CAMBRIDGE
International Examinations

Cambridge
IGCSE

Coursework Training Handbook (Part 2): Teacher Accreditation

Cambridge IGCSE®

Biology
Combined Science
Co-ordinated Sciences
0610/0653/0654

Cambridge Secondary 2

Contents

Section 1: Introduction

This booklet is for use by teachers who wish to be accredited to carry out coursework assessment in Cambridge IGCSE Biology, Combined Science or Co-ordinated Sciences. It should be used in conjunction with the *IGCSE Science Coursework Training Handbook (Part 1): Guidance* booklet.

1.1 Is this the right booklet for me?

This booklet is one of three entitled *IGCSE Coursework Training Handbook (Part 2): Teacher Accreditation*. The other two cover IGCSE Chemistry and IGCSE Physics.

You should use this booklet if you wish to enter candidates for Paper 4: Coursework, in IGCSE Biology, Combined Science or Co-ordinated Sciences.

Note that, if you teach Combined Science or Co-ordinated Sciences, you do **not** need to complete tasks in each of the subject areas. You may choose the one – Biology, Chemistry or Physics – with which you are most comfortable, and submit tasks from just that one subject area.

If you teach Physical Science then you can complete the tasks contained in the Part 2 Coursework Training Handbooks for Teacher Accreditation for **either** Physics **or** Chemistry.

1.2 How to use this booklet

This booklet contains several tasks that you need to complete in order to become accredited to carry out coursework assessment in any of the sciences.

In order to gain accreditation you should:

- Work carefully through the *IGCSE Science Coursework Training Handbook (Part 1): Guidance* booklet, which is available electronically on Teacher Support and can be ordered as hard copy from the Cambridge Publications Catalogue. It is essential that you are thoroughly familiar with the contents of that booklet before you begin to work through the tasks in this booklet.
- Complete each of the tasks in this booklet.
- Copy and complete the accreditation forms at the back of the book, checking that you have met all the requirements of the accreditation tasks.
- Send your completed forms, and all of the documents that form part of your submission, to the address indicated on the forms.

Allow 4–6 weeks for your work to be checked by a coursework assessor. You will receive feedback on what you have submitted. If there are any problems with your work that suggest you may not quite be ready to assess coursework, you may be asked to resubmit. You may apply as many times as you wish, to gain accreditation, although there is a small charge on each occasion.

1.3 The tasks

Task 1

This task is explained in Section 2. You will write worksheets and mark schemes that could be used for coursework assessment.

Task 2

This task is explained in Section 3. You will write mark schemes and then use them to assess the work of learners in the skill areas C2, C3 and C4.

Section 2: Task One, writing worksheets and mark schemes

Before you begin this task:

- re-read Section 6: Constructing worksheets and mark schemes, in the *IGCSE Science Coursework Training Handbok (Part 1): Guidance booklet*.
- make sure that you have the assessment criteria for awarding marks for C1, C2, C3 and C4 with you for reference. You will find these in your IGCSE syllabus, or in the Part 1 booklet.

There are three parts to this task: 1a, 1b and 1c.

Note: if possible, try to ensure that your worksheets are on topics that differ from those in the Part 1 booklet, and those in this booklet.

Task 1a

Write a worksheet and mark scheme that you could use to assess skill C1, and that would allow access to the full range of marks. You may choose to use either a tick list mark scheme, or a descriptive mark scheme.

Task 1b

Write one worksheet that you could use to assess skills C2 and C3, and that would allow access to the full range of marks in each of the two skills. Write a mark scheme for C2, and another for C3.

Task 1c

Write a worksheet and mark scheme that you could use to assess skill C4, and that would allow access to the full range of marks.

Section 3: Task Two, assessing learners' work

Before you begin this task:

- re-read Section 9: Assessing learners' work, in the Part 1 booklet
- have the Part 1 booklet with you so that you can refer to it regarding worksheets and mark schemes while carrying out this task.

3.1 Task 2a

- Study the worksheet *Effect of surface area on the effect of enzymes*, on page 66 in the Part 1 booklet.
- Write your own mark schemes for the assessment of C2 and C3. You may choose to use the mark schemes on page 67 as a starting point, or you may prefer to write your own mark scheme from scratch.
- Use your mark schemes to assess the following piece of work for skills C2 and C3. Write comments explaining why you have given the marks on a copy of the Accreditation Mark Sheet on page 42 of this handbook.

Learner A

ENZYME ACTIVITY.

AIM: To investigate the effect of surface area on the activity of enzymes.

OBSERVATIONS.

Qualitative Data.

TABLE SHOWING THE RELATIONSHIP BETWEEN THE HEIGHT OF FOAM FORMED AND THE TOTAL SURFACE AREA OF POTATO CYLINDERS.

Number of potato pieces cut from 3·5cm potato cylinder	Diameter per potato / cm ± 0·01	Total surface area of potatoes/cm²	Height of foam / cm. ± 0·01
1	0·90	11·20	1·00
2	0·90	12·40	1·10
3	0·90	13·70	1·60
4	0·90	15·00	1·20
5	0·90	16·30	1·70

Sample calculations.

For 1 potato piece;

Total surface area : $2\pi r(r+h)$

$= 2\pi \times 0.45\,cm\,(0.45\,cm + 3.5\,cm.)$

$= 11.2\,cm^2$

For 5 potato pieces;

Total surface area = $5 \times [2\pi r(r+h)]$

$= 5 \times [2\pi \times 0.45(0.45 + 0.7)]$

$= 16.3\,cm^2$

Qualitative Data

1) The hydrogen peroxide (H_2O_2), was colourless and odourless.
2) The liquid soap was a light green and had a lemon-like scent.
3.) When liquid soap was added to the H_2O_2, the solution remained colourless, but had a slight odour from the liquid soap. The addition of the liquid soap made the volume of H_2O_2 rise by about $0.2\ cm^3$.
4.) The freshly cut potato cylinders were a bit moist before they were placed into the solution.
5.) The potato cylinders were yellowish in colour, and of the same diameter.
6.) When the first 3.5 cm potato cylinder was dropped into the $10\ cm^3$ H_2O_2 solution, it was not entirely covered.
7.) The volume of the solution was raised from about $10.02\ cm^3$ to approximately $12\ cm^3$ when the potato was dropped into it.
8) Bubbles ~~rose~~ were formed at the end of the potato cylinder which was in the solution, and slid along the sides of the potato, to form foam at the surface of the H_2O_2 solution.
9.) The foam went up gradually and covered the initially uncovered part of the potato cylinder.
10.) When two pieces are cut from ~~the~~ another 3.5cm long potato cylinder and placed into the H_2O_2, they are completely covered by the solution and remain suspended.
11.) Here, the bubbles were released from both ends of each potato cylinder and hence, the foam was formed at a relatively faster rate.
12.) For the first and second experiment, there was a cloudiness within the H_2O_2, but not the entire solution became cloudy - the bottom part remained clear.
13.) When ~~th~~ other 3.5cm long potato cylinder are divided into three, four and five equal pieces respectively,

the foam is formed faster within two minutes, as the number of cylinders increase.

14) Much more lather was formed as the ~~to~~ number of potato cylinders increased

15) ALL potatoes remained suspended in the solution, with some rotating vigorously and others colliding with each other.

16) At the end of the experiment, the potato cylinder looked bigger and soggier, and volume of the hydrogen peroxide solution had reduced by about 2 cubic centimeters.

SOURCES OF EXPERIMENTAL ERROR.

