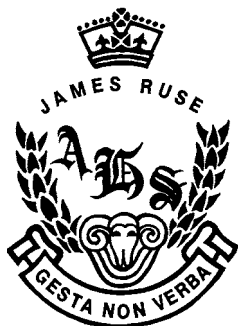


## James Ruse Agricultural High School



## HIGHER SCHOOL CERTIFICATE COURSE

### 2006 TERM 1 ASSESSMENT TASK – THEORY EXAMINATION

## BIOLOGY

### General Instructions

- Reading time – 5 minutes
- Working time – 30 minutes
- Write using black or blue pen
- Draw diagrams using pencil
- Write your Student Number on the top of the Part A and Part B Answer Booklet

Total marks for this paper: 23  
This paper has two parts, Part A and Part B

#### Part A

Total marks (6)

- Attempt all questions
- Allow about 6 minutes for this part

#### Part B

Total marks (17)

- Attempt all questions
- Allow about 24 minutes for this part

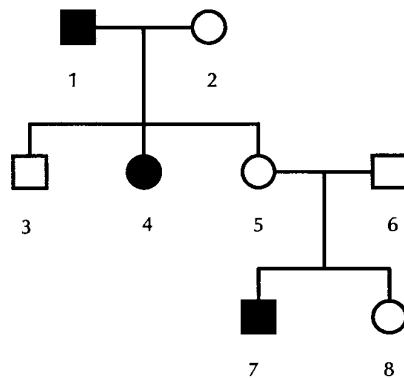
**Part A****Total marks (6)****Attempt all questions****Each question is worth one mark****Allow about 6 minutes for this part**

Select the alternative A, B, C or D that best answers the question and, using ink, place an X in the corresponding space in the table on your answer book

1. The alleles for the gene responsible for haemoglobin are co-dominant. When the alleles for normal haemoglobin and abnormal haemoglobin occur together, the resulting condition is known as “sickle cell *anaemia*”. When only the abnormal haemoglobin alleles are present, the person suffers from “sickle cell *disease*”. What is the chance of a couple having children that suffer from sickle cell anaemia if one parent suffers from sickle cell anaemia and the other is normal?
  - (A) 0%
  - (B) 25%
  - (C) 50%
  - (D) 100%
2. In humans, short-sightedness is dominant to normal vision. What are the phenotypic percentages of children if both parents are heterozygous for vision?
  - (A) 25% normal, 75% short-sighted
  - (B) 50% normal, 50% short-sighted
  - (C) 75% normal, 25% short-sighted
  - (D) 100% short-sighted

Questions continue over page →

3. A pedigree showing the inheritance of a genetic-based disease is displayed.



Key



Male sufferer



normal male



Female sufferer



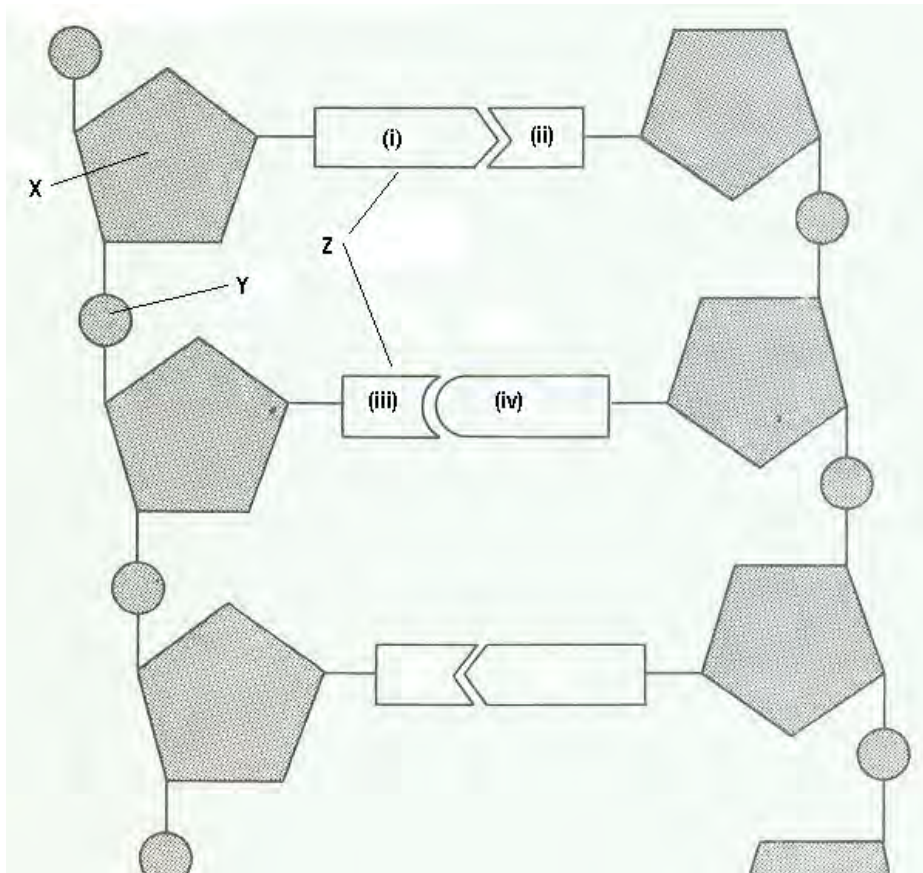
normal female

What type of inheritance is this disease?

