

**Year 11 Combined
Higher Biology**

Name: _____

Class: _____

Date: _____

Time: **90 minutes**

Marks: **88 marks**

Comments:

**Thursday 23rd
March 2023**

PM Session

Q1.

This question is about cell structures.

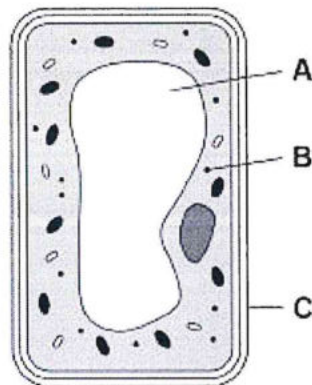
- (a) Draw **one** line from each cell structure to the type of cell where the structure is found.

Cell Structure	Type of cell where the structure is found
Nucleus	Prokaryotic cells
Permanent vacuole	Plant cells only
Plasmid	Eukaryotic cells

(2)

- (b) **Figure 1** shows a plant cell.

Figure 1



What are the names of structures **A**, **B** and **C**?

Tick **one** box.

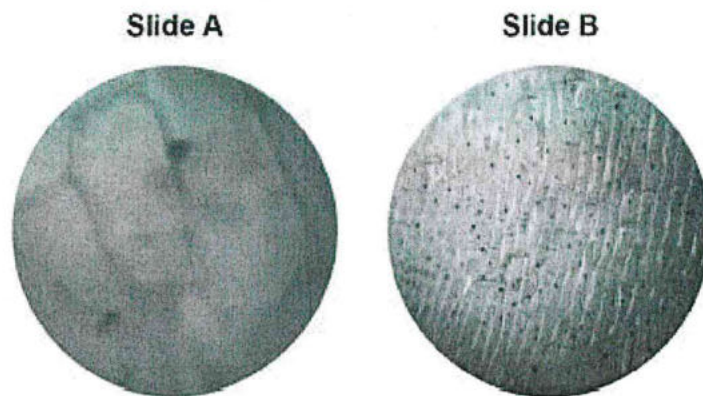
Structure A	Structure B	Structure C	
Chloroplast	Vacuole	Cell wall	<input type="checkbox"/>
Nucleus	Chloroplast	Cell membrane	<input type="checkbox"/>
Vacuole	Mitochondrion	Cell membrane	<input type="checkbox"/>
Vacuole	Ribosome	Cell wall	<input type="checkbox"/>

(1)

A student observed slides of onion cells using a microscope.

Figure 2 shows two of the slides the student observed.

Figure 2



The cells on the slides are **not** clear to see.

- (c) Describe how the student should adjust the microscope to see the cells on Slide A more clearly.

(1)

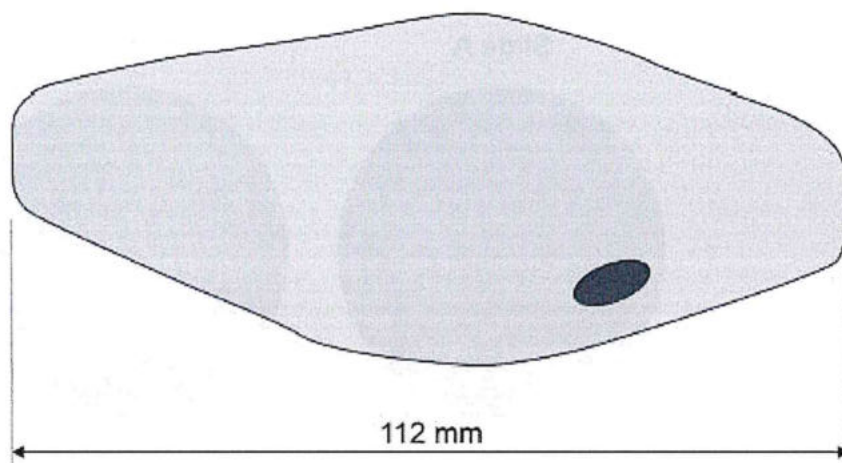
- (d) Describe how the student should adjust the microscope to see the cells on Slide B more clearly.

