

**Promoting the Use of Educational Technology  
in Learning and Teaching in Science (S1-3)  
Learning and Teaching Resources**

**Digestive System**





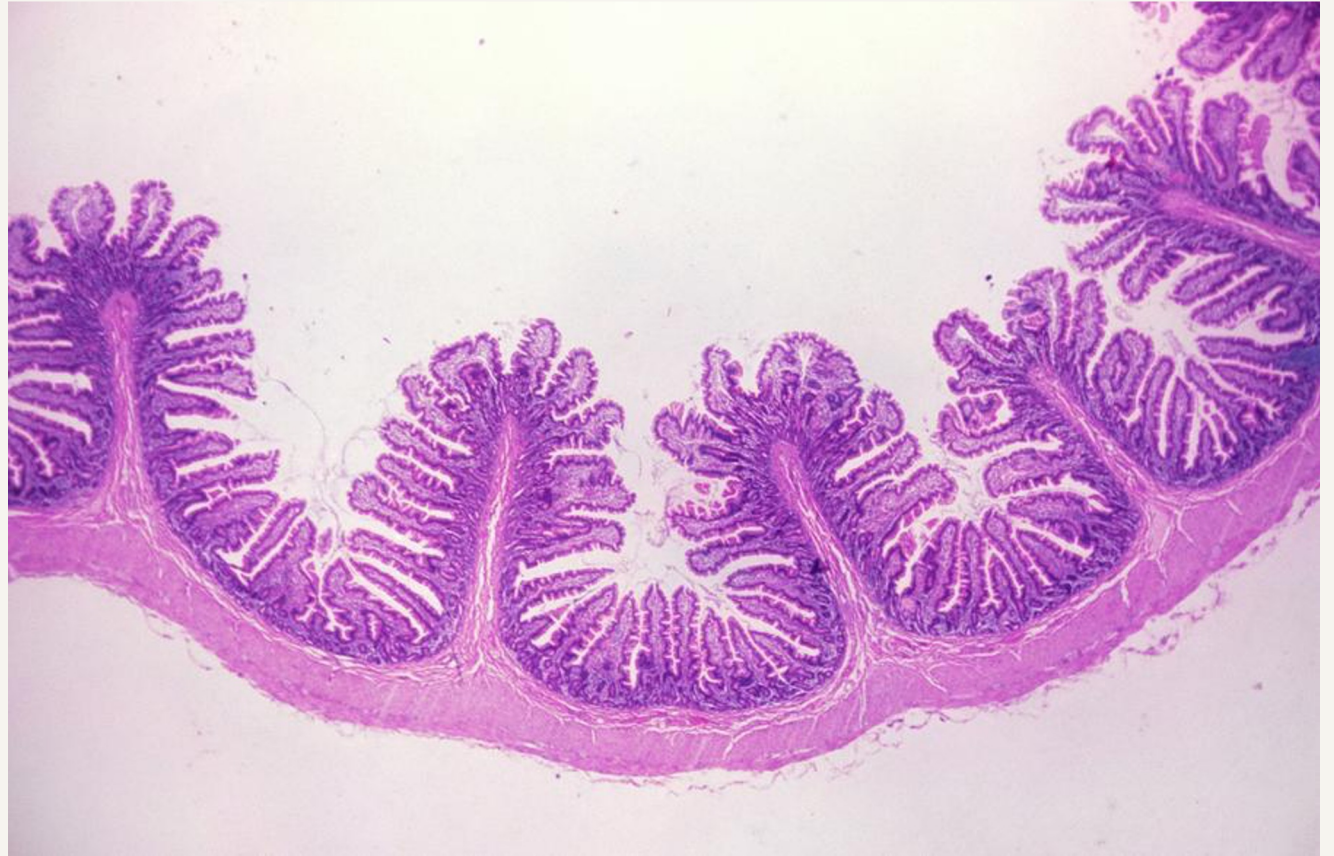
# *Digestion of starch*

*People eat rice, wheat, potatoes and other plants that are rich in starch as their energy sources.*

