REDSPOT New Solutions . New Minds

About

BIOLOGY
ALTERNATIVE TO PRACTICAL
(PAPER 6) (YEARLY)

About Thinking Process

When solving problems, we first analyse the questions and then gather relevant information until we are able to determine the answers. But for presentation reason, we need to organise, rearrange and then present ONLY the required workings and solutions.

Thinking process reveals the extra but relevant information which is not required as part of the solutions.

period	**1998 to 2022**
contents	**June & November, Paper 6, Worked Solutions**
form	**Yearly**
compiled for	**O Levels**
special features	**Thinking Process**

Appointed Agents & Wholesalers in PAKISTAN:

BOOK LAND
Urdu Bazaar, Lahore. Tel: 042-37124656

NATIONAL BOOK SERVICE
Urdu Bazaar, Lahore. Tel: 042-37247310.

LAROSH BOOKS
Urdu Bazaar Lahore. Tel: 042-37312126.

BURHANI BOOK CENTRE
New Urdu Bazar, Karachi, Tel: 021-32634718

MARYAM ACADEMY
Urdu Bazaar, Karachi, Tel: 0331-2425264

TARIQ BOOK TOWN
Samar Garden, Hydari North nazimzbad, Karachi
Tel: 021-34555918, 36649425

REHMAN BOOKS
College Road, Rawalpindi
Tel: 051-5770603, 0313-5618976

WELCOME BOOKS
Soneri Masjid Road, Peshawar Cantt.
Tel: 091-5274932, 0300-5860068

Tel No: 042-35201010
Mobile No: 0300-8447654
E-Mail: info@redspot.com.pk
Website: www.redspot.com.pk
Address: P.O. Box 5041, Model Town, Lahore, Pakistan.

'O' Level Biology (Alternative To Practical) 5090 (Yearly)

CONTENTS

NOVEMBER 2022

Answer **all** questions.

Question 1

Yeast is a microorganism that can use the sugar sucrose to obtain energy for growth. When yeast is added to a sucrose solution it grows, producing bubbles of a gas that cannot escape from the mixture and so the volume of the mixture increases.

A student investigated the effect of varying the concentration of sucrose solution on the growth of yeast, by measuring this increase in volume.

He started with a supply of 5% sucrose solution.

He labelled four test-tubes, **A**, **B**, **C** and **D**.

(a) (i) State what you would use to label the test-tubes.

..... [1]

He followed this procedure:

- add 15 cm^3 of 5% sucrose solution to test-tube **A**
- add 9 cm^3 of 5% sucrose solution and 6 cm^3 of distilled water to test-tube **B** to produce 15 cm^3 of 3% sucrose solution
- add 3 cm^3 of 5% sucrose solution and 12 cm^3 of distilled water to test-tube **C** to produce 15 cm^3 of 1% sucrose solution
- add 15 cm^3 of distilled water to test-tube **D**.

(ii) He measured the volumes of 5% sucrose solution and distilled water with a small measuring cylinder. Describe how he could ensure that the dilutions produced were correct.

.....

..... [1]

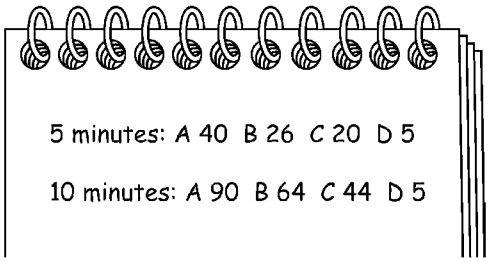
(b) He set up a beaker as a water-bath at a temperature of 40 °C.

He added 1 g of yeast to each test-tube and stirred each mixture well.

The four test-tubes were then placed in the water-bath.

He decided that any change in height of the mixture in each test-tube would be an indication of a change in its volume and so of how much the yeast had grown.

He measured the **total increase** in height of the mixtures in the test-tubes in mm after 5 minutes and 10 minutes and recorded them in his notebook.



(i) Complete the table using the information given.

test-tube	percentage sucrose solution	.....	
		after 5 minutes	after 10 minutes
A			
B			
C			
D			

[4]

(ii) Use his results to describe the effect of sucrose concentration on yeast growth.

.....

.....

.....

.....

.....

