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 | | | | |

Friday 7 June 2019

Afternoon (Time: 1 hour 45 minutes) | Paper Reference **1BI0/2F**

Biology

Paper 2

Foundation 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 5 6 4 0 7 R A 0 1 3 2

Pearson

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 (a) Figure 1 shows the water cycle.

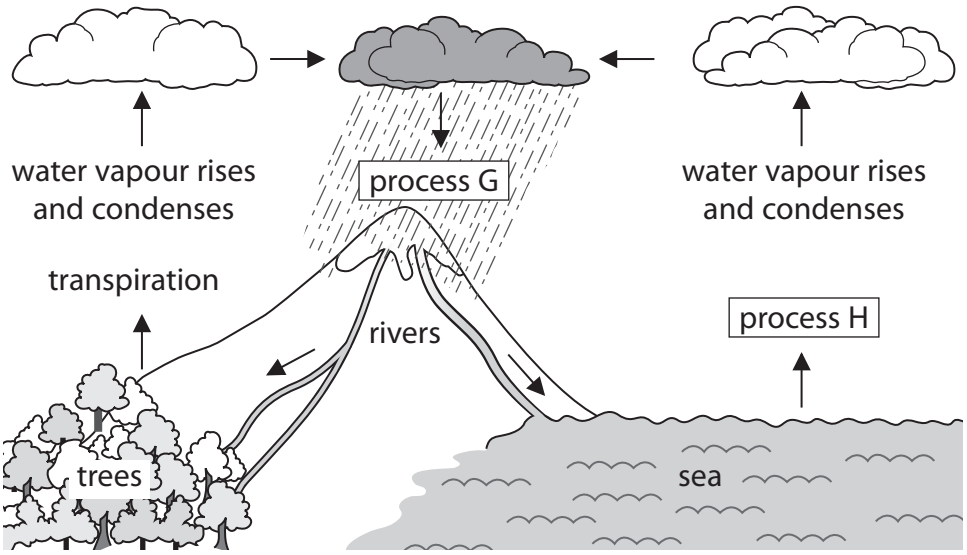

Figure 1

(i) Name process G and process H.

(2)

process G Precipitation / type of precipitation eg rain (1)

process H Evaporation / vaporisation (1)

(ii) What causes the water vapour to condense and form clouds?

(1)

☒ **A** the water vapour cools down

☒ **B** the water vapour heats up

☒ **C** the temperature of the water vapour stays the same

☒ **D** the trees absorb more water

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(b) Water from rivers is treated before it is safe to drink.

Use words from the box to complete the sentences.

(2)

filtering	fish	heating
mud	pathogens	stirring

During water treatment, the solids in river water are removed by filtering (1) .

Chlorine is then added to the water to kill pathogens (1) .

(c) Figure 2 shows the Canary Islands.

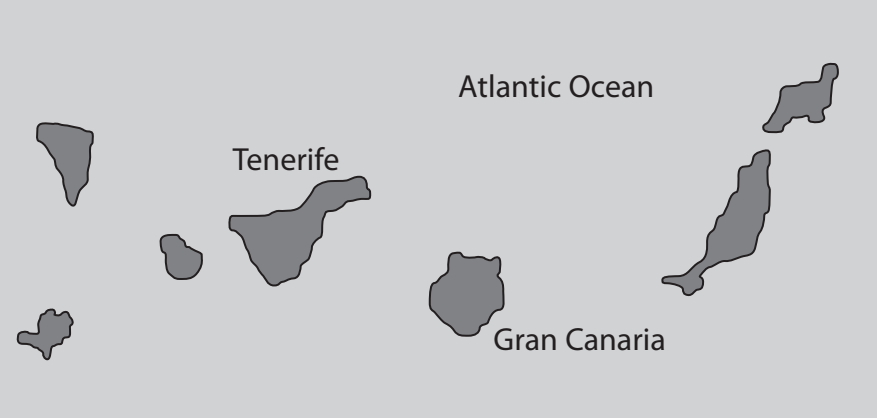

Figure 2

The Canary Islands do not have enough fresh water.

Describe how seawater can be turned into drinking water.

