

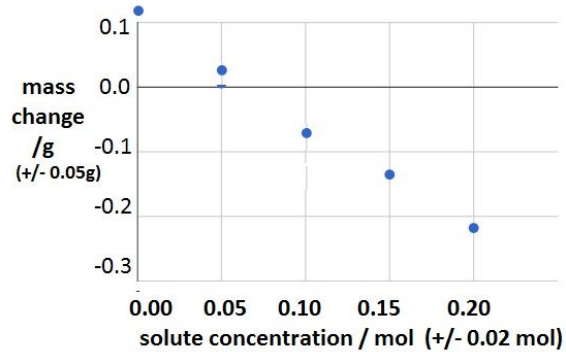
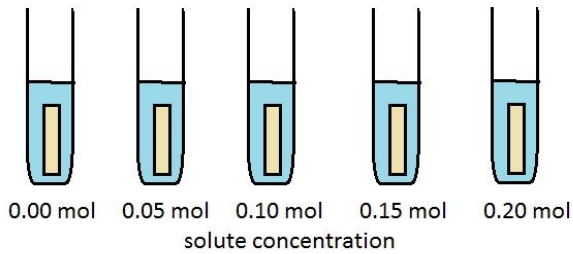
# IB BIO SL PAPER 3 PRACTICE EXAM

## SECTION A

- Section A is worth 25 marks and covers skills related to the prescribed practicals or to experimental techniques in general.

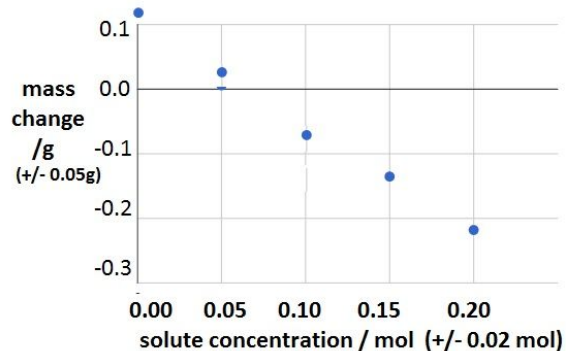
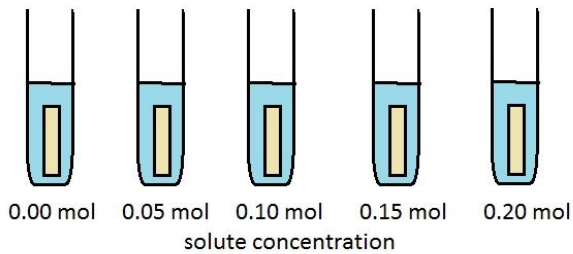
### Practical 2 - Estimation of osmolarity in tissues

In a simple experiment five cylinders of potato were soaked in five solute concentrations as shown below. Use the graph to estimate the solute concentration of the cytoplasm of the potato cell cytoplasm. (1 mark)



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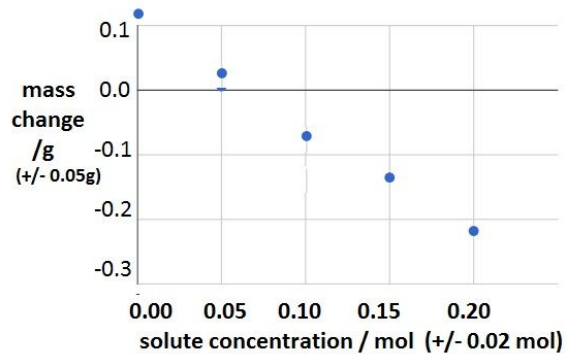
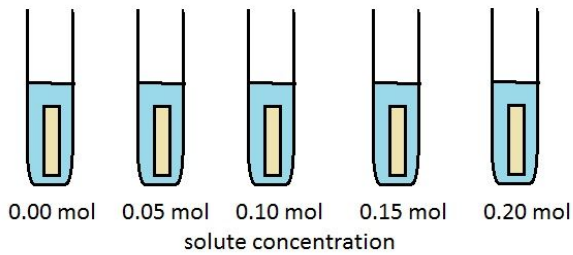


List the factors which must be controlled to make the experiment a reliable fair test.

(3 marks)

## Practical 2 - Estimation of osmolarity in tissues

In a simple experiment five cylinders of potatoes were soaked in five solute concentrations as shown below.



