

# Home Learning Tasks



Your home learning tasks have been split into four main sections. It is entirely up to you in which order you complete these. They are designed to revisit some of the key Scientific skills you have used in your lessons this year. This means that some of the experiments you are asked to work on may be unfamiliar – Please don't be put off by this as we are looking for the skills.

If you can, we would like you to send any completed work to us through Show My Homework. Please don't worry if you can't; keep hold of it until we return to school.

Science in Action	Application of Science	Recall of knowledge: Choose 1	Widening Your Scientific Mind
<p>We want you to get creative for this section! We will provide you with a method for an experiment you can complete at home. Use the planning sheets to record what you did and what you found out.</p> <p>If you want a real challenge, you could design your own investigation altogether! Use the blank planning sheet to help you structure your ideas.</p>	<p>For this task, you will have to read information around a key area of Science. This is where we are looking for you to develop your Scientific skills and will be given a list of criteria for the work that you produce.</p>	<p><b>Option One:</b> An Educake quiz will be set over the 3 weeks for you to complete. Decide how many you think you need to get right – 50%? 75%? 100%?</p> <p><b>Or</b></p> <p><b>Option Two:</b> How much can you remember on digestion – answering some practice questions.</p>	<p>These tasks will help to understand the Science in the real world. We would like you to watch, read or discover some new Science and will provide you with some stimulus material to look at.</p> <p>You will be given <b>two</b> options and you we'd like you to complete at least <b>one</b>.</p>

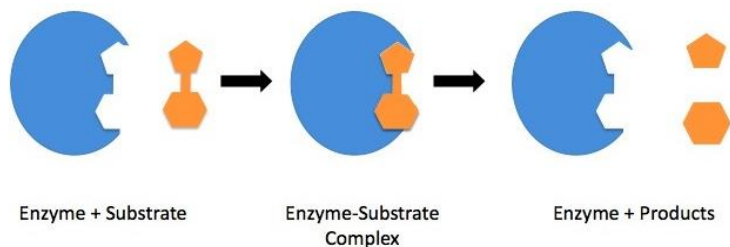
**For Year 9 - Wb 1<sup>st</sup>, 8<sup>th</sup> and 15<sup>th</sup> June**

# Biology Home Learning Project 1 – Food and Digestion

## Section One – Science in Action

Enzymes are proteins that are biological catalysts that speed up chemical reactions (breaking down

larger molecules into smaller ones), but they remain chemically unchanged.



You are investigating how the surface area to volume ratio effects how fast the enzyme amylase breaks down bread.

Fill in the boxes:

### **Independent variable**

I will change: \_\_\_\_\_

### **Dependent variable (what the results depend on)**

I will measure: \_\_\_\_\_

Using a \_\_\_\_\_

### **Control variable**

I will keep these the same:

\_\_\_\_\_  
\_\_\_\_\_

This is because \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

### **Write a step by step method describing how you would do the investigation.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

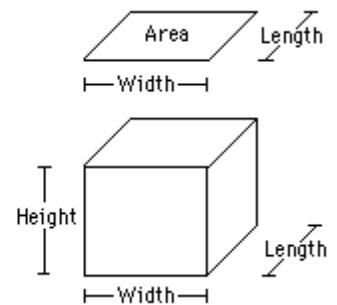
Carry out the practical:

- **Measure out 5 different sizes of bread (length, width and depth)**
- **Calculate the surface area to volume ratio.**

$$\text{Area of side} = \text{Length} \times \text{Width}$$

$$\text{Area of Cube} = \text{Length} \times \text{Width} \times 6$$

$$\text{Volume of Cube} = \text{Length} \times \text{Width} \times \text{Height}$$



**(Recap of how to do this:**

<https://www.youtube.com/watch?v=DHGWH3NdAjc> **1:09 – 2.35)**

- **Time how long it takes for the bread to disintegrate (break up) in your mouth.**