(2)

• desalination/ remove salt from the water (1)
• evaporate the water (1)

(Total for Question 1 = 7 marks)

2 Figure 3 shows the positions of the endocrine glands in a woman and a man.

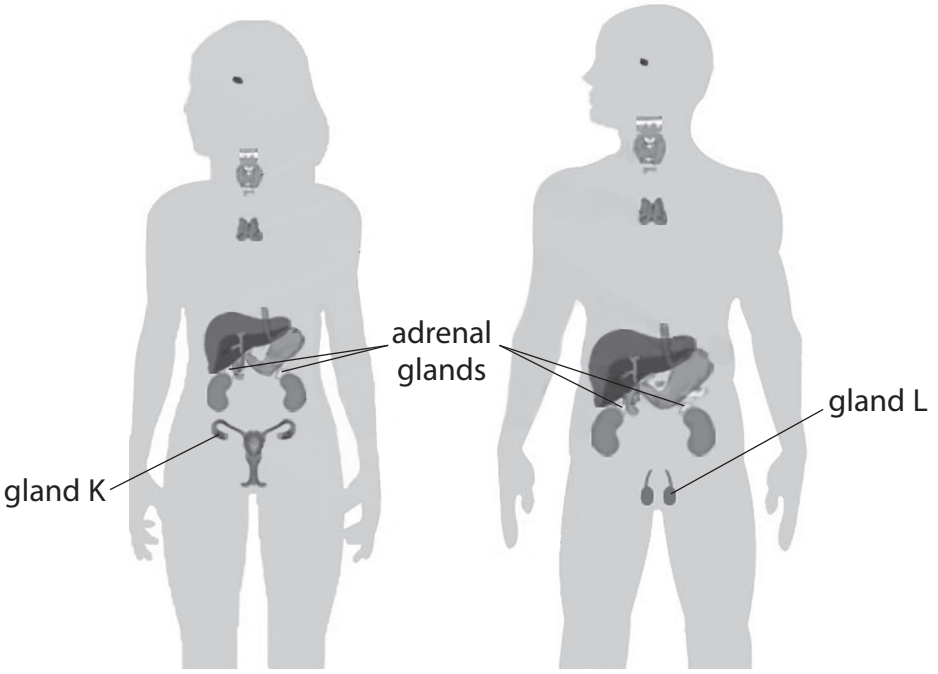

Figure 3

(a) Draw **one** straight line from each hormone to the effect of the hormone on the body.

(2)

hormone	effect of hormone
	increases glucose levels
hormone from gland K in the woman	prepares the uterus lining for a fertilised egg
hormone from gland L in the man	causes facial hair to grow
	controls the water content of the body
	decreases sweating

(b) How is adrenalin transported from the adrenal glands to its target organs?

(1)

- ☒ **A** by transpiration
- ☒ **B** by osmosis
- ☒ **C** dissolved in blood plasma
- ☒ **D** carried by red blood cells

(c) What name is given to the process of maintaining the internal body conditions?

(1)

- ☒ **A** respiration
- ☒ **B** diffusion
- ☒ **C** digestion
- ☒ **D** homeostasis

(d) Figure 4 shows the concentration of glucose in the blood of a person.

