

**Year 11 Combined
Foundation Biolgy**

Name: _____

Class: _____

Date: _____

Time: **90 minutes**

Marks: **89 marks**

Comments:

**Thursday 23rd
March 2023**

PM Session

Q1.

This question is about cell structures.

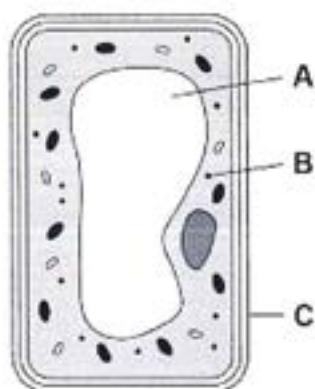
- (a) Draw **one** line from each cell structure to the type of cell where the structure is found.

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**?

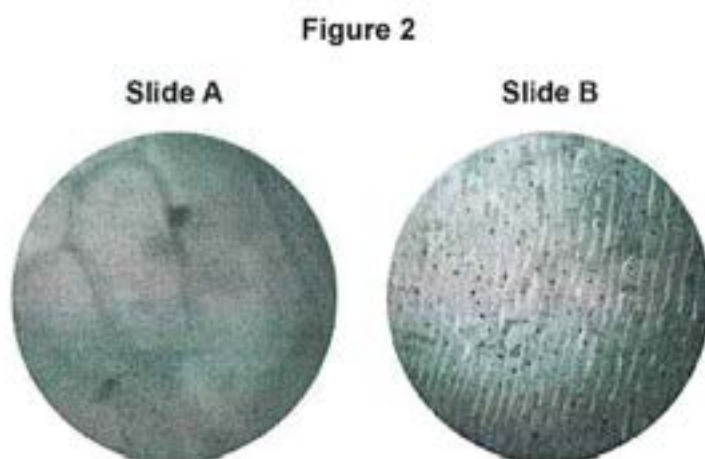
Tick **one** box.

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.



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)

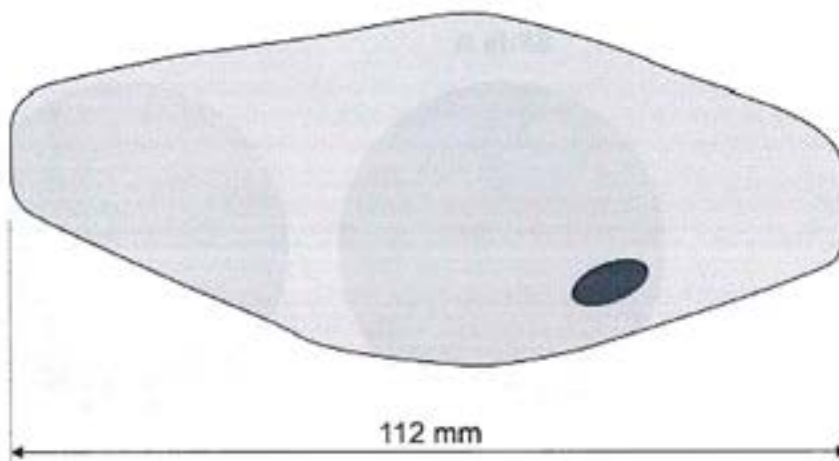
- (d) Describe how the student should adjust the microscope to see the cells on Slide B more clearly.

(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) Which **organ** in a plant absorbs water from the soil?

(1)

- (b) The concentration of nitrate ions in the soil is lower than the concentration of nitrate ions inside a plant.

How would the nitrate ions move from the soil into the cells of this plant?

Tick (✓) **one** box.

By active transport

By diffusion

By osmosis

(1)

Dissolved sugars are transported in the phloem.

- (c) What is the name of the process that moves dissolved sugars through the phloem?

Tick (✓) **one** box.