1) Potato cylinders

a) The potato cylinders may not all have had the initial length of 3·5 cm. as when cut, the ends were uneven.

b) In my aim of increasing the surface area, the 3·5cm. potato cylinders may not have been cut into equal pieces, due to uneven edges.

c)

2) Liquid soap (detergent)

Not exactly the same number of drops of liquid soap were placed into the H_2O_2. Also, when the detergent was being dropped, some of it clung the measuring cylinder and slid down, thereby not ensuring a fair test.

3) Measuring Cylinder.

When the potato cylinders were dropped into the H_2O_2 solution, the solution splashed and in effect, some of it clung to the measuring cylinder. This happened in some, not all of the experiments and thefore it fluctuated the volumes used for each experiment.

4.) Timing

a) The timer was not set immediately the potato pieces were dropped into the H_2O_2 solution.

b) The heights of the foam could not all have been measured at the same time, as there was a bit of difficulty in measuring after the timer was stopped.

5.) Foam.

a) The foam was higher at some points in the measuring cylinder than others, so ~~a~~the exact part to measure up to was unknown.

b) The foam continued to rise even after the timer was stopped. It was therefore difficult to locate the level at which the foam had been at the time the timer was stopped.

6.) Temperature

The room temperature was not constant throughout the experiment.

AMMENDMENTS TO ERRORS

1) Potato cylinders

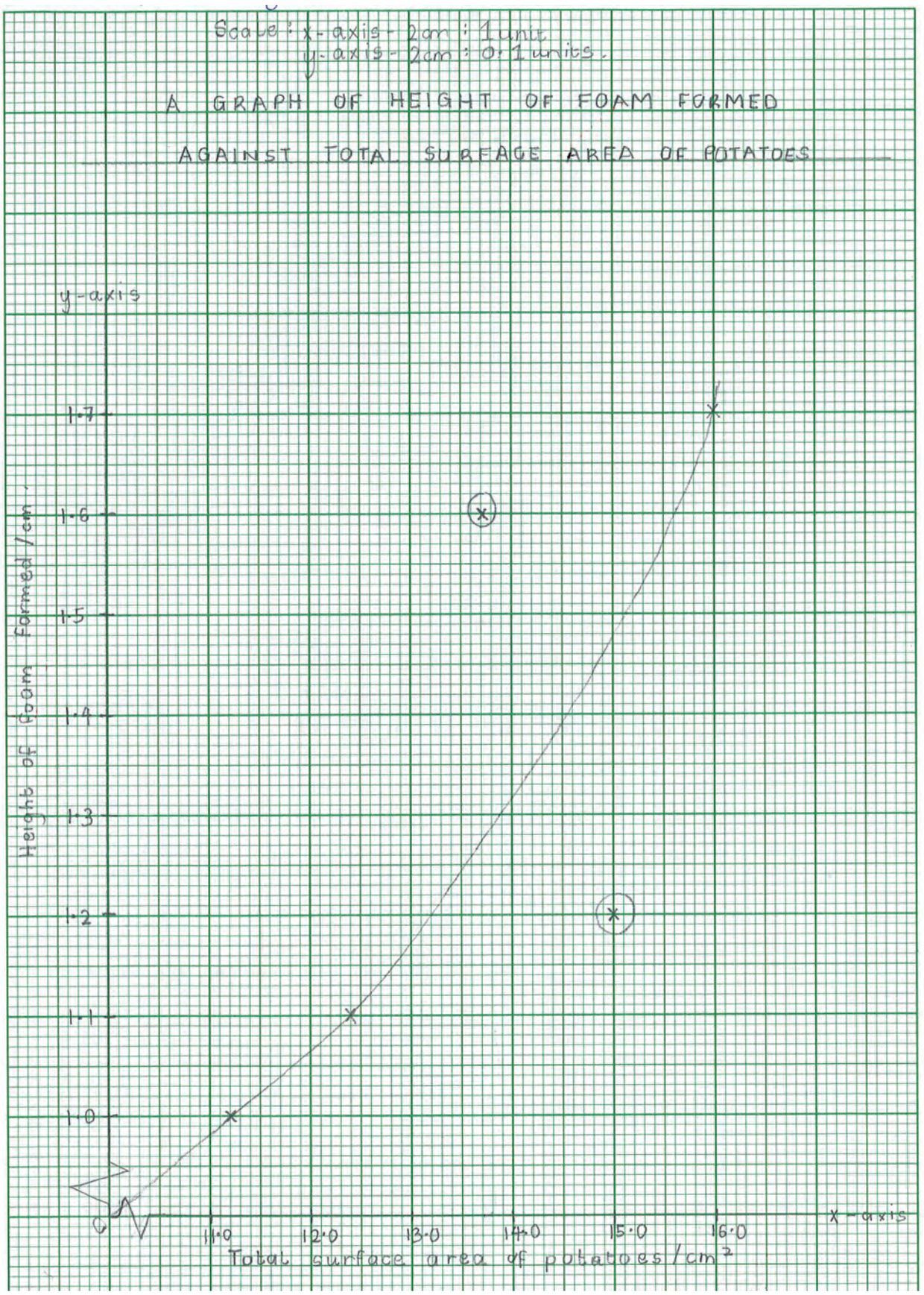
a) Round the edges of the potato cylinder before usage.

2) Liquid soap (detergent)

Ensure that only two drops of detergent are pipetted into the H_2O_2 solution and lower it so it drops directly into the solution.

3) Measuring cylinder.

Use a clamp to lower the potato cylinders into measuring cylinder to prevent splashing.


Scale: x-axis - 2cm : 1 unit
y-axis - 2cm : 0.1 units.
A GRAPH OF HEIGHT OF FOAM FORMED
AGAINST TOTAL SURFACE AREA OF POTATOES
y-axis
Height of foam formed / cm
1·7
1·6
1·5
1·4
1·3
1·2
1·1
1·0
O
11·0
12·0
13·0
14·0
15·0
16·0
x-axis
Total surface area of potatoes / cm²

COMMENTS ON GRAPH.

The graph is quite reliable although there are two points off it. Nevertheless, expected results were gained for one of them ~~and it was~~ (13·7, 1·6) but it was just unfortunate it was not the curve.

3.2 Task 2b

- Study the worksheet *Comparing the structure of flowers from two species of plants* on page 34 in the Part 1 booklet.
- Write a mark scheme that can be used to assess skill C2. You could base your scheme on the mark scheme on page 35 in the Part 1 booklet, or you could write your own.
- Use your mark scheme to assess the following piece of work. Write comments explaining why you have given the marks on a copy of the Accreditation Mark Sheet on page 43 of this handbook.

