Assessment Schedule – 2017

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 relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains TWO relevant ideas.	Explains THREE relevant ideas.	Links the changes in pH in the gut to the requirements of the different digestive enzymes OR Links the processes of chemical and physical digestion to the digestion of (2 of) carbohydrate, protein and fats.	Links the changes in pH in the gut to the requirements of the different digestive enzymes AND Links the processes of chemical and physical digestion to the digestion of (2 of) carbohydrate, protein and fats.

Examples of possible ideas include:

- Physical digestion is the breakdown of food from large pieces to smaller pieces / increased surface area.
- Chemical digestion is the breaking down of the small bits into molecules / small particles for absorption.
- Physical digestion occurs in the mouth, stomach etc.
- Chemical digestion is the breakdown of food into smaller molecules through digestive enzymes, e.g. amylase.
- The main sites of carbohydrate digestion is in the mouth and in the small intestine.
- Carbohydrates digested by amylase.
- The main site of fat digestion is the small intestine.
- Fat digested by lipase.
- The main site of protein digestion is the stomach.
- Protein digested by pepsin / protease / trypsin.
- Carbohydrate digestion breaks down polysaccharides into disaccharides and monosaccharides, e.g. starch to sucrose to glucose.
- Fat digestion breaks down fats to fatty acids and glycerol.
- Protein digestion breaks down proteins into amino acids.
- There are different pH's throughout the digestive system e.g. mouth pH = 7ish stomach pH = 2ish and small intestines pH = 7ish (at least 2 of).

Examples of possible explanations include:

- Carbohydrate digestion occurs firstly in the mouth, where the breakdown of starch begins. Saliva is released so that amylase is added to the starch and the food is moistened ready to be physically digested by the mixing action of the tongue and the chewing motion of the jaw and teeth. This results in some of the starch being broken into sucrose before it is swallowed.
- Fat digestion occurs in the small intestines where the enzyme lipase breaks down fats into fatty acid and glycerides.
- Bile released into the small intestines from the gall bladder emulsifies the fats, which increases the surface area to improve the digestion of fats by enzymes.
- Protein digestion occurs in the stomach where the enzyme pepsin breaks down protein into polypeptides, then trypsin in the small intestines breaks down polypeptides into amino acids.

- Different enzymes work best / have different optimum pH's, and if the pH is incorrect, the enzyme will denature – the substrate will no longer fit into the enzymes active site. Because of this, the digestive system is divided into sections / organs each with the correct pH for the enzyme that works there e.g. Mouth pH = 7ish regulated by the production of neutral saliva so that salivary amylase can digest starch into maltose. Stomach pH = 2ish regulated by the production of acid, HCl, so that pepsin can digest protein into polypeptides. Small intestines pH = 7ish regulated by the addition of bile (from the gall bladder) and / or bicarbonates salts from the pancreas allow the enzymes amylase to digest maltose into glucose, trypsin to digest polypeptides into amino acids and lipase to digest fats into fatty acids and glycerols.
- Both physical and chemical digestion are needed for effective nutrients to be extracted from the food; physical digestion occurs in

• If pH is incorrect digestion / enzymes doesn't work / denatures.	• If pH is incorrect for the specific enzyme, it will denature / change shape so the substrate doesn't fit into the active site therefore not work. • Physical digestion e.g. mastication / chewing breaks the food into small bits with larger surface area for the enzymes to work better. • Chemical digestion / enzymes break the bonds in the small bits of food making them small enough to be absorbed.	the mouth through the breaking down of food through movement e.g. mastication of teeth (molars grinding etc.), mixing of tongue, peristaltic movements of muscles. This breaks up the large bits into smaller bits, increasing the surface area of the food bits so that chemical digestion can be more efficient. Chemical digestion is also needed; enzymes break down the small bits using enzymes (breaking bonds) down into molecules small enough to be absorbed into the blood stream. Carbohydrates are broken down into maltose then glucose by amylase, protein is broken down into amino acids by pepsin and trypsin and fats are digested by lipase into fatty acids and glycerol.

