Pearson Edexcel

Additional Assessment Materials Summer 2021

Pearson Edexcel GCSE in Biology (1BI0) Higher

Resource Set Topic 5: Health, Disease and the Development of Medicines

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- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.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

2 (a) Obesity increases the risk of a person developing cardiovascular disease.

Losing weight can reduce the risk of this disease occurring.

Explain why exercise can cause weight loss.

(2)

(b) Figure 2 shows a gastric band fitted to a stomach.

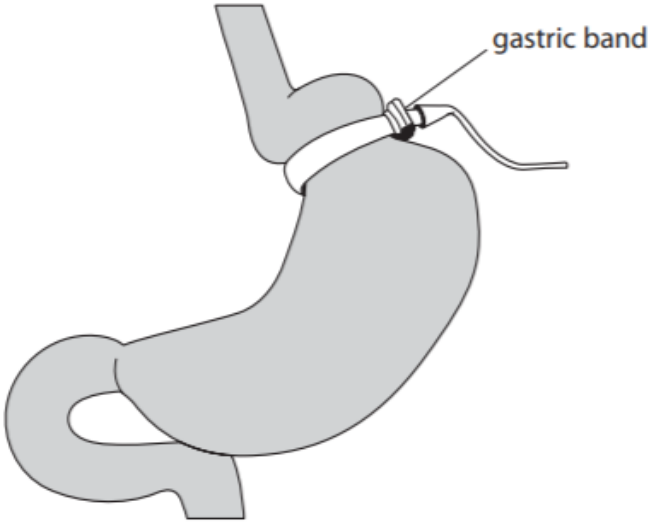

Figure 2

Explain how a gastric band helps a person to lose weight.

(2)

(c) BMI and waist:hip ratio can be used to find out if a person is obese.

Figure 3 shows some data for two males.

male	BMI	waist:hip ratio
A	27.3	0.85
B	?	0.81

Figure 3

BMI is calculated using the equation:

$$\text{BMI} = \frac{\text{mass in kilograms}}{(\text{height in metres})^2}$$

(i) Male B has a mass of 72 kg and a height of 1.81 m.

Calculate the BMI of male B.

Give the answer to 3 significant figures.

(3)

BMI = ...

(ii) Figure 4 shows the interpretation of BMI values.

BMI range	interpretation
below 18.5	underweight
18.5 – 24.9	normal
25.0 – 29.9	overweight
30.0 and above	obese

Figure 4

Males with a waist : hip ratio above 0.90 are defined as abdominally obese.

Explain what the BMI and waist : hip ratio for male A shows about his weight distribution.

(2)

4aiii.

(iii) An autoclave is used to prepare the agar growth medium used in Step 2.

Explain why the agar growth medium is autoclaved.

(2)

5 *Streptococcus* bacteria can cause a sore throat or skin infection.

An illness called scarlet fever can also develop during an infection with this bacterium.

(a) (i) Give **two** precautions a doctor should take when treating a patient who is infected with *Streptococcus*.

(2)

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.....

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(ii) From September 2013 to March 2014 there were 2830 cases of scarlet fever in the UK.

From September 2014 to March 2015 there were 5943 cases of scarlet fever.

Calculate the percentage increase of the number of cases of scarlet fever between the periods September 2014 to March 2015 and September 2013 to March 2014.

(2)

..... %

(b) Patients with scarlet fever can be treated with antibiotics.

New antibiotics need to be tested before they can be used in patients.

Which is the correct sequence for the development of a new medicine?

(1)

- ☒ **A** testing in healthy volunteers → testing using cultured cells → double blind trials on patients
- ☒ **B** testing using cultured cells → double blind trials on patients → testing in healthy volunteers
- ☒ **C** testing in healthy volunteers → double blind trials on patients → testing using cultured cells
- ☒ **D** testing using cultured cells → testing in healthy volunteers → double blind trials on patients

(c) Most cases of scarlet fever occur in children.

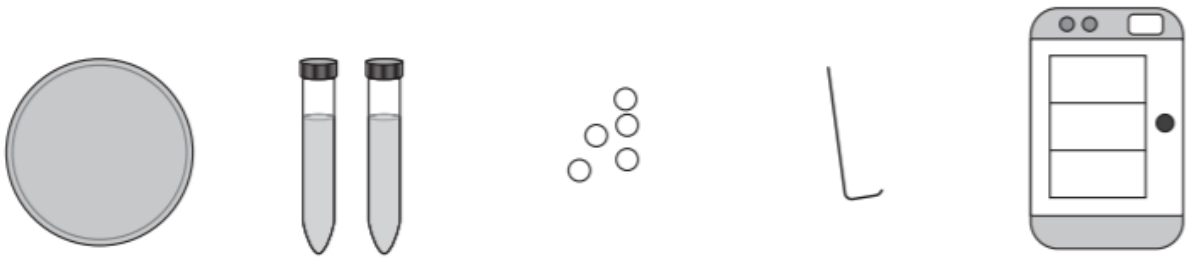
Adults have usually developed immunity to a toxin that the *Streptococcus* bacteria produce during infection.