**Basic - Run the investigation 3 times and calculate the average**

**Intermediate: Are there any anomalies? If so how can you tell?**

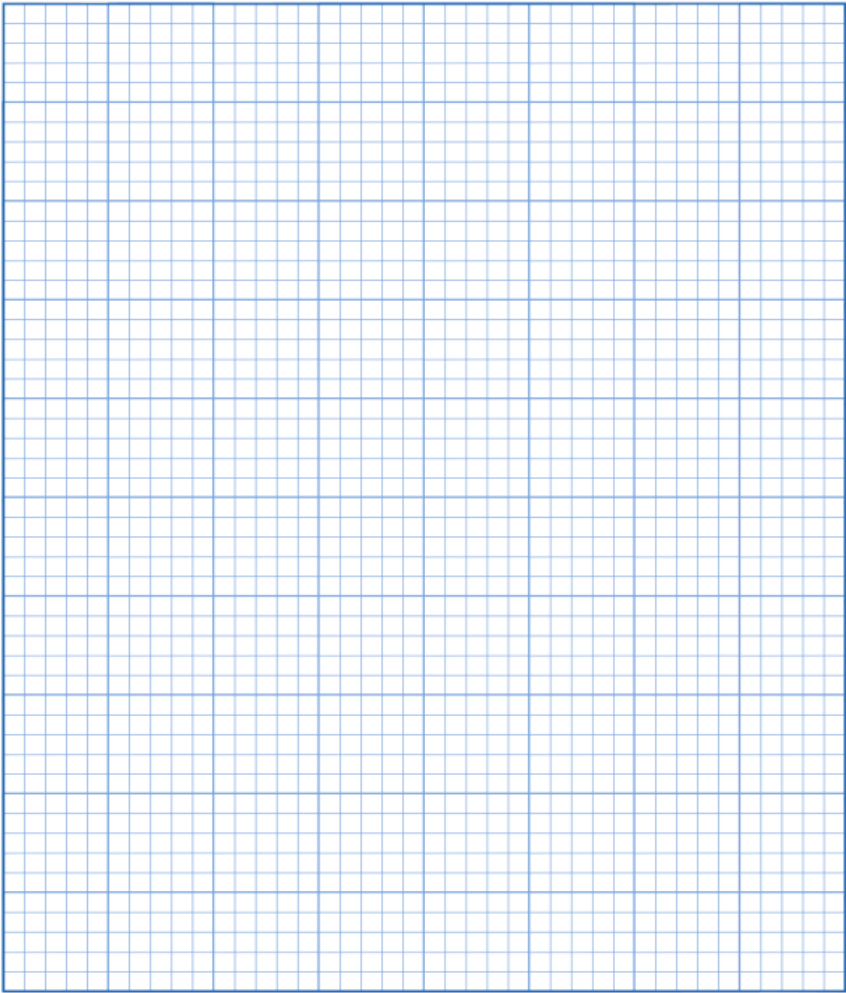
Surface area to volume ratio	Time taken for the bread to disintegrate (seconds)			
	Trial 1	Trial 2	Trial 3	Average

**Suggest 3 ways that you could improve the investigation.**

I could improve the investigation by ...

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Challenge:** Plot your results on the graph paper and draw a line of best fit.



Conclusion:

What did you find? Use your graph to give extra detail.

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Explain why you observed this pattern.

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Any observations, did you taste a difference in the bread?

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# The journey of a cheese sandwich

## Task:

You must explain the journey of a cheese sandwich through your digestive system.

You can choose to explain your ideas through either:

- writing a story;
- drawing a cartoon.



## Top tips:

- Describe what happens in each organ of the digestive system.
- Consider which food groups are in a cheese sandwich.
- Use scientific ideas about enzymes if you can.

**Key words:** carbohydrate, protease, lipid, peristalsis, bile, enzyme substrate complex, salivary gland, emulsion amino acids, glucose, active transport, soluble/insoluble, fatty acid, amylase, hydrochloric acid, lipase, glycerol, optimum, protein, villi, diffusion, microvilli, neutralise,

## Choose one level to focus on, try to challenge yourself ...



- Named the organs in the digestive system (including the glands).
- Described what happens to the food in each organ.
- Named the food groups in the cheese sandwich.
- Explained why the body needs food groups.



- Named all of the organs of the digestive system in order.
- Explained what happens to the food in each organ.
- Described why the body needs each of the food groups.
- Described the role of each enzyme in digestion.
- Explained adaptations of the small intestines for absorption, link in the importance of solubility.



