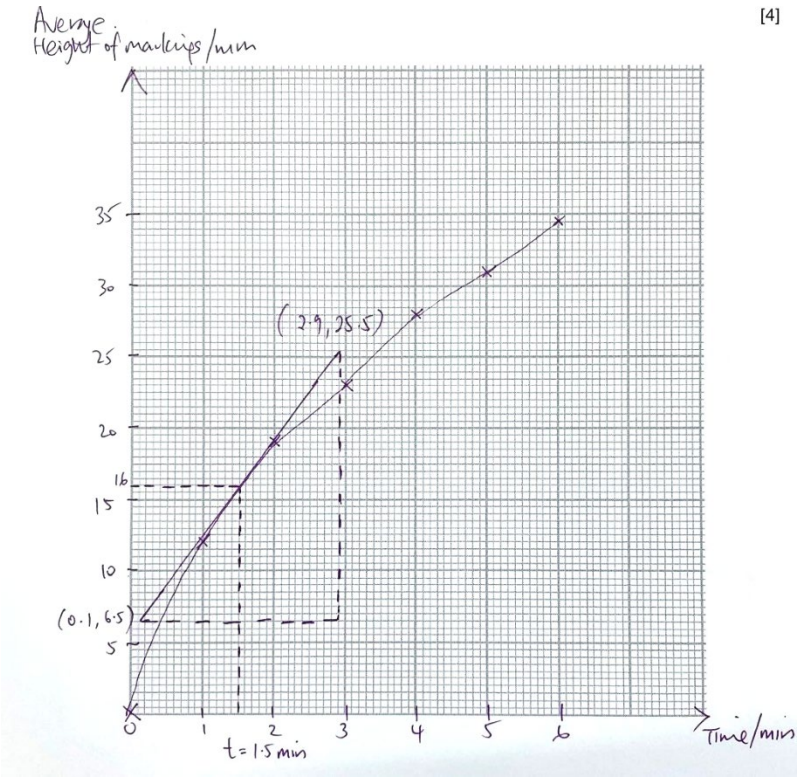
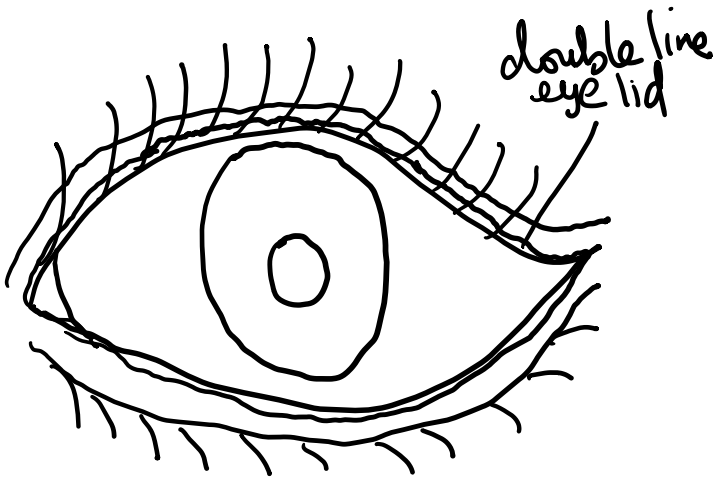
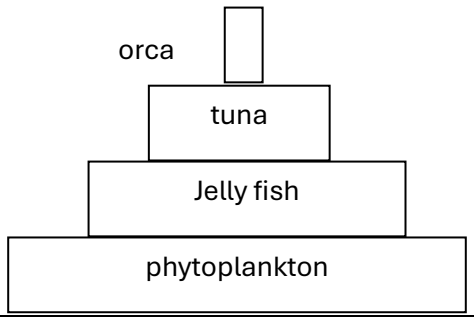
2024 TMS Biology Practical Prelims Mark Scheme (6093/03)

<table>
<tr><th>Qn</th><th>Description</th><th>Marks</th></tr>
<tr><td>1a</td><td>
<table>
<tr><th rowspan="2">Time/ min</th><th colspan="2">Height of markings/mm</th><th rowspan="2">Average height of markings/ mm</th></tr>
<tr><th>First reading</th><th>Second reading</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>11</td><td>13</td><td>12</td></tr>
<tr><td>2</td><td>18</td><td>19</td><td>19</td></tr>
<tr><td>3</td><td>22</td><td>24</td><td>23</td></tr>
<tr><td>4</td><td>26</td><td>29</td><td>28</td></tr>
<tr><td>5</td><td>29</td><td>32</td><td>31</td></tr>
<tr><td>6</td><td>32</td><td>35</td><td>34</td></tr>
</table>
Note: Trend to be observed: Curve/ not straight line
</td><td>1)Heads/ unit = 1m
2)7 data sets = 1m
3)Nearest mm = 1m
4)2 sets of readings = 1m</td></tr>
<tr><td>1b</td><td>[4]
 
