Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | | | | | |

Candidate Number | | | | |

Tuesday 12 May 2020

Afternoon (Time: 1 hour 45 minutes)

Paper Reference **1BI0/1H**

Biology

Paper 1

Higher Tier

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an **asterisk** (*), marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 6 2 0 7 0 A 0 1 2 8

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Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

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)

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(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)

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

(i) Name this type of pathway.

(1)

.....

(ii) State what is meant by the term genome.

(1)

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(Total for Question 1 = 6 marks)

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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)

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(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

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(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)

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

(1)

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(Total for Question 2 = 9 marks)

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3 Figure 2 shows a banana plantation.



© warmer/Shutterstock

Figure 2

After the bananas have been harvested, the old plants are cut down.

The suckers then develop into mature plants producing the next crop of bananas.

The tip of each sucker contains a group of cells called a meristem.

(a) (i) Describe the function of a meristem in the growth of a plant.

(2)

(ii) A student took a sample of cells from a meristem to view under a light microscope.

Describe how the student would prepare a microscope slide using these cells.

(3)

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(b) Figure 3 is a drawing of a eukaryotic cell.

Structure **Z** is found in plant leaf cells.

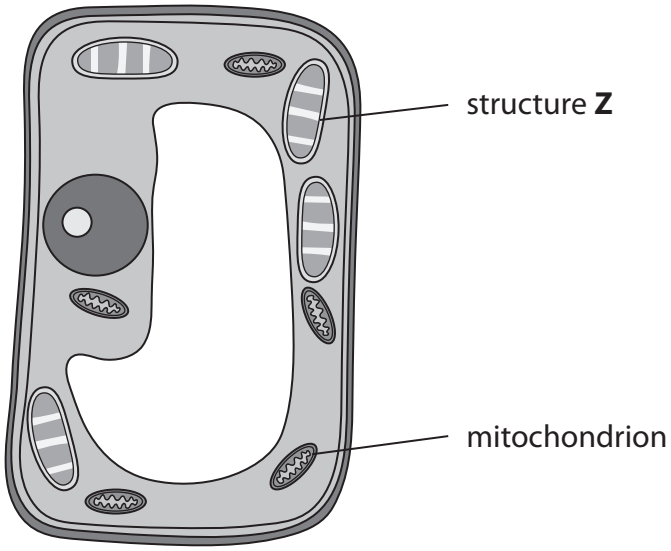


Figure 3

(i) Name structure **Z**.

(1)

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(ii) Give **one** function of the mitochondrion.

(1)

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(iii) Describe how a prokaryotic cell is different from the cell in Figure 3.

(2)

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(Total for Question 3 = 9 marks)

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4 Gregor Mendel used pea plants in plant breeding experiments. He discovered the basis of genetic inheritance.

(a) He cross-bred tall pea plants with short pea plants.

All the offspring were tall, as shown in Figure 4.

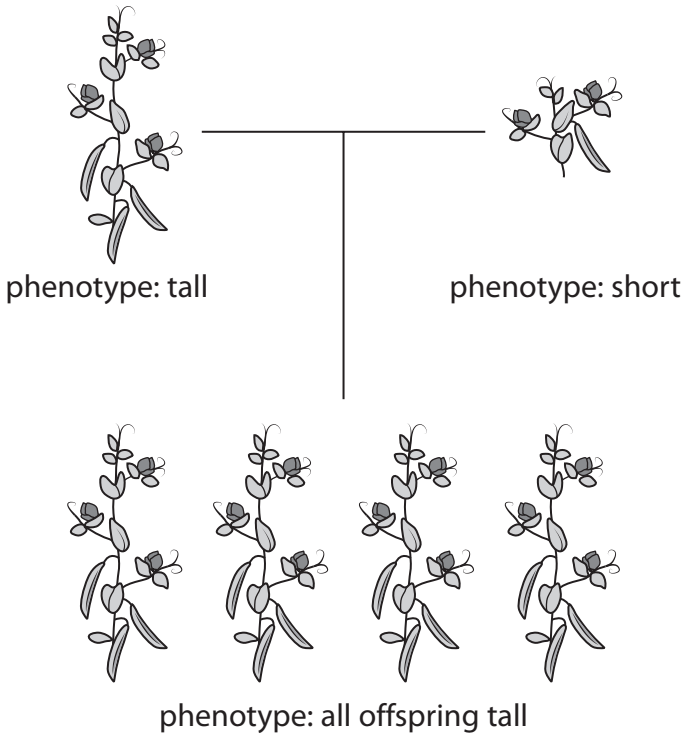


Figure 4

(i) Explain why the offspring are all tall.

