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Multiple Choice Questions

- Decide which of the choices best completes the statement or answers the question.
 - Locate that question number on the separate answer sheet provided.
 - Use the procedure described by your teacher to answer each question. For example, “fill in the circle that corresponds to your choice” or “make an X over the letter corresponding to your choice.”
- The products of protein digestion that are absorbed by the villi in the small intestine are called
 - polypeptides.
 - nucleotides.
 - fatty acids.
 - amino acids.
 - Which row below has an organ incorrectly paired with its function?

Row	Organ	Function
a.	stomach	begins chemical digestion of protein
b.	mouth	begins chemical digestion of starch
c.	large intestine	production and storage of bile
d.	small intestine	absorption of nutrients

Use the following information to answer the next two questions.

Diarrhea

Diarrhea is a very common problem in childhood. Usually, it is mild and brief. Sometimes, it can be severe, especially in infants.

A child has diarrhea if there are more bowel movements than usual and if stools are less formed and more watery than usual. A child with diarrhea may also have fever, loss of appetite, nausea, vomiting, stomach pains, cramps, and blood and/or mucus in the bowel movement. Diarrhea can be dangerous if not treated properly because it drains water and salts from the child.

Many different germs cause diarrhea. Most commonly, it is caused by a virus (such as Rotavirus) and so cannot be cured with antibiotics. Occasionally bacteria cause diarrhea. Examples include *Campylobacter*, *Salmonella*, *Shigella*, and *Escherichia coli*. Some bacterial diarrhea can be treated with antibiotics but the child usually starts to get better before the bacteria are identified.

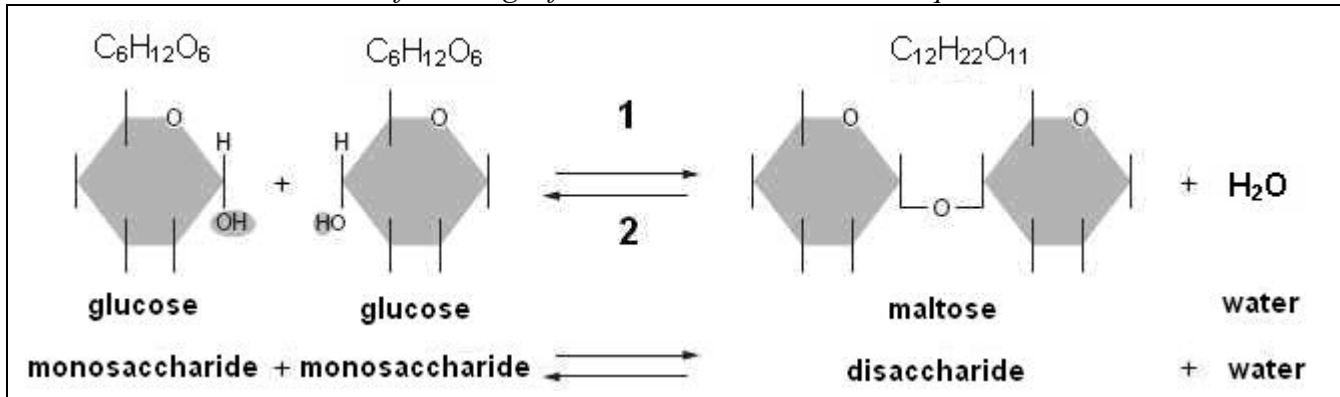
Source: <http://www.caringforkids.cps.ca/babies/Dehydration.htm>

- A person with diarrhea that is caused by a bacterial infection could die due to
 - starvation.
 - exhaustion.
 - dehydration.
 - peristaltic paralysis.

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4. The organ of the digestive tract most likely affected by a virus that causes diarrhea is the
- large intestine.
 - small intestine.
 - stomach.
 - esophagus.

Use the following information to answer the next question.