(2)

(e) The student made the necessary adjustments to get a clear image.

Figure 3 shows the student's drawing of one of the cells.

Figure 3



The real length of the cell was 280 micrometres (μm).

Calculate the magnification of the drawing.

Magnification = \times _____

(3)
(Total 9 marks)

Q2.

This question is about plant transport systems.

- (a) Describe how water is transported from the soil to the atmosphere through a plant.

(4)

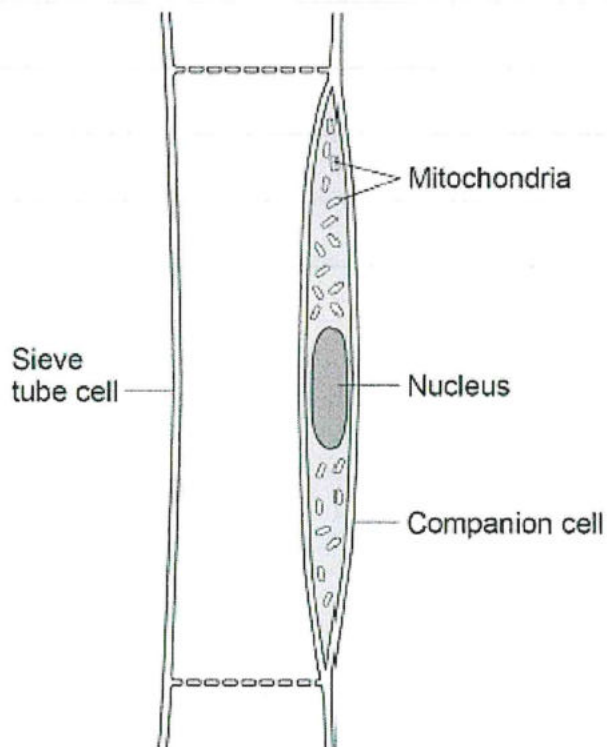
- (b) Dissolved sugars are moved through a plant in phloem tissue.

What is the name of the process that moves dissolved sugars through phloem tissue?

(1)

Phloem tissue is made of sieve tube cells and companion cells.

The figure below shows a section of phloem tissue.



- (c) Explain **one** way **sieve tube cells** are specialised for their function.

Use the figure above.

(2)

- (d) What does the structure of the companion cells suggest about the process that moves dissolved sugars through the phloem tissue?

Give a reason for your answer.

Use the figure above.

(2)

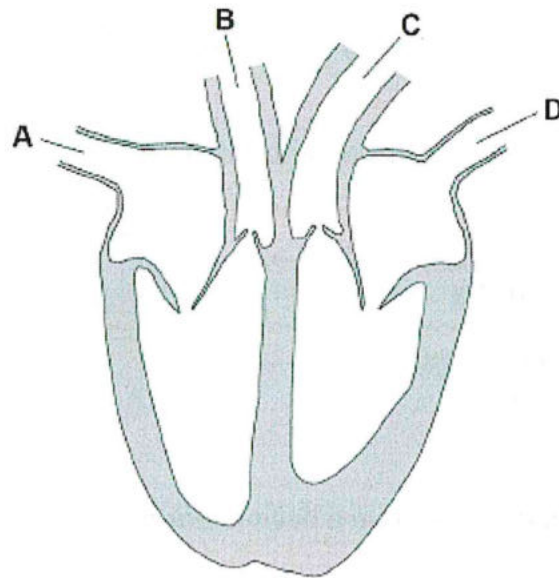
- (e) Describe why it is important that dissolved sugars are moved both upwards **and** downwards in a plant.

(3)

(Total 12 marks)

Q3.

The figure below shows the human heart.



- (a) Which blood vessel transports blood with the highest oxygen concentration **into** the heart?

Tick (✓) **one** box.