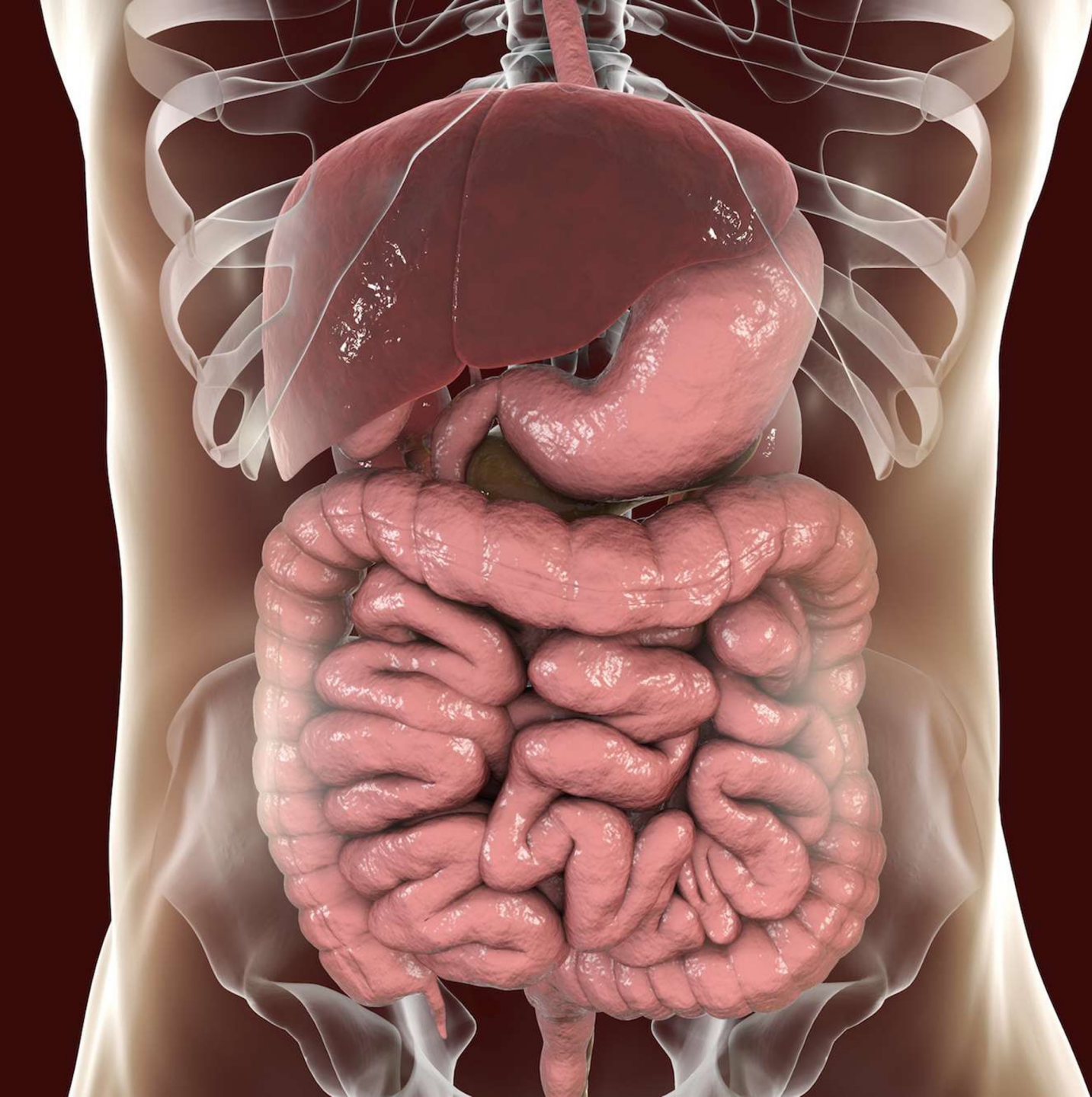


*However, the particles of starch are big.*

*When food is absorbed in the small intestine, only small particles like monosaccharide (simple sugar particles) could be taken up.*



<https://images.fineartamerica.com/images-medium-large-5/lm-of-a-section-through-the-human-small-intestine-biophoto-associatesscience-photo-library.jpg>



*So, there is a need to break the large particles in food, like starch, into smaller ones.*

***How does human body do that?***



*Let's start with a piece of bread.*

*In the mouth, the teeth first break the bread into smaller pieces.*

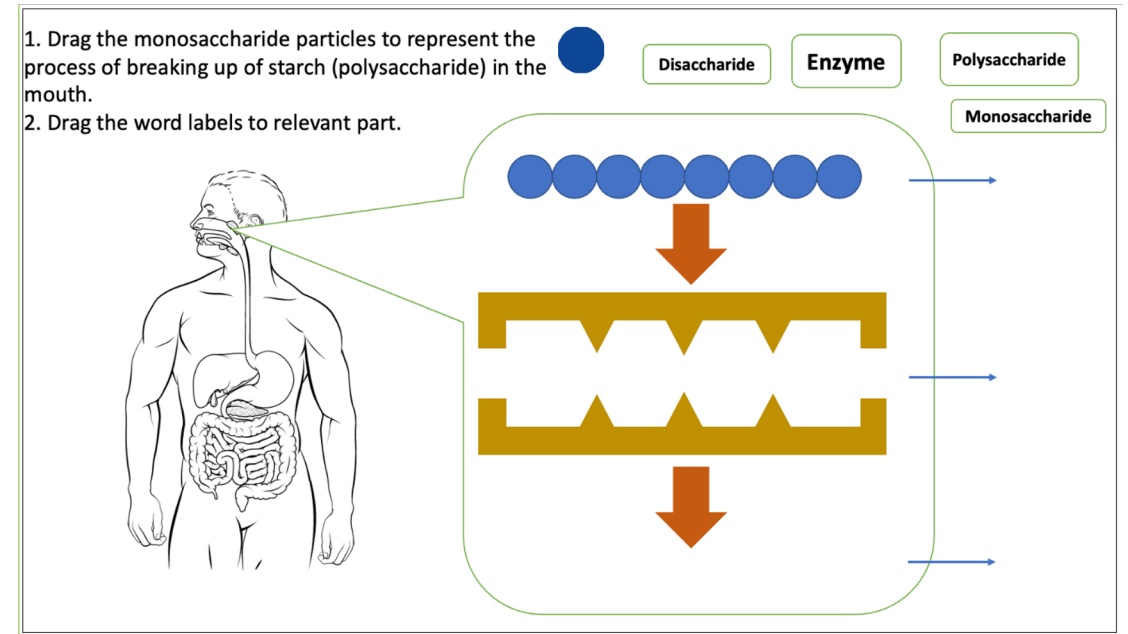
*This is called **mechanical digestion.***