..... [3]

(iii) Suggest an explanation for the results in test-tube **D**.

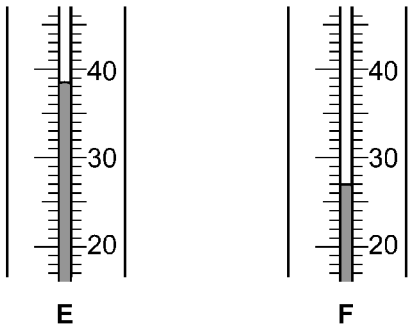
.....

.....

.....

..... [1]

(c) (i) He wanted to carry out this investigation at a temperature of 40 °C. The thermometers in the diagram show the temperature of the water when he first placed the test-tubes in the water-bath (**E**) and after 10 minutes (**F**).



Record the temperature when the test-tubes were first placed in the water-bath.

.....

Record the temperature after 10 minutes.

.....

[2]

(ii) Suggest how the temperature of the yeast mixtures could have been maintained at 40 °C throughout the investigation.

.....

.....

.....

.....

.....

..... [3]

(d) Yeast uses sucrose to obtain energy for growth.

Suggest a simple method to demonstrate that this process requires enzymes to be present in the yeast.

.....

.....

.....

.....

..... [3]

[Total: 18]

Question 2

A student thought that seeds might germinate better in the dark than in the light.

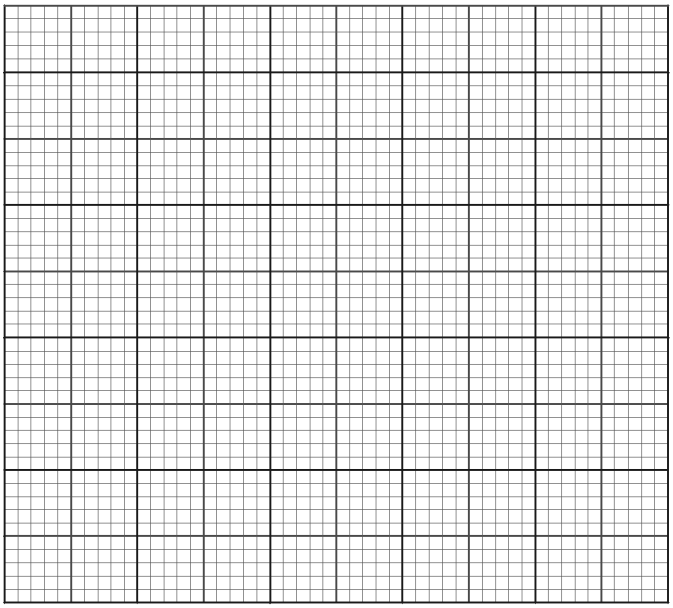
To investigate this she set up six identical Petri dishes each with 20 seeds on moist filter paper. Three of these dishes she placed in the dark and three under lights in the laboratory. The lights were left on all the time.

After each 24-hour period she counted and recorded the total number of seeds in each dish that had germinated. She then calculated the mean numbers of seeds (to the nearest whole number) that had germinated in the light and in the dark.

Her results are shown in the table.

time / hours	seeds germinated / mean number per Petri dish	
	light	dark
0	0	0
24	0	5
48	11	15
72	13	16
96	15	17

(a) (i) Construct line graphs of the data for seeds germinated in the light and in the dark using the same axes on the grid below. Join the points with straight lines. [5]



(ii) Use your graph to estimate the mean number of seeds that had germinated after 36 hours in the dark. Show your working on the graph.

mean number of seeds ..... [2]

(iii) Use the data and your graph to suggest what the student could conclude about the effect of light and dark on the germination of these seeds.

.....

.....

.....

..... [2]

(b) (i) State **two** variables other than light that the student should have controlled in her investigation.

.....

..... [2]

(ii) Suggest **one** reason for using 20 seeds in each of the Petri dishes in this investigation.