- Described in detail all of the organs of the digestive system.
- Explained in detail what happens to the food in each organ, naming specific enzymes and products.
- Explained why the body needs each of the food groups.
- Explained how food is digested, absorbed and transported to the cells.
- Discussed some of the adaptations of the small intestines for food absorption.
- Explained the importance of bile in the digestion of lipids.

## Section Three – Application of Science

### Either

Go to [www.educake.co.uk](http://www.educake.co.uk) and enter the username and password you were given. If it doesn't work and you are unable to reset it yourself, email [pschuller@stocksbridgehigh.co.uk](mailto:pschuller@stocksbridgehigh.co.uk) and you will be given instructions on what to do next.



1. Decide how many you think you need to get right before you start. Are you aiming for 50%, 75% or even 100%? If you don't reach your target first time, that's okay as you can retake the quiz as many times as you like.
2. If you don't agree with the way that Educake has marked your answer, you can disagree with the mark. Pressing this will ask your teacher to check and decide whether your answer is indeed correct or whether it still needs a little bit of work. Make sure you check back regularly to see whether you have received some feedback
3. If you want to set yourself a real challenge; you can set yourself your own quiz to complete. Try setting yourself 10 random questions from a topic you have covered this year. If you are unsure, email your Science teacher with your name and class and they will be able to help you out.

### Or

**Choose one of the exam questions to answer. There are 3 different levels of difficulty, indicated by the stars.**

**Q1.** Catalase is an enzyme.

Catalase controls the following reaction:



A student did an investigation on catalase activity.

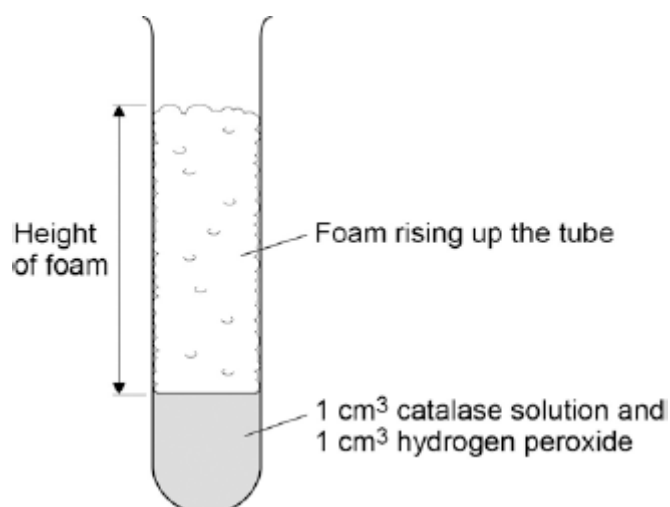
This is the method used.

1. Put 1 cm<sup>3</sup> hydrogen peroxide solution in a test tube.
2. Add 1 cm<sup>3</sup> of catalase solution.
  - Bubbles of oxygen are produced.

- Bubbles cause foam to rise up the tube.

3. Measure the maximum height of the foam.

The diagram below shows the experiment.



The experiment is carried out at 20 °C.

The table below shows some results from the investigation.

Temperature in °C	Maximum height of foam in cm			
	Test 1	Test 2	Test 3	Mean
10	1.3	1.1	0.9	1.1
20	0.0	3.3	3.1	3.2
30	5.2	5.0	5.3	5.2
40	4.2	3.5	4.4	4.0
50	2.1	1.9	2.3	2.1
60	0.0	0.0	0.0	0.0

(a) Why did the student carry out the experiment three times at each temperature?

Tick **one** box.

To make the experiment more accurate

☐

To prove the experiment was correct

☐

To show the experiment was more repeatable

☐

(1)

- (b) The student thought one result was an anomaly.

Circle the anomaly in the table above.

(1)

- (c) What did the student do with the anomalous result?

\_\_\_\_\_

(1)

- (d) Look at the table above.

What conclusion can be made as the temperature increases?

Tick **one** box.

Decreases the rate of reaction up to 30 °C

☐

Decreases the rate of reaction up to 40 °C

☐

Increases the rate of reaction up to 30 °C

☐

Increases the rate of reaction up to 40 °C

☐

(1)

- (e) At which temperature was catalase denatured?

Tick **one** box.