(2)

(ii) In this investigation, the parent pea plants were grown in a warm, closed greenhouse.

Give **two** reasons why the parent pea plants were grown in a warm, closed greenhouse.

(2)

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2 .....

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(b) Pea plants produce different coloured peas.

The allele for yellow-coloured peas (A) is dominant to the allele for green-coloured peas (a).

Two heterozygous parent plants were used in a genetic cross.

(i) Predict, using the Punnett square, the percentage probability that this cross will have offspring that produce green-coloured peas.

(3)

percentage probability of green-coloured peas = ... %

(ii) Explain **one** advantage to pea plants of using sexual reproduction to produce offspring.

(2)

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(c) Peas contain small amounts of fat.

Describe a test to identify fat.

(2)

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(Total for Question 4 = 11 marks)

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5 Figure 5 shows a great tit on a bird feeder.



© taviphoto/Shutterstock

Figure 5

Scientists have found that great tits living now have longer beaks than great tits living 50 years ago.

Genetic analysis shows changes in the sequence of the bird's DNA.

(a) (i) Give the complementary strand sequence for this DNA template.

(1)

A	T	G	T	T	A	C	G	T
:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:

(ii) Which statement correctly describes a DNA molecule?

(1)

☒ **A** two strands joined together by strong bonds to form a double helix

☒ **B** two complementary bases twisted into a double helix by strong bonds

☒ **C** a double helix with strands joined by hydrogen bonds between bases

☒ **D** four complementary strands joined together with hydrogen bonds

(iii) State the term used to describe a change in the sequence of DNA bases.

(1)

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(b) Scientists think that great tits living now have longer beaks because of the increased use of bird feeders during the last 50 years.

Explain how natural selection could have caused an increase in beak length because of the use of bird feeders.

(4)

(c) Birds are classified in the domain Eukarya.

(i) Why are the cells from birds described as eukaryotic?

(1)

- ☒ **A** they have membrane-bound organelles
- ☒ **B** they do not have nuclei
- ☒ **C** they have a rigid cell wall
- ☒ **D** they have a cell membrane

(ii) Give **one** reason why the three domain classification system was proposed.

(1)

(Total for Question 5 = 9 marks)

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6 (a) A student mixed 10 cm^3 of starch solution with 5 cm^3 of amylase solution and kept the tube in a water bath at 25 °C.

The student tested the solution for starch and for glucose every 30 seconds.

Figure 6 shows the results.

time in seconds	starch detected	glucose detected
0	Yes	No
30	Yes	No
60	Yes	Yes
90	Yes	Yes
120	Yes	Yes
150	No	Yes
180	No	Yes

Figure 6

(i) Give **one** reason for the result at 150 seconds.

(1)

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(ii) Another student repeated the investigation with the same volumes of solutions and at the same temperature of 25 °C.

Give **two** other variables that would need to be controlled in the investigation.

(2)

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2 .....

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(iii) Both students also included a tube containing 10 cm^3 of starch solution with 5 cm^3 of distilled water instead of 5 cm^3 of amylase solution.

They tested the solution for starch and for glucose every 30 seconds.

Give **one** reason why this tube was included in their investigations.

(1)

(b) Amylase has an optimum pH of 6.8.

Devise a method the students could use to confirm the optimum pH for amylase.

(3)

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(c) Amylase is produced by salivary glands and the pancreas.

Explain why amylase is not produced in the stomach.

(3)

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(Total for Question 6 = 10 marks)

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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.

