

Name: _____ Index Number: _____ Class: _____



TEMASEK SECONDARY SCHOOL
O Level Preliminary Examination 2024
Secondary 4 Express

BIOLOGY

6093/03

Paper 3 Practical Test

1 hour 50 minutes

Candidates answer on the Question Paper.

Additional Material: Nil

READ THESE INSTRUCTIONS FIRST

Do not open the booklet until you are told to do so.

You are required to **submit this booklet** at the end of the examination.

Write your name, index number and class on all the work you hand in.
Give details of the practical shift and laboratory, where appropriate, in the boxes provided.

Write in dark blue or black pen.

You may use an HB/2B pencil for any diagrams or graphs.

Answer **all questions** in the spaces provided on the Question Paper.

The use of an approved scientific calculator is expected, where appropriate.

You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

Shift
Laboratory

For Examiner's Use	
1	
2	
Total	/40

This document consists of **12** printed pages.

1 You are advised to read the whole question before you start.

Plants transport water up along xylem vessels. In this experiment, you are going to compare the upward movement of water in the celery and in a piece of blackboard chalk.

You are provided with:

- 2 pieces of blackboard chalk
- 2 petri dishes
- 1 pin
- 1 stopwatch
- 1 plastic dropper
- 1 “stick” of celery stalk (10cm long)
- Paper towels
- knife
- white tile
- ruler (15cm)
- 60cm³ of coloured water (in beaker)

Part 1

- Step 1 Pour coloured water into two petri dishes until each is **half** full.
- Step 2 Cut the celery stalk into two equal lengths. Stand one half of the stalk vertically onto a dish of coloured water.
- Step 3 Stand one piece of chalk vertically on the **other** dish of coloured water as shown in Fig.1.1.

