

MY TARGET GRADE IS \_\_\_\_\_

PART 5

ENZYMES AND  
DIGESTION

BIOLOGY 1

DIGESTION

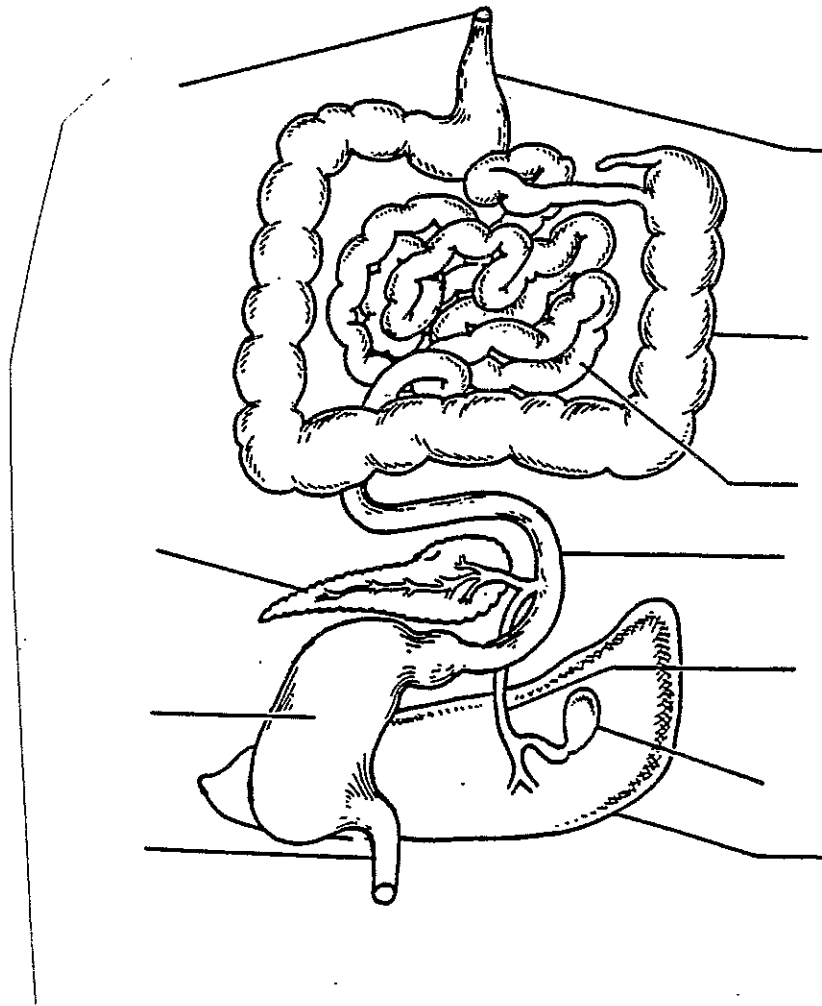
Fats, proteins and carbohydrates are LARGE, INSOLUBLE molecules.

They are BROKEN DOWN by physical and chemical means so that they can be ABSORBED into the bloodstream and used by the body.

Copy the flow chart.

Outline of the Alimentary Canal

Outline of Processes



Label fully the diagram below.

THE DIGESTIVE SYSTEM

USING 'LOCK AND KEY' HYPOTHESIS DIAGRAMS.  
COMPLETE WORKSHEETS 1 AND 2.

1. They are **PROTEIN** in nature.
2. They are **BIOLOGICAL CATALYSTS** - i.e. they speed up the rate of reaction.
3. They are **SUBSTRATE SPECIFIC** - i.e. they only work on one kind of substance.
4. They **WORK BEST** at **SPECIFIC pH** and **TEMPERATURES**. They are easily **DENATURED** by changes in pH and HIGH TEMPERATURES.

PROPERTIES OF ENZYMES

PROTEASES → breakdown PROTEINS → AMINO ACIDS

LIPASES → breakdown FATS → FATTY ACIDS AND GLYCEROL

CARBOHYDRASES (AMYLASES) → breakdown STARCH → GLUCOSE

Breakdown processes are catalyzed by ENZYMES.