*But chemical digestion also takes place in the mouth.*

*The starch, which is a polysaccharide, is chemically broken into disaccharides.*

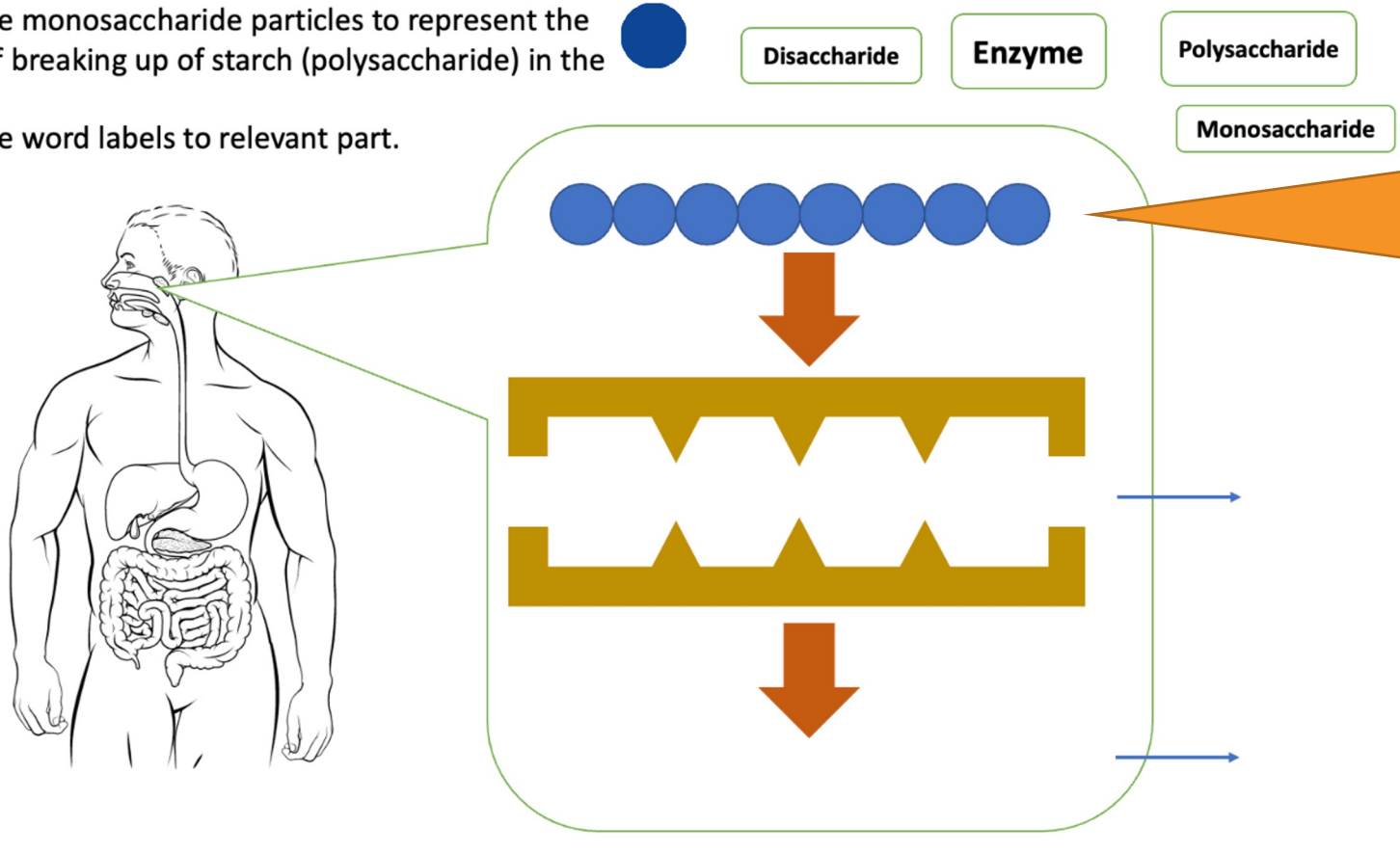
***Can you use a diagram to represent this?***

*You teacher will show you how you can access this platform.*



1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the mouth.

