The human body – 2021/20 GCSE 21st GCSE Biology B

1. Nov/2021/Paper_J257_03/No.4

This question is about hormones in plants and animals.

Select the correct word from the list to match each statement.

You can use each word once, more than once, or not at all.

ADH **adrenalin** **auxin** **ethene** **FSH** **gibberellin**

LH **oestrogen** **progesterone** **thyroxine**

(a) A plant hormone responsible for the ripening of fruits. ..... **[1]**

(b) A plant hormone responsible for gravitropism in roots. ..... **[1]**

(c) A human hormone that is responsible for ovulation. ..... **[1]**

(d) A human hormone that increases the permeability of the kidney tubule. ..... **[1]**

(e) A human hormone that regulates growth and chemical reactions in cells. ..... **[1]**

(f) A human hormone used in the contraceptive pill to prevent ovulation. ..... **[1]**

2. Nov/2021/Paper_J257_03/No.9

(a) Explain **two** ways in which white blood cells defend against disease.

1. .....

.....

2. .....

..... **[2]**

(b) Multiple sclerosis is a disease which causes the fatty sheath surrounding neurons to break down.

What is the role of the fatty sheath?

.....

..... **[1]**

(c) Multiple sclerosis is an autoimmune disease. This means the body's immune system attacks healthy body cells.

A new treatment has been trialled which scientists hope will stop the progression of the disease. The flow chart in **Fig. 9.1** shows the procedure followed.

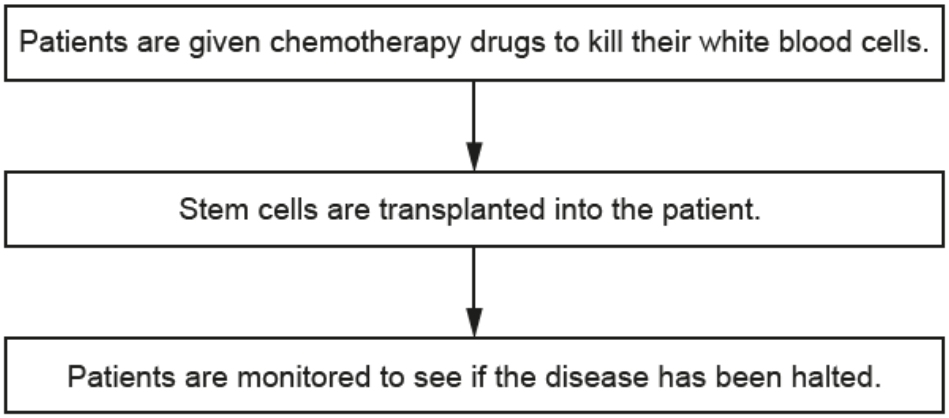


Fig. 9.1

Suggest why stem cells were given to the patient **after** chemotherapy.

.....

.....

.....

..... **[2]**

(d) Information about the clinical trial is given in **Fig. 9.2**.

Multiple sclerosis (MS) clinical trial

- 24 patients were involved
- All patients had advanced MS
- Results showed that 70% of patients showed no sign of the disease after treatment
- One patient died during the study as a result of the treatment

Fig. 9.2

This was the first clinical trial of this treatment and it was not known what effects the treatment would have.

Suggest why the patients still chose to take part in the trial, even though there were risks.

.....

..... **[1]**

(e) The results of this study were published in a peer reviewed journal.

Why would this give other scientists confidence in the findings?

.....

..... **[1]**

(f) 24 patients took part in this study. Only half of the patients were reassessed after 3 years.

Why is this a concern?

.....

..... **[1]**

3. Nov/2021/Paper_J257_03/No.12

Insulin and glucagon are two hormones involved in the control of blood sugar in humans.

(a) The statements explain how insulin and glucagon work together to control blood sugar.

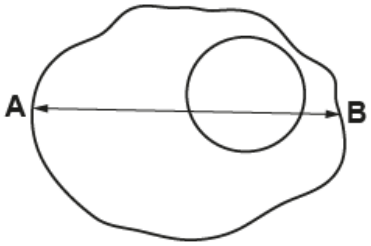
Complete the table by deciding if each statement explains the role of insulin, glucagon or both.

Tick (✓) **one** box for each statement.

Statement	Both insulin and glucagon	Only insulin	Only glucagon
Decreases the amount of blood glucose			
Increases the amount of blood glucose			
Increases the rate of glucose uptake by cells			
Produced by the pancreas			
Stimulates the conversion of glucose to glycogen			
Stimulates the conversion of glycogen to glucose			

[3]

(b) A student is looking at some pancreas cells using a microscope. They draw one of the cells.



