into smaller parts.
 	
Chemical digestion may include:
• It is the breaking down of the small pieces of food into molecules / small particles for absorption.
• Chemical digestion occurs by enzymes / acids breaking food down into smaller particles.
 	
Specific conditions in the stomach may include:
• Specific enzymes are involved in the process of chemical digestion in the stomach.
• Enzymes in the stomach operate only in low pH (acid) conditions.
• Smaller food particles make it easier for the body to absorb.
 	
Other accurate descriptions will also be accepted.
 	
*Focus **must** be on stomach.*
	Explains, giving reasons and providing examples:
	
	Physical / mechanical digestion may include:
	• Physical digestion occurs via (peristaltic) contractions of the smooth muscle in the stomach walls. This churning reduces the size of the pieces of food and occurs on all foods, regardless of which food group they belong to. The purpose is to increase the surface area on which both the stomach acid and enzymes can continue their digestive action.
	
	Chemical digestion may include:
	• Chemical digestion in the stomach is restricted to the digestion of proteins. Stomach wall cells secrete hydrochloric acid at a low pH or acidic pH. This helps as:
	  ○ Acid starts breakdown of proteins, i.e. to denature proteins and make them more accessible for the enzymatic action of pepsin.
	  ○ Acid provided correct pH for pepsin to function, i.e. to activate pepsinogen to its active form, pepsin.
	  ○ After activation in the acidic environment, pepsin will then act on the internal peptide bonds of proteins. Pepsin is specific in its action, starting the process of reducing proteins to amino acids, which can then be absorbed into the bloodstream.
	
	Other accurate explanations will also be accepted.
		Discusses, making multiple links between biological ideas:
		
		The processes of chemical and physical digestion in the stomach, showing why both processes are necessary, and the need for this to occur in a stable environment may include:
		• Physical and chemical digestive processes are both required for food to be digested efficiently. These processes are important because they allow for the initial larger pieces of food to be broken down into smaller pieces. The mechanical churning is necessary because it creates a greater surface area for the chemical digestion of hydrochloric acid and pepsin to act on proteins. This can break the molecules down into smaller amino acids. This is necessary because protein molecules are too large to be absorbed through the walls of the digestive system, but amino acid molecules are smaller and can be absorbed. (*HCL and action on protein to be included.)*
		• All enzymes are specific in what they do and the conditions in which they can operate (*must reference pepsin and action on proteins*). Without the stable acidic nature of the stomach, the pepsin would not be activated in the first place and, once done so, could be denatured and stop working if the conditions changed. If the enzyme is denatured, the substrate will no longer fit into the enzymes' active site, and the reaction (in this case the breakdown of protein) will not continue.
		
		Other accurate discussions will also be accepted (making multiple links between ideas).

N1	N2	A3	A4	M5	M6	E7	E8
Limited / partial attempt to describe biological characteristics of digestion in the stomach.	**Genuine attempt** to describe biological characteristics of digestion in the stomach, but **not enough evidence** for Achievement.	**Describes,** with limited detail, at least THREE biological characteristics of: • the two digestion processes • specific conditions required in the stomach.	**Describes** at least FOUR biological characteristics of: • the two digestion processes • specific conditions required in the stomach.	**Explains** at least TWO biological ideas related to: • how physical digestion occurs in the stomach • how chemical digestion occurs in the stomach • how / why enzymes are involved in digestion.	**Explains** at least THREE biological ideas related to: • how physical digestion occurs in the stomach • how chemical digestion occurs in the stomach • how / why enzymes are involved in digestion.	**Discusses** (making multiple links between biological ideas): • the processes of chemical and physical digestion in the stomach, showing why both processes are necessary **OR** • the need for digestion to occur in a stable stomach environment.	**Discusses** (making multiple links between biological ideas): • the processes of chemical and physical digestion in the stomach, showing why both processes are necessary **AND** • the need for digestion to occur in a stable stomach environment.

N= No response; no relevant evidence.

