Course Title: Understanding assessment and improving delivery in International A level Biology

YBI11/19IF01

Sample student responses

AO1 Student response 2bi

A

(b) Anticoagulants, antiplatelets and thrombolytics are drugs used to treat blood clots.

(i) One anticoagulant binds to the active site of thrombin.

Explain how this drug reduces blood clotting.

(2)

• Thrombin catalyses the conversion of soluble fibrinogen to insoluble fibrin. By ~~preventing~~ binding to the active site of thrombin, the antio agulant prevents thrombin from catalysing the conversion of fibrinogen to fibrin, which is responsible for making a sticky mesh to make a blood clot. So a blood clot is prevented.

B

(b) Anticoagulants, antiplatelets and thrombolytics are drugs used to treat blood clots.

(i) One anticoagulant binds to the active site of thrombin.

Explain how this drug reduces blood clotting.

(2)

Thrombin is the active enzyme that converts soluble fibrinogen into the insoluble fibrin that forms the bloot clot. If thrombin's ~~site~~ active sites are saturated with the drug, fibrinogen won't be able to bind to them to ~~prod~~ become fibrin, ~~and~~ hence blood clots won't form.

C

(b) Anticoagulants, antiplatelets and thrombolytics are drugs used to treat blood clots.

(i) One anticoagulant binds to the active site of thrombin.

Explain how this drug reduces blood clotting.

(2)

Anticoagulants attaches to the active site of thrombin and breaks down the structure of the enzyme by breaking apart the peptide bonds as it is a protein structure. when the active site is destroyed, fibronogen cannot attach to thrombin and be catalysed to fibrin which mean that blood clotting is reduced.

D

(b) Anticoagulants, antiplatelets and thrombolytics are drugs used to treat blood clots.

(i) One anticoagulant binds to the active site of thrombin.

Explain how this drug reduces blood clotting.

(2)

~~It prevents the~~ to produce ~~th~~ the insoluble substance called fibrin thrombin should be convertered into thromboplastin. When ~~throm~~ an enzyme acts on the active site and binds to thrombin means that ~~they~~ the thrombin will/can be broken down. ~~into~~ This reduces the 'production' of fibrin mesh substances, resulting in ~~a loss of a~~ blood clots being reduced

AO2a Student reponses 1bi

A

(i) Describe the effect of temperature on the solubility of these three salts.

(3)

Salt H the solubility is the same for all the temperatures. For salt F as you increase the temperature the solubility increases. For salt G ~~I~~ it reaches it's maximum solubility (30/g per 100g of water) at 30°C then it's solubility decreases after ~~H~~ 30°C.

B

(i) Describe the effect of temperature on the solubility of these three salts. (3)

Salt H has a constant solubility of 32g/100g water for all temperatures. Salt F has a linear increase in solubility as temperature increases (positive correlation) with an overall increase of 72g/per 100g of water. Now salt G has a non-linear increase in solubility as temperature increases upto 30C but then has a linear decrease from 30°C to 80°C. At about 26°C all salts have about the same solubility.

C

(i) Describe the effect of temperature on the solubility of these three salts. (3)

Salt F has the highest solubility rate at 80°C. As ~~solubil~~ temperature ~~of water~~ increases Solubility of salt F increases, solubility of salt H is constant across all temperatures, and solubility of salt G increases in a non uniform relationship till 30°C then solubility decreases.

D

(i) Describe the effect of temperature on the solubility of these three salts.

(3)

Salt F shows a linear relationship with the effect of temperature on the solubility of salts. Salt G had an optimum temperature of 30°C for ~~th~~ the solubility of 50g per ~~10~~ 100g of water. After 30°C the solubility decreased to 40g per 100 g water at 80°C. Salt H remained constant solubility across all temperatures.

AO2b 5bii

A

Osmotic dehydration helps to preserve the pineapple by reducing the water content.

Osmotic dehydration also ensures that the concentration of each sugar in the pineapple does not change. This preserves the sweet taste of the pineapple.

Explain what the solution of sugars should contain to preserve pineapples.
Use the information in the table to support your answer.

(6)

The solution should contain a glucose concentration of more than 0.00108 $g\,dm^{-3}$ and 1.71 $g\,cm^{-3}$. It should also contain a pH buffer to maintain a constant pH level ~~and~~ temperature should be constant because both of these factors affect ~~premab~~ premeablity. ~~With~~ with these conditions ~~so~~ the solution will have a higher solute concentration while low water potential therefor water leaves the pinapple by osmosis from high water potential to low water potential through a partially premeable membrane. The Solution Should contain some sort of ~~dis~~ healthy ~~disenfectar~~ non toxic material to kill bacteria and fungis to prevent them from growing.