QUESTION TWO

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains TWO relevant ideas.	Explains THREE relevant ideas.	Provides evidence for ONE of: Links the dentition of herbivores and carnivores to their diets OR Links differences in the guts of herbivores and carnivores to their diets OR Evaluates the relative effectiveness of herbivore and carnivore guts.	Provides evidence for TWO of: Links the dentition of herbivores and carnivores to their diets AND Links differences in the guts of herbivores and carnivores to their diets OR Evaluates the relative effectiveness of herbivore and carnivore guts.

Examples of possible ideas include:

- A carnivore eats mainly meat.
- A herbivore eats mainly plant material.
- Herbivores have teeth that are flatter for grinding up the plant material.
- Carnivores have teeth that are sharper and pointier to allow for the capture and grip of live prey / slice meat.
- A herbivore gut is longer than a carnivore gut OR a carnivores gut is shorter than a herbivores.
- The caecum is bigger in an herbivore gut than in a carnivore gut.
- The carnivores stomach is bigger than a herbivore stomach.
- Diastema present in a rabbit.

Examples of possible explanations include:

- The teeth of herbivores and carnivores are different because of their different diets and the nature of their food. For example, herbivores, because they are plant eaters, have strong, wide, and flat molars that are made for grinding leaves, and small or non-existent canine teeth because they are not needed.
- Many herbivores, such as horses and cows, have jaws that are capable of moving sideways which allows for increased grinding motion.
- The strong flat molars allow the tough cellulose plant material to be broken down through a grinding action, which increases the surface area of the food.
- Carnivores, meat eaters, have very defined canine teeth for tearing at meat, and sharp molars. The sharp / pointed canines allow the carnivore to pierce and hold on to and cut through the flesh of its prey, killing it.
- The presence of the diastema / gap in the rabbits mouth allows free movement of the tongue and food as rabbits have to chew the tough plant material,

Examples of possible discussions include:

- All animals have teeth that are adapted to eating certain types of food. For example, herbivores / the rabbit, eat plant material / cellulose, have wide, flat molars for grinding tough celluloses, and small or non-existent canine teeth because they are not needed. The flat molars allow the tough cellulose plant material to be broken down through a grinding action. This helps with the difficult digestion of cellulose. (Herbivore incisors are sharp for tearing plants, but they may not be present on both the upper and lower jaw.) Many herbivores, such as rabbits have jaws that are capable of moving sideways which allows for increased grinding motion.
  On the other hand, carnivores eat meat, have very defined canine teeth for tearing at meat and piecing / holding / killing their prey and sharp molars / carnassial which slice up the meat into bits to be swallowed.
- Different diets result in different gut adaptions. For the rabbit to effectively digest the tough cellulose / plant material it needs a much longer gut because the cellulose takes much longer to be digested so needs to be kept inside the rabbit for longer. They also have a much bigger caecum, which houses cellulase / enzyme producing bacteria / microbes

	• Protein / meat isn't digested in the mouth OR protein / meat much easier to digest so doesn't need to be grind up. • Dogs have shorter digestive system because protein is more easily digested by enzymes so needs less time inside the dog. • Rabbits have a longer digestive system because plant material / cellulose is much harder to digest so needs to spend longer inside the rabbit. • Dogs stomach is larger because it is the main site of protein / meat digestion OR rabbits have a smaller stomach because they do not eat protein so not needed as much. • Rabbits have a large caecum which contains enzyme producing bacteria to digest the tough plant material / cellulose OR dogs have a smaller caecum because they don't eat plant material / cellulose so don't need to house the bacterial to digest cellulose.	that digest the plant material for the rabbit. Rabbits have a smaller stomach as they do not eat protein / meat so not needed. While the dog eats meat, which is easier to digest by enzymes therefore have a shorter gut as the food doesn't need to be held inside the dog for as long. They have a much larger stomach as, this is where protein is digested by enzymes / pepsin. The dog's caecum is smaller because they don't digest / plant material / cellulose. • Given the differences in diet, both guts are relatively efficient in digesting the different foods eaten. For example, in order to effectively digest the cellulose in the plant material, it is necessary for herbivores to have a structure that enables this to occur. Most mammalian herbivores have a relatively large caecum for this purpose. The caecum contains a large number of bacteria, which aid in the enzymatic breakdown of plant materials such as cellulose. However in carnivores, the food eaten does not contain cellulose so these bacteria are not required On the other hand, carnivore digestive systems are also effective in breaking down the animal material they eat. This occurs by release of enzymes capable of digesting nutrients found in meat, relatively fast movement of food through the digestive system, and regulation of pH values to allow for efficient chemical digestion.

