



SAMPLE ASSESSMENT TASKS

PLANT PRODUCTION SYSTEMS
ATAR YEAR 11

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Sample assessment task

Plant Production Systems – ATAR Year 11

Task 3 – Unit 1 and Unit 2

Assessment type: Production project

Conditions

Period allowed for completion of the task: 2 weeks with a combination of in-class and out-of-class work

Task weighting

5% of the school mark for this pair of units

Fodder crop

(58 marks)

Supplementary feeding is important in any livestock enterprise. Your role is to research and produce a fodder crop at the research station.

What to do

1. **Quality hay production**

Discuss **two (2)** uses of a fodder crop and how it fits into the whole-farming system.

(4 marks)

2. **Paddock plan**

Draw a diagram of the paddock chosen to grow the fodder crop. On the diagram include

- fence lines, gates, water points etc.
- any environmentally significant areas like nearby remnant vegetation, and water ways
- a calculation of the arable area, and
- areas you would exclude from the paddock
- discussion of reasons for your decision.

(8 marks)

3. **Plant variety**

- List **four (4)** plant varieties suited to hay production and describe their characteristics.

(8 marks)

- Recommend a variety to grow and give reasons to support your selection.

(3 marks)

- Farmers sometimes grow a legume with their hay crop to improve the nutritive value of the fodder. Identify and describe two suitable legume varieties for this purpose.

(6 marks)

4. **Production goals**

- Identify production goals (i.e. quality and quantity goals) for the hay crop.

(4 marks)

- Identify **three (3)** factors that will impact on the quality of a fodder crop. For each factor, explain what needs to be managed to maximise the final quality of the hay.

(9 marks)

5. **Timeline**

Produce a timeline showing the expected activities as your hay crop grows. Include the crop growth stages and how this relates to timing of each activity. (12 marks)

6. **Referencing**

Provide a reference list such that any sources of information used in researching the information are acknowledged and another reader could access these resources.

For books the name of the author(s), title of the book, date of publication and publisher need to be provided.

For scientific reports the name of the author(s), report title, date of publication and where the report is published need to be provided.

Where web based sources are used, give its html address, the date accessed and, ideally, the author and/or publisher of the website.

(4 marks)

Marking key for sample assessment task 2 – Unit 1 and Unit 2

Student Name: _____

Description	Marks
1. Quality hay production	
1 mark for each use of fodder crop identified (up to 2 marks) – possible uses include <ul style="list-style-type: none"> • supplementary feed • fattening stock • hay reserves for poor seasons 	1–2
Recognises how the identified use fits in with the whole-farming system (1 for each use)	1–2
Subtotal	4
2. Paddock plan	
<ul style="list-style-type: none"> • clearly drawn diagram including fences, gates and water points • identifying environmental issues on diagram • correct calculations of arable area • identification of areas on the diagram to be excluded from the paddock • reasons discussed for areas excluded from paddock 	1–2 1 1–2 1 1–2
Subtotal	8
3. Plant variety	
<ul style="list-style-type: none"> • identification of four plant varieties for hay production (1 mark each) • characteristics for each variety given • variety recommended • reasons for recommendation provided • identification of two legume varieties for hay production (1 mark each) • description of each legume variety (2 marks each) 	1–4 1–4 1 1–2 1–2 1–4
Subtotal	17
4. Production goals	
<ul style="list-style-type: none"> • identification of quality production goals • identification of quantity production goals • identification of three factors that will impact quality of hay crop (1 mark each factor) • explains what needs to be managed for each factor to maximise final hay quality (2 marks each) 	1–2 1–2 1–3 1–6
Subtotal	13
5. Timeline	
Include activities such as <ul style="list-style-type: none"> • weather events e.g. opening rain, false break, waterlogging, frost, storm, lightning (fire), high temperature • pests/weeds/diseases could occur e.g. first emergence of weeds, later emergence of weeds (doublegees), symptoms of disease (fungal), appearance of pests (RLEM, aphids) • management practices e.g. topdressing fertiliser, weed/pest/disease control, sowing, checking, mowing, baling • growth stages of the crop e.g. germination, emergence, leaf formation, tillering, stem elongation, flowering, grain fill 	1–3 1–3 1–3 1–3
Subtotal	12