Explain how an adult develops immunity to the toxin.

(3)

10 A scientist was planning to compare the effectiveness of the antibiotic myxopyronin on two different species of bacteria.

Figure 18 shows the equipment the scientist can use.



agar plates | two species of bacteria | filter discs of myxopyronin | spreader | incubator

Figure 18

(a) (i) Describe how the scientist could determine the effectiveness of myxopyronin on the two species of bacteria.

(2)

*(b) Infections can also be caused by viruses.

Describe the lytic pathway of a virus and how this causes the spread of infection through a population.

(6)

3 (a) *Clostridium tetani* is a bacterium that can be found in soil.

It causes the infection tetanus.

Children are vaccinated against tetanus.

Explain why these children do not get tetanus if the bacteria enter their body through a cut in the skin.

(3)

7 Measles is a disease caused by a virus.

(a) Describe the lytic pathway for a virus.

(3)

(c) Measles is prevented by immunisation.

(i) State **two** reasons why people might not be immunised against measles.

(2)

1 .....

.....

2 .....

.....

(ii) The spread of measles is prevented by herd immunity.

Describe herd immunity.

(2)

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.....

8 (a) LDL cholesterol is a type of cholesterol which increases the risk of heart disease.

Statins are drugs used to reduce LDL cholesterol levels.

Figure 12 shows the cholesterol levels in the blood of a man.

He started taking statins at the beginning of February and stopped taking them four months later.

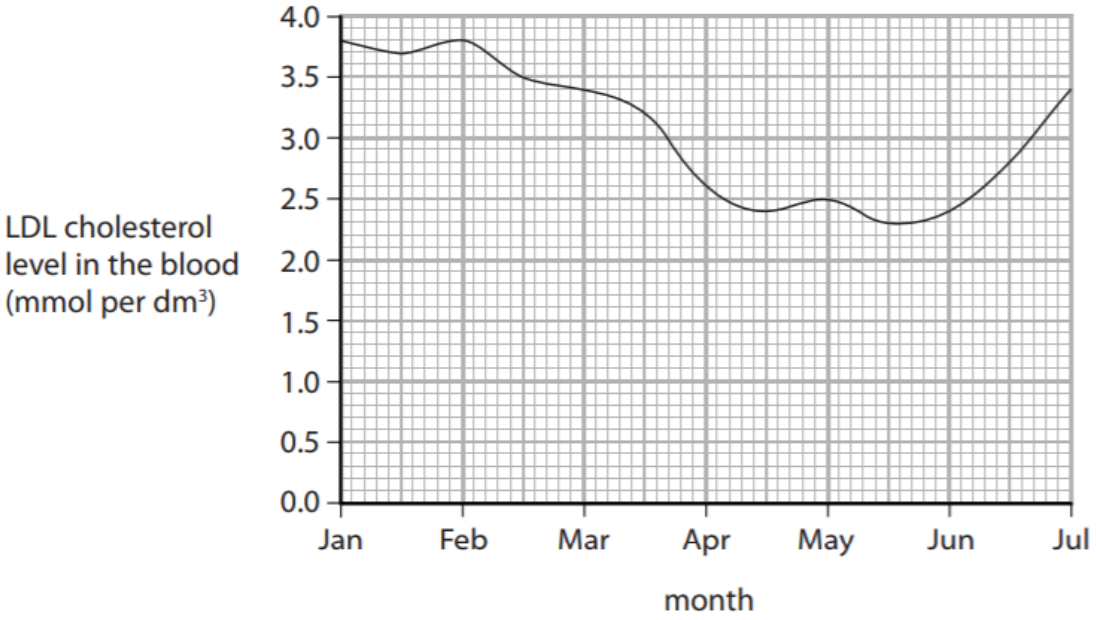

Figure 12

(i) Describe the effect of statins on LDL cholesterol levels in the blood.

Use data from the graph to support your answer.

(2)

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.....

(ii) Use evidence from the graph to explain why statins are usually prescribed as life-long medication.

(2)

(b) Which data can be used to calculate the man's BMI?

(1)

- ☒ **A** waist circumference and height
- ☒ **B** waist circumference and hip circumference
- ☒ **C** mass and height
- ☒ **D** mass and hip circumference

*(c) Gonorrhoea is a sexually transmitted bacterial infection.

Figure 13 shows the number of people diagnosed with gonorrhoea in the UK.

