

Q1.All living cells respire.

- (a) Respiration transfers energy from glucose for muscle contraction.

Describe how glucose from the small intestine is moved to a muscle cell.

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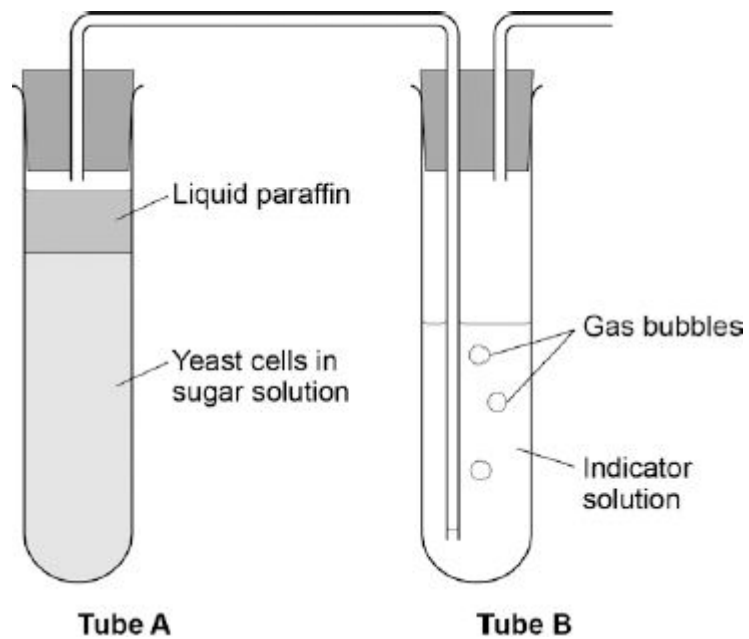
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(2)

- (b) The diagram below shows an experiment to investigate **anaerobic** respiration in yeast cells.



What is the purpose of the liquid paraffin in Tube A?

Tick **one** box.

To prevent evaporation

To stop air getting in

To stop the temperature going up

To stop water getting in

(1)

(c) The indicator solution in Tube **B** shows changes in the concentration of carbon dioxide (CO₂).

The indicator is:

- **blue** when the concentration of CO₂ is very low
- **green** when the concentration of CO₂ is low
- **yellow** when the concentration of CO₂ is high.

What colour would you expect the indicator to be in Tube **B** during maximum rate of anaerobic respiration?

Tick **one** box.

Blue

Green

Yellow

(1)

(d) Suggest how the experiment could be changed to give a reproducible way to measure the rate of the reaction.

Include any apparatus you would use.

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(2)

- (e) Compare anaerobic respiration in a yeast cell with anaerobic respiration in a muscle cell.

