Pearson Edexcel

Additional Assessment Materials Summer 2021

Pearson Edexcel GCSE in Biology (1BI0) Foundation

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- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

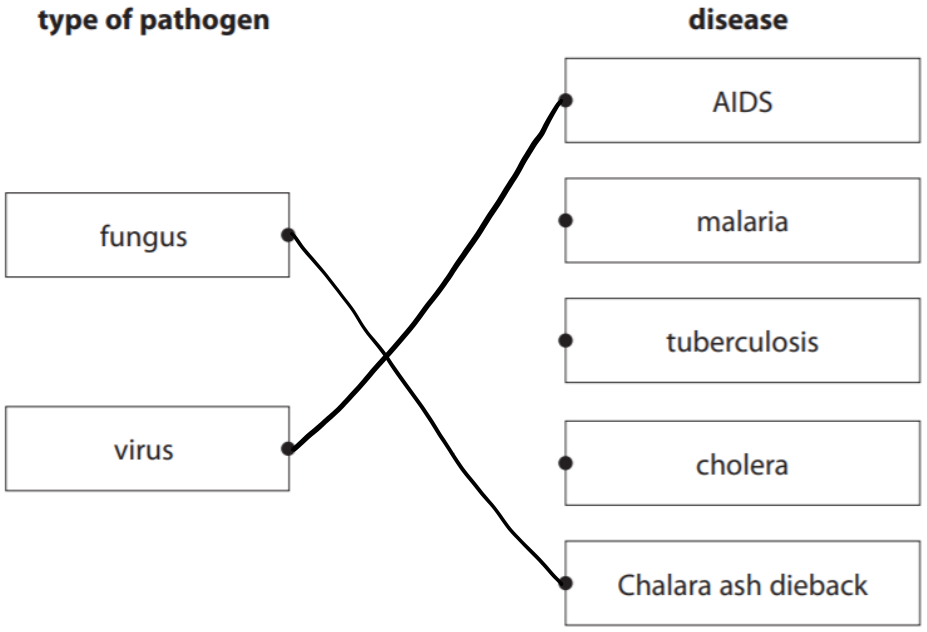
Purpose

- 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.

1 (a) Pathogens cause disease.

Draw one straight line from each type of pathogen to the disease that is caused by that pathogen.

(2)



(b) Antibiotics can be used to treat diseases.

Antibiotics kill

(1)

- ☒ **A** antibodies
- ☒ **B** antigens
- ☒ **C** bacteria
- ☒ **D** viruses

(c) Figure 1 shows the number of white blood cells in blood samples from three patients.

	Patient X	Patient Y	Patient Z
Number of white blood cells per µl	8 500	5 700	12 500

Figure 1

Explain why the data suggests that Patient Z has a bacterial infection.

(2)

- highest number of white blood cells per µL
- bacterial infection will trigger immune response where increase in number of white blood cells to destroy / kill bacteria by phagocytosis and/or lymphocytosis by producing more/lots of antibodies

(d) HIV is diagnosed by blood tests.

State **two** safety precautions that need to be taken when handling blood samples.

(2)

1 wear gloves when handling blood samples

2 dispose samples safely

7.

*(b) Explain how plants protect themselves from being eaten by pests and against diseases caused by pathogens.

(6)

PHYSICAL DEFENCES
- plant leaves have waxy cuticles which are impermeable
- plant cells have cell walls made of cellulose which are difficult for pests or pathogens to penetrate
- some plants have spines or hairs which deter pests

CHEMICAL DEFENCES
- chemicals can deter pests
- production of chemicals which are toxic to pests and pathogens
- chemicals have anti-microbial properties
- unpleasant taste & smell which deters pest

8 (a) Cirrhosis is a disease caused by prolonged alcohol abuse.

(i) Prolonged alcohol abuse causes cirrhosis of the

(1)

☒ **A** brain

☒ **B** liver

☒ **C** heart

☒ **D** skin

(ii) Give **one** reason why cirrhosis is described as a non-communicable disease.

