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 | | | | |

# Monday 1 June 2020

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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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** Figure 1 shows a diagram of the heart.

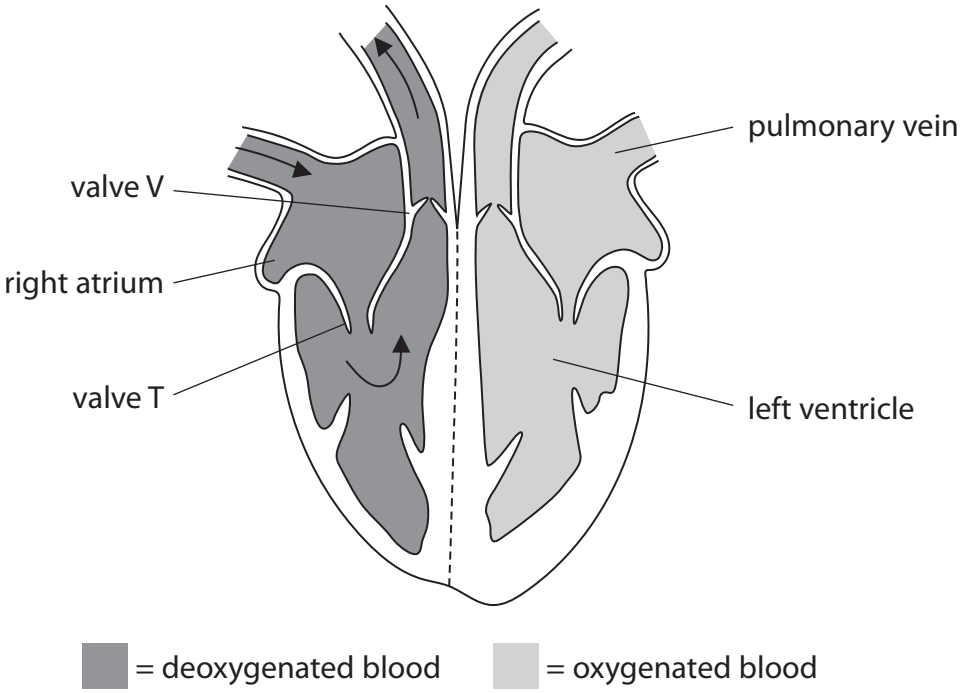


**Figure 1**

(a) (i) Draw arrows on Figure 1 to show how oxygenated blood moves through the heart.

**(1)**

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(ii) What happens when the right ventricle contracts?

**(1)**

- ☒ **A** valve T opens
- ☒ **B** valve T closes
- ☒ **C** blood is forced into the left atrium
- ☒ **D** blood is forced into the pulmonary vein

(iii) Draw **one** straight line from each structure to its function.

**(2)**

| **structure** | **function** |
|---|---|
| pulmonary vein | carries deoxygenated blood |
| | forces blood towards body organs |
| | carries blood from the lungs to the heart |
| left ventricle | takes blood to the right side of the heart |
| | forces blood towards the lungs |

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(b) Figure 2 shows a dissected vein.

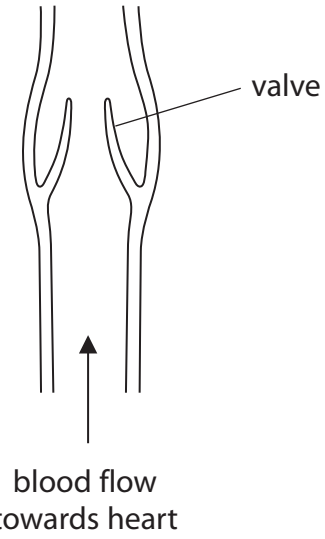


**Figure 2**

(i) Explain how the valves in veins help the blood, at low pressure, flow towards the heart.

**(2)**

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.....

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.....

(ii) The equipment used to dissect the vein was cleaned and put into disinfectant.

State why this equipment was put into disinfectant.

**(1)**

.....

.....

**(Total for Question 1 = 7 marks)**

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**2** The animal shown in Figure 3 is a tick burrowing into the skin of a human.

© IanRedding/Shutterstock

**Figure 3**

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

**(2)**

| | | |
|---|---|---|
| enzymes | food | herbivores |
| parasites | producers | prey |

(i) The tick burrows into the skin to obtain ..... .

(ii) When a tick burrows into human skin the tick benefits but the human is harmed.

This means that ticks are classed as ..... .

(b) When skin is cut a blood clot forms.

