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

Fanling Kau Yan College – Yiu Nga Yung, Yoyo

Contents

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Project details

Project Details

Topic:

S3 Biology – Digestion of starch

- Explain the needs of digestion in humans in terms of the type of substances to be absorbed.
- Distinguish between mechanical and chemical digestion.

DragGame e-learning activities

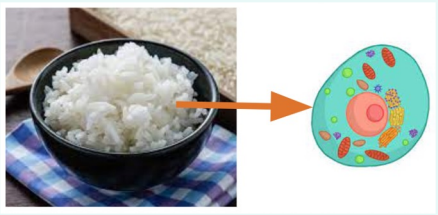
02

Classroom dialogue without using DragGame e-learning activities

Key Questions to students

1. What is the importance of digestion?
2. What happen to food substances in mouth cavity?

Dialogue Flow

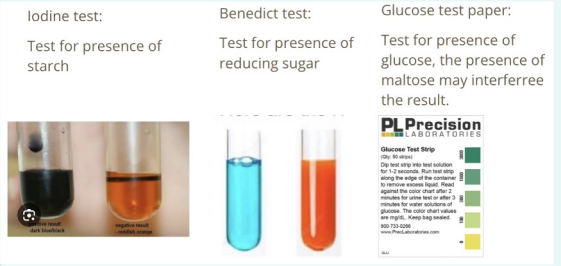


2. What happen to rice in our mouth cavity?
   - broken down into smaller pieces physically.

4.What is the new substance formed? How to test it ?

1. What is the importance of digestion?

3. Anything else happen?
   - Tastes something sweet (a new substance is formed.)



What can students learn from the above dialogue?

- Break down of large food substances into small food substances by physical and chemical digestion

- Small food substances = new chemicals
  → sugar, supported by the sweetness taste and the evidence from the tests

Reflection on students' learning outcome

Students may not know the changes at the molecular level, hence they may not know

polysaccharide→ dissaccharides→monosaccharides

03

Examples of classroom dialogue using student-generated representations with different teaching purposes

Teaching purpose:
Extend students' understanding to the molecular level
& Apply the concept in different scenarios

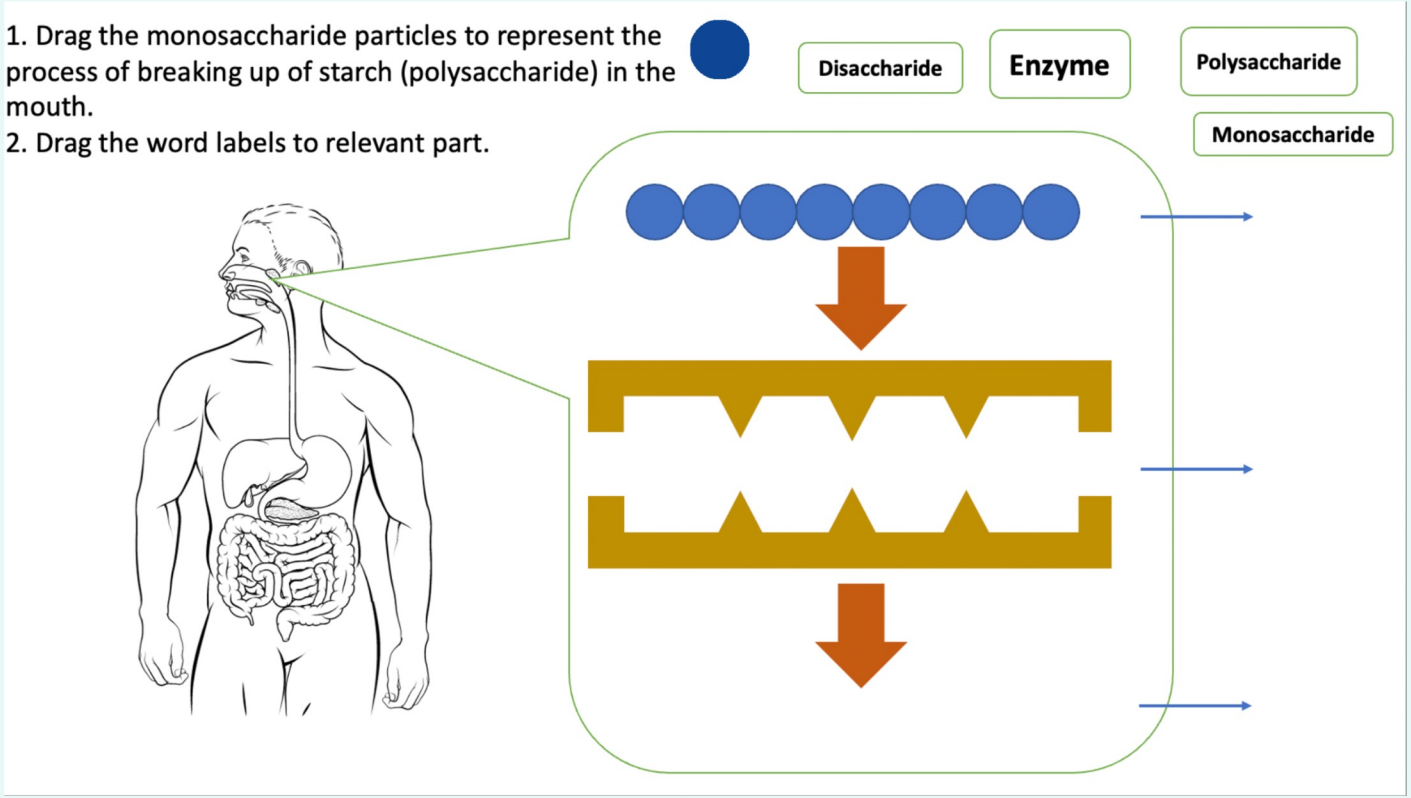
From: **Recognise the formation of sugar**