(i) The actual size of this cell from points **A** to **B** is 80 µm.

Calculate the magnification used to produce this drawing.

Use the equation: magnification = $\frac{\text{measured size}}{\text{actual size}}$

Magnification = × ..... **[2]**

(ii) The magnification of a light microscope is 1.5×10^3.

The magnification of an electron microscope is 5×10^5.

Calculate the difference in magnification.

Give your answer in **standard form**.

Difference in magnification = ... **[3]**

4. Nov/2020/Paper_J257_03/No.1

Fig. 1.1 shows three different circulatory systems.

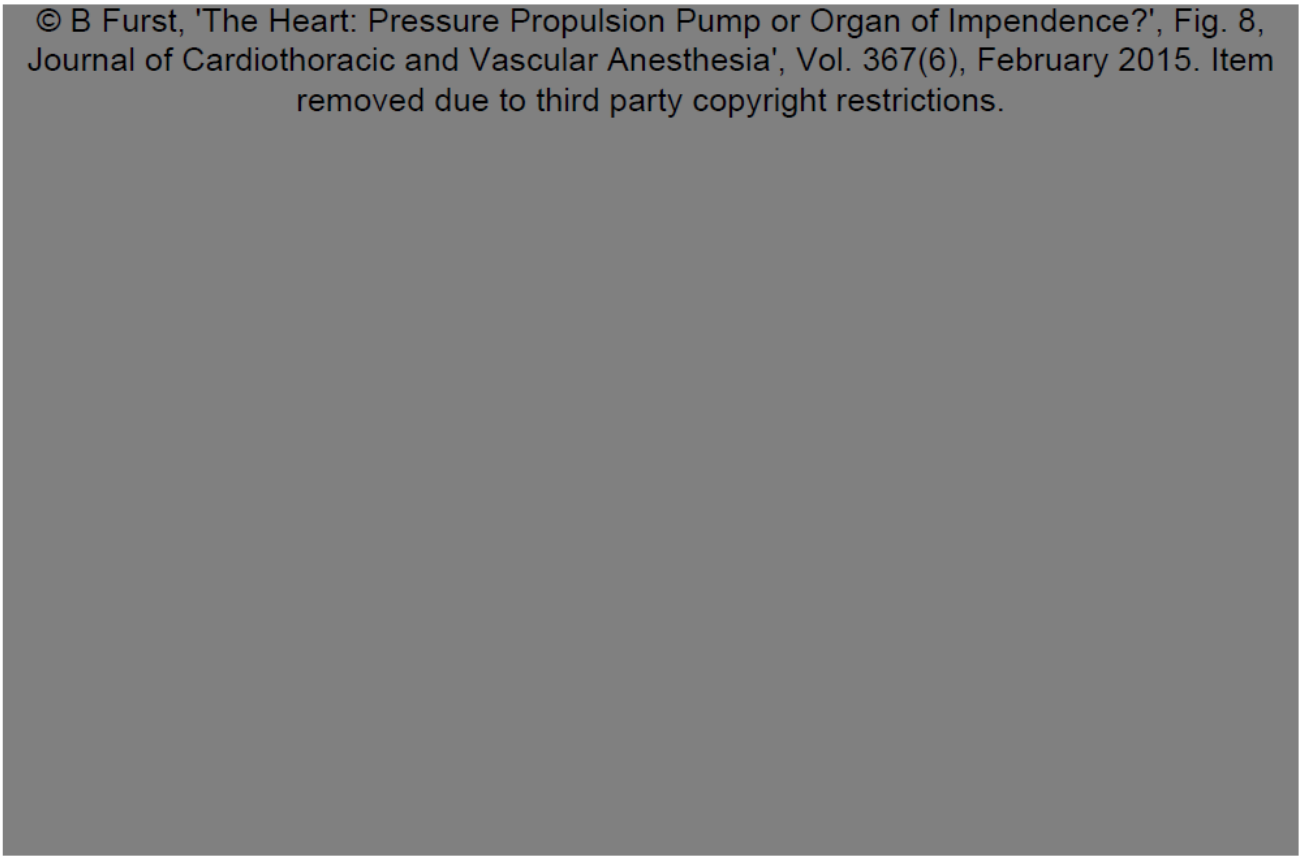


Fig. 1.1

(a) Which diagram best represents the **human** circulatory system?

Tick (✓) **one** box.

A ☐

B ☐

C ☐

Give a reason for your answer.

.....

.....

.....

..... **[2]**

(b) The human heart has many features that means it is adapted to its function.

For each statement decide which structure's function is described.