Description	Marks
6. Referencing	
• at least three sources – 1 mark each up to a maximum of 3 marks	1–3
• clear referencing allowing verification	1
Subtotal	4
Total	58

Sample assessment task

Plant Production Systems – ATAR Year 11

Task 6 – Unit 1 and Unit 2

Assessment type: Investigation

Conditions

Period allowed for completion of the task: 2 weeks; combination of in-class and out-of-class time

Task weighting

10% of the school mark for this pair of units

Effect of salinity on seed germination

(61 marks)

There is concern about the salinisation of farmland due to the potential for it to negatively impact plant health, including the germination rate of seeds.

In this investigation you will measure the rate of germination of wheat, barley and radish seeds in different salt concentrations.

The steps involved

Phase 1 – Research and planning (individual followed by group refinement)

Phase 2 – Conduct the experiment (group work)

Phase 3 – Data processing and analysis (individual followed by group refinement)

Phase 4 – Evaluation (individual followed by group refinement)

What you need to do

Research and planning

- (a) Initially working on your own, research background information about germination. Use the 'Research' questions on the *Investigating germination and salinity* worksheet to assist with your research. You need to show this to your teacher before the next step.
- (b) Working in your group, discuss your individual research and refine your ideas through group discussion. Each member of the group will need to submit any revised answers to the 'Research' questions.
- (c) Initially working on your own, complete the 'Planning' questions on the *Investigating germination and salinity* worksheet. You will be given 20 minutes of class time to do this. You need to show this to your teacher before the next step.
- (d) Working in your group, discuss your individual planning and refine your ideas through group discussion. Each member of the group will need to submit any revised answers to the 'Planning' questions.

Conduct the experiment

- (e) Working in your group, conduct the experiment as described in the *Investigating germination and salinity* worksheet.

Data processing and analysis and Evaluation

- (f) Initially working on your own, complete the 'Data processing and analysis' and 'Evaluation' questions in the *Investigating germination and salinity* worksheet.
- (g) Working in your group, discuss your individual analysis and evaluation and refine your ideas through group discussion. Each member of the group will need to submit any revised answers to the 'Data processing and analysis' and 'Evaluation' questions.

Investigating germination and salinity

Research sheet

Student's name: _____

Background research

1. Briefly describe how soils in many agricultural regions of Western Australia have become salt affected. (3 marks)

Individual ideas

Any refinements after group discussion

2. Identify at least **two (2)** factors that can influence seed germination? (2 marks)

Individual ideas

Any refinements after group discussion

Planning

1. What is the aim of your investigation? (2 marks)

Individual ideas

Any refinements after group discussion

2. What are the independent variables (i.e. variables to be varied) in the investigation? (2 marks)

Individual ideas

Any refinements after group discussion

3. What is the dependent variable (i.e. variable to be measured) in the investigation? (1 mark)

Individual ideas

Any refinements after group discussion

4. What variables need to be controlled in the investigation? (3 marks)

Individual ideas

Any refinements after group discussion

5. Write a hypothesis for your investigation. (2 marks)

Individual ideas

Any refinements after group discussion

6. Predict what you think will happen. (2 marks)

- 7. List any equipment you need for your investigation. Indicate the concentrations of the salt solutions you wish to use and the number and types of seeds needed. (4 marks)

Individual ideas	Any changes after group discussion

- 8. Describe the method you will use to conduct the investigation. Describe how you will control variables and ensure it is a fair test. Indicate how frequently measurements will be taken and how many seeds will be used. Show your plan to your teacher. (7 marks)

Individual ideas

Any refinements after group discussion

Conduct the experiment

In your group, conduct the experiment safely as in the plan approved by your teacher.

(5 marks)

Results

(8 marks)

Present your results in table format. Spread sheets such as *Excel* can be used for tables. Provide a supporting description of your observations over the duration of the trial.

