

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use Total Task 1



General Certificate of Education
Advanced Level Examination
June 2011

Human Biology

HBI6X/PM1

**Unit 6X A2 Externally Marked Practical Assignment
Task Sheet 1**

To be completed before Task Sheet 2

For submission by 15 May 2011

For this paper you must have:

- a ruler with millimetre measurements
- a calculator.

Measuring the energy content of a food substance

Introduction

When a food substance burns, heat energy is released. If this energy is transferred to water, the change in temperature of the water can be used as a measure of the energy content of the food substance. In Task 1, you will investigate a simple method for obtaining a measure of the energy content of a runner bean seed.

Task 1

Materials

You are provided with

- runner bean seed
- boiling tube
- 25 cm³ measuring cylinder
- distilled water
- clamp and stand
- thermometer
- mounted needle
- access to a balance
- Bunsen burner
- heat-resistant mat
- method of lighting Bunsen burner.

You may ask your teacher for any other apparatus you require.

Outline method

Read these instructions carefully before you start your investigation.

Be aware that it can take 1 to 2 minutes for a seed to start burning. You might also need to relight your seed.

1. Use the measuring cylinder to put 25 cm³ of distilled water into a boiling tube.
2. Use the clamp and stand to hold the boiling tube at an angle of about 45° and facing away from you and anyone else.
3. Record the temperature of the water in the boiling tube.
4. Weigh the runner bean seed and record its mass.
5. Carefully use a mounted needle to hold the seed.
6. Light the Bunsen burner and use it to set fire to the seed.
7. As soon as the seed is burning, move it under the boiling tube so that it heats the water in the tube as it burns. To keep the seed burning, it might help to rotate it slowly.
8. If the seed stops burning, see if it will relight and continue heating the water.
9. When the seed finally stops burning, record the temperature of the water.
10. Weigh the remains of the seed and record its mass.

You will need to decide for yourself

- when the seed is alight
- when the seed has finished burning
- how to prevent your Bunsen burner from affecting your results.

Recording your results

Record your results in the table.

Initial mass of seed / g	
Initial temperature of water / °C	
Final temperature of water / °C	
Final mass of seed / g	

Turn over ►

Questions on Task 1

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

- 1** The method you used only allows some of the seed's energy content to be measured. The unburned remains of the seed is one piece of evidence for this. Give **one** other piece of evidence from your experiment that also shows why only some of the seed's energy content can be measured.

.....
.....
(1 mark)

- 2** Describe how you could monitor the temperature of the water in the boiling tube while the seed burns.

.....
.....
(1 mark)

- 3** Another student, who followed the same method, recorded a temperature increase of 8 °C. Without changing any of the apparatus, how could you modify the method to make sure that a temperature increase of at least 10 °C was always obtained?

.....
.....
(1 mark)

- 4** As the seed burns, the organic matter it contains releases its energy. Most of the organic matter in the seed is starch.

- 4 (a)** Describe how you could show that the seed contains starch.

.....
.....
.....
.....
(2 marks)

- 4 (b)** Use your results to calculate the proportion of the seed that did not burn. Show your working.

Proportion of seed that did not burn =
(2 marks)

- 5** What additional measurement would you have had to take during your investigation to calculate the rate of combustion of the seed? Explain your answer.

.....
.....
.....
.....
(2 marks)

- 6** The energy content of food substances is expressed in units of kJ g^{-1} . Explain why it is important to express the energy content in this way.

.....
.....
(1 mark)

END OF TASK 1

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**