Activity 3 – Practice Exam Questions

Hi Y12,

I have put together these exam queries for you to complete. They based on the cells and plant transport topics from GCSE. I have also tried to include questions with maths skills in. These are all high demand questions and therefore are around grades 7 – 9.

I would like you to complete the questions and then mark and correct them, using the mark scheme. There are 65 marks all together. I would like to know your mark and the questions / topic areas that you struggled on, so please email this information to me. (m.imrie@theredhillacademy.org.uk) If you can print the questions, that is great, but don't worry if you can't. Just write your answers on paper.

Next, you need to look at the feedback table. This has follow-up tasks, which will help you to address any areas in these topics where you are still struggling.

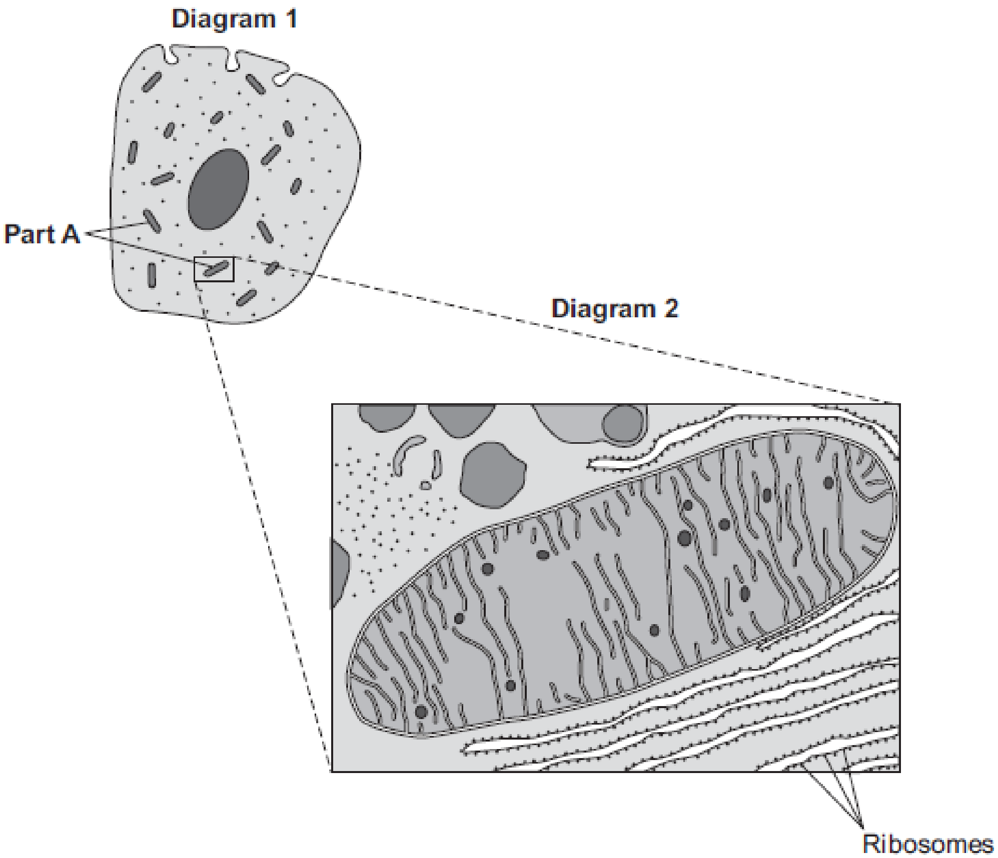
Please let me know if you have any questions,

Mrs Imrie

Cells

Q1. **Diagram 1** shows a cell from the pancreas.

Diagram 2 shows part of the cell seen under an electron microscope.



Part **A** is where most of the reactions of aerobic respiration happen.

(a) (i) Name part **A**.

____

(1)

(ii) Complete the equation for aerobic respiration.

glucose + oxygen $\longrightarrow$ ____________ + ____________ (+ energy)

(2)

(iii) Part **A** uses oxygen.

Explain how oxygen passes from the blood to part **A**.

(3)

(b) The pancreas cell makes enzymes.