5. Which row correctly identifies the processes indicated by 1 and 2 above?

Row	Process 1	Process 2
a.	dehydration synthesis	dehydration reaction
b.	hydrolysis reaction	dehydration synthesis
c.	dehydration synthesis	hydrolysis reaction
d.	hydrolysis reaction	hydrolysis synthesis

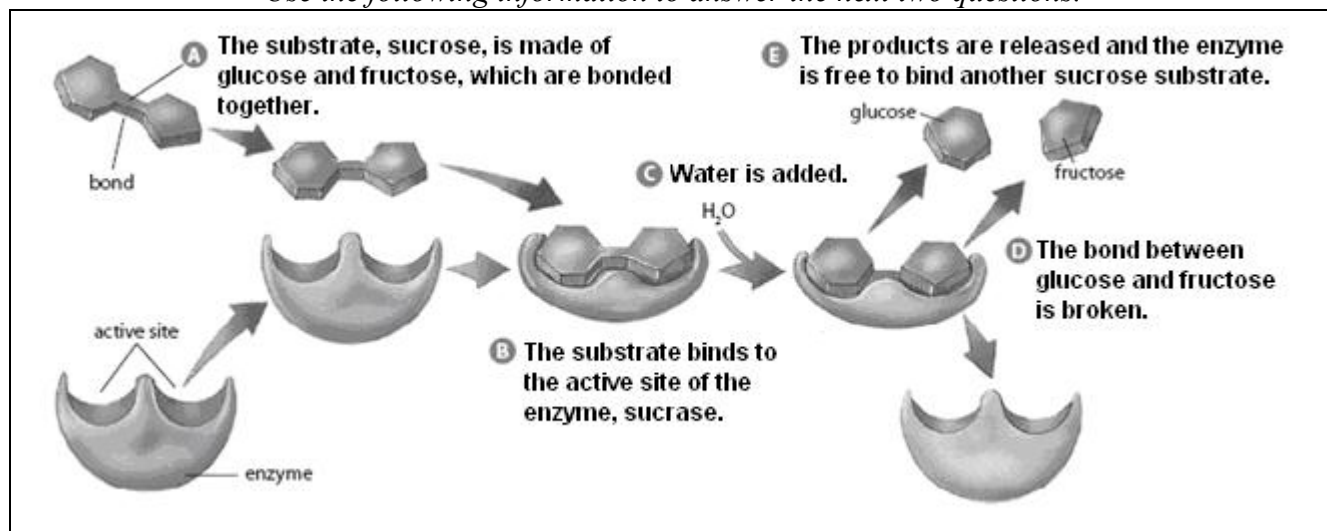
6. The hormone secretin plays an important role in regulating the pH in the digestive tract by stimulating the
- liver to produce digestive enzymes.
 - stomach to produce hydrochloric acid.
 - pancreas to release more bicarbonate ions.
 - small intestine to produce digestive enzymes.
7. The function of the mechanical digestion of food is to
- decrease peristaltic action.
 - expose more surface area for enzyme activity.
 - break down enzymes so that they are able to function.
 - break down food so that it can be absorbed immediately.

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Use the following information to answer the next two questions.



8. Which row below indicates the letter on this diagram where an inhibitor molecule would bind and describes the effect of an inhibitor molecule on an enzyme controlled reaction?

Row	Letter	Effect
a.	A	cause the enzyme to break down
b.	B	block the active site stopping the reaction
c.	C	prevent water from being added to the reaction
d.	D	preventing the breaking of the bond between glucose and fructose