(1)

cannot be spread from one person to another

(b) 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)

- exercise requires energy from respiration
- obtained from fat

(c) Figure 8 shows a gastric band fitted to a stomach.

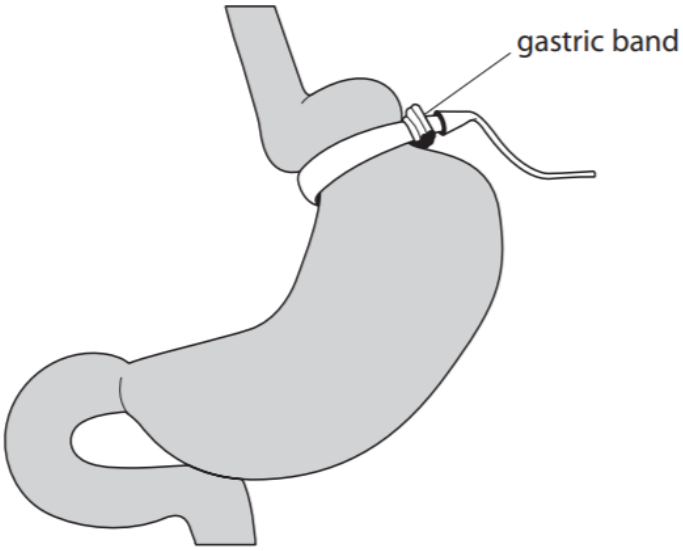


Figure 8

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

(2)

- reduces volume of stomach
- reduces food intake
- stored fat is used up

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

Figure 9 shows some data for two males.

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

Figure 9

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)

$$\text{BMI} = \frac{72}{1.81^2} = 21.977$$

$$\simeq 22.0$$

BMI = 22.0

(ii) Figure 10 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 10

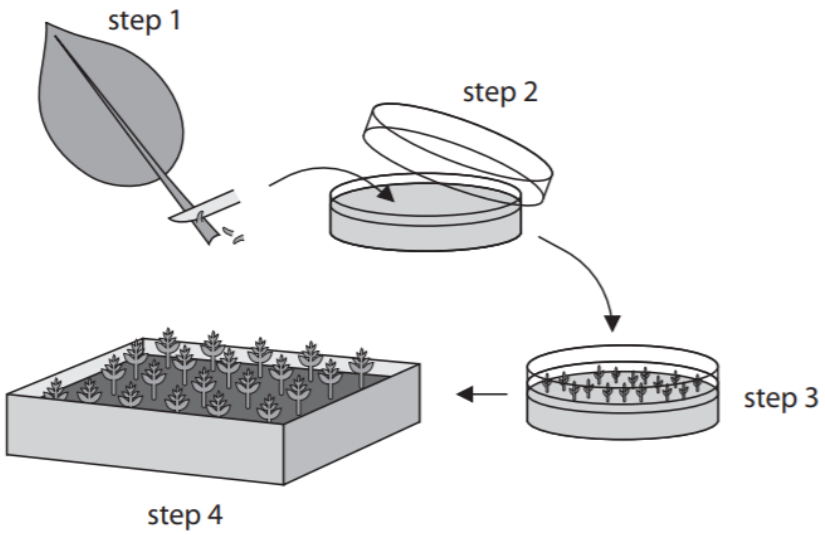
Males with a waist : hip ratio above 0.90 are defined as abdominally obese.

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

(2)

- BMI shows male A is overweight but his waist : hip ratio shows he is not abdominally obese
- male A's weight distribution is not around abdomen

10 (a) Figure 15 shows a method of producing plants.



Step 1. Cells taken from parent plant.

Step 2. Cells placed on agar growth medium.

Step 3. Cells develop into tiny plantlets.

Step 4. Plantlets grown in compost.

Figure 15

(i) Some cells in each plantlet develop into root cells.

Name the process occurring as these cells develop into root cells.

(1)

differentiation

(ii) Describe the advantages of producing plants by the method shown in Figure 15.

