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For Teacher's Use	
Section	Mark
PSA	
Stage 1 Skills	
Stage 2 Skills	
Section A	
Section B	
TOTAL (max 50)	



General Certificate of Education
Advanced Subsidiary Examination
June 2011

Human Biology

HBI3T/Q11/test

Unit 3T AS Investigative Skills Assignment

For submission by 15 May 2011

For this paper you must have: - the task sheet, your results and your graph - 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 space 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 36. - You will be marked on your ability to: - use good English - organise information clearly - use scientific terminology accurately.
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Section A

These questions relate to your investigation into whether length of the lower arm can be used to predict height of a person.

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

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

- 1** You investigated whether there was a relationship between length of the lower arm and height. Which of the two variables you measured was the dependent variable? Explain your answer.

.....

 (1 mark)

- 2 (a)** Give **two** possible sources of error when you measured length of the lower arm.

1

 2

 (2 marks)

- 2 (b)** Give **two** possible sources of error when you measured height.

1

 2

 (2 marks)

- 3** Suggest **two** variables that might affect the relationship between length of the lower arm and height.

1
 2
 (2 marks)

- 4** It was important to hold the book with its spine fully in contact with the wall when measuring each person's height (Step 6).
Explain why.

.....

..... (1 mark)

- 5** Another way of measuring a person's height is to measure the length of the body when the person is lying down.
Suggest **one** advantage of this method over the method you used.

.....

..... (1 mark)

- 6** Explain whether your results indicate that lower arm length can be used to predict a person's height reliably.
Use examples from your data to support your answer.

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.....

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..... (2 marks)

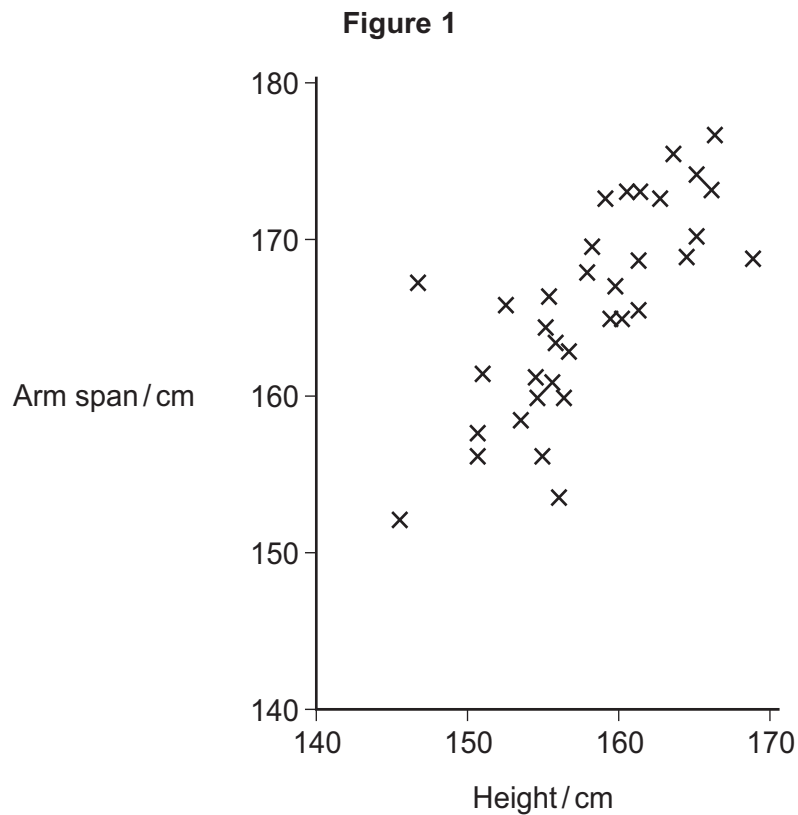
(Extra space)

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Turn over for the next question

Turn over ►

- 7** A group of students investigated the possible relationship between arm length and height. They measured arm span. This is the distance between the fingertips when the arms are held out horizontally from each side of the body. Their results are shown in **Figure 1**.



7 (d) Suggest **two** possible sources of error in measuring arm span that were **not** present in your investigation.

1.....

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2.....

.....

(2 marks)

17

Turn over ►

Resource Sheet

Introduction

The information is about body proportions and body mass and their correlations with climate and disease.

Resource A

Scientists measured the heights and the femur lengths of a large number of 18-year-old female students. The femur (thigh bone) is the bone between the hip joint and the knee joint.

Figure 2 shows their results.

Figure 2

Measurement	Mean / cm ($\pm$ Standard Deviation)	Range / cm
Height	167.32 ($\pm$ 5.68)	150.5 to 181.0
Femur length	41.83 ($\pm$ 1.96)	36.2 to 47.3

Resource B

Figure 3 shows femur lengths from fossils of some hominids.