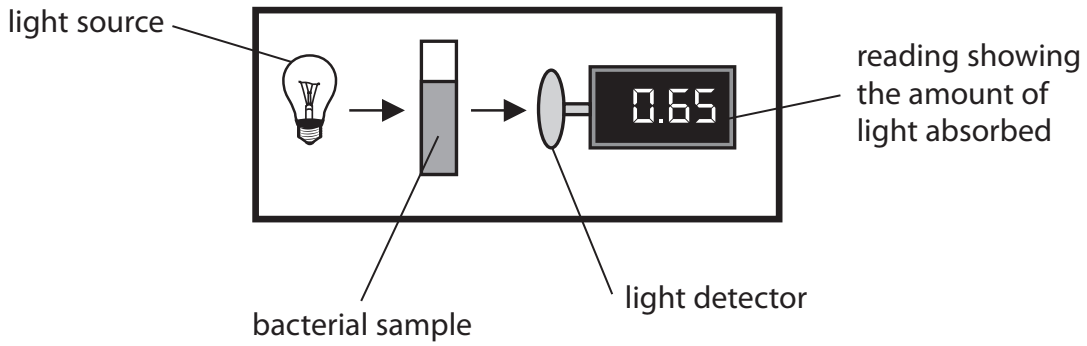


Figure 7

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

(2)

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2 .....

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

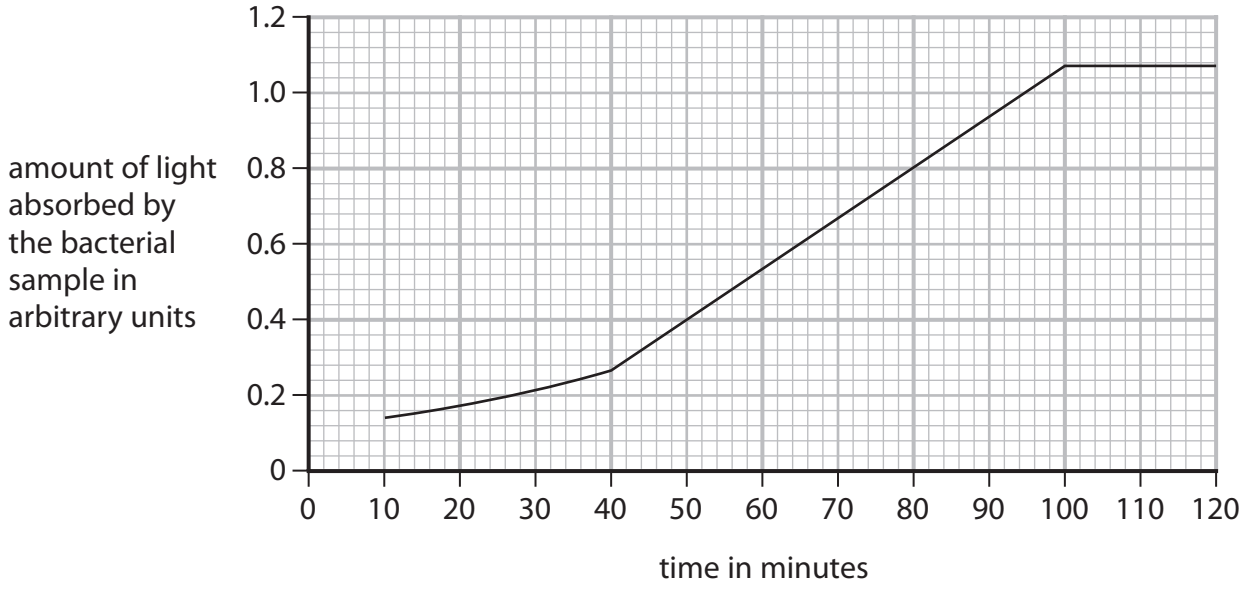


Figure 8

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)

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(b) Some bacteria contain a gene that produces a toxin that can kill insects.

This gene can be inserted into the genome of a crop plant.

(i) What method is used to insert the gene from the bacteria into the crop plant?