2. Drag the word labels to relevant part.



A monosaccharide, e.g., glucose, is **very simple** particle.

Here we see the starch particle. It is very big and made of up **thousands** of monosaccharide particles.

Obviously, the drawing of starch is too simple. This is the **limit** of our drawing.

If we wish to be realistic, we need to have thousands of these blue circles there.



1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the mouth.

2. Drag the word labels to relevant part.

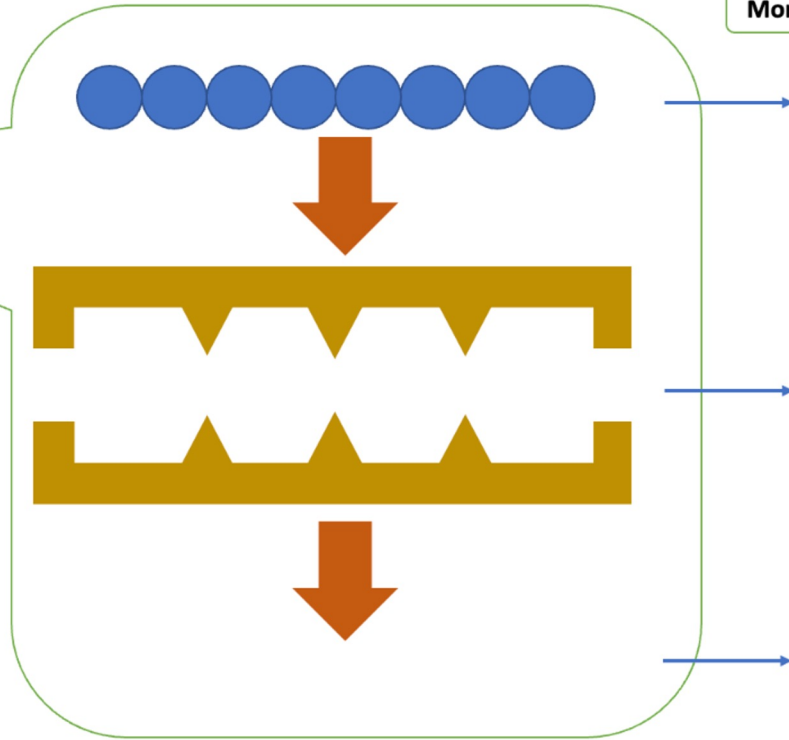
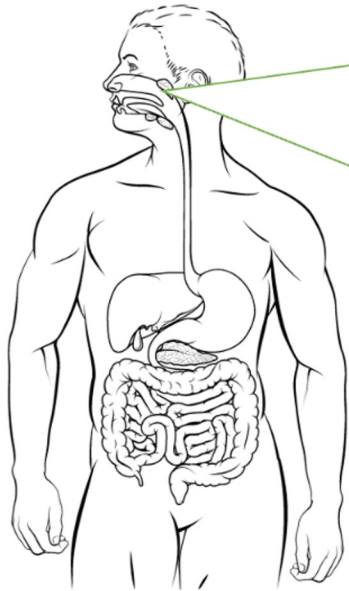