(Total for Question 5 = 10 marks)

B

Osmotic dehydration helps to preserve the pineapple by reducing the water content.

Osmotic dehydration also ensures that the concentration of each sugar in the pineapple does not change. This preserves the sweet taste of the pineapple.

Explain what the solution of sugars should contain to preserve pineapples. Use the information in the table to support your answer.

(6)

~~glucose~~ sucrose.
the solution should contain ~~sucrose~~, ~~because~~
sucrose ~~contains~~ has the ~~lowest~~ ~~Highest~~ ~~low~~ highest concentration of
suger, if the solu contains high concentration of suger
~~...~~ ~~...~~ and the pineapple Has lower concentration
so the solution will move from a region of high concentration
of suger to a region of low concentration of suger
moving down concentration gradiant ~~that~~ through
partially permeable membrance

(Total for Question 5 = 10 marks)

C

Osmotic dehydration helps to preserve the pineapple by reducing the water content.

Osmotic dehydration also ensures that the concentration of each sugar in the pineapple does not change. This preserves the sweet taste of the pineapple.

Explain what the solution of sugars should contain to preserve pineapples.
Use the information in the table to support your answer.

(6)

The solution of sugars should be ~~glucose~~ Fructose + sucrose as the data values of concentration of sugar are very close together are higher in comparison to those of ~~fructose and sucrose~~ glucose. The mean concentration of glucose is 1.08g cm^{-3} which is relatively close to the concentrations of ~~sugar~~ glucose in the respective pineapples → This has a lower concentration of sugar in comparison to fructose mean (1.52) and sucrose of mean concentration of 8.55. The sweet taste of the pinapple could essentialy be ~~preserved~~ preserved due to higher concentrations of the solution of sugar such that its concentration is constant throughout osmotic dehydration. In addition, as most concentration of sugar comes from sucrose + fructose in each pineapple, it would be beneficial for the taste

(Total for Question 5 = 10 marks)

P 6 1 4 6 9 A 0 1 7 2 8

D

Osmotic dehydration helps to preserve the pineapple by reducing the water content.

Osmotic dehydration also ensures that the concentration of each sugar in the pineapple does not change. This preserves the sweet taste of the pineapple.

Explain what the solution of sugars should contain to preserve pineapples.
Use the information in the table to support your answer.

(6)

The solution of sugars should contain the same concentration of each sugar for the particular pineapple. If pineapple 1 is being preserved, the solution should contain 1.71 gcm^{-3} of fructose, 1.22 gcm^{-3} of glucose and 9.08 gcm^{-3} of sucrose. If the concentration of sugar is the same, there will be no net movement of sugar outside or inside the pineapple. The solution should have a larger water concentration than inside the pineapple so that water diffuses out of the pineapple since diffusion occurs from an area of high concentration to low concentration

(Total for Question 5 = 10 marks)

P 6 1 4 6 9 A 0 1 7 2 8

AO2b analysis from W113 paper q 1c

A

(c) The table shows the results of an investigation into the effect of boric acid concentration, in a sucrose solution, on the growth of pollen tubes.

Boric acid concentration / parts per million (ppm)	Pollen tube length / µm
25	78
50	126
100	166
200	134
300	112
400	90

(i) Calculate the percentage increase in pollen tube length at 100 ppm compared with that at 25 ppm.

(2)

$$\frac{166 - 78}{166} \times 100$$

53

Answer 53 %

B

(c) The table shows the results of an investigation into the effect of boric acid concentration, in a sucrose solution, on the growth of pollen tubes.

Boric acid concentration / parts per million (ppm)	Pollen tube length / µm
25	78
50	126
100	166
200	134
300	112
400	90

(i) Calculate the percentage increase in pollen tube length at 100 ppm compared with that at 25 ppm.

(2)

$\frac{166 - 126}{166} \times 100$

$= 24 \cdot 1\%$

Answer 24·1 %

C

(c) The table shows the results of an investigation into the effect of boric acid concentration, in a sucrose solution, on the growth of pollen tubes.

Boric acid concentration / parts per million (ppm)	Pollen tube length / µm
25	78
50	126
100	166
200	134
300	112
400	90

(i) Calculate the percentage increase in pollen tube length at 100 ppm compared with that at 25 ppm.

