***Human Biology ATAR – Task 4: Science Inquiry***

***Digestive system (7.5%)***

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| --- | --- | --- | --- |
| Name: Danica Yutuc | | | |
| Time allowed: 1 Lesson | | | |
| **Section** | Your Mark | Marks available | Percentage |
| **Section 1:**  The journey of food |  | 25 | 50% |
| **Section 2**:  Validation |  | 25 | 50% |
|  |  | **50** | **100%** |

**Declaration of Authenticity**

I (Student Name) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ declare that this work is my own and I have not plagiarised from any source.

Signature:  
  
Date:

**Section 1: The Journey of a Piece of Food**

**Task:**

Choose one item of food. It must be a solid food, not a drink.

Describe the journey of this piece of food throughout the entire digestive system.

**Make sure to describe:**

* The entire process, from ingestion to elimination
* How long it takes for each stage of the process
* The mechanical digestive of the food
* The chemical digestive of the food
* The substances that are broken down and absorbed from the specific type of food you chose
* What those substances are then used for in the body

**Your assignment must follow the following guidelines:**

* It must be no more than 1000 words.
* It must include references in APA style format at the end of the assignment (you are expected to use at least two sources, other than your textbook for this task). The references do not count towards your word count.
* You must use appropriate headings to break your assignment.

**Other allowances:**

* Please be aware that you are allowed and encouraged to use diagrams to support your assignment, however if you do, please include a link to those images in the document as a reference.

Most marks will be associated with the quality and accuracy of your description of the process. However, some marks are associated with the format of your assignment and its readability.

*(Hint: using appropriate headings and avoiding complicated jargon will improve your assignment)*

***Marking Rubric***

***Marks Description:***

|  |  |  |
| --- | --- | --- |
| ***Level*** | ***Score*** | ***Description*** |
| Not Discussed | 0 | Little to no information about this is provided |
| Developing | 1 | Information lacks detail or contains information that is incorrect. |
| Satisfactory | 2 | Information is correct and clear, however additional information was needed. |
| Exemplary | 3 | Information is detailed and includes all the relevant facts |

***Main Content:*** ***(21 Marks)***

|  |  |  |
| --- | --- | --- |
| ***Area of the Digestive System*** | ***Information***  ***Required*** | ***Scored***  ***(0-3)*** |
| Mouth and Oesophagus | Describes the role of the mouth, teeth, salivary glands, epiglottis and esophagus in digestion. |  |
| Stomach | Describes the role of the stomach in mechanical digestion of food, and if applicable, chemical digestion of proteins. |  |
| Small Intestine  (Breakdown) | Describes the role of the small intestine in the chemical digestion of food. Includes reference to the roles of the pancreas and if applicable the gall bladder. |  |
| Small intestine  (Absorption) | Describes how substances are absorbed in the small intestine, referring to the villi and microvilli and processes of transportation of the specific nutrients. |  |
| Material breakdown and use. | Describes what the specific substances in the chosen food are broken down into, and what they are used for in the body. |  |
| Large intestine | Describes the role of the large intestine in the absorption of water, minerals and some vitamins. Also discusses the role of bacteria in the breakdown of materials. |  |
| Elimination and Faeces | Describes the process of elimination from the rectum and anus. Discusses the make-up of faeces. |  |
| **Total** | |  |

***Presentation and Format:* *(3 Marks)***

|  |  |  |
| --- | --- | --- |
| ***Developing (1)*** | ***Satisfactory (2)*** | ***Exemplary (3)*** |
| Assignment is not written in a logical order or lacks structured paragraphs/headings. Scientific vocabulary is not used very often or is used incorrectly. | The assignment is written in a fairly logical order. Some headings and paragraphs could have been better structured. Correct scientific vocabulary is used sometimes. | Assignment is written in a logical order, with use of headings, and paragraphs to break up content. The assignment is clearly written and correctly uses scientific vocabulary. |

***References:* *(1 Mark)***

Included 3 references in APA formatting

**TOTAL: /25**

The Digestion of an Apple

1. Mouth & Oesophagus:

Mechanical digestion:

The first stage of the digestive system is when the apple enters the mouth in order to be broken down into smaller and easy to swallow pieces by a motion of chewing with the use of our teeth and jaw. During this chewing motion process, the salivary glands secrete saliva to moisten, lubricate and easily to be swallowed. Saliva (contains mucus, rich in enzyme and amylase). Amylase is a special protein that helps digest carbohydrates, made by the pancreas or salivary glands. Salivary amylase breaks apart starches into two chain sugars (maltose). This begins the chemical digestion of starch, breaking down the large starch molecules into smaller ones. Single glucose molecules will be produced when the simple sugar will later be broken down to be used as cellular energy. The tongue helps to form bolus (chewed food mixed with saliva) that moulds and mashes the apple that guides it to the back of the throat and pushed through the pharynx and oesophagus. A soft flap of tissue called epiglottis closes over the windpipe when we swallow to keep food and liquid out of the lungs. Peristalsis are waves of muscle contractions that force bolus to be transported from oesophagus to the stomach and occur throughout the digestive tract.