Disaccharide

Enzyme

Polysaccharide

Monosaccharide

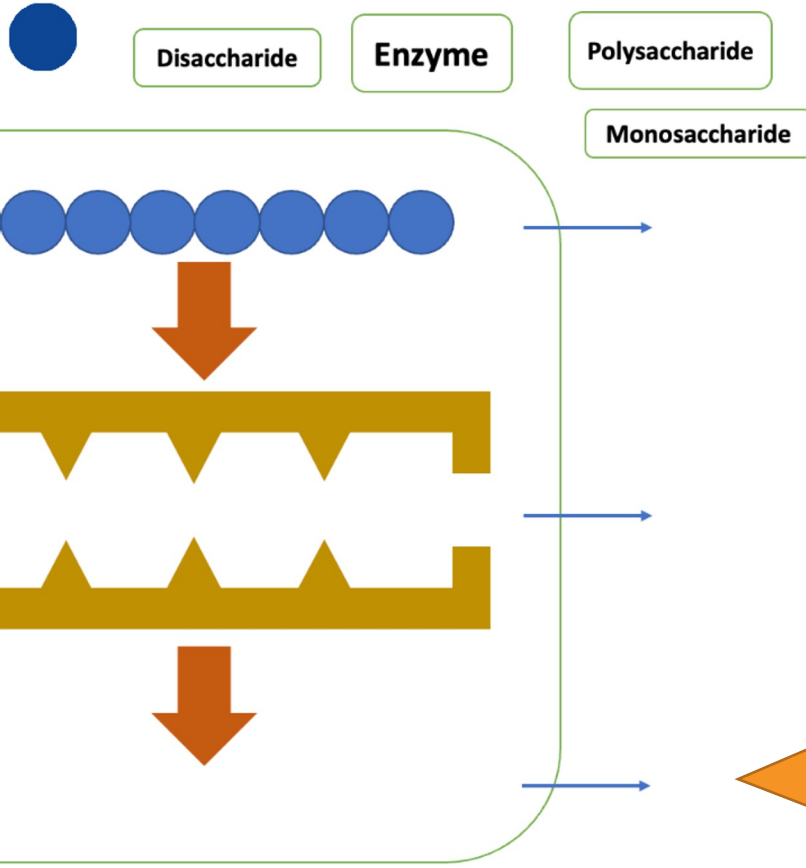


*So, if you need to drag a word from the four words above to describe the chain of eight blue particles here, which term would you use?*

*(Hint: Read the beginning of those words and guess which one is the best.)*

1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the mouth.

2. Drag the word labels to relevant part.

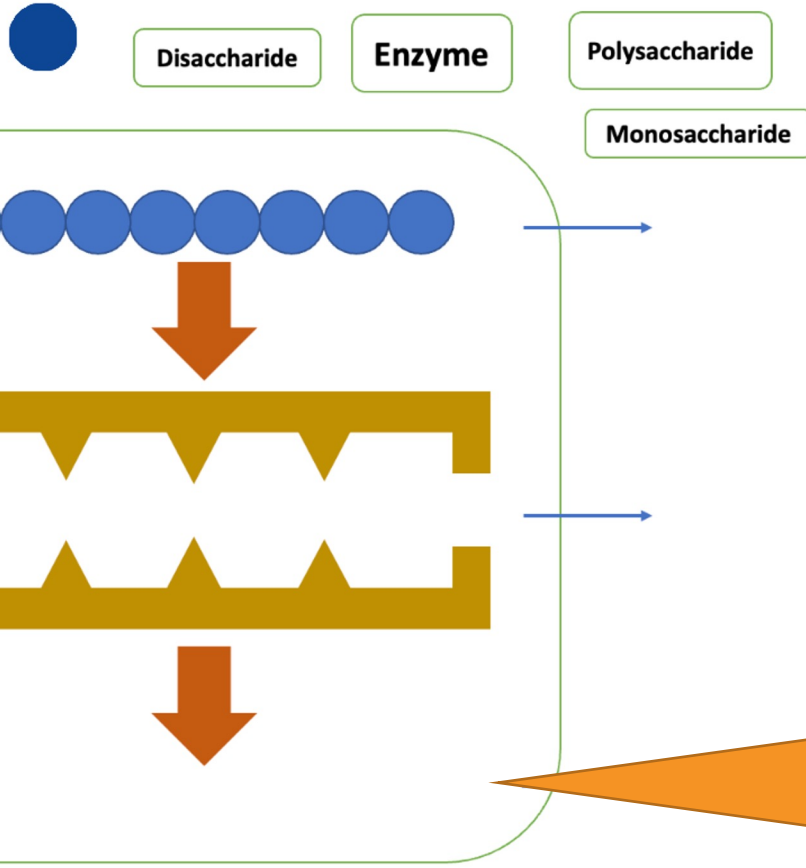


*It is known that the chemical digestion in mouth does NOT produce something directly absorbed in the small intestine.*

*So, what is the product here?*

1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the mouth.

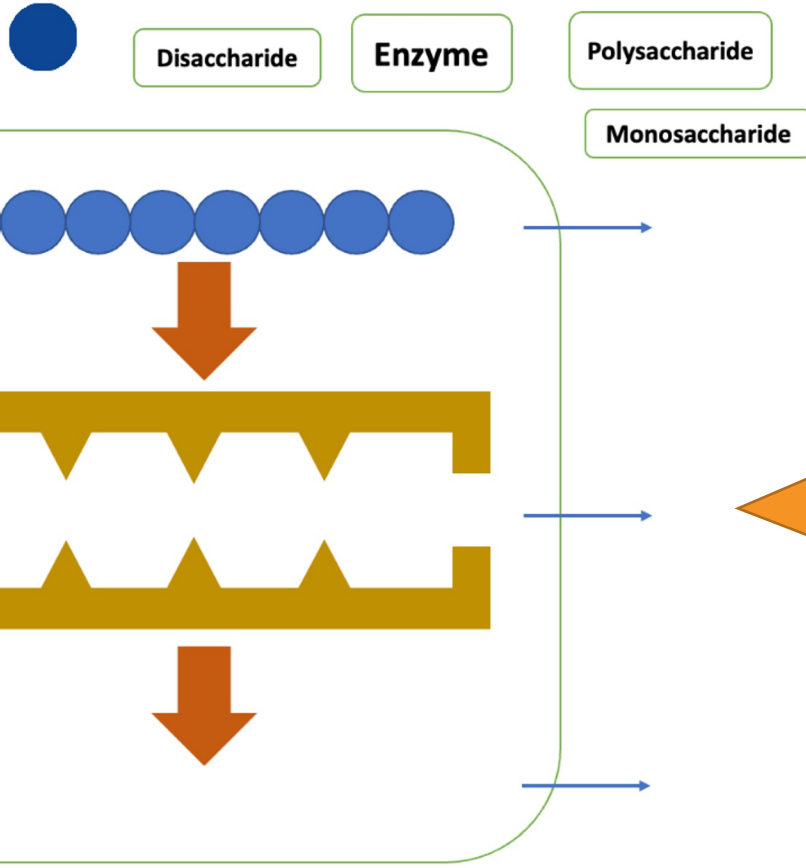
2. Drag the word labels to relevant part.