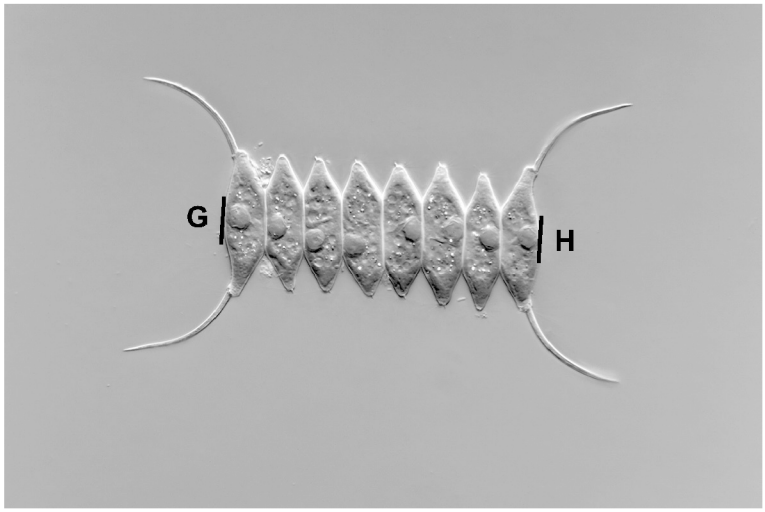
.....

..... [1]

[Total: 12]

Question 3

The photomicrograph shows a simple plant that lives in ponds and lakes.



magnification ×630

(a) In the space below make a large drawing of the plant as it appears in the photomicrograph. [5]

(b) Draw a straight line on the photomicrograph to join lines **G** and **H**. Measure the length of this line and record it.

.....

Use your measurement to calculate the actual length of the plant. Round your answer to 3 decimal places.

Space for working.

..... mm

[3]

(c) Describe how you would find out whether a sample of pond water contained this plant.

.....

.....

.....

.....

.....

..... [2]

[Total: 10]

SOLUTIONS - NOVEMBER 2022

Q1 - Solution

(a) **(i)** Marker (or wax pencil, sticky label).

(ii) Measuring cylinder should be cleaned between measuring sucrose solution and distilled water or rinsed with sucrose solution or distilled water before use.

(b) **(i)**

test-tube	percentage sucrose solution	total increase in height / mm	
		after 5 minutes	after 10 minutes
A	5	40	90
B	3	26	64
C	1	20	44
D	0	5	5

(ii) As concentration of sucrose increasees, yeast grows more and height or volume of solution increases. There is a little growth with 0% or no sucrose in tube with only distilled water. There is more growth between 5 and 10 minutes than between 0 and 5 minutes with sucrose.

(iii) Test tube **D** is acting as a control as it contains no sucrose and only distilled water. It shows little growth of yeast, due to a small amount of sucrose or glucose already present in yeast cells.

(c) **(i)** Water-bath: 38.5 °C

After 10 minutes: 27 °C

(ii) A thermometer should be used to take the temperature at regular intervals overtime, continuously throughout the experiment. Whenever, temperature falls slightly, adjust it by adding hot water or by heating on water bath.

(d) Heat another sample of yeast to boiling temperature (100 °C), so that enzymes in yeast are deactivated or denatured. This tube is used for comparison. It will show no growth and height of foam or volume of solution will not rise in it.

COMMENT on **ANSWER**

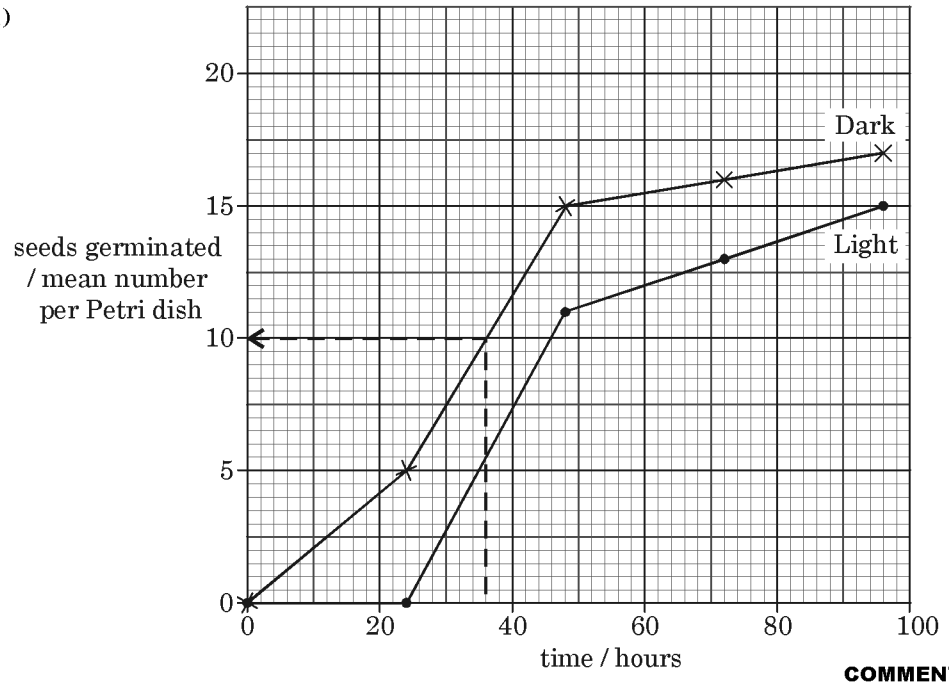
"**(a)** **(ii)** Separate measuring cylinders can be used for sucrose and distilled water. Clean/ dry measuring cylinder can be used for each test tube. Avoid parallax error by reading bottom of meniscus at eye level.

