

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Teacher's Use	
	Mark
Stage 1 Skills	
Stage 2 Skills	
Section A	
Section B	
TOTAL ISA Mark	



General Certificate of Education  
Advanced Subsidiary Examination  
June 2010

# Biology

# BIO3T/P10/test

## Unit 3T AS Investigative Skills Assignment

### Written Test

**For submission by 15 May 2010**

**For this paper you must have:**

- the task sheet, your results and your graph
- a ruler with millimetre measurement
- a calculator.

**Time allowed**

- 1 hour 15 minutes

**Instructions**

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 35.
- You will be marked on your ability to
  - use good English
  - organise information clearly
  - use accurate scientific terminology.

Signature of Teacher marking the ISA ..... Date .....

**Section A**

These questions relate to your investigation into the effect of bile salts and lipase on the digestion of triglycerides in milk.

Use your Task Sheet and your results table and graph to answer them.

Answer **all** questions in the spaces provided.

**1** What temperature did you choose for the water bath? Give a reason for choosing this temperature.

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(1 mark)

**2 (a)** You left tube **1** in the water bath for 5 minutes before adding the water and lipase solution. Explain why you left the tube for 5 minutes.

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(1 mark)

**2 (b)** You were **not** told to incubate the water and the lipase solution in the water bath before adding them to tube **1**.  
Would it have made any difference to your result if you had incubated them?  
Explain your answer.

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(1 mark)

**3** Sodium carbonate solution is alkaline. Explain why you added sodium carbonate solution to each tube at the start of the investigation.

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(1 mark)

**4** You investigated the effect of bile salts and lipase on the digestion of triglycerides. In tube **1** you added lipase and water to the milk. Explain why you were told to set up tube **1** like this.

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(1 mark)

**5** Digestion of triglycerides in milk caused phenolphthalein indicator to change colour. Explain how.

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(3 marks)

*Extra space* .....

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**6** In investigations involving enzymes, buffers are often used. Why is it **not** appropriate to use a buffer in this investigation?

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(2 marks)

7 A student carried out the same investigation as you did. He recorded the following results.

Tube number	Solutions added to tubes (in addition to phenolphthalein, sodium carbonate and milk)	Time taken for phenolphthalein to go colourless/minutes
1	Lipase and water	7
2	Bile salts and water	More than 15
3	Lipase and bile salts	5
4	Boiled lipase and bile salts	More than 15
5	Lipase and boiled bile salts	5

7 (a) The student's result for tube 4 was different from his result for tube 3. Use your knowledge of enzymes to explain why.

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(3 marks)

Extra space .....

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**7 (b)** Describe what the table shows about the effect of bile salts on the digestion of triglycerides. Give the evidence from the table that supports your answer.

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(2 marks)