*If one blue circle represents a monosaccharide particle, how would you represent your product here?*

1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the mouth.

2. Drag the word labels to relevant part.



*Something needs to be used to help break down the starch chemically.*

*Do you know what it is? And why is it needed?*

*Can you tell the rest of the class?*

1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the mouth.

2. Drag the word labels to relevant part.

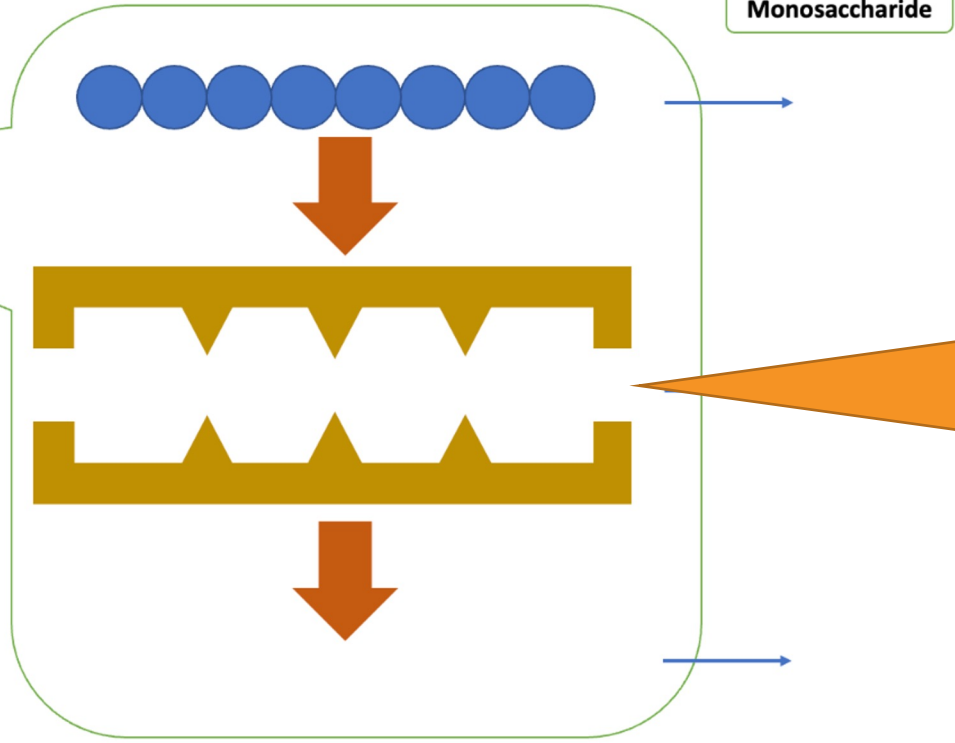
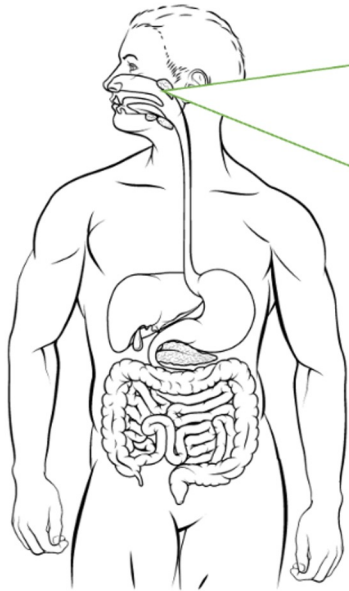