A B C D

(1)

- (b) Blood pressure is a measure of the force of the blood against the walls of the blood vessels.

Which blood vessel transports blood at the highest pressure?

Tick (✓) **one** box.

A B C D

(1)

(c) What is the correct order for blood flowing through the heart to the lungs?

Tick (✓) **one** box.

left atrium → left ventricle → pulmonary artery

left atrium → left ventricle → pulmonary vein

right atrium → right ventricle → pulmonary artery

right atrium → right ventricle → pulmonary vein

(1)

(e) Many people who survive a heart attack get out of breath easily when they exercise gently.

Explain why heart attack survivors get out of breath easily.

(4)

Scientists have developed patches of beating heart cells to repair damaged heart tissue.

The patches are placed onto areas of the heart where cells have died. New cells grow to replace the dead cells.

The patches are made using a person's own cells that are converted into stem cells.

(f) Explain why stem cells are used to make the patches.

(2)

(g) The scientists could have used human embryonic stem cells to make the patches.

Give **two** advantages of using stem cells made from the person's own cells, rather than using embryonic stem cells.

1 _____

2 _____

(2)

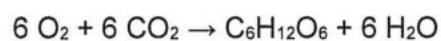
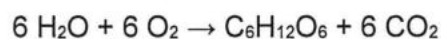
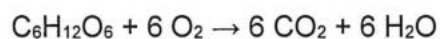
(Total 11 marks)

Q4.

Plants absorb light for photosynthesis.

(a) Which is the equation for photosynthesis?

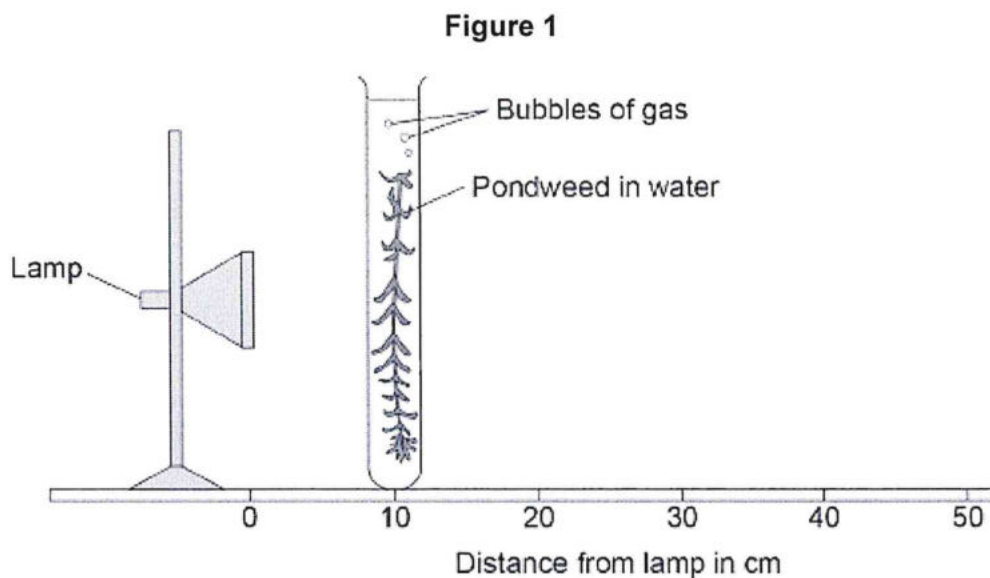
Tick (✓) **one** box.



(1)

A student investigated the effect of light intensity on the rate of photosynthesis.

Figure 1 shows the apparatus.



This is the method used.

1. Set up the apparatus as shown in **Figure 1**.
2. Place the pondweed 10 cm away from the lamp.
3. Switch on the lamp.
4. Record the number of bubbles of gas produced in 5 minutes.
5. Repeat steps 2 to 4 with the pondweed at different distances from the lamp.

(b) What was the independent variable in this investigation?

Tick (✓) **one** box.

