

**ADVANCED SUBSIDIARY GCE  
HUMAN BIOLOGY**

**2857**

Growth, Development and Disease

**WEDNESDAY 10 JANUARY 2007**

Morning

Time: 1 hour

Additional materials: Electronic calculator  
Ruler (cm/mm)



Candidate  
Name

Centre  
Number

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Candidate  
Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED.**  
**ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.**

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

<b>FOR EXAMINER'S USE</b>		
<b>Qu.</b>	<b>Max.</b>	<b>Mark</b>
1	15	
2	10	
3	9	
4	17	
5	9	
<b>TOTAL</b>	<b>60</b>	

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Answer **all** the questions.

1 Research has been carried out into the use of embryonic stem cells to repair damaged tissues in adults.

(a) State **two** properties of stem cells.

1 .....

.....

2 .....

..... [2]

(b) Following an investigation it was discovered that injections of embryonic stem cells improved the function of hearts damaged by heart attacks.

Suggest how stem cells helped to repair the damaged heart muscle.

.....

.....

.....

..... [2]

(c) Describe **two** ethical issues in using stem cells to treat damaged tissues in humans.

1 .....

.....

2 .....

..... [2]

- (d) Some damaged tissues are able to repair themselves using mitosis.

Fig. 1.1 shows the main stages in mitosis.



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Fig. 1.1

(i) Use the information in Fig. 1.1 to complete the table below.

The first stage has been done for you.

photo-image micrograph	stage of mitosis	description of <b>chromosomes</b> at this stage
<b>A</b>	<b>prophase</b>	<b>chromosomes become visible</b>
<b>B</b>		
<b>C</b>		
<b>D</b>		

[6]

(ii) Explain the importance of mitosis in the repair of tissues.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 15]

- 2 (a) MRSA refers to strains of the bacterium *Staphylococcus aureus* which are resistant to an antibiotic commonly used to treat infections caused by *Staphylococcus aureus*.

MRSA infections can be dangerous if they cannot be cleared up quickly with antibiotics.

- (i) Patients in hospital are at a higher risk of becoming dangerously ill with an MRSA infection.

Suggest **two** reasons for this increased risk.

- 1 .....
- .....
- 2 .....
- ..... [2]

- (ii) State **three** precautions that could be taken to reduce the spread of MRSA in hospitals.

- 1 .....
- .....
- 2 .....
- .....
- 3 .....
- ..... [3]

(b) *Staphylococcus* bacteria are prokaryotic cells.

Fig. 2.1 shows a diagram of *Staphylococcus*.

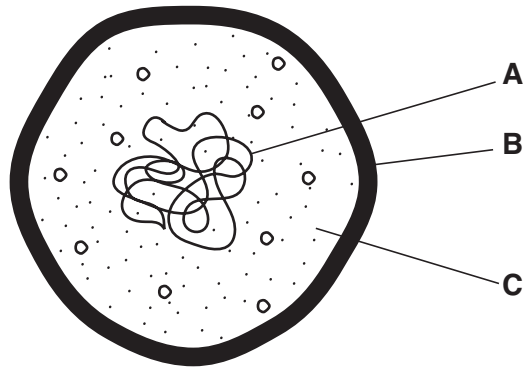


Fig. 2.1

Name the parts labelled **A** to **C**.

**A** .....

**B** .....

**C** ..... [3]

(c) Name **one** antibiotic **and** suggest how it might kill or stop the growth of bacteria.

.....  
.....  
.....  
..... [2]

[Total: 10]

3 Diagnostic screening for genetic diseases can involve examination of chromosomes or examination of the base sequence of specific genes.

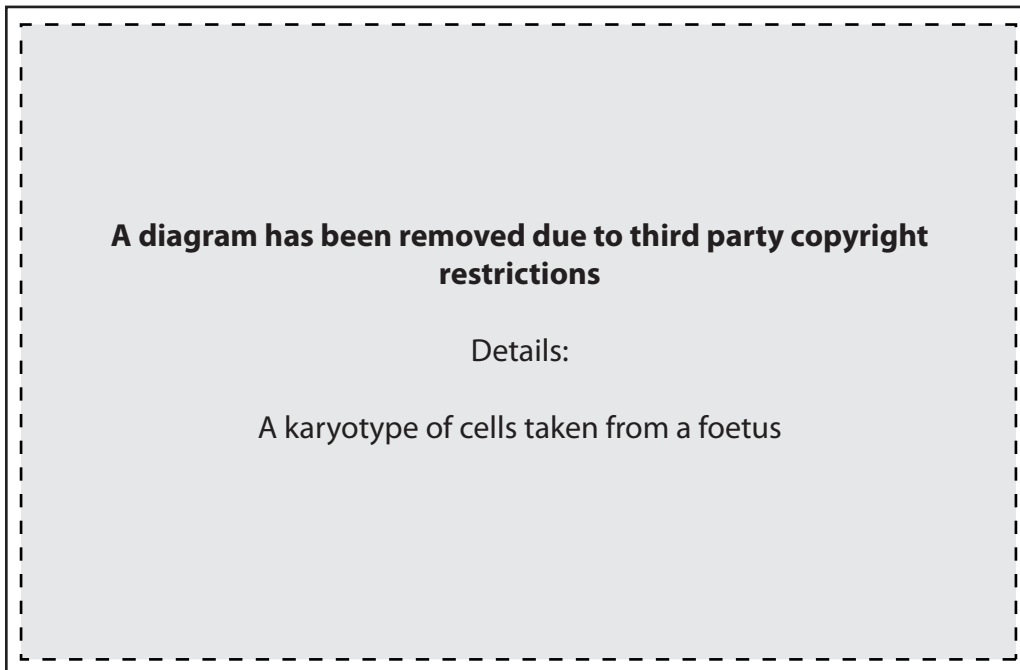
Some genetic diseases are caused by chromosomal mutations.

