

Year 11 Biology Separates

Name: _____

Class: _____

Date: _____

Time: **90 minutes**

Marks: **90 marks**

Comments: _____

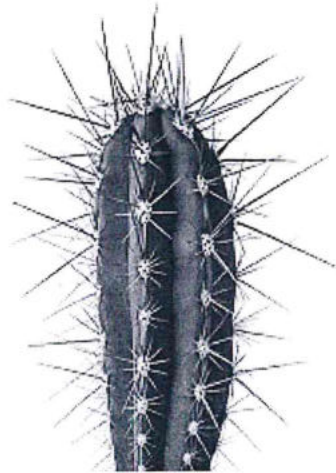
**Thursday 23rd
March 2023**

PM Session

Q1.

A cactus is a plant that lives in a dry environment.

The image below shows part of a cactus plant.



- (a) Give **one** adaptation shown in the image above that helps to prevent the cactus from being eaten by animals.

(1)

- (b) A plant may produce poisons that make animals unwell.

What is this type of defence mechanism?

Tick (✓) **one** box.

Chemical

Mechanical

Physical

(1)

- (c) Some desert plants only grow leaves after it has rained.

As soon as the soil dries out, the leaves fall off.

How could the leaves falling off the plant be an advantage to a plant that lives in a dry environment?

Tick (✓) **one** box.

The plant is less likely to reproduce.

The plant will not lose as much water.

The plant will photosynthesise faster.

(1)

The stem of a cactus is green.

(d) What causes the green colour in the stem?

(1)

(e) What is the advantage to the cactus of having a green stem?

(1)

The stem of a cactus contains many different tissues.

(f) What name is given to a group of tissues working together?

Tick (✓) **one** box.

Organ

Organism

Organ system

(1)

(g) Name **one** substance transported through the xylem in the stem of the cactus.

(1)

(h) Name the tissue that transports dissolved sugars through the stem of the cactus.

(1)

(Total 8 marks)

Q2.

Photosynthesis takes place the leaves of green plants.

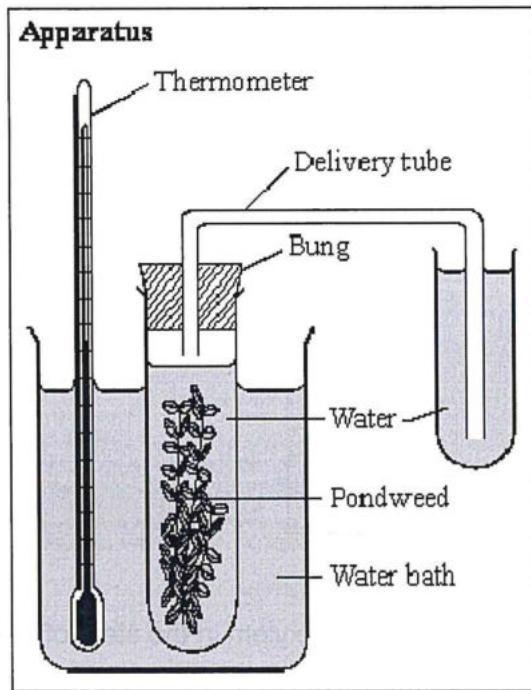
- (a) Write a balanced chemical equation for the formation of glucose by photosynthesis.

(3)

- (b) Describe **two** ways that the rate of photosynthesis can be decreased without lowering the temperature.

(2)

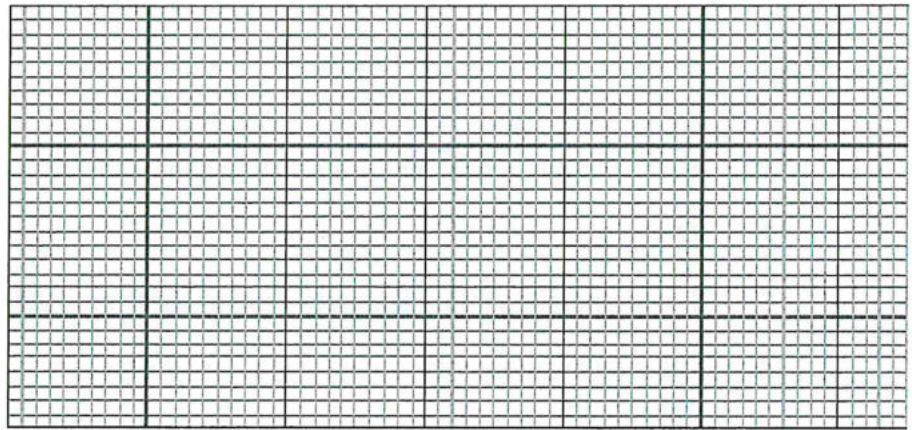
- (c) Some students decided to investigate the effect of temperature on the rate of photosynthesis in pond weed. They set up the apparatus and altered the temperature using ice and hot water. They counted the number of bubbles given off in a minute at different temperatures. They obtained the following results.