(2)

- many plants produced
- genetically identical with desired characteristics

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

Explain why the agar growth medium is autoclaved.

(2)

- sterilises agar growth medium
- destroys unwanted bacteria / pathogens
- so microorganisms don't affect growth of plantlets

(iv) One of the plantlets had different coloured leaves.

Give **one** reason why this plantlet had different coloured leaves.

(1)

mutation

3 (a) Chlamydia is caused by a pathogen.

(i) Chlamydia is transmitted by

(1)

- ☒ **A** insect vectors
- ☒ **B** sneezing
- ☒ **C** sexual intercourse
- ☒ **D** contaminated food

(ii) The type of pathogen that causes chlamydia is a

(1)

- [x] **A** bacterium
- [ ] **B** fungus
- [ ] **C** protist
- [ ] **D** virus

(b) Figure 3 shows the number of cases of chlamydia in the United Kingdom per 100 000 people between 1996 and 2013.

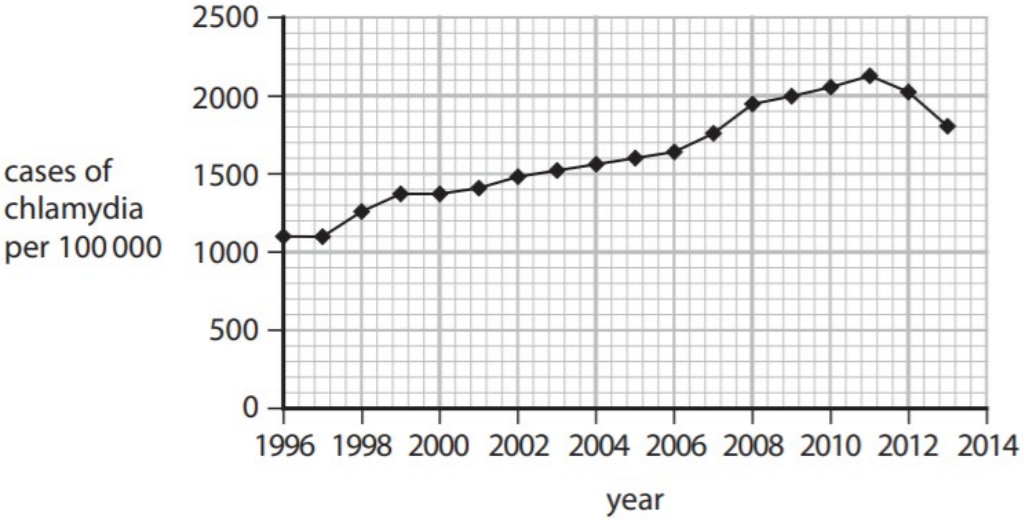


Figure 3

(i) Describe the trend in the number of cases of chlamydia between 1996 and 2013.

(2)

- general increase in number of cases by 1000 cases per 100 000 from 1996 to 2011
- however decrease afterwards by 300 at 2013

(ii) State the number of cases of chlamydia per 100 000 in 2013.

(1)

1800

(iii) The population of the United Kingdom in 2013 was 64 000 000.

Calculate the number of people with chlamydia in 2013.

(2)

1800 per 100 000

x640 ↳ ↳ x 640

1152000 64 000 000

1152000

4 (a) Figure 4 shows the structures in a leaf.

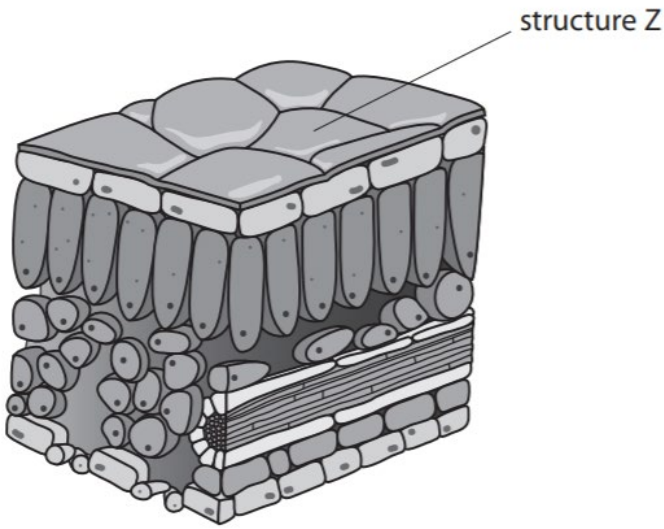


Figure 4

Explain how structure Z is involved in defence against pathogens.