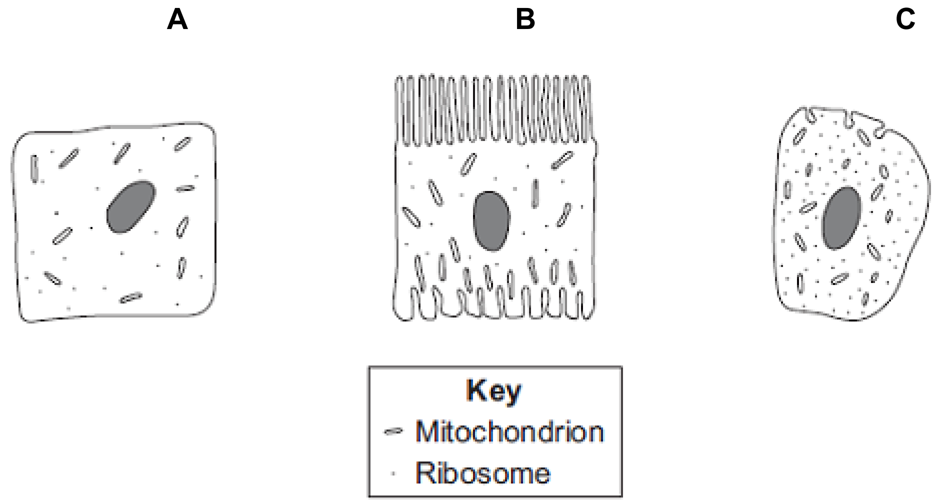
Enzymes are proteins.

Describe how the ribosomes and part **A** help the cell to make enzymes.

(3)

(Total 9 marks)

Q2. Diagrams **A**, **B** and **C** show cells from different parts of the human body, all drawn to the same scale.



(a) Which cell, **A**, **B** or **C**, appears to be best adapted to increase diffusion into or out of the cell?

Give **one** reason for your choice.

____

____

(1)

(b) (i) Cell **C** is found in the salivary glands.

Name the enzyme produced by the salivary glands.

____

(1)

(ii) Use information from the diagram to explain how cell **C** is adapted for producing this enzyme.

____

____

____

____

(2)

(Total 4 marks)

Q3. The heart pumps blood to the lungs and to the cells of the body.

(a) Name the blood vessel that transports blood from the body to the right atrium.

____

(1)

(b) The aorta transports blood from the heart to the body.

In a person at rest:

- blood travels at a mean speed of 10 cm/s in the aorta
- blood travels at a mean speed of 0.5 mm/s in the capillaries
- the speed of blood decreases at a rate of 0.4 cm/s^2 as blood travels from the aorta to the capillaries.

Calculate the time it takes for blood to travel from the aorta to the capillaries.

Assume that the speed of blood decreases at a constant rate.

Use the equation:

$$\text{rate of decrease in speed} = \frac{\text{change in speed}}{\text{time}}$$

Give your answer to 2 significant figures.

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____

____

____

____

____

____

Time = ____________________ s

(4)