Data processing and analysis

1. For each seed type, determine the average germination rate at each salt concentration and graph the results. Ensure appropriate labels and a key are used where needed. This can be done using graph paper or a spread sheet. (9 marks)
2. Describe any patterns or trends in your data. Are there differences in response to salt between the types of seed? (3 marks)

Individual ideas

Any refinements after group discussion

Evaluation

1. Do the data support the hypothesis? Explain. (2 marks)

Individual ideas

Any refinements after group discussion

2. State a conclusion that relates to the aim and hypothesis. (2 marks)

Individual ideas

Any refinements after group discussion

- 3. (a) List any sources of experimental error. (2 marks)
- (b) Suggest how the experimental design may have been improved to reduce any errors. If you think no changes are needed, explain why. (2 marks)

Individual ideas

Any refinements after group discussion

ACKNOWLEDGEMENTS

Planning, Data Analysis and Evaluation questions adapted from: Hackling, M. W. (2005). *Working scientifically: Implementing and assessing open investigation work in science* (Rev. ed.) (Appendices 2 & 3: Planning and report worksheet for science investigations). Perth: Department of Education and Training, pp. 27–38.

Marking key for sample assessment task 6 – Unit 1 and Unit 2

Description	Marks
Background research	
1. Recognition that soil salinity in W.A. farmlands is caused by <ul style="list-style-type: none"> removal of deep-rooted perennial trees that leads to raising of the water table that in turn dissolves salt in the ground and carries it to the root zone for shallow-rooted crops 	1 1 1
2. Identification of two factors that affect seed germination such as: <ul style="list-style-type: none"> internal factors such as seed maturation, seed dormancy, seed coat temperature availability of water availability of oxygen light smoke chemicals 	0–2
Planning	
1. Recognition that aim of investigation is to measure germination rates under different concentrations of salt solution and compare the response of different seed types to salt	1–2
2. Recognition that independent variables are salt concentration and seed type	1–2
3. Recognition that dependent variable is rate of germination	1
4. Recognition of control variables e.g. temperature, light exposure, quantity of solution given to seeds	0–3
5. Hypothesis stated in terms of how independent variables will affect dependent variable	0–2
6. Prediction expressed in terms of effect of independent variables on dependent variable	0–2
7. Equipment list	0–4
8. Description of method including indication of <ul style="list-style-type: none"> how variables will be controlled concentrations of salt solutions inclusion of control seeds (i.e. no salt – water only) repeats will be used number of seeds in each dish 	0–3 1 1 1 1
Conduct the experiment	
Safe conduct of experiment	0–2
Measurements made daily	1
Equipment cleaned and stored on completion of experiment	1–2
Results	
<ul style="list-style-type: none"> Appropriately designed table/s Table has appropriately labelled columns Table includes repeats and their averages Supporting description of appearance of seeds/seedlings 	1 1 0–2 0–4
Data processing and analysis	
1. Determination of averages for each seed type and graph with <ul style="list-style-type: none"> appropriate title appropriately labelled axes plot for wheat seeds, plot for barley seeds plot for radish seeds key 	0–3 1 1 1 1 1 1
2. Recognition of trend – statement relates dependent variable to independent variable; and compares sensitivity of wheat, barley and radish	0–3

Description	Marks
Evaluation	
1. Makes a valid statement relating hypothesis to results	0–2
2. States a conclusion related to aim and hypothesis	0–2
3. (a) Identifies possible errors in the experimental design	0–2
(b) Suggests possible improvements or justifies lack of need for changes to experimental design	0–2
Total	61

Sample assessment task

Plant Production Systems – ATAR Year 11

Task 2 – Unit 1 and Unit 2

Assessment type: Test

Conditions

Time for the task: 60 minutes

Task weighting

10% of the school mark for this pair of units

TEST

Plant structure and function

Recommended time: 60 minutes

Structure of the test:

Section	Suggested working time	Number of questions	Marks
ONE Multiple-choice	15 minutes	10	10
TWO Short answer	45 minutes	7	45
		Total	55