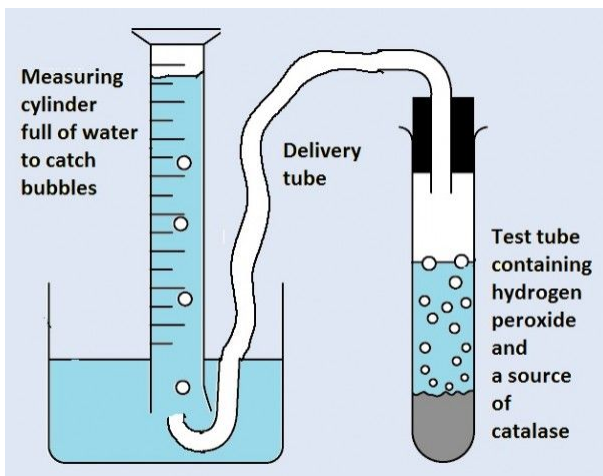
Explain what the figures  $\pm 0.05\text{g}$  and  $\pm 0.02\text{mol}$  indicate on the graph axes.

(1 mark)

## Practical 3 - Investigation of a factor affecting enzyme activity

This apparatus was used to investigate how pH can change the rate of an enzyme controlled reaction.

The source of catalase was a piece of liver. pH buffer solutions were added to the test tube.



Explain how you would set up an investigation of pH using buffer solutions.

1. How many different buffer solutions would you use, and which pH values? (2 marks)

2. How many repeats of each measurement would you need? And why? (2 marks)

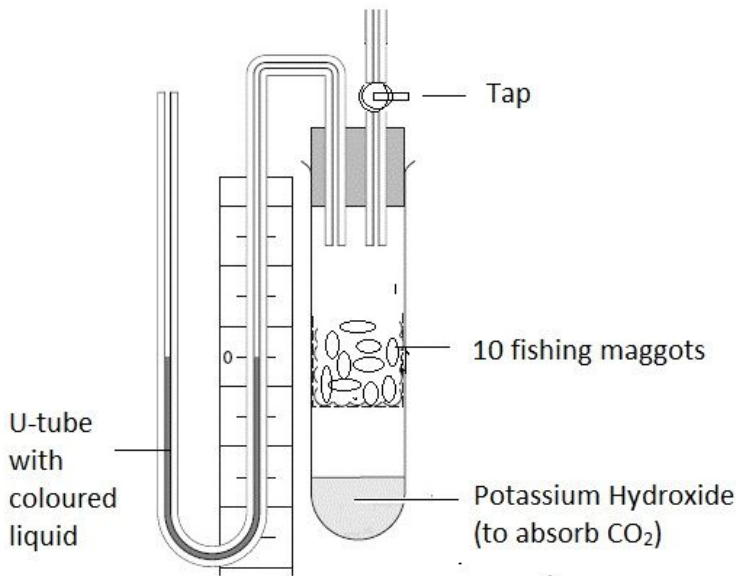
3. Why would a student need to consider the surface area, and the shape of the liver as well as its mass?

(1 mark)

### Practical 3 - Investigation of a factor affecting enzyme activity.

This apparatus is used to test the rate of respiration with some insect larvae.

Respiration is a metabolic pathway controlled by enzymes, so the data gives us some information about the factors which affect enzymes.



In an experiment to test the affect of temperature on enzyme controlled reactions a student wants to do experiments at five different temperatures, 0°C, 20°C, 40°C, 60°C and 80°C.

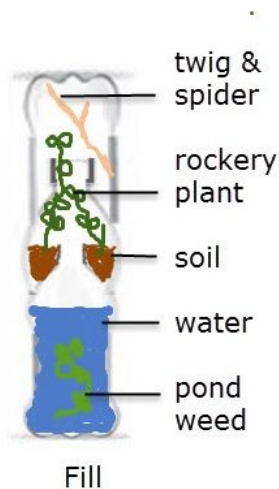
The teacher stopped the experiment because it was breaking the IB guidelines on animal experiments.

What is wrong with the plan? Explain why and suggest a better way to carry out the experiment.