Distance of the pondweed from the lamp

Length of the piece of pondweed

Number of bubbles of gas produced

Time taken to collect the gas

(1)

The lamp gets warm when it is on. This causes the temperature of the water to increase.

(c) Explain how an increase in temperature would affect the results of this investigation.

(2)

(d) Suggest **one** way the investigation could be improved so the temperature of the water does **not** increase.

(1)

(e) Suggest **two** improvements to the investigation so the results would be more valid.

Do **not** refer to controlling the temperature of the water.

1 _____

2 _____

(2)

The table below shows the results.

Distance of pondweed from the lamp in cm	Number of bubbles of gas produced in 5 minutes
10	120
20	56
30	31
40	16
50	10

- (f) Calculate the rate of photosynthesis when the pondweed was 40 cm from the lamp.

Give the rate of photosynthesis as the number of bubbles of gas produced per minute.

Rate = _____ bubbles of gas produced per minute

(1)

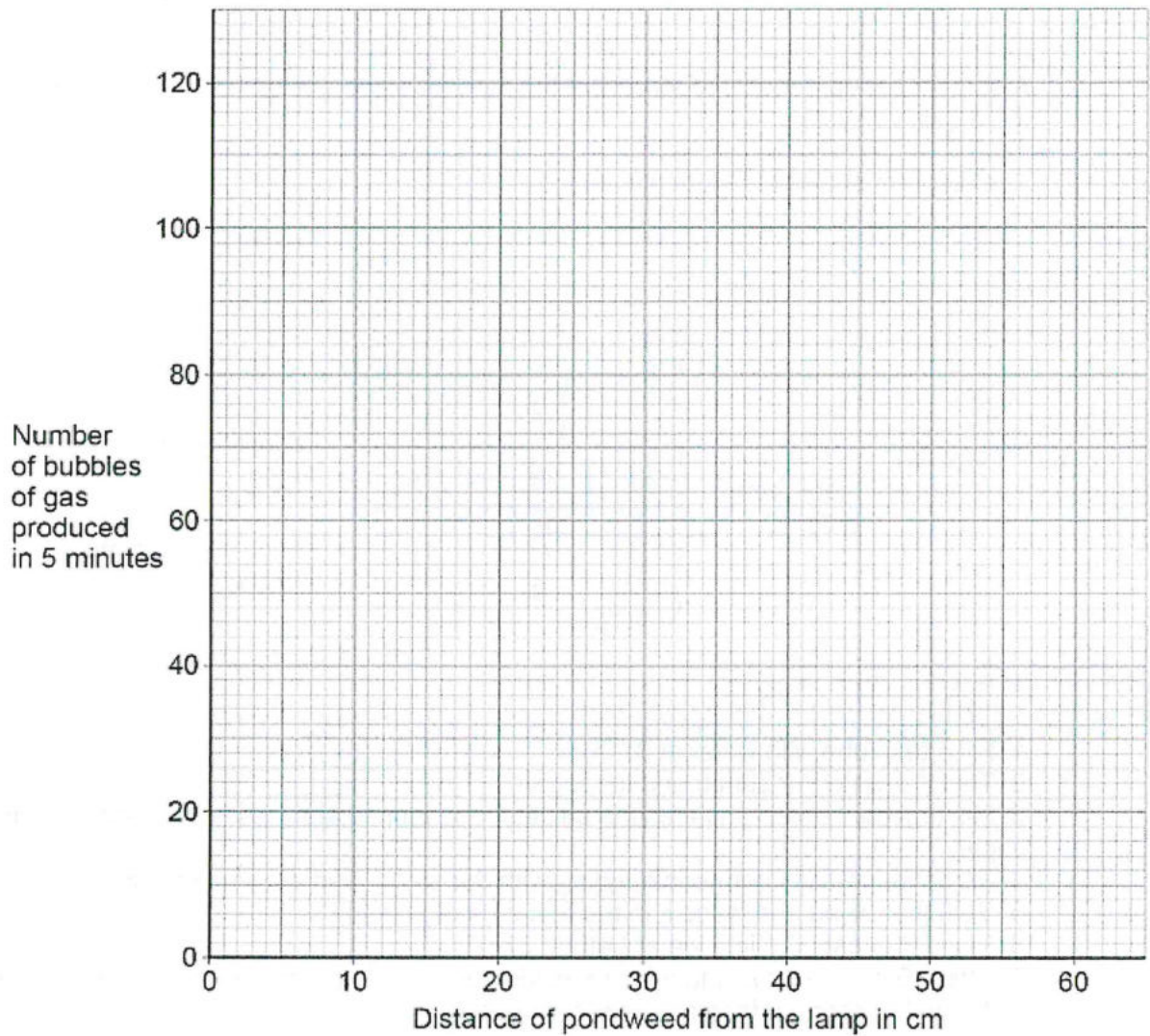
- (g) Give **one** conclusion that can be made from the table above.