Which part of the blood starts the clotting process?

**(1)**

☒ **A** red blood cells

☒ **B** water

☒ **C** platelets

☒ **D** white blood cells

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(c) Figure 4 shows a bird called an oxpecker eating ticks that are living on a zebra.

© MartinMaritz/Shutterstock

**Figure 4**

(i) Name the type of relationship where both the oxpecker and the zebra benefit.

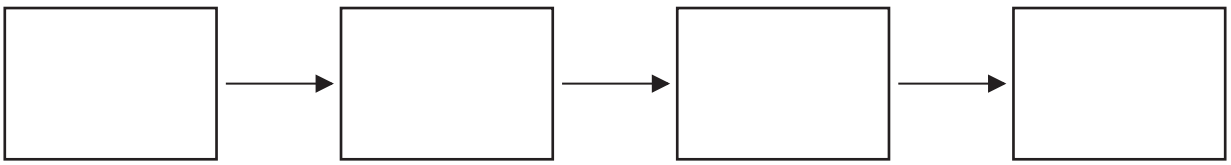
**(1)**

.....

(ii) Zebras eat grass.

Complete the food chain that includes zebras, ticks, oxpeckers and grass.

**(2)**



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(d) Figure 5 shows the maximum numbers of oxpeckers observed on four types of mammal.

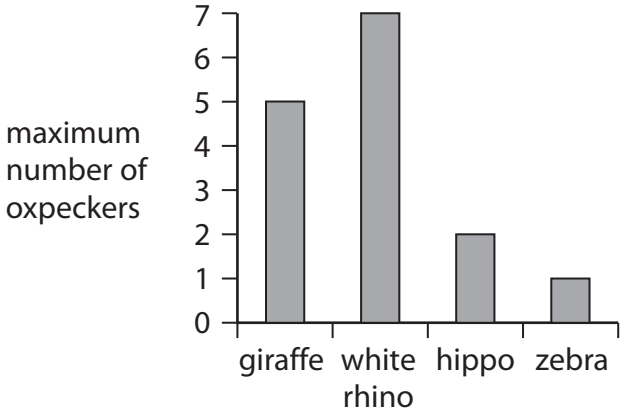


**Figure 5**

(i) Describe the difference in the maximum number of oxpeckers on the white rhino and on the hippo.

**(2)**

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(ii) Give **one** reason why more oxpeckers were observed on giraffes than on zebras.

**(1)**

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**(Total for Question 2 = 9 marks)**

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**3** (a) Figure 6 shows a root hair cell from a strawberry plant.

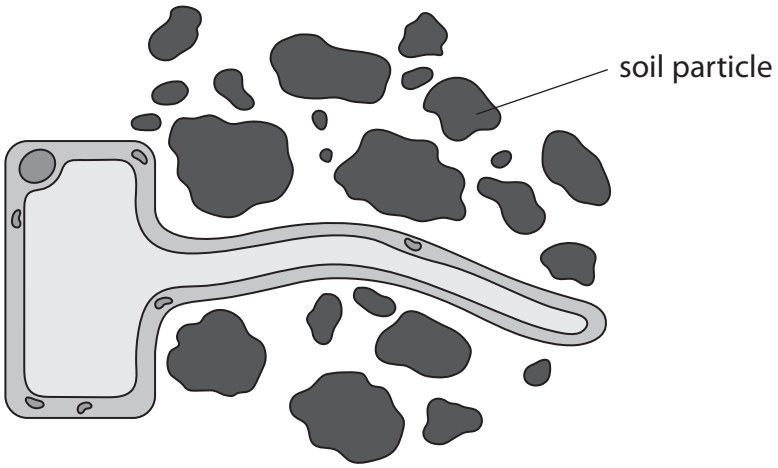


**Figure 6**

(i) Label the cell vacuole in Figure 6.

**(1)**

(ii) Explain how the structure of root hair cells increases water absorption from the soil.

**(2)**

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(b) Figure 7 shows fungus growing on strawberries.

The fungus is decomposing the strawberries.


© Catherine Eckert/Shutterstock

**Figure 7**

A scientist investigated the effect of temperature on the decomposition of strawberries.

The scientist spread fresh strawberries on six trays.

Each tray was kept at a different temperature.

After five days the scientist measured the area of fungus that had grown on each tray of strawberries.

