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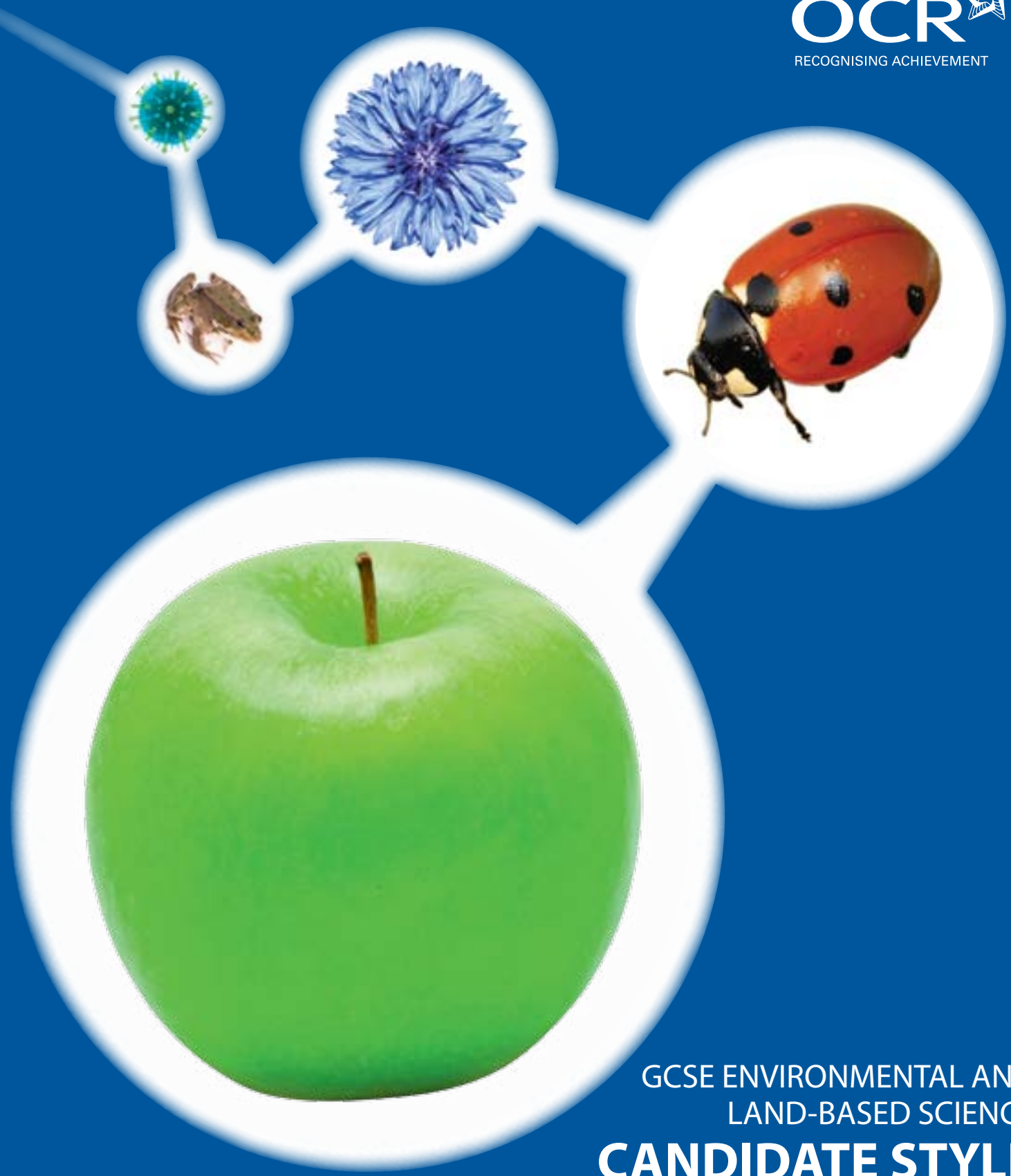

GCSE ENVIRONMENTAL AND LAND-BASED SCIENCE

CANDIDATE STYLE ANSWERS - CANDIDATE B

VERSION 1 APRIL 2012

www.ocr.org.uk/science

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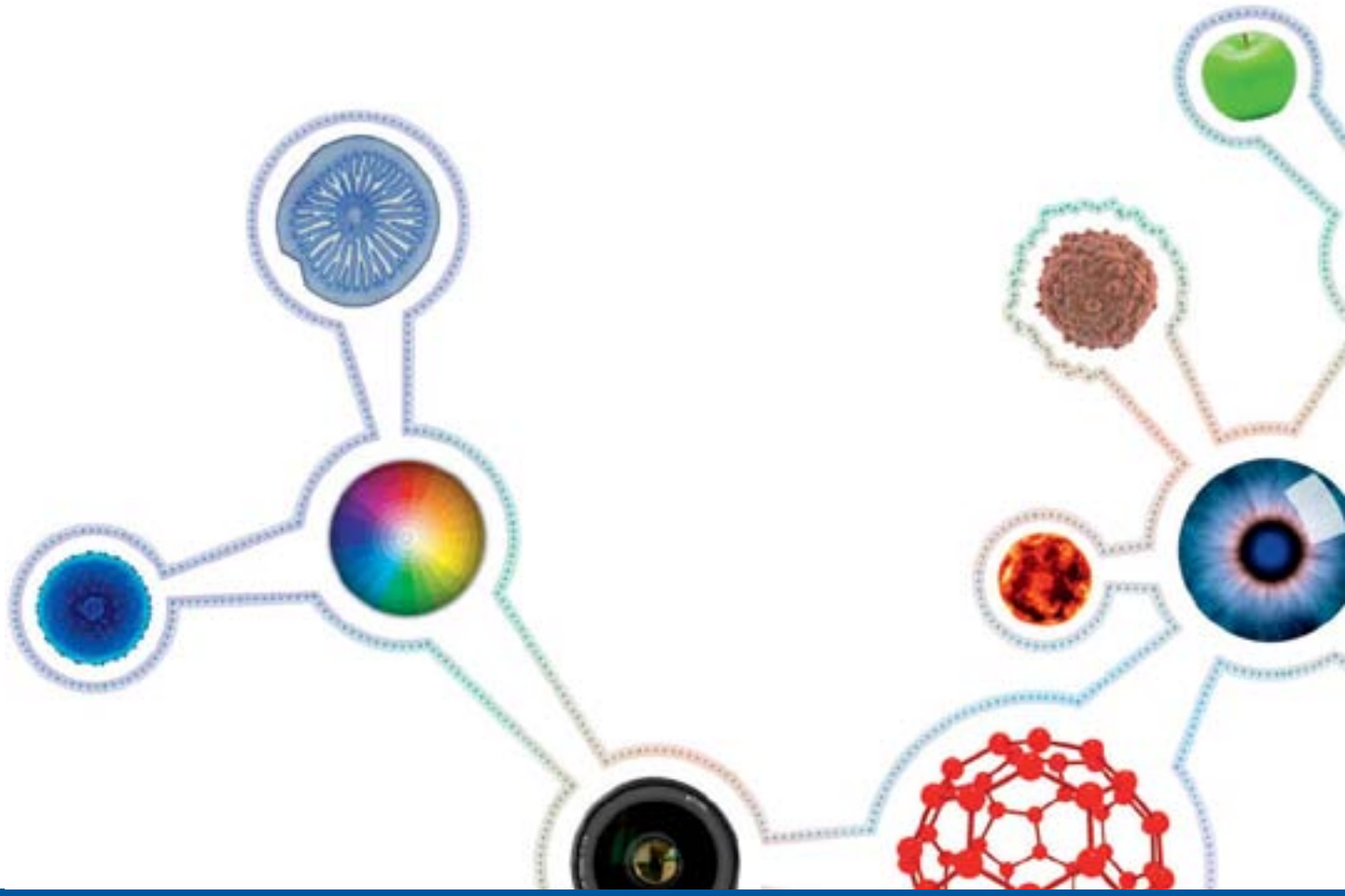


INTRODUCTION

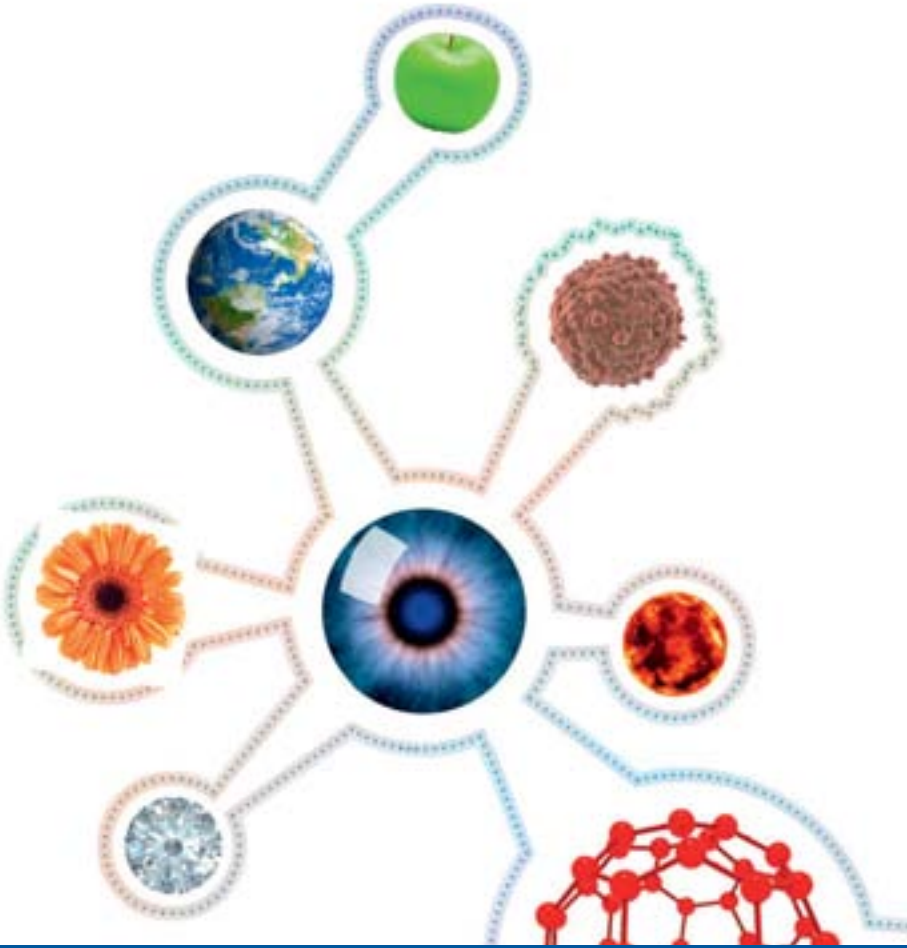
These support materials are intended to support teachers in their marking. There are three candidate style responses with accompanying commentary. These exemplars are based on the published Specimen Assessment Materials (SAMs), which can be downloaded from the relevant OCR webpage for the specification.

The exemplars and commentaries should be read alongside the Specifications and the Guide to Controlled Assessment for GCSE Environmental and Land-Based Science, all of which are available from the website.