Result

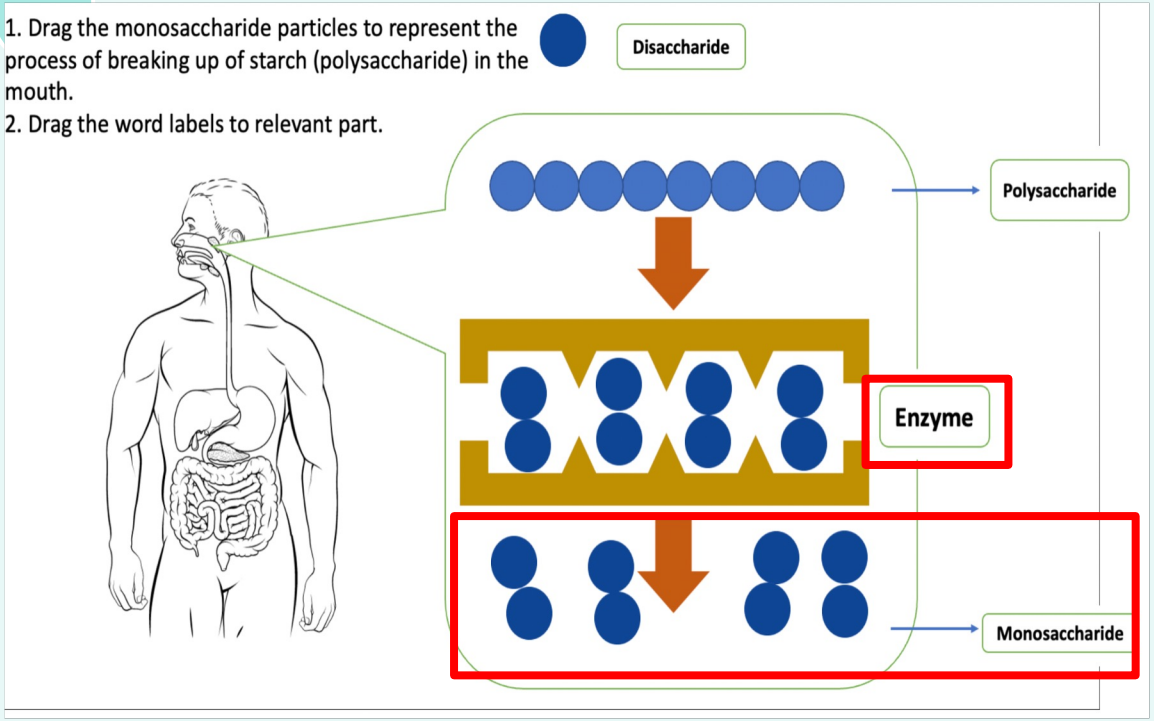
To: **Recognise under the aid of enzyme, how does sugar form and what kind of sugar is formed in the molecular view**
polysaccharide → dissaccharides → monosaccharides