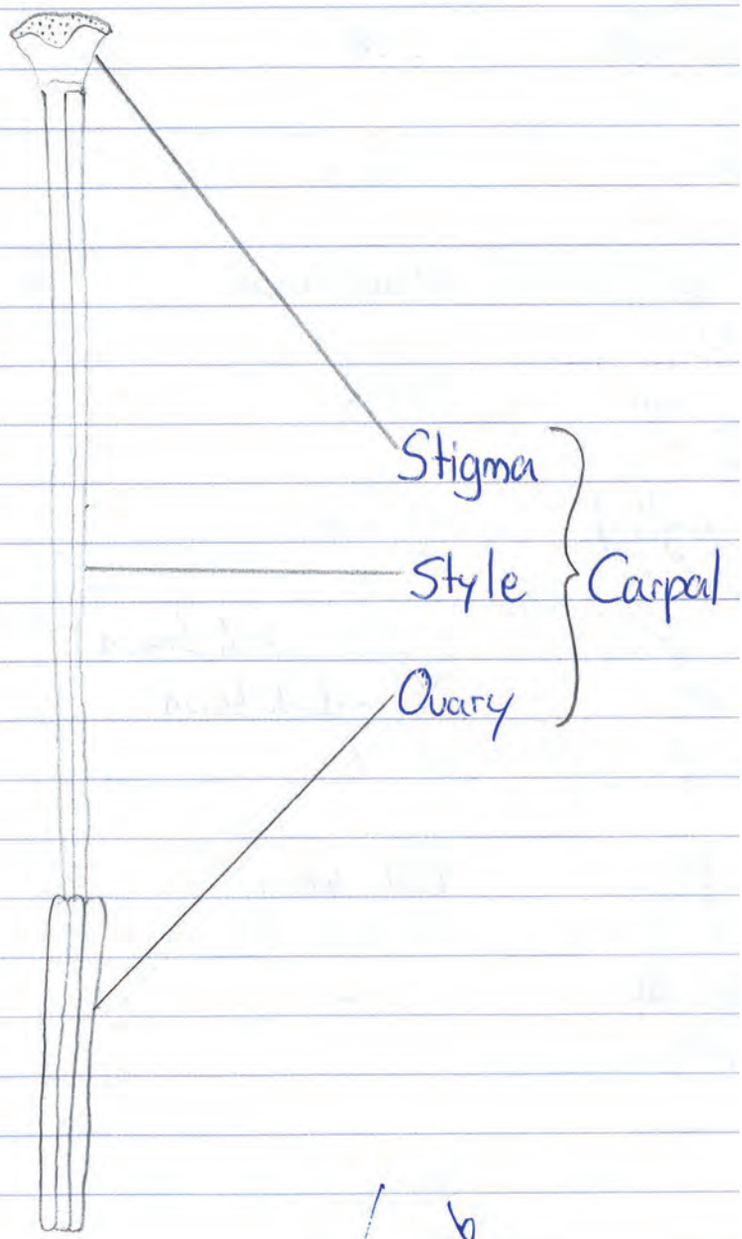
Learner B

a) Compare flowers A + flower B

Feature	Flower A	Flower B
Average length of anther /cm	1.4	3.8
Length of carpel /cm	8.2	11.3
Colour of Petals	Yellow/brown	white
Average length of petals /cm	9.8	12.0
Average length of stamen /cm	7.1	9.4
Do the petals have spots?	Yes - dark brown	No
Number of Petals	6	6
Colour of anther	Dark brown	Dark red / yellow
Average width of the petals /cm	5.4	3.1

b) Draw a biological diagram of the carpal of flower A.

Scale: $\frac{16.4}{8.2} = \times 2$



/ 6

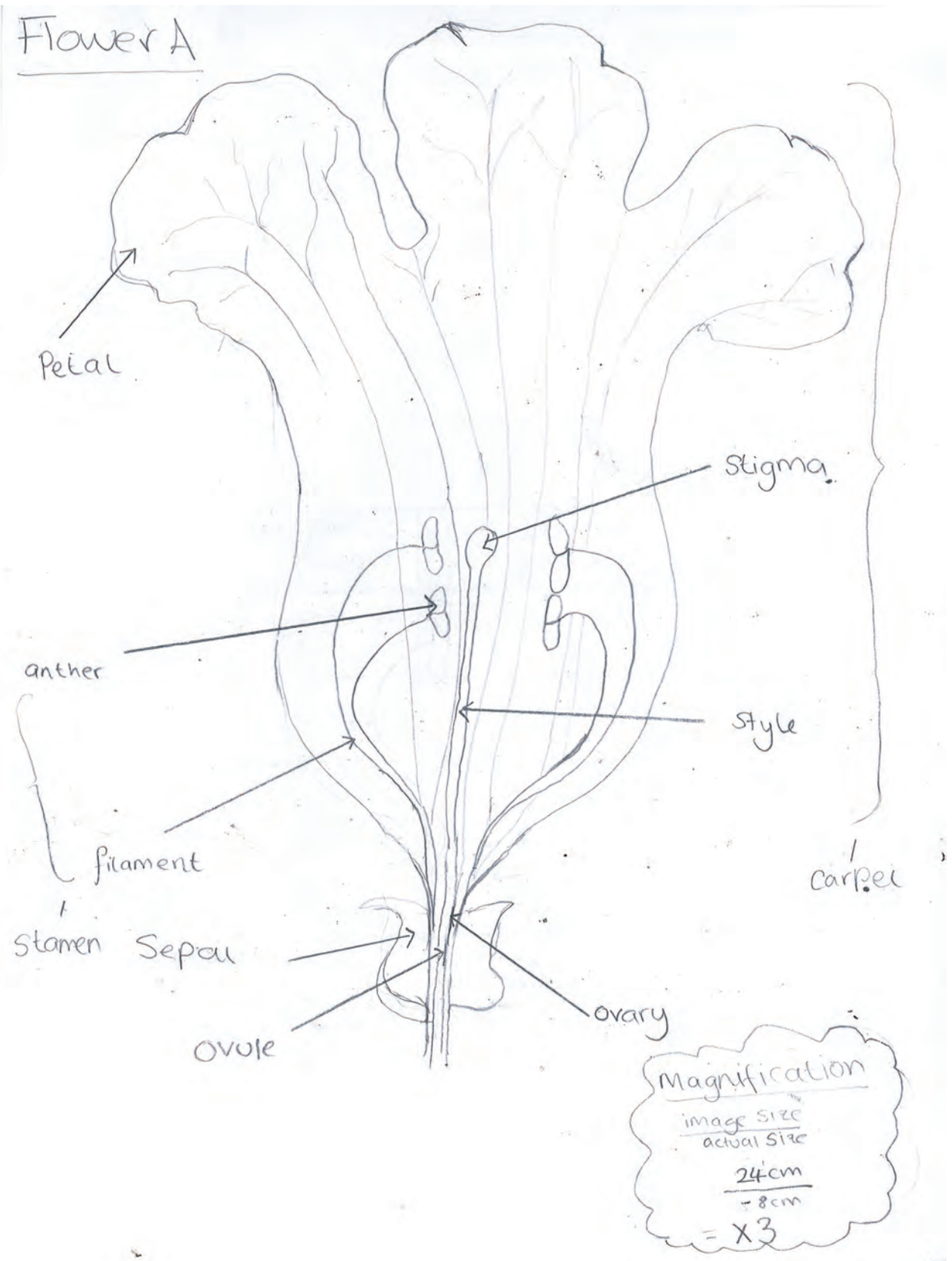

Flower A
Petal
Stigma
anther
Style
filament
Carpel
stamen
Sepal
ovary
ovule
Magnification
image size / actual size
24cm / 8cm
= x3

Table Comparing Flower A to Flower B

Comparison	Flower A	Flower B
Colour	Purple - White	Yellow
Petal Structure	not Segmented Petal	Segmented Petals
Number of Anthers	4	50
Stigma	inside flower	outside flower
Number of Stigma	1	5
length of Style (cm)	3	10
Number of petals	4	5
Size of Petals (cm)	2	10

3.3 Task 2c

- Study the worksheet *Osmosis in pawpaw fruit cells and potato cells* on the next page.
- Write mark schemes for this worksheet that could be used to assess skills C2 and C3.
- Use your mark schemes to assess the following piece of work for skills C2 and C3. Write comments explaining why you have given the marks on a copy of the Accreditation Mark Sheet on page 44 of this handbook.