PROTEIN	broken down into	AMINO ACIDS
FATS	broken down into	FATTY ACIDS AND GLYCEROL
CARBOHYDRATES	broken down into	GLUCOSE

## DIGESTION

### • DIGESTION IN THE MOUTH

- Food is chewed by the teeth and mixed with SALIVA. The tongue helps mix food and saliva.
- Saliva contains AMYLASE which begins starch digestion.
- Food is then swallowed and PERISTALSIS ensures that food moves constantly through the gut. Peristalsis consists of waves of muscular contractions. Circular muscles contract just behind where the food is and squeeze it forward.

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### • DIGESTION IN THE STOMACH

- The stomach physically churns and pounds the food.
- The cells lining the stomach produce ENZYMES and ACID, which mix with the food.
- ENZYMES - a PROTEASE enzyme begins protein digestion

ACID - disinfects food, dissolves small bones, AND PROVIDES

THE CORRECT pH FOR PROTEASE ENZYME TO WORK.

• Food leaves the stomach and enters the duodenum.

• Food is mixed with BILE and PANCREATIC JUICE.

• Bile is made in the LIVER and stored in the GALL BLADDER. It contains ALKALINE SALTS.

• NEUTRALIZES ACIDIC FOOD AND PROVIDES THE BEST pH FOR  
INTESTINAL ENZYMES.

• **EMULSIFIES FATS.** (Makes fat droplets smaller-increases surface area for enzymes to work).

• Pancreatic juice contains amylases, proteases and lipases which complete digestion.

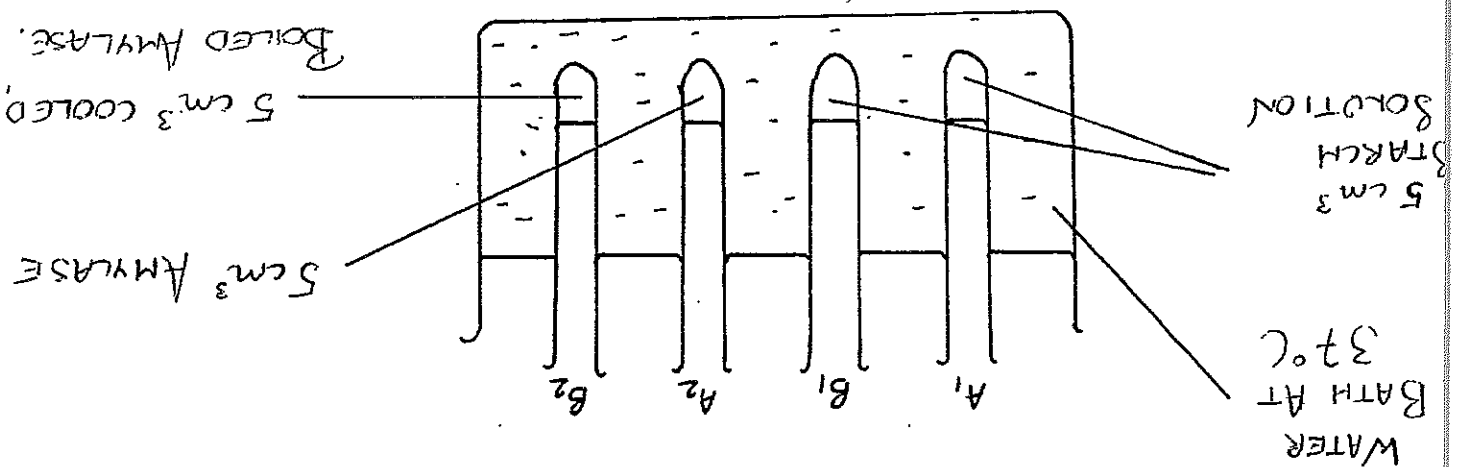
Place digestion flow chart here

# EXPERIMENT TO INVESTIGATE THE EFFECT OF SALIVARY AMYLASE

## ON STARCH

### METHOD

1. Set up apparatus as in diagram below.  
NB Make sure all test tubes are labelled correctly.



2. Leave for 5 minutes.

3. Add the contents of Tube A<sub>2</sub> to Tube A<sub>1</sub> and the contents of Tube B<sub>2</sub> to B<sub>1</sub>. Shake well and return to the water bath for 5 minutes.