Mechanism

Design of the DragGame e-learning activity



Classroom dialogue for clarifying the representation of symbols/ supplementing prior knowledge



1. Brown symbol = enzyme
1. 1 circle symbol = monosaccharide

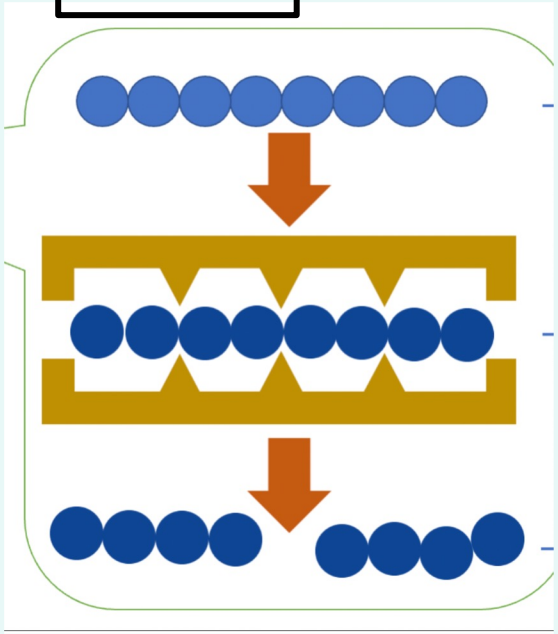
   vs

   2 circle symbols = monosaccharide

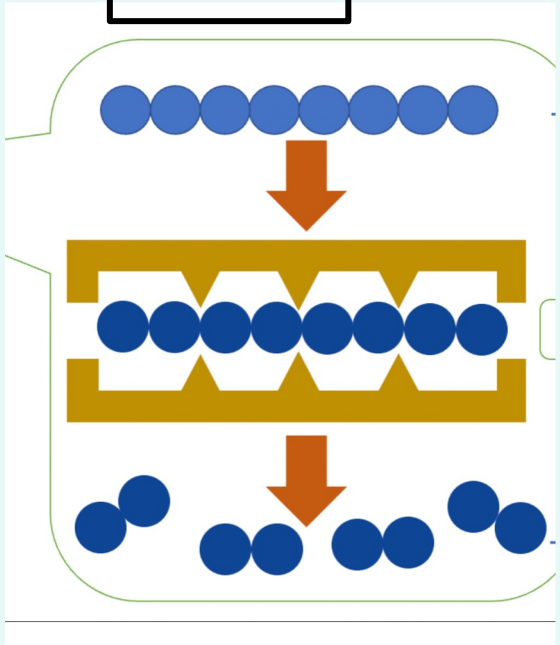
Question: e.g.,
if you use 2 circles to represent a monosaccharide, how about disaccharides?
How many circles should we use?