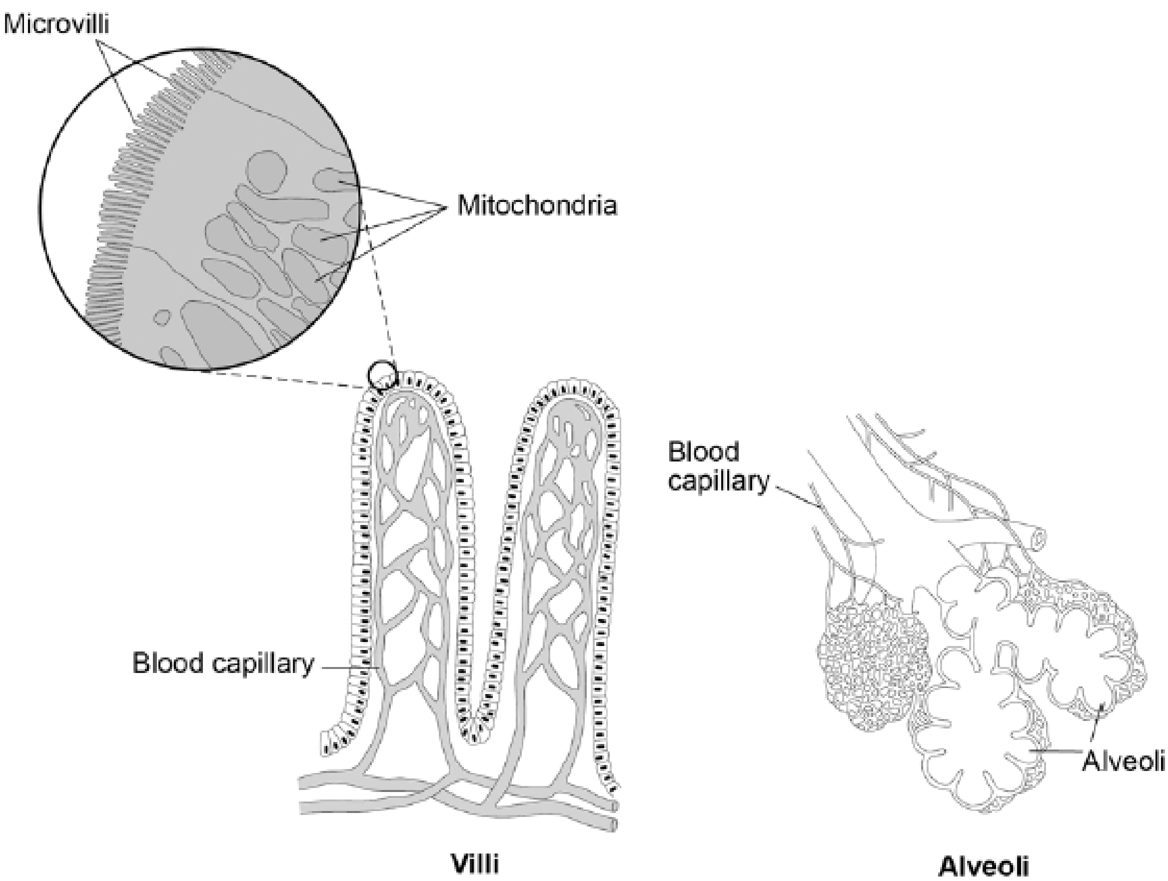
(c) Describe the route taken by oxygenated blood from the lungs to the body cells.

(4)

(d) The digestive system and the breathing system both contain specialised exchange surfaces.

- In the digestive system, digested food is absorbed into the blood stream in structures called villi.
- In the breathing system, gases are absorbed into the blood stream in the alveoli.

The diagram below shows the structure of villi and alveoli.



Explain how the villi and the alveoli are adapted to absorb molecules into the bloodstream.

(6)

(Total 15 marks)

Plant Transport

Q4. Plants exchange substances with the environment.

(a) Plant roots absorb water mainly by osmosis.
Plant roots absorb ions mainly by active transport.

Explain why roots need to use the two different methods to absorb water and ions.

(4)

(b) What is meant by the *transpiration stream*?

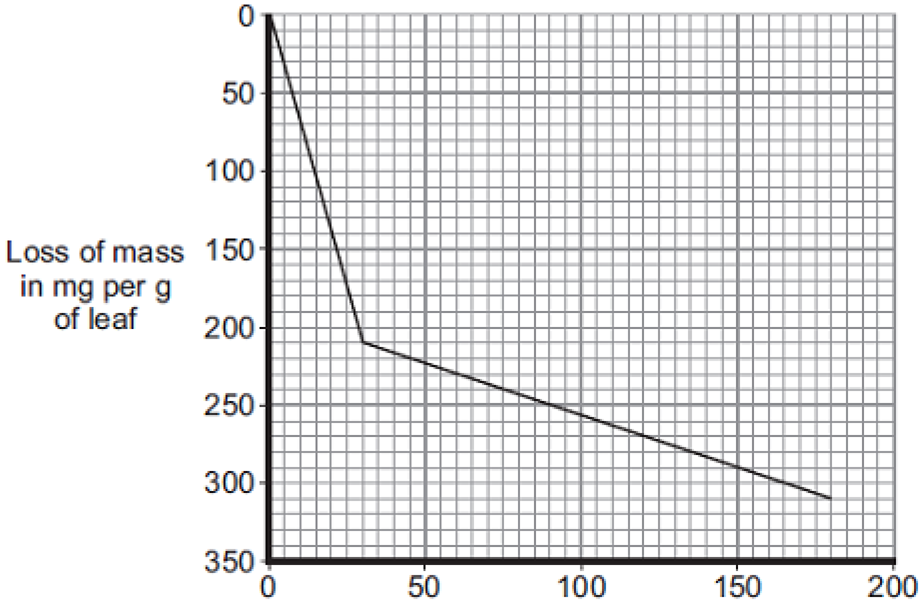
(3)

