Government of **Western Australia**
School Curriculum and Standards Authority

SAMPLE ASSESSMENT TASKS

PLANT PRODUCTION SYSTEMS
GENERAL YEAR 11

Sample assessment task

Plant Production Systems – General Year 11

Task 1 — Unit 1 and Unit 2

Assessment type: Investigation

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

Task weighting
10% of the school mark for this pair of units

Investigating soil characteristics

Introduction

Soil characteristics and composition affect plant growth and are changed by farming. Important soil characteristics include nutrient levels, pH, structure, texture and organic matter. We need to understand how farming is affecting our soil in order to manage this valuable resource sustainably.

In this investigation you will research factors related to soil characteristics, collect soil samples and measure some factors determining soil quality.

The steps involved

Phase 1 – Research and planning (individual followed by group refinement)
Phase 2 – Carrying out of field and experimental work (group work)
Phase 3 – Data processing and analysis
Phase 4 – Evaluation

What you need to do

Research and planning

(a) Initially working on your own, research background information about soil characteristics. Use the 'Research' questions on the *Investigating soil* 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.

Conduct field and experimental work

(c) Working in your group, conduct the field and experimental work as described in the *Investigating soil* worksheet.

Data processing and analysis and Evaluation

(d) Working on your own, complete the 'Data processing and analysis' and 'Evaluation' questions in the *Investigating soil* worksheet.

Some resources that may be useful include:

www.soilhealth.see.uwa.edu.au

Department of Agriculture and Food website – www.agric.wa.gov.au/climate-land-water/soils

Investigating soil worksheet

Student's name: _____

Phase 1: Background research **(7 marks)**

1. Identify the non-living and living components of soil. (2 marks)
   Non-living components

   _____

   _____

   Living components

   _____

   _____

2. What is soil pH? Why is it important for farmers to measure and monitor soil pH? (3 marks)

   Individual ideas

   _____

   _____

   _____

   _____

   _____

   _____

   Any refinements to your answers after group discussion

   _____

   _____

   _____

   _____

   _____

   _____

3. Give **two (2)** benefits of including organic matter in soil. (2 marks)

Individual ideas

_____

_____

_____

_____

_____

Any refinements to your answers after group discussion

_____

_____

_____

_____

Phase 2: Field and experimental work **(43 marks)**

Select **three (3)** sites on the school farm that are used for cultivation and **one** site in an area of remnant natural vegetation. For the cultivation sites try to choose one that is mainly sand, one that is mainly clay and one that is mainly loam.

Soil structure (16 marks)

1. Remove a spade of soil, trying not to break it apart.
2. Examine the soil structure for pores, aggregates and channels. Sketch and/or photograph your soil to show its structure. Provide a general description of the soil structure. Estimate the range of sizes of any aggregates and indicate the most typical size range.
3. Record your results in a table that allows ready comparison of the four sites.

Soil texture (13 marks)

1. Using the method as outlined in the Department of Agriculture and Food WA Farm note 506 (January 2012), (www.archive.agric.wa.gov.au/objtwr/imported_assets/content/lwe/water/irr/fn_soil_texturing.pdf) determine the soil texture for your four sites.
2. Record your results in a table that allows ready comparison of the four sites.

Soil pH (7 marks)

At each site, measure the soil pH at the surface and at a depth of approximately 10 cm.

Measure the soil pH using the following steps.

1. Take approximately a dessert spoon full of the soil (try to remove as many sticks, twigs etc. as possible from the soil sample) and mix it thoroughly with calcium chloride powder.
2. Add 3–4 drops of universal indicator to the soil/calcium chloride mixture. Wait about one minute for the indicator to change colour and determine the pH by matching the colour of the mixture with the pH colour chart.
3. Record your results in a table.

Soil organic matter (7 marks)

As a class, collect soil samples from each site using a recognised sampling method as demonstrated by your teacher.

In your group, for one of the soil samples, estimate its organic content by following these steps. You will need to share results with the rest of the class to answer the 'Data processing and analysis' and 'Evaluation' questions.