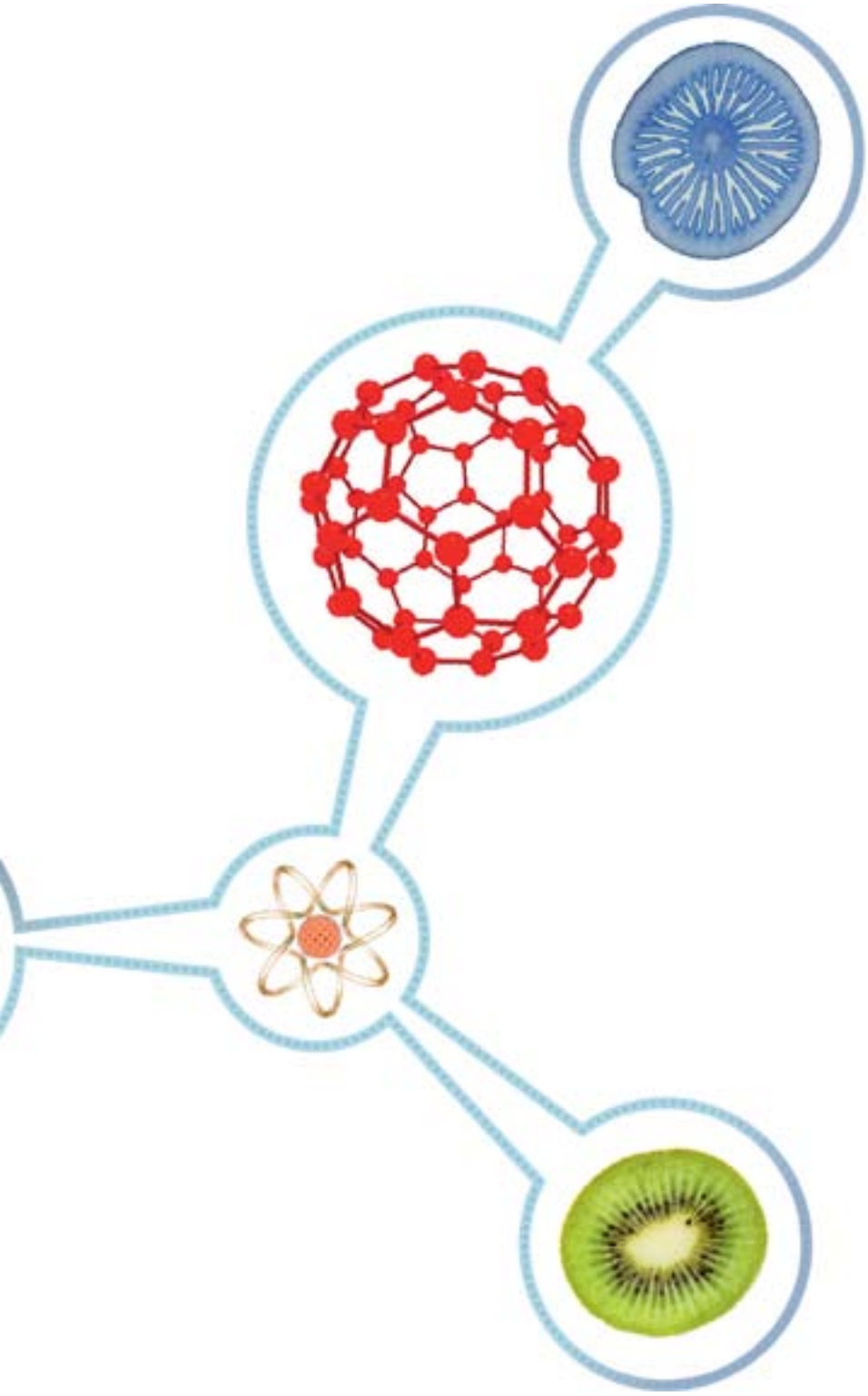
OCR will update these materials as appropriate.

Centres may wish to use these support materials in a number of ways:

- teacher training in interpretation of the marking criteria
- departmental standardisation meetings
- exemplars for candidates to review.



UNIT B681: PRACTICAL SCIENTIFIC SKILLS



Task: Carry out a survey of two contrasting habitats using quadrats to collect quantitative data Using quadrats on the distribution of plant species.

survey the school field with the sports pitch bank

Sports pitch bank south facing identifying sampling area

Using a quadrate to collect estimated percentage cover

Grid quatrats

Bank cut on 21 day cycle

Field cut on 7-14 day cycle

Collecting field data

Bank not recently cut I soon discovered I needed to kneel to identify and record % cover. We used a tape measure to mark out an area and generated random numbers with the calculator to identify grid ref's to sample

Field recently cut so hard to identify some plants you really need to look carefully. The cutting was a bit too recent

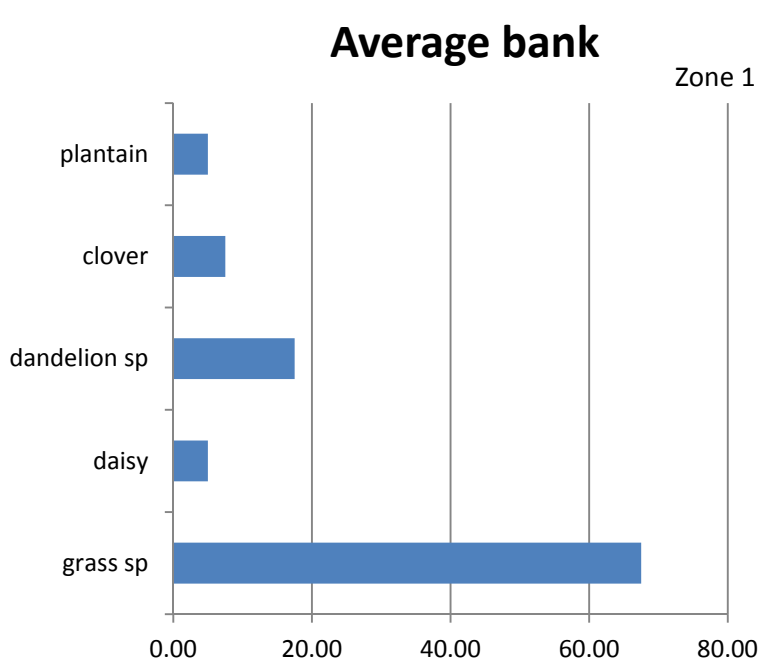
Using identification books to help identify plants

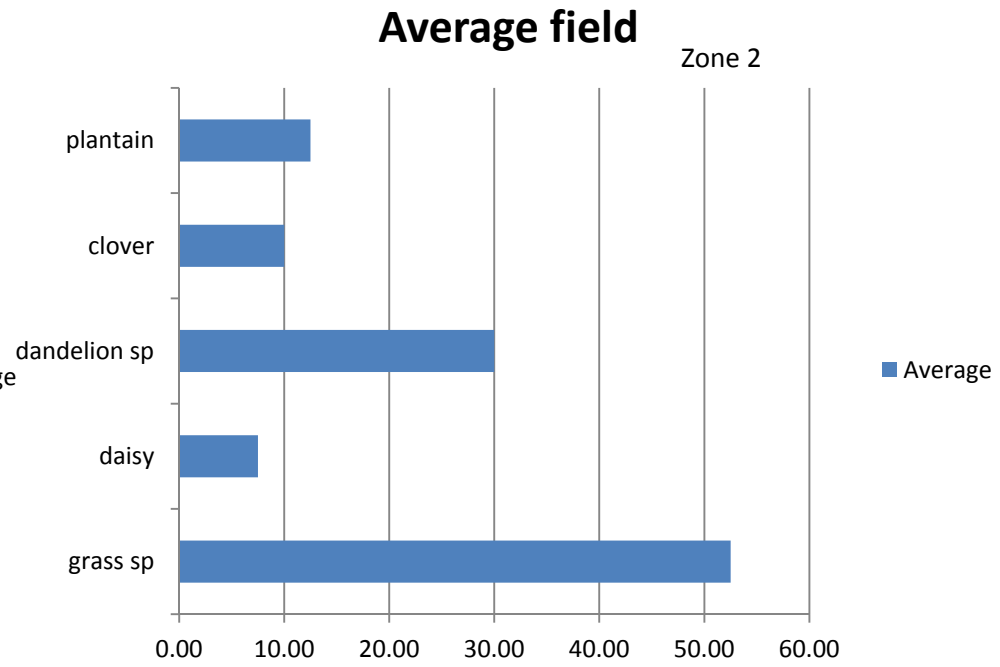
Counting how many squares each species is found in

Recording my results as I go w

comparing plant distribution on the sports pitch bank and the school sports field

	Zone 1	Bank			Zone 2	field	
Species	Q1	Q2	Average	Species	Q1	Q2	Average
grass sp	65	70	67.50	grass sp	60	45	52.50
daisy	5	5	5.00	daisy	5	10	7.50
dandelion sp	20	15	17.50	dandelion sp	30	30	30.00
clover	5	10	7.50	clover	15	5	10.00
plantain	5	5	5.00	plantain	10	15	12.50





Reflection and evaluation of the task

- We risk assed the task and concluded slipping on the bank was the main hazard also we checked that no ball or javelin playing would take place on the school field. We only did the task when the dew had dried and made the slope less slippery.
- Our sample size was really too small but we only had one lesson for each of us to collect data and we worked in pairs with the quadrats and each did two squares in each site.
- I intended to plot my partners data but he has not been in school.
- The results showed less grass in the field 52% against almost 68% on the bank and more plants like plantain and dandelion .These plants have a rosette leaf pattern and missed the lawn mowers blades so survive and its leaves prevent light getting to the grass so they were not driven out by competition .
- On the bank the grass is able to grow strongly making the plantain and daisy grow leaves which try to grow up.

Unit B681: Practical Scientific Skills: Mark Allocation

Strand to be assessed:

(a) Demonstrate competence in practical scientific skills

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks**	Performs a practical task which involves a series of step-by-step practical operations with little or no advice and guidance. Makes some appropriate amendments to the method.	Be able to carry out a task which involves a series of steps and make the necessary amendments to a procedure or skill with very little help, advice or direct supervision to enable competent performance of the task.	The task was clearly well performed and some modifications were made. This could have equally well been awarded 5 marks. It is a chance for teachers to decide from first hand observation.