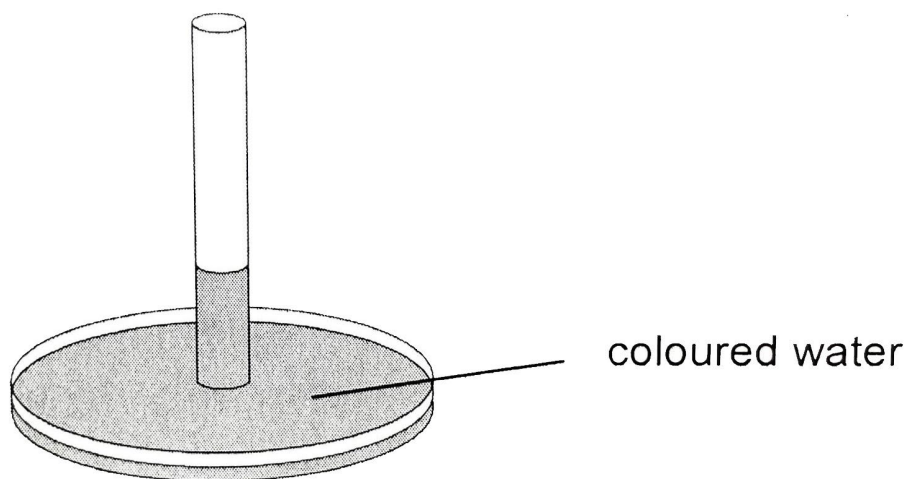


Fig.1.1

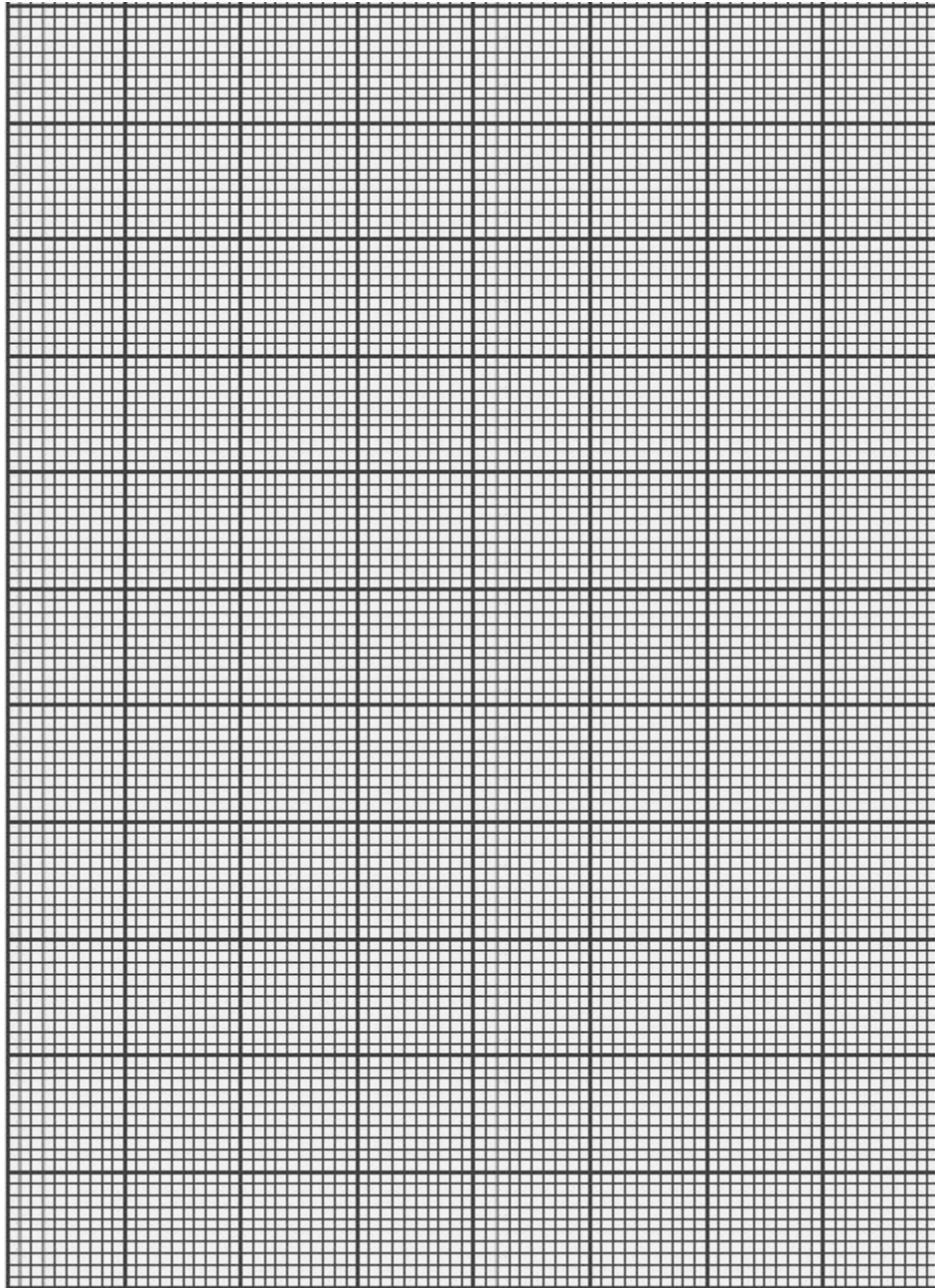
- Step 4 Take it out **immediately** and make a mark (dot) with the pin on the level of coloured water.

- Step 5 Put the chalk back and **immediately** start the stopwatch.
- Step 6 At 1 minute, with the chalk still standing in the petri dish, use the pin to make a mark (dot) on the level of the coloured water.
- Step 7 Continue to record the level of coloured water at 1 minute interval for a duration of 6 minutes.
- Step 8 Remove the chalk from the dish and dab the base of the chalk onto a piece of paper towel. Measure the height of the coloured water markings made on the chalk. Record your answers to the nearest **mm**.
- Step 9 Repeat step 3 to step 8.
- Step 10 Calculate the average height of markings for each of the time intervals.

(a) Present all your results in a table in the space provided.

[4]

- (b) Use the grid provided to plot a graph of average height of the coloured water marking against time. [4]



- (c) Determine the rate of uptake of coloured water at $t = 1.5 \text{ min}$. Show on the graph how you determine the rate.

Answer: [2]

Part 2

- Step 11 Remove the celery stalk from the dish and dab the base of the celery onto a piece of paper towel. Observe the top surface of the celery stalk. Use the knife to make a vertical cut down the celery to expose some of the stained tissue according to Fig.1.2.