Classroom dialogue for recognising the function/ features of enzyme

Student A



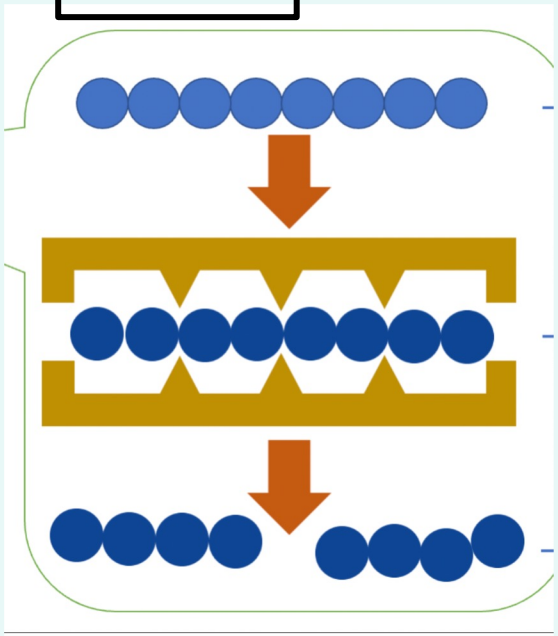
Student B



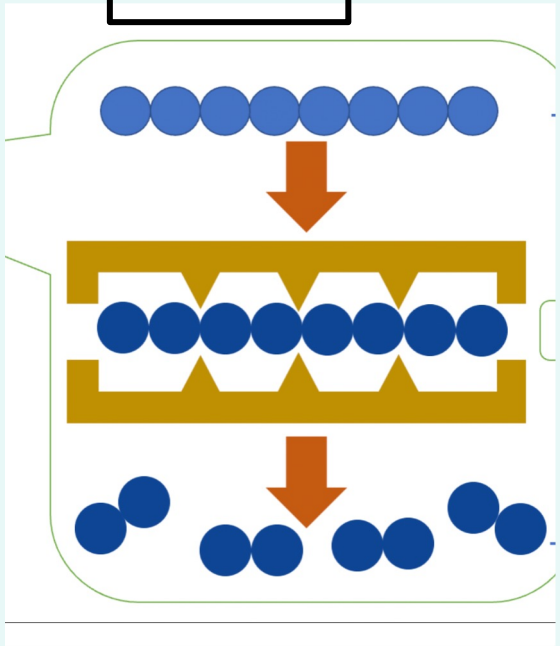
Question:
e.g., Why would you arrange the circles inside the enzyme in this way?
How do you find out what are the products in this digestion?

Let’s have a guess on how students’ thought~

Student A

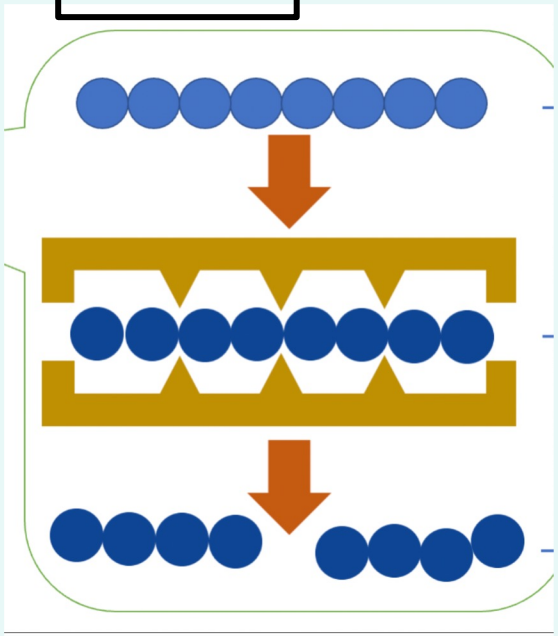


Student B

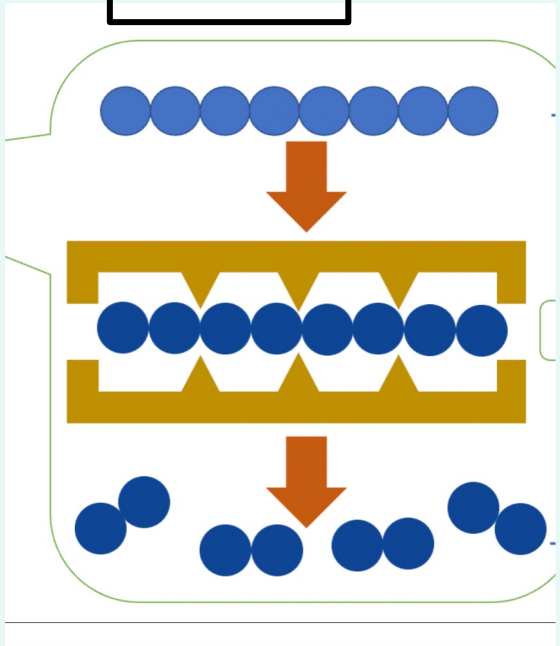


Let’s have a guess on how students’ thought~

Student A



Student B

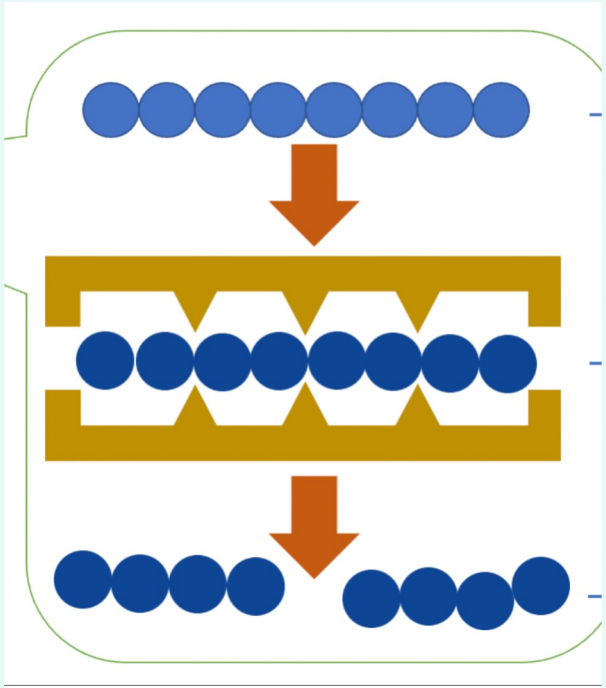


Student A:
Diagram is about physical digestion

Student B:
Diagram is about physical digestion

Classroom dialogue for clarifying students' understanding on physical and chemical digestion

