DULWICH COLLEGE | SINGAPORE |

Year 10 (I)GCSE Examination
Double Award Biology

May 2022

Name: .....

Teacher: .....

Teaching Group: .....

Time allowed: 1.5 hours

Total number of pages in the examination: 20

Instructions:

- Use **black** ink or ball-point pen.
- **Fill in the information** at the top of this page with your name, teacher and teaching group.
- Answer **all** questions.
- Answer the questions in the spaces provided – there may be more space than you need.
- Show all the steps in any calculations and state the units.
- 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 ☒.

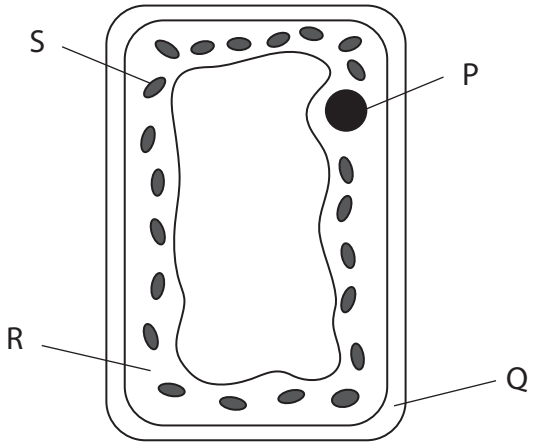
Total Marks available	/80	Teacher comment:
	%	
IGCSE Grade		

Student reflection –

Time finished the exam (If you finish early note down when you finished) -

Answer ALL questions.

1 (a) The diagram shows a plant cell.



(i) Which part of this cell contains chlorophyll?

(1)

- ☒ **A** P
- ☒ **B** Q
- ☒ **C** R
- ☒ **D** S

(ii) Which of these is found in chlorophyll?

(1)

- ☒ **A** calcium
- ☒ **B** iron
- ☒ **C** magnesium
- ☒ **D** water

(iii) Describe the role of chlorophyll.

(2)

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(b) Which of these is an example of positive phototropism?

(1)

- ☒ **A** a plant root growing away from light
- ☒ **B** a plant root growing downwards due to gravity
- ☒ **C** a plant stem growing towards light
- ☒ **D** a plant stem growing upwards due to gravity

(c) The table lists the roles of some substances found in living organisms.

Complete the table by naming each substance.

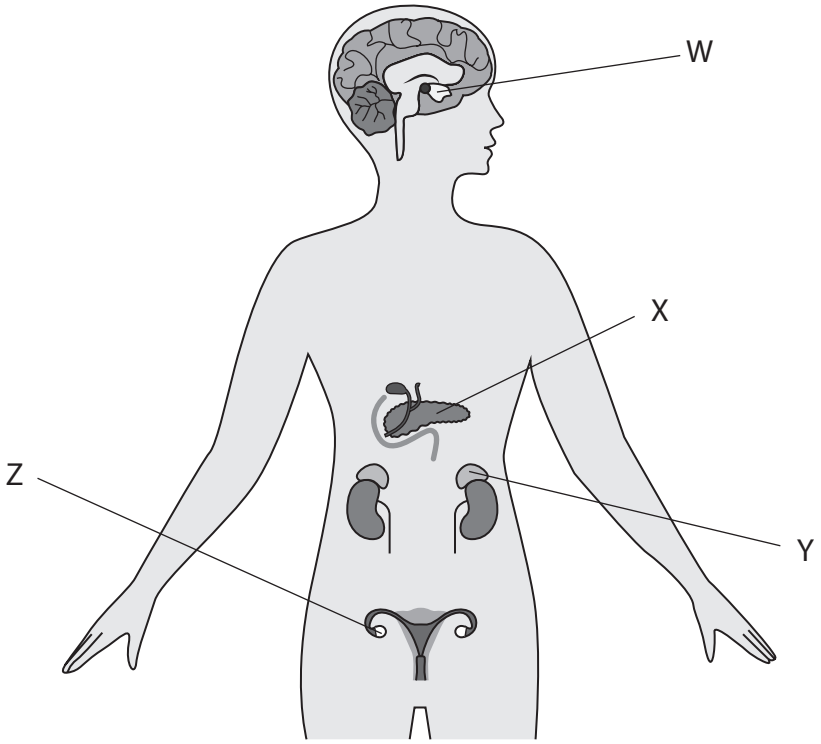
The first one has been done for you.