(c) Students investigated the loss of water vapour from leaves.

The students:

- cut some leaves off a plant
- measured the mass of these leaves every 30 minutes for 180 minutes.

The graph shows the students' results.



(i) The rate of mass loss in the first 30 minutes was 7 milligrams per gram of leaf per minute.

Calculate the rate of mass loss between 30 minutes and 180 minutes.

____

____

Rate of mass loss = ________________ milligrams per gram of leaf per minute

(2)

(ii) The rate of mass loss between 0 and 30 minutes was very different from the rate of mass loss between 30 and 180 minutes.

Suggest an explanation for the difference between the two rates.

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____

____

(2)

(Total 11 marks)

Q5. The leaves of most plants have stomata.

(a) (i) Name the cells which control the size of the stomata.

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(1)

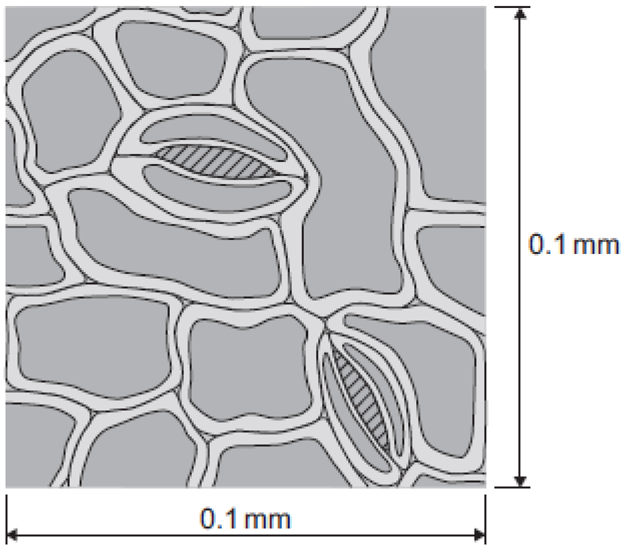
(ii) Give **one** function of stomata.

___

___

(1)

(b) The image below shows part of the surface of a leaf.



The length and width of this piece of leaf surface are both 0.1 mm.

(i) Calculate the number of stomata per mm^2 of this leaf surface.

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___

___ per mm^2

(2)

(ii) A different plant species has 400 stomata per mm^2 of leaf surface.

Having a large number of stomata per mm^2 of leaf surface can be a disadvantage to a plant.

Give **one** disadvantage.

___

___

(1)

(c) A student investigated the loss of water from plant leaves.

The student did the following:

- Step 1: took ten leaves from a plant
- Step 2: weighed all ten leaves
- Step 3: hung the leaves up in a classroom for 4 days
- Step 4: weighed all ten leaves again
- Step 5: calculated the mass of water lost by the leaves
- Step 6: repeated steps **1** to **5** with grease spread on the upper surfaces of the leaves
- Step 7: repeated steps **1** to **5** with grease spread on both the upper and lower surfaces of the leaves.

All the leaves were taken from the same type of plant.

The table below shows the student's results.

Treatment of leaves	**Mass of water the leaves lost in g**
No grease was used on the leaves	0.98
Grease on upper surfaces of the leaves	0.86
Grease on upper and lower surfaces of the leaves	0.01

(i) What mass of water was lost in 4 days through the upper surfaces of the leaves?