Question Two

Achievement	Achievement with Merit	Achievement with Excellence
Describes (simple ideas): *Respiration* may include: • Respiration occurs in the mitochondria in the body cells. • The purpose of respiration is to build energy-rich molecules (ATP) from glucose. *Aerobic respiration* (in words or equation) may include: • Aerobic respiration occurs in the presence of oxygen **OR** gives word equation for aerobic respiration. • Aerobic respiration releases more ATP molecules / more energy. *Anaerobic respiration* (in words or equation) may include: • Anaerobic respiration occurs without oxygen **OR** gives word equation for anaerobic respiration. • Anaerobic respiration releases fewer ATP molecules / less energy. • Lactic acid is a waste product or anaerobic, (that is toxic / harmful to body). • Zebra has more mitochondria. • Zebra uses aerobic OR cheetah uses anaerobic, and when. *Other accurate descriptions will also be accepted.*	**Explains**, giving reasons and providing examples: *Both types of respiration* may include: • The muscle cells in both mammals can respire aerobically and anaerobically. The cells are able to respire aerobically when there is longer demand for energy, such as when the zebra is running over long distances. On the other hand, mammal muscle cells can respire anaerobically for short periods of time. This normally happens during vigorous short-duration activities, such as when the cheetah is sprinting. *Aerobic respiration* may include: • The cells in the zebra's muscles are able to respire aerobically because there is less demand for high intensity energy over a longer endurance run. • When there is a good supply of oxygen to the cells, the glucose can be fully broken down and, in turn, allow the release of far more energy (more ATP can be produced). *Anaerobic respiration* may include: • Anaerobic respiration allows immediate access to energy for short-duration high-intensity activities. It is relatively inefficient, as anaerobic respiration does not make as much ATP, but it allows muscles to contract to run quickly as the cheetah does when attacking prey. • Lactic acid build-up occurs when respiring anaerobically. Lactic acid is toxic to the body and needs to be chemically broken down and removed. This limits the length of time the cheetah can sprint, as lactic acid would soon build up and cause cramping and / or pain. • Explains why zebra has more mitochondria and why. *Other accurate explanations will also be accepted.*	**Discusses**, making multiple links between biological ideas: *The role of mitochondria in aerobic respiration and the fact that more mitochondria are found in areas of the body that require a higher amount of energy* may include: • The zebra will most likely have the highest density of mitochondria because they are the ones that rely mostly on aerobic respiration to be able to sustain running over long distances. Mitochondria are the site of aerobic respiration, as opposed to anaerobic respiration, which occurs in the cell's cytoplasm. AND Mitochondrial density is proportional to increases in oxygen consumption or in peak VO_2, so the density is highest in the areas of the body that require the most sustained energy. In the case of the zebra, this will be in the skeletal muscles that are most directly related to their ability to run, i.e. the muscles in and around the legs. • Aerobic respiration occurs in mitochondria. Fully explains increased efficiency of ATP production in aerobic vs anaerobic respiration and hence more mitochondria are linked to higher demands for energy / ATP. ATP is currency of energy. *Example:* *Anaerobic respiration does not release much energy from each glucose molecule (e.g. 2 ATP per molecule), compared to aerobic respiration, (which releases, for example, approximately 36 ATP per molecule). Also, itt can last for only a short time because waste products like lactic acid build because there is no oxygen to break it down further.* *Other accurate discussions will also be accepted (making multiple links between ideas).*

N1	N2	A3	A4	M5	M6	E7	E8
Limited / partial attempt to describe biological characteristics of types of respiration.	**Genuine attempt** to describe biological characteristics of types of respiration, but **not enough evidence** for Achievement.	**Describes,** with limited detail, at least THREE biological characteristics of the two types of respiration.	**Describes** at least FOUR biological characteristics of the two types of respiration.	**Explains** at least TWO biological ideas related to: • the need for both types of respiration • aerobic respiration for short duration / high activity event • anaerobic respiration for longer duration / lower intensity activity events.	**Explains** at least THREE biological ideas related to: • the need for both types of respiration • aerobic respiration for short duration / high activity event • anaerobic respiration for longer duration / lower intensity activity events.	**Discusses** (making multiple links between biological ideas): • which animal has the highest mitochondria. • where the highest number of mitochondria will be found **OR** • the role of mitochondria in aerobic respiration and that more mitochondria are found in areas of the body that require a higher amount of energy.	**Discusses** (making multiple links between biological ideas): • which animal has the highest mitochondria and where the highest number of mitochondria will be found **AND** • the role of mitochondria in aerobic respiration and that more mitochondria are found in areas of the body that require a higher amount of energy.

N= No response; no relevant evidence.