(3)

Role of substance	Name of substance
positive phototropism	auxin
digests fat	
diffuses across a synapse	
prevents scurvy	

(Total for Question 1 = 8 marks)

2 The diagram shows the position of some hormone producing glands in the female body.



(a) Which of these structures is the adrenal gland?

(1)

- ☒ **A** W
- ☒ **B** X
- ☒ **C** Y
- ☒ **D** Z

(b) The adrenal gland is an organ that secretes adrenaline.

State what is meant by the term **organ**.

(1)

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(c) Adrenaline is released into the blood when there is danger.

The list gives the effects of adrenaline on different parts of the body.

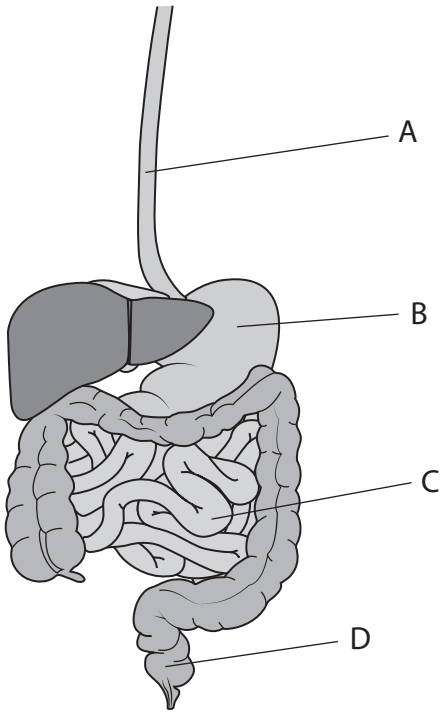
- dilates the pupil in the eye
- increases heart rate
- narrows small arteries in the intestine
- converts glycogen into glucose in the liver

Explain the advantages of these effects to a person in danger.

(5)

(Total for Question 2 = 7 marks)

3 (a) The diagram shows part of the human digestive system.



(i) In which of these parts is hydrochloric acid produced?

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(ii) In which of these parts are faeces stored?

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(b) The liver produces bile.

Explain the role of bile in digestion.

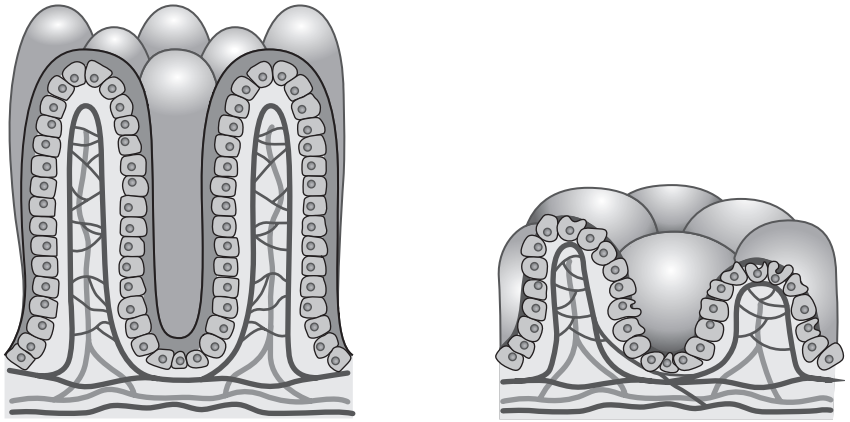
(3)

(c) Some people have a condition called coeliac disease.

In this condition the body reacts to eating gluten, a protein found in wheat.

This reaction damages the villi in the small intestine.

The diagram shows how the villi in the small intestine are damaged.



Undamaged Damaged

(i) Explain how the undamaged villi are adapted for their function.

(4)

(ii) Explain why children with untreated coeliac disease may grow more slowly and become tired more easily than children without coeliac disease.