- (A) dominant  
 (B) codominant  
 (C) sex-linked dominant  
 (D) sex-linked recessive
4. What roles did T. H. Morgan and G. Mendel play in developing our understanding of inheritance?

	Morgan discovered	Mendel discovered
(A)	Chromosomes contain genes.	Sex-limited trait genes are found on the X chromosomes.
(B)	Hereditary factors can transfer from one chromosome to another.	Dominant and recessive alleles.
(C)	Sex-limited trait genes are found on the X chromosomes.	Hereditary factors are in pairs.
(D)	Chromosomes are passed onto offspring.	Process of meiosis.

Questions 5 and 6 refer to the diagram, which depicts a segment of deoxyribonucleic acid.



5. What do the labels “X”, “Y” and “Z” represent?

	“X”	“Y”	“Z”
(A)	nucleic acid	nitrogenous base	phosphate
(B)	nitrogenous base	phosphate	deoxyribose sugar
(C)	phosphate	deoxyribose sugar	nitrogenous base
(D)	deoxyribose sugar	phosphate	nitrogenous base

6. What do the labels “(i)”, “(ii)”, “(iii)” and “(iv)” represent?

	“(i)”	“(ii)”	“(iii)”	“(iv)”
(A)	Adenine	Thymine	Cytosine	Guanine
(B)	Adenine	Adenine	Thymine	Cytosine
(C)	Cytosine	Thymine	Adenine	Guanine
(D)	Guanine	Guanine	Thymine	Thymine

**Part A and Part B Answer Booklet**

Student Number	
Mark / 23	

**Write your Student Number at the top of this page.**

**Part A**

**Total marks (6)**

**There are 6 questions in this part. Attempt all questions.**

**Each question is worth 1 mark.**

**Allow about 6 minutes for this part.**

Select the alternative A, B, C or D that best answers the question and, using ink, place an X in the corresponding space in the table below.

	1	2	3	4	5	6
(A)						
(B)						
(C)						
(D)						

**Part B**

**Total marks (17)**

**There are 4 questions in this part. Attempt all questions.**

**Marks vary for each question.**

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

**Allow about 22 minutes for this part.**

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**Question 1 (4 marks)**

Describe the roles of aldosterone and anti-diuretic hormone in the control of water balance in a human.

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Questions continue over page →

**Question 2 (4 marks)**

Using a specific example, describe how the study of biochemistry has provided evidence for the occurrence of divergent evolution in vertebrates.

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**Question 3** (4 marks)

Describe, with the aid of labelled diagrams, how the processes of crossing over and segregation of chromosomes lead to variation in a sexually-reproducing species.

Questions continue over page →



**Question 4 (5 marks)**

- (a) Compare an Australian insect with a freshwater fish in terms of the structures that are involved with the excretion of nitrogenous wastes. (2 marks)

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- (b) Explain the differences in urine concentration and the type of nitrogenous waste for an Australian insect with a freshwater fish. (3 marks)

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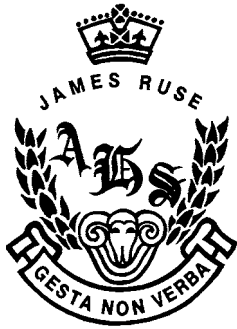
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**James Ruse Agricultural High School****2006****HIGHER SCHOOL CERTIFICATE COURSE****TERM 1 (Y12) ASSESSMENT TASK –  
RESEARCH SKILLS ASSESSMENT****BIOLOGY****General Instructions**

- Reading time – 5 minutes
- Working time – 40 minutes
- Write using black or blue pen
- Draw diagrams using pencil
- Write your Student Number on the pages of this Question and Answer Book

Total marks for this paper: 12

- Attempt all questions

**Submit evidence of your research (photocopies and printouts). Ensure your student number is on all paper submitted. Plastic sleeve this answer booklet with your research evidence. Do this at the end of the task.**

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**Write your Student Number at the top of each page.**

**Time allowed: 25 minutes**

**Question 1 (2 marks)**

“Assess the roles of the environment and genetics with regards to changes in a species. The changes may be associated with the evolution of subspecies or new species.”

Justify your choice of information sources (bibliography you obtained) you used in researching the above question. That is, why did you decide to use the particular resources you have used for this research task?

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Questions continue over page →

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Student Number

**Question 2 (4 marks)**

Use the data you have gathered to assess the roles of the environment and genetics with regards to changes in a species. The changes may be associated with the evolution of subspecies or new species.

