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

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

   (8 marks)

3. **Plant variety**
   a) List **four (4)** plant varieties suited to hay production and describe their characteristics.

   (8 marks)
   b) Recommend a variety to grow and give reasons to support your selection.

   (3 marks)
   c) 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**
   a) Identify production goals (i.e. quality and quantity goals) for the hay crop.

   (4 marks)
   b) 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: _______________________________**

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Quality hay production</strong></td>
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</tbody>
</table>
| 1 mark for each use of fodder crop identified (up to 2 marks) – possible uses include:  
  • supplementary feed  
  • fattening stock  
  • hay reserves for poor seasons  
Recognises how the identified use fits in with the whole-farming system (1 for each use) | 1–2   |
| **Subtotal**                                                               | 4     |
| **2. Paddock plan**                                                        |       |
|  • 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   |
| **Subtotal**                                                               | 8     |
| **3. Plant variety**                                                       |       |
|  • 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   |
| **Subtotal**                                                               | 17    |
| **4. Production goals**                                                    |       |
|  • 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   |
| **Subtotal**                                                               | 13    |
| **5. Timeline**                                                            |       |
| Include activities such as:  
  • 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   |
<p>| <strong>Subtotal</strong>                                                               | 12    |</p>
<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
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<tbody>
<tr>
<td>6. Referencing</td>
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<tr>
<td>• at least three sources – 1 mark each up to a maximum of 3 marks</td>
<td>1–3</td>
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<tr>
<td>• clear referencing allowing verification</td>
<td>1</td>
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<tr>
<td>Subtotal</td>
<td>4</td>
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<tr>
<td>Total</td>
<td>58</td>
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</tbody>
</table>
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

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   Any refinements after group discussion

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

   Individual ideas

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   _______________________________________
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   Any refinements after group discussion

   _______________________________________
   _______________________________________
   _______________________________________
Planning

1. What is the aim of your investigation? (2 marks)
   Individual ideas
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   Any refinements after group discussion
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
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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

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Any refinements after group discussion

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

Individual ideas

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Any refinements after group discussion

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

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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)

<table>
<thead>
<tr>
<th>Individual ideas</th>
<th>Any changes after group discussion</th>
</tr>
</thead>
<tbody>
<tr>
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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
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Sample assessment tasks | Plant Production Systems | ATAR Year 11
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

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Any refinements after group discussion

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Evaluation

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

   Individual ideas

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   Any refinements after group discussion

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

   Individual ideas

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   Any refinements after group discussion

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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

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Any refinements after group discussion