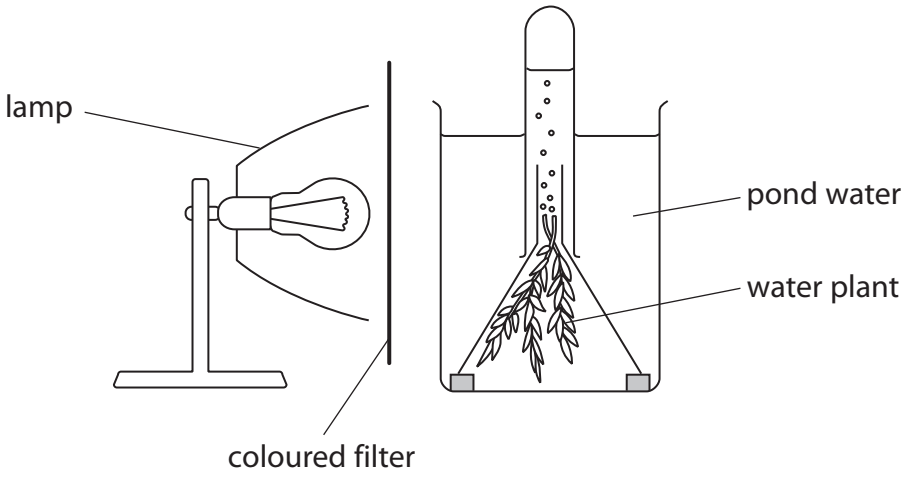
Use the information from the diagram and your own knowledge to support your answer.

(4)

(Total for Question 3 = 13 marks)

4 A student carries out an experiment to investigate the effect of changing the colour of light on the rate of photosynthesis in a water plant.

She sets up the apparatus shown.



(a) (i) Name the gas given off during photosynthesis.

(1)

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(ii) Explain how the student should control two variables in her investigation.

(4)

1 .....

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2 .....

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(b) The table shows the results the student obtained from her investigation.

Colour of light	Number of gas bubbles released in one minute			
	trial 1	trial 2	trial 3	average
Red	23	26	25	
Blue	19	18	21	19
Green	12	16	6	14

(i) Complete the table by calculating the average rate of photosynthesis for red light.

(1)

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(ii) Explain whether the results for each colour are reliable.

(2)

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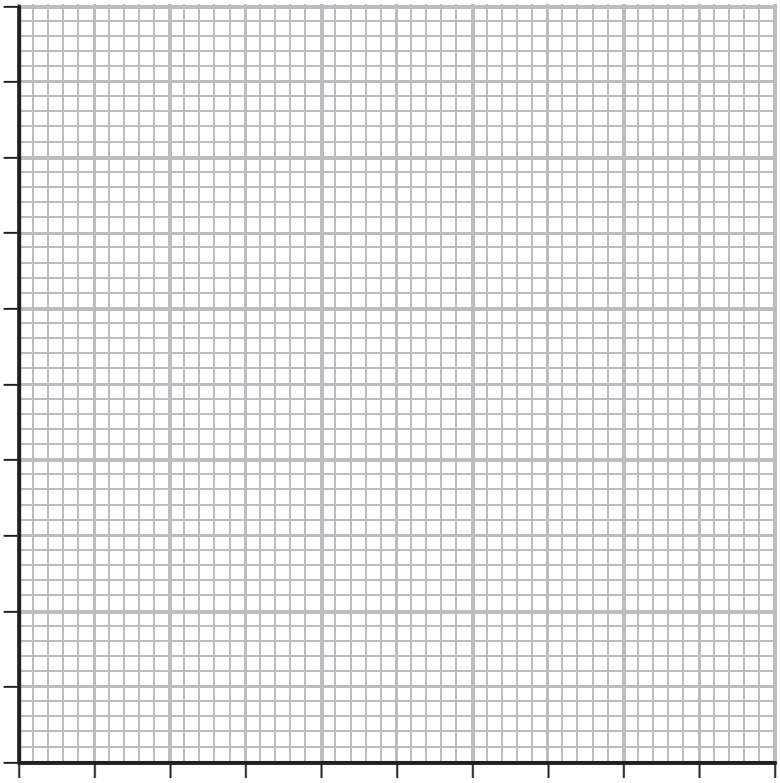
(c) Plot a bar graph to show the effect of the different colours of light on the average rate of photosynthesis.

(5)



(d) Suggest why there is a difference in the average rate of photosynthesis between blue light and green light.