(1)

(h) Plot the data from the table above on **Figure 2**.

Draw a line of best fit.

Figure 2



(3)

(i) Predict the number of bubbles that would be produced in 5 minutes if the pondweed was 60 cm from the lamp.

Use **Figure 2**.

Number of bubbles produced in 5 minutes = _____

(1)

(Total 13 marks)

Q5.

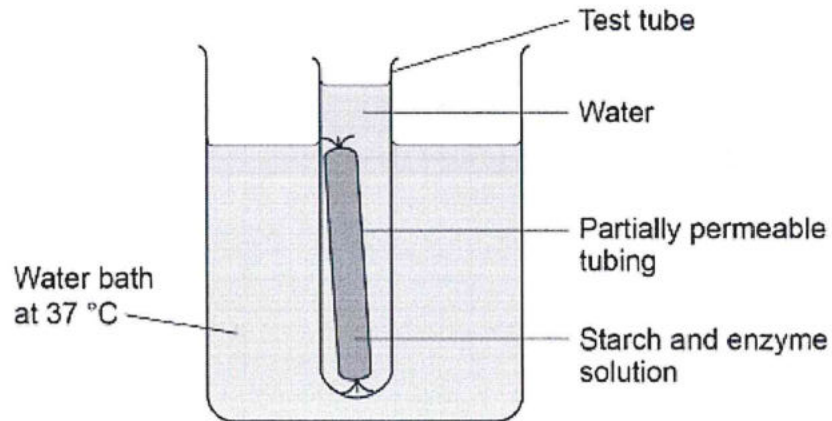
This question is about digestion.

- (a) Name the enzyme that digests starch in the human digestive system.

(1)

A student set up a model to represent the digestion and absorption of food molecules in the digestive system.

The diagram shows the student's model.



This is the method used.

1. Fill a test tube with water at 37 °C
2. Test the water for starch and for sugar.
3. Mix together starch and enzyme solution and immediately test it for starch and for sugar.
4. Fill some partially permeable tubing with the starch and enzyme mixture.
5. Seal the tubing and place it in the test tube of water.
6. Place the test tube in a water bath at 37 °C
7. After 30 minutes, test the mixture inside the partially permeable tubing and test the water in the test tube for starch and for sugar.

- (b) Suggest which parts of the body the partially permeable tubing and the water in the test tube represent.

Partially permeable tubing _____

Water in the test tube _____

(2)

The table below shows the results.

Test	Description of liquid	Result of starch test	Result of sugar test
1	Mixture inside tubing at start	✓	X
2	Water in the test tube at start	X	X
3	Mixture inside tubing after 30 minutes	✓	✓
4	Water in the test tube after 30 minutes	X	✓

Key

✓ = Present

X = Not present

(c) Name the reagents used to test for starch and for sugar.

Starch _____

Sugar _____

(2)

(d) Why was there no sugar present in test 1?

(1)

(e) Explain the results for test 3.

(2)

(f) Explain the results for test 4.

(2)
(Total 10 marks)

Q6.

Some diseases can be cured by using antibiotics or prevented by vaccination.