(3 marks)

### Practical 5 - Attempting to create a sealed microcosm

The diagram shows a simple mesocosm made by some students



Outline some of the practical difficulties you might encounter in the construction of such a mesocosm, and suggest some precautions which might be taken to avoid harm to students or the animals in the mesocosm. (3 marks)

## Practical 5 - Attempting to create a sealed microcosm



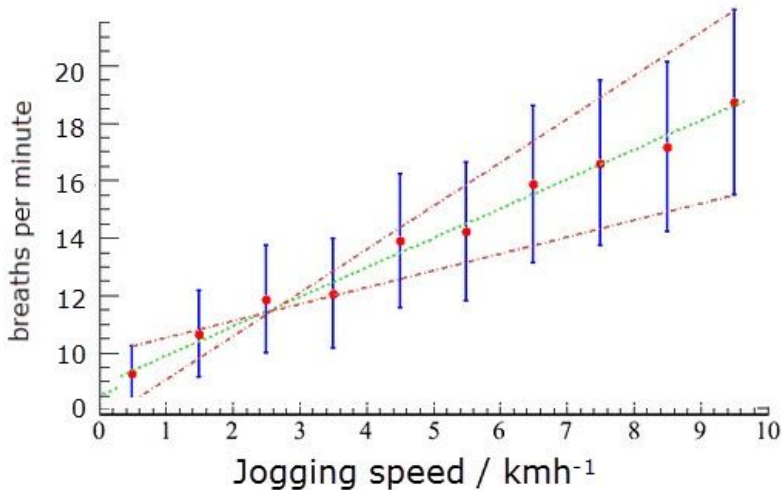
The photo shows a simple mesocosm made by some students

Suggest how this mesocosm could be used to investigate how the number of hours of light in a 24 hour period affects the balance of plants and animals in the mesocosm. (6 marks)

## Practical 6 - Monitoring of ventilation at rest, after mild & vigorous exercise

This graph shows the results of an experiment to measure ventilation rates at different jogging speeds. The red dots show the average rate and the blue bars show the range of readings taken.

Ventilation rate at different speeds



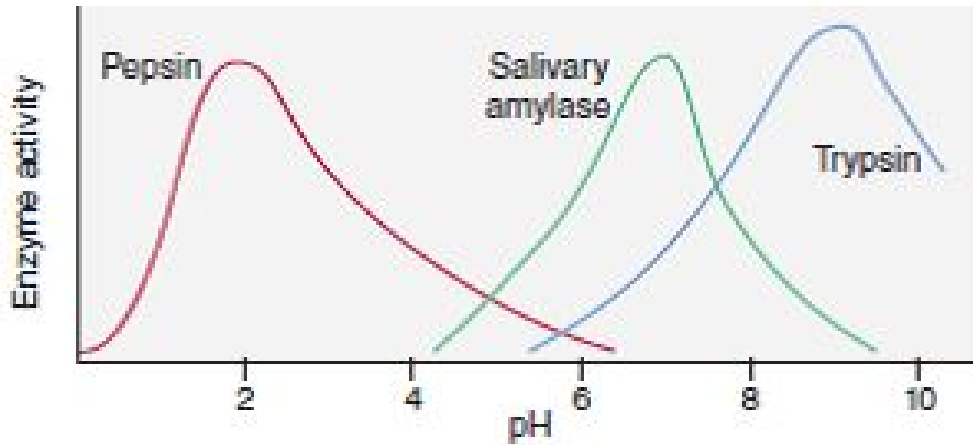
1. Describe how the ventilation rate changes as the jogging speed increases. (1 mark)

2. Suggest what you would expect to happen to the volume of each breath as the jogging speed increased and explain why. (2 marks)

## Section B

### OPTION D - Human Physiology 20 marks

1. Look at the graph. **Label** the part of the digestive system that each of the enzymes can be found at and **annotate** the macromolecule they catalyze the breakdown of. (6 marks)



2. Where are most nutrients absorbed in our body? (1 mark)
3. Name 2 differences between the digestive system of a fetal pig and human. (2 marks)
4. State 2 functions of the liver. (2 marks)
5. Distinguish between an arteries and veins. (2 marks)

6. The figures below are measurements of the rate of ventilation in 18 year old human subjects at rest and walking at controlled speeds on a treadmill set at 4 km/hr and then at 6 km/hr.

The subjects were tested once at rest and once at each treadmill speed and were given ten minutes recovery time between each test.

Subject	Ventilation rate per minute $\pm 1$		
	Rest	Treadmill 4kmhr <sup>-1</sup>	Treadmill 6 kmhr <sup>-1</sup>
1	11	17	21
2	12	19	20
3	11	15	19
4	14	21	21
5	15	19	21
6	12	18	23
7	13	19	22
8	11	29	19
9	12	17	21
10	15	19	22

a) Evaluate whether the ventilation rate gives an accurate estimation of the increase in oxygen consumption of the individual (2 marks).

b) Discuss which data set appears to be erroneous. (2 marks)

c) State three other variables which should be controlled in this investigation. (3 marks)