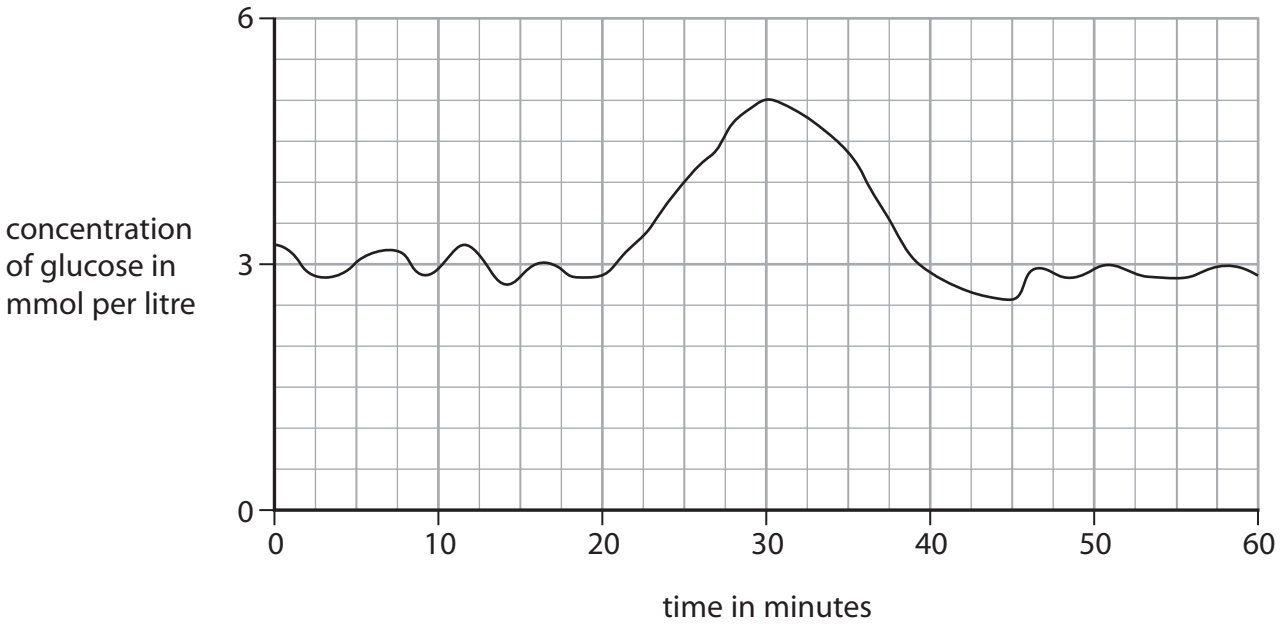

Figure 4

(i) Describe the trends shown in Figure 4 from 0 minutes to 30 minutes.

(2)

fluctuates / stays roughly the same (1)

• and then increases (1)

(ii) Explain why the concentration of glucose decreases from 30 minutes to 40 minutes.

(2)

(more) insulin (is released) (1)

• which makes the {cells / tissues / liver / muscles} absorb glucose (1)

(Total for Question 2 = 8 marks)

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3 (a) Photosynthesis occurs in leaves.

(i) Which substance is needed for photosynthesis?

(1)

☒ **A** carbon dioxide

☐ **B** glucose

☐ **C** oxygen

☐ **D** nitrogen

(ii) A leaf cell is 0.08 mm long.

Calculate the length of the image of this cell after it has been magnified 50 times using a microscope.

(2)

Substitution
0.08 (mm) x 50 (1)

evaluation
= 4 (mm)

..... mm

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Pine trees can live in dry soil.

(b) Use words from the box to complete the sentences.

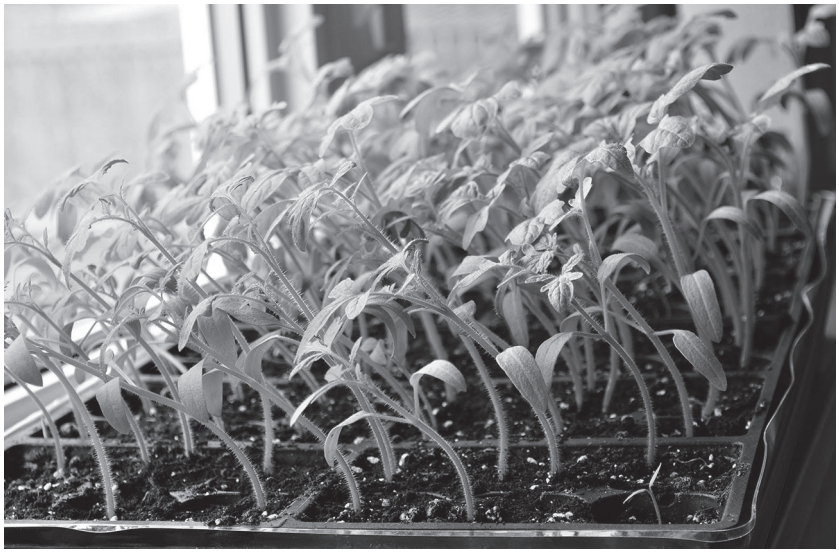
(2)

thickness	water	light
area	chlorophyll	volume

The pine leaf has stomata in pits to reduce the loss of water (1) .