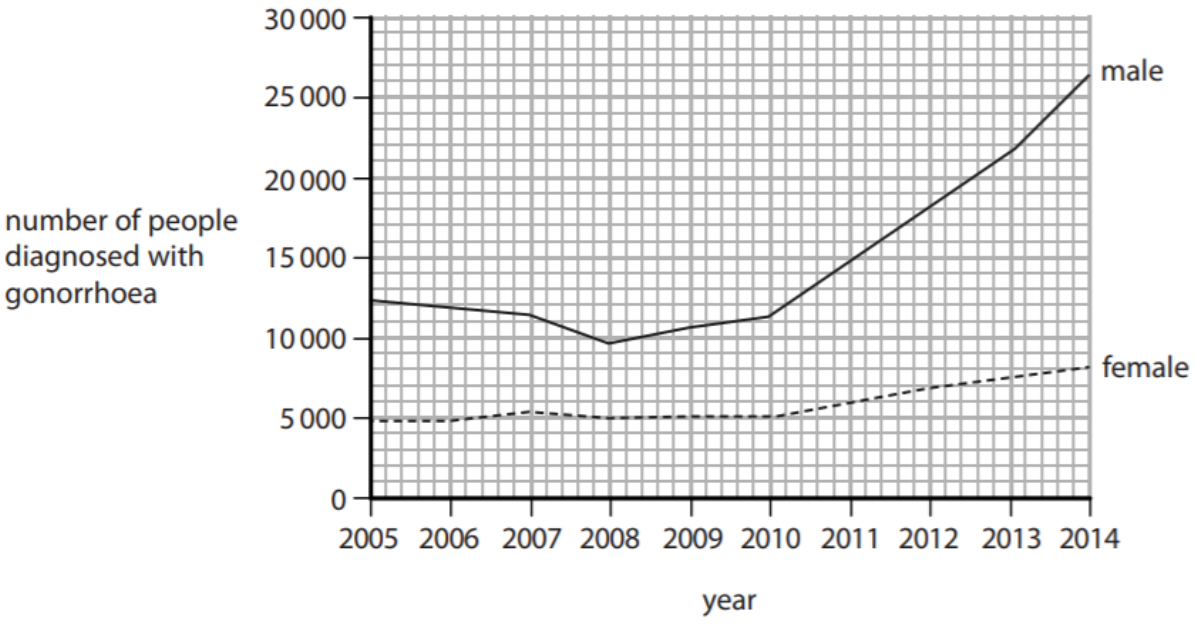

Figure 13

Explain how gonorrhoea is transmitted and how the number of people infected can be reduced.

Use data from the graph to justify why it is necessary to reduce the number of people infected.

(6)

1 Between 2013 and 2016 there was an outbreak of a disease called Ebola.

Ebola is estimated to have caused the deaths of more than 11 000 people.

(a) (i) Why is the number of deaths from Ebola only an estimate?

(1)

☒ **A** many people were immune to Ebola

☒ **B** many deaths were not confirmed to be caused by Ebola

☒ **C** Ebola does not spread easily

☒ **D** Ebola does not cause any symptoms

(ii) State how Ebola is spread from person to person.

(1)

(iii) The lytic pathway is part of the lifecycle of the Ebola virus.

After infection of the host cell, components of the virus are produced.

Describe the next stages of the lytic pathway.

(2)

(b) The genetic material of a virus can also be inserted into the genome of the host.

(i) Name this type of pathway.

(1)

2 (a) The human immunodeficiency virus (HIV) can cause AIDS.

Which type of cell is destroyed by the HIV virus?

(1)

- ☒ **A** red blood cell
- ☒ **B** nerve cell
- ☒ **C** white blood cell
- ☒ **D** sperm cell

(b) Describe how the specific immune system defends the body against disease.

(3)

(c) Figure 1 shows the number of people per million **of the population** in five European countries who were diagnosed with measles in one year.

country	number of people diagnosed with measles per million of the population
Belgium	21.00
France	15.63
Germany	8.42
Italy	20.06
Norway	0.05

Figure 1

(i) The population of Belgium in that year was 11.18 million.

Calculate the number of people in Belgium diagnosed with measles.

Give your answer to three significant figures.

(3)

..... people

(ii) Countries do not report the total number of people diagnosed with measles. Countries report the number of people diagnosed with measles per million of the population.

Give **one** reason why this is better.

(1)

.....

.....

(iii) Give **one** reason why the number of people per million diagnosed with measles is different in these countries.

(1)

.....

.....

.....

7 Bacteria grown in a liquid medium is called a bacterial culture.
As the number of bacteria increases the bacterial culture becomes opaque.
This is because light is absorbed by the bacterial culture.

(a) To measure the increase in the number of bacteria, a scientist took a sample from the culture every 20 minutes.

The apparatus shown in Figure 7 detects the amount of light transmitted through the bacterial sample and uses it to calculate the amount of light absorbed.

