



PLANT PRODUCTION SYSTEMS

GENERAL COURSE

Marking key for the Externally set task

Sample 2016

Copyright

© School Curriculum and Standards Authority, 2014

This document – apart from any third party copyright material contained in it – may be freely copied, or communicated on an intranet, for non-commercial purposes in educational institutions, provided that the School Curriculum and Standards Authority is acknowledged as the copyright owner, and that the Authority's moral rights are not infringed.

Copying or communication for any other purpose can be done only within the terms of the *Copyright Act 1968* or with prior written permission of the School Curriculum and Standards Authority. Copying or communication of any third party copyright material can be done only within the terms of the *Copyright Act 1968* or with permission of the copyright owners.

Any content in this document that has been derived from the Australian Curriculum may be used under the terms of the [Creative Commons Attribution-NonCommercial 3.0 Australia licence](#)

Disclaimer

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course.

Plant Production Systems

Externally set task – marking key

1. Using the diagram identify each flower part, and its corresponding function. **(7 marks)**

Flower part on diagram	Name of flower part	Function of flower part	Marks
A	Petal	Attracts pollinators	1
B	Stigma	Receptacle for pollen	1
C	Style	Holds stigma away from flower to encourage pollination	1
D	Ovary	Holds ovules, forms fruit	1
E	Ovule	Unfertilised seed	1
F	Filament	Holds pollen out from flower to encourage pollination	1
G	Anther	Produces pollen	1
Total			7

2. Plant producers aim to optimise profitability by managing plant requirements at different growth stages. Describe each growth stage identified below, and discuss the plant's requirements at each stage.

For each of the **three (3)** plant stages:

Description	Marks
Comprehensive explanation of growth stage	2
Basic explanation of growth stage	1
Explanation of plant requirement	2
Identification of plant requirement	1
Total	4

Answer could include, but is not limited to:

Germination

Embryo activates in correct environmental conditions of water and temperature. Starches converted to sugars and embryo develops shoots and roots.

Plant requires specific levels of moisture and temperature to encourage even germination. This is determined largely by the climate to which the plant is adapted.

Vegetative growth

Plants puts on additional tissue in roots, stems and leaves to increase size, explore soil and increase photosynthesis to maximise reserves for reproductive phase.

Plant is actively growing so has high demands for protein and carbohydrates. Plant requires optimum water, nutrients (especially N and P) and sunlight to maximise photosynthesis.

Reproductive growth

Plant produces flowers and reproductive structures for seed production. Reserves shifted to reproductive growth.

Plant requires water and external support for pollination – wind, specific organism.

3. Plant producers need to grow varieties which suit their environmental conditions and meet market requirements. **(7 marks)**

- (a) Select a raw plant product and identify an end (processed) product made from it.

Raw plant product _____ (0 marks)

End (processed) product _____ (1 mark)

Description	Marks
End (processed) product	1
Raw plant product	0
Total	1
Answer could include, but is not limited to:	
Raw plant product <ul style="list-style-type: none"> • wheat • grapes End product <ul style="list-style-type: none"> • bread or noodles • wine 	

- (b) Describe **one (1)** objective and **one (1)** subjective criterion that would be used to measure the quality of the raw product.

Objective criterion

Description	Marks
Identifies a criterion appropriate to the end product	1
Comprehensive explanation of how the criterion is used to determine suitability	2
Basic explanation of how the criterion is used to determine suitability	1
Total	3
Depending on product selected, answer could include, but is not limited to:	
<p>Objective measurements could include moisture %, protein %, grain size and shape, oil content. Protein content of wheat grain is used to determine milling performance, and its suitability for noodle making or various bread varieties as the level of protein helps determine the quality of the end product.</p> <p>The grain size and shape can affect the amount of useful end product. For example, in malting barley, it means that more malt can be extracted, and staining can affect the malting process, therefore buyers will avoid. Grain varieties can differ in their brightness. Buyers of barley (both feed and malting) prefer bright grains free of staining.</p>	