(2)

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(Total for Question 4 = 15 marks)

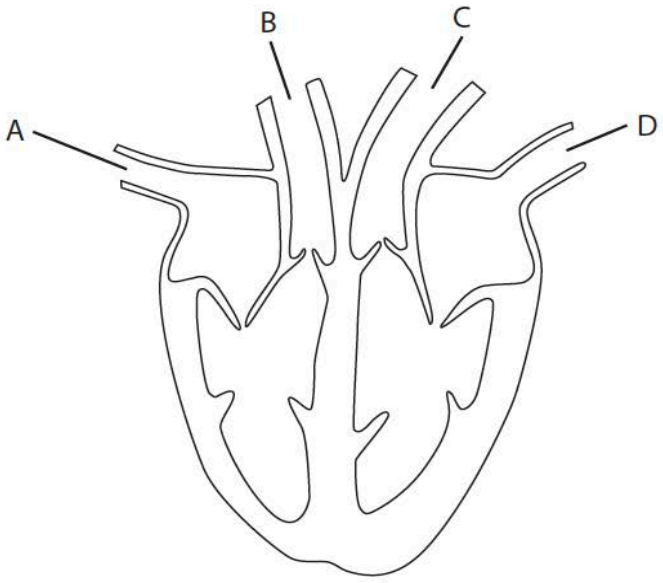
5 Aerobic respiration uses oxygen and produces ATP.

(a) Complete the word equation for aerobic respiration.

(2)

oxygen + ... ⟶ ..... + ... + ATP

b) The diagram shows the human heart with four blood vessels labelled A, B, C and D.



(a) (i) Which blood vessel brings oxygenated blood to the heart?

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(ii) Which blood vessel contains blood at the highest pressure?

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(b) (i) Draw a label line on the diagram to show the position of a semi-lunar valve.

(1)

(ii) Describe the function of the semi-lunar valves.

(2)

(c) In the heart of a foetus, the two upper chambers (atria) are linked by a hole so that blood can pass between them.

(i) Explain why this hole is normally closed before the baby is born.

(2)

(ii) Sometimes the hole does not close.

Explain what effect this will have on the baby.

(3)

(Total for Question 5 = 12 marks)

6 Humans can control their internal environment.

(a) State the term used to describe the control of an organism's internal environment.

(1)

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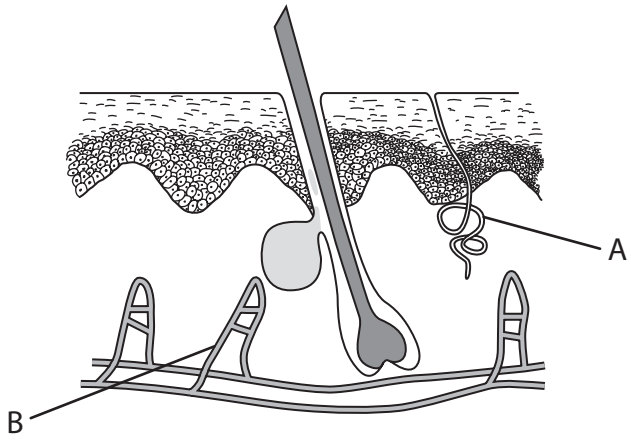
(b) Humans use their skin to regulate their body temperature. The diagram shows a section through the skin with two structures labelled A and B.



Changes take place in the skin when a person moves from a warm environment to a cold environment.

Explain the changes that take place in structure B as the person enters a cold environment.

(3)

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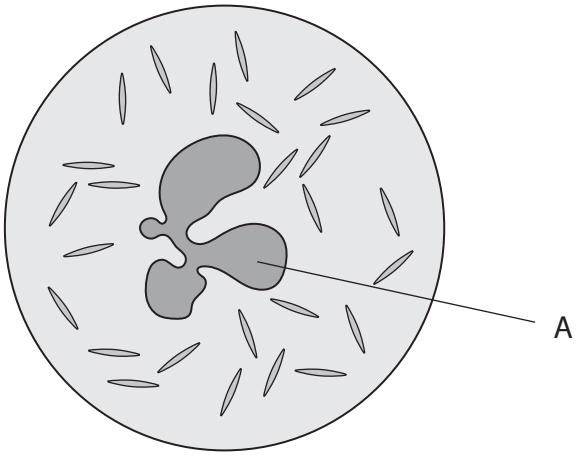
(Total for Question 6 = 4 marks)

7 Blood consists of cells and plasma.

(a) The diagram shows a white blood cell called a phagocyte.