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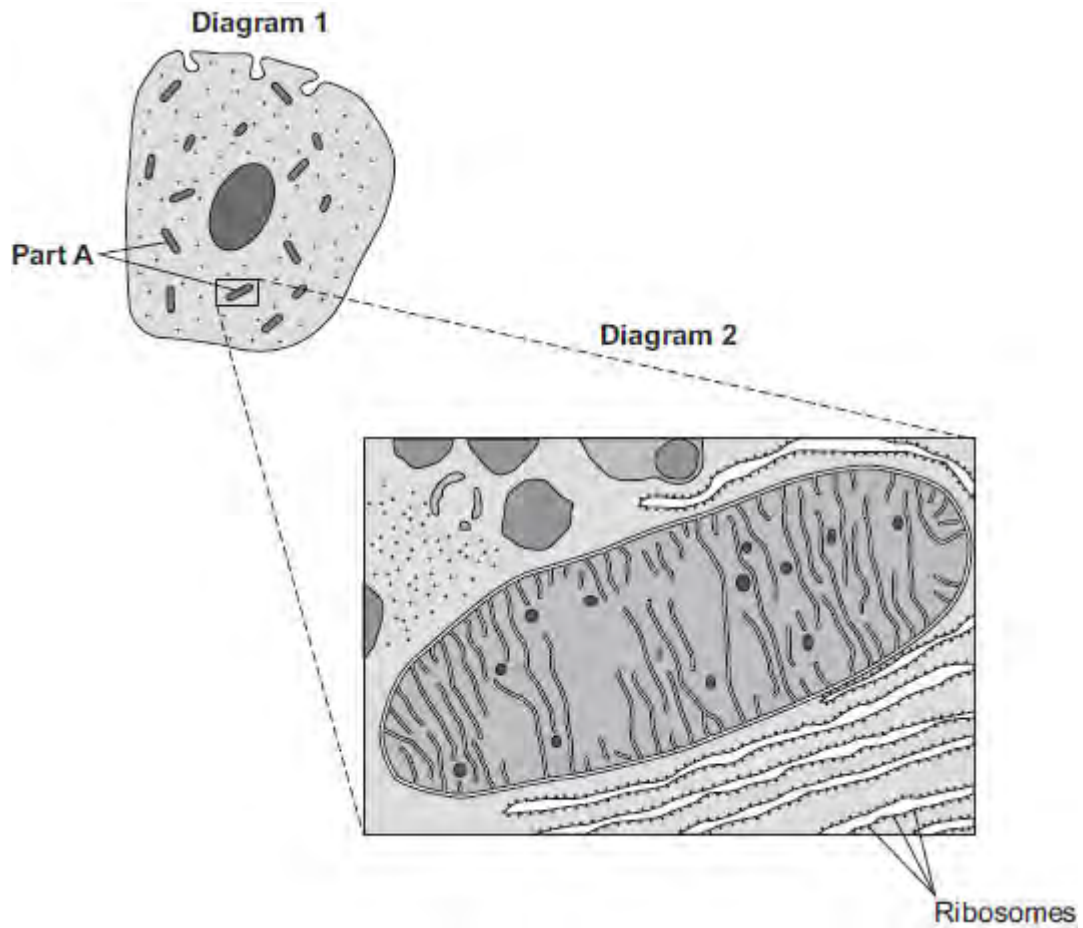
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(3)

(Total 9 marks)

Q2. Diagram 1 shows a cell from the pancreas.

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



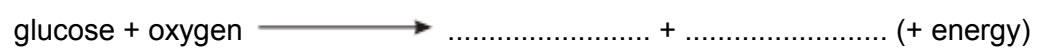
Part **A** is where most of the reactions of aerobic respiration happen.

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

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(1)

(ii) Complete the equation for aerobic respiration.



(2)

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

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

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(3)

(b) The pancreas cell makes enzymes.

Enzymes are proteins.

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

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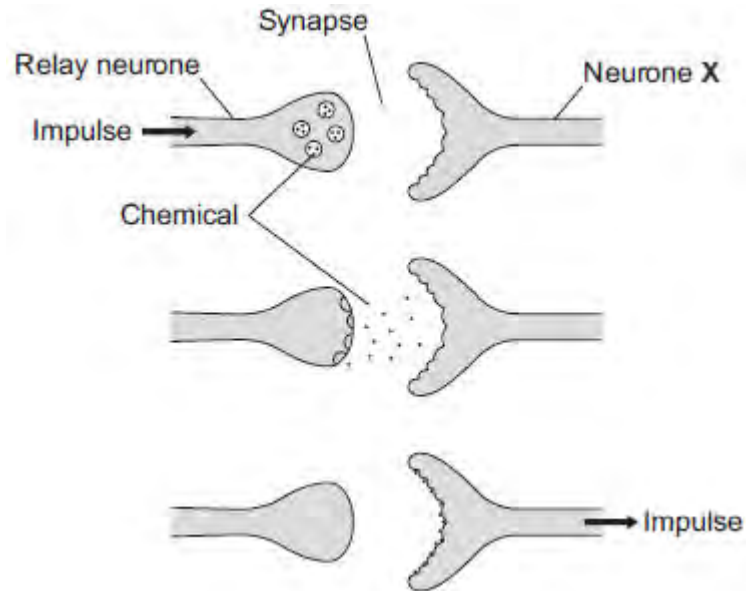
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(3)

(Total 9 marks)

Q3. The diagram below shows how a nerve impulse passing along a relay neurone causes an impulse to be sent along another type of neurone, neurone **X**.



(a) What type of neurone is neurone **X**?