15

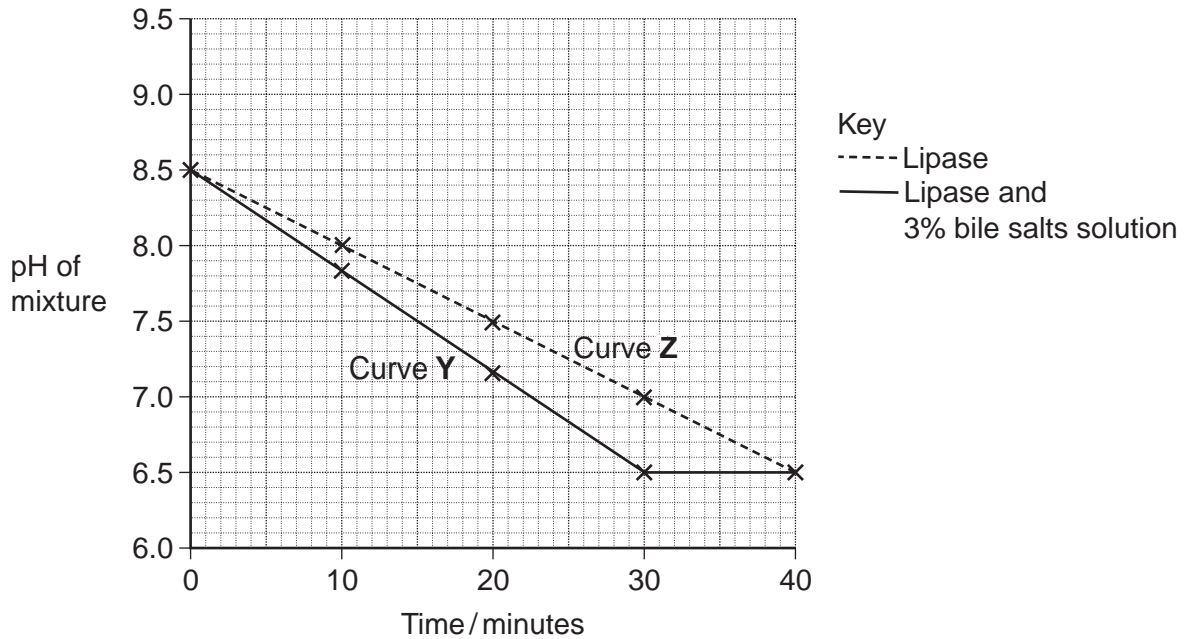
**Turn over for the next question**

## RESOURCE SHEET

### Resource A

Scientists investigated the effect of lipase and a 3% bile salts solution on the digestion of triglycerides. **Figure 1** shows their results.

**Figure 1**



### Resource B

The scientists also incubated triglycerides with different concentrations of bile salts. After 30 minutes they measured the diameter of the triglyceride droplets. They used the results to calculate the mean radius of the droplets at each concentration. **Figure 2** shows their results.

**Figure 2**

Concentration of bile salts /%	0	1	2	3	4	5
Mean radius of triglyceride droplet / $\mu\text{m}$	6	5	4	3	2	1

**Resource C**

Scientists fed different diets to three groups of monkeys of different ages. They fed half the monkeys in each age group a diet in which all the triglycerides were saturated and half on a diet in which all the triglycerides were unsaturated. All other aspects of the diets and living conditions were kept as similar as possible. The scientists measured the plasma cholesterol concentration of the monkeys. **Figure 3** shows their results.

**Figure 3**

<b>Age group / months</b>	<b>Type of triglyceride in diet</b>	<b>Number of monkeys in group</b>	<b>Mean plasma cholesterol concentration / mmol dm<sup>-3</sup> ( ± standard deviation)</b>
16	Saturated	10	8.45 ( ± 1.96)
32	Saturated	8	9.75 ( ± 2.60)
60	Saturated	12	10.42 ( ± 4.12)
16	Unsaturated	9	6.59 ( ± 1.56)
32	Unsaturated	8	7.24 ( ± 2.60)
60	Unsaturated	11	8.84 ( ± 2.32)

**Section B**

Use the information in the **Resource Sheet** to answer the questions.

Answer **all** questions in the spaces provided.

Use **Resources A** and **B** to answer Questions **8** to **12**.

**8** Describe what curve **Y** shows about the effect of lipase and bile salts on the pH of the mixture.

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*(2 marks)*

**9** The concentration of lipase did not change during the course of the investigation. Explain why.

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*(1 mark)*

**10** One of the scientists decided to repeat the investigation described in **Resource A** at a temperature 10 °C below the original temperature. Describe how you would expect his plotted curve to be different from curve **Z**.

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*(1 mark)*



11

Describe how you would use a microscope to find the mean diameter of triglyceride droplets on a slide.

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(3 marks)

*Extra space* .....

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**Turn over for the next question**

**Turn over ►**

**12 (a)** The ratio of mean radius of triglyceride droplets in bile salts at a concentration of 0% to the mean radius in bile salts at a concentration of 3% is 2:1.

What is the ratio of their surface areas? Show your working.

You can calculate the surface area of a droplet from the formula

$$A = 4\pi r^2$$

Where A = surface area  
r = radius  
 $\pi = 3.14$

(2 marks)

**12 (b)** Use the data in **Figure 2** to explain the difference between curves **Y** and **Z** in **Figure 1**.

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(3 marks)

*Extra space* .....

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Use **Resource C** to answer Questions **13** to **15**.

**13** The scientists concluded that a diet high in saturated triglyceride raises the concentration of blood plasma cholesterol. Evaluate their conclusion.

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(3 marks)

*Extra space* .....

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**14** The monkeys in this investigation were all of the same sex. Explain how selecting monkeys of the same sex would help the scientists to draw reliable conclusions.

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(2 marks)

**Turn over for the next question**

**Turn over ►**

15

Is the research described in **Resource C** relevant to human health? Explain your answer.

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(3 marks)

(Extra space) .....

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**END OF QUESTIONS**