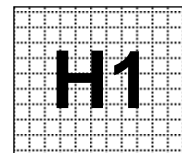


Civics Group	Index Number	Name (use BLOCK LETTERS)
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**ST. ANDREW'S JUNIOR COLLEGE**  
**2016 Preliminary Examination**

**H1 BIOLOGY**

**8875/2**

**Paper 2: Core (Mark Scheme)**

Monday

29th August 2016

2 hours

Additional Materials: Answer Paper  
Cover Sheet for Section B

**READ THESE INSTRUCTIONS FIRST**

Write your name, civics group and index number on all the work you hand in.

Write in dark blue or black pen on both sides of the paper.

You may use a soft pencil for any diagram, graph or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

**Section A**

Answer **all** the questions.

**Section B**

Compulsory question to be answered on writing paper provided.

At the end of the examination, fasten all your work securely together.  
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
Section A	
1	/16
2	/12
3	/12
Sub-total	/40
Section B	
5 or 6	/20
Total	/60

This document consists of **10** printed pages.

**[Turn over**

## Section A

Answer **all** questions.

**QUESTION 1**

Amylase is an enzyme that catalyses the break down of starch into maltose. A student investigated the effect of pH on the activity of amylase from saliva and pancreas. He monitored the time taken for 2.0 cm<sup>3</sup> of starch solution to be completely hydrolysed by the two types of enzymes at pH 5.0 and pH 8.5 respectively. The temperature of the reactions was kept constant at 37°C. He tabulated his findings in Fig. 1.1.

**Fig 1.1**

Amylase from	pH	Time taken for starch to be completely hydrolysed / s
Saliva	5.0	88
Saliva	8.5	35
Pancreas	5.0	252
Pancreas	8.5	26

**(a)(i)** Describe one similarity in the effect of pH on the activity of amylase from saliva and pancreas.

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.....[2]

**(ii)** Describe two differences in the effect of pH on the activity of salivary amylase and pancreatic amylase.

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.....[2]

**(b)** Collagen is an important structural component of skin, ligament and tendons. Describe the various levels of protein folding that gives it its fibrous structure.

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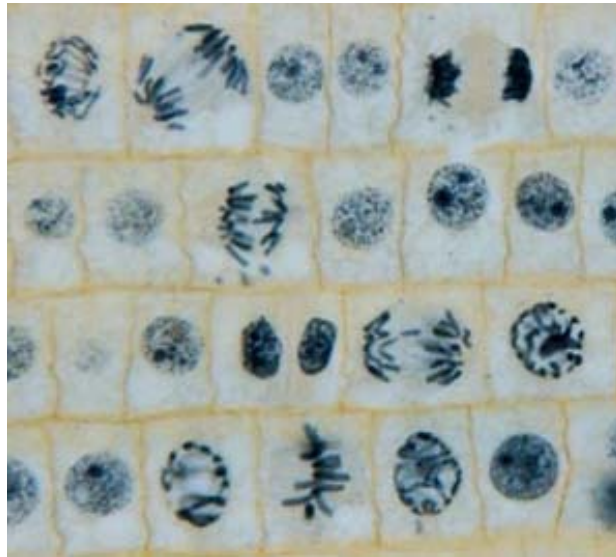
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.....[4]

**(c)** Fig. 1.2 shows some onion cells undergoing mitosis.



**Fig. 1.2**

**(i)** Identify (with arrows and labels) one cell each that is undergoing prophase, metaphase, anaphase and telophase.

.....[1]

**(ii)** Describe the events of anaphase.

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.....[2]

**(iii)** Describe the process of cytokinesis in the onion cells.

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.....[2]

**(d)** There are some reactions in plants which are crucial for its survival and growth. Explain the effect of a base addition to the gene coding for Ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCO) enzyme.