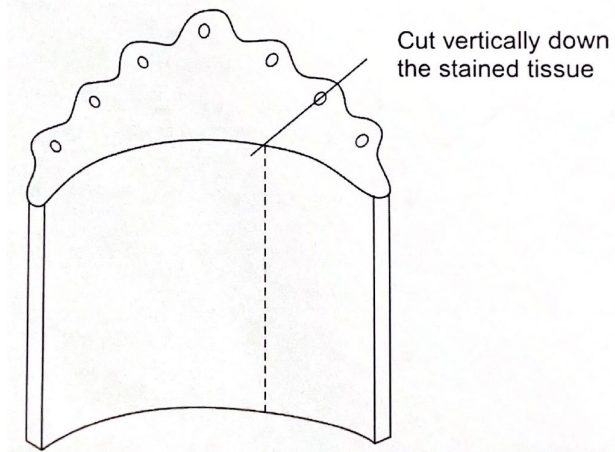


Fig. 1.2

- Step 12 Break the chalk to expose the **transverse** section of the stained portion.

- (d) Based on what you observed in the chalk, state one difference in the movement of coloured water up the chalk and the stick of celery.

.....

..... [1]

- (e) Identity **two** key sources of error in the experiment with the chalk and explain how it affects the results.

Source of error 1

Explanation

..... [2]

Source of error 2

Explanation

..... [2]

- (f) Describe **one** advantage of repeating the investigation.

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..... [1]

- (g) A student is provided with the apparatus shown in Fig. 1.3.

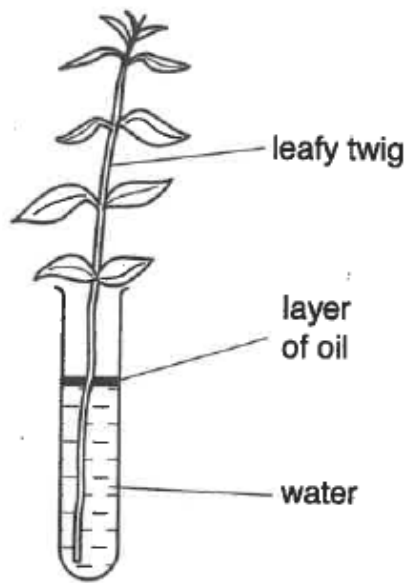


Fig.1.3

Describe how this apparatus, could be used to compare the rate of transpiration under different conditions of air movement.

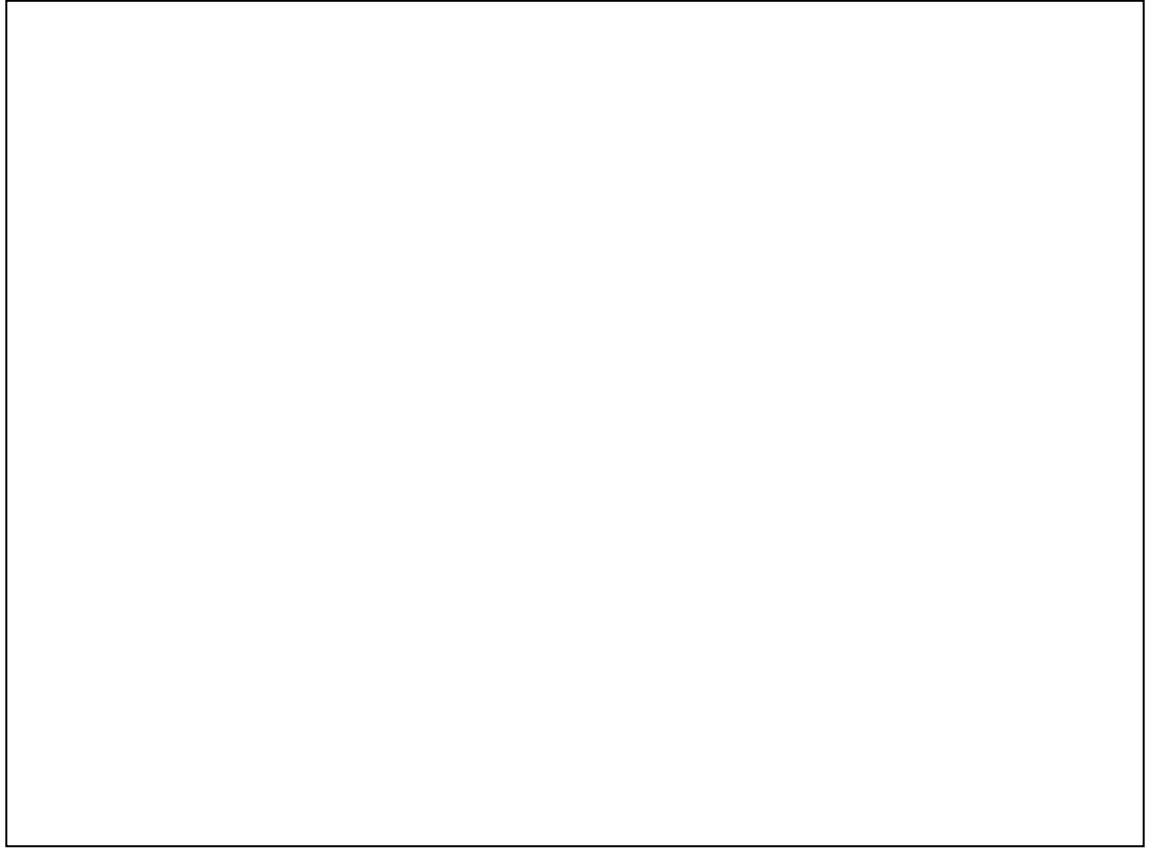
[5]