Subjective criterion

Description	Marks
Identifies a criterion appropriate to the end product	1
Comprehensive explanation of how the criterion is used to determine suitability	2
Basic explanation of how the criterion is used to determine suitability	1
Total	3
Depending on product selected, answer could include, but is not limited to:	
Possible subjective measurements include the presence of fungal staining, sprouted grain, presence of insects/insect damage or weed seeds. Sprouting affects seed viability and storage time. Grain pests can preferentially eat out grain embryos, which reduce the protein content of grain, thereby affecting its suitability for end use. The presence of weed seeds or foreign material effectively means there is less useful product, and it has to be cleaned before using for its original purpose, which is an added expense.	

4. Explain **one (1)** particular reason for developing a new variety of a specific plant type. **(3 marks)**
 Specific plant type _____ (no marks)

Description	Marks
Comprehensive explanation of reason for developing new variety	3
Basic explanation of reason for developing new variety	2
Identifies a specific reason	1
Total	3
Answer could include, but is not limited to:	
<p>Market requirements New markets or changing consumer requirements/preferences mean that new varieties need to be developed with added or enhanced characteristics that make them more suited to their final use. This, in turn, makes the plant production enterprise more profitable as the grower is able to access a new market or gain a premium of the product. Golden rice, which is fortified with vitamin A, was developed as a means of providing vitamin A through the diets of people where a deficiency is common; for example, some developing countries. Pink Lady apples were bred from two common varieties: Golden Delicious and Lady Williams, combining the best features of both to create a superior apple. Now they are Australia's most popular apple. New varieties of wheat are being bred for higher fibre levels to improve human health.</p> <p>Environmental condition Climate change, salinity, pests, soil acidity are a range of environmental reasons why existing varieties may be no longer suited to growing in a location, and hence new varieties need to be developed that are able to cope in the new environmental conditions. New varieties have been developed with better salt tolerance, water use efficiency, frost tolerance, resistance to pests, increased yield etc.</p>	

- 5(a) You have been asked by a plant breeding company to trial three new varieties of a crop, in an effort to find a variety that can grow in an environment with a growing season rainfall of 150 mm. The trial is undertaken in a glasshouse where rainfall and other conditions can be controlled. **(11 marks)**

The experiment is to be designed to test the hypothesis that one of the new varieties will be more suited to the low rainfall environment than the common variety.

Identify each the following aspects of the experimental design, and explain their importance in conducting a valid trial.

Description	Marks
Identifies the independent variable	1
Explains the independent variable	2
Identifies a dependent variable	1
Explains a dependent variable	2
Identifies a control treatment	1
Explains a control treatment	2
States the need for replication	1
Explains method of replication	2
Total	8
Answer could include, but is not limited to:	
<p>Independent variable</p> <ul style="list-style-type: none"> crop varieties: allows comparisons of performance between varieties under the low rainfall environment to be made, as the performance of each variety can be measured <p>Dependent variable</p> <ul style="list-style-type: none"> growth rates or another measure of growth: grain production, biomass, height, heads/plant, grains per plant; need a basis on which to differentiate the performance of each variety <p>Control treatment</p> <ul style="list-style-type: none"> commonly grown variety under the low rainfall levels: comparing the performance of each new variety against the performance of the commonly grown variety <p>Replication</p> <ul style="list-style-type: none"> multiple pots (at least three) of each variety at same watering level: improves the reliability of results, and reduces possible error 	

- (b) Suppose that you have completed the trial and the results have been collected. Describe the results that you would observe to conclude your hypothesis was **NOT** supported.

Description	Marks
Comprehensively explains that, for the hypothesis not to be supported, there would be no difference in any of the following indicators between treatments: <ul style="list-style-type: none"> growth rate, or biomass, or yield 	3
Basic explanation that there would be no difference between treatments	2
No difference statement alone with no explanation	1
Total	3