The results are shown in Figure 8.

| temperature in °C | area of fungus after 5 days in $cm^2$ |
|---|---|
| 5 | 8 |
| 10 | 25 |
| 15 | 36 |
| 20 | 48 |
| 25 | 60 |
| 30 | 72 |

**Figure 8**

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(i) The mean rate of growth of fungus at 25 °C was 12 $cm^2$ per day.

Calculate the mean rate of growth of fungus at 30 °C.

**(2)**

..... $cm^2$ per day

(ii) State the effect of temperature on the growth of fungus on strawberries from 5 °C to 30 °C.

**(1)**

.....

.....

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(c) Decomposition of strawberries can be prevented by boiling the strawberries with sugar to make jam.

(i) Enzymes in the fungus caused decomposition.

Explain how boiling stops the enzymes from working.

**(2)**

(ii) Cells from a fungus can land on jam.

The sugar solution inside the jam is more concentrated than the sugar solution inside the fungus cells.

State how osmosis causes the fungus cells to die.

**(1)**

**(Total for Question 3 = 9 marks)**

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**4** A scientist investigated the distribution of invertebrates found in a garden.

(a) Figure 9 shows an invertebrate about to fall into a pitfall trap.

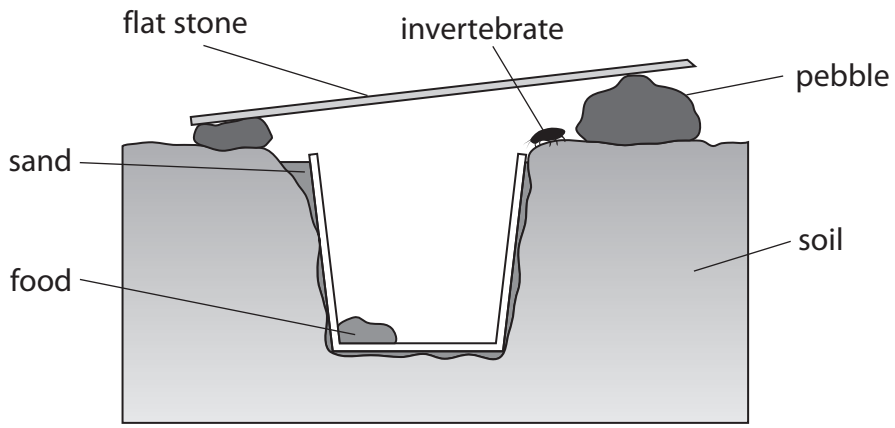


**Figure 9**

The steps the scientist used to set up the pitfall trap are shown below.

The steps are not in the correct order.

1. put some sand around the beaker
2. put a beaker, baited with food, in the hole
3. place a flat stone on pebbles over the beaker
4. check the pitfall trap each day
5. dig a hole in the garden

Complete the steps in the correct order, from left to right.

The first number has been written in for you.

**(2)**

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|---|---|---|---|---|
| 5 | | | | |

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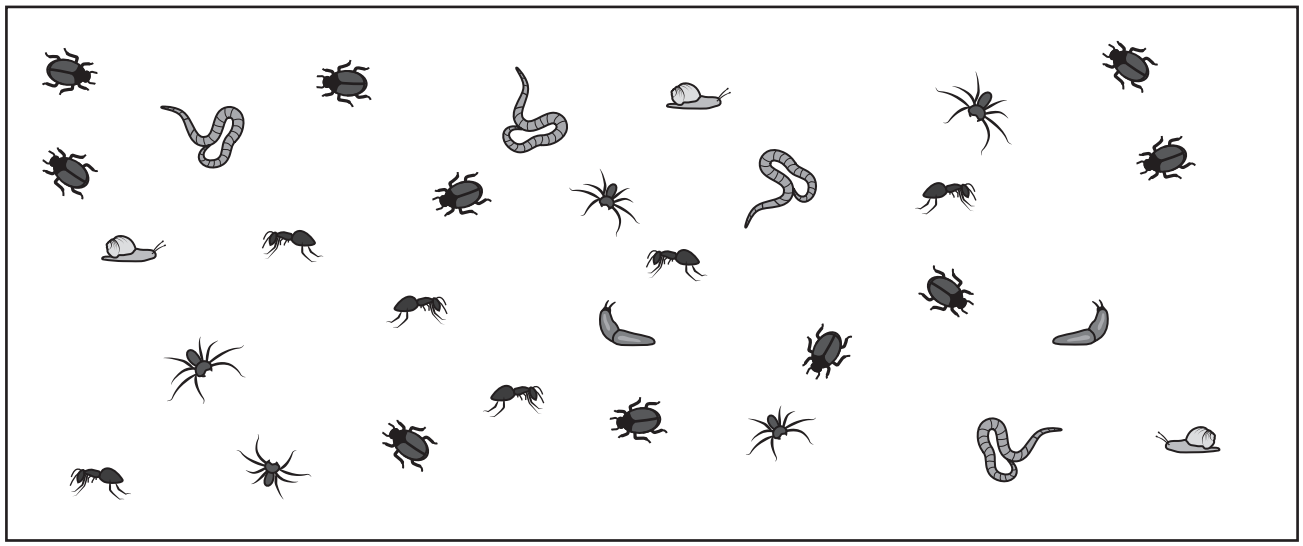
(b) Figure 10 shows 30 invertebrates that the scientist collected.