(2)

$\frac{166 - 78}{78} \times 100 = 112.8$

$112.8 - 100 = 12.8$

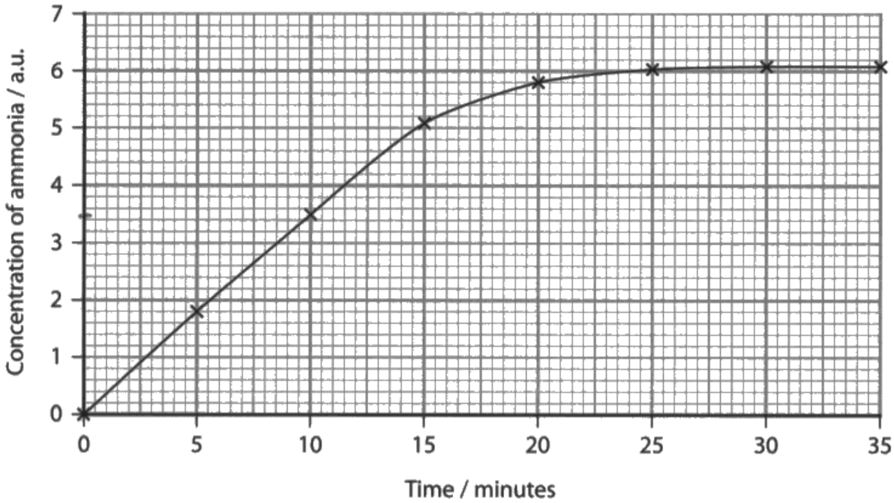
Answer 12.8 %

AO2b analysis from W113 paper q 3c

A

(c) In another investigation, the concentration of ammonia was recorded every 5 minutes for 35 minutes, at a pH of 6.0.

The graph shows the results of this investigation.



Calculate the initial rate of this reaction.

Include appropriate units with your answer.

(1)

initial rate of reaction ⇒ concentration of ammonia / time

⇒ 3.5 / 10 minutes

= 0.35 a.u. per minute

Answer 0.35 a.u.pm

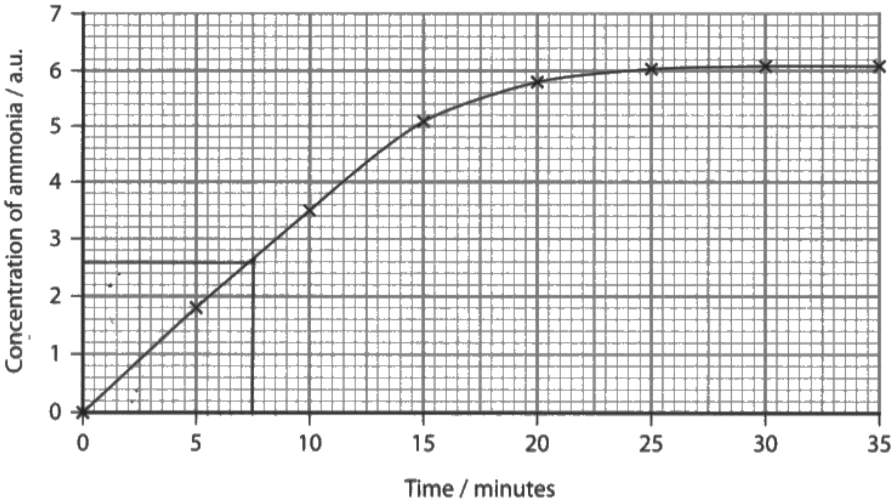
(Total for Question 3 = 16 marks)

TOTAL FOR PAPER = 50 MARKS

B

(c) In another investigation, the concentration of ammonia was recorded every 5 minutes for 35 minutes, at a pH of 6.0.

The graph shows the results of this investigation.



Calculate the initial rate of this reaction.

Include appropriate units with your answer.