1. Place the sample in a suitable oven proof container to dry in an oven at about 75 °C overnight to remove any water in the sample.
2. Record the weight of the cooled dried sample.
3. Place the sample in a suitable dish and heat with a Bunsen burner stirring regularly to combust all the organic matter in the sample.
4. Record the weight of the cooled sample.
5. Determine the weight of organic matter by calculating the difference between the two weights. Express the amount of organic matter in the sample as a percentage of the total weight.

Phase 3: Data processing and analysis **(20 marks)**

1. From your observations, describe reasons for any differences in soil structures between the four sites. (4 marks)

2. Describe **two (2)** farming practices that can affect soil structure. (4 marks)

3. a) Rank the surface pH of the soil at your four sites. Suggest reasons for any differences. (3 marks)

b) Rank the pH of the soil at a depth of 10 cm for your four sites. Suggest reasons for any differences. (3 marks)

c) Identify any trends in surface pH compared to pH at a depth of 10 cm. Suggest **one (1)** reason for each trend identified. (3 marks)

4. Rank the organic matter content of the soil at your four sites from least to most. Suggest reasons for any differences in their organic matter content. (3 marks)

Phase 4: Evaluation **(10 marks)**

1. Based on the results of your field work and your observations, suggest which of your sites would best support plant growth. Explain your choice. (3 marks)

2. For the site selected in Question 1, recommend a crop to be grown on the site based on its pH level. Explain your choice. (3 marks)

3. Suggest how the reliability of your pH measurements could be improved. (1 mark)

4. Identify an assumption made about the heating of the soil with the Bunsen burner in the method used to estimate the organic matter in the soils. Comment on the validity of this assumption. (3 marks)

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

Phase 1: Background research

1. Identify the non-living and living components of soil.

Description	Marks
Identifies typical non-living components e.g. sand, silt, clay, minerals, decomposing organic matter	1
Identifies typical living components e.g. earth worms, microbes, fungi, insects	1
Total	**2**

2. What is soil pH? Why is it important for farmers to measure and monitor soil pH?

Description	Marks
Recognises that soil pH is a measure of its acidity	1
Identifies appropriate reasons for monitoring soil pH, such as crop growth may be adversely affected by incorrect pH, pH controls the release of nutrients from the soil and farm chemicals can alter the soil pH	1–2
Total	**3**

3. Give **two (2)** benefits of including organic matter in soil.

Description	Marks
Identifies two benefits (1 mark each benefit)	1–2
Total	**2**
Answer could include, but is not limited to:	
• improves nitrogen availability • improves availability of other nutrients • helps to hold soil together • promotes presence of other organisms	

Phase 2: Field and experimental work

Description	Marks
Soil structure	
• sketch or photograph and general description of soil provided (1 mark for each site). Description may include the following ▪ pores ▪ channels ▪ other features e.g. sandy, loamy, high in clay	1–4
• range of size of aggregates provided (1 mark for each site)	1–4
• typical aggregate size provided (1 mark for each site)	1–4
• results displayed in a table allowing ready comparison of the four sites	1–2
• table includes	
▪ column for site number	1
▪ appropriate titles for columns, such as general description, range of aggregate sizes, typical aggregate size	1
Soil texture	
• follows procedure for soil texture determination for all four samples	1–4
• description of how soil behaved during ribbon preparation	1–4
• results recorded in a table which includes titled	1–2
▪ column for site	1
▪ column for length of hanging ribbon	1
▪ description of soil feel/behaviour	1
Soil pH	
• pH measured at surface and at 10 cm depth for each site	1–2
• results recorded in a table which includes titled	1–2
▪ column for site ▪ column for pH at surface ▪ column for pH at 10 cm	1–3
Soil organic matter	
• procedure to measure soil organic matter safely conducted	1–3
• percentage of organic matter calculated for each site	1–4
Total	**43**

Phase 3: Data processing and analysis

1. From your observations, describe reasons for any differences in soil structures between the four sites.

Description	Marks
Comprehensively describes reasons for differences in soil structures between the four sites	3–4
Briefly states reasons for differences in soil structures between the four sites	1–2
Total	**4**
Answer could include, but is not limited to:	
• site may be subject to compaction from farm machinery • site is not under cultivation (remnant bush site) • site may be subject to water logging • site under cultivation	
Total	**4**

2. Describe **two (2)** farming practices that can affect soil structure.

Description	Marks
Describes two farming practices that can affect soil structure (2 marks each practice)	1–4
Total	**4**
Answer could include, but is not limited to:	
• use of heavy farm machinery may compact soil reducing pores and other spaces in soil • tillage versus low or no-tillage practices; tillage may break up soil reducing aggregates • leaving stubble so that root channels remain • tree/shrub removal which can lead to reduction in channels and pore spaces • use of chemicals that reduce soil microbial and invertebrate life which reduce aggregation and pores	

3. a) Rank the surface pH of the soil at your four sites. Suggest reasons for any differences.