**You may refer to diagrams contained in the information you have brought and will submit. Ensure all diagrams are clearly referenced in your answers if you wish to do this.**

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Questions continue over page →

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**Question 3 (1 mark)**

Student Number

**State the name of one Australian scientist associated with the research you have addressed.**

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**Question 4 (4 marks)**

**Describe the methodology employed by the research scientist(s) to obtain the data associated with the research you have addressed.**

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**Submit evidence of your research (photocopies and printouts). Ensure your student number is on all paper submitted. Plastic sleeve this answer booklet with your research evidence. Do this at the end of the task.**

James Ruse Agricultural High School

2006 TERM 1 (Y12) ASSESSMENT TASK – THEORY ASSESSMENT

BIOLOGY MARKING GUIDELINES

PART A

Multiple Choice: Questions 1-6 (1 mark each)

	1	2	3	4	5	6
(A)		X				X
(B)						
(C)	X			X		
(D)			X		X	

PART B

1	Outcomes assessed:		
	Criteria	Marks	Band
	<ul style="list-style-type: none"> <li>• Aldosterone: acts in the distal convoluted tubule (1) to absorb sodium from tubule into blood. (1)</li> <li>• Anti-diuretic hormone: acts in collecting duct (1) to cause reabsorption of water. (1)</li> </ul>	4	4

2	Outcomes assessed:		
	Criteria	Marks	Band
	<ul style="list-style-type: none"> <li>• Biochemical studies of the amino acid sequence of cytochrome C (respiratory chain enzyme) has revealed humans are more closely related to chimpanzees than other apes. However, the similarities in the amino acid sequences suggest the divergence of humans and apes from a common ancestral form.</li> </ul> (1): specific example (e.g., humans-apes). (1): biochemistry addressed (e.g., amino acid sequence). (1): relationship described between different vertebrates. (1): common ancestral form mentioned.	4	5

3	Outcomes assessed:		
	Criteria	Marks	Band
	<p>(1): <i>crossing over</i> diagram: showing crossing over of homologous chromosomes. Crossing over produces different combinations of genetic material on chromosomes that are homologous.</p> <p>(1): <i>random segregation of chromosomes</i> diagram: showing at least two ways in which sets of homologous chromosomes can line up. Random segregation causes different sets of chromosomes to be inherited in different ways in forming the gametes. Or, a <i>description</i> of how segregation of chromosomes provides variation.</p> <p>(1): labels (at least two) on both diagrams.</p> <p>(1): showing resulting gametes for each variation process.</p>	4	4

4	Outcomes assessed:		
	Criteria	Marks	Band
(a)	<ul style="list-style-type: none"> <li>• Aust. insect excretes nitrogenous waste via malpighian tubules.</li> </ul> <p>(1) Freshwater fish uses nephrons in kidneys. Or, gills also excrete ammonia. (1)</p>	1 1	3
(b)	<ul style="list-style-type: none"> <li>• Aust. insect excretes nitrogenous waste in the form of uric acid</li> </ul> <p>(1); this chemical does not require a lot of water to be dissolved in and thus the insect can reabsorb water. For these reasons, urine is more concentrated than freshwater fish. Freshwater fish excretes nitrogenous waste in the form of ammonia (1); this compound requires large amounts of water to dissolve in. (1)</p>	1	
	Uric acid requires less water than ammonia. (1)	1	



James Ruse Agricultural High School

2006 TERM 1 (Y12) ASSESSMENT TASK – RESEARCH SKILLS ASSESSMENT

MARKING GUIDELINES

1	Outcomes assessed:		
	Criteria	Marks	Band
	<ul style="list-style-type: none"> <li>• Use of credible information sources (e.g., university web site, or book written by university-based researchers). (1)</li> <li>• Using more than one source of information enables a reliability check on the information pertaining to the task. (1) Or, journals and WWW allow up-to-date information. (1)</li> </ul>	2	4

2	Outcomes assessed:		
	Criteria	Marks	Band
	<ul style="list-style-type: none"> <li>• Assess (make a judgement of value, quality, outcomes, results or size) the roles of environment and genetics... (1) “J” mark</li> <li>• Description of the role of the environment regarding changes to a species. (1) “E” mark</li> <li>• Description of the role of genetics regarding changes to a species. (1) “G” mark</li> <li>• Incorporation of data to support either role of environment or genetics. (1) “D” mark</li> </ul> <p>No specific species used: maximum of 2 marks “Generic focus”</p>	4	6

3	Outcomes assessed:		
	Criteria	Marks	Band
	<ul style="list-style-type: none"> <li>• Name of one Australian scientist. (1).</li> </ul>	1	3

4	Outcomes assessed:		
	Criteria	Marks	Band
	<ul style="list-style-type: none"> <li>• Statement of the methodology employed (for environmental impact or genetics impact on change in species). (1)</li> <li>• Description of the methodology employed (how change in species was measured). (1)</li> <li>• One other method involved in determining the impact of environment or genetics on evolution of a species. (1)</li> <li>• Link methodology to the research [“This method shows how data was acquired for determining the impact of environment and genetics on the evolution (change) in a species.”] (1)</li> </ul> <p>Maximum 2 marks for students that provide methods which are incommensurate with the answer provided in Q2. I.e., the methods presented in Q4 are not for the data discussed in Q2.</p>	4	6