Disaccharide

Enzyme

Polysaccharide

Monosaccharide

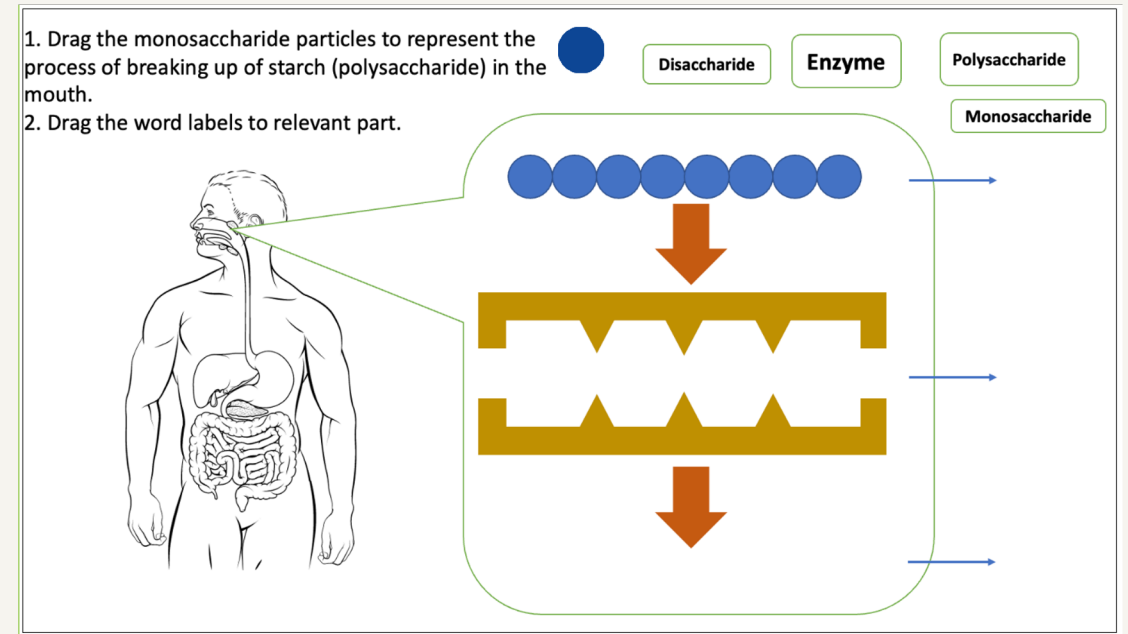


*We can put the blue particles here to show what is happening here.*

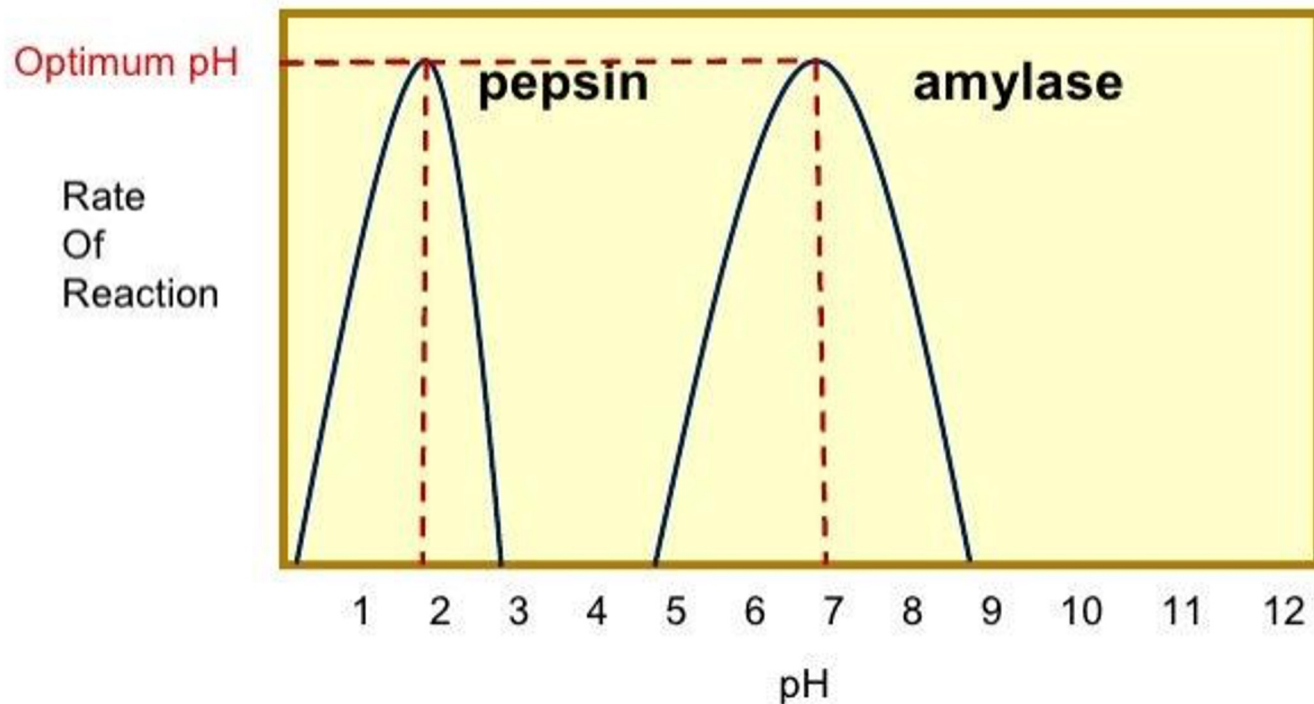
*All of you should create a picture to show the chemical digestion in the mouth now.*