Evaporation

Osmosis

Translocation

(1)

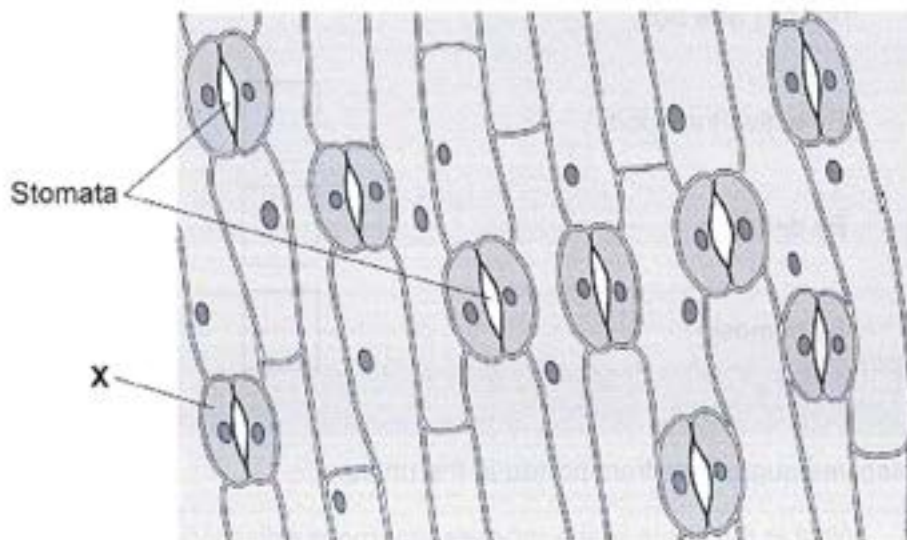
- (d) Give **one** use of sugars in a plant.

(1)

Stomata are openings on the surface of a leaf.

Stomata allow gases to move into and out of a leaf.

The figure below shows the surface of a leaf.



(e) What is cell X?

Tick (✓) **one** box.

Guard cell

Meristem cell

Palisade cell

(1)

(f) Why do the stomata open during the day?

Tick (✓) **one** box.

To allow carbon dioxide in

To allow nitrogen in

To allow oxygen in

(1)

(g) The area of the leaf shown in the figure above is 0.25 mm².

Calculate the number of stomata per mm² for the leaf in the figure above.

Use the equation:

$$\text{number of stomata per mm}^2 = \frac{\text{number of stomata}}{\text{area in mm}^2}$$

Number of stomata per mm² = _____

(2)

A student investigated the number of stomata per mm² on the upper and lower surfaces of leaves.

The leaves were taken from the same plant.

The table below shows the results.

Leaf	Number of stomata per mm ²	
	Upper surface	Lower surface
1	0	37
2	1	36
3	2	30
4	1	32
5	1	35
Mean	1	X

(h) Calculate mean value X in the table above.

X = _____

(2)

- (i) Water vapour is lost through stomata.

Explain the difference in the number of stomata on the upper and lower surfaces of the leaves.

Use the table above.

(3)
(Total 13 marks)

Q3.

The heart is part of the circulatory system.

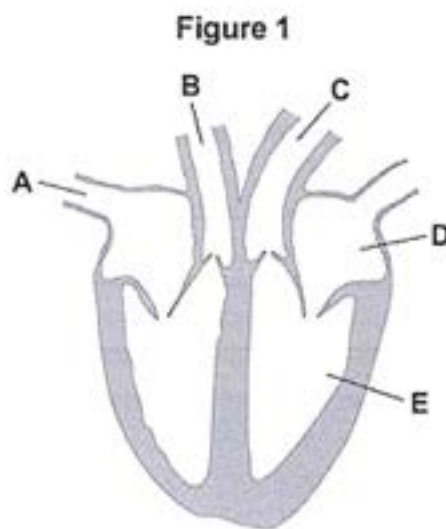
- (a) (i) Name **one** substance transported by the blood in the circulatory system.

_____ (1)

- (ii) What is the main type of tissue in the heart wall?

_____ (1)

- (b) **Figure 1** shows the human heart.



(i) Which blood vessel, **A**, **B** or **C**, takes blood to the lungs?