The pine leaf is needle-shaped to reduce the surface area .

(c) Figure 5 shows young tomato plants growing in a glasshouse.



(Source: © adastra/Shutterstock)

Figure 5

The young tomato plants are growing towards the light.

Explain how a plant hormone causes these shoots to grow towards the light.

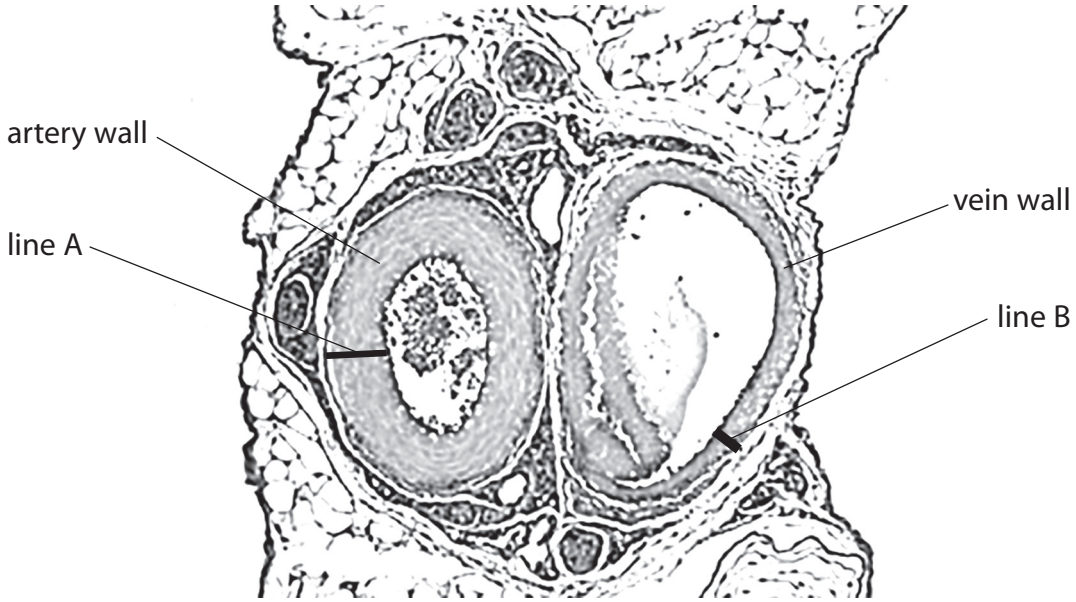
(2)

auxin (1)

• {building up on / moving to} the shaded side (1)

(Total for Question 3 = 7 marks)

4 (a) Figure 6 shows a cross section of an artery and a vein.



(Source: © The University of Kansas Medical Center)

Figure 6

(i) Measure the length of line A and the length of line B in mm.

(1)

line A line A = 8(mm) mm

line B line B = 4(mm) mm

(ii) State the ratio of the thickness of the artery wall to the thickness of the vein wall.

(1)

2:1

(b) (i) Give a reason why veins have valves.

(1)

to stop backflow of blood / to ensure blood flows in {one direction /right direction/towards the heart} / because the blood pressure in them is (too) low .

(ii) Name the artery that transports oxygenated blood from the heart to the body.

(1)

(the) aorta

(c) A scientist investigated the relationship between exercise and the ability to run at 3 metres per second for 20 minutes.

The scientist collected data from six groups of people.
Each group exercised for a different number of hours per week for six months.

There were 100 people in each group.

Figure 7 shows their results.

group	number of hours of exercise per week	number of people who could run at 3 metres per second for 20 minutes
A	0	9
B	2	20
C	4	33
D	6	52
E	8	61
F	10	62

Figure 7

(i) Describe the relationship shown by this data.

(2)

The more exercise you do the more likely you are able to run at 3 metres per second for 20 minutes (1)

• A comparison of the data of 2 groups (1)

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(ii) Explain why some people's leg muscles tired quickly and developed cramp when they were running.

(3)

They had not warmed up / stretched (muscles before exercise) (1)

• not enough blood / oxygen (gets to muscles / legs / around body) (1)

• anaerobic respiration occurs (1)

(Total for Question 4 = 9 marks)

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5 Figure 8 shows an area of nettle plants.