PLEASE DO NOT OPEN THE TEST UNTIL INSTRUCTED TO DO SO

Section One: Multiple-choice questions

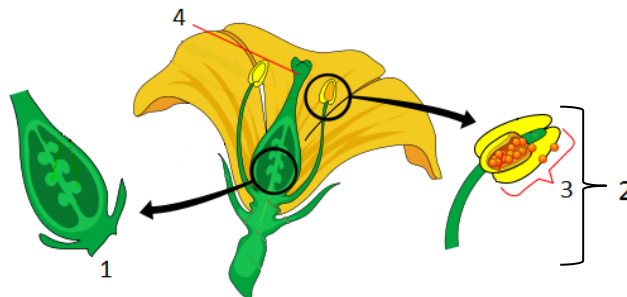
Choose the correct answer from the choices offered. Place answers on the multiple-choice answer sheet provided.

- Which one of the following represents cross-pollination?
 - cuttings made from one plant and grown into a new plant
 - genetic material transferred between plants
 - pollen transferred from one flower to another flower on a different plant
 - pollen transferred from one flower to another flower on the same plant

- Nutrient uptake in plants occurs via
 - root hairs.
 - root tips.
 - phloem.
 - xylem.

- Stomata are **best** described as
 - cell organelles involved in storage.
 - root structures.
 - pores on the leaf surface.
 - fine leaves to reduce water loss.

Consider the diagram of a flower and its parts below to answer question 4.



- Which one of the following gives the correct names for parts labelled 1, 2, 3 and 4?

	1	2	3	4
a)	anther	stigma	ovary	stamen
b)	ovary	stamen	anther	stigma
c)	stamen	anther	stigma	ovary
d)	ovary	anther	stamen	stigma

5. Plants with a large root surface area are better able to
- absorb water and nutrients from the soil.
 - absorb water and salt from the soil.
 - release water and nutrients from roots.
 - release water and salt from roots.
6. Nutrients are transported from roots to shoots via
- phloem.
 - xylem.
 - root hairs.
 - stomata.
7. The following statements relate to a major group of flowering plants.
- There is a single tap root with smaller roots growing from it.
 - Main veins of leaves are parallel.
 - The seeds germinate with a single seed-leaf.
 - The parts of the flower are in multiples of three.
- Which of the above characteristics correctly describe the group of flowering plants called monocots?
- I and III
 - I, II and III
 - II and III
 - II, III and IV
8. Crops need the most nitrogen during
- germination.
 - flowering.
 - reproductive growth.
 - vegetative growth.
9. What is the role of sulfur in plant nutrition?
- It has an important role in energy transfer in plant cells.
 - It helps promote flowering in plants.
 - It is used in the formation of amino acids, proteins, and oils.
 - It is important for regulating the opening and closing of stomata.
10. Theoretically, rates of fertiliser applications need to match soil types and
- rates of growth.
 - crop establishment.
 - cropping history.
 - yield.

End of Section One

Section Two: Short-answer questions

(46 marks)

Complete the questions in the spaces provided. All questions should be attempted.

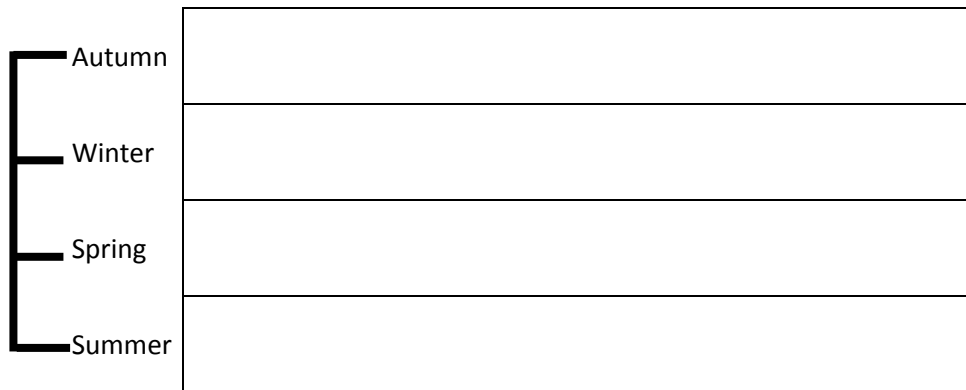
11. For a plant type that you are familiar with, answer the following questions.