Results	
Temperature in °C	Number of bubbles per minute
10	6
20	15
30	21
40	23
50	19

- (i) Plot the points on the graph.

Number of
bubbles
per minute



Temperature in °C

(3)

- (ii) Use your graph to predict the number of bubbles per minute at 25 °C.

(1)

- (iii) Suggest a reason why the rate of photosynthesis seems to decrease in this pondweed after 40 °C.

(1)

(Total 10 marks)

Q3.

A student carried out an investigation using chicken eggs. This is the method used.

1. Place 5 eggs in acid for 24 hours to dissolve the egg shell.
2. Measure and record the mass of each egg.
3. Place each egg into a separate beaker containing 200 cm³ of distilled water.
4. After 20 minutes, remove the eggs from the beakers and dry them gently with a paper towel.
5. Measure and record the mass of each egg.

Table 1 shows the results.

Table 1

Egg	Mass of egg without shell in grams	Mass of egg after 20 minutes in grams
1	73.5	77.0
2	70.3	73.9
3	72.4	75.7
4	71.6	73.1
5	70.5	73.8

- (a) Another student suggested that the result for egg 4 was anomalous.

Do you agree with the student? Give a reason for your answer.

(1)

- (b) Calculate the percentage change in mass of egg 3.

Percentage change in mass = _____

(2)

(c) Explain why the masses of the eggs increased.

(3)

(d) Explain how the student could modify the investigation to determine the concentration of the solution inside each egg.

(3)

Chicken egg shells contain calcium. Calcium ions are moved from the shell into the cytoplasm of the egg.

Table 2 shows information about the concentration of calcium ions.

Table 2

Location	Concentration of calcium ions in arbitrary units
Egg shell	0.6
Egg cytoplasm	2.1

(e) Explain how calcium ions are moved from the shell into the cytoplasm of the egg.

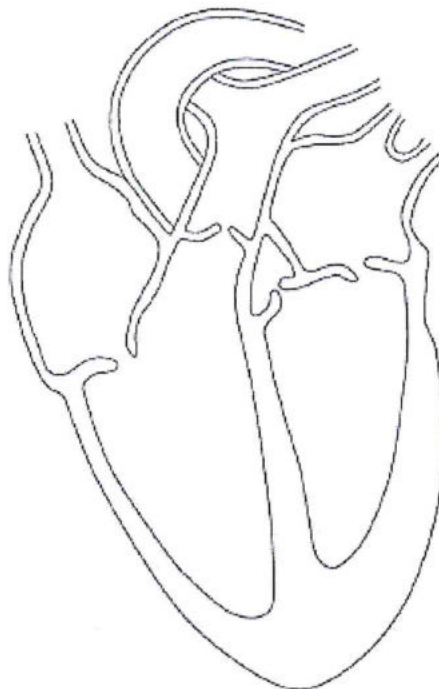
(3)

(Total 12 marks)

Q4.

Figure 1 shows the internal structure of the human heart.

Figure 1



(a) Which organ system is the heart a part of?

(1)

(b) Draw a ring around **one** valve on **Figure 1**.

(1)

(c) What is the function of the valves in the heart?

(1)

(d) Valves are also found inside some blood vessels.

Which type of blood vessel contains valves?

(1)

Sometimes a valve in the heart can begin to leak.

A leaking heart valve may be replaced with either:

- a mechanical valve
- a biological valve from a pig.

Table 1 shows information about the replacement valves.