(Source: © stevemart/Shutterstock)

Figure 8

Grass does not grow among the nettles.

(a) Explain why grass does not grow where there are nettles.

(2)

outcompeted (by nettles)

(1)

• by nettles absorbing (most of) the light (1)

(b) Figure 9 shows caterpillars eating nettle leaves.

(Source: © bbbb/Shutterstock)

Figure 9

A caterpillar has a body mass of 6.0 grams.
One week later, its body mass had increased to 7.5 grams.
Caterpillars convert 10% of food eaten into body mass.

(i) Calculate the mass of nettles that the caterpillar ate.

(2)

substitution
(7.5 – 6.0 =) 1.5(g) (1)

evaluation
(1.5) x 10 = 15 (g)

..... grams

(ii) Describe what happens to food eaten that is not converted into the body mass of the caterpillar.

(2)

some food is egested / not digested (1)

• some food is respired / used to released energy (1)

(c) Devise a method a scientist could use to investigate how temperature affects nettle growth.

(4)

put nettles in different temperatures (1)

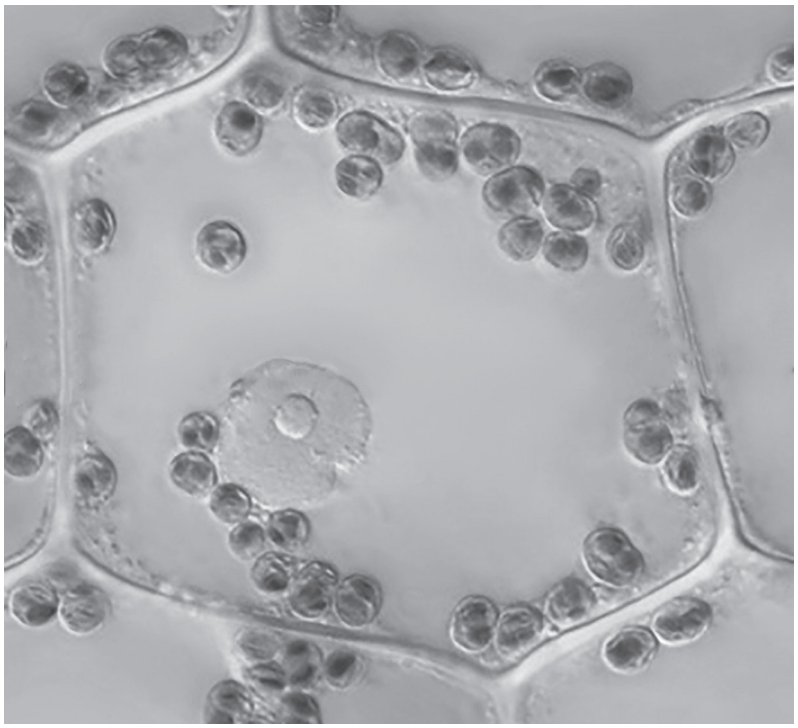
• time period stated (1)

• control of one relevant variable. (1)

• a way of measuring growth stated eg (change in) height / mass / number of leaves (1)

(Total for Question 5 = 10 marks)

6 Figure 10 shows a plant cell as seen under a light microscope.



(Source: © HERVE CONGE, ISM/SCIENCE PHOTO LIBRARY)

Figure 10

(a) Draw this plant cell in the box below.

Label **three** parts of this cell.

(4)

a diagram of the cell that reflects its shape and some of the internal structures. (1)

• with any three cell structures labelled from: nucleus / chloroplast / vacuole / cytoplasm / cell wall /cell membrane (3)

(b) Mitochondria cannot be seen with a light microscope.

What is the function of mitochondria in a plant cell?

(1)

☒ **A** respiration

☒ **B** make proteins

☒ **C** photosynthesis

☒ **D** store water

(c) A student wanted to investigate the movement of water into and out of cells in potatoes.

The student had the equipment shown in Figure 11.