Tick (✓) only **one** box in each row.

	Structure		
Function	**Heart valve**	**Cardiac muscle**	**Heart chambers**
Contracts to force blood from atria to ventricles			
Contracts to force blood out of the ventricles through vessels			
Prevents backflow of blood during contractions			
Blood temporarily stored in these small spaces to allow blood to be pumped at a high pressure			

[4]

(c) Some babies are born with a heart defect known as a 'hole in the heart'. This is where there is a hole between two of the heart's chambers.

Fig. 1.2 shows a normal heart. **Fig. 1.3** shows a heart of a baby with a 'hole in the heart'.

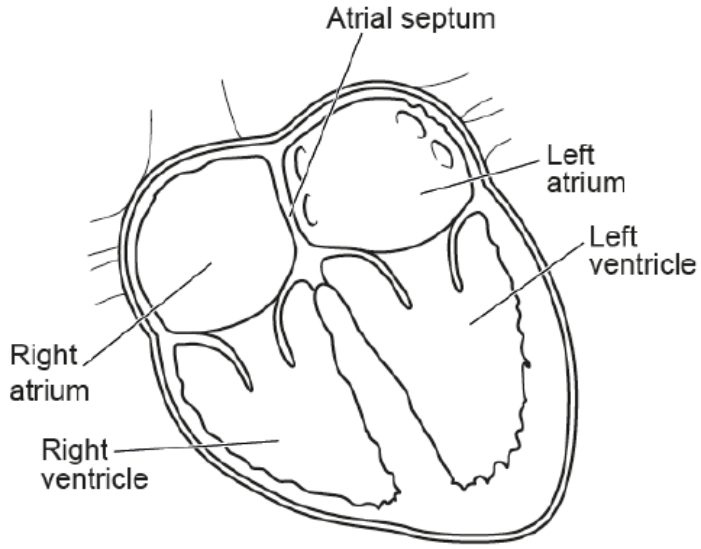


Fig. 1.2

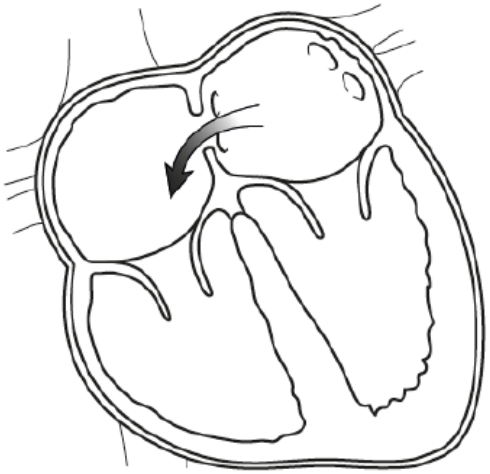


Fig. 1.3

Suggest how the defect in **Fig. 1.3** could affect the baby.

.....

.....

..... **[1]**

(d) The human circulatory system has three types of blood vessel.

Draw lines to connect the **blood vessel** to the correct description of its **structure** and the explanation of how its structure allows it to carry out its **function**.

Blood vessel	Structure	Function
Arteries	Very thin walls, one cell thick	To withstand the high blood pressure of blood leaving the heart
Capillaries	Very thick walls containing elastic tissue and muscle	They can be squashed to move blood along; backflow of blood is prevented
Veins	Thin walls containing elastic tissue, also contains valves	Allows diffusion of substances into and out of the vessel quickly and easily

[3]

5. Nov/2020/Paper_J257_03/No.9

Iritis is a condition where the iris of the eye inflames. It usually affects only one eye.

The iris can no longer contract to change the size of the pupil.

(a) Describe an experiment a doctor could perform to determine if a patient has iritis.

.....

.....

.....

.....

..... **[3]**

(b) **Fig. 9.1** and **Fig. 9.2** show the pupil size of an eye without iritis and an eye with iritis.

Eye **without** iritis
Fig. 9.1

Eye **with** iritis
Fig. 9.2

Calculate the percentage decrease in pupil diameter of the two pupils.

Percentage decrease = ... % **[3]**

(c) The optic nerve sends electrical impulses from the retina of the eye to the neurons in the brain.

Explain how nerve cells are adapted to transmit electrical impulses.

.....

.....

.....

.....

..... **[3]**

6. Nov/2020/Paper_J257_04/No.6

Alex has not had a drink of water for some time. This means there is less water in his blood.

Describe how Alex's body detects and responds to this, and how his blood and urine are affected by the body's response.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

7. Nov/2021/Paper_J257_01/No.1

Different substances are transported into and out of the human body to help keep its cells alive.