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ACKNOWLEDGEMENTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
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<tbody>
<tr>
<td><strong>Background research</strong></td>
<td></td>
</tr>
<tr>
<td>1. Recognition that soil salinity in W.A. farmlands is caused by</td>
<td></td>
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<tr>
<td>• removal of deep-rooted perennial trees</td>
<td>1</td>
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<td>• that leads to raising of the water table</td>
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<tr>
<td>• that in turn dissolves salt in the ground and carries it to the root zone for shallow-rooted crops</td>
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<tr>
<td>2. Identification of two factors that affect seed germination such as:</td>
<td>0–2</td>
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<tr>
<td>• internal factors such as seed maturation, seed dormancy, seed coat</td>
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<tr>
<td>• temperature</td>
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<td>• availability of water</td>
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<td>• availability of oxygen</td>
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<td>• light</td>
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<td>• smoke chemicals</td>
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<tr>
<td><strong>Planning</strong></td>
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<tr>
<td>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</td>
<td>1–2</td>
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<tr>
<td>2. Recognition that independent variables are salt concentration and seed type</td>
<td>1–2</td>
</tr>
<tr>
<td>3. Recognition that dependent variable is rate of germination</td>
<td>1</td>
</tr>
<tr>
<td>4. Recognition of control variables e.g. temperature, light exposure, quantity of solution given to seeds</td>
<td>0–3</td>
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<tr>
<td>5. Hypothesis stated in terms of how independent variables will affect dependent variable</td>
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<tr>
<td>6. Prediction expressed in terms of effect of independent variables on dependent variable</td>
<td>0–2</td>
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<tr>
<td>7. Equipment list</td>
<td>0–4</td>
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<tr>
<td>8. Description of method including indication of</td>
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<tr>
<td>• how variables will be controlled</td>
<td>0–3</td>
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<tr>
<td>• concentrations of salt solutions</td>
<td>1</td>
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<tr>
<td>• inclusion of control seeds (i.e. no salt – water only)</td>
<td>1</td>
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<tr>
<td>• repeats will be used</td>
<td>1</td>
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<tr>
<td>• number of seeds in each dish</td>
<td>1</td>
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<tr>
<td><strong>Conduct the experiment</strong></td>
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<tr>
<td>Safe conduct of experiment</td>
<td>0–2</td>
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<tr>
<td>Measurements made daily</td>
<td>1</td>
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<tr>
<td>Equipment cleaned and stored on completion of experiment</td>
<td>1–2</td>
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<tr>
<td><strong>Results</strong></td>
<td></td>
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<tr>
<td>• Appropriately designed table/s</td>
<td>1</td>
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<tr>
<td>• Table has appropriately labelled columns</td>
<td>1</td>
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<tr>
<td>• Table includes repeats and their averages</td>
<td>0–2</td>
</tr>
<tr>
<td>• Supporting description of appearance of seeds/seedlings</td>
<td>0–4</td>
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<tr>
<td><strong>Data processing and analysis</strong></td>
<td></td>
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<tr>
<td>1. Determination of averages for each seed type and graph with</td>
<td>0–3</td>
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<tr>
<td>• appropriate title</td>
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<td>• appropriately labelled axes</td>
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<tr>
<td>• plot for wheat seeds,</td>
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<td>• plot for barley seeds</td>
<td>1</td>
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<td>• plot for radish seeds</td>
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<td>• key</td>
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<td>2. Recognition of trend – statement relates dependent variable to independent variable; and compares sensitivity of wheat, barley and radish</td>
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<td>Description</td>
<td>Marks</td>
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<tr>
<td>1. Makes a valid statement relating hypothesis to results</td>
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<tr>
<td>2. States a conclusion related to aim and hypothesis</td>
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<tr>
<td>3. (a) Identifies possible errors in the experimental design</td>
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<tr>
<td>(b) Suggests possible improvements or justifies lack of need for changes to</td>
<td>0–2</td>
</tr>
<tr>
<td>experimental design</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Section</th>
<th>Suggested working time</th>
<th>Number of questions</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE</td>
<td>15 minutes</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Multiple-choice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWO</td>
<td>45 minutes</td>
<td>7</td>
<td>45</td>
</tr>
<tr>
<td>Short answer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
</tr>
</tbody>
</table>

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.

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

2. Nutrient uptake in plants occurs via
   a) root hairs.
   b) root tips.
   c) phloem.
   d) xylem.

3. Stomata are best described as
   a) cell organelles involved in storage.
   b) root structures.
   c) pores on the leaf surface.
   d) fine leaves to reduce water loss.

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

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
   a) absorb water and nutrients from the soil.
   b) absorb water and salt from the soil.
   c) release water and nutrients from roots.
   d) release water and salt from roots.

6. Nutrients are transported from roots to shoots via
   a) phloem.
   b) xylem.
   c) root hairs.
   d) stomata.

7. The following statements relate to a major group of flowering plants.
   I  There is a single tap root with smaller roots growing from it.
   II  Main veins of leaves are parallel.
   III The seeds germinate with a single seed-leaf.
   IV The parts of the flower are in multiples of three.

Which of the above characteristics correctly describe the group of flowering plants called monocots?
   a)  I and III
   b)  I, II and III
   c)  II and III
   d)  II, III and IV

8. Crops need the most nitrogen during
   a) germination.
   b) flowering.
   c) reproductive growth.
   d) vegetative growth.

9. What is the role of sulfur in plant nutrition?
   a) It has an important role in energy transfer in plant cells.
   b) It helps promote flowering in plants.
   c) It is used in the formation of amino acids, proteins, and oils.
   d) It is important for regulating the opening and closing of stomata.

10. Theoretically, rates of fertiliser applications need to match soil types and
    a) rates of growth.
    b) crop establishment.
    c) cropping history.
    d) 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)

<table>
<thead>
<tr>
<th>flowering</th>
<th>germination (annual plant types only)</th>
<th>seedling establishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>vegetative growth</td>
<td>seed/fruit set</td>
<td>dormancy (perennial plant types only)</td>
</tr>
</tbody>
</table>

   Autumn
   Winter
   Spring
   Summer

   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)

<table>
<thead>
<tr>
<th>Growth stage</th>
<th>Nutritional requirement</th>
<th>Fertiliser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetative growth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flowering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormancy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12. a) Complete the table below by explaining what is occurring in an **annual** plant at the indicated growth stages. (6 marks)

