Assessment Schedule – 2016

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

Evidence Statement

Question One

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE idea given.	TWO ideas given.	THREE ideas given.	FOUR ideas given.	Explains TWO relevant ideas.	Explains THREE relevant ideas.	Compares and contrasts physical and chemical digestion, explaining why both are necessary.	Compares and contrasts physical and chemical digestion, explaining why both are necessary, and specifically uses examples of a carnivore.

Examples of possible responses include:

- Physical digestion occurs when food is broken down from large pieces into smaller pieces.
- Physical digestion occurs in the mouth / by the teeth, churning in stomach, / in the intestine wall (peristalsis).
- Chemical digestion occurs when food is broken down from smaller pieces into molecules / even smaller pieces by the action of enzymes / large food molecules are broken into smaller molecules by the action of enzymes.
- Chemical digestion in the carnivore takes place in the stomach / small intestine (duodenum) (not in the mouth, as carbohydrates are not consumed).
- Physical digestion increases the surface area of food available for chemical digestion.
- Chemical digestion occurs so food can be absorbed.

Examples of possible responses include:

- In the carnivore, physical digestion takes place with the sharp incisors and canine teeth used to rip and tear meat off the fish and squid, and sharp, jagged-edged molars for cutting through meat and bone (at least 2 teeth types explained). **OR**

  Churning of the stomach muscles mix up and break up larger pieces. **OR**

  Peristalsis in the oesophagus / intestines squeezes and breaks up larger pieces.
- Physical digestion is necessary to allow enzyme action to take place, as it increases the surface area.
- Chemical digestion in the carnivore occurs primarily by pepsin in the stomach / then by trypsin in the duodenum.
- Chemical digestion occurs when enzymes are able to break down the bonds holding the food particles together (in carnivores, from protein into peptides / amino acids). It is necessary so that food can be broken down into molecules small enough to be absorbed.

Examples of possible responses include:

Physical digestion in carnivores occurs when sections of meat are ripped off by the teeth. Food then travels to the stomach where chemical digestion occurs using pepsin (protein broken down into amino acids). This produces smaller pieces / molecules. Some chemical digestion also occurs in the small intestine, (although because protein is rapidly digested in a carnivore, the food travels quickly through the small intestine to be excreted).

Both types of digestion are necessary, as physical digestion in the carnivore allows food to be broken into smaller pieces, and to increase the surface area for the efficient action of enzymes so that food is broken down into molecules that can be absorbed into the blood.

Question Two

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE idea given.	TWO ideas given.	THREE ideas given.	FOUR ideas given.	Explains TWO relevant ideas.	Explains THREE relevant ideas.	Discusses how sample B / starch provides the runner with energy.	Discusses how sample B / starch provides the runner with energy. AND Justifies the selection of sample B (as opposed to A / C / D At least ONE other food compared and discussed).

Examples of possible responses include:

- Describes respiration as the process of producing energy (ATP) from glucose.
- Describes aerobic respiration as occurring in the presence of oxygen
  OR aerobic respiration produces lots of energy
  OR aerobic respiration: slow release of energy
  OR glucose + oxygen → carbon dioxide + water + (lots of) energy (ATP).
- Describes anaerobic respiration as occurring in the absence of oxygen
  OR anaerobic respiration produces little energy
  OR anaerobic respiration: lactic acid is produced
  OR glucose → lactic acid + (small amount of) energy (ATP).
- Aerobic respiration better for the runner / Aerobic respiration produces more energy.
- Identifies sample B as being most beneficial for the runner.
- Lipids can be used for energy release.

Examples of possible responses include:

- Role of the small intestine is to absorb the food molecules that have already been broken down. This is done via villi (and microvilli) that can then pass needed raw materials such as glucose into the circulation.
- Role of the liver is to process food molecules received from the small intestine, and then store (for controlled release) – e.g. glucose stored in liver until needed (as glycogen).
- The circulation is involved by transporting raw materials such as glucose between thesmall intestine, liver, and muscles.
- Explains that aerobic respiration is better for the runner because it produces lots of energy, or that anaerobic is worse because less energy is produced.

Examples of possible responses include:

Sample B is the best food source for the runner because it contains starch. This can be broken down over a longer period of time to produce glucose. A large amount of glucose is required to fuel the runner's muscles moving by means of aerobic cellular respiration. Aerobic respiration produces a large amount of energy, which is useful to keep the runner's muscles moving.

Carbohydrates / starches are broken down into glucose over time, and glucose is absorbed from the small intestine (via hepatic portal vein), and travels to the liver, where it is (stored for a time and then) released into the circulation, so that muscle cells can access a source of glucose for respiration.

Sample A (sugar) would not be as useful for the runner, as although they would have a short-term boost of glucose, this would not be enough to sustain them over the long time-period of a marathon.

Sample C contains lipids and sample D contains proteins, neither of which would efficiently fuel cellular respiration for the marathon.

Question Three

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE idea given.	TWO ideas given.	THREE ideas given.	FOUR ideas given.	Explains TWO idea.	Explains THREE ideas.	Discusses similarities between herbivore and omnivore OR discusses role of digestive juices.	Discusses similarities between herbivore and omnivore AND discusses role of digestive juices.

Examples of possible responses include:

- Enzymes are proteins that break down large food particles / molecules into smaller ones.
- They do this by speeding up chemical reactions in the digestive system.
- Enzymes work only on one type of food / are specific, so more than one enzyme is required.
- Both horses and humans have enzymes to break down carbohydrates (e.g. salivary amylase), proteins (e.g. pepsin) and lipids (e.g. lipase) at least 2 enzymes.
- Each enzyme works at a specific pH.
- Enzymes do not work when the pH is too high / too low.

Examples of possible responses include:

- Each enzyme works at an optimum / best pH. If the pH is too low / acidic or too high / basic, then the enzyme will denature and not work.
- The enzymes in different parts of the digestive system work best at different pHs, e.g. in the mouth: amylase requires a neutral pH / pH 7, in the stomach: pepsin requires an acidic pH / pH 1–2 (or any other correct location / enzyme and its pH).
- Digestive juices such as HCl / pepsin / bile / pancreatic juices causes variations in pH. Different pH values are caused by different substances in the digestive system, released at different locations.
- Lock and key model OR induced fit model used to explain how digestive enzymes work to break food down

Examples of possible responses include:

- Both horses and humans have similar enzymes within their digestive systems, with both requiring amylase to break down carbohydrates, pepsin (and trypsin) to break down protein, and lipase to break down lipids. These are located in similar places with similar optimum pH's: amylase – mouth and small intestine pH = 7, pepsin in stomach pH = 1-2, and lipase (and trypsin) in small intestine pH = 7-8.
- Because enzymes need a specific optimum pH each part of the digestive system has difference in pH conditions maintained by digestive fluids – saliva in the mouth is a neutral pH; gastric / stomach juices contain HCl, which has a very acidic pH; pancreatic juice and bile in the small intestine are alkaline to neutralise the acidic pH of the stomach; as the chyme enters the small intestine.
- If the pH is too acidic or too basic, this will cause the enzyme to denature / change the shape of the active site irreversibly, and it will not be able to specifically bind to the substrate anymore, and therefore not carry out its role in digesting food. Therefore the digestive juices play an important role in maintaining pH levels.

Cut Scores

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