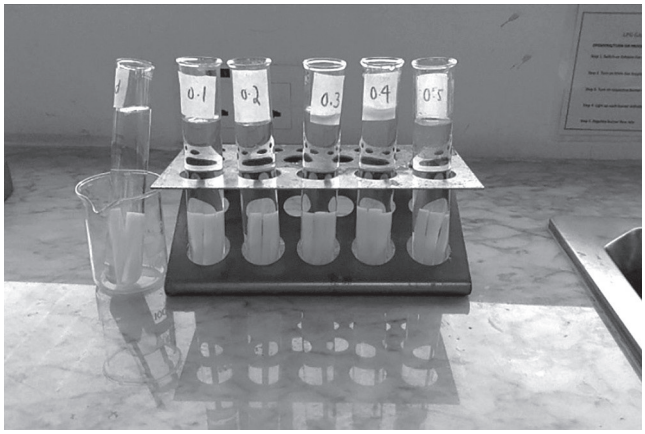


Figure 11

The test tubes in the rack contain different concentrations of sodium chloride solution.

The solutions were 0.1 M, 0.2 M, 0.3 M, 0.4 M and 0.5 M sodium chloride solution.

The test tube in the beaker contains distilled water.

There are three potato chips in each of the six test tubes.

(i) State why the test tube in the beaker only contains distilled water and three potato chips.

(1)

Used as a control / to compare with the results of the other tube

(ii) State **two** variables that need to be controlled in this investigation.

(2)

1 temperature (1)

2 • age / variety of potato

(iii) Explain why the chips in the 0.5 M sodium chloride solution lost mass.

(3)

There is a higher concentration of sodium chloride outside (the cell) than inside / higher concentration of water molecules inside (the cell) than outside (1)

• water moves out of {cells / chips} / into (sodium chloride) solution (1)

• by osmosis (1)

(Total for Question 6 = 11 marks)

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7 The increasing human population is affecting farming and the habitats of animals.

Figure 12 shows the human population of the UK from 1960 to 2018.

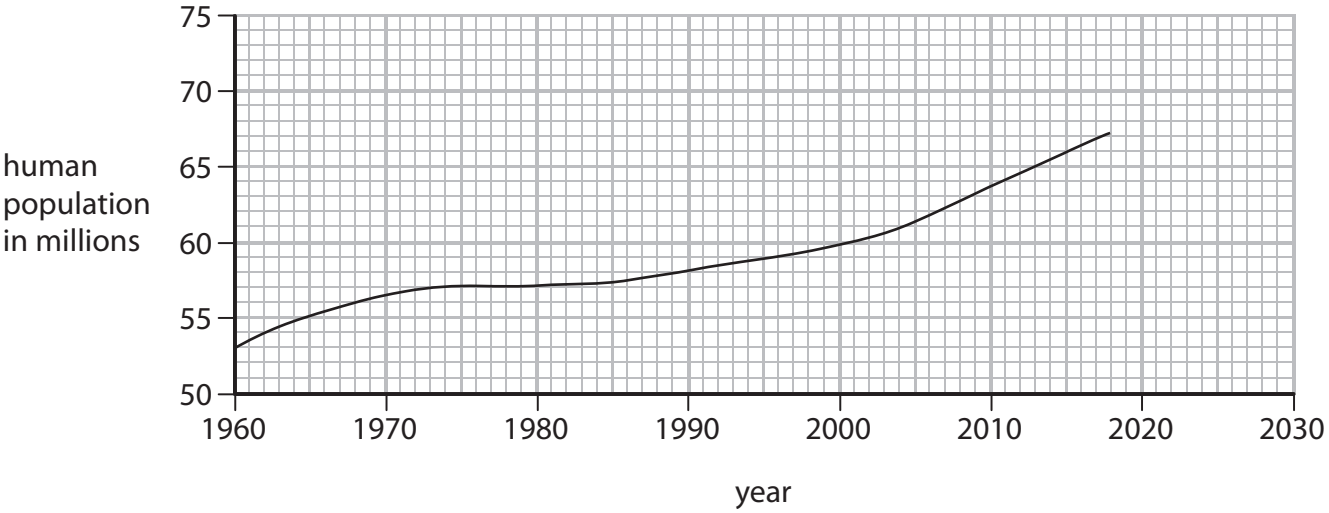

Figure 12

(a) Extend the line to estimate the human population of the UK in 2030 if this trend continues.