(2)

- waxy cuticle
- impermeable and pathogens cannot penetrate through this layer to enter

(b) Chemicals can be extracted from plants.

Some of these chemicals can kill bacteria.

A scientist spread some bacteria on a nutrient agar plate as shown in Figure 5.

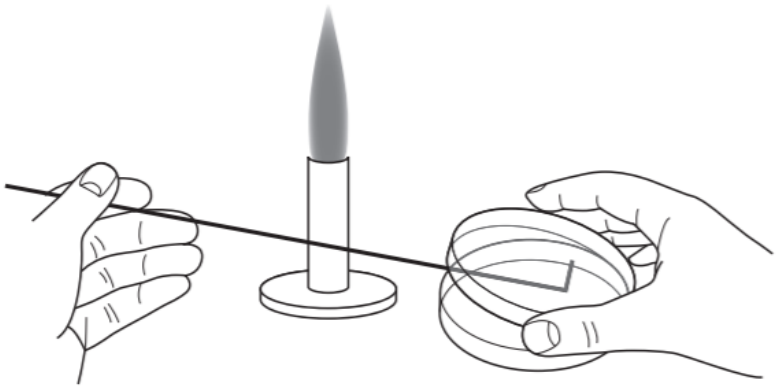


Figure 5

(i) What is being shown in Figure 5?

(1)

- ☒ **A** aseptic technique
- ☒ **B** cloning
- ☒ **C** genetic engineering
- ☒ **D** selective breeding

(ii) Explain why the scientist worked near to a Bunsen burner.

(2)

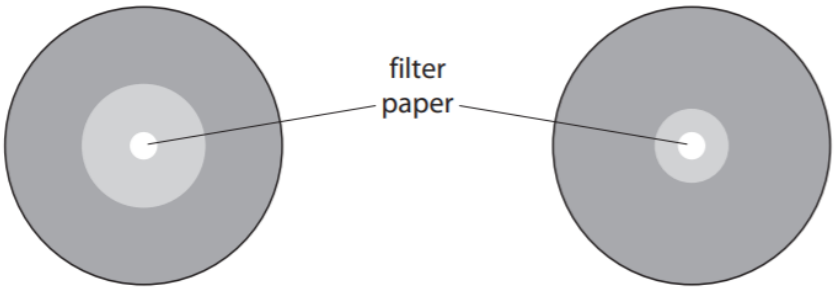
- bunsen flame is hot so heats up air around so air current flow towards up so prevents pathogens falling down near petri dish
- bunsen flame is hot so kills pathogens

(c) A scientist spread bacteria onto the surface of two agar plates.

A filter paper disc was placed in the centre of each plate.

Each filter paper disc had been soaked in a different chemical extracted from plants.

The results are shown in Figure 6.



chemical A	chemical B
radius of zone of inhibition = 12 mm	radius of zone of inhibition = 8 mm

Figure 6

(i) The area of a circle is calculated using πr^2.

Calculate the area of the zone of inhibition for chemical A.

Use $\pi = 3.14$

(2)

$3.14 \times 12^2 = 452.16 \text{ mm}^2$

452.16 mm²

(ii) The scientist concluded that chemical A was more effective than chemical B at killing bacteria.

Give **two** variables the scientist needed to control to make this conclusion valid.

(2)

1 same concentration of chemicals

2 same size & thickness of filter paper

9 (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)

- vaccination has modified/weakened form of Clostridium tetani bacterium
- it has antigens which when detected, white blood cells differentiate into plasma cells to produce antibodies and into memory cells
- same bacterium in body activates memory cells to make lots of complementary antibodies and quickly as well to kill bacterium before harming body cells and tissues

(b) Colistin is an antibiotic used to treat infections in the bloodstream.