Learner C

Coursework 4

Topic: Osmosis in Pawpaw fruit cells and ~~Potato~~ yam potato cells: effects of different sucrose solution on the cells
Skills: C1, C2 and C3

Instructions:

You are going to investigate the effect of the six different concentrations of sucrose solution on pieces of **pawpaw fruit and ~~potato~~ yam potato tissues**, and try to explain these in terms of osmosis.

You will need:

- A weighing balance
- Some paper towels
- Wax pencil for writing on containers
- Strips of peeled pawpaw fruit and ~~yam~~ potato tissue
- 6 different concentrations of sucrose solution
- 6 containers of your choice

1. Look at the concentrations of the sucrose solutions
2. Cut the pawpaw and potato tissues into small pieces of your choice
3. **Shape** them in such a way that you can easily identify them.
4. Weigh and record
5. Measure and pour $10cm^3$ of the appropriate solution into each container.
6. Place two pawpaw pieces and two ~~yam~~ potato tissue into each container without spilling.
7. Ensure that the solution covers the pieces
8. Leave them for at least half an hour, longer if possible.
9. Take out each piece of pawpaw and ~~yam~~ potato pieces, blot them with the paper towel and reweigh. Record all the weights on your result chart.
10. Calculate the following:
    Changes in each weight

    i. The average changes in weight for each solution
    ii. % Change in weight based on the average obtained in (i).
    iii. Briefly state your observations.
    iv. What was the state (texture: - firm, soft, turgid) of the pawpaw strips at the end of the experiment?
    v. Present your results in the most appropriate way.
    vi. Compare the osmotic effect in the pawpaw tissue with that of the yam

Title: Osmosis in Pawpaw fruit cells and Potato cells.

Aim: To investigate the effects of different concentrations of sucrose solutions on the cells.

Quantitative observation

Table showing change in mass of pawpaw and potato pieces as a result of different concentrations of sucrose solutions.

Concentration of solution/M	Pawpaw and potato piece no	Initial mass/g ±0.01	Final mass/g ±0.01	Change in mass /g ±0.02	Percentage change in mass /%
0.0	Pa_1	0.46	0.55	0.09	
	Pa_2	0.29	0.35	0.06	
	Po_1	0.57	0.66	0.09	20.5%
	Po_2	0.45	0.57	0.12	
Average	Average		0.44	0.09	
0.2	Pa_1	0.25	0.26	0.01	
	Pa_2	0.15	0.18	0.03	
	Po_1	0.55	0.61	0.06	12.9%
	Po_2	0.29	0.34	0.05	
Average	Average		0.31	0.04	
0.4	Pa_1	0.24	0.25	0.01	
	Pa_2	0.16	0.18	0.02	
	Po_1	0.48	0.47	0.01	2.06%
	Po_2	0.49	0.48	-0.01	
Average		0.34		-0.04	
0.6	Pa_1	0.25	0.26	0.01	
	Pa_2	0.14	0.15	0.01	
	Po_1	0.53	0.46	-0.07	-10
	Po_2	0.66	0.55	-0.11	
Average		0.40		-0.07	

Concentration of solution/M	Pawpaw and potato number	Initial mass/g ± 0.01	Final mass/g ± 0.01	Change in mass /g ± 0.02	Percentage change in mass /%
0.8	Pa_1	0.56	0.51	-0.05	
	Pa_2	0.12	0.15	-0.03	
	Po_1	0.44	0.36	-0.08	-18.25
	Po_2	0.47	0.34	-0.13	
Average		0.40		-0.07	
1.0	Pa_1	0.40	0.43	0.03	
	Pa_2	0.14	0.17	0.03	
	Po_1	0.34	0.30	-0.04	0.88
	Po_2	0.48	0.47	-0.01	
Average		0.34		0.03	

In the table,

- Average Initial mass = $\frac{\text{Initial mass 1} + \text{Initial mass 2} + \text{Initial mass 3} + \text{In. mass 4}}{4}$

eg. 0.0M $= \frac{0.46 + 0.29 + 0.57 + 0.45}{4}$

$= 0.44\text{g} \pm 0.02$.

- Change in mass = Final mass − Initial mass

Pa_1 in 0.0M $= 0.55\text{g} - 0.46\text{g} = 0.09\text{g} \pm 0.02$.

- Average change in mass = $\frac{\text{Mass 1} + \text{Mass 2} + \text{Mass 3} + \text{Mass 4}}{4}$

1.0M $= \frac{0.03 + 0.03 - 0.04 - 0.01}{4} = 0.003\text{g} \pm 0.02$

- Percentage change in mass = (Av. change in mass ÷ Av. Initial mass) × 100%

0.0M $= (0.09 \div 0.44) \times 100\% = 20.5\%$

- Pa_1 = Pawpaw piece 1, Po_1 = Potato piece 1

Pa_2 = Pawpaw piece 2, Po_2 = Potato piece 2.

Qualitative observation

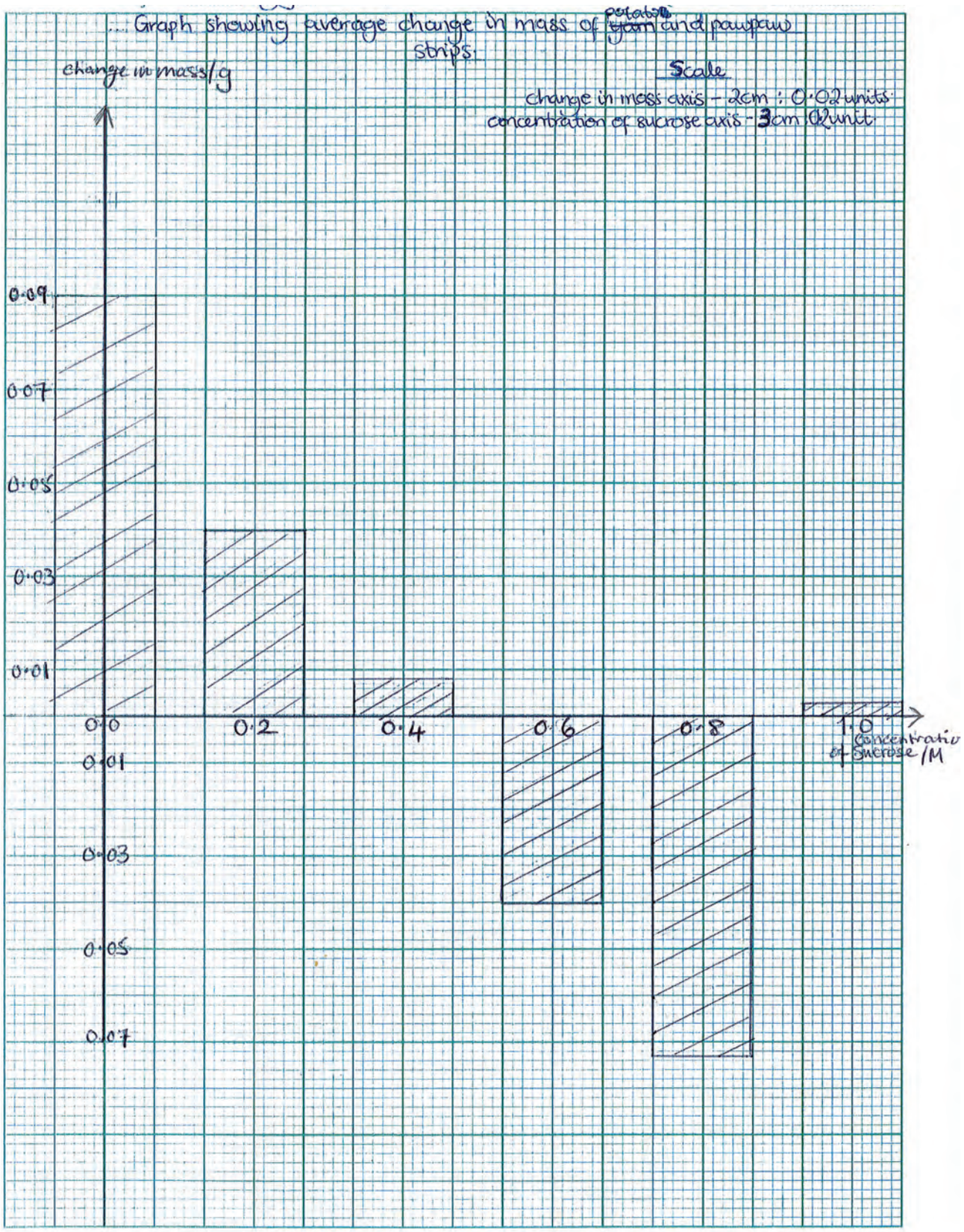
- Pawpaw is orange and potato is yellow
- All pieces floated in the sucrose solution.
- After the experiment, the pieces in solution 0·0M to 0·4M feel harder than before and those from 0·6M to 1·0M feel softer.
- After the experiment, all pieces look pale and discoloured.
- After the experiment, the sucrose solution looks cloudy and has some particles being suspended in it.
- The pawpaw and potato pieces feel turgid afterwards.