(1)

$\frac{2.6}{7.5} = 0.347$ au/min

Answer 0.347 au/min

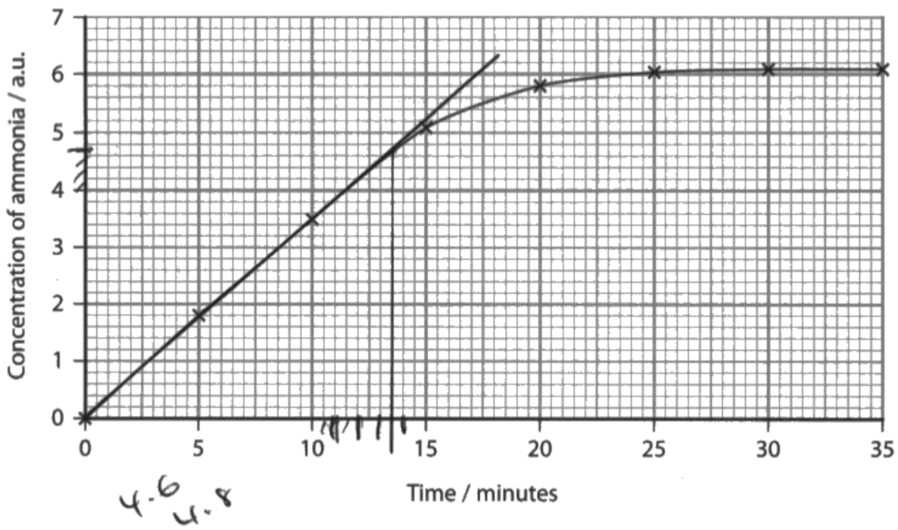
(Total for Question 3 = 16 marks)

TOTAL FOR PAPER = 50 MARKS

C

(c) In another investigation, the concentration of ammonia was recorded every 5 minutes for 35 minutes, at a pH of 6.0.

The graph shows the results of this investigation.



Calculate the initial rate of this reaction.

Include appropriate units with your answer.

(1)

tangent

rate = $\frac{\Delta y}{\Delta x}$ = $\frac{4.7 - 0}{13.5 - 0}$

= gradient

= 0.348

(to 3. s.f)

Answer 0.348 a.u. min^{-1}

(Total for Question 3 = 16 marks)

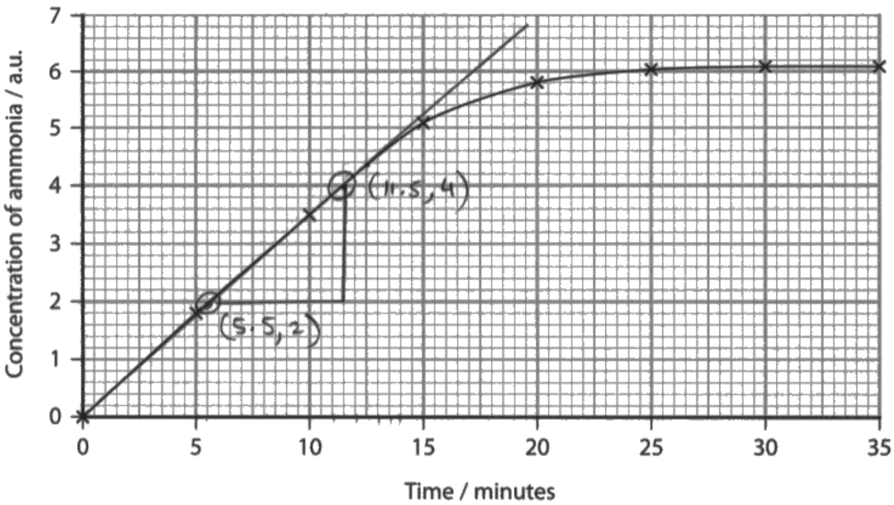
TOTAL FOR PAPER = 50 MARKS

P 6 1 4 7 1 A 0 1 4 1 6

D

(c) In another investigation, the concentration of ammonia was recorded every 5 minutes for 35 minutes, at a pH of 6.0.

The graph shows the results of this investigation.



Calculate the initial rate of this reaction.

Include appropriate units with your answer.

(1)

$$\frac{4-2}{11.5-5.5} = \frac{1}{3} = 0.33$$

Answer 0.33 a.u m^{-1}

(Total for Question 3 = 16 marks)

TOTAL FOR PAPER = 50 MARKS

P 6 1 4 7 1 A 0 1 4 1 6

AO3 3ai

A

3 The enzyme urease catalyses the following reaction:

urea → ammonia + carbon dioxide

The effect of pH on this reaction was investigated using the following method.