| key | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| beetle | snail | ant | spider | slug | worm |

**Figure 10**

(i) Complete the table by filling in the tally and number for the spiders and worms.

**(2)**

| invertebrate | tally | number of invertebrates |
|---|---|---|
| ant | 𝍸 \| | 6 |
| beetle | 𝍸 𝍸 | 10 |
| slug | \|\| | 2 |
| snail | \|\|\| | 3 |
| spider | | |
| worm | | |

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(ii) The scientist selected an invertebrate at random to observe it in more detail.

State the probability that the invertebrate selected is an ant.

Give your answer in its simplest form.

**(2)**

(iii) State how the type of food used to bait the pitfall trap could affect the number of different invertebrates caught.

**(1)**

(c) The scientist also counted the number of snails in four $1\,m^2$ areas of the garden.

The garden had a total area of $40\,m^2$.

Describe how the scientist can use this information to estimate the number of snails in the garden.

**(2)**

**(Total for Question 4 = 9 marks)**

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**5** (a) (i) Which row of the table shows the endocrine gland and hormone involved in the control of blood glucose concentration?

**(1)**

| | endocrine gland | hormone |
|---|---|---|
| ☒ **A** | ovary | oestrogen |
| ☒ **B** | ovary | insulin |
| ☒ **C** | pancreas | oestrogen |
| ☒ **D** | pancreas | insulin |

(ii) State a target organ for the hormone that controls blood glucose concentration.

**(1)**

(b) People with a high BMI are more likely to develop type 2 diabetes.
Figure 11 shows the mass, height and BMI for two people.

| person | mass in kilograms | height in metres | BMI |
|---|---|---|---|
| A | 110 | 2.0 | ? |
| B | 85 | 1.5 | 38 |

**Figure 11**

(i) Use the formula to calculate the BMI for person A

$$\text{BMI} = \frac{\text{mass}}{\text{height}^2}$$

**(2)**

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(ii) Person B develops type 2 diabetes.

Describe **two** lifestyle changes person B should make to help to control their blood glucose concentration.

**(2)**

1 .....

.....

2 .....

.....

(c) (i) Which row of the table shows the type or types of respiration that use glucose?

**(1)**

| | aerobic respiration | anaerobic respiration |
|---|---|---|
| ☒ **A** | yes | yes |
| ☒ **B** | yes | no |
| ☒ **C** | no | yes |
| ☒ **D** | no | no |

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(ii) A scientist measured the rate of respiration in a person when sleeping and then running at different speeds.

Figure 12 shows the results.

| activity | speed in km per hour | respiration rate in kJ per minute |
|---|---|---|
| sleeping | 0 | 3 |
| running slowly | 8 | 90 |
| running quickly | 12 | 130 |

**Figure 12**

Explain the trend shown in Figure 12.

**(3)**

**(Total for Question 5 = 10 marks)**

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**6** (a) Figure 13 shows a kidney nephron.