Student A



S: This diagram is about physical digestion. because chewing takes place in mouth cavity

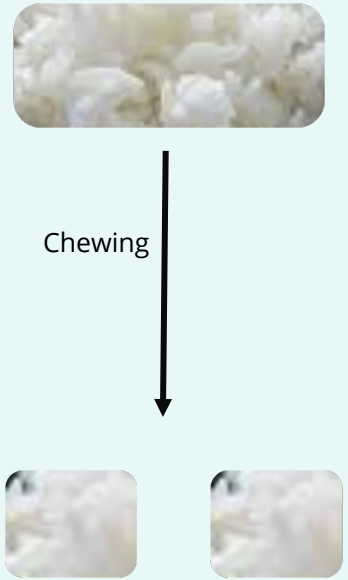
T: Apart from chewing, anything else happen in the mouth cavity?

S: Starch turns into glucose.

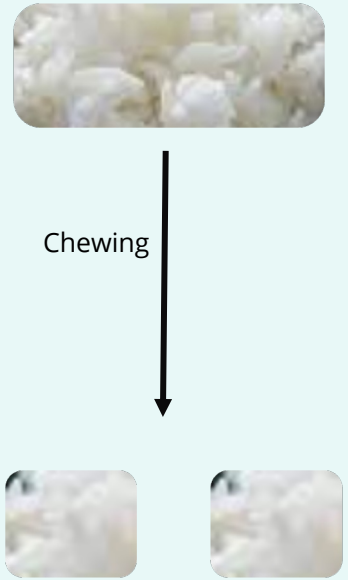
T: Which type of digestion is it ?

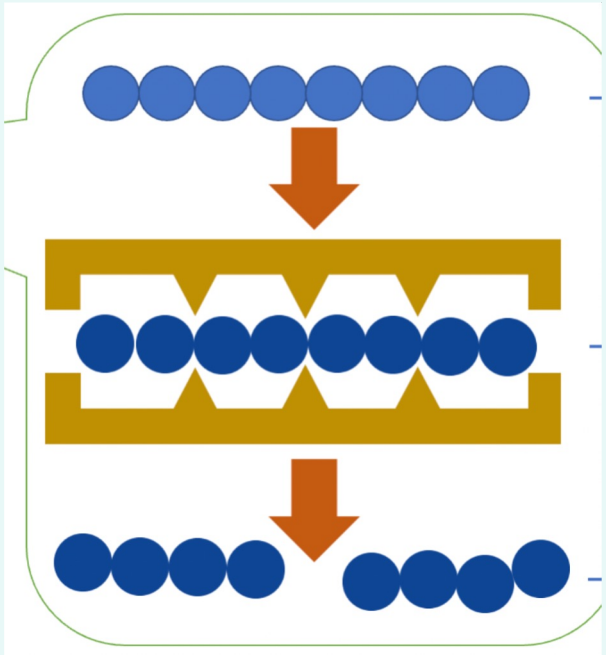
S: Chemical digestion. But it looks like teeth, so i think it's representing chewing.

Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only



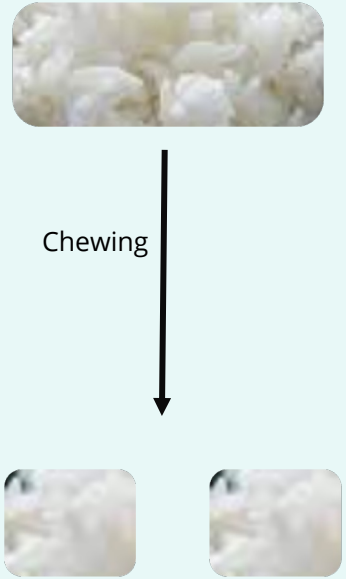
Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only



