Pearson Edexcel

Additional Assessment Materials Summer 2021

Pearson Edexcel GCSE in Biology (1BI0) Higher

Resource Set Topic 8: Exchange and transport

Questions

(Public release version)

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Additional Assessment Materials, Summer 2021

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- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.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

1b

(b) Figure 2 shows information about some of the components in the blood and in the filtrate in this part of the nephron.

component	concentration in the blood	concentration in the filtrate in the nephron
glucose	1.0mg per cm^3	1.0mg per cm^3
protein	47.0g per dm^3	0.0g per dm^3
red blood cells	4.5×10^6 per cm^3	0.0 per cm^3
white blood cells	8.0×10^3 per cm^3	0.0 per cm^3

Figure 2

(i) Calculate the difference in the number of red blood cells and the number of white blood cells in 1 cm^3 blood.

Give your answer in standard form.

(2)

(ii) Explain why there are differences in the concentrations of some components in the blood and some components in this part of the nephron.

(2)

2b

(b) Red blood cells are carried in veins and arteries.

Figure 4 shows the equipment used to measure the elasticity of an artery.

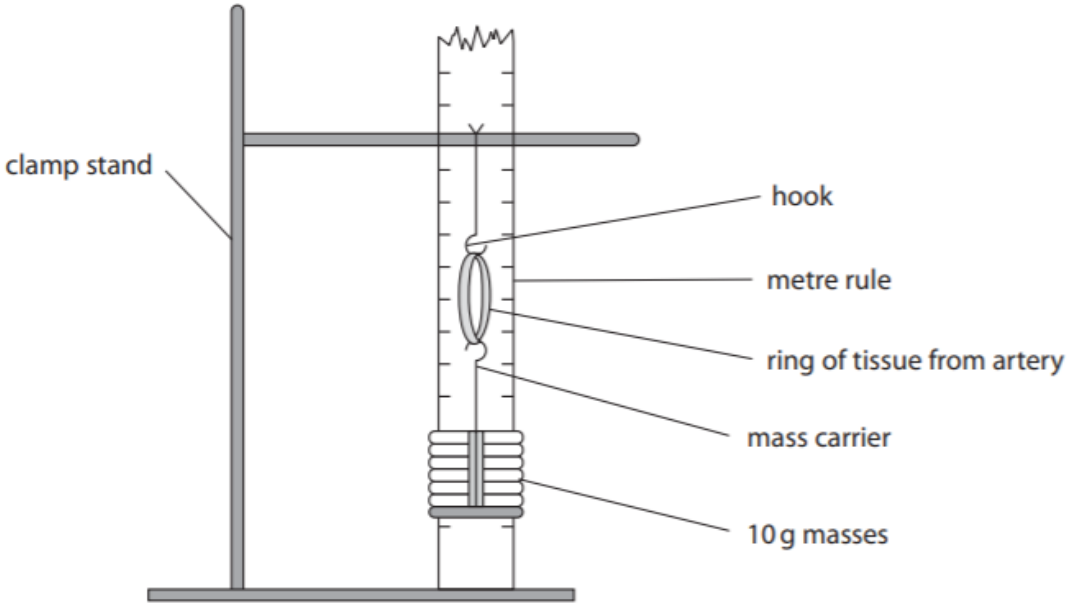


Figure 4

(i) Describe a method you could use to see how much the ring of tissue from an artery could stretch before it no longer returned to its original size.

(3)

(ii) Give **one** safety precaution you need to take when handling animal tissue such as blood vessels.

(1)

5 Figure 10 shows the estimated blood flow through some parts of the body when a person is at rest and during exercise.

part of the body	estimated rate of blood flow in cm^3 per minute	
	at rest	during exercise
brain	750	748
heart muscle	350	1 150
digestive system	2 500	1 200
other muscles	1 200	14 500
all other organs (except lungs)	1 423	1 420

Figure 10

(a) Compare the rate of blood flow through the body when this person is at rest and during exercise.

(3)

(b) Explain why there is a change in the rate of blood flow through the digestive system during exercise.

(2)

(c) The stroke volume is the amount of blood leaving one chamber of the heart per beat.

From which chamber of the heart does this volume of oxygenated blood flow?

(1)

- ☒ **A** left atrium
- ☒ **B** left ventricle
- ☒ **C** right atrium
- ☒ **D** right ventricle

(d) A person has a cardiac output of 4.9 litres per minute. The stroke volume of each heart beat is 70 ml.

Calculate the heart rate.

(2)

..... beats per minute

3 (a) A student investigated respiration in three different organisms.