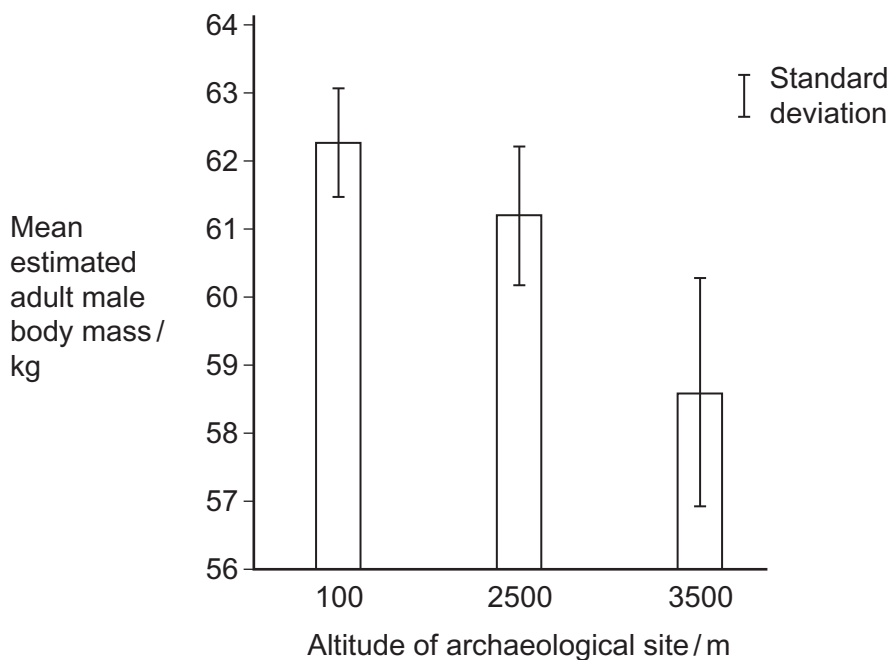
Figure 3

Genus of hominid	Age of fossils / millions of years	Number of fossils examined	Femur length / cm	
			Mean	Range
<i>Australopithecus</i>	2.0 to 3.3	5	30.3	28.3 to 33.0
<i>Australopithecus</i>	1.5 to 1.9	6	35.8	29.0 to 41.0
<i>Homo</i>	1.5 to 2.0	4	43.4	39.5 to 48.0
<i>Homo</i>	0.5 to 1.4	4	44.3	40.0 to 48.0

Resource C

Scientists investigated whether people who lived in colder climates were heavier on average than people who lived in warmer climates. They measured adult male skeletons from archaeological sites in Peru. The sites were of similar age but located at different altitudes. Climates at higher altitudes are colder than climates at lower altitudes. The scientists used the measurements to estimate the body masses of these males. The scientists' results are shown in **Figure 4**.

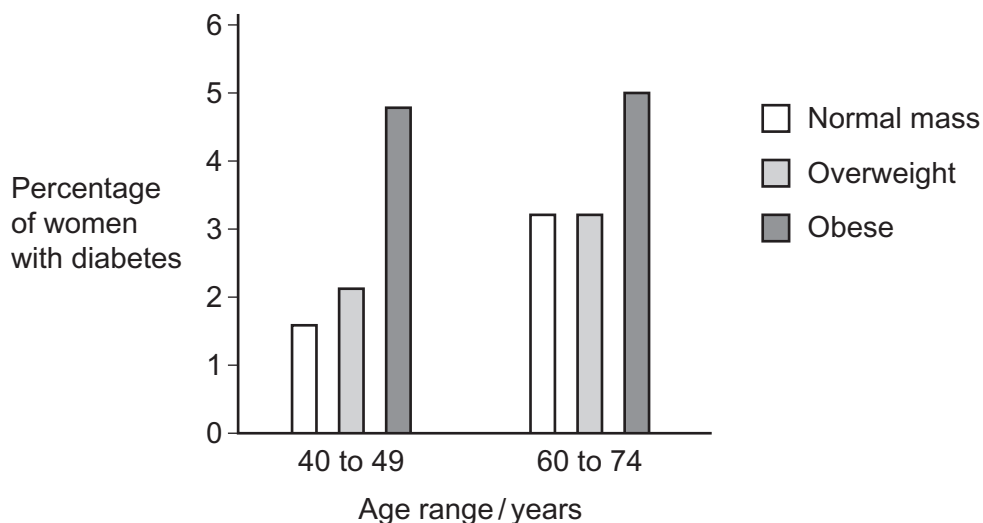
Figure 4



Resource D

Doctors investigated possible associations between body mass and diabetes. They studied a large number of women. The women were grouped by age and mass. Some of their results are shown in **Figure 5**.

Figure 5



Turn over ►

Section B

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

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

Use **Resources A** and **B** to answer **Questions 8, 9** and **10**.

- 8** Calculate the ratio between mean femur length and mean height of 18-year-old female students. Show your working.

Ratio femur length : height =
(2 marks)

- 9 (a)** What do the data in **Figure 3** show about the heights of *Australopithecus* and *Homo*?

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.....
(2 marks)

- 9 (b)** A scientist used the data from **Figure 2** and **Figure 3** to calculate the mean height of *Australopithecus* living between 1.5 and 1.9 million years ago. The answer he got was 143.2 cm. Explain how he got this answer.

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

- 9 (c)** Suggest **two** factors that may have made the scientist's calculation of the mean height of *Australopithecus* unreliable.

1
.....
2
.....
(2 marks)

- 10** The standard deviation is more useful than the range in evaluating data on height and femur length.
Explain why.

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(2 marks)

Use **Resource C** to answer **Question 11**.

- 11** The scientists' hypothesis was that people living in colder climates would be heavier on average than people living in warmer climates.

- 11 (a)** Suggest and explain one reason for this hypothesis.

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(2 marks)

- 11 (b)** Do these data support the scientists' hypothesis? Explain your answer.

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(2 marks)

- 11 (c)** Other than climate, name **one** factor that could affect body mass.

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(1 mark)

Turn over ►

Use **Resource D** to answer **Question 12**.

- 12 (a)** Using the data in **Figure 5**, describe how the percentage of women with diabetes varies with mass and age.

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(3 marks)

- 12 (b)** Using only the information in **Figure 5**, a doctor concluded that obesity increases women's risk of becoming diabetic. Was his conclusion justified? Explain your answer.

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(2 marks)

END OF QUESTIONS