(1)

72 million million

(b) Food security means that a population has enough safe and healthy food.

Which of these would improve food security?

(1)

☒ **A** increased reforestation

☒ **B** increased animal farming

☒ **C** increased human population

☒ **D** increased crop yield

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(c) A scientist tested three samples of different foods.

Figure 13 shows the results.

food sample	result of adding iodine solution	result of boiling with Benedict's solution	result of adding Biuret solution	result of emulsion test
E	black	blue	blue	clear
F	brown	orange	purple	clear
G	brown	orange	purple	cloudy

Figure 13

(i) Name the food group in sample E.

(1)

(food sample) E contains starch

(ii) Name the food groups in sample F.

(1)

(reducing) sugar and protein

(iii) The emulsion test shows that food sample G contained fat.
Describe how fat is digested in the body.

(2)

(fats are digested by) enzyme/ lipase (1)

• into glycerol and fatty acids (1)

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*(d) Figure 14 shows a field of a crop in one area of Africa.

The crop cannot be eaten by people.

The crop is used to produce biofuel.

(Source: © KAMBOU SIA/Stringer/Getty Images)

Figure 14

Describe the advantages and disadvantages of growing this crop to produce biofuel.

(6)

Stated Advantage Details of advantage
• provides jobs / can sell biofuels

• more money to spend /in local economy

• carbon neutral • does not add to greenhouse gases / global warming

• renewable / will not run out

• Less dependent on fossil fuels / fossil fuels last longer

• provides fuels locally • allows more local development/fuels are cheaper

• less transport of (other) fuels
• reduces fuel costs / pollution

Stated Disadvantage Details of disadvantage
• costs to set system up
• may end up being controlled by outside organisation
• may prevent starting growing biofuels

• machinery used • may offset savings/ cause pollution
• uses land to grow biofuel crop
• less food crops grown /food shortages / less food security
• high water demand (to irrigate)
• less water for drinking / irrigation (for other crops)
• loss of habitat /deforestation
• reduction in biodiversity / extinction of species
• leaves are poisonous • reduce biodiversity

(Total for Question 7 = 12 marks)

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8 (a) A student was investigating the populations of organisms in a garden.

Figure 15 shows the estimates of the number and biomass of some of the organisms in the garden.

organism	number	mean biomass of each organism in grams	biomass of population in grams
cabbages (plants)	80	70	5600
earthworms	620	3.4	?
slugs	30	4.1	123
hedgehogs	1	620	620
squirrels	2	600	1200

Figure 15

(i) Calculate the biomass of the population of earthworms in the garden.

(1)

2108 (g)

(ii) Hedgehogs eat slugs and earthworms.
Slug pellets were used to kill the slugs.

Explain how killing the slugs would affect the population of earthworms in this garden.

(2)

population of earthworms will decrease (1)

• because more earthworms will be eaten by hedgehogs (1)

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(iii) Describe a method that could be used to estimate the population of slugs in the garden.

(3)

• use of quadrat / belt transect (1)

• count the number of slugs in the sampled area (1)

• multiplication factor to make the estimate (1)

(b) Explain how cabbages, earthworms and squirrels contribute to the carbon cycle.

(3)

{squirrels / earthworms / cabbages} release carbon dioxide (1)

• from respiration (1)

• cabbages take in carbon dioxide (1)

(c) State **three** ways the concentration of nitrates in soil can be increased.

(3)

1 (add) artificial fertilisers (1)

2 • (add) manure / slurry / (use) green manuring (1)

3 • use crop rotation (1

(Total for Question 8 = 12 marks)

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9 (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 16.

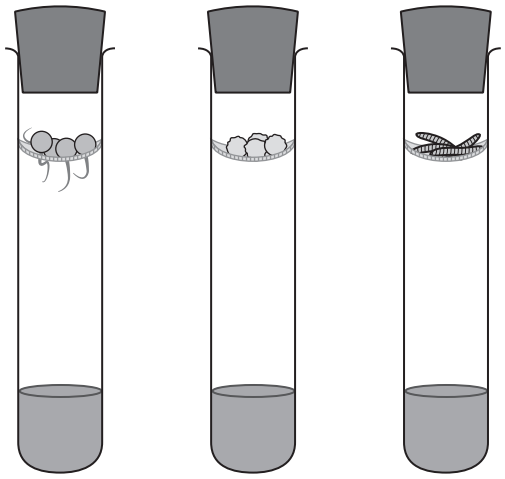

Figure 16

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

(2)

1 same concentration of indicator (1)

2 • same mass of organisms (1)

(ii) Describe a suitable control for this investigation.