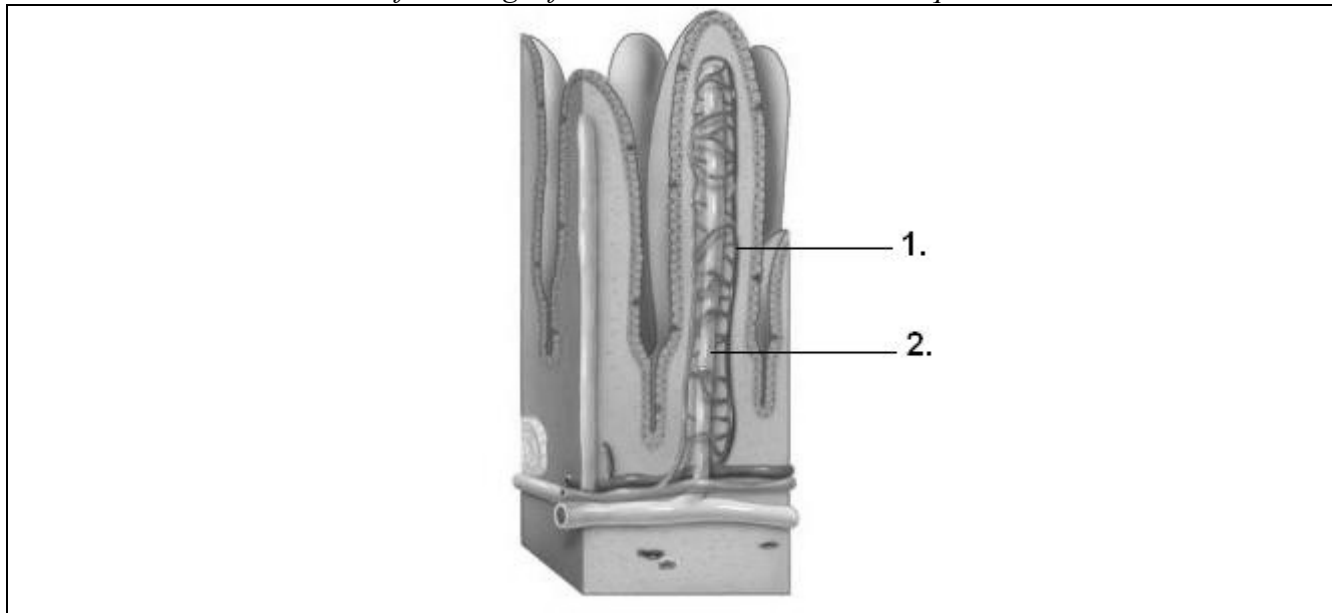
9. Which of the following statements is INCORRECT?
- An enzyme is a biological catalyst that speeds up a chemical reaction but is not used up in the reaction.
 - Each enzyme in the human body has a precise three-dimensional shape that is specific to the kind of reactant molecule with which it can combine.
 - When the substrate binds to the active site, its bonds become less stable and, thus, more likely to be altered and to form new bonds.
 - Enzyme reaction rates are not affected by temperature or pH.
10. At body temperature, which of these combinations is most likely to result in digestion of protein?
- protein, water, pepsin
 - protein, HCl, pepsin
 - protein, bile, pepsin
 - protein, sodium bicarbonate, pepsin

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11. Which of the following statements is true?

- Emulsification is a chemical process.
- Emulsification requires enzymes.
- Emulsification is a physical process.
- Emulsification results in the breakdown of lipids into glycerol and fatty acids.

Use the following information to answer the next question.



12. Which row identifies the nutrients absorbed by the structures labelled 1 and 2 respectively?

Row	1	2
a.	amino acids	fatty acids and glycerol
b.	fatty acids and glycerol	glucose
c.	amino acids	glucose
d.	glucose	amino acids

13. At body temperature, which of these combinations will result in the nutrients glycerol and fatty acids?

- fat, HCl, sucrase
- protein, bile, sodium bicarbonate, pepsin
- fat, bile, HCl, protease
- fat, bile, sodium bicarbonate, lipase

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Use the following information to answer the next question.

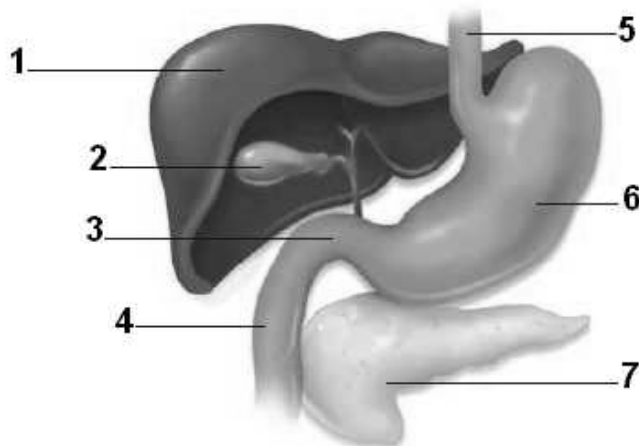
In an experiment, an unknown solution was tested for the presence of starch, protein, and glucose. The results are as follows:

Test Solution	Original Colour	Final Colour
Benedict's	light blue	yellow-green
Biuret	light blue	light blue
Iodine	yellow-orange	purple-black

14. The unknown solution contains

- glucose.
- protein and glucose.
- starch and glucose.
- starch, glucose, and protein.