Question Three

Achievement	Achievement with Merit	Achievement with Excellence
Describes (simple ideas): *The key components and how oxygen / products of digestion enter the circulatory system* may include: • The heart is a (double) pump. It pumps blood to and from the lungs, and through the blood vessels to the cells in the rest of the body. • Oxygen / the products of digestion are carried in blood and are transported around the body from the lungs / small intestine to the body's cells. • The purpose of transporting oxygen and the products of digestion around the body is so that they can be taken to the body cells for respiration. • Three types of blood vessels are called capillaries, arteries, and veins. (Must have ⅔) • Capillaries in the lungs pick up oxygen / capillaries in the walls of the small intestine collect the products of digestion. • Arteries carry high pressure blood away from the heart. Apart from blood being returned to the lungs, they normally carry oxygenated blood. • Veins carry lower pressure blood back to the heart. Apart from blood carried from the lungs to the heart, they normally carry deoxygenated blood. • Definition of diffusion. • Pulmonary system carries blood to lungs to collect oxygen. • Systemic system carries blood to body to deliver oxygen. *Other accurate descriptions will also be accepted.*	**Explains**, giving reasons and providing examples: *How / why oxygen / products of digestion enter the circulatory system* may include: • Large numbers of capillaries in the alveoli of lungs pick up oxygen – they are very thin, with one-cell-thick walls; they are (semi-permeable); and have a large surface area. All of that makes the diffusion of oxygen into them as efficient as possible (i.e. short diffusion distance). • Oxygen needs to be transported around the body from the lungs to the body cells via the blood vessels because oxygen is needed to carry out the process of aerobic respiration. This is an essential process in the body because it releases energy from the digested food molecules so that it can be used for life processes, such as growth, repair, and movement. OR The arteries (blood vessels) are needed so that blood can be transported, with the nutrients (and oxygen), to the body cells from the intestines / gut / alimentary canal where digestion occurs, to places in the body where the nutrients are used. • Large numbers of capillaries in the walls of the small intestine are found in the villi to collect digestion products. They also have the key properties of being thin, (semi-permeable), with a large surface area. The walls of the capillaries are only one cell thick, so the diffusion distances are small and, therefore, diffusion can occur quickly and efficiently. • Body cells need a continuous supply of the products of digestion to function effectively. Along with oxygen, the cells need glucose to carry out aerobic respiration and produce the high levels of ATP (adenosine triphosphate) needed to provide energy for all metabolic processes. • The heart pumps to move the blood around the body. This is required because the products of digestion need to be transported from the intestine to cells around the body that require the products, e.g. glucose needs to be moved to	**Discusses**, making multiple links between biological ideas: *The **structure of the circulation system, linking this to the need for oxygen AND digested nutrients*** may include: • Oxygen needs to be able to diffuse from the lungs into the circulatory system, and digested nutrients are absorbed into the bloodstream surrounding the small intestine so that they can be carried to the body cells via the blood vessels. This is because both are needed by the body cells to carry out the process of aerobic respiration. *May provide the word equation for aerobic respiration.* AND Having an efficient circulatory system provides the raw materials needed for all cells that have an energy requirement. A combination of oxygen with digested food products allows cells to carry out cell processes for survival. *The failure of circulation linked to (lack of) survival* may include: • Respiration is an essential process in the body because it releases energy from the digested food molecules. Without the circulation of oxygen and the delivery of digested food molecules to the body cells, aerobic respiration would be unable to occur, as mammals' bodies are too big to allow direct diffusion into the cells. If circulation failed, there would be insufficient energy for essential life processes, such as growth, repair, and movement, and the mammal would not survive. *Other accurate discussions will also be accepted (making multiple links between ideas).* *Example for E1:* *The heart provides the pump to move the blood around the body. This is required because the products of digestion need to be transported from the intestine to cells around the body that require the product, e.g. glucose needs to be moved to the muscle cells as they have a high energy demand to allow*

Achievement	Achievement with Merit	Achievement with Excellence
	the muscle cells, which have a high energy demand, to allow movement. • The hepatic portal vein transports nutrient-rich blood to the liver, where the nutrients are offloaded for processing, before being distributed by the heart. *Other accurate explanations will also be accepted.*	*movement. The arteries, capillaries, and veins form a network that can transport materials throughout the body. The arteries are needed so that blood can be transported, with the nutrients, to the body cells from the intestines / gut / alimentary canal where digestion occurs, to places in the body that the nutrients are used. For this to happen, the arteries direct blood into the much smaller and finer capillaries. These allow the products of digestion, e.g. glucose, to enter the individual cells, where they are used in cellular processes, e.g. respiration, which releases energy for life processes.*

N1	N2	A3	A4	M5	M6	E7	E8
Limited / partial attempt to describe biological characteristics of the process of circulation in mammals.	**Genuine attempt** to describe biological characteristics of the process of circulation in mammals, but not **enough evidence** for Achievement.	**Describes,** with limited detail, at least THREE biological characteristics relating to: ● the key components of the circulatory system ● how oxygen enters the circulatory system ● how the products of digestion enter the circulatory system.	**Describes** at least FOUR biological characteristics relating to: ● the key components of the circulatory system ● how oxygen enters the circulatory system ● how the products of digestion enter the circulatory system.	**Explains** at least TWO biological ideas relating to: ● how / why oxygen enters the circulatory system ● how / why the products of digestion enter the circulatory system.	**Explains** at least THREE biological ideas related to: ● how / why oxygen enters the circulatory system ● how / why the products of digestion enter the circulatory system.	**Discusses** (making multiple links between biological ideas): ● the structure of the circulation system, linking this to the need for oxygen AND digested nutrients **OR** ● the failure of circulation, linked to (lack of) survival.	**Discusses** (making multiple links between biological ideas): ● the structure of the circulation system, linking this to the need for oxygen AND digested nutrients **AND** ● the failure of circulation, linked to (lack of) survival.

N= No response; no relevant evidence.