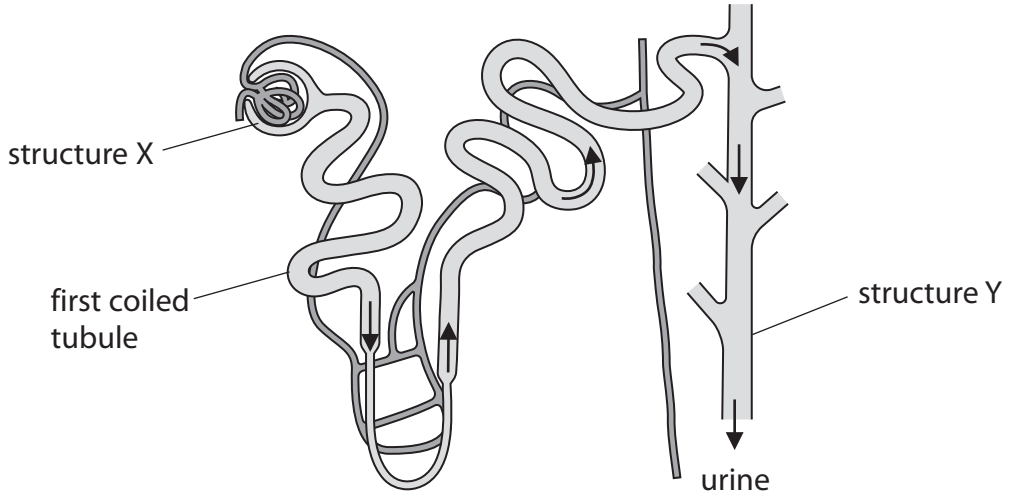


**Figure 13**

(i) Structure X is the

**(1)**

- ☒ **A** glomerulus
- ☒ **B** Bowman's capsule
- ☒ **C** collecting duct
- ☒ **D** capillary

(ii) Figure 14 shows the concentration of glucose in the filtrate in the nephron.

| filtrate | mean concentration of glucose in millimoles per litre |
|---|---|
| filtrate in the start of first coiled tubule | 6 |
| filtrate in the end of first coiled tubule | 0 |

**Figure 14**

Explain why the concentration of glucose changes as it moves through the first coiled tubule.

**(2)**

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(iii) Name the structure that carries urine from the kidney to the bladder.

**(1)**

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(b) The concentration of protein in urine from person A and person B was measured each year from 2015 to 2019.
Person A had healthy kidneys. Person B had kidney disease.

| year | concentration of protein in urine in arbitrary units | |
|---|---|---|
| | person A (with healthy kidneys) | person B (with kidney disease) |
| 2015 | 2 | 25 |
| 2016 | 4 | 37 |
| 2017 | 5 | 57 |
| 2018 | 4 | 79 |
| 2019 | 3 | 106 |

**Figure 15**

Use the data in Figure 15 to compare the changes in the concentration of protein in the urine from person A and person B.

**(2)**

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(c) Person B needs a kidney transplant.
Person B has a twin sister.

Explain why this twin sister could be a suitable kidney donor for Person B.

**(2)**

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**(Total for Question 6 = 8 marks)**

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**7** People produce sweat when they are hot.

Sweat consists of substances dissolved in water.

Figure 16 shows the concentration of dissolved substances in the sweat of two patients in a hospital.

| substance in sweat | concentration in mmol per $dm^3$ | |
|---|---|---|
| | patient A | patient B |
| urea | 8.0 | 32.0 |
| glucose | 0.5 | 0.4 |
| sodium ions | 40.0 | 36.0 |
| chloride ions | 35.0 | 32.0 |

**Figure 16**

(a) (i) Calculate the ratio of the concentration of urea in the sweat of patient A to the concentration of urea in the sweat of patient B.

Give your answer in its simplest form.

**(2)**

.....

(ii) Describe how urea is produced in the body.

**(2)**

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(iii) The blood of patient B has a very high concentration of urea.

Which organ removes most urea from the blood?

**(1)**

☒ **A** kidney

☒ **B** lung

☒ **C** liver

☒ **D** stomach

(b) The human body can regulate the temperature of the blood.

(i) Which part of the brain controls body temperature?

**(1)**

☒ **A** cerebral hemispheres

☒ **B** medulla oblongata

☒ **C** cerebellum

☒ **D** hypothalamus

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*(ii) Figure 17 shows a diagram of the skin.