Description	Marks
Ranking of surface pH provided	1
Appropriate reasons for difference provided, such as • land not cultivated (remnant bush) • differences in soil types (loam vs sand vs clay) • applications of fertilisers and other farm chemicals altering pH • water logging	1–2
Total	**3**

b) Rank the pH of the soil at a depth of 10 cm for your four sites. Suggest reasons for any differences.

Description	Marks
Ranking of pH at 10 cm provided	1
Appropriate reasons for difference provided, such as • land not cultivated (remnant bush) • differences in soil types (loam vs sand vs clay) • applications of fertilisers and other farm chemicals altering pH • water logging	1–2
Total	**3**

c) Identify any trends in surface pH compared to pH at a depth of 10 cm. Suggest one reason for each trend identified.

Description	Marks
Any trends identified	1
Appropriate reasons for any trends provided, such as • effects of differences in oxygen availability at surface and 10 cm depth • effects of differences in water availability at surface and 10 cm depth • effects of differences in concentrations of fertiliser and other farm chemicals at surface and 10 cm depth	1–2
Total	**3**

4. Rank the organic matter content of the soil at your four sites from least to most. Suggest reasons for any differences in their organic matter content.

Description	Marks
Ranking of organic matter content provided	1
Appropriate reasons for difference provided, such as • land not cultivated (remnant bush) versus land cultivated • applications of fertilisers and other farm chemicals affecting vertebrate and microbial life • water logging	1–2
Total	**3**

Phase 4: Evaluation

1. Based on the results of your field work and your observations, suggest which of your sites would best support plant growth. Explain your choice.

Description	Marks
Suggested site provided	1
Appropriate reasons for selection provided and based on results of their field work and observations, such as • appropriate pH for plant type • soil type will allow for plant roots to grow (i.e. not too much clay) • soil type will allow for nutrient release to roots • suitable water holding capacity, drainage, nutrient holding capacity	1–2
Total	**3**

2. For the site selected in Question 1, recommend a crop to be grown on the site based on its pH level. Explain your choice.

Description	Marks
Suggested plant type provided	1
Appropriate reasons for selection provided and based on pH given, such as • essential nutrients plants need are released at the soil pH • plant type prefers soil of this pH	1–2
Total	**3**

3. Suggest how the reliability of your pH measurements could be improved.

Description	Marks
Recognises that repeat measurements should be used to get an average	1
Total	**1**

4. Identify an assumption made about the heating of the soil with the Bunsen burner in the method used to estimate the organic matter in the soils. Comment on the validity of this assumption.

Description	Marks
Identifies an appropriate assumption, such as • all organic matter is combusted to volatile compounds • all water was removed by heating in the oven overnight • there no loss of inorganic carbon from the soil in the heating	1
Appropriate comment given about validity, for example • combustion of organic matter to volatile compounds dependent on reaching high temperature (and sufficient oxygen supply) so if these conditions are not met not all organic matter will be volatilised • it is less likely for all water to be removed by overnight heating in the oven in high clay soils as their minerals will hold on to the water strongly • carbonates in the soil may be decomposed on heating releasing carbon dioxide making weight loss higher than it should be	1–2
Total	**3**

Sample assessment task

Plant Production Systems – General Year 11

Task 2 — Unit 1 and Unit 2

Assessment type: Production project

Conditions
Period allowed for completion of the task: 3 weeks in a combination of in-class and out-of-class work.

Task weighting
10% of the school mark for this pair of units

Choosing crop varieties

Background information **(51 marks)**

The plant variety selected to be grown by a producer requires careful consideration of a number of factors, with the ultimate aim of optimising profit.

For this task, you will need to select a crop that is commonly grown at your location.