Plant type: _____

a) On the timeline below, indicate when the following growth stages typically occur.

(6 marks)

flowering	germination (annual plant types only)	seedling establishment
vegetative growth	seed/fruit set	dormancy (perennial plant types only)



b) For each of the growth stages in the table below, describe the plant’s main nutritional requirements and provide an example of a fertiliser able to supply the nutrient.

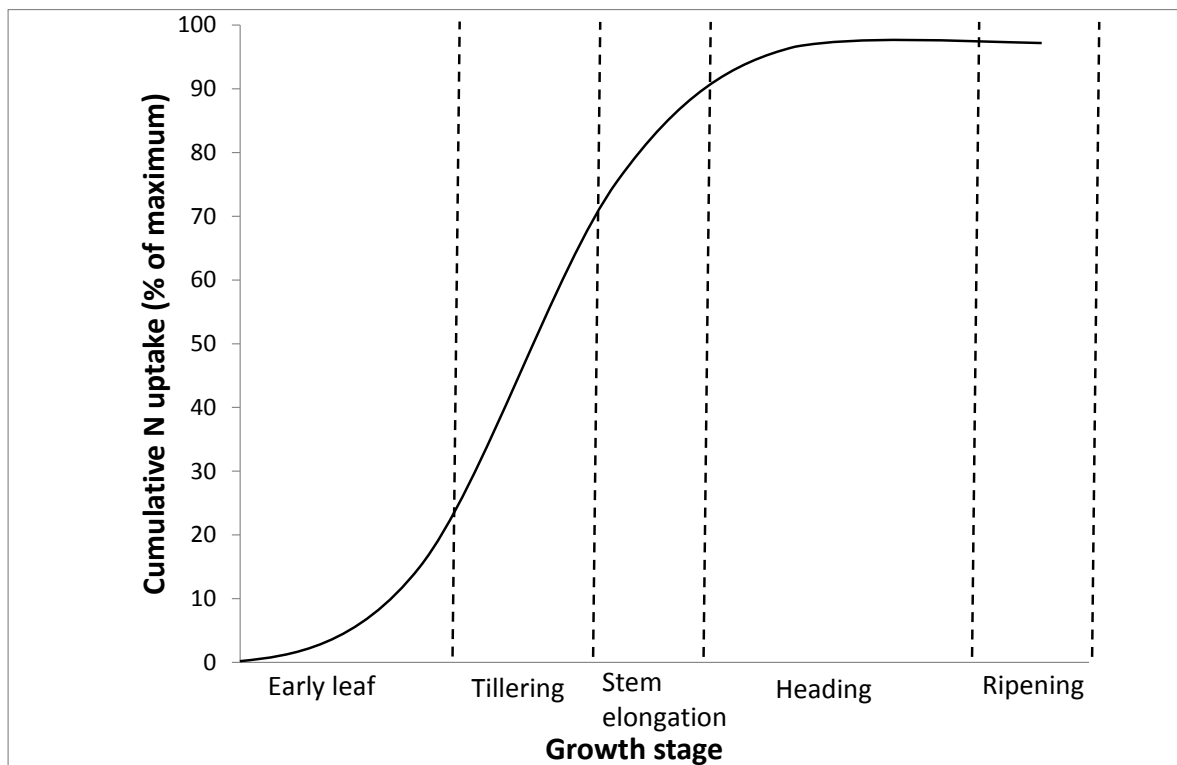
(8 marks)

Growth stage	Nutritional requirement	Fertiliser
Germination		
Vegetative growth		
Flowering		
Dormancy		

12. a) Complete the table below by explaining what is occurring in an **annual** plant at the indicated growth stages. (6 marks)

Growth stage	Explanation
Germination	
Vegetative growth	
Reproductive stage	

- b) The graph below shows the typical nitrogen requirements for a wheat crop during its growth cycle. The x -axis shows the typical growth stages for wheat.