(1)

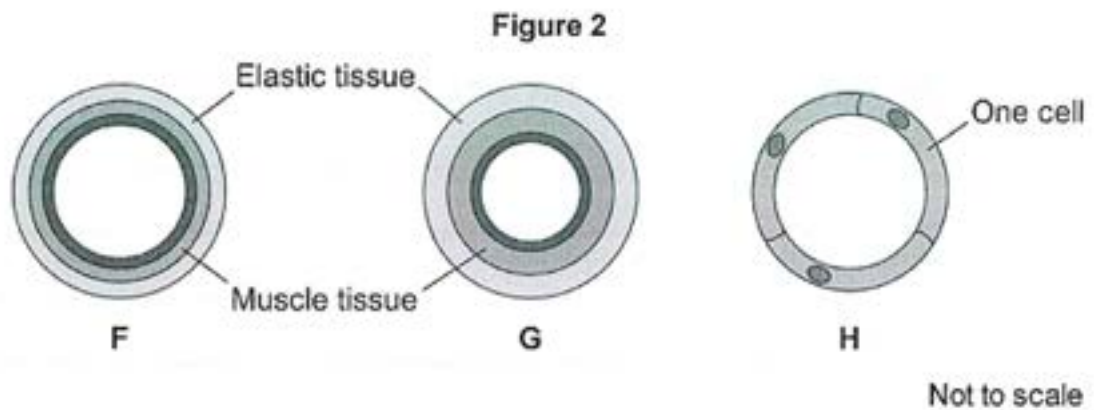
(ii) Name parts **D** and **E** shown in **Figure 1**.

D _____

E _____

(2)

(c) **Figure 2** shows three types of blood vessel, **F**, **G** and **H**.



(i) What type of blood vessel is **F**?

Tick (✓) **one** box.

an artery

a capillary

a vein

(1)

(ii) A man needs to have a stent fitted to prevent a heart attack.

In which type of blood vessel would the stent be placed?

Tick (✓) **one** box.

an artery

a capillary

a vein

(1)

(iii) Explain how a stent helps to prevent a heart attack.

(2)

(Total 9 marks)

Q4.

Pathogens cause infectious diseases.

- (a) Draw **one** line from each disease to the type of pathogen that causes the disease.

Disease	Type of pathogen
Gonorrhoea	Bacterium
	Fungus
	Protist
Measles	Virus

(2)

The body defends itself against pathogens in different ways.

- (b) Give **two** ways that the body prevents pathogens entering the body.

1. _____

2. _____

(2)

- (c) If pathogens do enter the body the immune system tries to destroy the pathogens.

Describe how the immune system defends the body against disease.

(6)

(d) Give **one** reason why antibiotics cannot be used to treat HIV infections.

(1)

(e) Give **two** ways to prevent the spread of HIV.

1. _____

2. _____

(2)

(f) Some people with a HIV infection develop AIDS.

Some people with AIDS may die from a different type of infection, such as a chest infection.

Why do people with AIDS die from a different type of infection?

Tick (✓) **one** box.

HIV damages the immune system.

Pathogens enter the body more easily.

People with AIDS are immune to HIV.

(1)

(Total 14 marks)

Q5.

Four foods were tested for starch, sugar and protein.

The table shows the results.

Food	Test for starch: colour after iodine test	Test for sugar: colour after Benedict's test	Test for protein: colour after Biuret test
A	Blue-Black	Brick red	Blue
B	Orange	Blue	Lilac
C	Blue-Black	Yellow	Blue
D	Orange	Orange	Lilac

(a) Give **three** conclusions about food **D**.

1 _____

2 _____

3 _____

(3)

(b) Starch is broken down into glucose.

Which type of enzyme breaks down starch?

Tick (✓) **one** box.

Carbohydrase

Lipase

Protease

(1)

(c) Which part of a cell releases energy from glucose?

Tick (✓) **one** box.