4. Using a CLEAN pipette, remove THREE drops of solution from Tube A and place in a spotting tile. Repeat for Tube B. Add a drop of iodine to each.

5. Record whether starch is present or not.

6. Repeat this testing of solutions every 2 minutes for 10 minutes.

RESULTS

TUBE	1	2	3	4	5	6
A						
B						

CONCLUSIONS

**KEY** ✓ = starch present  
 X = starch absent

1. Explain what you think happened to the starch.

A \_\_\_\_\_

B \_\_\_\_\_

2. Describe how you could prove what happened to the starch in Tube A.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. Why were the test tubes kept at 37 C in Tube A and B?

\_\_\_\_\_

\_\_\_\_\_

4. What was the purpose of Tube B in the experiment?

\_\_\_\_\_

5. Give TWO ways in which the rate of this reaction could be increased.

\_\_\_\_\_



Place diag here

- Presence of **BLOOD** vessels in each villus.
- Lining epithelium is **MOIST** and **THIN**.
- Presence of **VILLI** which increase the surface area for absorption.
- **Very LONG**.

**HOW THE SMALL INTESTINE IS ADAPTED FOR ABSORPTION**

The small intestine consists of the duodenum and the ileum. Nearly all absorption takes place here.

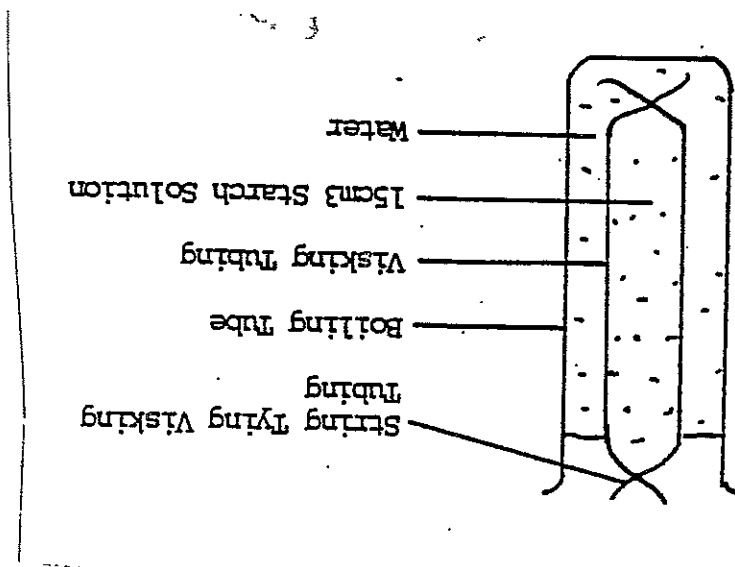
**ABSORPTION**

Any undigested food (roughage/fibre), bacteria and bile pass into the **COLON** or **LARGE INTESTINE**. **WATER** is reabsorbed and a solid material-**FACCES**-is stored in the **RECTUM** and removed from the **ANUS**.

THE MODEL GUT EXPERIMENT-ABSORPTION OF DIGESTED FOODS

METHOD

1. Set up apparatus as shown below. Leave for 5 minutes.



2. After this time take a sample of water from the boiling tube and test it for the presence of starch and glucose every 2 minutes for a maximum of 10 minutes.

1. Describe how you tested for the presence of starch and glucose.
2. Show clearly the results you obtained in each case.
3. Visking tubing is said to act as a selectively permeable membrane. What does this mean?
4. Which part of the human digestive system could be represented by the visking tubing?
5. Would starch contained in a piece of bread you have eaten be able to pass through the villi of the small intestine? Give reasons for your answer.
6. Would glucose be able to pass through the villi of the small intestine? Give reasons for your answer.
7. What group of nutrients does starch belong to?
8. What is the end-product of starch digestion?
9. What is the name of the process whereby particles move through the selectively permeable membrane?
10. What are some of the limitations of this gut model?