(b) Collect and process primary data

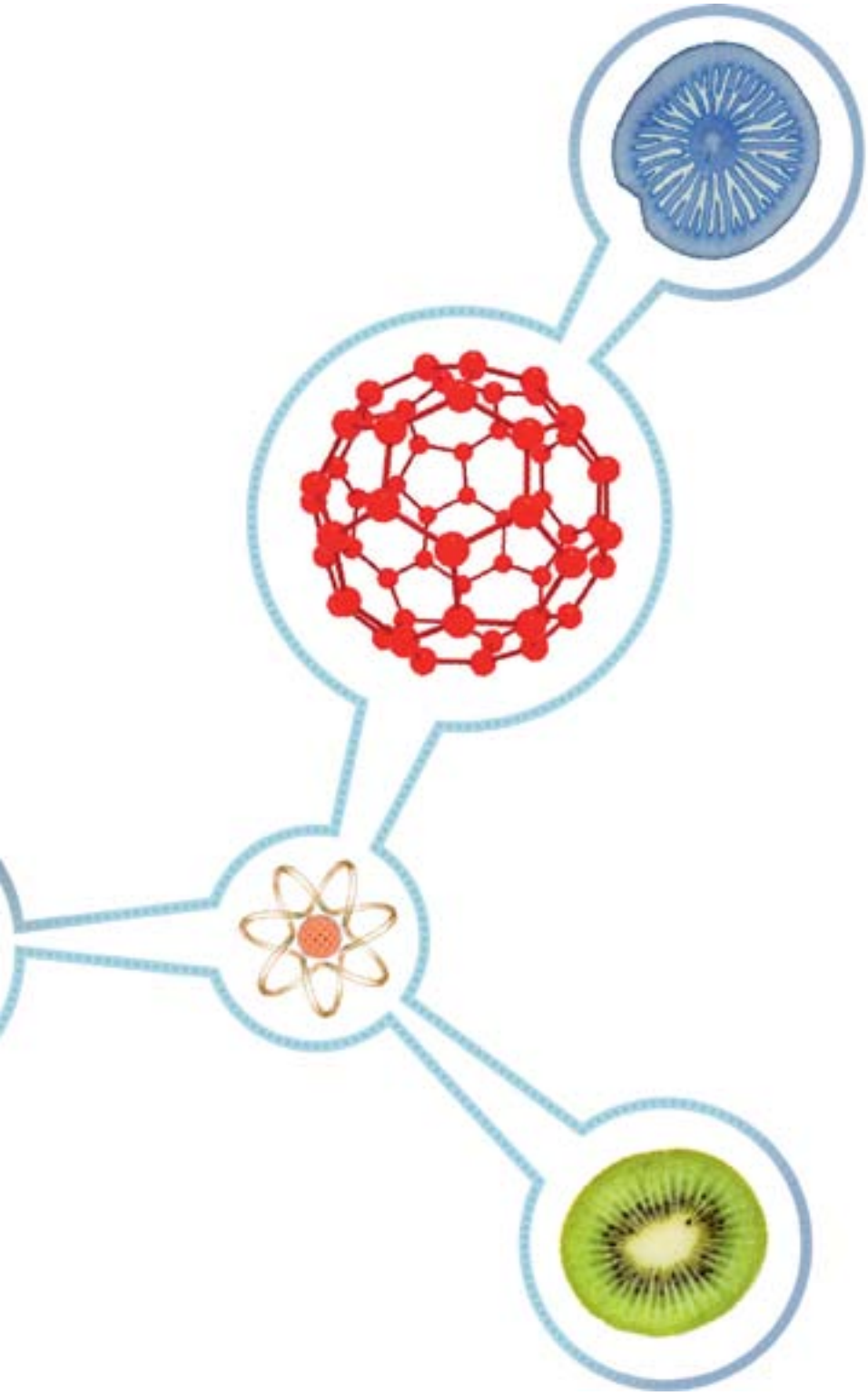
Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks**	Collects and records in an appropriate format the full range of data specified by the task, and uses graphical or mathematical techniques, with some gaps in data, errors or inaccuracies.	Candidates working at this level will draw line graphs or more complex and appropriate bar charts but there will be some errors in scales, plotting or drawing the line of best fit. Answers from mathematical techniques will be seen but possibly will show some error or be simplistic by nature.	Appropriate bar charts were drawn. The technique is more graphical than mathematical. Although they only used averages, the candidate identified an appropriate set of data and provided a scientific justification.

(c) Evaluate method used and data collected

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks**	Writes a limited evaluation of the task including the management of risks. Makes a relevant comment on the appropriateness of the procedure used. Account is clear and specialist terms are for the most part used appropriately.	Candidates will identify the hazards involved concerning the use of equipment, chemicals or biological material. They will include some risks and will suggest some precautions to minimise these. They will make good use of the photographic evidence to inform the reader and make comments on the data and its validity.	The candidate was clearly aware of risks/hazards and took appropriate measures to manage these. They commented on the appropriateness of the procedures and used appropriate terms. They used the data collected to show an awareness of competition.
5-6 marks	Writes a detailed critical evaluation of the task, including the management of risks and the appropriateness of the procedure used. Account is clear and organised and specialist terms are used appropriately.	Candidates will produce information on potential hazards identifying whether they are high or low risk and the steps which were made in order to minimise these risks. They will use detailed annotation of film or photographic evidence to inform the reader and make constructive and appropriate observations of the data relating the results to the performance of the task.	Just failed to meet the criteria for 5 marks, although quite close.

Overall for task: 4 marks

UNIT B682: PRACTICAL SCIENTIFIC SKILLS



Task: monitor the health and development of a small animal taking appropriate measurements and handling the animal in the correct way.

Checking the health and weight of my school rabbit.

Eye and ear check

Bright clear eyes indicate a healthy rabbit

In rabbit like this with floppy ears mites can be a problem as the ears provide a warm moist home for mites

Anus and genital checks

Checking for a dirty anus dirt/scouring might be an infection but probably indicate too much green food or apples in the diet

Genitals need to be clean and free from discharge

Weighing the rabbit

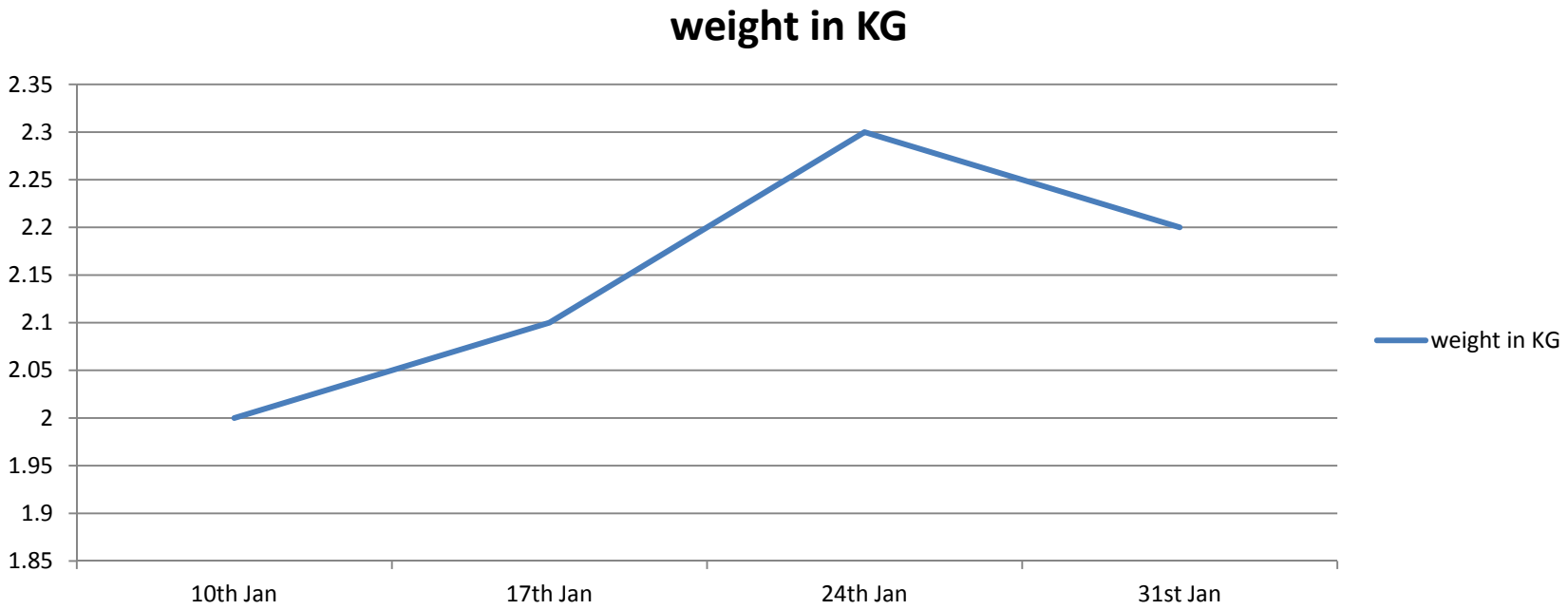
Checking the balace is zeroed

Me handling the rabbit to keep it calm and stress free

Growth record of my rabbit

Monitoring Rabbit Health

	10th Jan	17th Jan	24th Jan	31st Jan
eye check	bright	bright	bright	slight discharge
nose check	clean	clean	clean	clean
anus check	clean	moist	clean	clean
coat	shiny	shiny	shiny	slightly flat
claws	ok	clipped	ok	ok
weight in KG	2	2.1	2.3	2.2



Task reflection and evaluation

- The main hazard is infection so I always put on overalls and after the job remove them hang them up and wash my hands with soap and water. I also washed my hands between hutches if I suspected any health problems to avoid spreading disease.
- I found recording weight a useful way to monitor health .
- My last entry shows quite a small weight loss probably due to a gut infection or too much wet food in the diet. I would need to check that this did not continue.
- The flat coat suggest its more than diet so I will isolate the rabbit for a few days and give her a diet with more dry food and see if she improves if not I will ask my teacher to call the vet for a detailed check as a gut infection might be starting.
- The rabbits are quite difficult to catch so when I go to the hutch I always speak to them and approach them calmly.
- I am a relaxed guy and I think that helps me handle animals.

Unit B682: Practical Scientific Skills: Mark Allocation

Strand to be assessed:

(a) Demonstrate competence in practical scientific skills

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks	Performs a practical task which involves a series of step-by-step practical operations with little or no advice and guidance. Makes some appropriate amendments to the method.	Be able to carry out a task which involves a series of steps and make the necessary amendments to a procedure or skill with very little help, advice or direct supervision to enable competent performance of the task.	The candidate fully met the criteria although the evidence is not very clear, move to next level
5-6 marks **Award 6 marks**	Performs independently a practical task which involves a series of step-by-step practical operations and makes decisions, amendments and modifications to improve the task outcome.	Be able to carry out a series of practical skills required by the task, making necessary amendments and modifications to the procedure without the need for any advice and achieve a professional and improved outcome as a result of their modification and amendments where and when needed.	This candidate worked very competently. The photographs show evidence of a competent student. When professional judgement is required they were able to distinguish between discussion and independent decisions. When livestock is involved some teacher involvement will be expected.