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(1)

(b) Describe how information passes from the relay neurone to neurone **X**.
Use the diagram to help you.

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(3)

- (c) Scientists investigated the effect of two toxins on the way in which information passes across synapses. The table below shows the results.

Toxin	Effect at the synapse
Curare	Decreases the effect of the chemical on neurone X
Strychnine	Increases the amount of the chemical made in the relay neurone

Describe the effect of each of the toxins on the response by muscles.

Curare

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Strychnine

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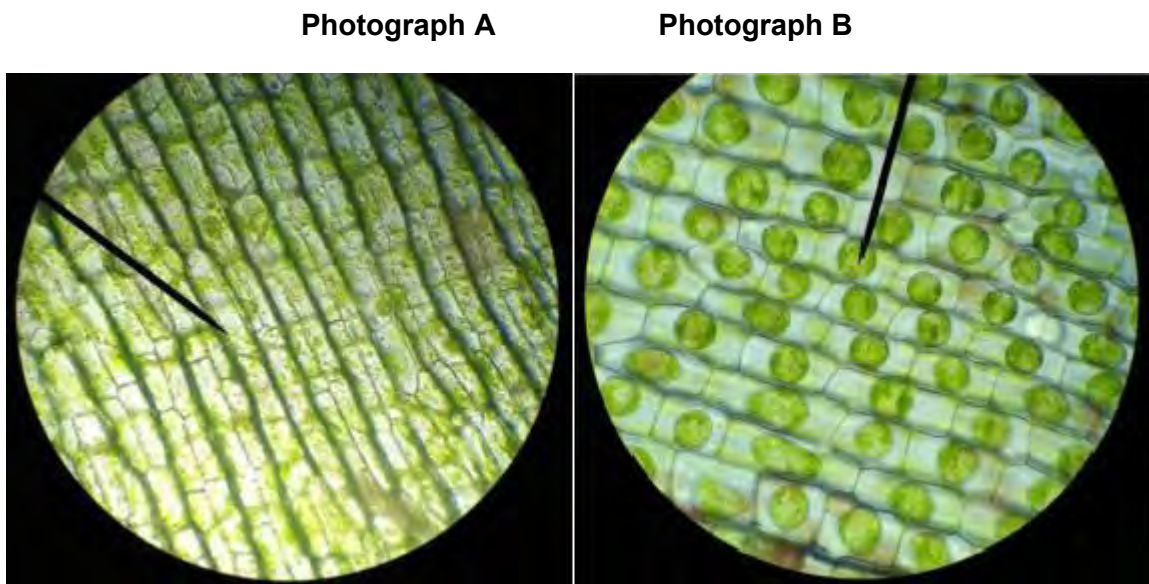
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(2)
(Total 6 marks)

Q4. The photographs show the same cells of a common pond plant.

Photograph A shows the cells in a hypotonic solution.

Photograph B shows the same cells in a hypertonic solution.



A & B AELODEA IN HYPOTONIC SOLUTION by ficklendfreckled [CC- BY-2.0], via Flickr.

(a) What is a **hypertonic** solution?

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(2)

(b) What word is used to describe plant cells placed in:

(i) a **hypotonic** solution

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(1)

(ii) a **hypertonic** solution?

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(1)

(c) Explain what has happened to the plant cells in **Photograph B**.

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(4)

(d) Animal cells will also change when placed in different solutions.

Some red blood cells are put in a hypotonic solution.

Describe what would happen to these red blood cells **and** explain why this is different from what happened to the plant cells in **Photograph A**.