Use the following information to answer the next question.



Accessory Organs of Digestion

15. Which row below correctly identifies the organ that produces enzymes that chemically digest proteins, starch, and fats?

Row	Organ Number	Organ Name
a.	1	liver
b.	6	stomach
c.	2	gall bladder
d.	7	pancreas

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Use the following information to answer the next question.

Regulation of Processes in the Small Intestine

The activities of the digestive tract are coordinated by the nervous system and the endocrine system. The nervous system, for example, stimulates salivary and gastric secretions in response to the sight, smell, and consumption of food.

16. When food arrives in the stomach, proteins in the food stimulate the secretion of the **i** called gastrin. Gastrin then stimulates the secretion of **ii** and the inactive precursor to molecule of **iii** from glands in the stomach.

The row that completes the statement above is:

Row	i	ii	iii
a.	hormone	hydrochloric acid	pepsin
b.	enzyme	substrate	glucose
c.	protein	sodium bicarbonate	amylase
d.	fat	fatty acids	glycerol

Numerical Response Questions

- Record your answer on the answer sheet provided.
- If an answer is a value between 0 and 1 (e.g., 0.25), then be sure to record the 0 before the decimal place.

Use the following information to answer the next question.

Enzymes of the digestive system

- amylase
- carbohydrases
- peptidases
- lipase

1. Match the enzyme, as numbered above, to the substrate digested given below. Record your **four-digit answer** in the numerical-response section on the answer page.

Enzyme: _____
 Substrate sucrose lipids proteins starch

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Use the following information to answer the next question.

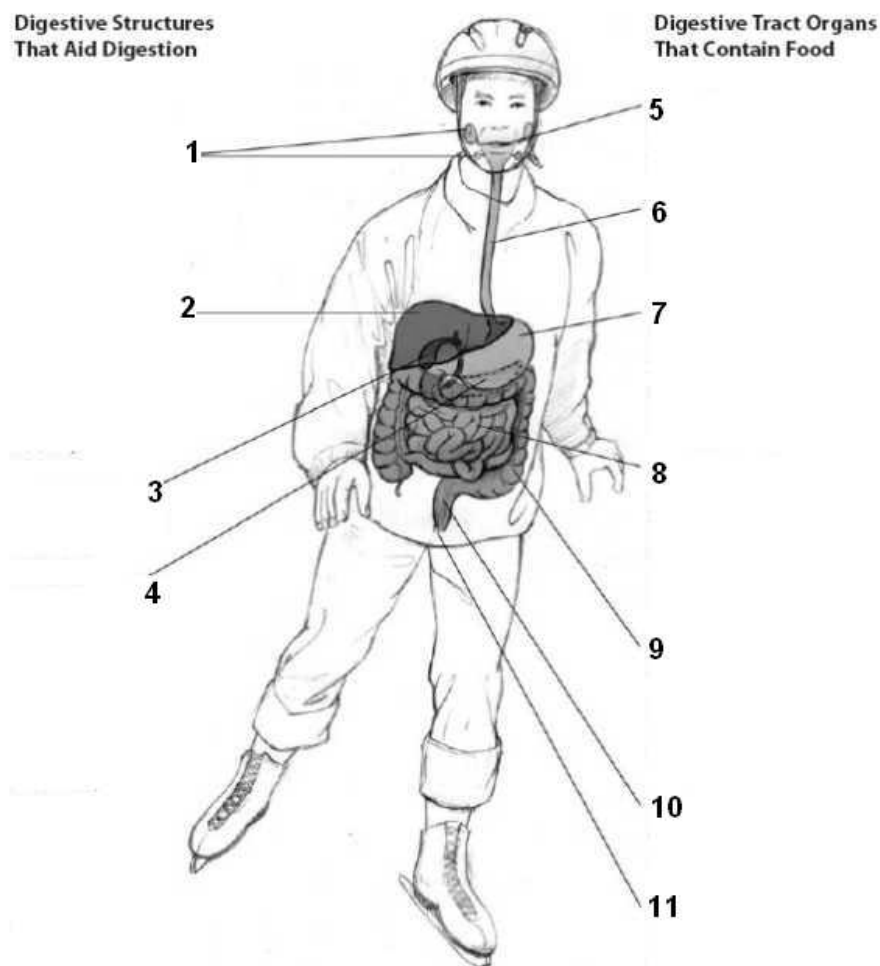
The following structures are part of the digestive tract.

