1.8 Biology Required Practicals and Data Analysis: Test Pack

Total Marks

AQA 8464 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 On 03/03/2026, Priya's group began the required practical investigating osmosis in potato tissue. They planned to cut chips from the same potato using a cork borer, and place them into sucrose solutions of different concentrations for a fixed length of time, measuring the mass of each chip before and after.

(a) Identify the independent variable and the dependent variable in this investigation. **(2)**

(b) State two variables, other than concentration, that should be controlled to make this a fair test, and explain why one of them must be controlled. **(3)**

(c) Explain why each potato chip should be blotted dry with a paper towel before its mass is measured. **(1)**

(Total for Question 1 is 6 marks)

© Revision Library | revisionlibrary.co.uk

2 Deepa's group carried out the four standard food tests on a range of school-canteen food samples. Their method notes are shown below, with some gaps left to complete.

Test for reducing sugars: reagent = Benedict's solution; method = _____; positive result = blue solution turns green, then yellow, then a brick-red precipitate forms
Test for starch: reagent = _____; method = add a few drops directly to the food sample at room temperature; positive result = orange-brown solution turns blue-black
Test for protein: reagent = biuret reagent (sodium hydroxide solution, then dilute copper sulfate solution); method = add the reagents and mix at room temperature, do not heat; positive result = _____
Test for lipids (fats): reagent = ethanol, then water; method = shake the sample with ethanol, then pour the mixture into water; positive result = _____

(a) Complete the method for the reducing sugars test (the blank after 'method ='). **(1)**

(b) Complete the reagent used for the starch test (the blank after 'reagent ='). **(1)**

(c) Complete the positive result for the protein test (the blank after 'positive result ='). **(1)**

(d) Complete the positive result for the lipids test (the blank after 'positive result ='). **(1)**

(Total for Question 2 is 4 marks)

© Revision Library | revisionlibrary.co.uk

3 A group investigated the rate of bubble production from pondweed at a range of distances from a lamp.

Distance from lamp (cm): 10, 20, 30, 40, 50
Bubbles of oxygen produced per minute: 55, 32, 18, 10, 6

(a) The relative light intensity reaching the pondweed is estimated using the equation: relative light intensity = 1 / distance^2. Calculate 1 / distance^2 for d = 30 cm and for d = 50 cm. Give your answers in standard form (units cm^{-2}). **(3)**

(b) Describe the relationship between 1/distance^2 and the rate of bubble production shown by the data between 30 cm and 50 cm. **(2)**

(c) Explain why the rate does not continue to increase in the same proportion at the smallest distance tested (10 cm). **(2)**

(Total for Question 3 is 7 marks)

4 Deepa's group tests a control tube of distilled water alongside each food sample when carrying out the food tests.

(a) Explain why a tube containing distilled water, instead of a food sample, should be tested alongside the food samples. **(2)**

(b) One of Deepa's food samples turns blue-black when iodine solution is added, but stays blue (no colour change) when biuret reagent is added. What does this tell you about the composition of the food sample? **(2)**

(Total for Question 4 is 4 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 1.8 Biology Required Practicals and Data Analysis: Test Pack

Question 1

(a) independent variable: concentration of the sucrose solution, oe **B1**

(a) dependent variable: change in mass of the potato chip (e.g. percentage change in mass), oe **B1**

(a) Answer: Independent variable: concentration of sucrose solution. Dependent variable: change in mass of the potato chip.

(b) temperature of the solutions, oe **B1**

(b) size/dimensions (length and diameter) of each potato chip, oe; allow volume of solution, time left in the solution, or using chips from the same potato **B1**

(b) explanation, e.g. if temperature were not controlled, any difference in mass change could be caused by temperature affecting the rate of osmosis rather than by concentration, making the test unfair/invalid, oe **B1**

(b) Answer: Temperature of the solutions and the size (length/diameter) of each potato chip (also accept volume of solution or time in solution); if temperature were not controlled, differences in results could be due to temperature rather than concentration.

(c) to remove excess surface solution/water, which would otherwise be included in the mass and make the measurement inaccurate, oe **B1**

(c) Answer: Blotting removes surface liquid clinging to the chip, so only the mass of the chip itself is measured, giving a more accurate result.

Question 2

(a) add the reagent to the sample and heat in a water bath (e.g. at about 75°C) for a few minutes, oe **B1**

(a) Answer: Add Benedict's solution to the sample and heat in a water bath for a few minutes.

(b) iodine solution (iodine dissolved in potassium iodide solution), oe **B1**

(b) Answer: Iodine solution.

(c) blue solution turns purple / lilac, oe **B1**

(c) Answer: The blue solution turns purple (lilac).

(d) a cloudy / milky white emulsion forms, oe **B1**

(d) Answer: A cloudy, milky-white emulsion forms.

Question 3

(a) method: squares the distance then takes the reciprocal ($1 / d^2$), for either value **M1**

(a) d = 30 cm: 1.11×10^{-3} cm^{-2} (awrt), cao **A1**

(a) d = 50 cm: 4.00×10^{-4} cm^{-2}, cao **A1**

(a) Answer: d = 30 cm: 1.11×10^{-3} cm^{-2}; d = 50 cm: 4.00×10^{-4} cm^{-2}.

(b) as $1/distance^2$ increases, the rate of bubble production increases, oe **B1**

(b) the increase is roughly directly proportional (a straight-line relationship) over this range, oe **B1**

(b) Answer: Over this range, the rate of bubble production increases roughly in direct proportion to $1/distance^2$ (a straight-line relationship).

(c) at this high light intensity (short distance), light is no longer the limiting factor, oe **B1**

(c) another factor, such as carbon dioxide concentration or temperature, becomes limiting instead, so the rate increase levels off rather than continuing at the same rate, oe **B1**

(c) Answer: At the shortest distance, light is no longer limiting the rate; another factor (e.g. CO_2 concentration or temperature) becomes limiting instead, so the rate rises by proportionally less than expected.

Question 4

(a) it acts as a control, allowing comparison with the food samples, oe **B1**

(a) it checks that the reagents themselves do not produce a colour change/false positive, so any colour change seen in the food samples can be confidently attributed to the food, oe **B1**

(a) Answer: It is a control: it shows that any colour change in the food samples is caused by the food itself, not by the reagents alone.

(b) the sample contains starch (positive iodine test), oe **B1**

(b) the sample does not contain protein (negative biuret test, as the solution stayed blue rather than turning purple), oe **B1**

(b) Answer: The sample contains starch (positive iodine test) but does not contain protein (biuret test stayed blue, so it was negative).

© Revision Library | revisionlibrary.co.uk