JAMES RUSE AGRICULTURAL HIGH SCHOOL

YEAR 12

HSC ASSESSMENT TASK

TERM 1 2007

THEORY

BIOLOGY

General Instructions:

- **Reading Time 5 minutes**
- **Working Time 25 minutes**
- **Write using black or blue pen**
- **Draw diagrams in pencil**
- **Write your student number on the answer on the answer sheet**

TOTAL MARKS FOR THIS PAPER: 25

Part A : **Total Marks (4 Marks)**

Attempt all questions
Each question is worth one mark

Select the alternative A,B,C or D that best answers the question. Place an X in the corresponding space in the table on your answer sheet.

1. The work of Gregor Mendel on pea plants assisted our understanding of the inheritance of characteristics. What did Mendel determine?

   (A) Mutations are the source of new alleles
   (B) Crossing over increases variation
   (C) Homologous pairs of chromosomes assort during meiosis
   (D) Factors segregate during gamete formation

2. Analysis of the nitrogenous bases extracted from a cell showed that 20% were thymine. What amount of cytosine would you expect to be present?

   (A) 20%
   (B) 30%
   (C) 60%
   (D) 80%

3. Insufficient dietary intake of certain amino acids can lead to malnutrition even if there is sufficient energy intake. What process is most likely to be directly affected by such deficiencies?

   (A) Transcription
   (B) Translation
   (C) DNA replication
   (D) Meiosis

4. What was the role of Sutton and Boveri in genetics?

   (A) They showed chromosomes were made of DNA
   (B) They worked out the base pair rule in DNA
   (C) They showed a full set of chromosomes was necessary for normal development.
   (D) They showed that co-dominant traits deviate from the Mendelian pattern of inheritance.

Student No……

PART A

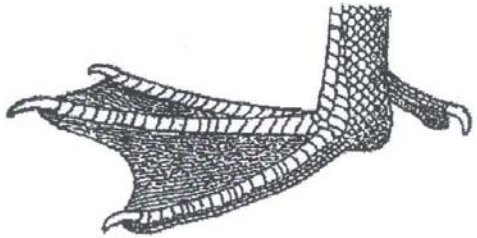
Select the alternative A,B,C or D that best answers the question and place an X in the corresponding space in the table below.

	A	B	C	D
1				
2				
3				
4				

PART B

5. (5 Marks)

Many species of bird have webbed feet. These are obviously useful for paddling through water.



For many years biologists grouped all birds with webbed feet together and considered them more closely related to each other than to other birds.
In recent years, however, more advanced technology has shown that many of the groups of birds with webbed feet are actually more closely related to groups of birds without webbed feet than they are to each other.

(A) The occurrence of webbed feet in birds is an example of one type of evolution. Identify this type of evolution. (1 Mark)

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(B) Analyse the type of evidence that may have changed scientific thinking about these species of birds. (4 Marks)

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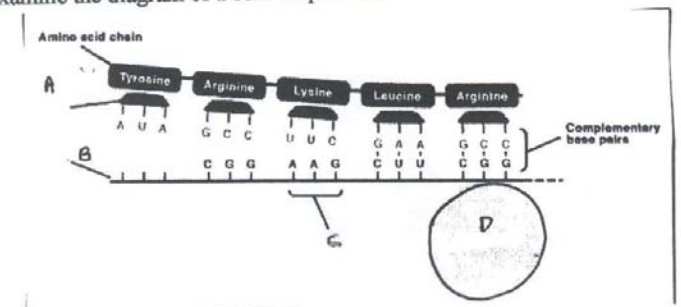
6. (5 Marks)

Examine the diagram of a cellular process.

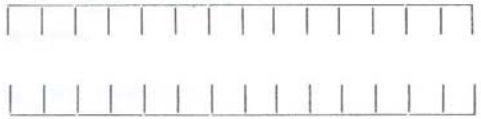


(A) Identify the labels for:

A.....B.....

C.....D.....

(B) Fill in the bases on the uncoiled DNA molecule, which would code for this amino acid chain.