[Total: 21]

2 You are provided with a small mirror to use for studying one of your eyes.

- (a)** **(i)** Make a large labelled drawing of **one** of your eyes in the space below.
Include the structures immediately surrounding your eyes that provide it
with protection.

[5]



- (ii)** Calculate the magnification of your drawing. Show your working.

Magnification = [2]

- (b) While looking at his left eye with a mirror, a student covered his right eye with his hand. After 10 seconds, the student removed his hand.

The student made simple diagrams of part of his left eye which are shown in Fig.2.1.

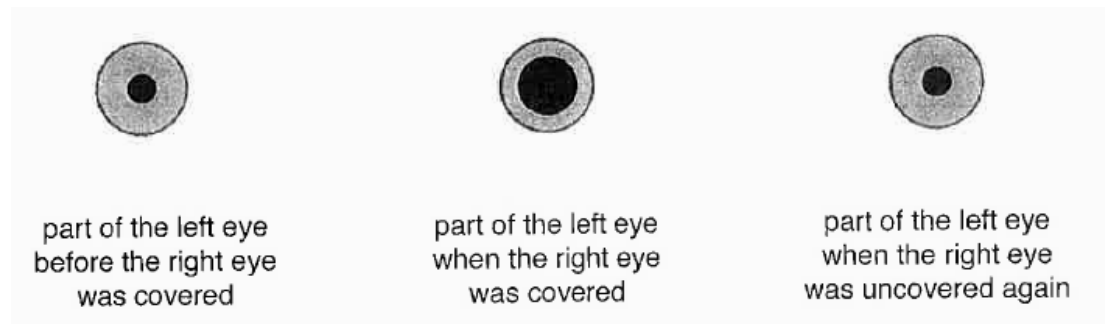


Fig. 2.1

- (i) Describe what happened to the **left** eye when the **right** eye was covered and then uncovered.

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.....[2]

- (ii) Explain what happened inside the **left** eye to bring about the changes you have described.

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.....[2]

- (c) Squid have eyes that are very similar to human eyes.

Fig.2.2 is a vertical section of the eye of a squid.