(a) (i) Complete the table to describe how each substance is related to the requirements of cells.

Tick (✓) at least **one** box in each row.

Substance	Used by cells for aerobic cellular respiration	Made by cells in aerobic cellular respiration	Helps to maintain the volume of the cell's cytoplasm
Carbon dioxide			
Oxygen			
Water			

[4]

(ii) The lungs are a gaseous exchange surface in the human body.

Complete the sentences to explain why this exchange surface is important.

Use the words.

You can use each word once, more than once, or not at all.

big **distance** **fast** **slow** **surface area** **volume**

The gaseous exchange surface in the lungs has a large .....

Without this exchange surface the exchange of gases would be too

.....

[2]

(b) It is important that the water content of the body remains constant.

(i) Which organ is responsible for maintaining the water balance of the human body?

Put a (ring) around the correct answer.

Heart **Kidney** **Skin** **Stomach**

[1]

(ii) State **two** ways in which the human body loses water.

1 .....

2 .....

[2]

(c) If the amount of water in the blood increases, more water could enter cells.

(i) What is the name of the process that moves water into these cells?

Put a (ring) around the correct answer.

Active transport **Diffusion** **Excretion** **Osmosis**

[1]

(ii) If too much water enters a cell what could happen to the cell?

Tick (✓) **one** box.

It could burst ☐

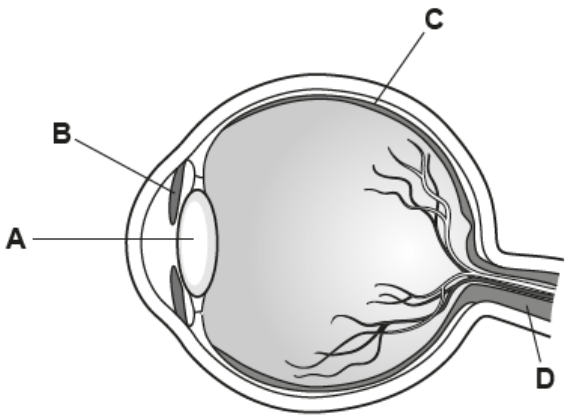
It could shrink ☐

There would be no change ☐

[1]

8. Nov/2021/Paper_J257_01/No.2

The diagram shows the human eye.



(a) (i) Which letter shows the lens?

Tick (✓) **one** box.

A ☐

B ☐

C ☐

D ☐

[1]

(ii) Which letter shows the part of the eye that controls the size of the pupil?

Tick (✓) **one** box.

A ☐

B ☐

C ☐

D ☐

[1]

(b) Poor vision can be caused by a defect in the eye.

Draw lines to connect each common defect with what it is caused by.

Common defect	Caused by
Cataract	The eyes are too long.
Long-sightedness	The lens cannot become round enough.
Short-sightedness	A cloudy patch forms on the lens.

[2]

(c) Conjunctivitis is an infection of the eye. People with conjunctivitis often have red eyes with a sticky substance covering the eye.

The eyes are also itchy.

(i) Conjunctivitis can be caused by bacteria.

What could a doctor give a patient to help kill bacteria?

..... **[1]**

(ii) Conjunctivitis is a communicable disease.

Suggest how a person with conjunctivitis could prevent spreading the disease to another person.

.....

..... **[1]**

(d) Some bacteria can respire anaerobically.

Which statement about **anaerobic** respiration in bacteria is correct?

Tick (✓) **one** box.

It does **not** use glucose ☐

It does **not** use oxygen ☐

It produces oxygen ☐

It produces water ☐

[1]

9. Nov/2021/Paper_J257_01/No.10

(a) Plants and animals use small organic molecules to make larger organic molecules.

Draw lines to connect the small organic molecules with the large organic molecules that they are used to make.

Small organic molecules	Large organic molecules
Amino acids	Fats
Fatty acids	Long-chain carbohydrates
Glycerol	Proteins
Sugar	

[2]

(b) Plants obtain important substances from their environment.

Which list of elements must plants obtain from the environment?

Tick (✓) **one** box.

- Carbon, hydrogen, and oxygen ☐
- Carbon, hydrogen, nitrogen, and oxygen ☐
- Nitrogen and carbon ☐
- Only carbon ☐

[1]

10. Nov/2021/Paper_J257_02/No.3

The circulatory system transports blood around the human body.

(a) Blood is transported in blood vessels.

Complete the table by identifying each type of blood vessel **and** explaining the function of each structure.

Type of blood vessel	**Vessel's structure**	**Function of the vessel's structure**
.....	Thick walls made of muscle and elastic tissue	....
.....	Thin walls containing elastic tissue	Allows the vessel to be squashed, to push blood along
	Valves inside the vessel	....