____

____

Mass = ____________ g

(1)

(ii) Very little water was lost when the lower surfaces of the leaves were covered in grease.

Explain why.

___

___

___

___

___

___

___

(3)
(Total 9 marks)

Q6. The table shows the concentrations of three mineral ions in the roots of a plant and in the water in the surrounding soil.

Mineral ion	**Concentration in millimoles per kilogram**	
	Plant root	**Soil**
Calcium	120	2.0
Magnesium	80	3.1
Potassium	250	1.2

(a) (i) The plant roots could **not** have absorbed these mineral ions by diffusion.

Explain why.

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(2)

(ii) Name the process by which the plant roots absorb mineral ions.

___

(1)

(b) How do the following features of plant roots help the plant to absorb mineral ions from the soil?

(i) A plant root has thousands of root hairs.

___

___

(1)

(ii) A root hair cell contains many mitochondria.

___

___

___

___

(2)

(iii) Many of the cells in the root store starch.

___

___

(1)
(Total 7 marks)

Q7. A student carried out an investigation using leaf epidermis.

This is the method used.

1. Peel the lower epidermis from the underside of a leaf.
2. Cut the epidermis into six equal sized pieces.
3. Place each piece of lower epidermis into a different Petri dish.
4. Add 5 cm^3 of salt solution to the six Petri dishes. Each Petri dish should have a different concentration of salt solution.
5. After 1 hour, view each piece of epidermis under a microscope at ×400 magnification.
6. Count and record the total number of stomata present and the number of open stomata that can be seen in one field of view.

The student's results are shown in the table.

Concentration of salt solution in mol / dm^3	**Number of stomata in field of view**	**Number of open stomata in field of view**	**Percentage (%) of open stomata in field of view**
0.0	7	7	100
0.1	8	8	100
0.2	7	6	**X**
0.3	9	6	67
0.4	10	4	40
0.5	9	2	22

(a) Calculate value **X** in the table above.

____

____

X = ____________________ %

(1)

(b) Give **one** conclusion from the results in the table above.

____

____

(1)

(c) How could the student find out what concentration of salt solution would result in half of the stomata being open?

____

____

(1)

(d) The student measured the real diameter of the field of view to be 0.375 mm.

Calculate the number of open stomata per mm^2 of leaf for the epidermis placed in 0.4 mol / dm^3 salt solution.

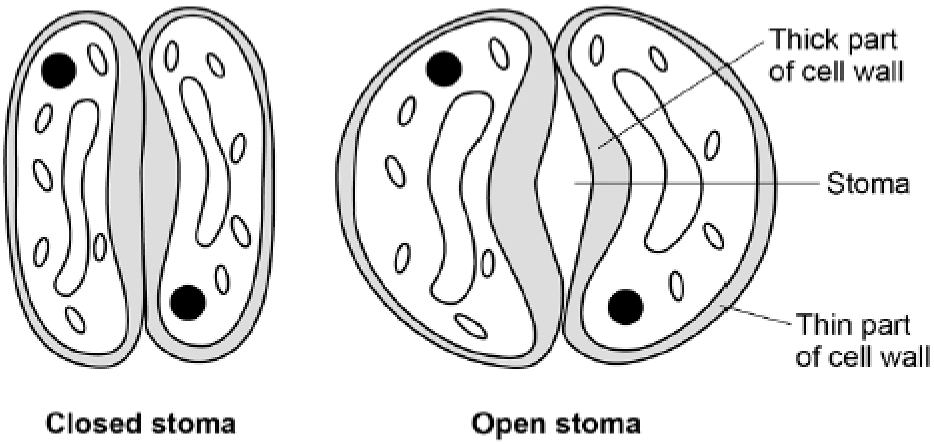
Use information from the table above.

Take π to be 3.14

Number of open stomata = ____________________ per mm^2

(3)

(e) The diagram below shows two guard cells surrounding a closed stoma and two guard cells surrounding an open stoma.



When light intensity is high potassium ions are moved into the guard cells.

Describe how the movement of potassium ions into the guard cells causes the stoma to open.

(4)
(Total 10 marks)