10 °C

☐

30 °C

☐

40 °C

☐

60 °C

☐

(1)

- (f) The student thought the optimum temperature for catalase activity was



between 30 °C and 40 °C.

How could the investigation be improved to find a more precise value for the optimum temperature?

Tick **one** box.

Do the experiment at 70 °C and 80 °C

☐

Do the experiment at 30 °C, 35 °C and 40 °C

☐

Use less hydrogen peroxide solution

☐

Use more catalase solution

☐

(1)

(g) Amylase is the enzyme that controls the breakdown of starch to glucose.

Describe how the student could investigate the effect of **pH** on the breakdown of starch by amylase.



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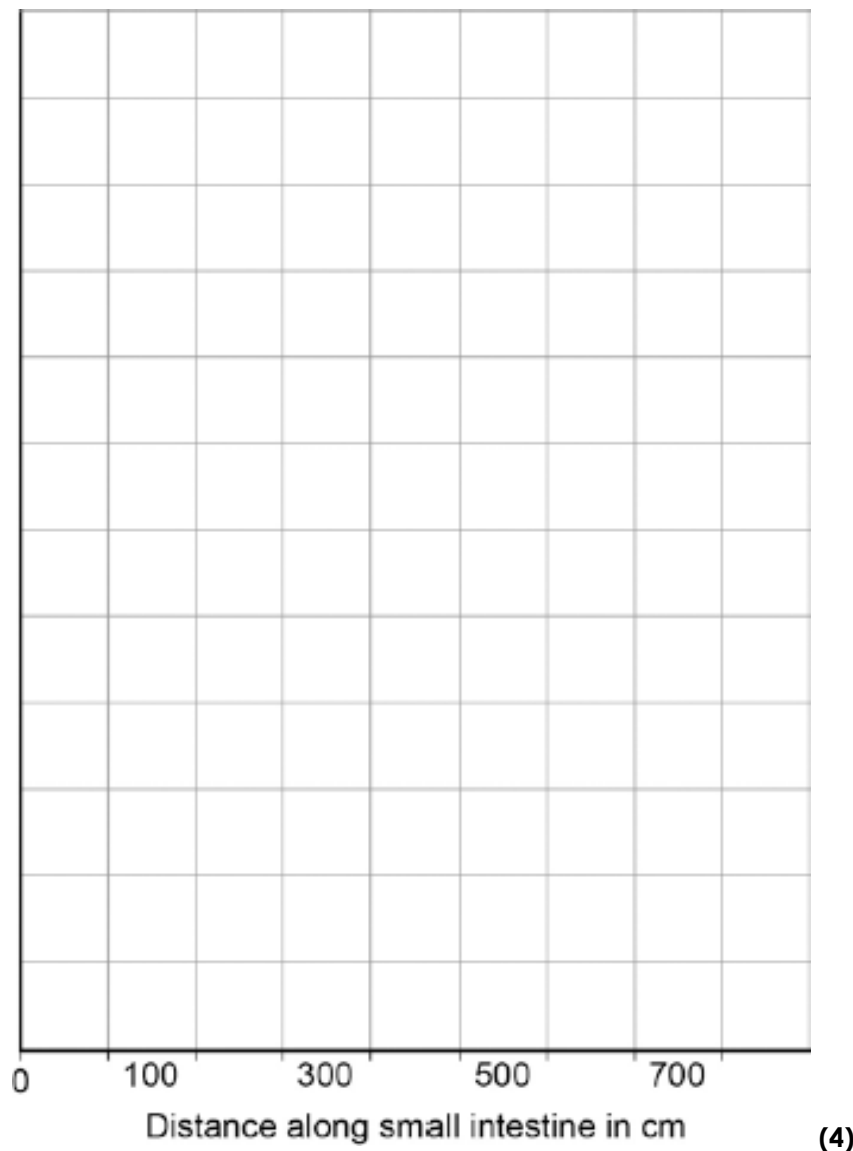
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**Q2.** After a meal rich in carbohydrates, the concentration of glucose in the small intestine changes.

 The table below shows the concentration of glucose at different distances along the small intestine.

Distance along the small intestine in cm	Concentration of glucose in mol dm <sup>-3</sup>
100	50
300	500
500	250
700	0

- (a) At what distance along the small intestine is the glucose concentration highest?  
\_\_\_\_\_ cm **(1)**
- (b) Use the data in the table to plot a bar chart on the graph below.
- Label the y-axis.
  - Choose a suitable scale.