QUESTION THREE

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response / no relevant evidence.	ONE relevant idea given.	TWO relevant ideas given.	THREE relevant ideas given.	FOUR relevant ideas given.	Explains ONE relevant idea.	Explains at least TWO relevant ideas.	Discuss ONE process and how it helps to maintain healthy functioning of the body.	Discussion **links** TWO or more processes to each other and to the healthy functioning of the body.

Examples of possible ideas include:

- Absorption is the process of the digested food moving into the blood.
- Absorption occurs through the villi / in the small intestines.
- Villi increase the surface area for absorption of digested food.
- Circulation is the movement of the absorbed food from the gut area around the body.
- The heart helps with circulation as it pumps the blood / food around the body.
- Assimilation is the take up of digested foods by the cells.
- Respiration is that the breakdown of food to releases energy.
- Respiration occurs in (the mitochondria of) cells.
- Soluble materials (glucose and amino acids) circulate in the blood.
- Insoluble materials (fatty acids and glycerol) circulate in the lymph system.
- Respiration is oxygen + food → carbon dioxide + water + ATP (energy) OR defines as the release of energy from food.

Examples of possible explanations include:

- Absorption is the process of the digested food passing through the small intestine wall. The villi are infoldings of the gut wall, which greatly increase the surface area for absorption of digested food. Inside each villus there are blood capillaries, which absorb glucose and amino acids and lacteals, which absorb some of the nutrients from fat digestion.
- Circulation is the movement of the absorbed food from the gut area around the body where the nutrients are needed for body function / life processes. The soluble molecules (glucose and amino acids) are transported in the blood and the insoluble molecules are transported in the lacteals.
- Assimilation is the take up of digested molecules into the cells so the nutrients can be used for body processes / life processes. The blood / lacteals transport molecules to the hepatic portal vein where they go to the liver before being distributed to the body cells that need them where the molecules then diffuse into the cells.
- Respiration is the breakdown of food in the cells / mitochondria, to release the energy that is needed by the cells to function. This process requires the food molecules and oxygen and produces carbon dioxide and energy (ATP) OR word equation.

Examples of possible discussions include:

After digestion has occurred, the processes of absorption, circulation, assimilation, and respiration are essential to the healthy functioning of the body. Once food has been digested, it needs to be **absorbed** so that it can be transported to places in the body that require it, for example the muscle cells. The process of absorption occurs through the small intestine wall via specialised structures called villi. The villi are infoldings of the gut wall, which greatly increase the surface area available for rapid absorption of digested food, thus increasing the efficiency of the process. Inside each villus there are blood capillaries, which absorb glucose and amino acids, and lacteals, which absorb some of the fatty acids and glycerol from fat digestion. Then **circulation** of the soluble molecules / glucose / amino acids are moved throughout the body by the blood system and the insoluble molecules / fatty acids / glycerol are moved in the lacteal. **Assimilation** occurs next where the blood / lacteals transport molecules to the hepatic portal vein where they go to the liver before being distributed to the body cells that need them where the molecules then diffuse into the cells. Many of the absorbed molecules are used by the cells for **respiration** (energy production) where they react with oxygen to produce water, carbon dioxide and ATP / energy. This energy is used by the organism to carry out many processes needed to keep it healthy.

Cut Scores

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