(b) Collect and process primary data

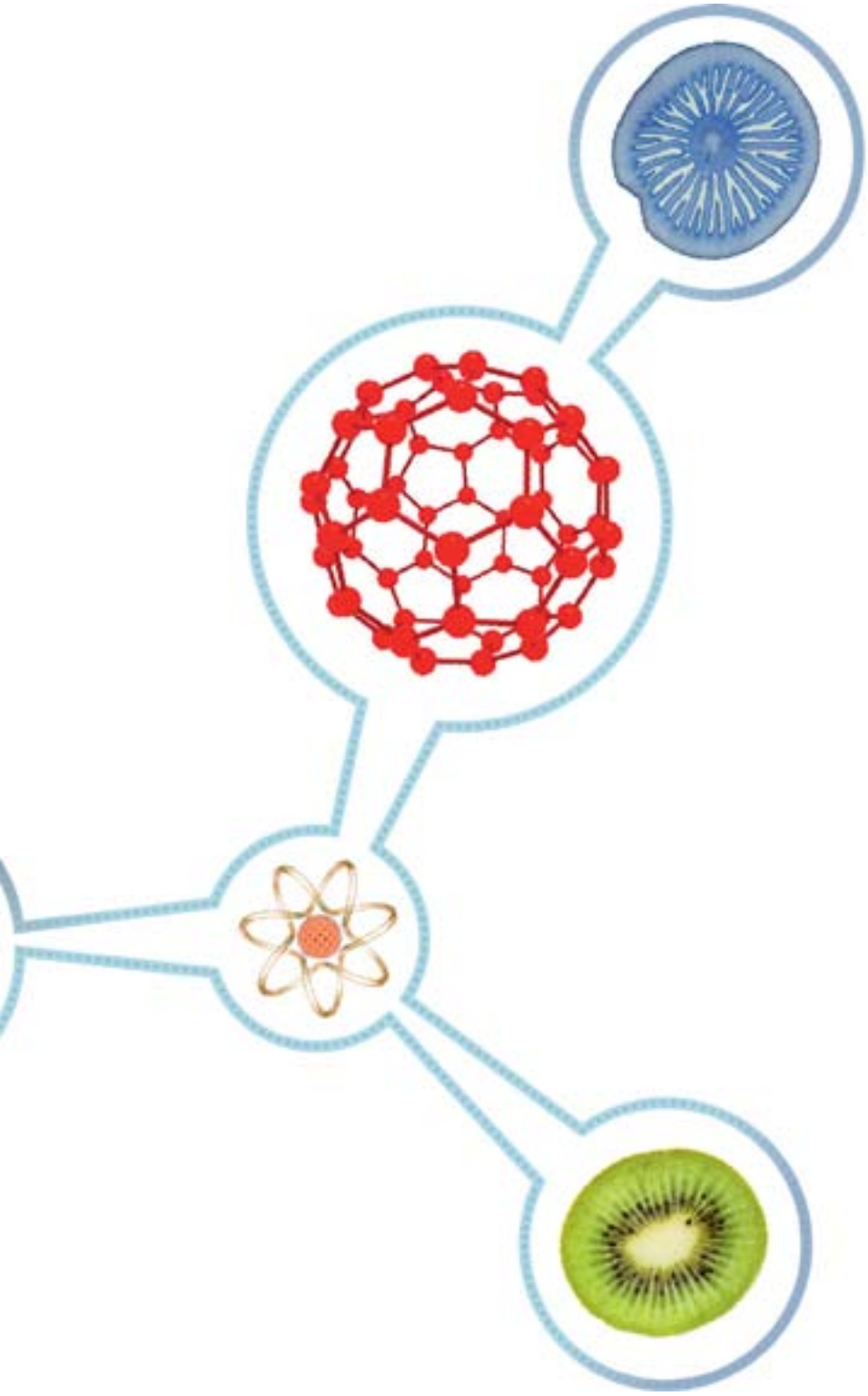
Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks**	Collects and records in an appropriate format the full range of data specified by the task, and uses graphical or mathematical techniques, with some gaps in data, errors or inaccuracies.	Candidates working at this level will draw line graphs or more complex and appropriate bar charts but there will be some errors in scales, plotting or drawing the line of best fit. Answers from mathematical techniques will be seen but possibly will show some error or be simplistic by nature.	The Candidate collected a good range of appropriate qualitative and quantitative data. The line graph clearly showed how the young rabbit was growing and how it lost condition. The candidate used both types of data to conclude the need for careful observation and management.

(c) Evaluate method used and data collected

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks**	Writes a limited evaluation of the task including the management of risks. Makes a relevant comment on the appropriateness of the procedure used. Account is clear and specialist terms are for the most part used appropriately.	Candidates will identify the hazards involved in the use of equipment, chemicals or biological material. They will include some risks and will suggest some precautions to minimise these. They will make good use of the photographic evidence to inform the reader with comments on the data and its validity.	The Candidate identified the health risks and managed them correctly and showed an awareness of potential cross infection hazards. Good use was made of qualitative observations to validate the actions needed. They linked these to quantitative data. The Candidate was able to identify the importance of his personal character on the animal.

Overall for task: 5 marks

UNIT B683: PRACTICAL SCIENTIFIC SKILLS



B683 Task: To monitor the health and development of farm animals health taking appropriate measurements ,handling the animal in an appropriate way.

Checking school lambs and ewes

Sharpening the shears for dagging and me feeding the ewes.

Ewes mouth and ewes and lambs in June

Checking age and mouth condition. Note very clean good teeth

Ewe and lamb both showing good stance and posture

Feet and udder check of ewes

Me marking a ewe when I had checked her feet

Checking the udder and that the milk was free from mastitis

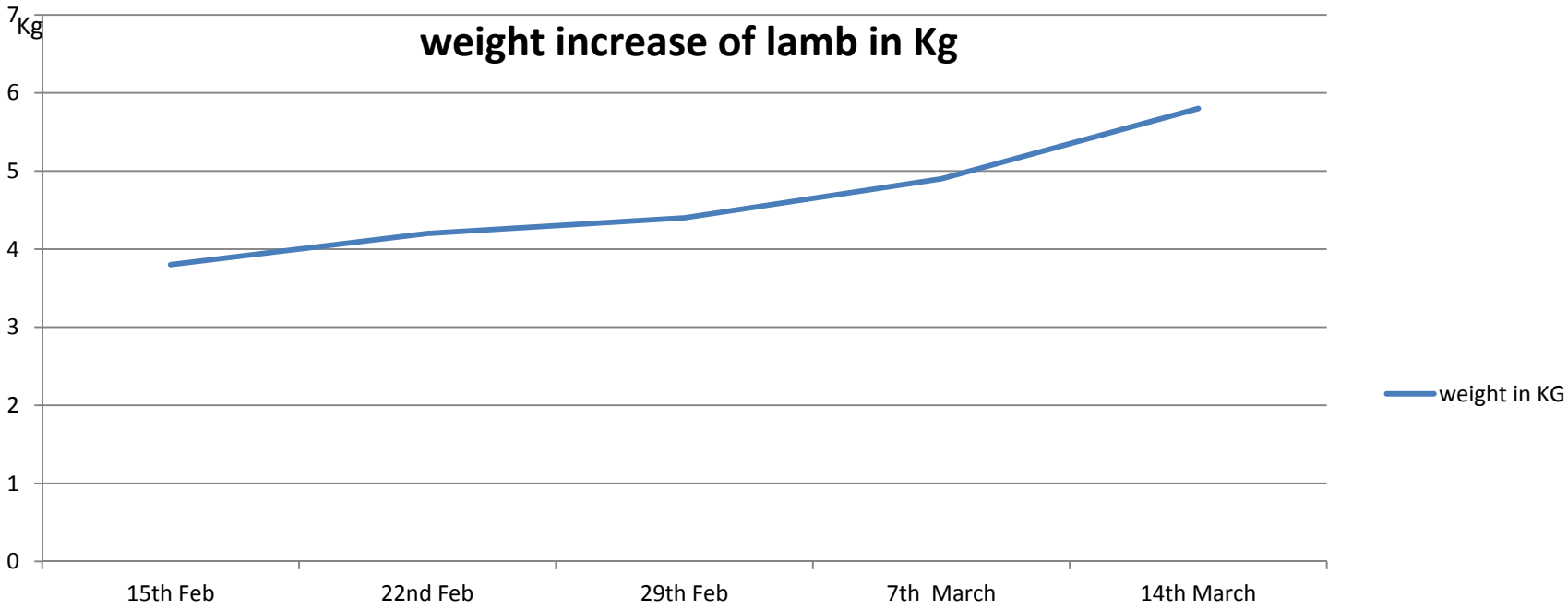
Health record of my lamb

Lamb Health and growth

Lamb 1

	15th Feb	22nd Feb	29th Feb	7th March	14th March
feet	clean	clean		clean	clean
anus	cleaned	slight scour		clean	clean
nose	moist	moist		moist	moist
eyes	bright	bright		bright	bright
weight in KG	3.8	4.2	4.4	4.9	5.8

Graph showing the growth of my lamb



Evaluation and reflection

- We check our risk assessment and put on overalls and steel capped wellington boots to protect from the ewes feet and work as a group. The main hazard to us is the sheep being heavy hurting our back or the ewes standing on my feet. At the end I washed my hands with soap and water and hung up my overalls to dry .
- The data is a few weeks older than the photos of health checks .
- The graph stays flat in mid February this may be due to scouring also we had no data for half term week.
- I think I may have had a faulty scales reading on 15 march as my lamb only gained 2 KG in a month .
- The lamb looked well
- We checked eyes nose and mouth and in the ewes I checked the udder for mastitis as the ewes were starting to dry up.

Unit B683: Practical Scientific Skills: Mark Allocation

Strand to be assessed:

(a) Demonstrate competence in practical scientific skills

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks	Performs a practical task which involves a series of step-by-step practical operations with little or no advice and guidance. Makes some appropriate amendments to the method.	Be able to carry out a task which involves a series of steps and make the necessary amendments to a procedure or skill with very little help, advice or direct supervision to enable competent performance of the task.	The candidate fully met the criteria and carried out the task with care.
5-6 marks **Award 6 marks**	Performs independently a practical task which involves a series of step-by-step practical operations and makes decisions, amendments and modifications to improve the task outcome.	Be able to carry out a series of practical skills required by the task making necessary amendments and modifications to the procedure without the need for any advice and achieve a professional and improved outcome as a result of their modification and amendments where and when needed.	This candidate worked competently as evidenced in the photographs. They used professional judgement to distinguish between discussion and independent decisions. When livestock is involved some teacher involvement will be expected.