- One test tube containing 5 cm^3 of urease solution was placed in a water bath at 40 °C and left for 10 minutes.
- Another test tube containing 5 cm^3 of urea solution in a buffer at pH 3.0 was placed in the same water bath and left for 10 minutes.
- After 10 minutes, the contents of both tubes were mixed together in one test tube.
- This test tube was replaced in the water bath.
- The concentration of ammonia was measured after 15 minutes and again after 60 minutes.
- The procedure was repeated for pH values of 4.0, 6.5, 6.8, 7.3, 8.0 and 9.0.

(a) (i) Explain why the urease solution and the urea solution were kept in the water bath at 40 °C before and after being mixed.

(4)

The urease solution and the urea solution were both kept in the water bath before and after being mixed to maintain ~~[illegible]~~ a control of temperature in the experiment ~~by maintaining a constant temperature~~, however it was also to allow for the enzymes to react at an optimum temperature, as the higher temperature will allow for more frequent successful collisions to occur however the temperature was not too high that it would not denature the enzyme causing it not to work but instead to catalyse the reaction between ammonia and carbon dioxide

B

3 The enzyme urease catalyses the following reaction:

urea → ammonia + carbon dioxide

The effect of pH on this reaction was investigated using the following method.

- One test tube containing 5 cm^3 of urease solution was placed in a water bath at 40 °C and left for 10 minutes.
- Another test tube containing 5 cm^3 of urea solution in a buffer at pH 3.0 was placed in the same water bath and left for 10 minutes.
- After 10 minutes, the contents of both tubes were mixed together in one test tube.
- This test tube was replaced in the water bath.
- The concentration of ammonia was measured after 15 minutes and again after 60 minutes.
- The procedure was repeated for pH values of 4.0, 6.5, 6.8, 7.3, 8.0 and 9.0.

(a) (i) Explain why the urease solution and the urea solution were kept in the water bath at 40 °C before and after being mixed.

(4)

→ as temperature is a controlled variable in the experiment
→ 40 °C is the optimum temperature for the enzyme urease to work at (as lots of enzyme - substrates can form at this temperature & any temperature higher or lower can denature the enzyme)
→ to make the results more valid so that pH was the only independent variable that was causing the change in ammonia production
→ to maintain a constant temperature of 40 °C

C

3 The enzyme urease catalyses the following reaction:

urea → ammonia + carbon dioxide

The effect of pH on this reaction was investigated using the following method.

- One test tube containing 5 cm³ of urease solution was placed in a water bath at 40 °C and left for 10 minutes.
- Another test tube containing 5 cm³ of urea solution in a buffer at pH 3.0 was placed in the same water bath and left for 10 minutes.
- After 10 minutes, the contents of both tubes were mixed together in one test tube.
- This test tube was replaced in the water bath.
- The concentration of ammonia was measured after 15 minutes and again after 60 minutes.
- The procedure was repeated for pH values of 4.0, 6.5, 6.8, 7.3, 8.0 and 9.0.

(a) (i) Explain why the urease solution and the urea solution were kept in the water bath at 40 °C before and after being mixed.

(4)

The urease solution and the urea solution were kept in the water bath at 40°C before and after being mixed because 40°C is the optimum temperature for enzyme activity, meaning that when the solutions got mixed together, ~~they~~ the enzymes were peaking in activity. If the temperature would've been any higher, the enzymes would've denatured, making the experiment fail and rendering the enzyme completely useless. If the temperature was any lower, the enzymes wouldn't have had much activity, meaning they would have been much less efficient than at 40°C.

D

3 The enzyme urease catalyses the following reaction:

urea → ammonia + carbon dioxide

The effect of pH on this reaction was investigated using the following method.

- One test tube containing 5 cm³ of urease solution was placed in a water bath at 40 °C and left for 10 minutes.
- Another test tube containing 5 cm³ of urea solution in a buffer at pH 3.0 was placed in the same water bath and left for 10 minutes.
- After 10 minutes, the contents of both tubes were mixed together in one test tube.
- This test tube was replaced in the water bath.
- The concentration of ammonia was measured after 15 minutes and again after 60 minutes.
- The procedure was repeated for pH values of 4.0, 6.5, 6.8, 7.3, 8.0 and 9.0.

(a) (i) Explain why the urease solution and the urea solution were kept in the water bath at 40 °C before and after being mixed.

(4)

before was to aclimatise them, and ensure they were both at the same temperature and both had the same amout of knetic energy in their particles.
After was to ensure that particles would maintain the same amount of knetic energy during the reaction, and would not cool down.
The water bath also acted as a control for temperature, ensuring any changes seen were truly due to pH.