7. Describe the experiments of Beadle and Tatum and how these contributed to our current knowledge of genetics. (6 Marks)

END OF TEST

2007 Term 1 HSC Bio

Student No............

PART A

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

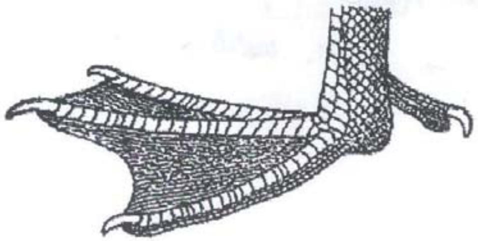
	A	B	C	D
1				X
2		X		
3		X		
4			X	

4

PART B

5. (5 Marks)

Many species of bird have webbed feet. These are obviously useful for paddling through water.



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In recent years, however, more advanced technology has shown that many of the groups of birds with webbed feet are actually more closely related to groups of birds without webbed feet than they are to each other.

(A) The occurrence of webbed feet in birds is an example of one type of evolution. Identify this type of evolution. (1 Mark)

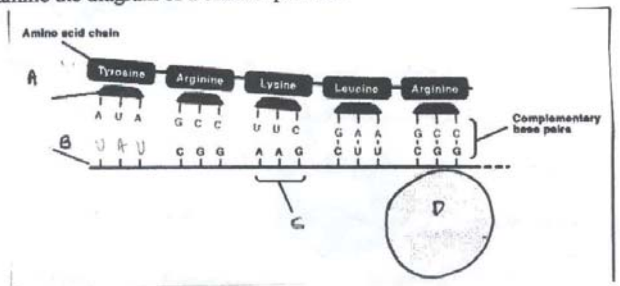
1 convergent

(B) Analyse the type of evidence that may have changed scientific thinking about these species of birds. (4 Marks)

biochemical evidence such as DNA - DNA hybridisation
DNA is isolated from 2 different species of bird.
The DNA is heated until it unwinds.
The single stranded DNA of both species is mixed
By measuring how hard it is to separate (by heating), the degree of similarity of the bases in DNA can be measured.
In birds that may be regarded as closely related by other means, the degree of similarity using this method may be found to be less — suggesting they shared a less recent common ancestor than
(Similarities with webbed feet → same environmental pressures).

6. (5 Marks)

Examine the diagram of a cellular process.



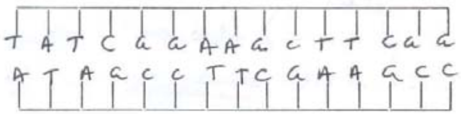
(A) Identify the labels for:

A. t - RNA B. m - RNA

C. codon D. ribosome

4

(B) Fill in the bases on the uncoiled DNA molecule, which would code for this amino acid chain.



1

7. Describe the experiments of Beadle and Tatum and how these contributed to our current knowledge of genetics. (6 Marks)

Beadle & Tatum experimented with bread mould (Neurospora). They used X-Rays to produce mutations in the mould & found that certain mutant strains were unable to grow unless vitamins or the amino acid(s) were added to the original nutrient.

eg. original nutrient —Enzyme 1→ B_1 —Enzyme 2→ B_2 —Enzyme 3→ arginine.

They investigated the 3 steps in the production of arginine. Mutant 1 couldn't produce enzyme 1 mutant 2 couldn't produce enzyme 2 & mutant 3 couldn't produce enzyme 3. If each was given (extend & ppts) the chemical of the next stage the (eg V+B1 thiamine or choline) the pathway would resume. They concluded one gene for one enzyme. Not all genes code for enzymes - may code for a structural protein eg collagen in our skin ∴ one gene one protein. Not all proteins consist of one polypeptide (eg haemoglobin consists of 4 polypeptides - 2 different types) ∴ Hypothesis modified to one gene one polypeptide.

UV? 1 1 — enzymes - aa — method — pathway eg. enzymes involved 1 1 1 1

controlled expt ✓
shown us mutations - new alleles
mutagen effects / radiation

END OF TEST