1. large intestine
2. stomach
3. liver
4. small intestine
5. rectum

2. The correct order of structures through which the food passes is ____, ____, ____, and _____. Record your **four-digit answer** in the numerical response section on the answer sheet.

Multiple Choice Questions

Use the following diagram to answer the next four questions.



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17. Which row below correctly identifies the approximate pH of mouth, the stomach, and the small intestine?

Row	Mouth	Stomach	Small Intestine
a.	2	2	2
b.	8	8	8
c.	2	8	2
d.	8	2	8

18. Which of the following identifies the organ or organs where starch digestion takes place?

- a. 7
- b. 2 and 3
- c. 5 and 8
- d. 4, 5, and 9

19. Which row correctly identifies the number and the name of the organ that produces enzymes for digesting disaccharides, peptides, and nucleotides?

Row	Number	Organ
a.	1	salivary glands
b.	8	small intestine
c.	4	pancreas
d.	9	large intestine

20. Bacteria such as *E. coli*, which can cause fecal contamination of drinking water supplies, live in the structure labelled

- a. 8
- b. 4
- c. 9
- d. 1

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Numerical-Response Question

Use the following information to answer the next question.

The following are four events that occur during lipid digestion.

1. absorption of glycerol and fatty acids into the lymph vessels
2. hydrolysis by lipase
3. emulsification by bile
4. physical digestion through chewing

3. The correct order of events is _____, _____, _____, and _____. Record your **four-digit answer** in the numerical response section on the answer sheet.

Multiple Choice Questions

21. Which of the following nutrients are absorbed by the cells of the small intestine by the process of diffusion?
- a. glycerol and fatty acids
 - b. amino acids
 - c. glucose
 - d. monosaccharides

Use the following information to answer the next question.

Glycemic Index

A new system for classifying carbohydrates calls into question many of the old assumptions about how carbohydrates affect health. This new system, known as the glycemic index, measures how quickly and how much blood sugar rises after you eat a food that contains carbohydrates.

White bread, for example, is converted almost immediately to blood sugar, causing blood sugar levels to spike rapidly. It's classified as "high glycemic" in reference to its rating on the index. Brown rice, in contrast, is digested more slowly, causing a lower and more gentle rise in blood sugar. It is considered to be low glycemic.

Source: <http://www.hsph.harvard.edu/nutritionsource/carbohydrates.html>

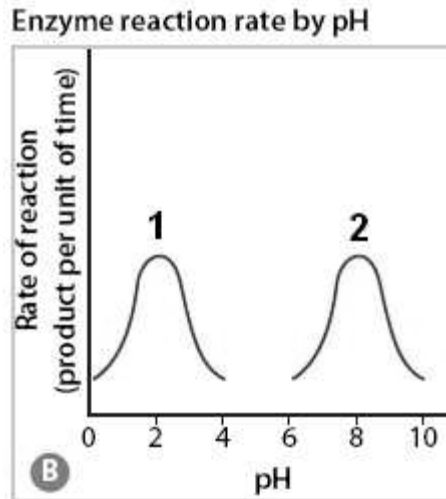
22. Which of the following statements provides the most likely explanation for the rapid spike in blood sugar levels after you eat a piece of white bread?
- a. Most of the starch in white bread is digested in the stomach, and the resulting monosaccharides are absorbed directly into the bloodstream through special cells in the stomach.
 - b. Some of the starch in white bread is digested by enzymes in saliva, and the resulting monosaccharides are absorbed by active transport into the cells of the intestinal wall.
 - c. Some of the starch in white bread is emulsified by bile released into the small intestine, and the resulting disaccharides are absorbed by diffusion into the cells of the intestinal wall.
 - d. Most of the starch is chemically digested in the large intestine, and the resulting disaccharides are absorbed by osmosis into the cells of the intestinal wall.