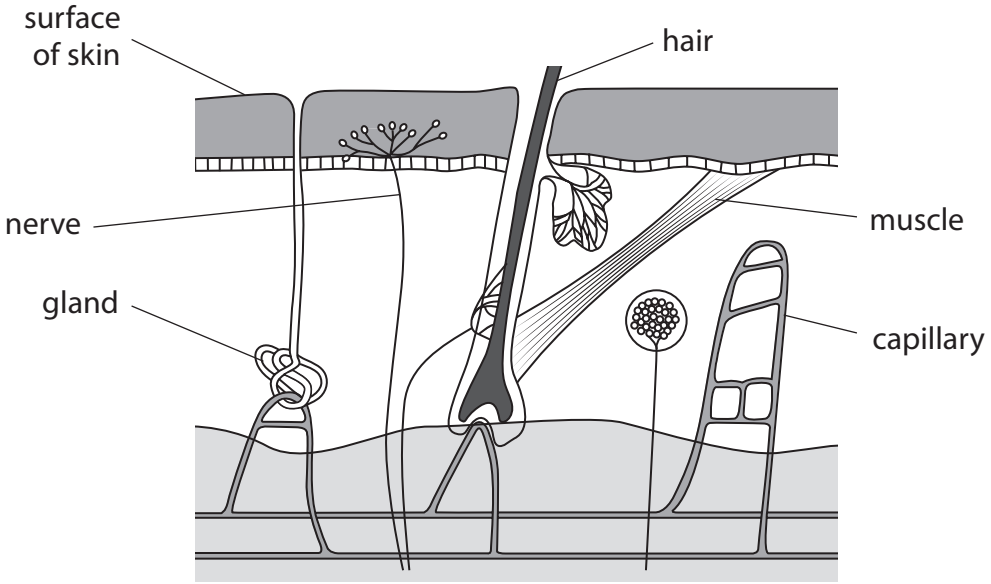


**Figure 17**

Explain how structures in the skin help to reduce body temperature during hot weather.

**(6)**

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**(Total for Question 7 = 12 marks)**

**8** Figure 18 shows the leaves and flowers of water lily plants (*Nymphaea odorata*) on a lake.

© Oleksandr Shymanskyi/123RF

**Figure 18**

(a) Water lilies have stomata on the upper surface of the leaves.

Explain why water lilies have no stomata on the lower surface of the leaves.

**(2)**

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(b) (i) The white petals of the water lily flowers cannot photosynthesise.

Which structure in leaf cells is the site of photosynthesis?

**(1)**

- ☒ **A** nucleus
- ☒ **B** vacuole
- ☒ **C** mitochondrion
- ☒ **D** chloroplast

(ii) Glucose is made by photosynthesis.

Glucose is converted to another sugar to be transported in the plant.

What is the name of this sugar?

**(1)**

- ☒ **A** glycerol
- ☒ **B** ribose
- ☒ **C** sucrose
- ☒ **D** starch

(iii) Describe how this sugar is transported from the leaves to the flowers of the water lily.

**(2)**

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(c) Figure 19 shows water lilies growing in a lake in Europe.

© lynn gladwell/123RF

**Figure 19**

(i) One water lily plant was brought from America 10 years ago and planted in the lake shown in Figure 19.

Explain why this non-indigenous plant now covers the whole surface of the lake.

**(3)**

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(ii) Explain how the water lilies will affect the biodiversity of this lake.

**(3)**

**(Total for Question 8 = 12 marks)**

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**9** A slide of potato cells was viewed using a light microscope.

Figure 20 is a drawing of the slide showing starch grains in the potato cells.

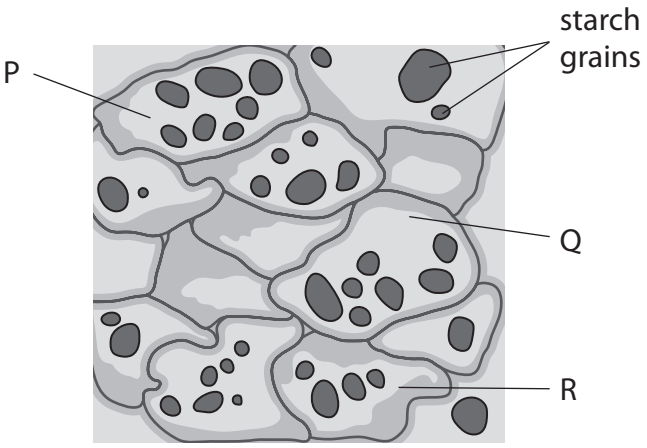


**Figure 20**

(a) (i) Calculate the mean number of starch grains in potato cells P, Q and R.

**(1)**

..... starch grains

(ii) Which structures are found in plant cells but are **not** found in animal cells?

**(1)**

☒ **A** cell membrane, nucleus, chloroplast

☒ **B** cell wall, cell membrane, cytoplasm

☒ **C** nucleus, large vacuole, chloroplast

☒ **D** cell wall, chloroplast, large vacuole

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(b) A scientist investigated how the length of starch grains in potatoes changed when the potatoes were stored in the dark.

Figure 21 shows a potato after being stored in the dark.


© rodimov/Shutterstock

**Figure 21**

Three potatoes were used in the investigation.

The length of starch grains in potato 1 were measured at the start.