(i) The magnification of the cell is calculated using this formula.

$$\text{magnification} = \frac{\text{diameter of cell in diagram}}{\text{actual diameter of cell}}$$

The actual diameter of the cell is 0.013 mm. **(2)**

Calculate the magnification of the cell.

magnification = ...

(ii) Name the structure labelled A in the diagram. **(1)**

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(iii) Describe the function of this cell in defending the body from infection.

(2)

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(b) Other white blood cells produce proteins called antibodies.

State how you could test a sample of plasma for protein.

(1)

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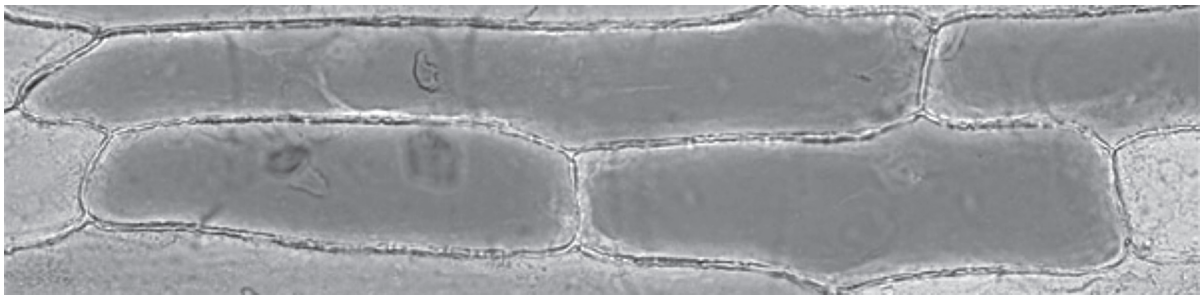
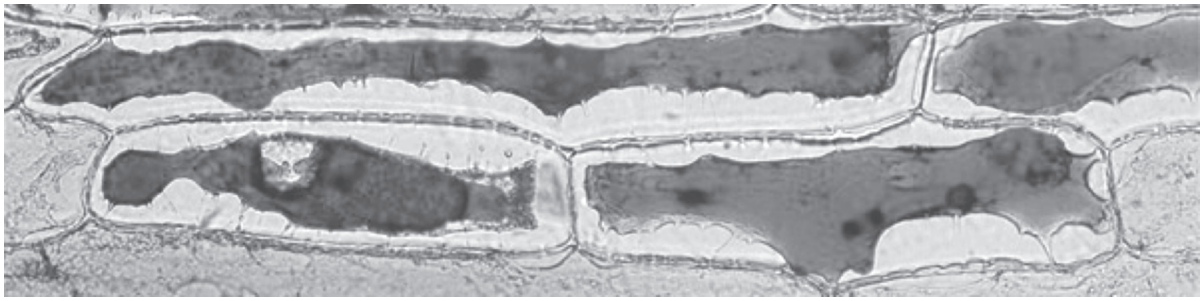
(Total for Question 7 = 6 marks)

8 A student prepared some plant cells taken from an onion. She placed the cells in a few drops of distilled water. She then used a camera attached to a microscope to photograph the cells.

She then added a few drops of concentrated salt solution to the cells and waited a few minutes. She then took another photograph of the same cells.



photograph of cells in distilled water



photograph of cells in concentrated salt solution

(a) Describe the differences in the appearance of the cells in concentrated salt solution compared with the cells in distilled water.

(2)

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(b) The student thought that the differences in the cells were caused by osmosis.

What is meant by the term **osmosis**?

(2)

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(c) Explain what happens to the cells in concentrated salt solution to change their appearance.

(3)

(d) Another student investigated the appearance of red blood cells in distilled water and in concentrated salt solution.
Use your knowledge of osmosis and the structure of red blood cells to describe and explain what the red blood cells would look like in distilled water

(2)

(Total for Question 8 = 9 marks)

9 Biological washing powder contains enzymes to remove stains from clothes.

Describe an investigation to find the temperature at which biological washing powder is most effective at removing stains.

Your answer should include experimental details and be written in full sentences.

(6)

(Total for Question 9 = 6 marks)