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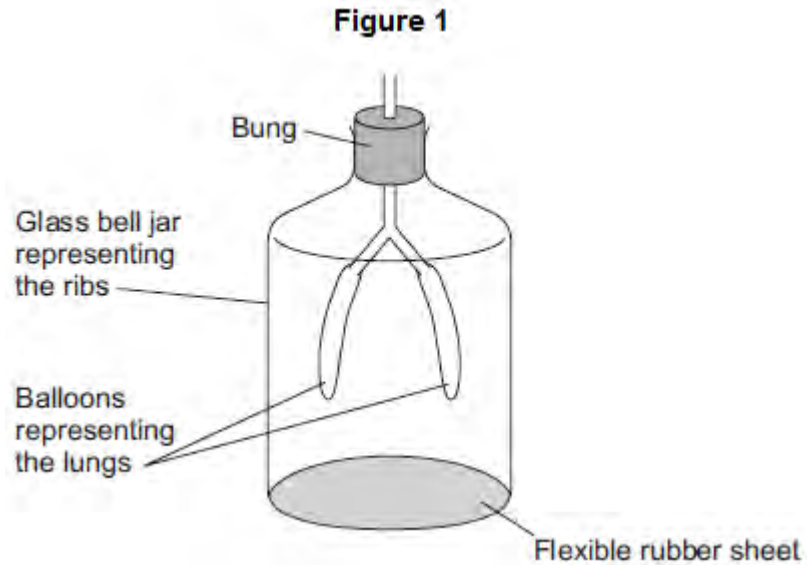
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(4)
(Total 12 marks)

Q5.Figure 1 shows a model representing the human breathing system.

The different parts of the model represent different parts of the human breathing system.



- (a) (i) Which part of the human breathing system does the flexible rubber sheet represent?

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(1)

- (ii) Explain why the balloons inflate when the flexible rubber sheet is pulled down.

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(3)

- (b) (i) During breathing, oxygen moves into the blood.

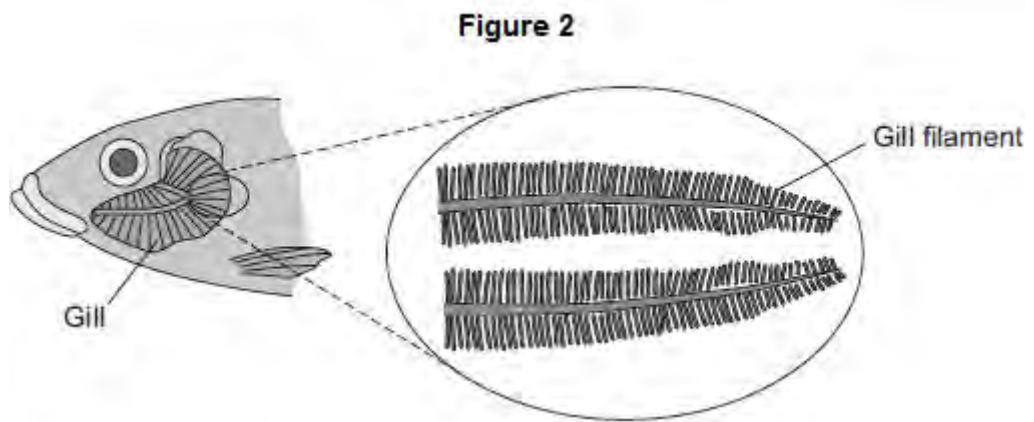
Explain how oxygen moves into the blood.

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(2)

(ii) **Figure 2** shows a fish head and gill.



Fish absorb oxygen from the water. Oxygen is absorbed through the gills of the fish.

Explain **one** way in which the gills are adapted for rapid absorption of oxygen.

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(2)
(Total 8 marks)

Q6.A A student investigated the effect of different sugar solutions on potato tissue.

This is the method used.

1. Add 30 cm³ of 0.8 mol dm⁻³ sugar solution to a boiling tube.
2. Repeat step 1 with equal volumes of 0.6, 0.4 and 0.2 mol dm⁻³ sugar solutions.
3. Use water to give a concentration of 0.0 mol dm⁻³.
4. Cut five cylinders of potato of equal size using a cork borer.
5. Weigh each potato cylinder and place one in each tube.
6. Remove the potato cylinders from the solutions after 24 hours.
7. Dry each potato cylinder with a paper towel.
8. Reweigh the potato cylinders.

The table below shows the results.