1. Stomach:

A sphincter which is located at the end if the oesophagus is a muscular valve that allow food to enter the stomach, then squeezes to prevent boluses from flowing back to the oesophagus. The stomach contract in variety of ways to churn the apple. Boluses are mixed with gastric juices and peristalsis continues to blend the apple with stomach acid. Stomach secretion’s role is to provide and produce nutrients from the apple (mineral, vitamins and fiber) to proceed with absorption process that occur in the small intestines. In the stomach hydrochloric acid is present in the gastric juice that breaks down the apple and pepsin (an enzyme from other food) breaks bonds between certain amino acids so that long chains will be broken into shorter chains known as polypeptide. Pepsin works in very acidic solutions. The hydrochloric acid allows pepsin to act and kills many bacteria that enters with the food. A chyme (thick, soupy liquid) is formed when it is ready to exit the stomach to be delivered to the small intestine by peristalsis. Apples usually spends 40 mins in the stomach filled with fiber to help balance pH levels.

1. Small Intestine:

Breakdown

The apple and chyme enter the small intestine (duodenum) and mixes with water and other digestive juice such as bile (helps absorbs and breakdown fatty acids). This process continually breakdown the sugars, fats and proteins. The gallbladder stores bile until it is needed. The pancreas makes enzymes that help digest proteins, fats and carbs. Bile breakdown big particles, some fluid from the pancreas that contains bicarbonate ions and enzymes to neutralise the stomach acid that is mixed with chyme. Bilirubin from bile which is a yellow-orange pigment is released by red blood cell as the apple is broken down and relies on the bacteria for the body to metabolise bilirubin and to produce waste. Complex carbohydrate will be broken down into simple sugars and glucose, proteins into amino acids and fat into fatty acids and glycerol. Secretion from the pancreas break apart complex proteins into peptide chains to break down amino acids. Glucose molecules, amino acids and free fatty acids are available to be absorbed into the blood stream through the villi. Carbohydrates in the apple are broken down into glucose in the small intestine that gives out main source of energy for the body’s cells, tissues and organs.

Absorption

The centre of the small intestine is covered with villi. Villi is tiny, microscopic, hair-like that line inside the small intestine. With the villi’s presence is our body, it plays at important role of increasing the surface area for nutrients to be absorbed into the blood and distribute around the body. Nutrients such as lipids, proteins, carbohydrates, vitamins, water and minerals are absorbed by the small intestine. The products of digestion and substances such as vitamins, minerals and water are absorbed through the wall of small intestine into the blood. Nutrients are absorbed through the internal surface, so efficient absorption requires a large surface. Some absorption occurs through diffusion (as there is a higher concentration of nutrient materials in the interior of small intestine than cells lining the villi). Active transport can also occur where nutrients in the cells of villi goes against the concentration gradient. Simple sugars such as glucose are absorbed by active transport as well as amino acids, they pass through the cells on the outside of the villi and into the blood capillaries. Water- and water-soluble vitamins are absorbed into blood capillaries by diffusion. Fatty acids and glycerol are absorbed by simple diffusion, they both recombine to form fats where tiny fat droplets enter the lacteals.

1. Material breakdown and use:

Consumption of apples will lead to boost important minerals (calcium, potassium and phosphorus) where they perform different functions. This includes strengthening the bones, building muscle and eliminating waste. Apples contain vitamin C which is a natural antioxidant to improve the body’s resistance towards infectious and damages radicals. Vitamin B (maintain red blood cells and keep the nervous system healthy), Vitamin K (help make proteins to strengthen bones), Vitamin E (support immune system) and dietary fibre found on the apple skin (which lower cholesterol, reduce chronic illness and helps from keeping you “regular.”

1. Large Intestine:

Most nutrients have been absorbed but some aren’t. Excess fluids, vitamins, minerals and water from the chyme are absorbed forming a solid substance called faeces (may also contain undigested food, bacteria and bile pigments) to be excreted out of the body. The digestive enzymes cannot fully break down fibre instead, it passes intact through the digestive system with a small amount of nutrient. The breakdown of nutrients such as vitamin K with the help of the bacteria complete the chemical part and absorbed in the blood. There are no villi, and no digestive juices are secreted, only the lining secrete a large amount of mucus. The bacteria break down remaining organic compounds, some may produce vitamins which are then absorbed through the walls into the blood.

1. Elimination & faeces:

The food molecules that is unabsorbed and undigested needs to be eliminated. Faeces a solid material that is made up of bacteria and undigested food are stored in the rectum ready to be expelled through the anus (external opening at the end of the rectum) which is the last part of the digestive system. Excretion is the removal of metabolic waste (waste produced by chemical activity of the body cells).

* “What Vitamins Are in Apples? Apple Nutrition Facts.” *Eckert’s*, 10 Nov. 2021, eckerts.com/what-vitamins-are-in-apples-apple-nutrition facts/#:~:text=Minerals%3A%20When%20you%20eat%20apples.

<https://eckerts.com/what-vitamins-are-in-apples-apple-nutrition-facts/#:~:text=Minerals%3A%20When%20you%20eat%20apples,filtering%20out%20waste%20(phosphorus)>.

* Staff, Editorial. “Q: Should Fruit Be Eaten on an Empty Stomach to Ensure Proper Digestion?” *Tufts Health & Nutrition Letter*, 16 Nov. 2013, [www.nutritionletter.tufts.edu/ask-experts/q-should-fruit-be-eaten-on-an-empty-stomach-to-ensure-proper-digestion/](http://www.nutritionletter.tufts.edu/ask-experts/q-should-fruit-be-eaten-on-an-empty-stomach-to-ensure-proper-digestion/).

Book:

* Newton, T. J. & Joyce, A (2014). Human perspective units 1 & 2: for ATAR course (7th edition), South Melbourne, Vic Cengage Learning Australia.