

**ADVANCED SUBSIDIARY GCE  
 HUMAN BIOLOGY**

Case Studies

**TUESDAY 3 JUNE 2008**

**2858/01**

Morning  
 Time: 45 minutes

Candidates answer on the question paper  
**Additional materials (enclosed):** None

**Additional materials (required):**  
 Electronic calculator  
 Ruler (cm/mm)



Candidate  
 Forename

Candidate  
 Surname

Centre  
 Number

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Candidate  
 Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 45.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	23	
2	22	
<b>TOTAL</b>	<b>45</b>	

This document consists of **11** printed pages, **1** blank page and **2** inserts.

Answer **all** the questions.

This question is based on the article ‘**FOOD FOR THOUGHT**’ (Case Study 1).

- 1 (a) In the case study, you were told that no more than 35% of energy intake should come from fat, and that no more than 11% should come from saturated fat.

Explain the meaning of the term *saturated fat*.

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..... [3]

- (b) Table 1.1 shows the fatty acids present in some foods. The fatty acids are expressed as a percentage of the total fat.

The figures given after the name of each fatty acid summarise its molecular structure. For example, *stearic (C – 18:0)* shows that the hydrocarbon chain of a stearic acid molecule has 18 carbon atoms and no double bonds.

**Table 1.1**

fatty acid	molecular structure	% of total fat in some foods			
		olive oil	milk fat	beef fat	corn oil
palmitic	C – 16:0	14	25	29	11
stearic	C – 18:0	3	11	20	2
oleic	C – 18:1	71	26	42	25
linoleic	C – 18:2	10	2	2	55
linolenic	C – 18:3	0	2	0	0

- (i) Using the information in Table 1.1, identify one example of a **polyunsaturated** fatty acid. Give a reason for your choice.

name .....

reason .....

.....

..... [2]

- (ii) Using the information in Table 1.1, suggest **one** dietary modification that could reduce the level of saturated fat in the diet.

.....

..... [1]

- (iii) The average energy requirement for a 17-year-old male is  $11\,510\text{kJ day}^{-1}$ .

Calculate how many grams of saturated fat would provide 11% of the average energy intake for a 17-year-old male. The information provided in the case study may be used to help you.

Show your working.

**Give your answer to one decimal place.**

Answer = ..... g [2]



- (d) You are told in the case study that the advice to limit alcohol intake is based on health concerns other than consumption of excess kilojoules (kJ) in the diet and potential weight gain.

Suggest **one** possible **long term** consequence of excess alcohol consumption on health.

.....  
..... [1]

- (e) You are told in the case study that the DASH diet (Dietary Approaches to Stop Hypertension) appeared to reduce blood pressure in the group allocated this diet when they were compared with the control group.

Explain why two figures, such as 5.5/3.0, are given for the blood pressure reductions.

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..... [2]

- (f) In the case study, you are told that the DASH diet combined with low salt intake produced a bigger reduction in blood pressure than either of the two interventions on their own.

Suggest how this experiment might have been designed.

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..... [3]

**(g)** Explain, in terms of osmosis, why a high amount of salt in the diet can lead to high blood pressure.

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..... [2]

[Total: 23]

**7**  
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2 This question is based on the article ‘**LIGHTS, CAMERA, ACTION!**’ (Case Study 2).

(a) (i) Fig. 2.1, on insert 2, shows a karyotype of Turner’s syndrome.

Explain how karyotypes, such as the one shown in Fig. 2.1, are produced from a cell sample.

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..... [4]

(ii) Identify the karyotype given in Fig. 2.2, on insert 2. Give a reason for your answer.

karyotype .....  
reason ..... [2]

(b) In Turner’s syndrome, cells have only one X chromosome and no Y chromosome. This can arise from a chromosome mutation occurring in cell division, by either meiosis or mitosis.

- In meiosis, the X chromosome is lost during the formation of gametes.
- In mitosis, the X chromosome is lost during early cell division of the embryo.

(i) Explain why meiosis is necessary for the formation of gametes.

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..... [2]



- (ii) Following the loss of the X chromosome from **one cell** in the early cell division of the embryo, mitosis leads to **two types** of cells. Some of these cells have 45 chromosomes.

Explain how this leads to cells with 45 chromosomes being present in the **adult**.