(b) Collect and process primary data

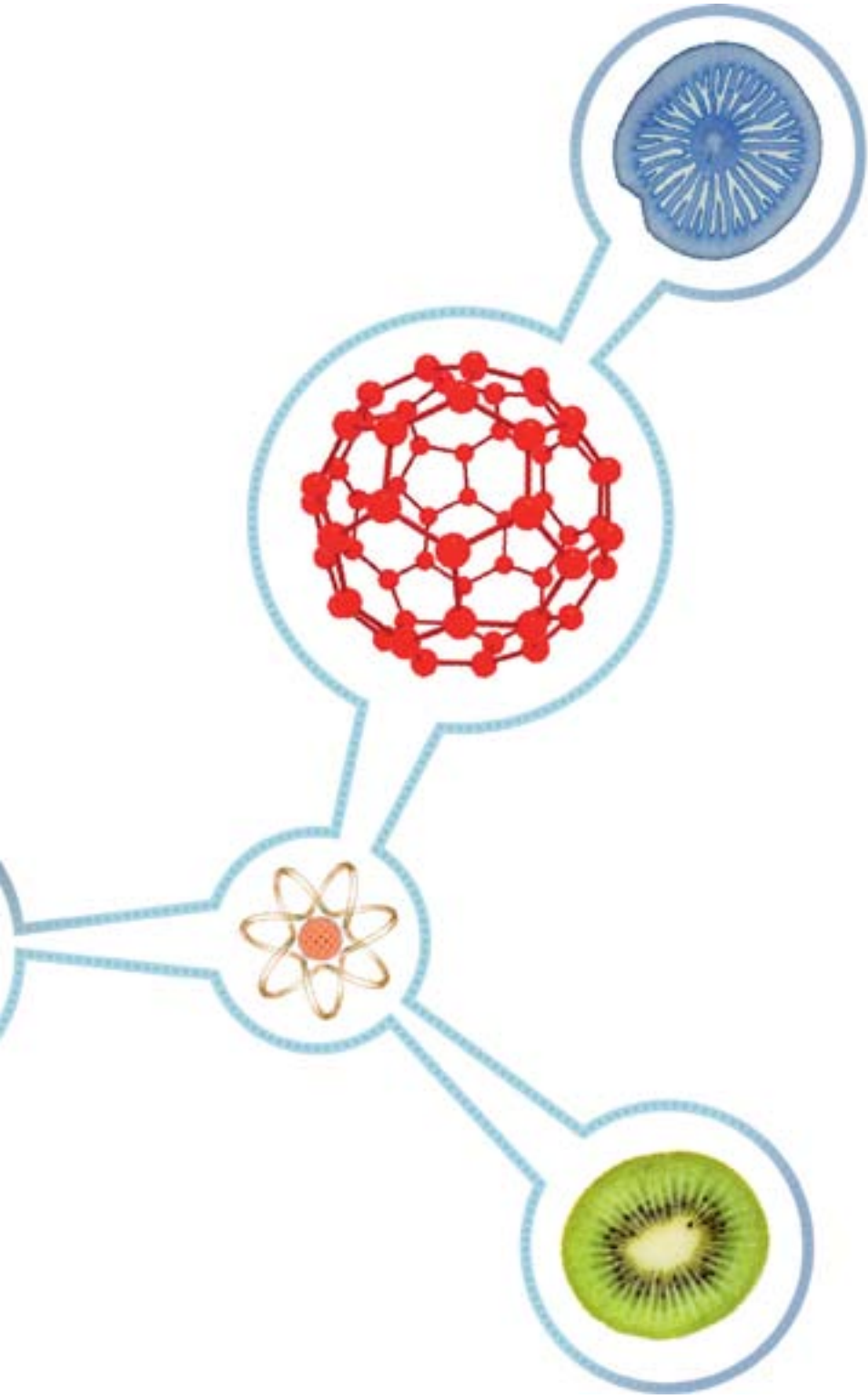
Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks**	Collects and records in an appropriate format the full range of data specified by the task, and uses graphical or mathematical techniques, with some gaps in data, errors or inaccuracies.	Candidates working at this level will draw line graphs or more complex and appropriate bar charts but there will be some errors in scales, plotting or drawing the line of best fit. Answers from mathematical techniques will be seen but possibly will show some error or be simplistic by nature.	Candidate collected a good range of appropriate qualitative and quantitative data . The line graph clearly showed the lambs growth although little or no real link to accuracy or errors possible in doing the task. The Candidate used both types of data to conclude the need for careful observation and management .

(c) Evaluate method used and data collected

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks almost 5**	Writes a limited evaluation of the task including the management of risks. Makes a relevant comment on the appropriateness of the procedure used. Account is clear and specialist terms are for the most part used appropriately.	Candidates will identify the hazards involved with the use of equipment, chemicals or biological material, they will include some risks and will suggest some precautions to minimise these. makes good use of the photographic evidence to inform the reader comments on the data and its validity	Candidate identified the health risks and managed them correctly, using safety boots and overall which were suitable for the purpose. The candidate carried out the practical weighing at a different time to the photographs. This is acceptable as the weighing is difficult. Opportunities for general health checking and skills involved in handling large animals were applied appropriately to the task.

Overall for task: 5 marks

SCIENTIFIC INVESTIGATION



Investigate the impact of intensification of farming on the soil.

investigating how intensive inorganic farming compares with similar land farmed organically

Comparing worm populations to support the idea 1

Contents

Research and introduction

- Soil is a living resource its character effected by its mineral composition and the organic composition.
- Much intensive practice has reduced organic matter and possibly harms soil structure.
- Excessive cultivation increases oxidation of organic matter
- Earthworms are a good indicator of soil overall health and productivity.

  They consume a great deal of matter in a short period of time - they can produce their own weight in castings (worm dung) every 24 hours

Intend to use them as the main way to compare two fields of the same soil type farmed in different ways for 30 years organically and intensively.

3

research
Where do worms live

- Earthworms can be found at just about every corner of the earth. They live in trees, in bark, and under rocks as well as along rivers and near springs, and ponds. Their favourite place to live, however, is in the earth's rich soil. During the winter months they burrow deep within the earth until the surface warms again during the spring. During the warm summer months, worms stay closer to the tops of soil where they create tunnels to wiggle in and out of. These tunnels are extremely important for plant life as they create a path for water and air, which is essential for the survival of plant life. (2)

- Soil farmed intensively tend to make a less suitable home for worms and so the soil will not gain from them.
- Worms indicate a healthy soil (2)

4

Research
what soils do they like

- The earthworms waste products add valuable nutrients to any soil. The concentrations of nitrogen, calcium, magnesium, and phosphates are all higher in soil that has earthworms. The movement of the earthworms through the soil loosens it up and makes it valuable to all gardeners and to many others. The enriched soil is naturally processed by the earthworms. Earthworms do not like acid soils with pH less than 4.5. The addition of lime raises pH and also adds calcium. Earthworms need a continuous supply of calcium, so are absent in soils low in this element
- (3)

5

prediction

I predicted that earth worms like to live in organic soil because they can eat the nutrients During the winter months they burrow deep within the earth until the surface warms again during the spring. During the warm summer months, worms stay closer to the tops of soil where they create tunnels to wiggle in and out of. These tunnels are extremely important for plant life as they create a path for water and air, which is essential for the survival of plant life. I predicted that the ph is Earthworms do not like acid soils with pH ($CaCl_2$) less than 4.5. The addition of lime raises pH and also adds calcium. Earthworms need a continuous supply of calcium, so are absent in soils low in this element .

Intensive farming will result in less worms and organic matter /humus because extensive cultivation exposes worms to the surface heat and predators and the use of inorganic fertiliser will result in many fewer worms.

6

Method

- Firstly you need tray, shovel and a bottle of hot soapy water
- Firstly we dug a hole (20x20) with a shovel in the organic soil
- Next we added the hot soapy water so that the worms come up to the surface waited 10 mins.
- We picked the worms up an placed them in a tray ,I will allow the same time at each site to collect.
- We then identified the worms using a key.
- Do this in both fields
- Carry out a BDH pH test collecting four samples from each site.
- Carry out a humus test air drying soil of known weight and then burning fiercly
- Then we can plot the data to look for patterns.

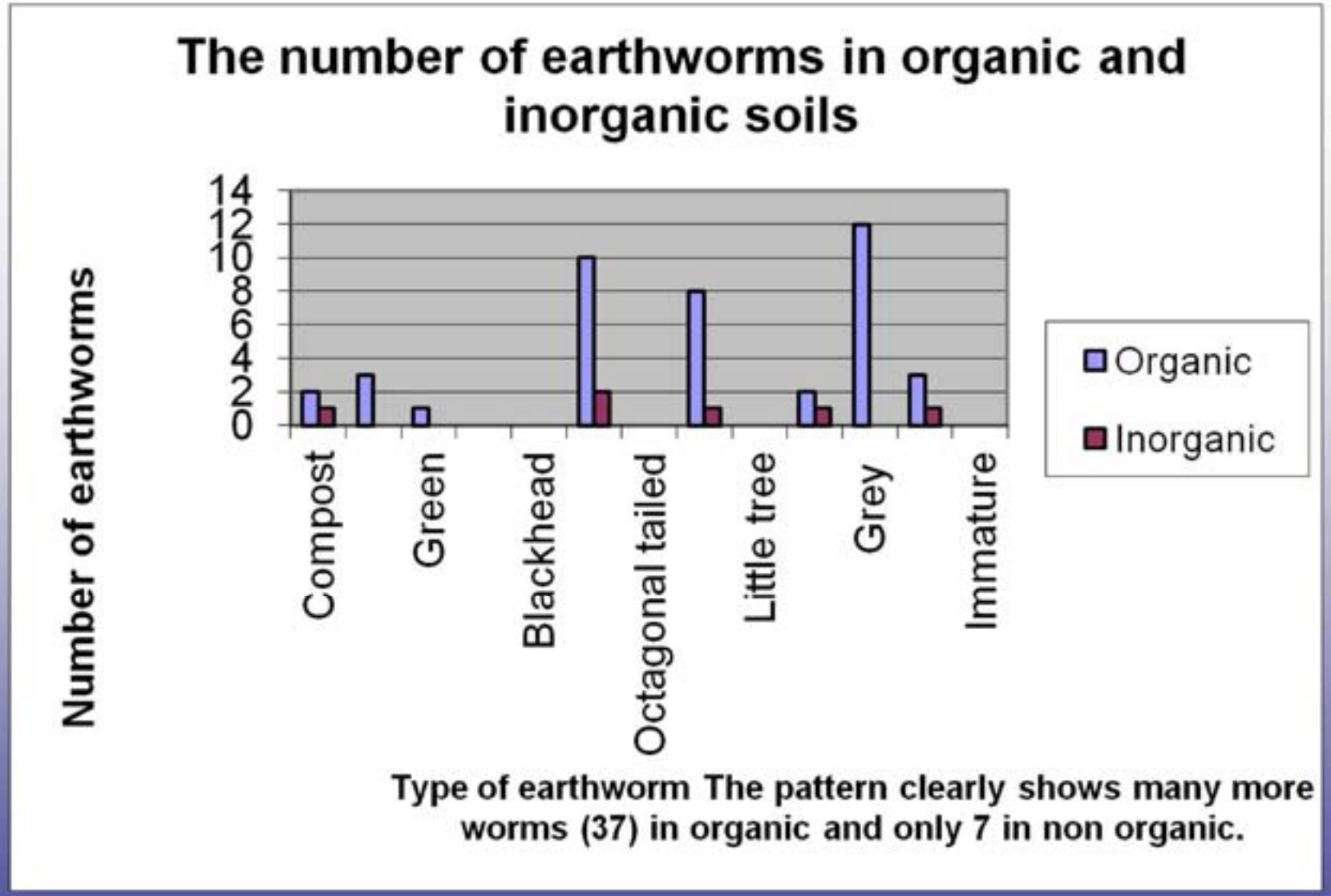
7

Risk/hazard management

- Collecting worms ,use soap and water only to avoid environmental harm or harm to user and not harm worms
- Watch out for trip hazards do not leave cans or tools on pathways.
- BDH testing. Use eye protection keep solutions and barium sulfate out of eyes
- Wash hands .
- Do not flush down sink.
- Humus testing, great care when heating soil in tins never face heated tin towards people .stones shatter and fly when hot, try to use a lid..
- Eye protection
- Care with hot container allow to cool in shallow waterbath

Table of my results from both fields

Earthworm type found	organic less intensive	inorganic intensive	
Compost	2	1	
Branding	3	0	
Green	1	0	
Redhead	0	0	
Blackhead	0	0	
lob	10	2	
Octagonal tailed	0	0	
Chestnut	8	1	
Little tree	0	0	
Rosie tipped	2	1	
Grey	12	0	
Blue grey	3	1	
Immature	0	0	


The number of earthworms in organic and inorganic soils
Number of earthworms
0
2
4
6
8
10
12
14
Compost
Green
Blackhead
Octagonal tailed
Little tree
Grey
Immature
Organic
Inorganic
Type of earthworm The pattern clearly shows many more worms (37) in organic and only 7 in non organic.