Mitochondria

Nucleus

Ribosomes

Vacuole

(1)

(d) Which food in the table above would be the most suitable for a person with Type 2 diabetes to eat?

Give **two** reasons for your answer.

Food _____

Reason 1 _____

Reason 2 _____

(3)

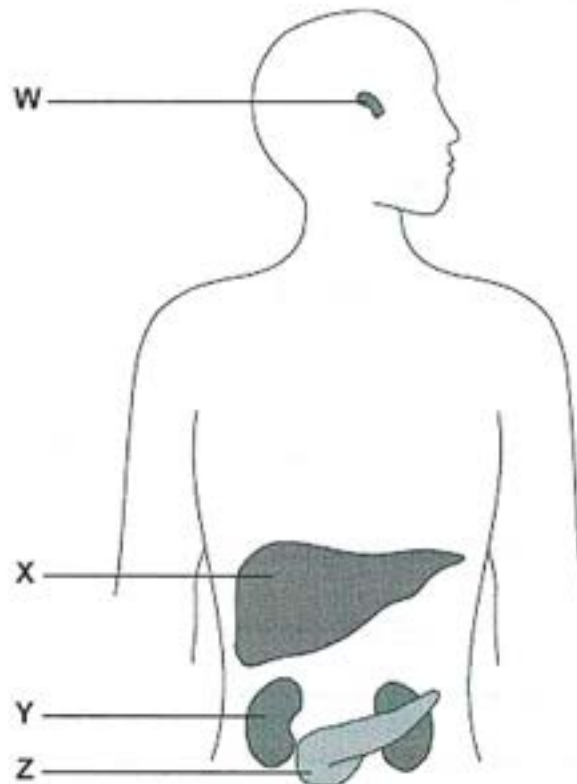
(Total 8 marks)

Q6.

The endocrine system releases hormones into the blood.

Figure 1 shows some endocrine glands and some target organs.

Figure 1



(a) Which structure is the pituitary gland?

Tick (✓) **one** box.

W X Y Z

(1)

(b) Which is the main **target** organ of the hormone insulin?

Tick (✓) **one** box.

Kidney Liver Pancreas

(1)

- (c) The endocrine system sends hormones to target organs.

The nervous system sends impulses to target organs.

How does the speed of movement of hormones compare with the speed of transmission of impulses?

Tick (✓) **one** box.

Hormones travel more slowly than impulses.

Hormones travel at the same speed as impulses.

Hormones travel more quickly than impulses.

(1)

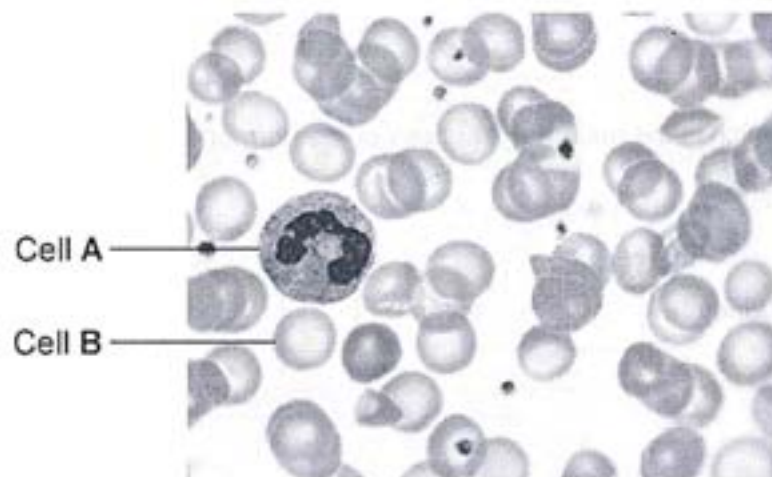
- (d) The pituitary gland releases hormones, which results in widespread effects on the body.

Explain why the pituitary gland is sometimes called the 'master gland'.

(2)

Figure 2 shows human blood viewed through a light microscope.

Figure 2



(e) Name cell **A** and cell **B**.