Possible sources of error and how they can be minimised

- Parallex error in measuring cylinder; Try to read the meniscus of the solution at eye level.
- When pieces are being dried, some of them may have water squeezed out of them, which alters results; dry firmly and do not press too hard on the pieces.
- The various pieces were dropped in the sucrose solutions at different times yet given the same time for osmosis; be as fast as possible when dropping the pieces in the sucrose solution.
- Splashing may occur when pieces are dropped in the solution and decrease the level of the solution; drop the pieces gently into the ~~Some~~ solution to ensure minimal splashing.
- Some of the pieces were not fully submerged in the solution; cover the pieces completely in the solution.

Conclusion

- On average, the higher the concentration of sucrose, the lower the change in mass.
- Potato pieces have more of an osmotic effect than ~~potatoe~~ pawpaw.


Graph showing average change in mass of potato and pawpaw strips
change in mass/g
Scale
change in mass axis – 2cm : 0·02 units
concentration of sucrose axis – 3cm : 0·2 unit
0·09
0·07
0·05
0·03
0·01
0·0
0·2
0·4
0·6
0·8
1·0
Concentration of Sucrose /M
0·01
0·03
0·05
0·07

3.4 Task 2d

- Study the following worksheet.
- Write a mark scheme for this worksheet that could be used to assess skill C4.
- Use your mark schemes to assess the following piece of work for skill C4. Write comments explaining why you have given the marks on a copy of the Accreditation Mark Sheet on page 45 of this handbook.

Design, and carry out, an experiment to test whether light affects the germination and/or growth of cress.

Note:
Germination is different from growth, a seed has germinated when the seed coat (testa) has split and the developing plant is just visible.

You can test germination and growth if you wish or collect data on just one.

You will have to devise your own method of varying light levels.

Remember to state a hypothesis first and to evaluate your experiment thoroughly.

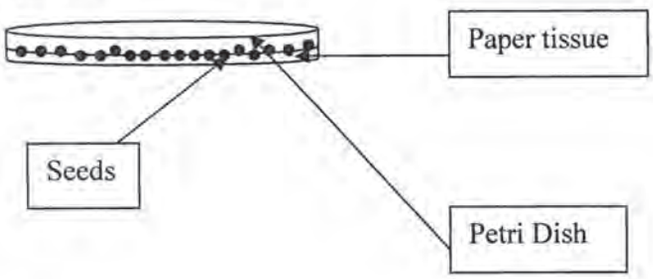
Remember to take into consideration the general guidelines for skill C4

Learner D

Aim: To investigate the effect of light on the growth of cress.

Hypothesis: I believe that the cress grown in full light will be the greenest and be the tallest, whilst the cress grown in the darkest conditions will be shorter with yellow leaves.

Diagrams:



Plan:

- I will take 3 Petri dishes of equal size.
- I will fold 1 piece of tissue paper 3 times and cut out an outline of the Petri dish so that the tissue fits into the Petri dish. Repeat this for each Petri dish.
- I will place 1 tissue paper cut-out into each Petri dish.
- I will count out 150 cress seeds and place 50 seeds into each Petri dish.
- I will make an opaque covering that will fit over a glass beaker using black cardboard.
- I will then cut out a $1cm^2$ hole in the top of the covering.
- I will then apply $5cm^3$ of water to each Petri dish, evenly distributed.
- I will then place 3 identical glass beakers upside down on each Petri dish, placing the opaque covering over 1 of them.
- I will place a bucket upside down over 1 of the beakers (not the one with the covering), making sure that no light can get in.
- I will place all 3 Petri dishes equal distance from a light source and apply $5cm^3$ of water to each every day for a week.
- I will plot a bar graph showing the average lengths of 10 seedlings from each Petri dish.

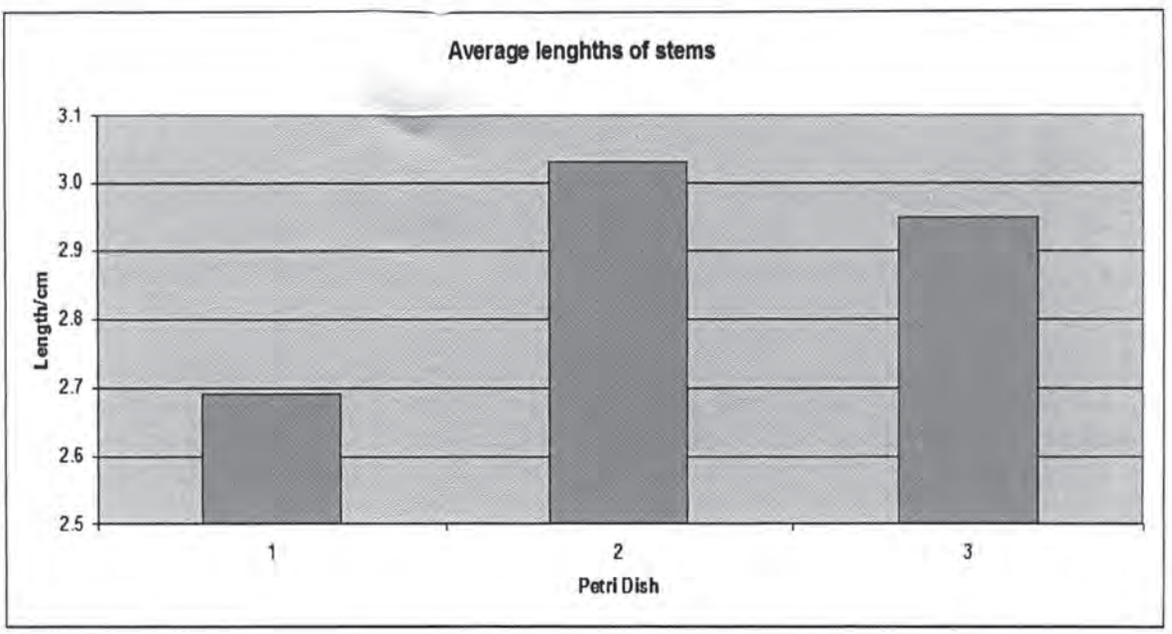
Changes to plan:

- Used $5cm^3$ instead of $3cm^3$

Results:

		Length of stem/cm										
Petri Dish	Conditions	1	2	3	4	5	6	7	8	9	10	Average
1	Dark	2.5	2.0	3.0	2.5	3.3	2.0	3.0	2.7	2.8	3.1	2.7
2	Half light	2.7	2.6	2.6	3.0	2.8	4.0	4.0	2.5	2.6	3.5	3.0
3	Light	4.0	3.1	2.5	3.0	3.1	2.7	2.6	3.0	2.8	2.7	3.0

Graph:



Conclusion:

By looking at our results, we can see that light increases the length at which cress will grow to in a 1 week period. This makes sense, because as soon as the cress starts photosynthesising, it will start making energy so that it will grow. In addition, after doing some research, I discovered that cress prefers growing in moderate light conditions, which may explain why Petri dish 2 grew the tallest.