9

Testing soil ph

- Method :put a spoon full of bariums sulphate
- add small amounts of soil in a tin can use distiled water to soak the soil put 5 to 6 drop of universal indicator
- Shack the tin and a clear liquid will be at the top

- Conclusion :This means that the ph in the soil doesn't affect the earth worms as they are both very similar.

My results

Sample	Colour	Ph
Organic	Green	7.0
Inorganic	Dark green	7.5

11

Testing for organic matter

We put the soil in the tin then weighed it

We put a bunson burner in the tin to burn the soil

12

Table of results comparing humus and water content

Soil Analysis

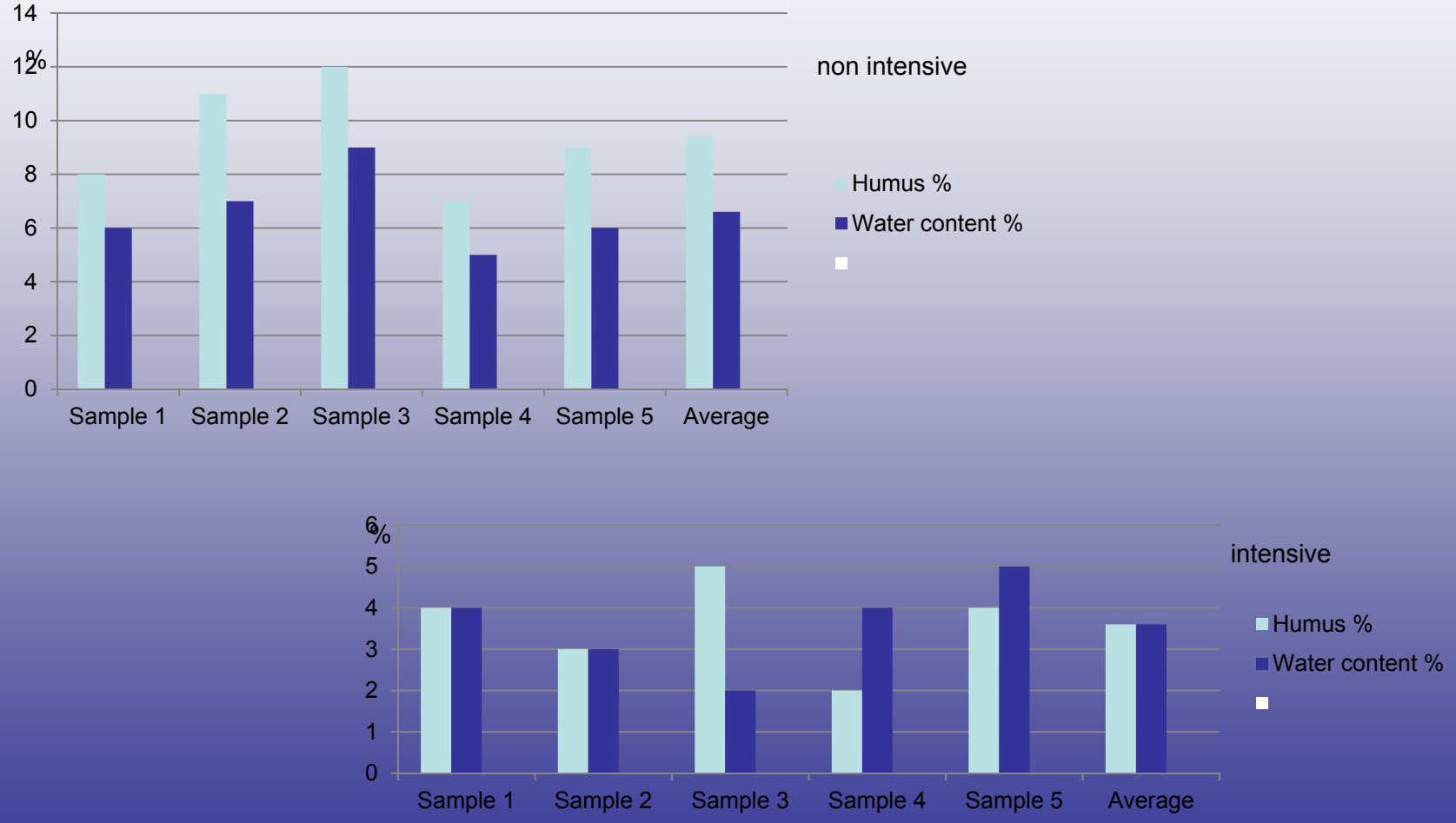
organic not intensive.

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
Humus %	8	11	12	7	9	9.4
Water content %	6	7	9	5	6	6.6

Soil analysis Intensive

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
Humus %	4	3	5	2	4	3.6
Water content %	4	3	2	4	5	3.6

Water and humus content of the intensive and non intensive soils



Conclusion

- Firstly earthworm survey confirms that inorganic soil 8 different worm species are found and in inorganic only 5 species found .In organic soil many more worms are present up 150% This is very much as my research suggested and suggests that worms are adding a considerable amount of organic matter to decompose into humus.
- The amount of humus is again much higher in organic soil almost 100% higher.
- Water content is also almost 75% greater in organic soil this would be largely due to more humus holding the water with humus acting like a sponge
- The data collected supports the prediction and my research suggesting that inorganically farmed land has a bad effect on the soil by reducing worms and soil life needed for humus to store water and nutrients.
- All three tests would indicate a bad effect but i have not been able to find how much profit each field makes.

10

Evaluation

- The data was limited by time and I only took one set of worm samples. The number of worms is greatly affected by weather and soil moisture and air temperature so ideally I needed to repeat this to confirm my findings However other students found similar findings. If I did it again I would take more readings on different days.
- To do this we had to carry out a field work risk assessment and remember to wash our hands after handling worms
- The humus graphs show a major difference and I think are fairly accurate however it was hard to stop some humus ash disappearing with the smoke. I could have used a clay crucible but the lab tech' says we will break them. When doing this test I wore eye protection and stood well back when heating the soil.
- I think the water content results were accurate as I used a new balance correct to two DP. I also think that air drying at 60 degrees C is best as it avoids humus being destroyed.
- I would like to take this further by repeating the worm survey at least three times. This would enable me to collect more meaningful results.
- I would ideally like to identify several farms intensive and non intensive on similar soils and carry out worm counts on these.
- By using additional data relating to humus pH and water content I think my results certainly support my research and prediction.

Bibliography

1. http://www.naturewatch.ca/english/wormwatch/about/ecology.html (January 7th 2011)
2. http://www.allaboutworms.com/where-do-earthworms-live (January 7th 2011)
3. http://www.essortment.com/all/earthworms soil_rmkf.htm (January 7th 2011)
4 Ialso thank my teacher and lab tech who discussed any questions.

13

Scientific Investigation: Mark Allocation

Strand to be assessed:

(a) Planning using appropriate secondary data

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
5-6 marks **Award 6 marks**	Selects relevant questions with some guidance. Plans an appropriate investigation incorporating some secondary data. Shows an awareness of limitations in the procedure and adequate action to control risk.	Candidates will have selected suitable research, use it to inform their plan and attempt to relate it superficially. They will show some awareness of the limitations of the procedure and take adequate care to control and manage risk.	Suitable risk management is indicated and clearly used; it is also evidenced in the photographs. The research involves several sources. Although it is only incorporated into the investigation to some extent, it does underpin the report. The hypothesis is a bit tentative but this is identified in the report.
7-8 marks	Selects relevant questions without guidance. Plans an appropriate investigation using a range of appropriate secondary data to inform the plan. Demonstrates a clear understanding of how to ensure precision and minimise error and control risk.	Selected a range of appropriate secondary data for the plan and worked independently to use the research to devise a workable scientific investigation and attempted to identify and control error to ensure an appropriate degree of precision and a full awareness of the risks involved in the procedure.	The candidate might appear to have worked independently but this can only be verified by the teacher and so it is advisable to annotate the script. There is insufficient detail of how secondary data is linked to the plan so not quite up to 7 marks.

(b) Collecting primary data

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
5-6 marks **Award 6 marks**	Carries out the investigation, collecting data of generally good quality with appropriate precision and repeatability; devises own format and correctly records data, including all units of measurement.	Collects a good range of data with sufficient accuracy and precision to show error or anomalous results and repeatability or additional data or work from a candidate doing similar activities, such work must be acknowledged. (In ELBS repeatability can be hard as investigations are often seasonal) Uses own recording method	Collected a good range of data and supportive data on pH, humus and water. The water humus data was good and almost suitable for the higher mark range, and made up for possible low precision in worm sampling, so overall supporting the higher mark in this range.

(c) Processing and analysing data

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
7-8 marks **Award 7 marks**	Reveals patterns in the data using graphical and/ or mathematical techniques. Provides an analysis of the trends/patterns based on the evidence and scientific knowledge and understanding. Uses the general pattern of results to give conclusions, with reasons, linked to scientific models.	As above but uses more data and clearly explains and identifies patterns and trends identifying some specific data expressed in the graphs and makes comments to address and justify the significance of this. Relate the outcomes to basic predictions within the plan and use the underlying science to attempt to explain the results and patterns shown. Uses scientific models to support the conclusion drawn.	A good range of data presented in a suitable way showing the pattern of results and compares them in a clear way. Data processed appropriately and conclusion shows use of mathematical data in a comparative way. The conclusion is linked to the science and to the prediction and research. Although, the conclusion is not directly explained as models it clearly relates to initial research.

(d) Evaluating the procedure and the evidence

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
5-6 marks **Award 6 marks**	Makes relevant comments about procedures used, including management of risks, and evidence obtained, including accuracy and any anomalous results. Suggests and explains changes that would improve the investigation.	Work at this level involves descriptions and some discussion rather than simple comments or statements, with some suggestions on how to improve to include some limited practical detail, e.g. change the temperature, but no detailed information on how to do it. Identifies anomalous or unexpected results and attempts to account and explain these.	Makes several comments about the procedure but in limited detail. Shows appropriate risk awareness and comments appropriately. Although no real anomalous results are identified candidate showed the awareness that only one sample from worm counts was a potential problem and the potential for error in humus sampling was explained and considered in a sensible way. Suggested and simply explained a range of suitable further studies and also drew attention to reasons for accepting the conclusion from his tests.