P 6 1 4 7 1 A 0 1 0 1 6

AO3 1 cii Design

A

(ii) You are provided with a solution containing 500 g dm^{-3} of sucrose.

Devise a procedure to investigate the effect of different concentrations of sucrose on the rate of growth of pollen tubes, using this sucrose solution.

(5)

to begin the investigation make six different concentrations of sucrose solutions such as 0%, 20%, 40%, 60%, 80% and 100% and then using a syringe measure out 5cm^3 of each solution and add each one to a test tube which will be labelled with the corresponding concentration of sucrose solution. Then measure out 18 different pollen tubes and ensure that they are relatively the same length, mass and diameter and then add those to individual test tubes, so that there is three in each and then leave them in a waterbath at 55°C for an hour this is to ensure that the temperature is controlled for the entirety of the experiment. Then after an hour remove the pollen tubes and out of the three in each test tube calculate a mean and determine the change in length for each pollen tube and compare to the pollen tubes from other concentrations.

(Total for Question 1 = 18 marks)

① make 6 diff concentrations. 0 20 40 60 80 100.
② Measure pollen tubes - same size/mass/length.
③ Place in test tube along with 5cm^3 of solution of sucrose.
④ leaves for same amount of time (1 hour).
⑤ Then measure change in everything.

B

(ii) You are provided with a solution containing 500 g dm^{-3} of sucrose.

Devise a procedure to investigate the effect of different concentrations of sucrose on the rate of growth of pollen tubes, using this sucrose solution.

(5)

→ make different concentrations of sucrose using the 500 g dm^{-3}, e.g. 50% concentration made by adding 250 g dm^{-3} of sucrose solution & 250 cm^3 of distilled water together

→ independent variable : concentration of sucrose

Dependent variable : rate of growth of pollen tubes

controlled variables : temperature (by using a thermostatically controlled water bath), pH (use a pH buffer)

a control : add only distilled water & see how pollen tubes grow with that as a comparison

→ procedure : add 5-10 pollen grains into each beaker with different sucrose solutions (pollen grains germinate in this to produce pollen tubes) & leave for a few hours. measure the pollen tube lengths using a micrometer screw gauge & compare results after repeating measurements & calculating averages for 3 - 5 pollen grains per concentration.

(Total for Question 1 = 18 marks)

For safety, wear gloves & goggles to protect your skin & eyes from sucrose solution.

P 6 1 4 7 1 A 0 5 1 6

Turn over ▶

C

(ii) You are provided with a solution containing 500 g dm^{-3} of sucrose. cont'd.

Devise a procedure to investigate the effect of different concentrations of sucrose on the rate of growth of pollen tubes, using this sucrose solution.

(5)

~~Pour a known volume~~ Dilute the solution so that different concentrations may be obtained. Let the concentration increase by 10 dm^{-3} every time and place these different concentrations in to separate beakers (same volume in each). Before placing the pollen tube in a beaker measure its mass and note it down. Place the pollen tube inside the solution and ~~measure the pollen tube mass every minute or so~~ after 10 min measure its mass. As a control place the tube in distilled water and check for any increase in mass. Repeat the experiment several time for each (ex. 5 times) concentration and obtain the mean. Plot the results on a graph chart. To make measurements more accurate before weighing place tubes on towel or a cotton pad so that water stuck to the tube wont affect the measurements. During this procedure wear: goggles, gloves and a lab coat.

(Total for Question 1 = 18 marks)

D

(ii) You are provided with a solution containing 500 g dm^{-3} of sucrose.

Devise a procedure to investigate the effect of different concentrations of sucrose on the rate of growth of pollen tubes, using this sucrose solution.

(5)

We treat this sucrose solution as the stock solution to obtain other concentrations. To calculate them we divide the concentration of the stock solution by the desired concentration. Then we need to see the ratio and proportionally add water to sucrose. We take ~~different~~ beakers and label them with concentration numbers. We make solutions with ~~corresponding~~ corresponding beakers. We pipette the solutions on the earlier ~~lab~~ labelled ~~test tubes~~ slides of corresponding concentrations, and cover them with cover slip. ~~After~~ We ~~take one~~ put them in the thermostatically controlled water bath. After one hour, we observe them under a microscope starting from low power lens to high power, resolving with coarse focusing knob to see more and more details. We align the eyepiece graticule to a micrometer scale and count the diameters of the pollens for each concentration

(Total for Question 1 = 18 marks)