(b) **(ii)** Sucrose is used in respiration, so CO_2 gas is released by yeast which is trapped in bubbles. Hence, height of foam increases.

(d) In tubes having yeast at 40 °C, yeast enzymes are working at optimum temperature, so respiration occurs and maximum CO_2 is formed."

Q2 - Solution

(a) (i)



(ii) From graph, Mean number of seeds = 10

(iii) In dark, rate of seed germination is greater than in light. Also seeds start germination earlier in dark than in light.

(b) (i) 1. Amount of water used to soak filter paper.

2. Temperature

(ii) More seeds are used to produce reliable results. Some seeds might not be viable or die, so enough seeds should be used.

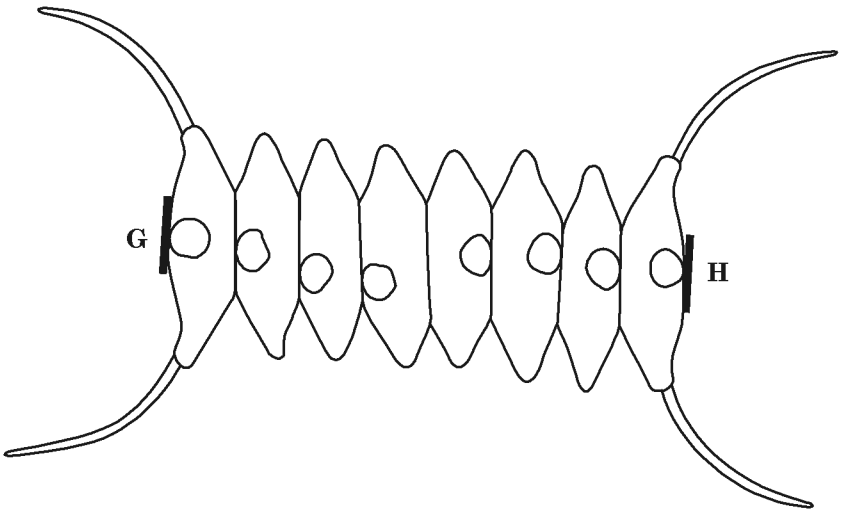
COMMENT on **ANSWER**

"**(b) (i)** Temperature can be controlled by keeping seeds in thermostatically controlled room or incubator. A measured volume of water is used for soaking filter paper. Seeds of same type or species of plant are used.

(ii) Random variation can occur in more seeds. Same number of seeds for light and dark are used which allows fair comparison."

Q3 - Solution

(a)



(b) Length of the line GH on photomicrograph = 42 mm

$$\text{Actual length} = \frac{\text{Length of the line GH}}{\text{magnification}}$$

$$= \frac{42}{630} = 0.067 \text{ mm}$$

(c) A sample of pond water containing this plant can be taken and a drop of pond water is placed on glass slide. A coverslip is placed over it and by using high power microscope, this plant can be searched and examined.

COMMENT on **ANSWER**

❝ (c) More than one sample of pond water may be taken to find out this plant. If one drop has no such plant then other may contain it. Examination can be done under high power objective of ×40 / ×45. ❞