- c) The total nitrogen required by the crop during its growth cycle is approximately 120 kg/ha. At the time of sowing, the nitrogen available from the soil and a previous legume crop is about 80 kg/ha.

(5 marks)

- i. What percentage of the total nitrogen required is available at the time of sowing?

(1 mark)

- ii. At what growth stage should it be applied, and why?

(2 marks)

- iii. What quantity of nitrogen fertiliser needs to be added?

(1 mark)

- iv. State why it is necessary for there to be rain for post-sowing fertiliser application.

(1 mark)

13. Describe the process of sexual reproduction as it applies to plants. (4 marks)

14. Describe the process of asexual reproduction as it applies to plants. (4 marks)

15. Complete the following table for the indicated reproduction types by identifying **one (1)** advantage and **one (1)** disadvantage. (4 marks)

Reproduction type	Advantage	Disadvantage
Sexual reproduction		
Asexual reproduction		

16. For each of the following reproduction types, give an example of a plant production system where it is used and state why it is the most suitable. (4 marks)

Sexual

Asexual

17. Complete the table below by giving the function of the listed plant parts. (6 marks)

Plant part	Function
Waxy cuticle	
Phloem	
Petiole	

End of test

ACKNOWLEDGEMENTS

Section One

- Question 4** Image adapted from: Ruiz, M. (2007). *File:Mature flower diagram.svg*. Retrieved August, 2014, from http://commons.wikimedia.org/wiki/File%3AMature_flower_diagram.svg

Marking key for sample assessment task 2 – Unit 1 and Unit 2

Section One: Multiple-choice

(10 marks)

Question	Answer
1	C
2	A
3	C
4	B
5	A
6	B
7	D
8	D
9	C
10	A

Description	Marks
1 mark per question	0–10
Total	10

Section Two: Short answer

(46 marks)

11. For a plant type that you are familiar with, answer the following questions.

Plant type: _____

a) On the timeline below, indicate where the following growth stages typically occur.

flowering	germination (annual plants types only)	seedling establishment
vegetative growth	seed/fruit set	dormancy (perennial plant types only)

Description	Marks
For the selected plant type, 1 mark for each growth stage correctly aligned to the season	0–6
Total	6

- b) For each of the growth stages in the table below, describe the plant's main nutritional requirements and provide an example of a fertiliser able to supply the nutrient.

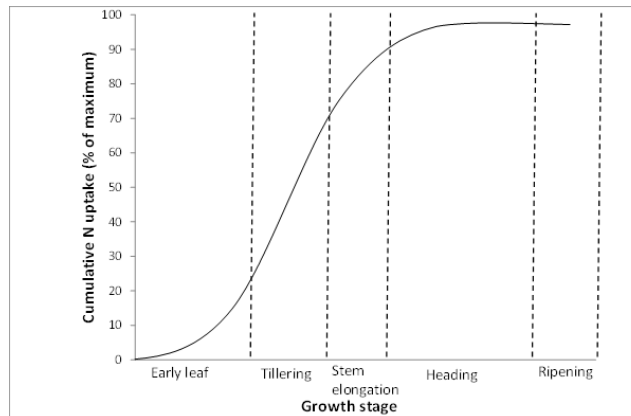
Growth stage	Nutritional requirement	Fertiliser
Germination	Nutritional needs contained in seed – no need for additional fertiliser but usually seed is sown with fertiliser required for vegetative growth	Nil required but fertiliser added for vegetative growth
Vegetative growth	Active growth – nitrogen and phosphorus	Urea (N) Superphosphate (P) Hayburst etc.
Flowering	Potassium required for flowering and fruiting	Any fertiliser with potash e.g. sulfate of potash, super potash
Dormancy	Plant going into dormancy – no additional nutrition required	Nil

Description	Marks
1 mark for each nutritional requirement	0–4
1 mark each for suitable fertiliser	0–4
Total	8

12. a) Complete the table below by explaining what is occurring in an **annual** plant at the indicated growth stages.