<table>
<thead>
<tr>
<th>Growth stage</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germination</td>
<td></td>
</tr>
<tr>
<td>Vegetative growth</td>
<td></td>
</tr>
<tr>
<td>Reproductive stage</td>
<td></td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Reproduction type</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual reproduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asexual reproduction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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)

<table>
<thead>
<tr>
<th>Plant part</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waxy cuticle</td>
<td></td>
</tr>
<tr>
<td>Phloem</td>
<td></td>
</tr>
<tr>
<td>Petiole</td>
<td></td>
</tr>
</tbody>
</table>

End of test
ACKNOWLEDGEMENTS

Section One

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

Section One: Multiple-choice

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>D</td>
</tr>
<tr>
<td>8</td>
<td>D</td>
</tr>
<tr>
<td>9</td>
<td>C</td>
</tr>
<tr>
<td>10</td>
<td>A</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mark per question</td>
<td>0–10</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

Section Two: Short answer

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.

<table>
<thead>
<tr>
<th>flowering</th>
<th>germination (annual plants types only)</th>
<th>seedling establishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>vegetative growth</td>
<td>seed/fruit set</td>
<td>dormancy (perennial plant types only)</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the selected plant type, 1 mark for each growth stage correctly aligned to the season</td>
<td>0–6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>
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.

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

**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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germination, at least two of the following</td>
<td>0–2</td>
</tr>
<tr>
<td>• seed takes up water</td>
<td></td>
</tr>
<tr>
<td>• embryo releases enzymes to mobilise food reserves</td>
<td></td>
</tr>
<tr>
<td>• embryo develops root and shoot and starts to grow</td>
<td></td>
</tr>
<tr>
<td>Vegetative growth</td>
<td>1</td>
</tr>
<tr>
<td>• plant increases in size</td>
<td></td>
</tr>
<tr>
<td>• through developing root system and leaf/stem structures</td>
<td></td>
</tr>
<tr>
<td>Reproductive stage, at least two of the following</td>
<td>1–2</td>
</tr>
<tr>
<td>• plant flowers</td>
<td></td>
</tr>
<tr>
<td>• set seeds</td>
<td></td>
</tr>
<tr>
<td>• reserve nutrients sent to fruit/seed for next generation</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
</tr>
</tbody>
</table>
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.

![Graph of nitrogen requirements](graph.png)

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.

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. recognition that 80 kg/ha represents ~67 % of N needed</td>
<td>1</td>
</tr>
<tr>
<td>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</td>
<td>1</td>
</tr>
<tr>
<td>iii. amount of N needed = 120 – 80 = 40 kg/ha</td>
<td>1</td>
</tr>
<tr>
<td>iv. recognition that rain needed to wash fertiliser to root zone</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition of the following</td>
<td></td>
</tr>
<tr>
<td>• involves two parents – male and female</td>
<td>1</td>
</tr>
<tr>
<td>• offspring are different to each other and parents.</td>
<td>1–2</td>
</tr>
<tr>
<td>• involves flowers, pollen, pollination, seed formation</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition of the following</td>
<td></td>
</tr>
<tr>
<td>• involves single parent</td>
<td>1</td>
</tr>
<tr>
<td>• offspring genetically identical to each other and parent</td>
<td>1–2</td>
</tr>
<tr>
<td>• involves cuttings, runners, tubers, grafting</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>
15. Complete the following table for the indicated reproduction types by identifying one (1) advantage and one (1) disadvantage.

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mark for each advantage and disadvantage</td>
<td>1–4</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production system for sexual reproduction</td>
<td>1</td>
</tr>
<tr>
<td>Appropriate reason for use of sexual reproduction given for stated system</td>
<td>1</td>
</tr>
<tr>
<td>Production system for asexual reproduction</td>
<td>1</td>
</tr>
<tr>
<td>Appropriate reason for use of asexual reproduction given for stated system</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
</tr>
</tbody>
</table>

Answer could include, but is not limited to:

For sexual reproduction possible production systems include
- 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
- 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.

<table>
<thead>
<tr>
<th>Plant part</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waxy cuticle</td>
<td>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).</td>
</tr>
<tr>
<td>Phloem</td>
<td>The phloem transports soluble nutrients such as sugars and other organic compounds made in the leaves to other parts of the plant.</td>
</tr>
<tr>
<td>Petiole</td>
<td>The petiole is the stalk that attaches the leaf to the stem.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waxy cuticle function</td>
<td>1–2</td>
</tr>
<tr>
<td>Phloem function</td>
<td>1–2</td>
</tr>
<tr>
<td>Petiole function</td>
<td>1–2</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
</tr>
</tbody>
</table>