- (a) (i) Explain fully why antibiotics cannot be used to cure viral diseases.

(2)

- (ii) There has been a large increase in the populations of many antibiotic-resistant strains of bacteria in recent years.

Explain why.

(2)

- (b) A person can be immunised against a disease by injecting them with an inactive form of a pathogen.

Explain how this makes the person immune to the disease.

(3)

(Total 7 marks)

Q7.

Reflex actions are rapid and automatic.

(a) Name the following structures in a reflex action.

(i) The structure that detects the stimulus.

_____ (1)

(ii) The neurone that carries impulses to the central nervous system.

_____ (1)

(iii) The neurone that carries impulses away from the central nervous system.

_____ (1)

(iv) The structure that brings about the response.

_____ (1)

(b) Describe what happens at a synapse when an impulse arrives.

_____ (2)

(c) Some people have a condition in which information from the skin does not reach the brain.

Explain why this is dangerous for the person.

_____ (2)

(Total 8 marks)

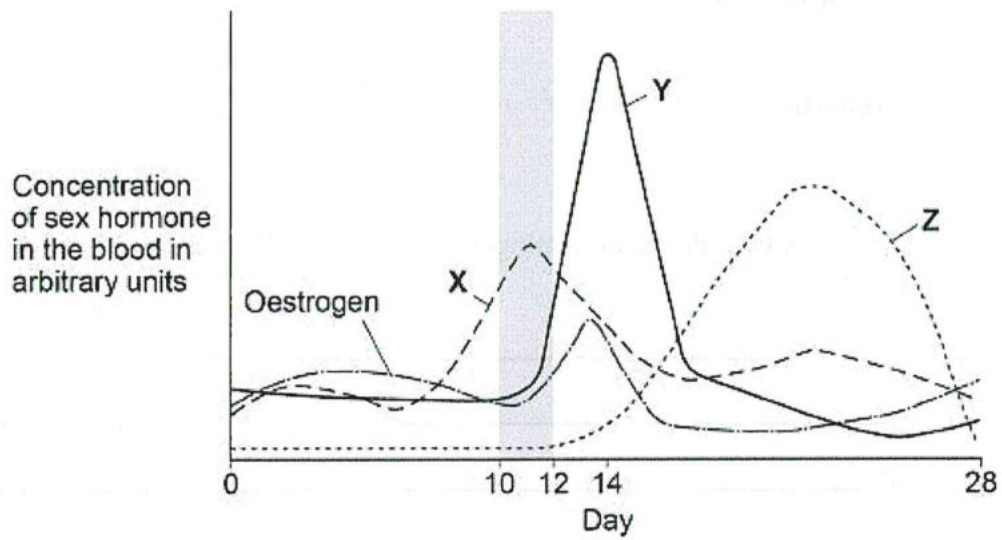
Q8.

Endocrine glands produce hormones.

- (a) Which hormone stimulates basal metabolic rate?

(1)

The diagram below shows how concentrations of sex hormones in the blood vary during a 28-day menstrual cycle.



- (b) Which hormone does X represent?

Tick (✓) **one** box.

FSH

LH

Progesterone

Testosterone

(1)

(c) Which hormone does **Z** represent?

Tick (✓) **one** box.

FSH

LH

Progesterone

Testosterone

(1)

(d) Describe **two** effects of oestrogen between day 10 and day 12 of the menstrual cycle.

1. _____

2. _____

(2)

In vitro fertilisation (IVF) is a fertility treatment.

(e) Hormones are used in IVF treatment.

Explain how different hormones are used to help a woman become pregnant.

(3)

- (f) The table below shows information about IVF success rates.

Age of woman in years	Percentage (%) of IVF treatments resulting in pregnancy
<35	29
35–37	23
38–39	15
40–42	9
43–44	3
>44	2

A 35-year-old woman with fertility problems wants a child.

Suggest why she should start IVF treatment as soon as possible.

You **must** include data from table above in your answer.

(1)
(Total 9 marks)