Table 1

Mechanical valve	Biological valve from a pig
Made of plastic or metal	Made from living tissue
Can cause the blood to clot around the valve	No risk of blood clotting around the valve
No need for another replacement valve after 5 years	Sometimes another replacement valve is needed after 5 years

(e) Suggest **two** reasons why a patient may choose a mechanical valve and **not** a biological valve from a pig.

1 _____

2 _____

(2)

(f) Suggest **one** reason why a patient may choose a biological valve from a pig and not a mechanical valve.

(1)

(g) A person may develop other medical conditions.

Draw **one** line from each medical condition to the correct treatment.

Medical condition	Treatment
High blood cholesterol	Antibiotics
	Artificial pacemaker
Irregular heart rate	Insulin
	Statins

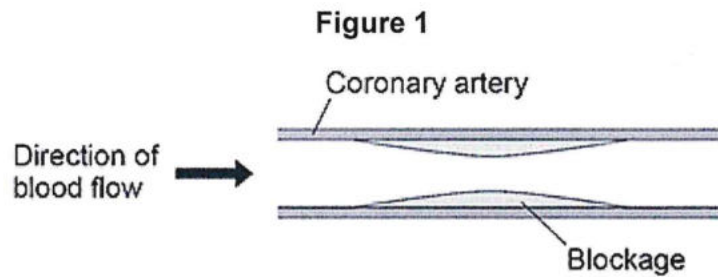
(2)
(Total 9 marks)

Q5.

A high cholesterol concentration in the blood can lead to blockages inside arteries.

The coronary arteries supply blood to the heart muscle.

Figure 1 shows a coronary artery with a blockage.



(a) Why could the blockage in **Figure 1** cause cells in the heart to die?

(2)

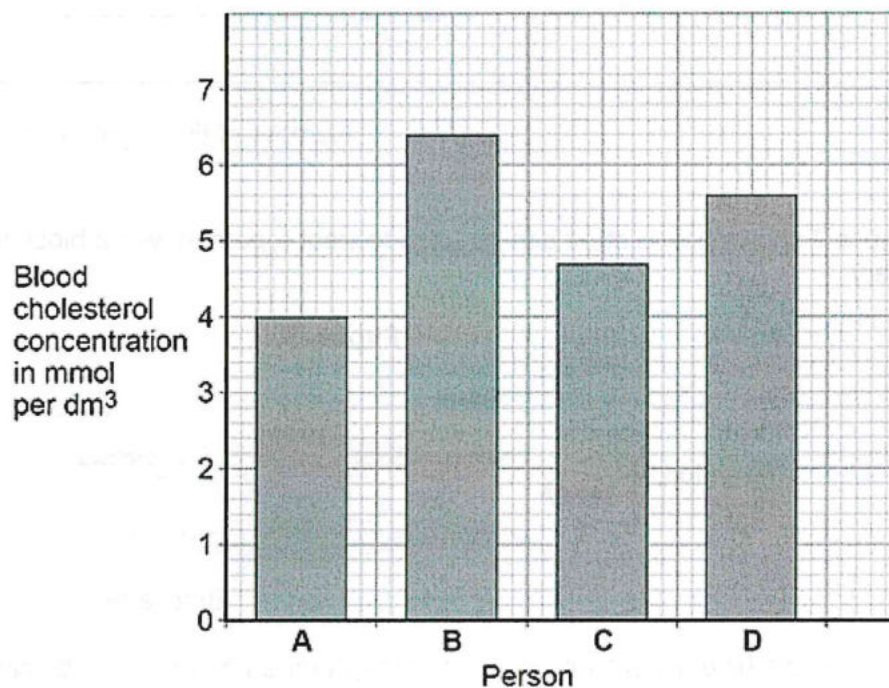
Doctors can measure the concentration of cholesterol in the blood.

The table below shows four different blood cholesterol categories.

Blood cholesterol concentration in mmol per dm ³	Cholesterol category
<4.6	Low
4.6–5.0	Normal
5.1–6.1	Medium
6.2 and above	High

Figure 2 shows the blood cholesterol concentration of four people.

Figure 2



(b) Which person is in the medium cholesterol category?

Tick (✓) **one** box.