(1)

☒ **A** selective breeding

☒ **B** asexual reproduction

☒ **C** genetic engineering

☒ **D** tissue culture

*(ii) Discuss the advantages and disadvantages of growing crop plants that produce a toxin that can kill insects.

(6)

(Total for Question 7 = 12 marks)

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8 (a) The reaction time of five people was tested using a computer.

These people were then given 100 cm^3 of a liquid to drink.

Their reaction times were recorded 10 minutes after drinking the liquid.

Figure 9 shows the results.

person	reaction time in seconds		
	before drinking the liquid	after drinking the liquid	difference
1	0.256	0.245	–0.011
2	0.234	0.232	–0.002
3	0.268	0.259	–0.009
4	0.254	0.248	–0.006
5	0.215	0.208	–0.007

Figure 9

(i) Calculate the mean difference in reaction time.

Give your answer in milliseconds.

(2)

..... ms

(ii) The drinks manufacturer wants to advertise the effect of the drink on reaction time.

The manufacture needs to confirm the effect on reaction time by improving the investigation.

Give **two** improvements the manufacturer would need to make to this investigation.

(2)

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2 .....

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(b) Figure 10 shows a neurone.

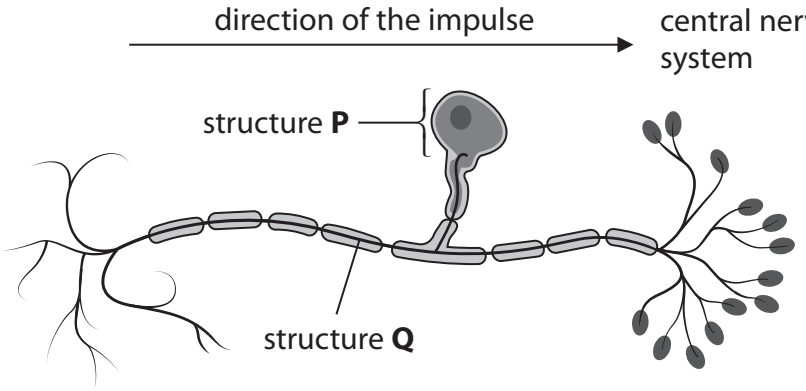


Figure 10

(i) Name the type of neurone shown in Figure 10.

(1)

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(ii) Which row identifies structure **P** and structure **Q**?

(1)

		structure P	structure Q
☒	**A**	myelin sheath	axon
☒	**B**	cell body	dendron
☒	**C**	myelin sheath	dendron
☒	**D**	cell body	axon

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*(c) Some painkillers prevent neurotransmitters binding to receptors in a synapse.

Explain how a signal is transmitted at a synapse and how the painkillers reduce the pain felt by the person.

(6)

(Total for Question 8 = 12 marks)

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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)

(ii) Cell division occurs during the cell cycle.

During which stage of the cell cycle is DNA replicated?

(1)

☒ **A** anaphase

☒ **B** prophase

☒ **C** interphase

☒ **D** telophase

(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)

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(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 for Question 9 = 11 marks)

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10 (a) The UK driving test requires a person to be able to read a number plate at a distance of 20.5 metres.

Some people are short-sighted so cannot read the number plate at this distance.

Explain how a diverging lens corrects short-sightedness.

You may draw a diagram to help with your answer.

(2)

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(b) Colour blindness affects approximately 1 in 12 men.

In a city of 2 million people, 51% are men.

(i) What is the number of men who are colour blind in the city?

(1)

☒ **A** 42 500

☒ **B** 85 000

☒ **C** 166 666

☒ **D** 1 020 000

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(ii) Colour blindness is a sex-linked genetic disorder caused by a recessive allele.

Colour blindness only affects 1 in 200 women.

Explain why more men than women are colour blind.

(2)

(iii) A female without the allele for colour blindness has a baby boy.

The father is colour blind.

Explain the probability of the baby boy being colour blind.

(2)

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(c) One cause of colour blindness is a change in the DNA sequence of a gene.

This results in the production of a different protein in cone cells in the retina of the eye.

Explain how a change in the DNA sequence of a gene can result in the production of a different protein.

(4)

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

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