(e) The quality of scientific communication

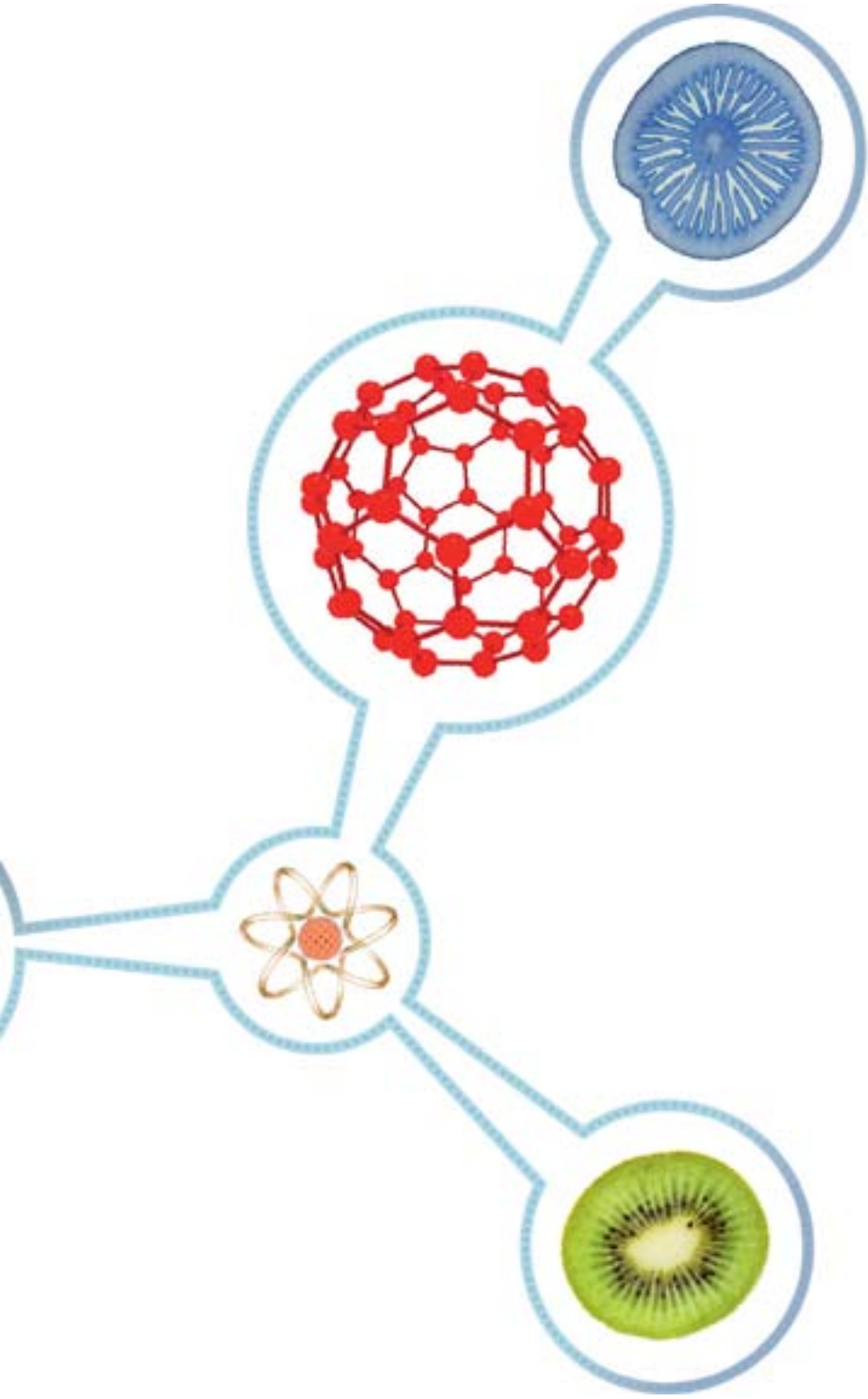
Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks**	Report well set out and a range of visual information used, with sections labelled; sub-headings, a table of contents and bibliography present. Information is effectively organized with generally sound spelling, punctuation and grammar. Scientific and technical terms are used appropriately.	The report will be logical and clearly set out with information presented in a logical way with sub headings, contents, pages numbered and a bibliography. Appropriate use of scientific and technical terms and a sound general vocabulary. Spelling, punctuation and grammar will have only a few errors The report will be easy to read and the reader will be able to understand its aim and the outcomes will be well communicated.	The mark criteria are all met at this level but with insufficient detail in the report and in use of references and making appropriate scientific use of these at a higher level. Generally, the use of English was good for work presented in this format and the investigation formed a full and balanced report.

(f) Determination, initiative and independence

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
3-4 marks **Award 4 marks**	Completes investigation and responds well to any difficulties when given guidance.	Generally worked independently with little need for direct guidance. Was able to identify problems but may have needed some guidance to resolve them.	This is always a teacher mark but the nature of this investigation could allow for any mark between 4-6 depending on the candidates motivation and ability. For argument, I assume the candidate required some general prompts and reminders typical of students in this mark range.

Overall for task: 33 marks out of 48

WORK-RELATED PORTFOLIO



Work related report on Paignton zoo and the job of a Zoo Gardener

Jon Magnolia

Contents

Introduction

- In September 2011 we went to Paignton zoo as part of the coursework on jobs in animal care. First we sat and listened to a speech from an actually zookeeper while a PowerPoint was playing in the background telling us how the zoo was formed and about the three main jobs: Vet, Gardener and Zookeeper. I will focus on the job of the zoo gardener. The zoo is a registered charity and has an impotent role in conservation and education . Paignton Zoo in Torbay Devon provides a valuable education resource and plays an important role in conservation and international breeding programmes.
- The gardener is part of the whole community and also provides plants for the public and for the new sea coasts project.

Herbert Whitley owner of
Paignton zoo a registered charity

Gardener For a Day

Be a Zoo Gardener for a Day This is a rare chance to get behind the scenes of the zoos botanic garden work. The department offers a wide range of experiences that cannot be found anywhere else. These include growing crops using the latest technology in our vertical hydroponic nursery, cultivating a wide diversity of plants in one of our indoor exotic glasshouses, helping check the inventory of plants in one of the main established collection areas and if required preparing the botanical labels to help interpret the collection.

Length of experience: 1 day

Cost: £150

Days: First Wednesday of each month.

Basic job description

- To assist the Head Gardener and Curator in delivering the aims and objectives laid out in the Garden Master Plan and Educational Strategy.
- To support the Head Gardener in managing the Garden and up to 40 volunteers as well as being part of a team of five skilled gardeners. Collectively to be involved in the training and development of two horticultural trainees.

Job description continued

- practical experience in the maintenance of gardens including the operation of grounds maintenance equipment.
- The main purpose of this role is to maintain and develop the gardens and grounds of the zoo. You must have practical gardening skills, a sound knowledge of
- plants, of garden machinery and tractors, an understanding proficiency in their operation
- and ability to support the implementation of relevant policies including Health and Safetyand CoSHH.
- The successful applicant should be a good communicator and happy to work as part of a small team but also be able to work on their own initiative. A flexible approach is very important.
- The role requires a driving licence and tractor experience is essential.
- Certificates for handling and applying weed killer, use of chainsaw is an advantage

Personal qualities needed for the job my interview with the gardener

- Patience because plants need time to grow
- Also you need to know about plant diseases and what the mean
- Be physically fit
- Get on with other people
- Learn from your mistakes
- Like plants and be interested in the overall work environment of the zoo and to incorporate the gardens into the zoo.

Qualifications needed

NVQS this is a national vacation qualification

They also have variety of courses to choose from this include:

- Horticulture level 1
- Amenity Horticulture levels 1-4
- Production Horticulture levels 1-3
- The courses allow access to a range of garden and park work and work for landscape gardeners

HORTICULTURE LEVEL 1

THE FIVE MAIN UNITS OF THE COURSE ARE :

- Maintain Safe and Effective Working Practices
- Assist with Maintaining Structures and Surfaces
- Assists with Maintaining Plants
- Assisting with Planting and Establishing Plants
- Assist with Propagation of Plants from Seeds
- Assist with the Maintenance of Grass Surfaces

SKILLS AND PRACTICES YOU WILL LEARN ARE :

- design, tractor driving, plant knowledge, propagation, full time garden projects, and much more.

AMENITY HORTICULTURE LEVELS 1- 4

- **LANDSCAPE QUALIFICATION:**
- Specify and monitor landscape maintenance
- Produce plants for decorative horticultural displays
- Maintain plants for decorative horticultural displays
- Create grassed and planted areas
- Manage planted areas for their amenity value
- Prepare sites for landscape construction and installation
- Construct hard landscape components
- Restore landscape and components
- Prepare for and maintain equipment and machines
- Transplant large root-balled trees
- Prepare and apply pesticides
- Design landscape areas and specify materials and components
- Assess the characteristics of the site
- Improve your customer relationship (ICS)
- Monitor and control customer service problems (ICS)
- Lead the work of teams and individuals to achieve objectives (Management Standards)

- **SPORTSTURF QUALIFICATION:**
- Create grassed and planted areas
- Manage sports turf areas
- Manage drainage and irrigation systems
- Manage planted areas for their amenity value
- Prepare and apply pesticides

PRODUCTION HORTICULTURE LEVELS 1-3

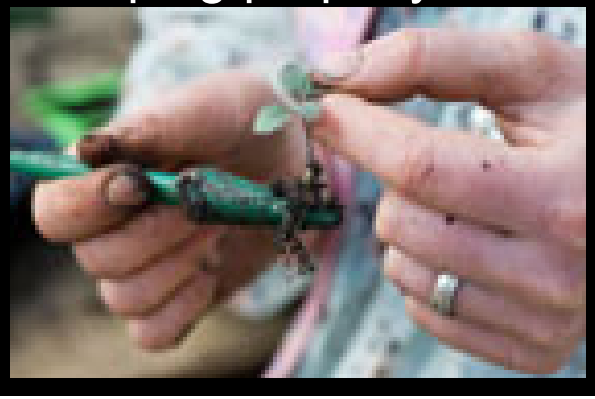
THE FIVE MAIN UNITS OF THE COURSE ARE :

- Monitoring health and safety
- Maintain & develop personal performance
- Establish and maintain effective working relationships with others
- Clearing horticultural and landscaping sites
- Establishing crops or plants in growing medium

- **OPTIONAL UNITS :**
- Prepare ground for seeding and planting
- Propagate plants from seed
- Monitor and report on the growth and development of crops and plants
- Control pest, diseases and disorders
- Load and unload physical resources within the work area
- Prepare plants for despatch

Specific skills – pricking out

- The term pricking out means the transferral of seedling to give it more room to develop and grow.
- Pricking out is an essential part of propagating plants from seed. Once seedlings have germinated, they need space to establish a strong root system. It's important to prick out as soon as the plant is ready; it's usually when the leaves start to come out.
- Then you have to move the plants into a different tray, with some good potting compost. They need enough room to develop a strong root system. When doing this you need to choose the strongest plants as these are the ones that are mostly like to survive.
- You have to do this really gently as you can very easily damage the plants; this could then lead on to the plants growth being stunted and them not developing properly.