The length of starch grains were measured in potato 2 after 5 weeks in the dark.

The length of starch grains were measured in potato 3 after 10 weeks in the dark.

Figure 22 shows the results.

| potato | time after placing in the dark in weeks | mean length of starch grains in μm |
|---|---|---|
| 1 | 0 | 64 |
| 2 | 5 | 50 |
| 3 | 10 | 30 |

**Figure 22**

(i) Calculate the percentage difference in the mean length of starch grains in potato 2 at 5 weeks and in potato 3 at 10 weeks.

**(2)**

.....%

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(ii) State **two** variables the scientist should have controlled to improve this investigation.

**(2)**

1 .....

.....

2 .....

.....

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

State why the potatoes need glucose.

**(1)**

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*(c) Figure 23 shows a diagram of some equipment that can be used to investigate the rate of photosynthesis.

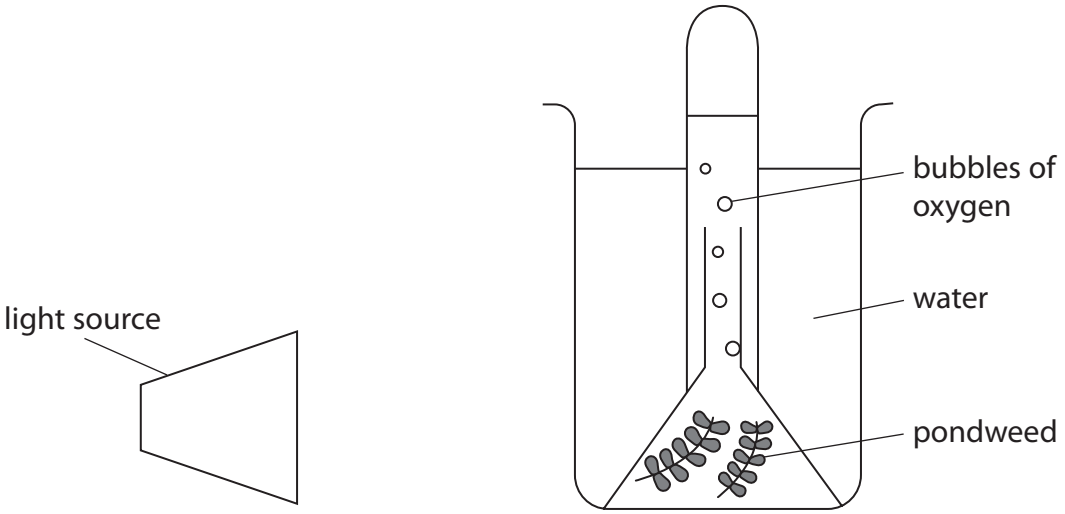


**Figure 23**

Devise a plan to investigate the effect of light intensity on the rate of photosynthesis.

Include variables you would need to control.

**(6)**

**(Total for Question 9 = 13 marks)**

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**10** Figure 24 shows the world human population from 1800 to 2015.