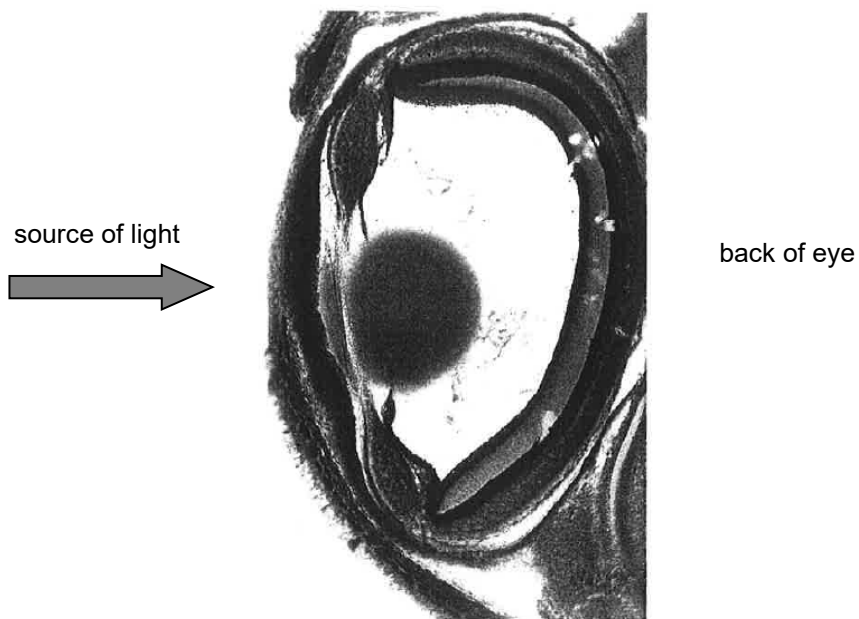


Fig.2.2

- (i) State **one** way visible in Fig.2.2 that the squid eye is the similar to a human eye.

..... [1]

- (ii) State **one** way that the squid eye differs from the human eye.

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..... [1]

- 3 Fig. 3.1 shows a marine food web consisting of several organisms and its relationship.

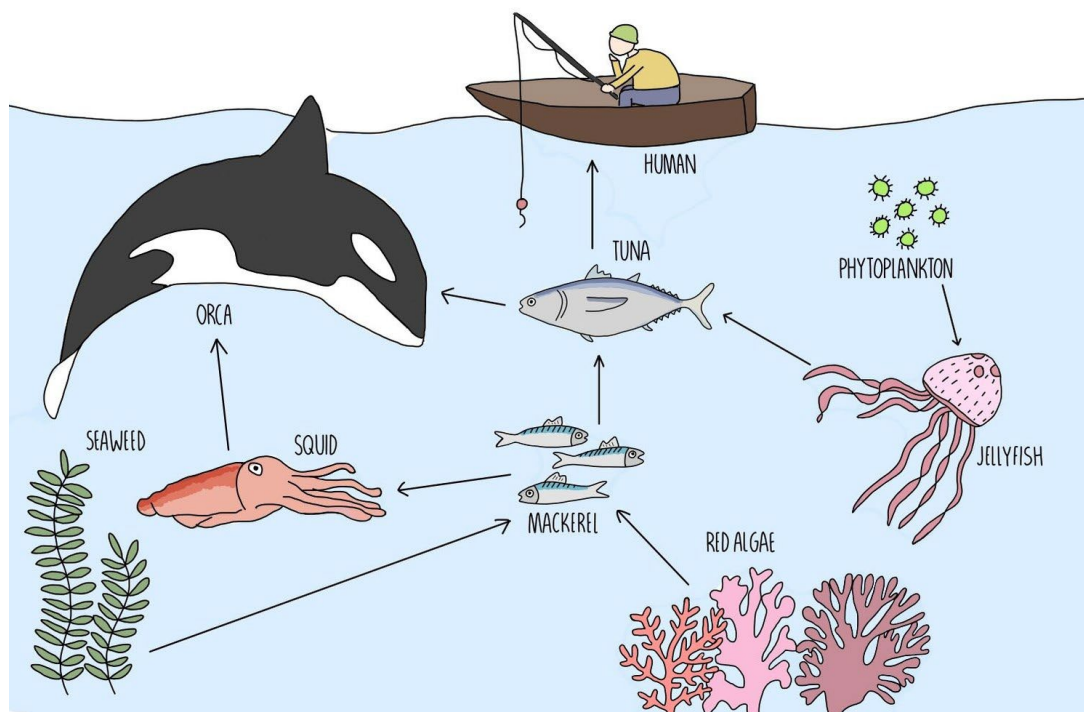


Fig. 3.1

- (a) Based on Fig.3.1, draw a pyramid of biomass consisting of 4 trophic levels.

[1]

- (b) Describe how the biomass of the organisms in Fig.3.1 can be determined.

.....

..... [1]

- (c) Suggest one possible limitation that can affect the accuracy of the biomass obtained.

.....

..... [1]

Table 3.2 shows a summary of mean mercury found in body tissues (ppm) of the various seafood.

Table 3.2

Marine Organisms/Seafood	Mean Mercury, Hg found in body tissues (ppm)
Mackerel	0.30
Jellyfish	0.52
Orca	6.28
Squid	0.58
Tuna	1.65
Phytoplankton	0.05
Red algae	0.06

- (d) Using the information from Fig.3.1 and Table 3.2, explain why tuna is dangerous for human consumption in the long term.

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.....[3]

[Total:19]

End of Paper