I noticed that Petri dish 1 was yellow, 3 was green and 2 was a mixture of the two colours. This may be due to the cress in Petri dish 1 using its remaining energy to grow towards a light source, rather than generating chlorophyll. On this assumption, I would guess that if I was to measure the cress halfway through the experiment, the cress in Petri dish 1 would be the tallest. I also noticed that the cress had twined together in all 3 Petri dishes, possibly to increase stability.

In conclusion my hypothesis was almost correct; the cress grown in full light was taller and greener than the cress grown in darkness, however the cress grown in moderate light was even taller.

Evaluation: If I were to repeat the experiment, I would use a greater number of Petri dishes and measure a larger number of cress stems to increase accuracy and reliability. I would also control the temperature they were grown in, and measure the cress halfway through the experiment. I would use distilled water to water the cress, in case the chlorine had an effect. I would also measure the widths of the stems.

3.5 Task 2e

- Study the following worksheet, *The effect of temperature on the rate of rennin action*.
- Write mark schemes for this worksheet that could be used to assess skills C2, C3 and C4.
- Use your mark schemes to assess the following two pieces of work (Learners E and F) for C2, C3 and C4. Write comments explaining why you have given the marks on a copy of the Accreditation Mark Sheets on pages 46–47 of this handbook.

The Effect of Temperature on the Rate of Rennin Action

Rennin is an enzyme found in the stomach of mammals, particularly in the young. It makes the protein in milk clot, preventing it from leaving the stomach too soon.

AIM

To design and carry out an experiment to find the effect of temperature on rennin action.

MATERIALS

You have the following available:

test tubes
milk
rennin solution
temperature-controlled water baths
thermometers
clock

PROCEDURE AND RECORD

1 Design an experiment to find out the effect of temperature on the reaction between rennin and milk protein. Perform this investigation.

2 Write the plan for your investigation as a series of step-by-step instructions including:

the apparatus you used
the variables you kept the same
the variable you changed
how you used all your results to reach your conclusion

3 Record the outcome under the following headings:

Results
Conclusion
Evaluations and Improvements

Learner E

Aim: To design and carry out an experiment to find the effect of temperature on the rate of rennin reaction.

Materials:

1) Four Test tubes
2) Milk
3) Rennin solution
4) Temperature controlled water baths
5) Thermometers
6) Clock

Method:

1) All four test tubes were filled with an equal amount of milk
2) Test tubes were then placed in separate water baths with differing temperatures; 20°C, 40°C,60°C,80°C.
3) Test tubes are now at temperature of bath.
4) Add Rennin solution to the 20°C test tube.
5) Begin timing.
6) Every ten seconds check the test tube to see if milk has coagulated.
7) Invert test tube and if milk stays the reaction is complete.
8) Record time.
9) Repeat steps 4-8 with the other water baths.

Controlled Variables:

-Amount of milk added to each test tube

- Amount of rennin added to each test tube

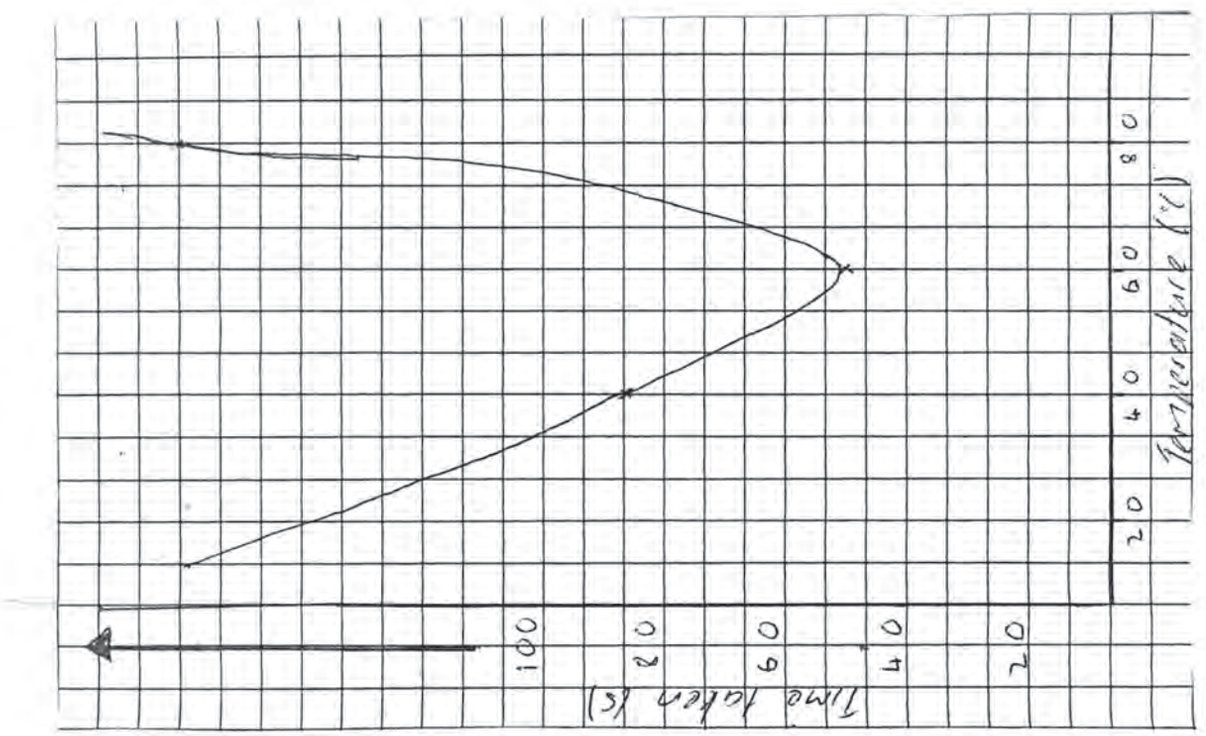
-Temperature of each water bath was kept constant

Variables that were changed:

- Temperature of the water baths

Results:

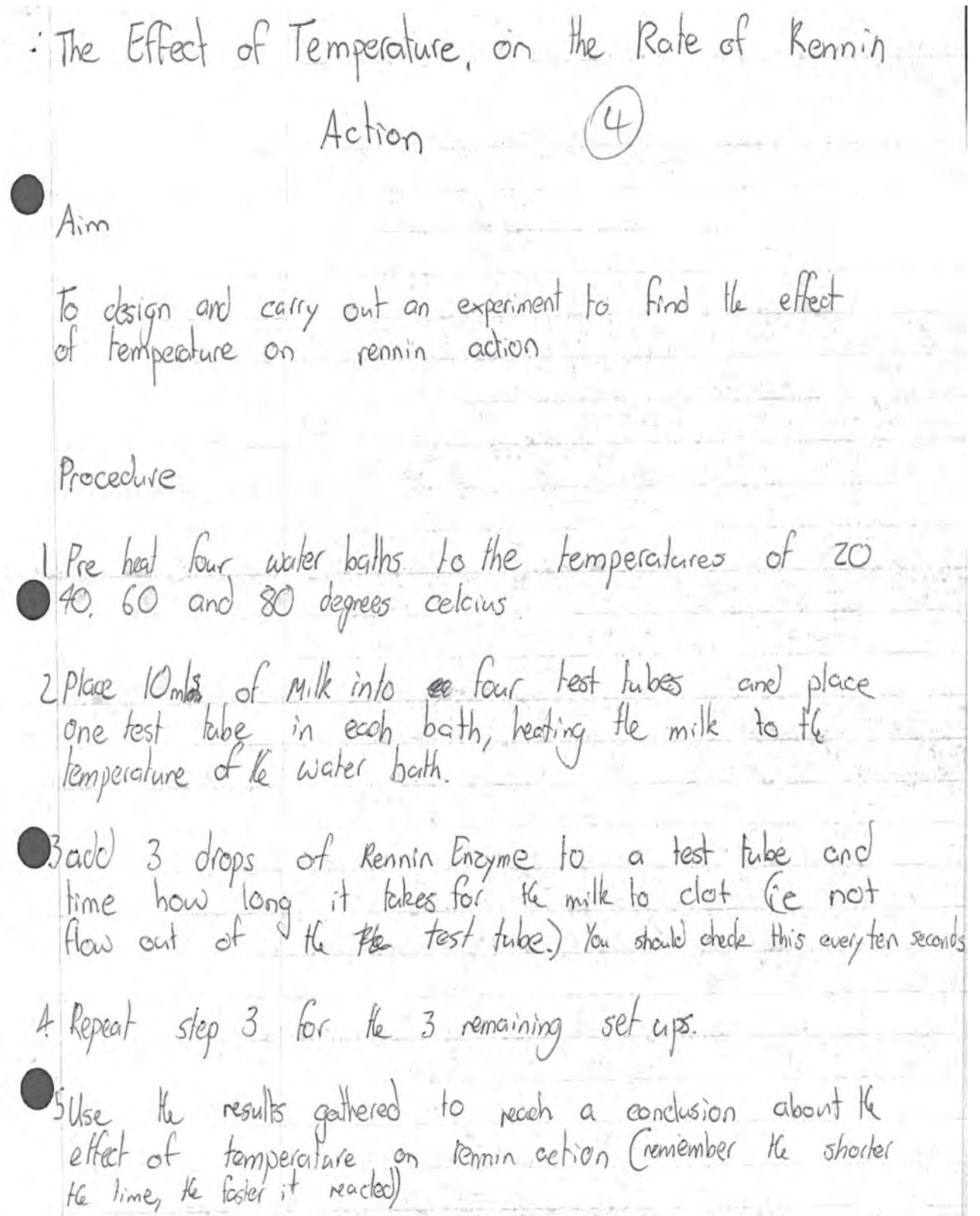
Temperature of water bath	20°C	40°C	60°C	80°C.
Time taken (s)	∞	80	45	∞



Conclusion: The milk in the 20°C never coagulated because there was not sufficient heat to begin the reaction although I predict that given a long enough time the milk would have eventually coagulated. The 80°C test tube also never coagulated because with such a high heat the enzymes denatured, so the shape of the enzyme changed. According to Fisher's lock and key theory the enzymes will not 'fit' together with the milk particles so this literally means they cannot function anymore. The 60°C coagulated the fastest in 45 seconds but this does not necessarily mean it is closest to optimum because the large 20°C gaps in the scale are not very accurate. The 40°C took 80 seconds to coagulate. By modelling my graph I can conclude that the optimum temperature is between 40 and 60°C.

Evaluations and Improvements: The test was not very accurate with huge variations within groups. I put this down to the amount of milk and rennin added. So this could be improved quite easily by being given a set value of milk and rennin or just by repeating the test. Another way to improve the test would be to set out more water baths at closer temperature intervals. Maybe 5 or 10°C. Another simple problem was with groups mixing up their test tubes with others, this could also be fixed easily by labelling your groups test tubes.

Learner F



The Effect of Temperature, on the Rate of Rennin Action (4)

Aim

To design and carry out an experiment to find the effect of temperature on rennin action

Procedure

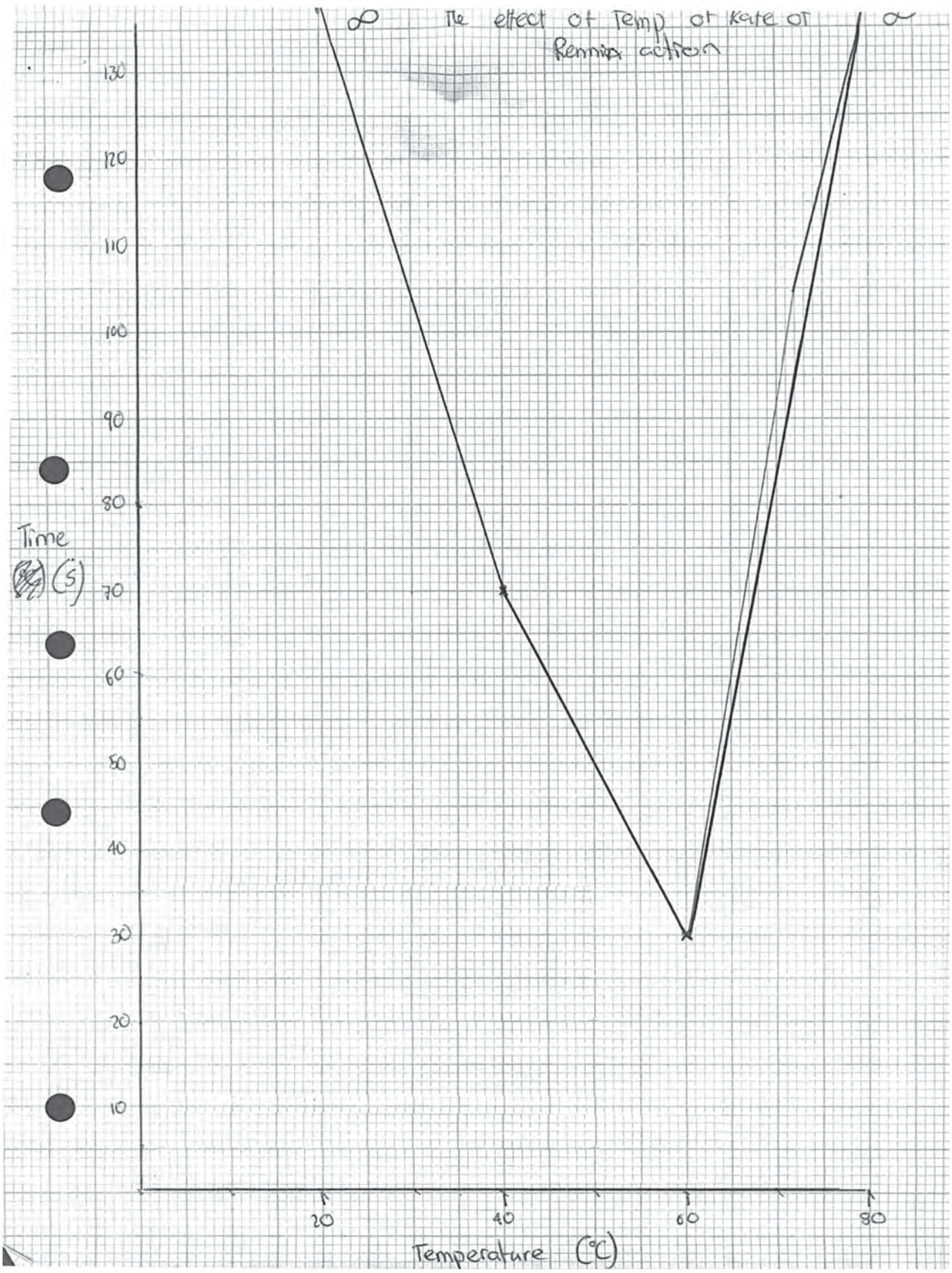
1 Pre heat four water baths to the temperatures of 20 40, 60 and 80 degrees celcius.