[4]

(b)* Describe the journey of blood around the human body. Start with deoxygenated blood (which has very little oxygen in it) in the right side of the heart.

You should include:

- organs that the blood travels to in the excretory system, the digestive system, and the gaseous exchange system.
- the correct order in which the blood travels to these systems.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

11. Nov/2020/Paper_J257_01/No.4

(a) Plants respond to their environment.

Select the word from the list below that describes each statement.

auxin **gravitropism** **photosynthesis** **phototropism** **respiration**

(i) Plant shoots grow towards the light. ..... **[1]**

(ii) Plant roots grow in the direction of gravity. ..... **[1]**

(iii) A hormone involved in plant growth responses. ..... **[1]**

(b) Pathogens can cause disease in plants.

Which **two** statements describe **plant** defences against pathogens?

Tick (✓) **two** boxes.

They have a cell wall. ☐

They have platelets. ☐

They have white blood cells. ☐

They produce antibodies. ☐

They produce antimicrobial substances. ☐

[2]

(c) **(i)** Some plants grow in waterlogged soil.

What type of respiration will take place in root cells growing in waterlogged soil?

..... **[1]**

(ii) Which **two** statements, when taken together, explain why plants that grow in waterlogged soil may obtain fewer nutrients from the soil?

Tick (✓) **two** boxes.

Active transport uses ATP. ☐

Active transport requires a concentration gradient. ☐

Active transport needs water. ☐

Less ATP is made in aerobic respiration. ☐

Less ATP is made in anaerobic respiration. ☐

[2]

12. Nov/2020/Paper_J257_01/No.6

Insulin controls the blood sugar level in the human body.

(a) Complete the sentences to describe how insulin controls blood sugar levels.

Use words from the list.

You can use each word once, more than once, or not at all.

high **kidney** **less** **low** **more** **pancreas**

When blood sugar levels are ....., insulin is released from

the ..... .

The insulin causes cells to take up ..... sugar.

[3]

(b) Insulin is an example of a hormone released by the endocrine system in the human body.

For each statement decide if it is a **true** or **false** description of hormonal control.

Tick (✓) **one** box in each row.

Statement about hormonal control	True	False
Effects can be long-lasting.		
Hormones are transported by the blood.		
Target cells have specific receptors.		
Hormones are usually fast-acting.		
Hormones are secreted by glands.		

[2]

(c) People with Type 1 diabetes cannot make enough insulin.

Scientists think stem cells could be used to enable the pancreas to produce insulin again.

What **two** properties do stem cells have that make this possible?

1 .....

.....

2 .....

.....

[2]

13. Nov/2020/Paper_J257_02/No.6

Some students are playing a game.

Their teacher has scattered small green straws and small red straws over a large area of grass.

In each round of the game, the students have to run around and pick up as many straws as they can in 10 seconds.

(a) The straws are like a population of prey.

Which statement is an example of **variation** between the straws?

Tick (✓) **one** box.

They are all small. ☐

They are different colours. ☐

They are in different places on the grass. ☐

They will not all be picked up. ☐

[1]

(b) The straws are 'hunted' by the students, who are like predators.

Explain why the **green** straws are better suited to 'survive' in the grassy environment.

.....

.....

.....

..... **[2]**

(c) The students are in competition to pick up as many straws as they can.

Suggest **one** example of variation between students that could affect their ability to compete for the straws.

.....

..... **[1]**

(d) Which biological process is the game a model of?

Tick (✓) **one** box.

Mutation ☐

Natural selection ☐

Reproduction ☐

Selective breeding ☐

[1]

(e) The students play several rounds of the game.

(i) Straws that have been picked up are **not** put back on the grass after each round. The total population of straws left on the grass will therefore be smaller after several rounds.

Predict one **other** way in which the population of straws left on the grass will have changed after several rounds of the game.

Prediction .....

..... **[1]**

(ii) The student who picks up the **fewest** straws in each round has to drop out of the game. The total population of students will therefore be smaller after several rounds.

Predict one **other** way the population of students will have changed after several rounds of the game.

Explain your answer.

Prediction .....

.....

Explanation .....

..... **[2]**

14. Nov/2020/Paper_J257_02/No.7

Nina is walking in her garden with no shoes or socks on.

She steps on a sharp stone.

The sharp stone hurts Nina. Her foot moves away from the sharp stone quickly and automatically. This is a reflex response. It happens because of a **reflex arc** in Nina's nervous system.

Explain how the structures of Nina's reflex arc work together to move her foot away from the sharp stone without her having to think about it.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**