(c) Look at the graph above.

Describe **how** the concentration of glucose changes as distance increases along the small intestine.

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(2)

(d) Explain **why** the concentration of glucose in the small intestine changes between 100 cm and 300 cm.

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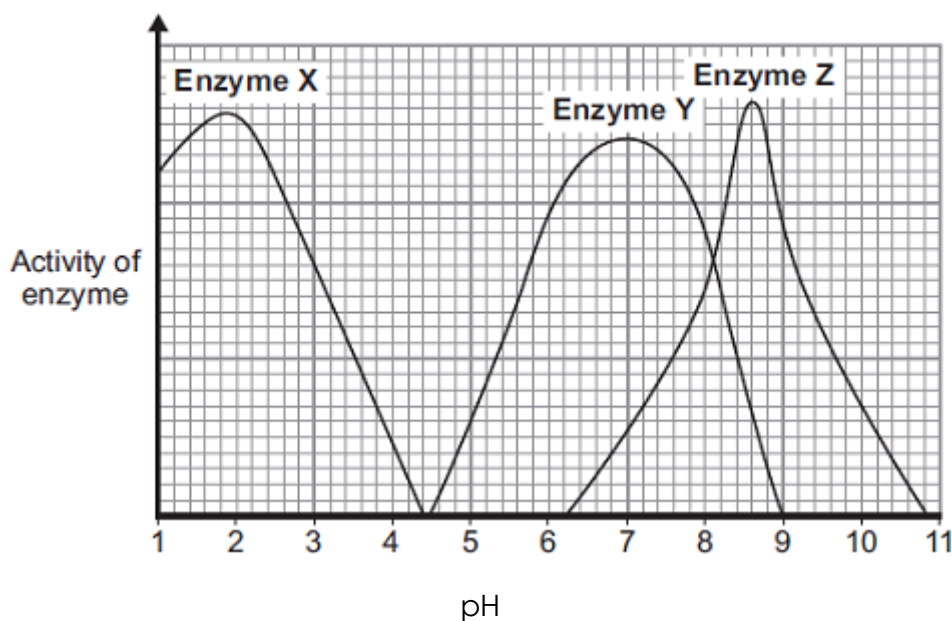
(2)

- (e) Explain **why** the concentration of glucose in the small intestine changes between 300 cm and 700 cm.

(3)

(Total 12 marks)

**Q3.** (a) The graph shows the effect of pH on the activities of three enzymes, **X**, **Y** and **Z**. These enzymes help to digest food in the human digestive system. Each enzyme is produced by a different part of the digestive system.



(i) What is the optimum (best) pH for the action of enzyme **Z**?

\_\_\_\_\_

(1)

(ii) The stomach makes a substance that gives the correct pH for enzyme action in the human stomach.

Name this substance. \_\_\_\_\_

(1)

(iii) Which enzyme, **X**, **Y** or **Z**, will work best in the human stomach?

\_\_\_\_\_

(1)

(b) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Different parts of the human digestive system help to break down molecules of fat so that they can be absorbed into the body.

Describe how.

To gain full marks you should refer to:

- the enzyme and where the enzyme is produced
- the products of digestion
- any other chemicals involved.

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(6)  
(Total 9 marks)

## **Section Four – Widening your Scientific mind**

### **Either**

**Watch The Secret of Your Food: We are what we eat**

<https://www.youtube.com/watch?v=23EMDlvtnEE>

Create a poster, presentation or a leaflet to summarise the key nutrients that we need to live healthily.

You may want to include:

- Information on the source of key nutrients, uses in the body and what they are made up of.
- Yeast is a single celled organism, when it respire, what does it produce?

- How many essential amino acids are there?
- What do we mean by lactose intolerance, why is it a problem for our health – how is this overcome? What role do enzymes play in this?
- What are the key vitamins and their uses?

Or

**Alternatively, if you are interested, watch the documentary on blood:**  
<https://vimeo.com/124030235>. This will add to and consolidate what we've covered in class.

What are the findings from the trials, anything that surprised you/something you didn't know before. Present these to your family or share your findings with friends.