Red hydrogencarbonate indicator was placed in each of three test tubes.

Gauze was placed in each test tube to hold the organisms.

In test tube 1 the student placed four germinating peas.

In test tube 2 the student placed four dried peas.

In test tube 3 the student placed four mealworms.

Bungs were added to each of the test tubes.

The three test tubes were left for one hour.

The equipment used is shown in Figure 3.

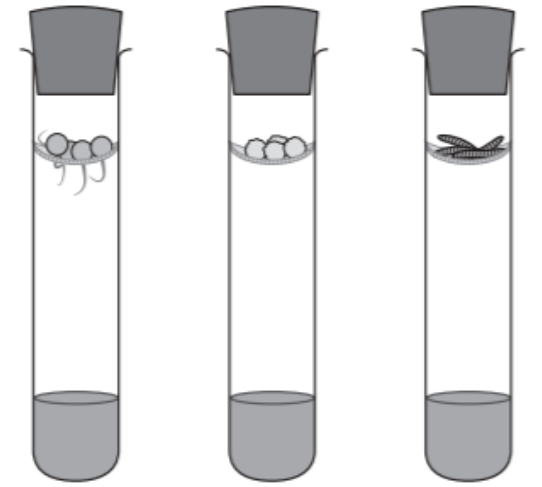


Figure 3

(i) State **two** ways this method could be improved to make the results for these three organisms more comparable.

(2)

1 .....

.....

2 .....

.....

(ii) Describe a suitable control for this investigation.

(2)

(b) Hydrogencarbonate indicator changes from red to yellow when more carbon dioxide is present.

The results for this investigation are shown in Figure 4.

organisms	colour of hydrogencarbonate indicator
germinating peas	yellow
dried peas	red
mealworms	yellow

Figure 4

(i) Explain why the result for the germinating peas is different from the result for the dried peas.

(2)

(ii) How was the carbon dioxide produced in this investigation?

(1)

- ☒ **A** by photosynthesis
- ☒ **B** when glucose is broken down in the presence of oxygen
- ☒ **C** when glucose is broken down in the absence of oxygen
- ☒ **D** by the reaction between oxygen and water

(c) Explain why cellular respiration is essential for living organisms.

(2)

8 (a) Figure 9 shows the stroke volume at different heart rates of a person who has trained for a marathon and of a person who has not trained for a marathon.

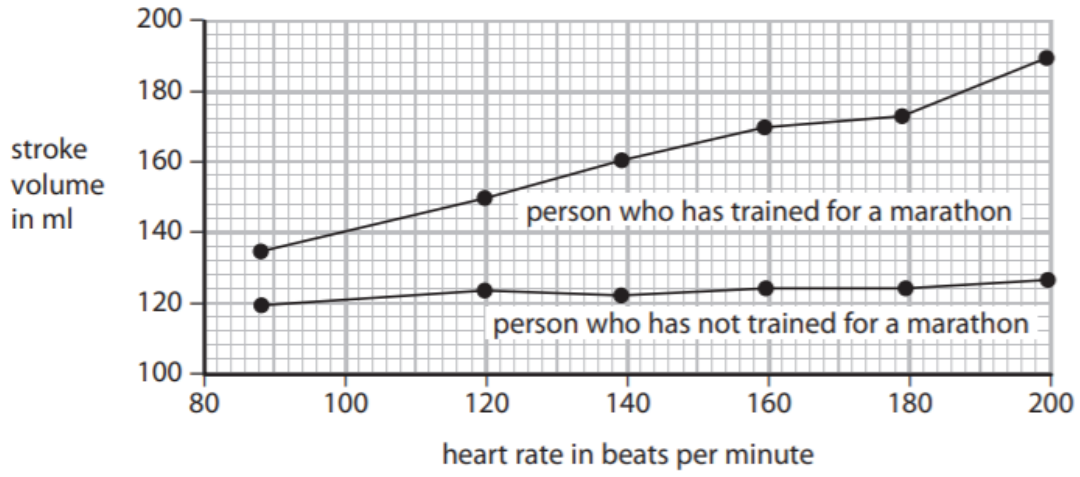


Figure 9

(i) Compare the effect of heart rate on stroke volume of the person who has trained for a marathon with the person who has not trained for a marathon.

(2)

(ii) Calculate the cardiac output for the person who has trained for a marathon when the heart rate is 160 beats per minute.
Give the units in your answer.

(3)

.....

*(b) Blood from the body enters the heart through the vena cava.

Describe how this blood flows through the heart and lungs to leave the heart through the aorta.

Include references to the chambers of the heart and the relevant valves in your answer.