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..... [3]

- (c) In the case study, Holly states that she was *quite old* before she was diagnosed as having Turner's syndrome.

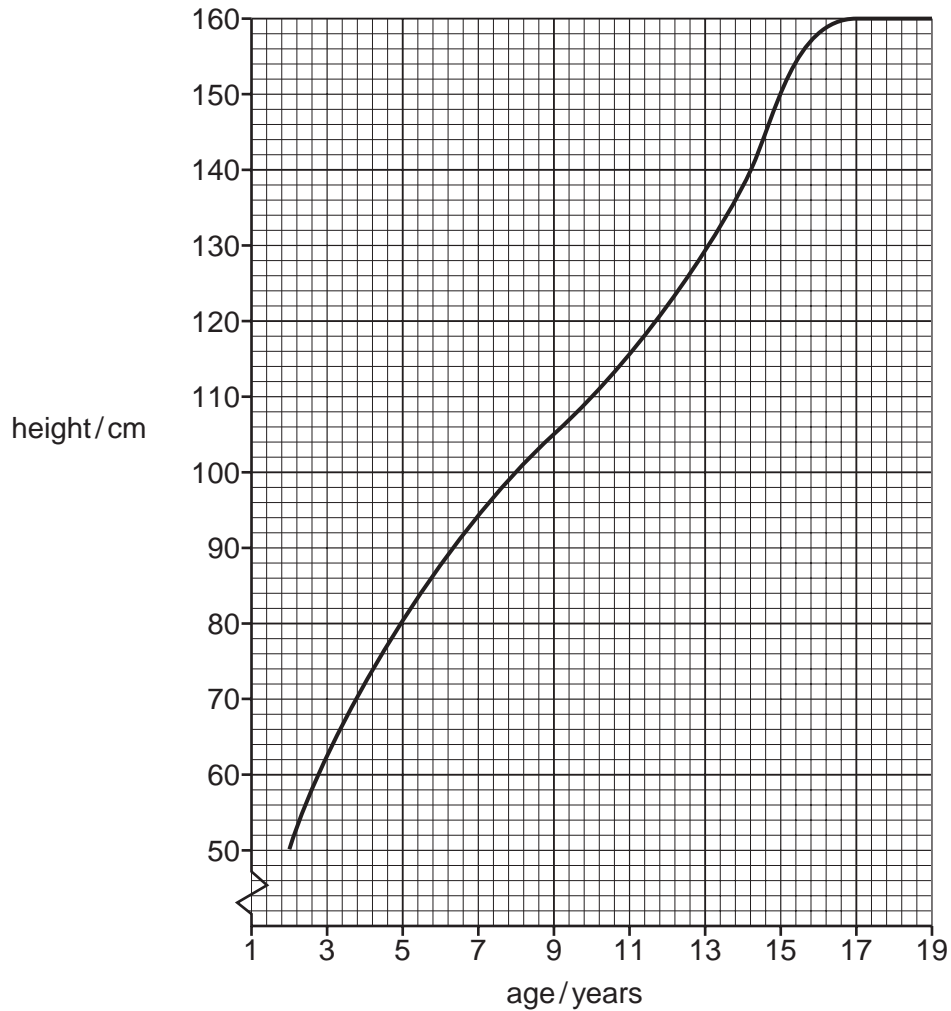
Describe **one** technique by which Turner's syndrome could be detected **before birth**.  
Details of karyotyping are **not** required.

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..... [2]

(d) In the case study, Peter refers to the use of growth charts to record how tall Holly should be.

The data from the charts can be plotted as an **absolute growth curve**.

Fig. 2.3 shows an absolute growth curve for a normal female.



**Fig. 2.3**

- (i) Draw a line on Fig. 2.3 to indicate the absolute growth curve of a female with Turner's syndrome. [1]

(ii) Describe how you would use the same data from the growth charts to produce an absolute growth **rate** curve.

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..... [3]

(e) In the case study, you were told that Holly had undergone both an MRI scan and an echocardiogram. These had been carried out by the radiography department.

Radiographers also play an important role in the detection of diseases such as cancer.

Describe **and** explain the methods used by radiographers to detect cancers.

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..... [5]

[Total: 22]

END OF QUESTION PAPER

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