

## QUESTION ONE

Different adaptations enable different animal groups to survive success

You are required to describe and give reasons for how your chosen biol  
by your three animal groups. You may use clearly labelled diagrams in

G.P. 16  
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Name of animal group one: Sac gut (Hydra)

Describe and give reasons for how your chosen biological process is carried out by this animal group.

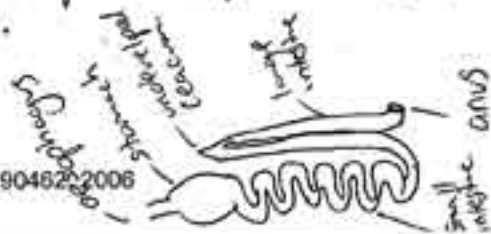
The Hydra is a carnivore, it lives ~~in~~ under the ocean and feeds on tiny extra and intracellular sea creatures.

The Hydra has a sac gut. This is an extremely simple and very inefficient method of digestion. There is one opening for the food to enter and wastes to exit. The Hydra is sessile as it is stuck on a rock. It captures and incapacitates its prey by stinging them with endoblasts of its tentacles. This adaptation is vital to the Hydra ~~as~~ as it can't move to hunt its prey. The Hydra has no dentition (teeth) so the prey is ingested whole through the oral groove when it goes straight into the enteron (gut cavity). Cells lining the gut cavity excrete <sup>digestive</sup> enzymes that start to breakdown the prey. The prey is broken down ~~and~~ by intra and extracellular process. Its broken down into tiny molecules small enough to be absorbed through the lining of the gut cavity, and transported around the Hydra, and used as energy. ~~This method of digestion is extremely inefficient as the Hydra has to completely digest and absorb~~ The indigestible remains such as the skeleton of the prey are then egested via the anal pore which is the same opening the prey was ingested through. This method of digestion is extremely inefficient as the Hydra has to completely digest ~~and~~ <sup>and egest</sup> one thing before it can ingest another. This process takes a very long time, and is very inefficient.

Name of animal group two: Carnivore (cat)

Describe and give reasons for how your chosen biological process is carried out by this animal group.

The cat is a ~~1~~ carnivore and a mammal. It has to hunt for its food, which is mainly mice, birds and other small mammals. ~~The~~ The cat has adaptations to aid it in catching its prey, like contractable claws and sharp teeth. The cat has pointed incisors that it uses for biting and nipping off ~~a~~ flesh. Very well developed canines used for ~~a~~ killing, tearing and ripping. The cat has specially evolved molars called carnassials that are large jagged canines which are used for crunching bones. The cat's temporalis muscles is very well developed due to all the biting that the cat ~~off~~ does. The cat's diet consists of mostly proteins. After the cat has swallowed its prey, it enters the stomach when digestive enzymes begin the breakdown of the meat. The stomach has a pH level of 1 ~~is~~ because the enzyme pepsin works best in this acidic environment as it needs to break down all the protein. Also the pH level is 1 to kill all the bacteria on the decaying flesh. ~~The~~ Any fat and carbohydrate is stored in the cat's muscle. The food then travels into the ~~intestine~~ where the ~~nutrients~~ <sup>nutrients</sup> are absorbed from it, and ~~nutrients~~ are ~~not~~ absorbed then into the large intestine, and finally expelled via the anus. The length of the cat's gut is short and about 2-3 times the length of its body. It is short as the digestion and breaking down of proteins is very quick and simple providing the cat with all the energy that it needs to pursue its busy fast paced lifestyle of running, hunting and killing. Protein is very easy and fast to digest. The cat ~~need~~ needs a lot of energy, and its diet of protein provides it with ~~quite~~ ~~good~~ lots of fast energy.



Name of animal group three: Herbivore Hind gut fermenter (Rabbit)

Describe and give reasons for how your chosen biological process is carried out by this animal group.