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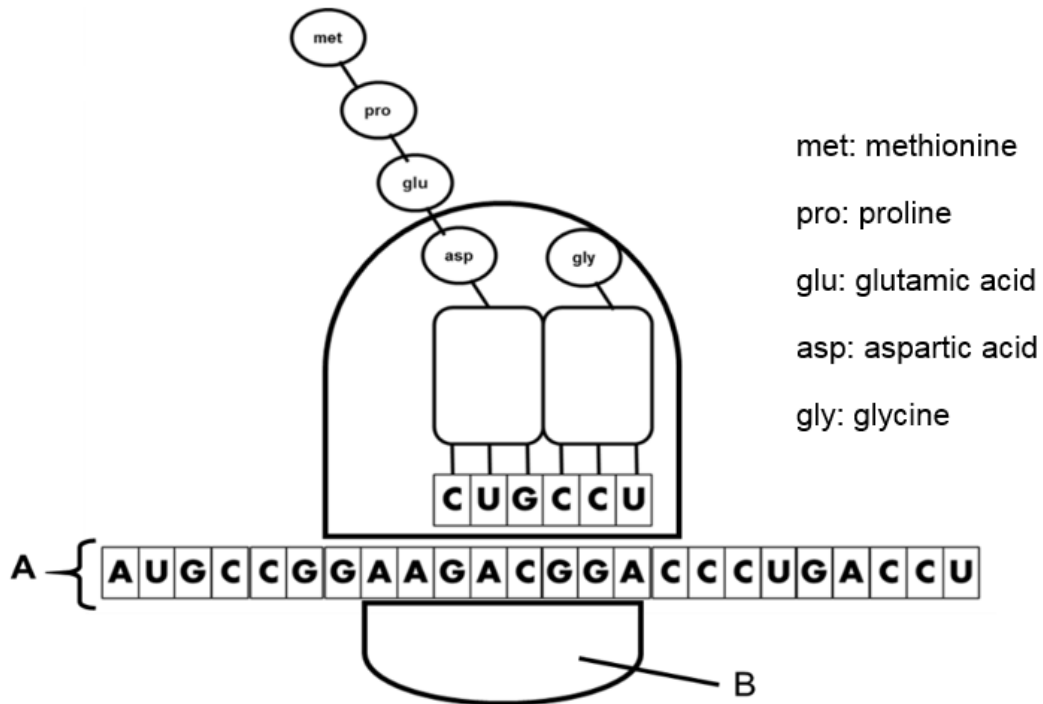
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.....[3]

**[Q1 Total: 16]**

**QUESTION 2**

Fig. 2.1 shows a process happening in a eukaryotic cell.



**Fig. 2.1**

**(a)** Name the structures labelled **A** and **B**. [1]

A: .....

B: .....

**(b)** Relate the structure of **A** to its role in protein synthesis.

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

**(c)** Outline one change to **A**, following completion of transcription in the nucleus before it can be used for the process in Fig. 2.1.

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

**(d)** How many amino acids does the protein, encoded by the section of **A** shown in Fig. 2.1, have?

.....[1]

**(e)** An antibiotic which affects the elongation stage of the process in Fig. 2.1, is added shortly after initiation, such that truncated polypeptides are formed instead.

With reference to Fig. 2.1, suggest and explain how the antibiotic works to give rise to a tripeptide.

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.....[3]

**(f)** Tetracycline is an example of a ribosome-targeting antibiotic which is effective only towards bacterial cells.

Suggest why tetracycline has no effect on eukaryotes.

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.....[2]

**(g)** Discuss one problem of producing eukaryotic proteins using a prokaryotic host and how it can be overcome.

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.....[3]

**[Q2 Total : 12]**

**QUESTION 3**

Some beetles have spines on their legs to help them capture prey. Three alleles determine the presence and type of spines a beetle will produce. The inheritance of a single  $L^C$  allele produces curved spines on the legs. The  $L^s$  allele is recessive to  $L^C$  allele, and produces straight spines. Beetles that are homozygous recessive for the  $L^n$  allele produces no spines on its legs.

When a beetle with curved spines was crossed with a beetle with straight spines, they produced the following offspring:

62 curved spines  
28 straight spines  
30 no spines

**(a)(i)** Define the term homozygous.

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

**(a)(ii)** Draw a genetic diagram to show the cross between the beetle with curved spines and the beetle with straight spines described above.

.....[5]



**(iii)** If an F<sub>1</sub> offspring with curved spines was picked at random and test crossed with a beetle with no spines, what is the probability of producing beetles with no spines? Show your working.

.....[2]

**(b)** Explain how genotype is linked to phenotype.

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.....[4]

**[Q3 Total : 12]**

**Section B**

Answer one question.

Your answers should be illustrated by large, clearly labelled diagrams, where appropriate.

Your answers must be in continuous prose, where appropriate.

Your answers must be set out in sections (a), (b) etc., as indicated in the question.

- 4     (a) Using two examples, explain the significance of genetic engineering in improving the quality and yield of crop plants. [5]
- (b) Discuss the ethical implications of genetically modified crop plants. [5]
- (c) Explain the effects of temperature and carbon dioxide concentration on the rate of photosynthesis. [10]

[Total: 20]

**OR**

- 5     (a) A guppy (*Poecilia reticulata*) is a species of small fish which originates in the freshwater mountain streams of the islands of Trinidad and Tobago.
- It was observed in one stream, the guppies have bright and colorful rainbow markings, while in another nearby stream they would be less brightly colored.
- Explain how natural selection may bring about the evolution of the less brightly colored guppies in the other stream. [5]
- (b) Explain why variation is important in selection. [5]
- (c) Explain how gene mutations can result in diseases such as sickle cell anaemia. [10]

**- END OF PAPER -**