State the location of your plant enterprise _____

Selected crop type _____

1. Describe **three (3)** factors about the growing environment (location) that a producer needs to consider before planning a crop. (6 marks)

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Rainfall – past and predicted

Agzones have been developed to group together environmental regions that give similar crop performance. The six Agzones in Western Australia are shown in Figure 1.

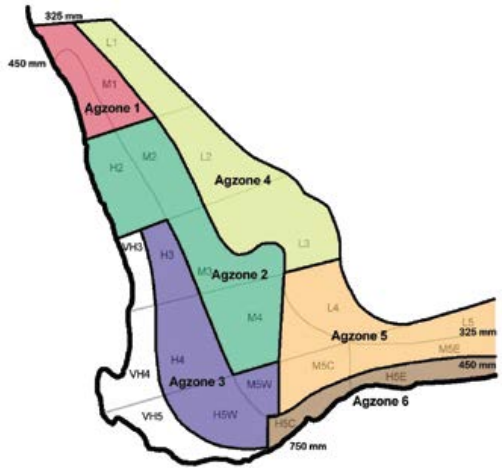

Figure 1: Agzones in Western Australia

2. Identify the Agzone for your farm location. (1 mark)

_____

3. What is the average annual rainfall for your area? Include your information source. (1 mark)

_____

4. Create a typical monthly rainfall graph for your location. (5 marks)
The following website might assist: www.bom.gov.au/climate/data/
   - select data about 'Rainfall'
   - for 'type of data' select 'Monthly'
   - enter location, then click 'Find'
   - select the appropriate 'Matching town'
   - select the appropriate 'Bureau station'
   - select 'Get Data'
   - look at the summary statistics for all years at the bottom of the page.

   You may like to create a graph in a spreadsheet and attach it as an appendix. Compare the current average monthly rainfall with the historical averages for the same month.

5. Create another graph showing the average monthly temperatures. (5 marks)
Using the same website:
   - select data about 'temperature'
   - for 'type of data' select 'Monthly' and 'mean maximum temperature'
   - enter location, then click 'Find'
   - select the appropriate 'Matching town'
   - select the appropriate 'Bureau station'
   - select 'Get Data'
   - look at the summary statistics for all years at the bottom of the page.

   You may like to create a graph using a spreadsheet and attach it as an appendix. Compare the current average monthly temperature with the historical averages for the same month.

6. Record daily maximum and minimum temperatures and daily rainfall over a month period during the growing season at your school. Attach your record as an appendix.
(5 marks)

7. Discuss how the rainfall and temperature patterns are connected with the growing season for crops grown in your area. (4 marks)

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8. Explain why it would be important to look at long-term averages when using climate data to inform decisions. (3 marks)

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Using climate outlooks in decision making

To develop your understanding of climate outlooks, watch the following video:
'Climate outlooks: Stacking the odds in your favour video' (Bureau of Meteorology)
www.youtube.com/watch?v=8Y5poxiwEQM&feature=youtu.be

9. Using the sources listed below, describe the climate outlook for the next three months for your growing location. (4 marks)
In your answer include the:
- expected rainfall patterns (timing and amounts)
- temperature ranges
- possibility of frosts.

View the latest outlooks for the current season.
www.bom.gov.au/climate/ahead/?ref=ftr

www.agric.wa.gov.au/agseasons/seasonal-climate-information

_____

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_____

Pests, weeds and diseases

10. Using the table below, list a potential crop pest, disease and weed you might encounter, and describe the impact of each on production. (6 marks)

	Name	Impact
Pest		
Disease		
Weed		

Variety selection

11. Describe **three (3)** characteristics of a plant that a producer should consider before selecting a variety to grow. (6 marks)

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12. Identify **two (2)** suitable varieties of the crop chosen for your location, giving reasons for each selection. (2 marks)
You may find the following websites useful:

www.agric.wa.gov.au/crops
www.grdc.com.au/
www.nvtonline.com.au/

Variety 1_____

Reasons

_____

_____

Variety 2_____

Reasons

_____

_____

13. For **one (1)** of the varieties, identify a suitable market and explain your choice. (3 marks)

_____

_____

_____

_____

ACKNOWLEDGEMENTS

Rainfall – past and predicted (Fig. 1)
Department of Agriculture and Food. (n.d.). [Agzone diagram]. Retrieved November, 2014, from http://archive.agric.wa.gov.au/PC_93599.html?s=1001

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

1. Describe **three (3)** factors about the growing environment (location) that a producer needs to consider before planning a crop.