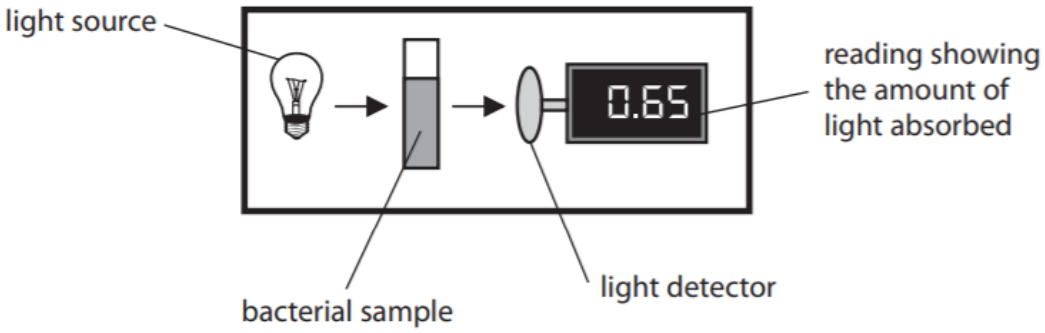

Figure 7

(i) Give **two** aseptic techniques the scientist should use when taking samples from the bacterial culture.

(2)

1 .....

.....

2 .....

.....

.....

(ii) Figure 8 shows the amount of light absorbed by the bacterial sample.

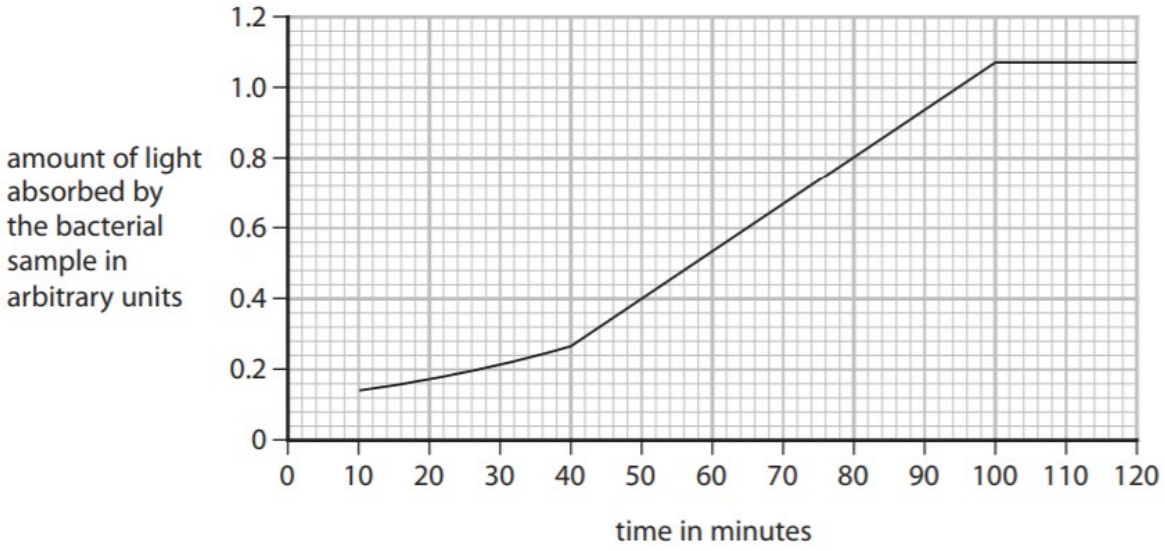

Figure 8

The bacterial population increases rapidly between 40 and 100 minutes.

Calculate the time taken for the amount of light being absorbed by the bacterial sample to double from 0.5 to 1.0 arbitrary units.

(2)

..... minutes

(iii) The scientist put a small sample of the bacteria on a microscope slide and used a magnification of ×1000 to view the sample.

The bacteria could not be seen very clearly.

Give **one** improvement the scientist could make to view the bacteria more clearly.

(1)

.....

.....

9 Cancer Research UK found that many people do not realise that obesity is linked to an increased risk of developing cancer.

In the body, fat tissue sends signals that cause other cells to divide.

(a) (i) Describe how this could cause cancer to develop.

(3)

(iii) Obesity is linked to 1 in 20 cases of **all** types of cancer.

Approximately 13% of cases of bowel cancer are caused by obesity.

Determine how the impact of obesity on bowel cancer compares to the impact of obesity on all types of cancer.

(2)

(b) Two men have the same mass of 80 kg.

One man's BMI is categorised as normal weight, the other man's BMI is categorised as obese.

Explain why the men have different BMI values.

(2)

(c) Obesity can also cause cardiovascular disease to develop.

Describe the different treatments available for cardiovascular disease.

(3)

TOTAL = 77 MARKS