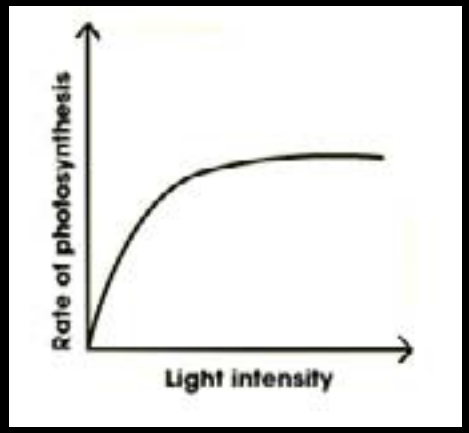
Scientific and technological knowledge

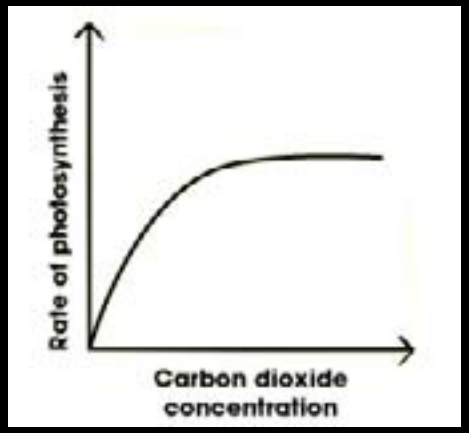
- **The maintenance of the Soil this includes the pH to measure the pH you would use a pH sensor**
- **Hydroponics pH sensors tells the pH of the soil/water either acidic or has alkaline**
- **Hydroponics Light sensors controls the amount sunlight received.**
- **Hydroponics Heat sensors in winter if it gets to cooled the sensor puts the heat on.**
- **pH affects the paInt growth because it affects the availability of nutrients to the plants. If the pH is higher than 7.5 then ions such as iron, Manganese, Copper, Boron and zinc become less available. When there is a deficiency then the plant's growth will slow down. It also affects the absorption of nutrients by the plants because when the pH is lower then 6, Phosphoric acid, calcium and mangnesium become less soluble in water and it becomes difficult for the plant to absorb them. When the pH is between 3 and 5 and the temperature above 26 degrees centigrade then fungal diseases can develop that will affect plant growth** .
- All work carried out has to be risk assessed and work in most enclosures requires close liaison with keepers and specific procedures to manage and control risk with no room for error !

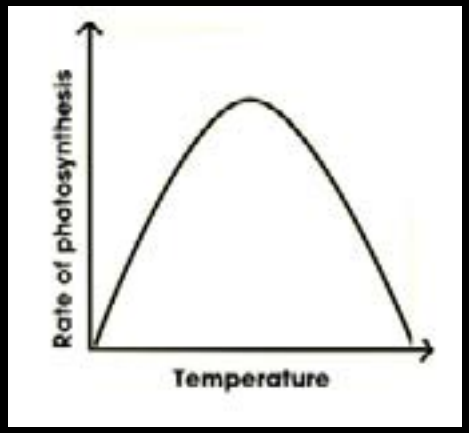
Limiting Factors In Photosynthesis

- Three factors can limit the speed of photosynthesis light intensity, carbon dioxide concentration and temperature.

- Without enough light, a plant cannot Photosynthesise very quickly
- Sometimes photosynthesis is limited by the concentration of carbon dioxide in the air.
- If it gets too cold, the rate of photosynthesis will decrease. Plants cannot photosynthesise if it gets too hot as well.







VERTICROP

- Plants are grown in a vertical plane in specially designed trays suspended from an overhead track. This allows the trays to rotate on a closed loop conveyor and in the process pass through a feeding station which provides water and nutrients. This permits an even airflow over the plants and equal exposure to light, whilst water and nutrient run-off from the feeding station is captured and recycled, reducing consumption to as little as 5% of the uptake in conventional systems.
- The use of this method allows animal food crops to be grown for special crops which would be expensive and difficult to obtain in the UK

VertiCrop™ vertical farm at Paignton Zoo

Financial Benefits Of Verticrop

- Installing VertiCrop™ at Paignton Zoo means they can grow more plants in less room using less water and less energy. It will help to reduce food miles and bring down our annual bill for animal feed, which is currently in excess of £200,000 a year. To begin with, the Zoo will grow a whole range of herbs such as parsley and oregano, as well as leaf vegetables like lettuce and spinach, plus a range of fruits such as cherry tomato and strawberry. Reptiles, birds and most of the mammal collection - including primates and big cats – will benefit from the production of year-round fresh food. Paignton Zoo animals crunch their way through about 800 carrots a day and approximately £8,000 worth of fruit per month. Herbs are used as enrichment for many species.

Making of the

The exhibit replicates the humid atmosphere, lush vegetation and tall tropical palms of a swamp. Head gardener Catherine Mortimer is cultivating giant water lilies for the attraction. It has been necessary to research the climatic and environmental conditions and to select suitable species for the animal enclosure. Victoria cruziana comes from the upper reaches of the Amazon in Argentina, Paraguay and Uruguay and has leaves two metres in diameter with up-turned edges. Underneath, the leaves are purple and covered with peach-like fuzz and razor-sharp teeth.

It is important to develop such exhibits for education and furthering public understanding and awareness of such species for some people it will be the closest they come to such environments

Crocodiles in crocodile swamp

BIBLIOGRAPHY
Useful web addresses for WRR

www.paigntonzoo.com
www.wikipedia.com
www.google.com
Gardener For a Day : shop.paigntonzoo.org.uk
Horticulture Course Information : www.myerscough.ac.uk
Limiting Factors In Photosynthesis
http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/plants/plants2.shtml

Work-Related Report: Mark Allocation

Strand to be assessed:

(a) Collecting primary data (information)

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
(a) Collecting primary data (information) **5-6 marks** **Award 6 marks**	Collects relevant and appropriate data from a variety of sources including a practitioner and/or workplace visit.	Candidates will have collected and selected relevant primary data for their report from a variety of sources, which includes suitable selection of the data collected from a visit or practitioner and or from their own enterprise.	Clearly collected data and information from the main practitioner and other employees and used secondary research.
(b) Reference to sources **5-6 marks** **Award 6 marks just**	Identifies sources clearly using adequate references.	Candidates will have identified a range of sources that they have accessed to complete collection of primary data, and it will be recorded in sufficient detail to know from whom, when and how data was collected. (see marking criteria)	A bibliography and basic references shown sufficient detail and amount appropriate for the topic, just 6

6 marks

(b) Collecting secondary data (information)

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
(a) Collecting secondary data (information) **5-6 marks** **Award 6 marks**	Researches, selects and uses one piece of secondary data to support the importance of the chosen job role.	For higher marks, candidates should show research skills demonstrating suitable selection of appropriate material from the available resources rather than indiscriminate copying.	The comments and data mean the information has been related to the report and the role of the gardener at the zoo.
(c) Reference to sources **5-6 marks** **Award 5 marks**	Identifies sources clearly using adequate references.	Higher marked candidates should be showing evidence of referencing through their report in addition to including a reference list.	References just adequate.

6 marks

(c) The work carried out

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
(a) The organisation/ workplace ** **5-6 marks** **Award 6 marks**	Explains how the roles of the employees contribute to the organisation.	For 5-6 marks, candidates need to give explanations on how the employees contribute to the organisation rather than simple comments or statements.	Candidate explained the role and its importance to the organisation directly and indirectly.
(b) The work carried out in a chosen job role and its place in the wider organisation** **5-6 marks** **Award 5 marks**	Explains the purpose of the work and how it fits into the wider organisation.	For 5-6 marks, candidates need to give explanations on the purpose of the job role showing understanding of how it fits in to the wider organisation rather than simple comments or statements e.g. Links to National and European agricultural policies.	Explains the role of the gardener in limited detail and how some aspects have a wider impact on the organisation.

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
(c) The location of the organisation/ workplace and the effect on society **5-6 marks** **Award 5 marks just**	Explains the reasons for the location of the organisation and some effects on society.	For 5-6 marks, candidates need to give explanations on the reasons for the location of the organisation and more than one effect the work has on society rather than simple comments or statements.	Although not really explained, the location is given and the Candidate has identified its wider role in society.

5 marks

d) Skills used in the workplace

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
(a) Technical skills applied in the workplace **5-6 marks** **Award 5 marks**	Explains how examples of technical skills are applied in the workplace.	For 5-6 marks, candidates need to explain how the technical skills are applied in the workplace. The technical skill information at this level needs to link to how the practitioner uses the skill within the job role.	Technical skills involved in cultivation and management explained and related to the job in a basic way.
(b) The expertise needed by an individual, or a working group, with the vocational qualifications and personal qualities required **5-6 marks** **Award 5 marks**	Explains how the expertise, vocational qualifications and personal qualities needed by an individual, or a working group relate to the work.	For 5-6 marks, candidates need to explain how the expertise, personal qualities and qualifications needed in the job role are applied in the workplace. Note that as well as the need to include all three qualities, the report needs to include an explanation of what these are and how they are used, and not just statements to identify them.	This has been given in some detail and clearly related to the job in different ways even if not in depth.

5 marks

(e) Scientific knowledge applied in the workplace

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
(a) Scientific knowledge applied in the workplace **5-6 marks** **Award 6 marks**	Explains how scientific knowledge underpins the work described.	For 5-6 marks, candidates need to explain how the scientific knowledge underpins the work described. Candidates at this level should not be just including the related science but must indicate how it is used by the practitioner chosen.	This is covered indirectly and directly in the reasonable detail of verticulture
(b) Financial or other regulatory contexts that impact on the work done (e.g., health and safety regulations) **3-4 marks** **Award 4 marks**	Identifies two relevant examples of the impact of a financial or other regulatory factor on the work.	For 3-4 marks, candidates will need to identify examples of two examples of the impact of financial or regulatory factors (this can include 1 from each section or 2 from the same) involved in the chosen job role. Work at this level will probably just include basic statements on the factors with minimal reference to impact. Again take care candidates include the impact of these regulations and not just statements of what they are.	Work relating to finance and the importance of verticulture and to the course being a fundraiser are explored. An awareness of the need for specific area risk assessments involving other departments is evident.

5 marks

(f) Quality of the presentation

Mark allocated	Specification statements	Teacher Guidance	Task specific justification
(a) The structure and organisation of the scientific report **5-6 marks** **Award 5 marks**	Communicates Information relevant to the task in a clear, effectively organised report, and includes contents listing of key elements, reference page and page numbering. Presents the information in a form and structure that mostly suits its purpose.	The aim of this strand is to assess how candidates can organise and write a scientific report, using relevant scientific or technical vocabulary and suitable visual material. It is advisable that candidates are given the marking criteria for this section so they are aware of what they need to do to complete a well structured scientific report.	Generally met, in some slides a bit basic but others in depth.
(b) Use of visual means of communication (charts, graphs, pictures etc) **5-6 marks** **Award 5 marks**	Uses a variety of types of visual material to convey information or illustrate ideas.		Generally makes good use of visual material to covey ideas and information.
(c) General quality of communication **5-6 marks** **Award 6 marks**	Uses limited relevant technical or scientific vocabulary. The report is written clearly. Spelling, punctuation and grammar are of very variable quality.		Allowing for use of spell check, the general standard is good for a power point presentation.

5 marks

Total mark 32 out of 48

GENERAL QUALIFICATIONS
Telephone 01223 553998
Facsimile 01223 552627

science@ocr.org.uk
1 Hills Road, Cambridge CB1 2EU

www.gcse-science.com