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Use the following information to answer the next question.

Optimum pH for Two Protease Enzymes

Two protease enzymes are secreted at different stages and at different sites during digestion. Each protease works best at an optimum pH. The graph below shows the relative rate of reaction for each enzyme.



23. The enzymes labelled 1 and 2 on the graph above are
- pancreatic amylase and lipase, respectively.
 - sucrase and maltase, respectively.
 - nuclease and peptidase, respectively.
 - pepsin and trypsin, respectively.

Numerical Response Questions

Use the following information to answer the next question.

The following diseases or conditions affect different parts of the digestive tract or are eating disorders in which people starve themselves.

- Crohn's disease and colitis
- hepatitis and cirrhosis
- heart burn and ulcers
- anorexia nervosa and bulimia

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4. Match the diseases or conditions, as numbered in the box on the previous page, to the organ(s) affected or the classification of the disease/disorder. Record your **four-digit answer** in the numerical-response section on the answer sheet.

Disease/Disorder number:

Organ/disorder:

stomach

liver

inflammatory
bowel disease

eating
disorder

Use the following information to answer the next question.

Testing for Macromolecules

The following solutions or supplies can be used to test for the presence of different types of macromolecules.

1. Benedict's solution
2. Biuret solution
3. iodine
4. unglazed brown paper

5. A student wants to test for the presence of proteins, sugars, starch, and lipids in an unknown solution. To test for protein she would use number ____; for sugars, ____; for starch, ____; and for lipids, _____. Record your **four-digit answer** in the numerical-response section on the answer sheet.

Multiple Choice Questions

24. Which of the following is NOT a function of the large intestine?
- a. To concentrate and eliminate waste materials.
 - b. To absorb water and salts.
 - c. To chemically digest macromolecules.
 - d. To produce and absorb vitamins B-12 and K.

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Use the following information to answer the next question.

Pancreatic Cancer

Pancreatic cancer starts in the cells lining the ducts of the pancreas. It does not have many warning signs in the early stages of the disease. Symptoms usually develop as the cancer advances. Some of the signs and symptoms, which may not necessarily mean cancer, are:

1. pain in the upper abdomen or upper back.
2. weight loss.
3. fatty stools (steatorrhea).
4. cuts and bruises that are slow to heal.

25. The production of fatty stools (bowel movements) in a person with pancreatic cancer is most likely the result of
- a. less lipase being released into the small intestine.
 - b. less pancreatic amylase being released into the small intestine.
 - c. less bile being released into the small intestine.
 - d. less protease enzymes being released into the small intestine.

Written Response Questions

Use the following information to answer the next question.

Investigating Digestive Enzymes

A student performed an activity to show that lipase, an enzyme produced in the pancreas, does in fact hydrolyze fats into glycerol and fatty acids. The student was provided with the following materials:

Materials

- whole milk (cereal cream)
- lipase solution
- 3 - 25 mL test tubes
- phenolphthalein (phenolphthalein is a pH indicator that is pink in a base and colourless in an acid)
- dish soap
- 10% sodium bicarbonate solution (NaHCO_3)
- 3 rubber stoppers
- medicine droppers
- test tube holder
- wax pencil
- 37 °C hot water bath

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1. **Design** an experiment demonstrating that lipase digests milk to produce an acid **and** that emulsification is important in the digestion of lipids. Write the steps of a procedure in the space below. Be sure to include a control test in the procedure. (10 marks)

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

2. **Explain** the purpose of the milk, the soap, the sodium bicarbonate, and the water bath in this investigation. (4 marks)

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3. Use a data chart to **predict** what the student observed in each test tube during the investigation and **interpret** the results in each test tube. (6 marks)

4. **Identify** the test tube that would show the fastest reaction, and **explain** why. (2 marks)