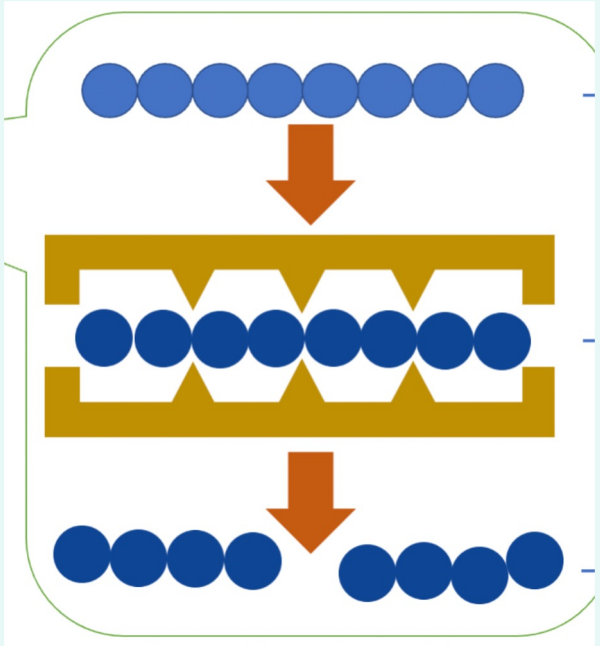


Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only

Macroscopic Level



Molecular Level



T: Can chewing break down a a cup of rice into smaller pieces?

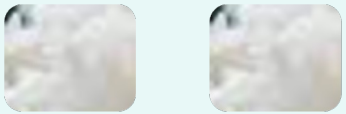
T: Is it possible to have only 1 polysaccharide in a bowl of rice ?

T: Can chewing break down a long polysaccharide into a shorter one?

Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only

Macroscopic Level:
Physical Digestion

Chewing



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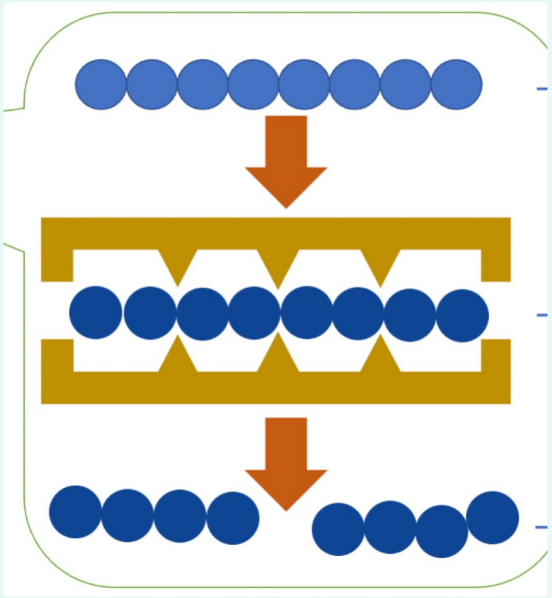
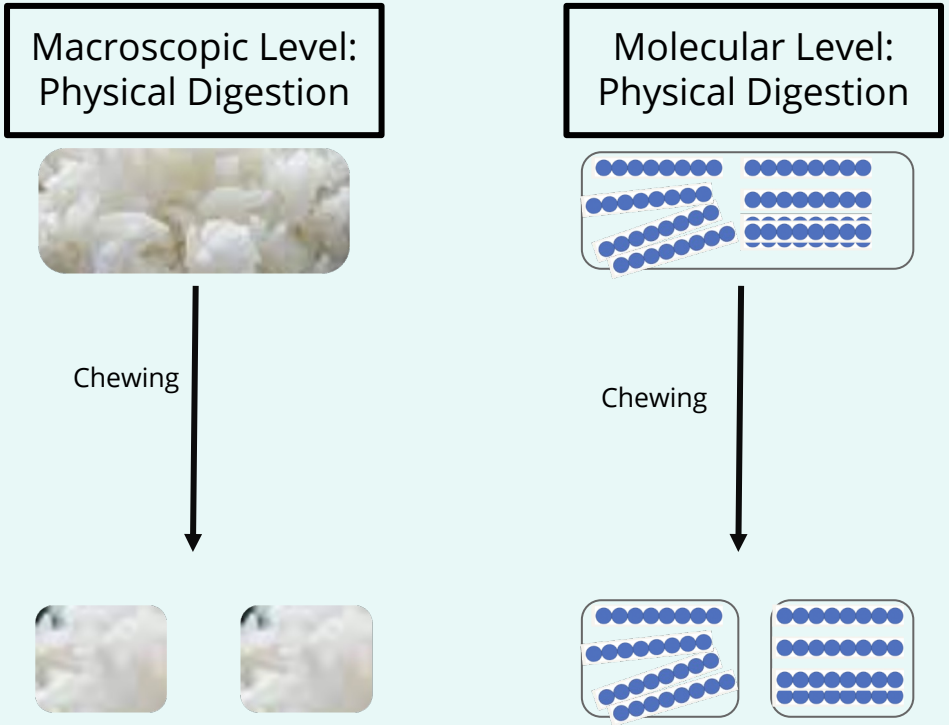
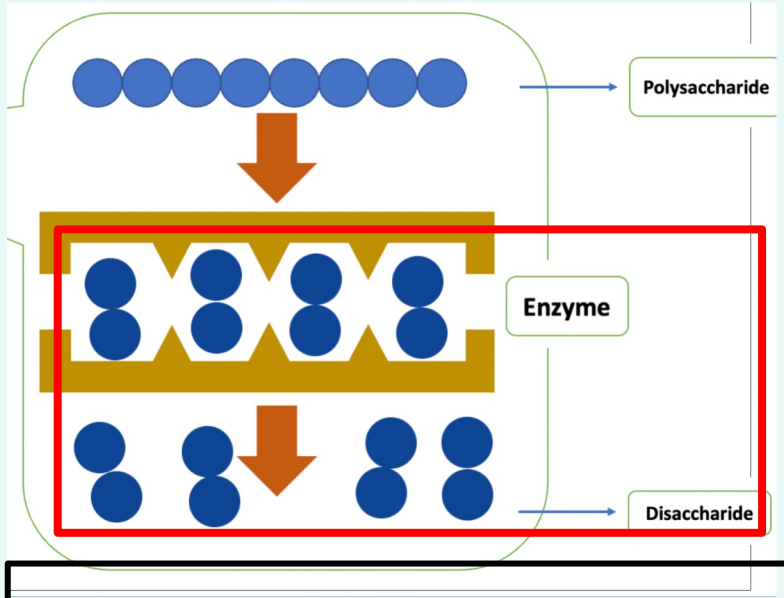
Molecular Level:
Chemical Digestion

