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Section	Mark
Task 1	
Task 2	
Section A	
Section B	
TOTAL EMPA MARK	



General Certificate of Education
Advanced Level Examination
June 2011

Human Biology

HBI6X

Unit 6X A2 Externally Marked Practical Assignment

For submission by 15 May 2011

For this paper you must have: • your Task Sheet 2, your results and your calculations • a ruler with millimetre measurements • 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 30. • You will be marked on your ability to: – use good English – organise information clearly – use scientific terminology accurately.
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Practical Skills Verification	Yes ☐
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Section A

These questions relate to your investigation into the relationship between energy content and mass of a food substance.

Use your Task Sheet 2, your results and your statistical calculation to answer them.

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

- 9** Using a graduated pipette instead of a measuring cylinder would improve the method. Explain why.

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(1 mark)

- 10** You were told to have the boiling tube facing away from you and have the tube at an angle of about 45°.

- 10 (a)** Why were you told to have the tube facing away from you?

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(1 mark)

- 10 (b)** What was the advantage of having the tube at an angle of about 45°?

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(1 mark)

11 When the seed was burning, only some of the heat released was transferred into the water.

11 (a) Give **two** reasons why only some of the heat was transferred into the water.

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(2 marks)

11 (b) Does the efficiency of the transfer of heat to water affect the accuracy **or** the reliability of your results? Explain your answer.

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(1 mark)

12 A student carried out a similar investigation to yours with runner bean seeds and with pea seeds. She measured the mass of each seed and calculated the energy transferred from the burning seed into water. Her results are shown in the table.

Runner bean seed		Pea seed	
Mass of seed / g	Energy transferred / J	Mass of seed / g	Energy transferred / J
1.24	4.3	0.28	1.2
1.37	5.0	0.19	1.0
0.98	3.9	0.31	1.8
1.53	5.8	0.22	1.1
1.06	4.1	0.35	2.1

What is the mean energy transferred from the pea seeds in J g^{-1} ? Show your working.

Answer = J g^{-1}
(2 marks)

Turn over ►

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ANSWER IN THE SPACES PROVIDED**

- 13** The student wanted to draw a graph of her results. What type of graph should she use to show the relationship between the mass of a seed and the energy transferred? Explain your answer.

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(2 marks)

- 14** She calculated the mean mass of the runner bean seeds and the mean mass of the pea seeds. She then used a t test to decide whether the difference between the means was significant.

- 14 (a)** Give the null hypothesis for her t test.

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(1 mark)

- 14 (b)** Explain how she should use a table of t values to decide if the difference between the two means is significant or not.

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(2 marks)

- 15** When seeds are eaten, some of their energy is lost in faeces. Explain **one** reason why.

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(2 marks)

Resource Sheet

Introduction

The basal metabolic rate (BMR) is the number of joules the body uses per kilogram of body mass per hour when at rest.

Resource A

BMR falls with age. The loss of a small amount of muscle each year is thought to be one reason for the fall.

Some researchers investigated two hypotheses to explain the fall in BMR with age.

Hypothesis 1 – Level of exercise

A person who exercises frequently has a higher BMR.

Hypothesis 2 – Level of energy intake

A person who eats more has a higher BMR.

Resource B

Researchers measured the BMR of groups of men. The groups were as follows.

- Young inactive
- Young active
- Old inactive
- Old active

Their results are shown in the table.

Group of men	Mean BMR / J kg ⁻¹ h ⁻¹
Young inactive	302
Young active	323
Old inactive	268
Old active	285

Resource C

'Energy flux' describes the rate of flow of energy through the body. It depends on BMR, the level of exercise and energy intake. This is shown in the table.

Type of energy flux	Level of exercise	Energy intake
High	High	High
Low	Low	Low

Weight loss when dieting depends on energy flux. Losing weight by reducing energy intake can only continue for a certain time. If energy intake is reduced by too much for too long, then muscle tissue is lost. As a result, BMR decreases and so does the rate of weight loss.

Turn over for the next question

Turn over ►

Section B

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

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

Use **Resource A** to answer Questions **16** and **17**.

16 If muscle tissue is lost, BMR falls. Explain why.

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(2 marks)

17 (a) Use **Hypothesis 1** to suggest why older men tend to have a lower BMR than younger men.

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(1 mark)

17 (b) Use **Hypothesis 2** to suggest why older men tend to have a lower BMR than younger men.

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(1 mark)

Use **Resource B** to answer Questions **18** and **19**.

- 18** Two of the young active men, born on the same day, had the same body masses but different BMRs. Suggest and explain **two** reasons for the difference in their BMR.

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(4 marks)

- 19** The researchers extended their study to include men and women. They expressed their results in the same units. Explain why.

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(2 marks)

Use **Resource C** to answer Question **20**.

- 20** Complete the table for someone who is trying to lose weight.

Type of energy flux	Level of exercise	Energy intake

(1 mark)

Turn over for the next question

Turn over ►

21 Many doctors believe that keeping body weight at a suitable level is one way to enjoy a long life. Use all the resources to evaluate this belief.

(Extra space) (4 marks)

END OF QUESTIONS

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