(6)

9 (a) Figure 10 shows alveoli from a lung.

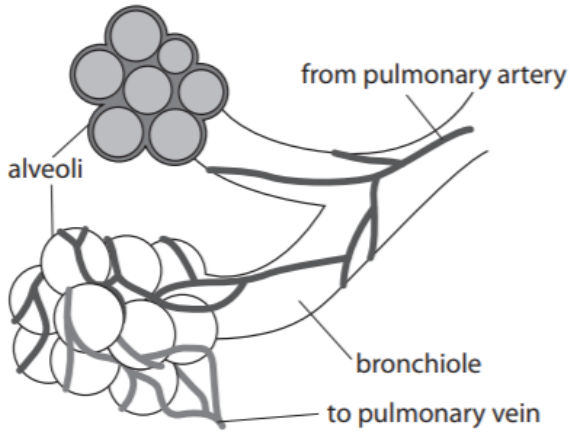


Figure 10

(i) Explain why these alveoli have the internal structure shown in Figure 10.

(3)

(ii) How does oxygen move across the alveolar membrane into the capillary?

(1)

☒ **A** by osmosis

☒ **B** by active transport

☒ **C** by diffusion

☒ **D** by respiration

(b) Figure 11 shows the movement of molecules across a membrane.

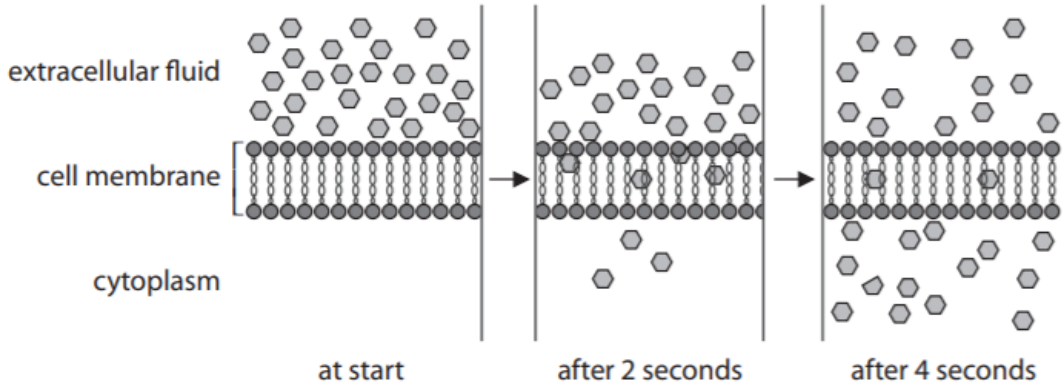


Figure 11

Describe how Figure 11 illustrates movement of molecules across a membrane.

(2)

*(c) Explain, using Fick's law, the factors that affect the diffusion rate of molecules into and out of cells.

(6)

3biii.

(iii) The starch grains in the potatoes became smaller as the starch was converted into glucose.

State why the potatoes need glucose.

(1)

6 (a) Figure 11 shows the time taken for blood to clot at different temperatures.

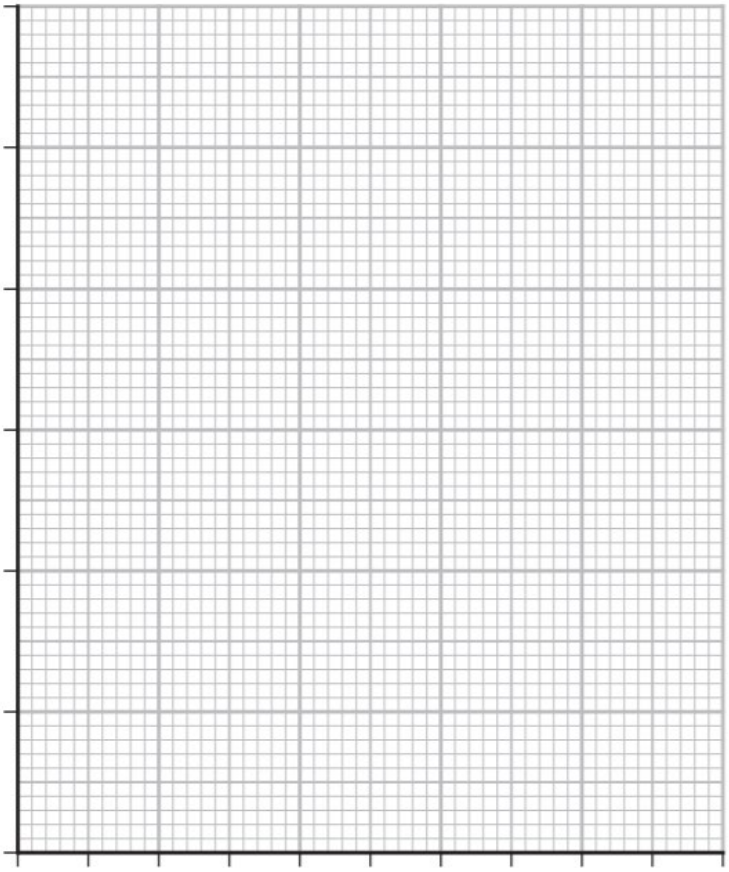
temperature in °C	time taken for blood to clot in seconds
5	90
15	70
25	55
35	40
45	110

