



Additional Assessment Materials
Summer 2021

Pearson Edexcel GCE (Biology A)

Resource Set Topic 6: Immunity, Infection and
Forensics

Question Paper

(Public release version)

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General guidance to Additional Assessment Materials for use in 2021

Context

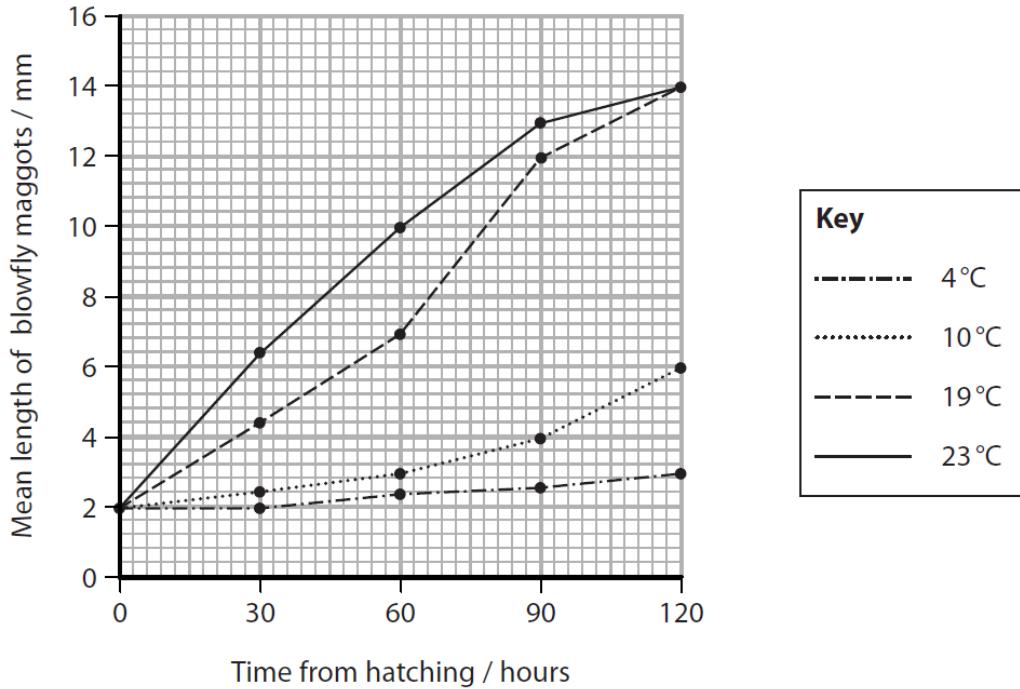
- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

2 One method of estimating the time of death is to determine the age of blowfly maggots on a dead body.

(a) The effect of environmental temperature on the growth of blowfly maggots is shown in the graph.



(i) Blowfly maggots found on a dead body had lengths between 3 and 8 mm. The body had been at a constant environmental temperature of 19°C since death.

Determine the maximum time since these maggots hatched.

(1)

..... hours

(ii) Determine the fastest rate of growth of a blowfly maggot at a temperature of 19°C.

Give your answer to 2 significant figures.

(2)

..... mm hour⁻¹

(iii) Explain the effect of temperature on the rate of growth of blowfly maggots.

(3)

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(b) Microorganisms are also found on a dead body.

Describe the role of decomposers, such as microorganisms, in the carbon cycle.

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(Total for Question 2 = 8 marks)

(ii) Interferon can be used to treat people with viral hepatitis.

Interferon can be made by animal cells or by genetically modified bacteria.

The table shows information about interferon made by these animal cells and genetically modified bacteria.

Source of interferon	Type of molecule	Folding	Antiviral activity
Animal cells	Glycoprotein	Correctly folded	High
Genetically modified bacteria	Protein	Incorrectly folded and needs to be refolded before it can be used	Low

Explain why the interferon made by genetically modified bacteria is different from the interferon made by animal cells.

(2)

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(iii) Glycoproteins made in animal cells are released into the extracellular fluid by

(1)

- A endocytosis
- B exocytosis
- C facilitated diffusion
- D phagocytosis

(Total for Question 3 = 12 marks)

- (c) The human gut contains more than a thousand species of bacteria. Only 30 to 40 of these species are found in the stomach.

Explain why there are relatively few species of bacteria in the stomach.

(2)

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(Total for Question 3 = 7 marks)

(c) Body farms use the bodies of pigs to study the changes in insect species on a body after death.

(i) Describe how this study could be carried out.

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(ii) Explain how the results of this study could be used to help to establish the time of death of a human.

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(Total for Question 5 = 12 marks)

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(c) A bacteriostatic antibiotic works by

(1)

- A** destroying bacteria
- B** destroying viruses
- C** preventing the multiplication of bacteria
- D** preventing the development of antibiotic resistance

(d) Hospitals have developed practices in response to the increase in hospital acquired infections.

Describe the infection control practices hospitals have introduced.

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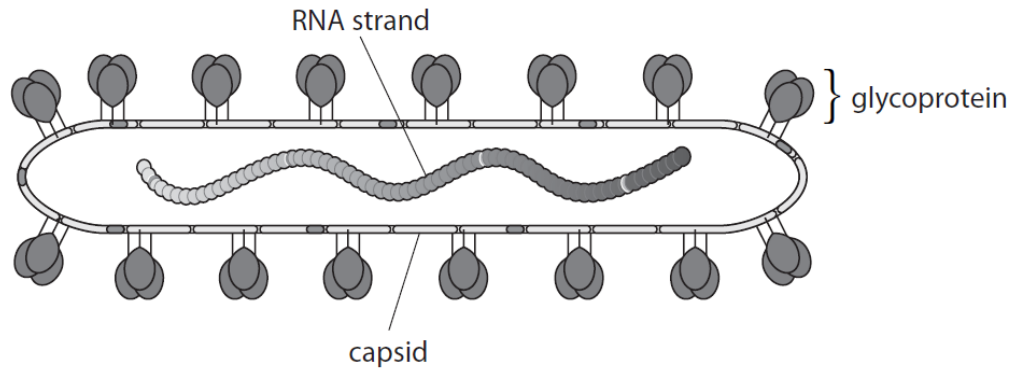
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(Total for Question 7 = 4 marks)

- 9 Ebola virus disease (EVD) is a rare and deadly disease most commonly found in Africa. Following a severe outbreak in 2014, in which 11 000 people died, work has been underway to develop a vaccine.

The diagram shows the structure of an Ebola virus.



- (a) Compare and contrast the structure of Ebola virus with that of the human immunodeficiency virus (HIV).

(3)

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(b) A vaccine has been developed by genetically modifying a virus that infects cattle. In the genetically modified virus, one of the genes was replaced with a gene for a protein found in the Ebola virus.

In a trial of 52 volunteers, 48 developed antibodies against the Ebola virus within 14 days of injection.

(i) The type of immunity given by this vaccine is (1)

- A artificial active immunity
- B artificial passive immunity
- C natural active immunity
- D natural passive immunity

(ii) Explain the role of T cells in the immunity to the Ebola virus that develops following the use of this vaccine.

(3)

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(Total for Question 9 = 7 marks)
TOTAL FOR TEST = 50 MARKS