A B C D

(1)

(c) Which person is most at risk of having a heart attack?

Tick (✓) **one** box.

A B C D

(1)

(d) Give a reason for your answer to part (c).

(1)

(e) The blood cholesterol concentration of person **D** is greater than the blood cholesterol concentration of person **A**.

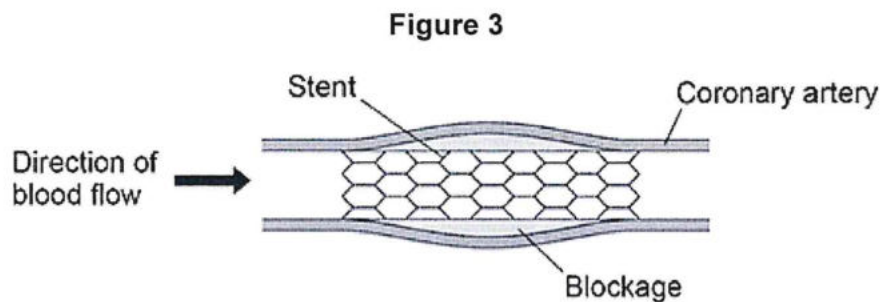
Calculate how many times greater.

Use **Figure 2**.

Number of times greater = _____

(2)

Figure 3 shows how a stent can be used to treat a person with a blockage in a coronary artery.



(f) Explain how a stent works as a treatment for a person with a blockage in a coronary artery.

(2)

Patients are given anti-clotting drugs after they have a stent fitted.

The drugs help to prevent clots forming in the blood.

(g) Which part of the blood starts the blood clotting process?

Tick (✓) **one** box.

Antibodies

Plasma

Platelets

Red blood cells

(1)

(h) When a stent is fitted the doctor gives the patient an injection of anti-clotting drugs.

The patient then takes one anti-clotting tablet every day.

Anti-clotting drugs:

- are very effective
- can take a week to begin working fully
- have been used for over 60 years
- cost very little to make
- do **not** work effectively if the patient eats certain types of food.

The patient must have their blood tested every few weeks to check that the anti-clotting drugs are working.

Evaluate the use of anti-clotting drugs in patients who have had a stent fitted.

(4)
(Total 14 marks)

Q6.

A virus called RSV causes severe respiratory disease.

- (a) Suggest **two** precautions that a person with RSV could take to reduce the spread of the virus to other people.

1. _____

2. _____

(2)

- (b) One treatment for RSV uses monoclonal antibodies which can be injected into the patient.

Scientists can produce monoclonal antibodies using mice.

The first step is to inject the virus into a mouse.

Describe the remaining steps in the procedure to produce monoclonal antibodies.

(3)

- (c) Describe how injecting a monoclonal antibody for RSV helps to treat a patient suffering with the disease.

(2)

A trial was carried out to assess the effectiveness of using monoclonal antibodies to treat patients with RSV.

Some patients were given a placebo.

- (d) Why were some patients given a placebo?

(1)

A number of patients had to be admitted to hospital as they became so ill with RSV.

The results are shown in the table below.

Treatment received by patient	% of patients within each group admitted to hospital with RSV
Group A: Monoclonal antibody for RSV	4.8
Group B: Placebo	10.4

The trial involved 1 500 patients.

- Half of the patients (group A) were given the monoclonal antibodies.
- Half of the patients (group B) were given the placebo.

- (e) Calculate the total number of patients admitted to hospital with RSV during the trial.

Total number of patients admitted to hospital = _____

(2)

(f) Evaluate how well the data in the table above supports the conclusion:

'monoclonal antibodies are more effective at treating RSV than a placebo'.

(2)

(Total 12 marks)

Q7.

Water conservation is important to the human body.

(a) Which gland releases the hormone that controls water loss from the body?

Tick (✓) **one** box.

Adrenal

Pancreas

Pituitary

Thyroid

(1)

(b) Which hormone helps the kidneys to control water loss from the body?

Tick (✓) **one** box.

ADH

Adrenaline

LH

Thyroxine

(1)

Q8.

This question is about plant hormones.

(a) Farmers can spray seeds with gibberellins to start germination.

What are **two** other uses of gibberellins?