(a) State what is meant by a chromosomal mutation .

..... [1]

(b) Karyotypes may be used to diagnose chromosomal mutations.

Fig. 3.1 shows a karyotype of cells taken from a foetus.



© The Tech Museum of Innovation

Fig. 3.1

(i) Name the condition shown by this foetus.

..... [1]

(ii) State how the karyotype shown in Fig. 3.1 differs from a normal female karyotype.

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

(iii) Name one procedure that could have been used to obtain the foetal cells.

..... [1]



(iv) Outline the stages in the production of a karyotype from foetal cells.

.....  
.....  
.....  
.....  
.....  
..... [3]

(c) Genetic diseases are also caused by gene mutations and may be detected by genetic screening.

Discuss **one ethical issue** linked to each of the following examples.

Example 1:

A woman who is 14 weeks pregnant has found out from a diagnostic test that the baby she is carrying has sickle cell anaemia.

ethical issue .....

.....  
.....  
.....

Example 2:

A young man has found out from a diagnostic test that he has the gene for Huntington's disease. This is a degenerative, fatal disease of the nervous system that does not develop until later in life (30-40 years old).

ethical issue .....

.....  
.....  
..... [2]

[Total: 9]

- 4 (a) Every second, someone in the world is newly infected with tuberculosis (TB).

Table 4.1 shows the estimated number of new cases of TB in 2003.

Table 4.1

**A table has been removed due to third party copyright restrictions**

Details:

A table showing the estimated number of new cases of TB in 2003 in Africa, Europe and worldwide

© WHO

- (i) Explain why the number of new cases is expressed as a number per 100000 population.

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

- (ii) Using the data from Table 4.1 calculate the percentage of global cases of TB that occur in Africa .

Show your working. Give your answer to the nearest whole number .

Answer = .....% [2]

- (iii) With reference to the information in Table 4.1, describe **and** explain the differences in the **number of new cases** of TB in Africa and Europe.

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..... [5]

- (b) Vaccination plays an important part in the control of infectious diseases such as TB.

Describe how the Heaf test is used to decide whether or not a child needs to be vaccinated against TB.

.....

.....

.....

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.....

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..... [2]



5 (a) Breast cancer is one of the most common cancers in the UK, but early diagnosis and treatment can increase the chance of survival.

(i) State **two** ways of diagnosing breast cancer.

1 .....

2 ..... [2]

(ii) Suggest why an early diagnosis of breast cancer increases the chance of survival.

.....

..... [1]

(b) Complete the following description of cancer by using appropriate words from the list to fill in the gaps.

- meiosis      mitosis      tumour      malignant
- mutation      proto-oncogenes      translation
- benign      transcription      regulators      cyst

Cancer is a disease that starts in our cells. A ..... occurs in special genes called ..... which are found in all normal cells. This leads to a lack of control of ..... . The uncontrolled growth of cells forms a lump called a ..... . Some lumps are ..... and may not cause any problems. Other lumps are ..... and contain cells that can spread into other body tissues causing severe damage. [6]

[Total: 9]

**END OF QUESTION PAPER**

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*Copyright Acknowledgements:*

Fig. 1.1 © Dr Donald A Levin/Department of Botany, University of Texas at Austin, [www.micro.utexas.edu/courses/levin/bio304/genetics/celldiv.html](http://www.micro.utexas.edu/courses/levin/bio304/genetics/celldiv.html)  
Fig. 3.1 © The Tech Museum of Innovation, [www.thetech.org](http://www.thetech.org)  
Table 4.1 from *Fact Sheet No 104: Tuberculosis*, 2005 © World Health Organisation, [www.who.int](http://www.who.int)

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