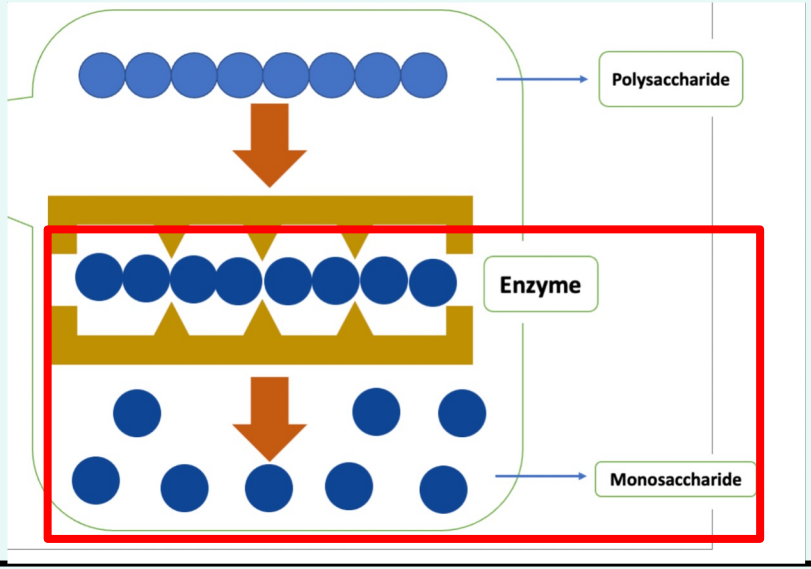


Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only



Classroom dialogue for recognising the function/ features of enzyme





Question:

e.g., Why would you arrange the circles inside they enzyme in this way?

How do you find out if dissaccharide or monosaccharides are the product in this digestion?

Personal insights and Reflection

- Drag Game design:
  - Scientific concept accuracy VS Level of complexity of symbols
  - Simple but scientifically accurate symbols

- Classroom dialogue:
  - Choices of Ss' works to fulfill lesson objectives
  - Scaffoldings

- Develop students' understanding in molecular view by visualising the molecular structure

- Elicit students' thinking effectively with oral and diagrammatic representation

Thanks!

Do you have any questions?

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