</td><td>Axis =1m
Plots = 1m
Scale = 1m
Best fit line = 1m</td></tr>
<tr><td>1c</td><td>Rate of uptake of coloured water at t = 1.5m
R = 25.5 – 6.5 / 2.9-0.1 = 19/2.8 = 6.79mm/min (3sf) or (6.8mm/min (1d.p)</td><td>Working = 1m
Final answer =1m</td></tr>
</table>

	• Show coordinates on graph • Working	
1d	Coloured water travelled up the whole chalk but in xylem vessels of celery stem.	1m
1e(i)	Source of error: Uneven horizontal level of coloured water; Explanation: subjective decision in marking the level of coloured water, leading to inaccurate readings. Source of error: chalk particles may not be evenly packed Explanation: rate of water uptake in the chalk is uneven, resulting in inaccurate readings.	1m 1m 1m 1m
1f	To ensure reliability of the results.	1m
1g	Independent Variable: different fan speed • fan speed (5 different speeds)/ • place fan at varying distance to the apparatus (5 variations – 20cm intervals x 5 distances within fixed fan speed.) Dependent Variable: height of water in the test tube after a fixed duration. Constant variable: • same set up as in Fig. 1.3, • duration of experiment (fixed time) e.g. 30 mins/ 1 hour Method: 1. Set up the apparatus as in Fig.1.3 and place the electric fan at a fixed distance (1.2m) from the leafy twig. 2. Measure the initial height of water in the tube. 3. Measure the water loss water loss after 30 min. 4. Repeat Step 1 to 4 for 4 other distances (each at 20 cm distance apart i.e. 1.0m, 0.8m, 0.6m, 0.4m) 5. Calculate the rate of water loss by taking difference in height of water per min. 6. Plot a graph of rate of water loss against distance. 7. Draw a conclusion on how difference distances would affect the rate of transpiration via rate of water loss from twig. E.g. the higher the rate of water loss, the higher the rate of transpiration.	1 m for correct variable IV/DV / Constant variables can also be picked up from procedures, as long as clear description of how IV is varied. 2 m for correct design/procedure 1 m to show how the interpretation of results would be.

	Reliability: Repeat the investigation and take average of the readings. Alternative: • Set up as in Fig. 1.3 • A fan is positioned at the same distance to the twig (e.g. 1m) for varying fan speeds. • The speed of fan at which gives the greatest rate of water loss, would have the highest rate of transpiration. Other suggestions: IV: 1 with fan, 1 without fan, 1 in enclosed area	1 m to show how to ensure reliability
2a(i)	Drawing of eye  	Parts to include: Labelling: Eye lid Eye lash (top more / longer than bottom/ single line) Sclera Iris All correct: 2m 2-3 correct: 1m Drawing: Lines – 1m Size -1m Proportion/Quality of observation -1m
2a(ii)	Magnification = length of drawing/ length of actual	Must show working Final answer in 1 d.p 2m
2b(i)	When right eye was covered, pupil dilates. When right eye was uncovered, pupil constricts.	1m 1m

2b(ii)	[change in stimulus] As right eye was uncovered again, <u>increased light intensity was detected</u> by the photoreceptors. [transmission] Nerves impulses were transmitted the iris muscles Circular muscles contract, radial muscles relax, [purpose] to reduce amount of light entering the eye to prevent retina damage. Reject: Dilation of pupil Focus on end effect i.e. pupil constriction	0.5m 0.5m 0.5m 0.5m
2c(i)	Presence of lens, choroid, retina, ciliary muscles, vitreous humour [any one that is visible form Fig.2.2]	1m
2c(ii)	No eye lid, eye lash Thicker choroid More elongated eye Different proportion of humour compared to human eye No optic nerve [any one]	1m
3a	seaweed →mackerel →squid →orca seaweed → mackerel →tuna → human red algae → mackerel → tuna → human  	1m Shows upright pyramid with largest base any 4 trophic levels food chain including humans
3b	Organism at each trophic level is killed, dried, and weighed to obtain its dry mass; then multiply by total numbers of that trophic level at a particular time.	1m
3c	It may be impossible to capture the organisms available at that season.	1m
3d	• Bioaccumulation occurs up the food chain. • Phytoplankton (producer) will absorb the mercury in water. [0.5] • Mercury is <u>non-biodegrable and not excreted</u> from the body of the organisms. [1]	3 m

	• As mackerel feed on lots of phytoplankton in order to obtain sufficient energy, the absorbed mercury that will increase in concentration and accumulate. [0.5m] • This continues up the trophic level and humans, being at the fourth trophic level will hence accumulate the most mercury , [0.5] • which may have become toxic and cause death.[0.5] Key idea: - Bioamplification and Bioaccumulation up the trophic levels - Consumption of many organisms by the top predators which results in build-up of toxicity and death	