Some bacteria are resistant to Colistin.

Explain how these bacteria have become resistant to Colistin.

(4)

- a population of bacteria at the start
- mutation makes some resistant to Colistin
- when antibiotic used, kill most of bacteria but those with resistance allele survive due to selective advantage
- they pass an advantageous allele to offspring as they reproduce for next generation
- reproduction creates a new colony, population of resistant bacteria

4.

(d) Some drugs used to treat cancer are taken into cells by active transport.

Figure 8 shows some causes of preventable cases of cancer in 2015.

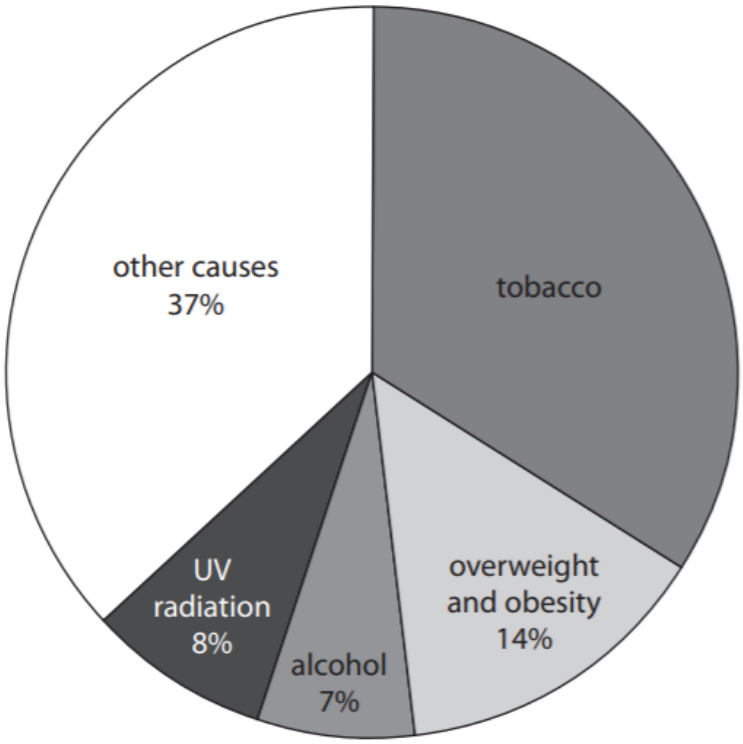


Figure 8

(i) What is the percentage of preventable cases of cancer that are caused by tobacco?

(1)

☒ **A** 41%

☒ **B** 37%

☒ **C** 34%

☒ **D** 26%

(ii) In 2015, data from Cancer Research UK suggested that 163 440 cases of cancer could have been prevented.

Calculate the number of preventable cases of cancer caused by alcohol.

Give your answer to the nearest whole number.

(2)

$163440 \times \frac{7}{100} = 11440.8$

number of preventable cases of cancer caused by alcohol 11441

7.

(c) The eye can be infected by bacteria.

State the type of drug used to treat infections caused by bacteria.

(1)

antibiotics

8 (a) Measles is a communicable disease caused by a virus.

(i) What can a virus also be classified as?

(1)

- ☐ **A** a bacterium
- ☐ **B** a fungus
- ☒ **C** a pathogen
- ☐ **D** a protist

(ii) Give **one** reason why measles is described as a communicable disease.

(1)

can spread from one individual to another

(b) 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

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

(3)

- pathogen has antigens which when detected, white blood cells differentiate into plasma cells to produce antibodies and into memory cells
- antibodies are specific & complementary to antigens forming antibody - antigen complex

(d) Figure 13 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 13

(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)

11.18 million x 21.00

= 234.78

235 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)

so more comparable as different countries have different population size

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

(1)

different countries have different education, health care and sanitation systems

TOTAL = 68 MARKS