(2)

same test tube, gauze and bung with (hydrogencarbonate) indicator (1)

• without any live organisms / with a mass of inert object e.g.stones /dead peas/glass beads(1)

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

The results for this investigation are shown in Figure 17.

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

Figure 17

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

(2)

germinating peas produce carbon dioxide (1)

• because germinating peas were respiring (aerobically) (1)

(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) Carbon dioxide is carried in blood plasma.

Human blood also contains red blood cells and white blood cells.

Explain how the structure of red blood cells and white blood cells is related to their function.

(6)

Red blood cells
structure function • to carry oxygen
• contains haemoglobin
• oxygen is joined to haemoglobin.

• biconcave disc shaped
• to increase surface area / to absorb / to release oxygen quicker
• small / flexible / smooth
• so can fit through capillaries
• no nucleus • so can contain more haemoglobin

White blood cells structure function
• is part of the immune system / fights disease

has receptors on membrane

• can recognise pathogens / antigens
• are large cells /can change shape / have flexible membranes

• can engulf pathogens

• has a nucleus / ribosomes
• makes antibodies / antitoxins / remember antigens from a previous infection

(Total for Question 9 = 13 marks)

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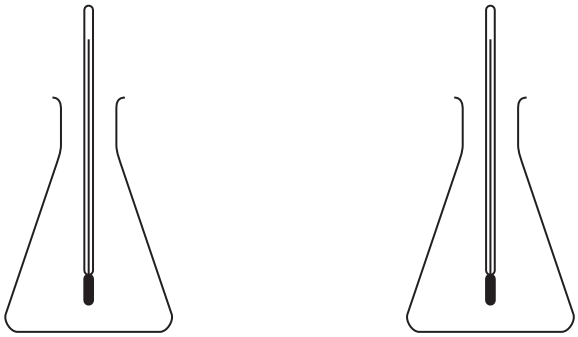
10 A student was investigating the effect of sweating.

The student set up two conical flasks each with a thermometer as shown in Figure 18.



flask 1 flask 2

Figure 18

Flask 1 was covered in **wet** tissue paper.

Flask 2 was covered with **dry** tissue paper.

Hot water was added to each of the flasks.

The temperature of the water in each flask was recorded every minute for 10 minutes.

(a) State **two** variables that would need to be controlled in this investigation.

(2)

1 starting temperature of water (1)

2 • volume of water (1)

(b) The results of this investigation are shown in Figure 19.

time in minutes	flask 1 (wet tissue paper) temperature in °C	flask 2 (dry tissue paper) temperature in °C
1	98	98
2	82	91
3	71	84
4	60	76
5	50	69
6	39	61
7	31	56
8	22	49
9	22	42
10	22	37

Figure 19

(i) Calculate the rate of temperature change in flask 1 from 1 to 8 minutes.

(2)

(98 – 22) = 76 (1)

rate calculated

(76 ÷ 8) = 9.5 (0C per minute)

..... °C per minute

(ii) Compare the trends shown in the data for flask 1 and flask 2.

(2)

flask 1 and 2 decrease in temperature (1)

• the temperature in flask 1 decreases faster than in flask 2 (1

(c) Explain how sweating helps to cool the body.

(2)

sweat/water is released onto the skin (1)

• transferring {thermal energy /heat} (1)

(d) Which part of the brain controls internal body temperature?

(1)

☒ **A** cerebellum

☒ **B** medulla oblongata

☒ **C** hypothalamus

☒ **D** pituitary gland

(e) Explain why it is important to control the internal temperature of the human body.

(2)

(internal) temperature is kept at the {optimum/best/37°C} (1)

• for enzyme action / (chemical) reactions to take place (1)

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

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