A _____

B _____

(2)

(f) The image of a cell has a diameter of 3.5 millimetres.

The magnification of the image is $\times 500$.

Calculate the diameter of the real cell.

Give your answer in micrometres.

Use the equation:

$$\text{magnification} = \frac{\text{diameter of image}}{\text{diameter of real cell}}$$

1 millimetre = 1000 micrometres

Diameter of the real cell = _____ micrometres

(4)

(Total 11 marks)

Q7.

This question is about the human nervous system.

- (a) A ball is thrown towards a boy.

As the ball is thrown, information passes along a pathway to allow the boy to catch the ball.

Draw **one** line from each action to the correct part of the pathway.

Action	Part of the pathway
Retina cells in the eye detect the light from the ball	Coordinator
The impulse reaches the brain which 'sees' the ball and sends an impulse to the arm muscle	Effector
The muscle in the arm contracts	Response
The arm stretches to catch the ball	Receptor
	Stimulus

(3)

Students in a college made this hypothesis:

'reaction time will increase as the time you have been awake increases.'

The students set up an investigation to test their hypothesis.

This is the method used.

- Find 5 volunteers willing to stay awake for 24 hours.
 - Keep the volunteers in a room where they can study, use an exercise bike or watch TV as they wish.
 - Provide food, water, coffee and tea as requested.
 - Measure the volunteers' reaction time every 4 hours using a computer program.
- (b) What was the independent variable in this investigation?

(1)

The students used a computer program to test reaction time.

(c) Describe one **other** method that can be used to measure reaction time.

(3)

(d) Which method would you choose to use at your school?

Tick **one** box.

Computer program

Method described in
part (c)

Give **one** reason for your choice.

(1)

The table shows the students' results.

Time awake in hours	Reaction time in seconds					
	Volunteer					Mean
	A	B	C	D	E	
0	0.25	0.33	0.35	0.21	0.27	0.28
4	0.20	0.30	0.31	0.19	0.26	0.25
8	0.21	0.28	0.33	0.20	0.27	0.26
12	0.26	0.40	0.58	0.22	0.30	0.35
16	0.44	0.49	0.83	0.27	0.75	X
20	0.64	0.55	1.11	0.39	1.40	0.82
24	0.92	0.61	1.15	0.45	1.35	0.90

- (e) Calculate value **X** in the table.

Give your answer to 2 significant figures.

X = _____ seconds

(2)

- (f) Describe the pattern of results for mean reaction time as the time awake increases.

(2)

- (g) Do these results support the students' hypothesis: 'reaction time will increase as the time you have been awake increases'?

Give **one** reason for your answer.

(1)

- (g) Give **two** ways the students could improve their investigation to make it more valid.

1. _____

2. _____

(2)

(Total 15 marks)

Q8.

Some students estimated the population of daisy plants in a field.

This is the method used.

1. Place a quadrat randomly on the field.
2. Count and record the number of daisy plants in the quadrat.
3. Repeat steps 1 and 2 another four times.

- (a) How could the students have made sure the quadrats were placed randomly?

(1)

- (b) Describe the piece of equipment called a quadrat.

(1)

The table shows the results.

Quadrat number	Number of daisy plants
1	8
2	11
3	4
4	6
5	16
Mean	X

- (c) Calculate mean value X.

X = _____ daisy plants

(1)

- (d) The field is a rectangle 100 m wide and 150 m long.

Calculate the area of the field.

Area = _____ m²

(1)

- (e) The quadrat used by the students had an area of 1.0 m^2

Estimate the population of daisy plants in the field.

Use your answers to part (c) and part (d).

Estimated population = _____ daisy plants

(2)

- (f) More daisy plants grew in some parts of the field compared to other areas of the field.

Give **two** biotic factors that may affect where daisy plants grow in the field.

1 _____

2 _____

(2)

- (g) The students noticed that the daisy plants growing near a building were smaller.

Explain why smaller daisy plants grew near the building.

(2)

(Total 10 marks)