Description	Marks
Germination, at least two of the following <ul style="list-style-type: none"> seed takes up water embryo releases enzymes to mobilise food reserves embryo develops root and shoot and starts to grow 	0–2
Vegetative growth <ul style="list-style-type: none"> plant increases in size through developing root system and leaf/stem structures 	1 1
Reproductive stage, at least two of the following <ul style="list-style-type: none"> plant flowers set seeds reserve nutrients sent to fruit/seed for next generation 	1–2
Total	6

- b) The graph below shows the typical nitrogen requirements for a wheat crop during its growth cycle. The x -axis shows the typical growth stages for wheat.



The total nitrogen required by the crop during its growth cycle is approximately 120 kg/ha. At the time of sowing, the nitrogen available from the soil and a previous legume crop is about 80 kg/ha.

- What percentage of the total nitrogen required is available at the time of sowing?
- At what growth stage should it be applied, and why?
- What quantity of nitrogen fertiliser needs to be added?
- State why it is necessary for there to be rain for post-sowing fertiliser application.

Description	Marks
i. recognition that 80 kg/ha represents ~67 % of N needed	1
ii. recognition that N fertiliser application needs to be mid to late tillering recognition that the importance of the timing is because the soil will be depleted of nitrogen	1 1
iii. amount of N needed = $120 - 80 = 40$ kg/ha	1
iv. recognition that rain needed to wash fertiliser to root zone	1
Total	5

13. Describe the process of sexual reproduction as it applies to plants.

Description	Marks
Recognition of the following	
<ul style="list-style-type: none"> involves two parents – male and female offspring are different to each other and parents. involves flowers, pollen, pollination, seed formation 	1 1-2 1
Total	4

14. Describe the process of asexual reproduction as it applies to plants.

Description	Marks
Recognition of the following	
<ul style="list-style-type: none"> involves single parent offspring genetically identical to each other and parent involves cuttings, runners, tubers, grafting 	1 1-2 1
Total	4

15. Complete the following table for the indicated reproduction types by identifying **one (1)** advantage and **one (1)** disadvantage.

Reproduction type	Advantage	Disadvantage
Sexual reproduction	Cheap and easy, offspring varied so useful for developing new varieties. Used in crossbreeding programs	Offspring have varied characteristics so harder management. Limited to flowering plants
Asexual reproduction	Offspring identical so easier management.	Additional cost and time involved. Only useful for perennial high value crops.

Description	Marks
1 mark for each advantage and disadvantage	1–4
Total	4

16. For each of the following reproduction types, give an example of a plant production system where it is used and state why it is the most suitable.

Description	Marks
Production system for sexual reproduction	1
Appropriate reason for use of sexual reproduction given for stated system	1
Production system for asexual reproduction	1
Appropriate reason for use of asexual reproduction given for stated system	1
Total	4
Answer could include, but is not limited to:	
For sexual reproduction possible production systems include <ul style="list-style-type: none"> cereal and legume crops, pastures; broad acre situations, Suitable because broad acre farming systems most practically need seeds for sowing in paddocks.	
For asexual reproduction possible production systems include <ul style="list-style-type: none"> orchard industry, potatoes, strawberries Suitable because it gives reliability of offspring performance.	

17. Complete the table below by giving the function of the listed plant parts.

Plant part	Function
Waxy cuticle	The water-repelling layer on the outer surface of a leaf that helps keep it from drying out (and protect it from invading bacteria, insects, and fungi).
Phloem	The phloem transports soluble nutrients such as sugars and other organic compounds made in the leaves to other parts of the plant.
Petiole	The petiole is the stalk that attaches the leaf to the stem.

Description	Marks
Waxy cuticle function	1–2
Phloem function	1–2
Petiole function	1–2
Total	6