2 Place 10mls of milk into four test tubes and place one test tube in each bath, heating the milk to the temperature of the water bath.

3 add 3 drops of Rennin Enzyme to a test tube and time how long it takes for the milk to clot (ie not flow out of the test tube.) You should check this every ten seconds

4 Repeat step 3 for the 3 remaining set ups.

5 Use the results gathered to reach a conclusion about the effect of temperature on rennin action (remember the shorter the time, the faster it reacted)


The effect of Temp of Rate of Rennin action
Time (s)
130
120
110
100
90
80
70
60
50
40
30
20
10
20
40
60
80
Temperature (°C)

Results

Temp (°C)	Time (s)
20	21 hours → ∞
40	70
60	30
80	∞

Conclusion.

From the results gathered, I can conclude that the optimum temperature for rennin to act at is about 60°C. At a temperature closer to 40°C it still reacts but much slower. at 20°C, there is not enough energy to power the reaction well enough. It takes a very long time compared to the other two temperatures that produced results and by this time the milk would have passed out of the stomach before it could clot so 20°C is definately not a good temperature for rennin to be reacting at. At 80°C the heat is too much for the encyme. The high temperature denatures the encyme, rendering it unable to react with the proteins in milk so it will never be able to make the milk clot.

Improvements.

Some improvements that could be made to the experiment are: The sterilization of the test tubes before use. They were only briefly rinsed out and make still harbour things that may hinder the results of the experiment; sterilise the water baths for the same reason, to prevent contamination; use more than one variety of bought milk to ensure correct analysis of rennin action; shake milk after rennin has been put in to ensure that the rennin has mixed throughout the milk before reacting and not just sitting on top.

Checklist

The list below summarises what you need to send to Cambridge, in order to apply for accreditation for coursework assessment.

Task	Requirement	Included
Task 1a	worksheet for C1	
	mark scheme for C1	
Task 1b	worksheet for C2 and C3	
	mark scheme for C2	
	mark scheme for C3	
Task 1c	worksheet for C4	
	mark scheme for C4	
Task 2a	mark scheme for C2	
	mark scheme for C3	
	assessment and comments for learner A for C2	
	assessment and comments for learner A for C3	
Task 2b	mark scheme for C2	
	assessment and comments for learner B for C2	
Task 2c	mark scheme for C2	
	mark scheme for C3	
	assessment and comments for learner C for C2	
	assessment and comments for learner C for C3	
Task 2d	mark scheme for C4	
	assessment and comments for learner D for C4	
Task 2e	mark scheme for C2	
	mark scheme for C3	
	mark scheme for C4	
	assessment and comments for learner E for C2	
	assessment and comments for learner E for C3	
	assessment and comments for learner E for C4	
	assessment and comments for learner F for C2	
	assessment and comments for learner F for C3	
	assessment and comments for learner F for C4	

Appendix

How to submit your work for accreditation

Copy all of the forms in the Appendix.

- Fill in the Cover Sheet with your identification details and sign the declaration of authenticity.
- Place a tick in each box on the Accreditation Mark Sheet to indicate that you have included all the required documents for Task 1.
- Fill in your marks and comments for each of the six accreditation test samples for Task 2 (a–e) on the appropriate, (copied) forms and tick the boxes to show you have included all necessary accompanying documentation.
- Place the Cover Sheet on the top of your submission followed by the submission forms and then all of your documents in order of task. For your own records take a copy of everything you are submitting and then post your submission to:

  Cambridge IGCSE Accreditation Co-ordinator (EDM)
  Cambridge International Examinations
  1 Hills Road
  Cambridge
  CB1 2EU
  UK

Remember you will need to allow 4–6 weeks for your work to be checked by a coursework assessor. You will then be informed by post.

CAMBRIDGE
International Examinations

Evidence for Cambridge IGCSE® coursework assessor accreditation
Cover Sheet

Cambridge IGCSE Biology (0610)

Please complete this form in BLOCK CAPITALS.

Centre number	
Centre name	
Teacher's name	
Contact email	

Declaration of authenticity

I have read and understood the training materials and certify that the evidence submitted with this form is my own original work.

Signed | **Date** (DD/MM/YY)

Name

Return this form to

Cambridge IGCSE Accreditation Co-ordinator (EDM)
Cambridge International Examinations
1 Hills Road
Cambridge
CB1 2EU
UK

Keep a copy of the form for your own records.

Appendix

Accreditation Mark Sheet

Cambridge IGCSE Biology coursework assessor accreditation

Please copy and complete the forms below which act as both:

- a checklist to ensure that you have included all required documents for your application
- a mark sheet for supplying your marks and comments on the sample answers used in accreditation task 2.

Task 1: You should include both a worksheet and a mark scheme for each of the following parts of the task. Tick boxes to show that all items have been included in your submission for Task 1.

	1a	1b		1c
	C1	C2	C3	C4
worksheets				
mark schemes				

Task 2: Include your mark schemes in your submission and your marks and comments for Task 2 on the following pages.

Please keep a copy of all completed forms for your records.

Cambridge IGCSE Biology coursework assessor accreditation

Task 2a:	Mark schemes for C2 and C3	☐	☐	Tick boxes to indicate that you have included these documents.

Learner A		
Enter your mark for C2:		
Justification for your marks:		
Enter your mark for C3:		
Justification for your marks:		

Cambridge IGCSE Biology coursework assessor accreditation

Task 2b:	Mark scheme for C2	☐	Tick box to indicate that you have included this document.

Learner B		
Enter your mark for C2:		
Justification for your marks:		

Cambridge IGCSE Biology coursework assessor accreditation

Task 2c:	Mark schemes for C2 and C3	☐	☐	Tick boxes to indicate that you have included these documents.

Learner C		
Enter your mark for C2:		
Justification for your marks:		
Enter your mark for C3:		
Justification for your marks:		

Cambridge IGCSE Biology coursework assessor accreditation

Task 2d:	Mark scheme for C4	☐	Tick box to indicate that you have included this document.

Learner D		
Enter your mark for C4:		
Justification for your marks:		

Cambridge IGCSE Biology coursework assessor accreditation

Task 2e:	Mark schemes for C2, C3 and C4	☐ ☐ ☐	Tick boxes to indicate that you have included these documents.

Learner E		
Enter your mark for C2:		
Justification for your marks:		
Enter your mark for C3:		
Justification for your marks:		
Enter your mark for C4:		
Justification for your marks:		

Cambridge IGCSE Biology coursework assessor accreditation

Task 2e continued:

Learner F		
Enter your mark for C2:		
Justification for your marks:		
Enter your mark for C3:		
Justification for your marks:		
Enter your mark for C4:		
Justification for your marks:		

Cambridge International Examinations
1 Hills Road, Cambridge, CB1 2EU, United Kingdom
Tel: +44 (0)1223 553554 Fax: +44 (0)1223 553558
Email: info@cie.org.uk www.cie.org.uk