The Rabbit is a hind gut fermenter and a herbivore. Its diet consists of foliage. Things like grass and leaves so there is a lot of cellulose in its diet. ~~The rabbit~~

The rabbit spends a long time eating, and it takes a while for the rabbit to obtain all the energy it requires, but also it doesn't have to hunt, so not a lot of energy is being used in finding food. The rabbit's dentition consists of long & sharp incisors for biting off grass and foliage, then there is a large gap in the rabbit's jaw as it has no need for canines in its lifestyle. This large gap is called a diastema. The Rabbit has large molars with enamel ridges, these are used to crack open cellulose walls ~~to~~ to release the nutrients inside. The rabbit's teeth grow continuously as they are constantly being worn down from all the chewing the rabbit does. The rabbit has a well developed masseter muscle for chewing from side to side. The chewed grass enters the rabbit's stomach which has a pH level of 5-7 so that the good bacteria can survive. ~~in the~~ ~~on~~ The food begins to be broken down in the stomach. Cellulose is extremely hard to digest. The food travels into the ileum where water is absorbed, then into the caecum where microbial ~~the~~ bacteria break down the cellulose and anaerobic fermentation takes place. <sup>cell</sup> enzymes in the caecum excrete an enzyme called cellulase which breaks down the cellulose. The food then travels into the large intestine where it is made into small pellets. They are then egested, but these pellets are full of nutrients so the rabbit reingests them and the nutrients are finally absorbed the second time through. Dry pellets are then egested. **THIS** method of digestion takes a very long time but it is efficient because the rabbit in the end receives the nutrients that it requires.



## QUESTION TWO

Discuss the reasons for the diversity in the structure and function for the biological process in your three animal groups.

There is great diversity shown in all of these animal groups, that maximises each one's potential to be able to compete successfully in their environment for food to be able to survive. The adaptations in each of these animals are vital in their survival. //

The Hydra is sessile, meaning that it can't move, it lives under the ocean, and eats tiny sea creatures. It has special adaptations to enable it to catch prey to survive. Endoblast on its tentacles allow it to sting and catch its prey, otherwise the Hydra would starve. Its method of digestion is very inefficient as is it a simple organism and doesn't have a large energy expenditure. ✓

The cat is a ~~her~~ carnivore so its adaptations enable it to compete successfully for its food. The cat has adaptations such as contractable claws and strong, sharp teeth to aid in catching its prey. The cat uses a lot of energy hunting for its food, this is ~~why~~ why it needs to be able to absorb and obtain energy from its food quickly. Proteins are what the cat's diet mainly consists of. These are broken down by pepsin in the acid environment of the cat's stomach pH 1, also the kill bacteria on the cleaning flush. The cat's method of digest is very efficient and provides the cat with a lot of quick energy so it can pursue its very busy lifestyle. The cat has a large energy expenditure as it is

always hunting and is very active. /

The rabbit is a herbivore and a hind gut fermenter, the rabbit doesn't require much energy while eating, but what it eats (cellulose) requires much energy to be broken down. So the rabbit needs a lot of energy for that. The rabbit doesn't have any defence mechanisms so it relies on being able to run away, fast. Lots of energy is needed for that. The rabbit is a dull grey color to blend in with its environment the grass so it's not easily seen. Cellulose is very hard to break down. The rabbit has a highly developed caecum where microbial bacteria lives that secrete the enzyme cellulase which breaks down cellulose. Anaerobic fermentation also occurs in the caecum, and breaks down the cellulose. The rabbit also reingests its pellets which is unusual, but works for the rabbit as the pellets are full of goodness and nutrients needed by the rabbit. Its stomach has a pH level of 5-7 this is so that the useful bacteria is able to survive. The rabbit's gut is very long, and the process of digestion takes a long time, but is efficient as in the end provides the rabbit with the energy that it needs.

P.T.O.

This candidate successfully displayed a clear understanding of diversity in the structure & function of nutritional adaptations in 3 clearly diverse groups. The candidate was able to provide reasons as to why these adaptations have their functions.

They clearly understand the purpose of the process of digestion. This may have been a prepared 'essay type' response which did not fully meet the demands of the question.

The candidate is unable to give reasons for the diversity in the structure & function in relation to the opportunities & demands of the niche.

Drawings would be a more concise way to demonstrate knowledge.

To gain E the candidate should relate & compare & contrast the adaptations & their functions & link biological ideas, answering the question. The candidate did not clearly discuss the relationship between food available, the demands of the organisms life style & the digestive adaptations it has.