



Additional Assessment Materials  
Summer 2021

Pearson Edexcel GCE in AS Biology

Topic 4: Exchange and Transport

(Public release version)

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## General guidance to Additional Assessment Materials for use in 2021

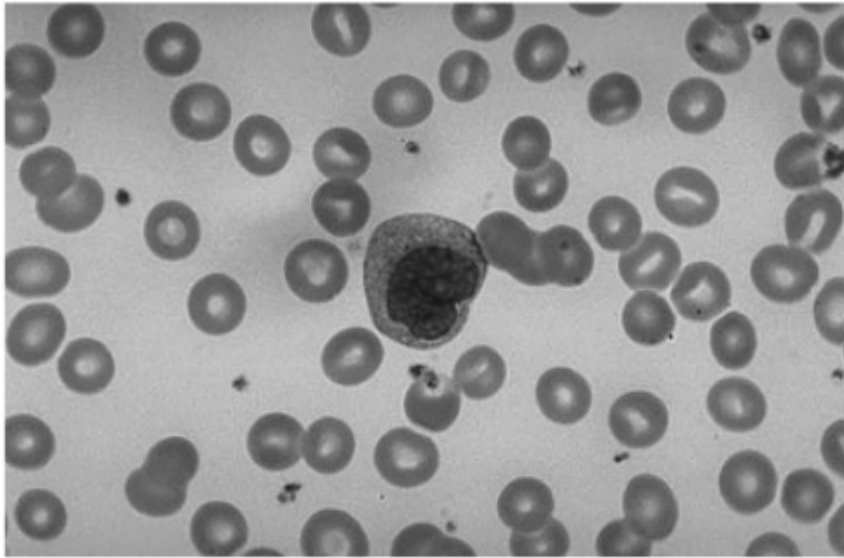
### Context

- 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- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.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.

1 The photograph shows blood cells as seen using a light microscope.



Source: Library.med.utah.edu

(a) Explain how the structures of erythrocytes and monocytes are related to their functions.

(3)

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(b) Blood is able to clot and prevent further blood loss from a cut.

Give **one** other function of blood clotting.

(1)

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(c) Doctors can measure the effectiveness of the clotting process using the prothrombin time test (PTT).

This test measures how long it takes for a sample of blood to clot.

Two groups of adults had their PTT recorded.

One group had liver disease and the other group was a healthy control.

The results are shown in the table.

Group	Mean PTT / seconds	Standard deviation / seconds
with liver disease	20.1	0.3
control	13.5	0.1

Analyse the data to deduce whether PTT is a useful indicator of liver disease.

(3)

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2 Substances move into and out of cells by different mechanisms.

(a) (i) Which of these mechanisms moves substances against a concentration gradient? (1)

- A active transport
- B diffusion
- C facilitated diffusion
- D osmosis

(ii) Which of these mechanisms enables non-polar molecules to pass through cell membranes? (1)

- A diffusion
- B facilitated diffusion
- C osmosis
- D transpiration

(b) Which of the following is usually found in a greater concentration in lymph than in blood? (1)

- A fatty acids
- B glucose
- C haemoglobin
- D oxygen

(c) The size of an animal can affect gas exchange.

As animals increase in size, their (1)

- A surface area decreases and volume increases
- B surface area to volume ratio decreases
- C surface area to volume ratio increases
- D surface area to volume ratio remains constant









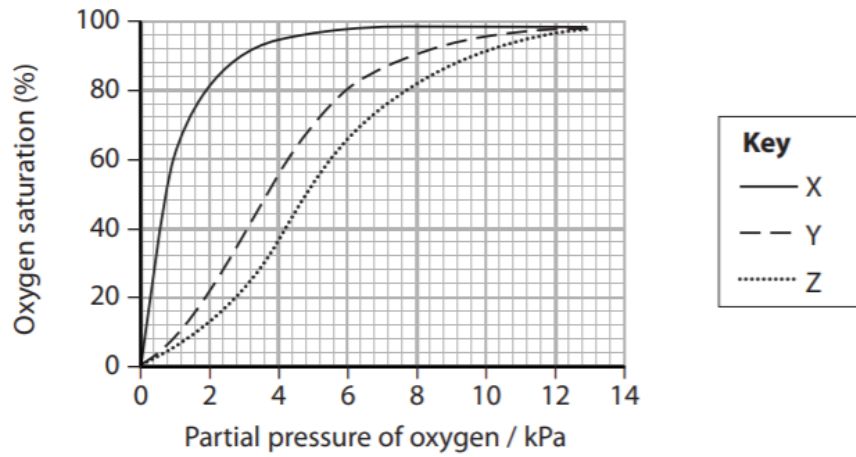




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(b) Northern elephant seals have a high concentration of haemoglobin in their blood.

The graph shows the oxygen dissociation curves for myoglobin, adult haemoglobin and fetal haemoglobin.



Which of the rows correctly matches each curve with myoglobin, adult haemoglobin and fetal haemoglobin?

(1)

	Myoglobin	Adult haemoglobin	Fetal haemoglobin
<input type="checkbox"/> A	X	Y	Z
<input type="checkbox"/> B	X	Z	Y
<input type="checkbox"/> C	Y	Z	X
<input type="checkbox"/> D	Z	X	Y

(c) Northern elephant seals are able to dive to great depths and hold their breath for up to two hours.

The tables show data for four diving mammals.

Species	Maximum time holding breath / min	Maximum diving depth / m	Mass of animal / kg
bottlenose dolphin	5	20	200
harbour seal	17	19	24
Weddell seal	82	400	400
Northern elephant seal	119	437	400

Species	Volume of oxygen in body / $\text{cm}^3 \text{kg}^{-1}$	Concentration of haemoglobin in blood / $\text{g dm}^{-3}$	Total blood volume / $\text{cm}^3 \text{kg}^{-1}$	Percentage of stored oxygen in different body tissues		
				lungs	blood	muscle
bottlenose dolphin	36	14	71	34	27	39
harbour seal	57	21	132	13	54	33
Weddell seal	87	210	173	5	66	29
Northern elephant seal	97	216	207	4	71	25

(i) Calculate the total mass of haemoglobin in a Northern elephant seal.

(3)

Answer .....

