Beatty Secondary School
Secondary 4E Pure Biology
Science Department

Name : _____ **Register No :** _____ **Class :** _____

Title : **Answering Planning Questions for Practicals** **Date :** _____

Planning questions in O level practicals:

1. usually **6** marks
2. usually can use the practical task that you have just completed during the exam to help you answer the planning question
3. usually requires you to include:
    a. **Independent variable** (variable that is being changed)
    e.g. concentration of salt or sugar solution/ temperature/ pH - 5 different concentrations/volumes/temperatures that are uniformly spaced.

    b. **Dependent variable** (variable being observed/measured)
    e.g. colour change/ time/Length/mass/volume

    c. **Controlled variable** (variable that is kept the same)
    e.g. Soaking time/ incubation time

    d. How **data collected** can be **used to reach a conclusion**
    e.g. plotting graph

    e. **Using the result to conclude the experiment**
    e.g. the concentration at which there is no change in mass is the concentration of the potato strip

    f. How to ensure **reliability** –
    e.g. repeat the experiment 3 times/ use two strips of potato for each concentration of solution

Practical task 1:

1 (a) You are going to investigate the effect of two different concentrations of sucrose solution on potato tissue.

You are provided with some potato tissue and two solutions of sucrose, labelled **S1** and **S2**.

- Label one petri dish **S1** and the other petri dish **S2**.
- Carefully cut two strips of potato tissue without skin, each measuring 50mm x 5 mm x 5mm.
- Measure and record, in mm, the length of each strip in Table 1.1.
- Place one strip into each petri dish.
- Pour solution **S1** into the dish labeled **S1**. Pour solution **S2** into the dish labeled **S2**. Make sure the strips are completely covered by the solutions.
- Leave the strips for 25 minutes. **Continue with parts (c) and (d) of the practical during this time.**
- After 25 minutes, remove each of the potato strips and gently blot them dry on a piece of filter paper. Be careful to note which is strip **S1** and **S2**.
- Measure again the length of each strip and record your results in Table 1.1. **[MMO]**
- Calculate and record in Table 1.1 the change in length of each strip. **[PDO]**

Planning question:

(b) (i) Outline an experiment you could carry out to investigate the cell sap concentration of the potato cells using potato slices. **[P]**

independent variable: concentration of sucrose / salt solution (provide 5 different values] [1]

controlled variable: diameter of potato slices and time of immersion

1. **Cut 5 equal-sized sticks of potato from the same potato and measure initial diameter.**
2. **Put the pieces into 5 different concentrations of sucrose solution - 0%, 10%, 20%, 30%, 40%. [1]**
3. **Leave the slices for 25 min. [1]**
4. **Remove and blot the potato strips. measure final diameter for each slice [1]**
5. **Repeat the experiment at least three times with new potato slices and sucrose solutions / use two slices for each experiment and take average change in diameter [1]**
6. **Interpreting data/result: Plot a graph showing average change in diameter against concentration of sucrose solution [1]**
7. **Conclusion: concentration of solution where there is no change is equivalent to the concentration of cell sap [1]**

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Practical task 2:

1 (a) Dehydrogenase is an enzyme found in cells such as yeast.

Methylene blue is an indicator that can be used to show the activity of dehydrogenase.

In the presence of active dehydrogenase, methylene blue changes colour from blue to colourless.

You are required to carry out an experiment to investigate the effect of temperature on the activity of dehydrogenase in yeast cells.

You have been provided with two yeast suspensions, **A** and **B**. Yeast suspension **B** has been heated to boiling and then cooled.

- Prepare a water bath by half filling a beaker with water and adjusting the temperature to 30 °C.
- Label one test-tube **A** and one test-tube **B**.
- Put 5 cm^3 of yeast suspension **A** into the test-tube labelled **A** using a syringe.
- Put 5 cm^3 of yeast suspension **B** into the test-tube labelled **B** using another syringe.
- Stand both test-tubes in the beaker of water kept at 30 °C. Leave the test-tubes in the water for 5 minutes.
- After 5 minutes, add 2 drops of methylene blue solution to each test-tube, mix carefully and leave the test-tubes in the water.
- Observe the colour of the contents of the test-tubes every 2 minute for a period of 10 minutes, while keeping the water temperature at 30 °C.
- Repeat this procedure using fresh yeast suspension and a beaker of water kept at 40 °C. **[MMO]**

Planning Question:

(b) Giving full experimental details, describe an experiment you could carry out to investigate the effect of pH on the activity of dehydrogenase, using yeast suspension and methylene blue solution. **[P]**

Independent variable: pH
Controlled variable: Temperature and volume of yeast suspension

Procedures:

1. **Prepare a water bath by half filling a beaker with water and adjusting the temperature to 35 °C.**

2. **Prepare 5 test tubes of 2 cm^3 of buffer solutions at different pH 1, 3, 5, 7 and 9. [1] Add 5 cm^3 yeast suspension into each of the test tube.**

3. **Stand all test tubes in the beaker of water kept at 35 °C. Leave the test-tubes in the water for 5 minutes. [1]**

4. **After 5 minutes, add 2 drops of methylene blue solution to each test-tube, mix carefully and leave the test-tubes in the water.**

5. **Observe the colour of the contents of the test-tubes every minute for a period of 5 minutes, while keeping the water temperature at 35 °C. [1]**

6. **Repeat the experiment three times (repeat steps 1 -5 using fresh yeast suspension. [1]**

7. **Interpreting data/ result:**
   Plot a graph showing average time taken for dehydrogenase to turn from blue to colourless against pH. [1]

8. **Conclusion: The optimum pH for yeast dehydrogenase to work is the pH at which the time taken for dehydrogenase to turn from blue to colourless is the shortest.[1]**