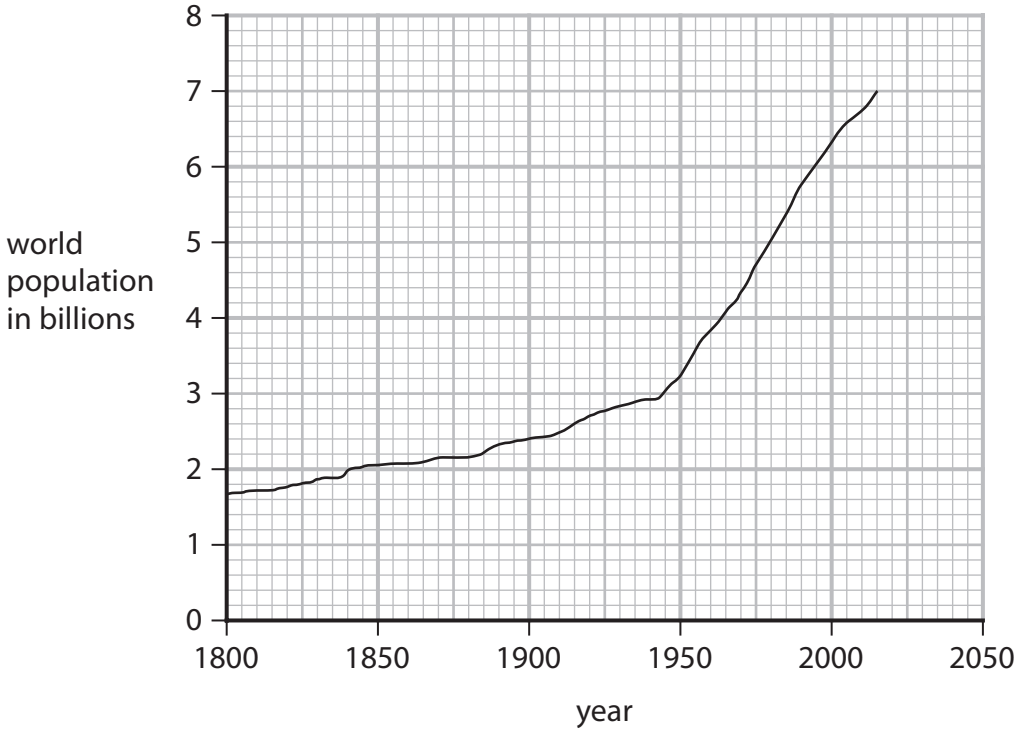


**Figure 24**

(a) In 2015, 13% of the world human population were classified as malnourished.

Calculate, using Figure 24, how many people were classified as malnourished in 2015.

**(2)**

..... billion

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(b) Protein is an important nutrient in meat.

Describe the laboratory test for protein.

**(2)**

(c) Figure 25 shows the mass of meat eaten in the world from 1980 to 2010.

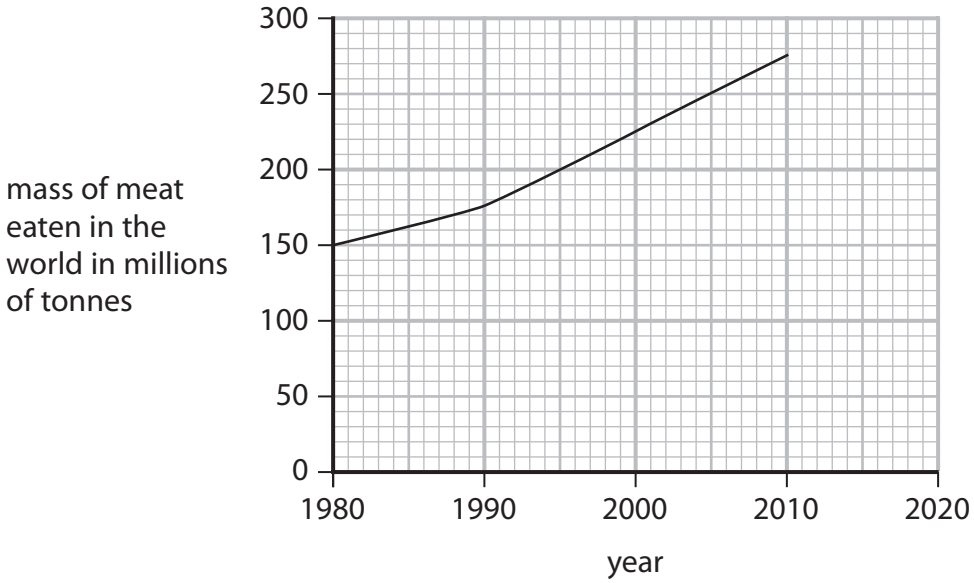


**Figure 25**

Calculate the rate of increase in the mass of meat eaten in the world from 2000 to 2010.

**(2)**

..... millions of tonnes per year

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(d) Figure 26 shows an energy pyramid.

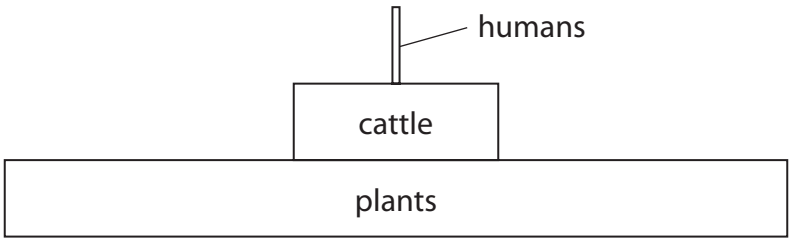


**Figure 26**

(i) Explain why the area labelled cattle is smaller than the area labelled plants.

**(2)**

(ii) The World Health Organisation uses this definition of food security.

*'When all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life'*

Explain how a large increase in the mass of meat eaten will decrease food security in the future.

**(3)**

**(Total for Question 10 = 11 marks)**

**TOTAL FOR PAPER = 100 MARKS**

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