Figure 11

(i) Draw a graph to show the data in Figure 11.

(3)

time taken for blood to clot in seconds



temperature in °C

(ii) Give **two** safety precautions that should be used when handling blood samples.

(2)

1 .....

.....

2 .....

.....

(b) (i) Which part of the blood causes blood to start clotting?

(1)

- ☒ **A** erythrocytes
- ☒ **B** lymphocytes
- ☒ **C** platelets
- ☒ **D** antibodies

(ii) Give **one** advantage of a blood clot forming.

(1)

.....

.....

(c) Explain how **one** structure of a vein helps the blood return to the heart.

(2)

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8 Figure 13 shows the heart rate of person A and person B.

Person A does not do any regular exercise.

Person B has been running regularly for one year.

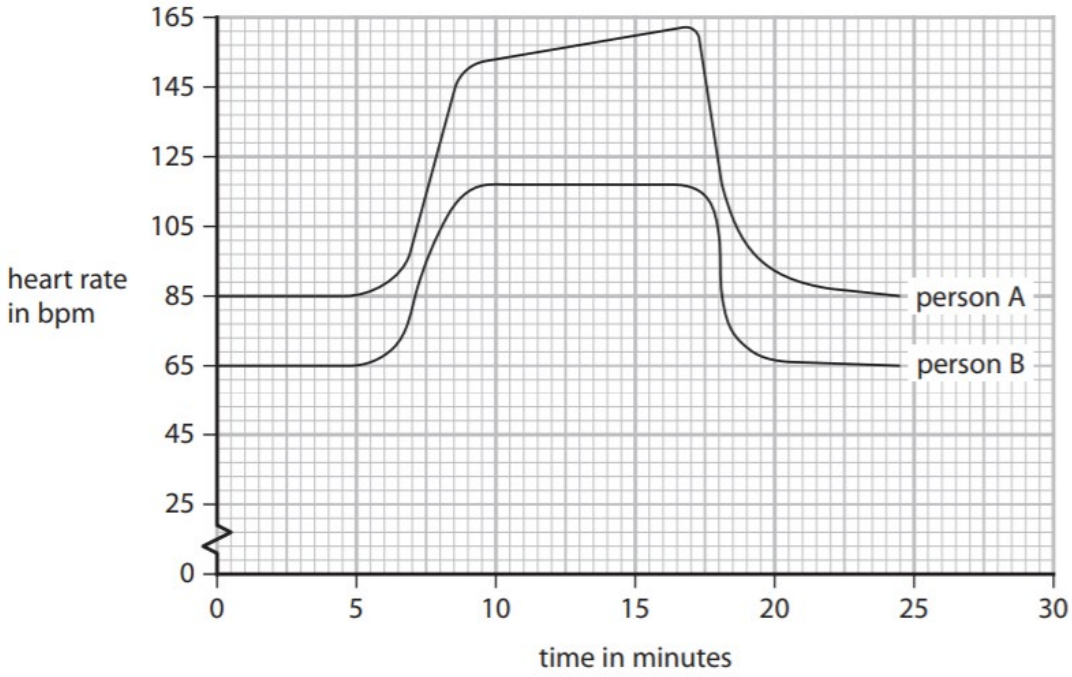

Figure 13

(a) Both people rested for the first 6 minutes, then did the same high intensity exercise for the next 12 minutes, then rested.

Compare the heart rates of person A with the heart rates of person B.

(4)

(b) The stroke volume for person B before exercising was 61 ml per beat.

Calculate the cardiac output for person B before exercising.

Give your answer in litres per minute.

(3)

..... litres per minute

(c) The cardiac output for person A during exercise was 5.5 litres per minute.

Explain why the heart rate for person A needed to be higher than the heart rate for person B during exercise.

(3)

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TOTAL = 68 MARKS