***Screen capture it and save it at the location that your teacher tells you to do so.***

*And we will compare some pictures created by you.*



*Enzyme works best in certain ranges of pH values.*



<http://image.slidesharecdn.com/blacktempandphonenzymes-111011101123-phapp01/95/effect-of-temperature-and-ph-on-enzyme-activity-16-728.jpg>

*The enzyme that helps break starch into disaccharide in the mouth is called **salivary amylase**.*

*Under which pH does it work best?*

*So, for salivary amylase to work well, what should the pH inside the mouth be?*

*In the stomach, another round of digestion occur.*

*Stomach breaks down the food into semi-fluid called **chyme** by churning and mixing with gastric juice.*

*Gastric contains acid, so the pH inside the stomach is low. This allows other enzymes to work.*

***Does chemical digestion of starch stop there? Why?***





*And the chemical digestion of starch resumes in small intestine.*

*However, **what does the body need to do to allow the chemical digestion of starch to re-start?***



*But the chemical digestion also takes place in the small intestine.*

*Can you use a diagram to represent this?*

1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the small intestine.  
2. Drag the word labels to relevant part.

Disaccharide

Polysaccharide

Enzyme

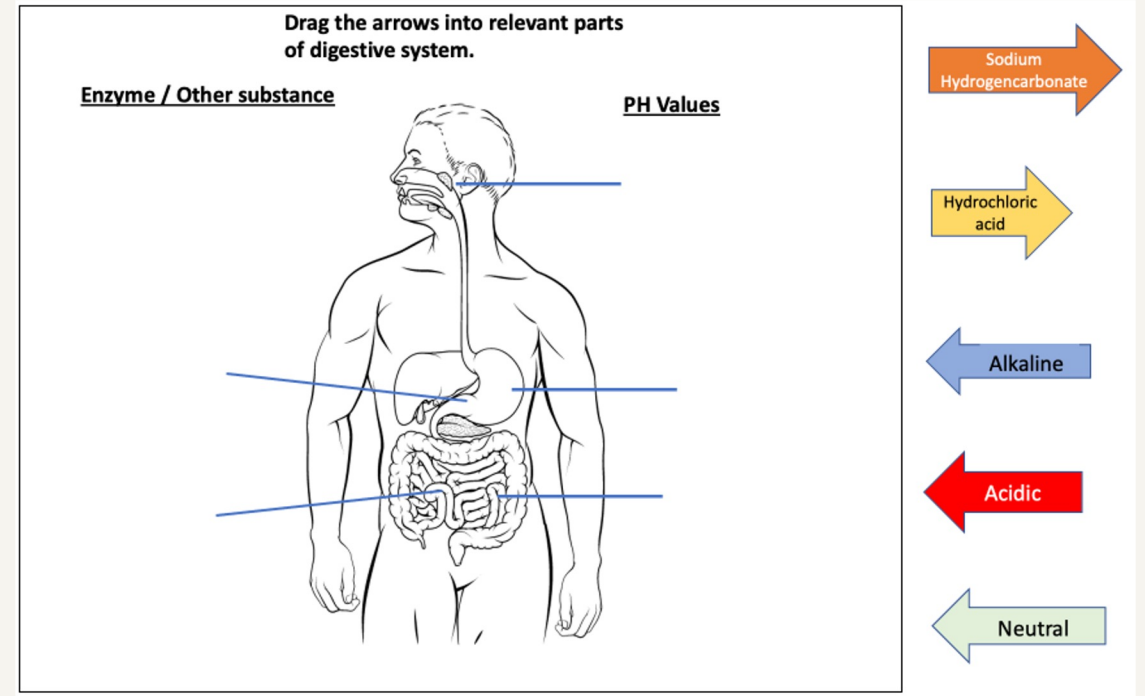
Monosaccharide

*Drag the substances produced by the human body (the right arrows) and the pH of different parts of the body (the left arrows) onto the right places.*

*Explain, with the aid of your diagram, why the **chemical digestion of starch happens in mouth and small intestine, but not in the stomach.***

Drag the arrows into relevant parts of digestive system.

Enzyme / Other substance                      pH Values



Sodium Hydrogencarbonate

Hydrochloric acid

Alkaline

Acidic

Neutral

*And we comes to the final step. The disaccharide particles have to be broken down into simple sugar.*

***Can you create a diagram to explain that?***

1. Drag the monosaccharide particles to represent the process of breaking up disaccharide in the small intestine.  
2. Drag the word labels to relevant part. ●

**Enzyme**

**Disaccharide**

**Blood Vessel**

**Villi**

**Monosaccharide**

**Polysaccharide**



*And the nutrients from the bread can finally be absorbed by the human body.*

***Can you use the saved diagrams to explain to others how the human body breaks down the starch in bread into smaller particles that the body can absorb?***

---

*We have used pictures to aid our understanding of the process in this lesson.*

---

***Can you guess why scientists use diagram when they wish to exchange ideas with each other?***



Copyright © 2023 Science Education Section, Curriculum Support Division, Education Bureau, HKSAR, All right reserved

Developed by Faculty of Education, The University of Hong Kong