Concentration of sugar solution in mol dm ⁻³	Starting mass in g	Final mass in g	Change of mass in g	Percentage (%) change
0.0	1.30	1.51	0.21	16.2
0.2	1.35	1.50	0.15	X
0.4	1.30	1.35	0.05	3.8
0.6	1.34	1.28	-0.06	-4.5
0.8	1.22	1.11	-0.11	-9.0

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

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Percentage change in mass = %

(2)

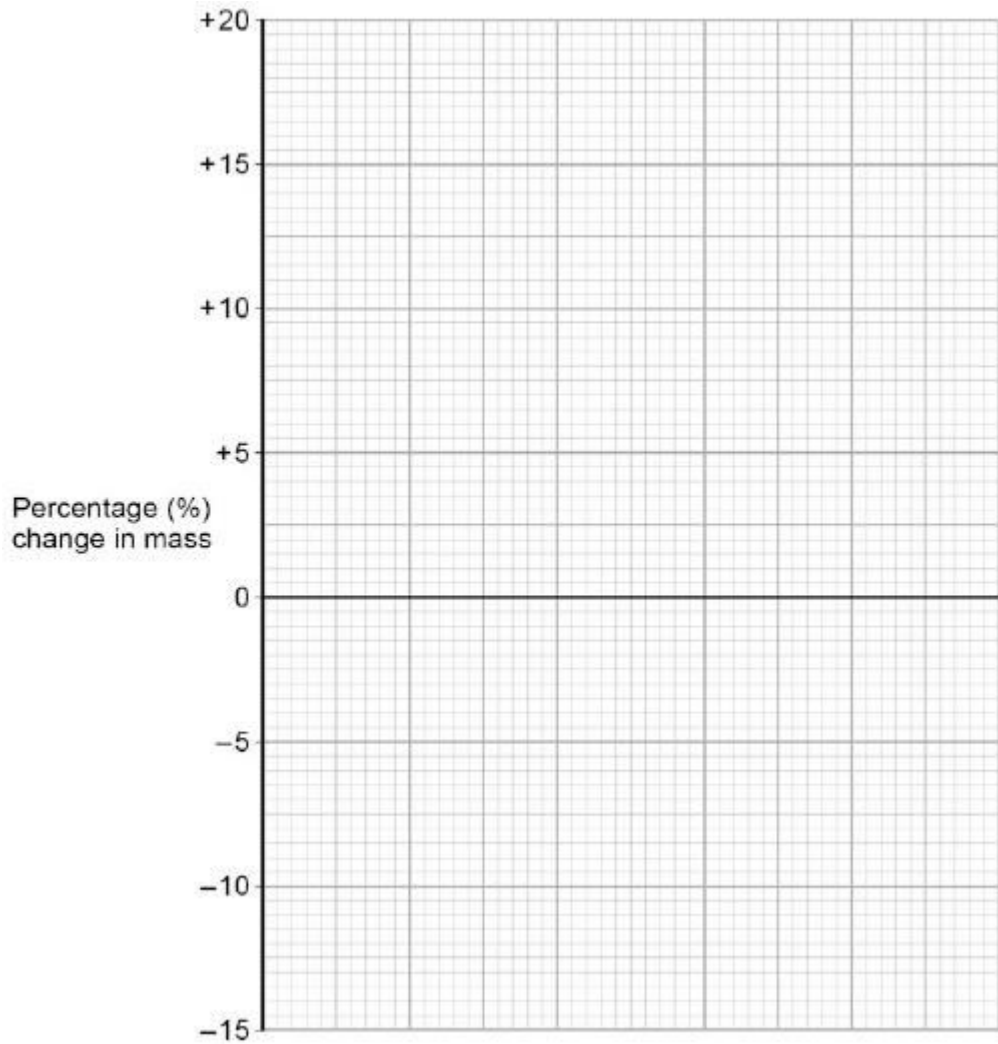
(b) Why did the student calculate the percentage change in mass as well as the change in grams?

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(1)

(c) Complete the graph using data from the table above.

- Choose a suitable scale and label for the x-axis.
- Plot the percentage (%) change in mass.
- Draw a line of best fit.



(4)

(d) Use your graph to estimate the concentration of the solution inside the potato cells.

Concentration = mol dm⁻³

(1)

(e) The results in the table above show the percentage change in mass of the potato cylinders.

Explain why the percentage change results are positive **and** negative.

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(3)

(f) Suggest **two** possible sources of error in the method given above.

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(2)

(Total 13 marks)