Tick (✓) **two** boxes.

To help in tissue culture

To help roots form

To increase fruit size

To kill weeds

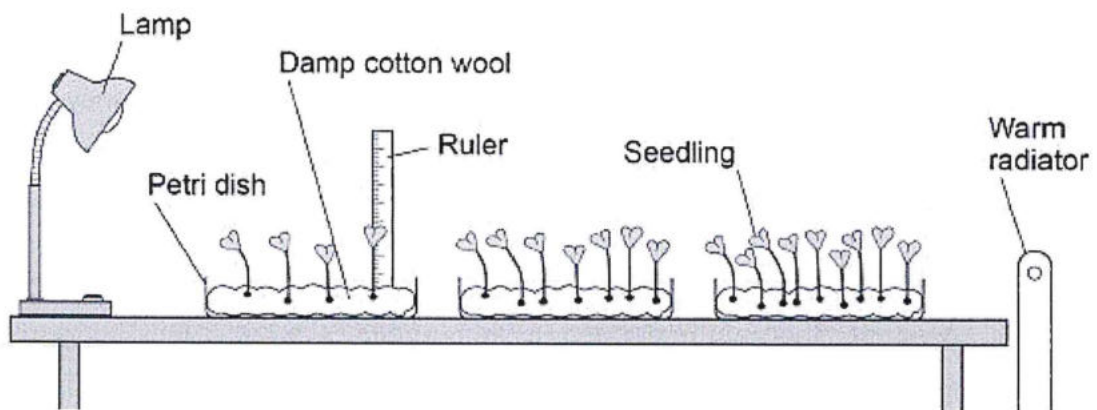
To promote flower production

(2)

Students investigated the effect of light intensity on the height of seedlings.

Figure 1 shows the equipment.

Figure 1



(b) Describe **two** improvements the students should make to their investigation.

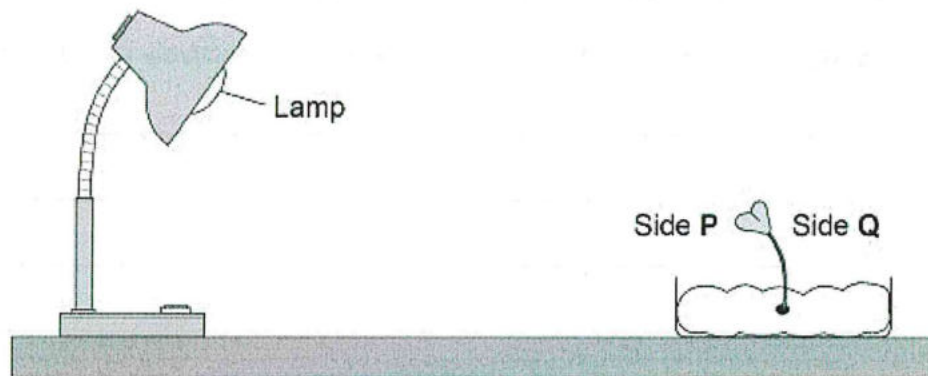
- 1 _____

- 2 _____

(2)

Figure 2 shows a seedling growing towards a lamp.

Figure 2



- (c) Suggest how the students measured the length of the curved seedling in Figure 2.

(1)

- (d) Explain what happened to the growth of the seedling on side Q compared with the growth on side P.

(3)

- (e) Bananas are often stored separately from other fruits because bananas release a plant hormone.

Why does storing bananas with other fruits cause the other fruits to ripen faster?

(1)

(Total 9 marks)

Q9.

Many different types of animals are produced using selective breeding.

Some cats are selectively bred so that they do not cause allergies in people.

(a) Suggest **two other** reasons why people might selectively breed cats.

1. _____

2. _____

(2)

(b) Selective breeding could cause problems of inbreeding in cats.

Describe **one** problem inbreeding causes.

(1)

(c) Many people have breathing problems because they are allergic to cats.

The allergy is caused by a chemical called Fel D1.

Different cats produce different amounts of Fel D1.

A cat has been bred so that it does not produce Fel D1.

The cat does **not** cause an allergic reaction.

Explain how the cat has been produced using selective breeding.

(4)

(Total 7 marks)