Description	Marks
Describes three factors about the growing environment that a producer needs to consider before planning a crop (up to 2 marks each factor)	1–6
Total	**6**
Answer could include, but is not limited to:	
• expected rainfall – amount and timing of rain • soil type – description might include water holding capacity, whether it is clay, loam or sand • temperature predictions • possibility of frosts • predictions about likelihood and prevalence of pests in the zone e.g. insects, mites, viruses, fungi	

2. Identify the Agzone for your farm location.

Description	Marks
Agzone identified	1
Total	**1**

3. What is the average annual rainfall for your area? Include your information source.

Description	Marks
Average annual rainfall provided	1
Total	**1**

4. Create a typical monthly rainfall graph for your location.

Description	Marks
Bar graph used (or if line graph used points **must** be joined by straight lines)	1
Axes correctly labelled (rainfall on vertical axis and month on horizontal)	1
Title of graph included	1
Accurate plotting of data	1
Statement comparing current monthly average rainfall to historical data	1
Total	**5**

5. Create another graph showing the average monthly temperatures.

Description	Marks
Bar graph used (or if line graph used points **must** be joined by straight lines)	1
Axes correctly labelled (temperature on vertical axis and month on horizontal)	1
Title of graph included	1
Accurate plotting of data	1
Statement comparing current monthly average rainfall to historical data	1
Total	**5**

6. Record daily maximum and minimum temperatures and daily rainfall over a month period during the growing season at your school. Attach your record as an appendix.

Description	Marks
Daily minimum temperature recorded for a month during growing season	1
Daily maximum temperature recorded for a month during growing season	1
Daily rainfall recorded for a month during growing season	1
Data presented in table format with appropriate titles for columns (units included in column title)	1–2
Total	**5**

7. Discuss how the rainfall and temperature patterns are connected with the growing season for crops grown in your area.

Description	Marks
Discusses how rainfall and temperature patterns are connected with the growing season for crops in the area	1–4
Total	**4**
Answer could include, but is not limited to:	
Discussion may include: • temperature and moisture requirements for germination • temperature and moisture requirements for sustained growth • timing of sowing • timing of herbicide/pesticide application • timing of any fertiliser applications • frost management • timing of harvesting	

8. Explain why it would be important to look at long-term averages when using climate data to inform decisions.

Description	Marks
Recognition that long term averages from climate data can improve decisions • by providing more reliable data • about selection of crop type to grow • about possibility of conditions likely to favour certain pests • about trends that may impact long-term farm management practices, such as tree planting, paddock management, farm product diversification	1–3
Total	**3**

9. Using the sources listed below, describe the climate outlook for the next three months for your growing location.

Description	Marks
Description for the Agzone includes	
• expected rainfall patterns – timing and amounts	1–2
• temperature range predictions	1
• possibility of frosts	1
Total	**4**

10. Using the table below, list a potential crop pest, disease and weed you might encounter, and describe the impact of each on production.

Description	Marks
Appropriate pest for selected crop identified Impact of identified pest provided	1 1
Appropriate disease for selected crop identified Impact of identified disease provided	1 1
Appropriate weed for Agzone identified Impact of identified weed provided	1 1
Total	**6**
Answer could include, but is not limited to:	
• pests may include cockchafer (impact is root damage and reduced yield), nematodes (impact is root damage and reduced yield), aphids (limits grain size and yield) • possible diseases for wheat/cereal crops include yellow spot, crown rot, stripe rust, septoria nodorum blotch; impact is generally reduced yield • possible weeds include wild oats, wild radish, annual rye grass, capeweed; impact is generally reduced yield	

11. Describe **three (3)** characteristics of a plant that a producer should consider before selecting a variety to grow.

Description	Marks
Three characteristics described (up to 2 marks for each characteristic)	1–6
Total	**6**
Answer could include, but is not limited to:	
• length of growing season • susceptibility to various pests and diseases • salt tolerance • long term yields • frost tolerance • seed quality – germination rates • grain quality e.g. protein content, moisture content • market conditions – is the variety one for which there is a strong market?	

12. Identify **two (2)** suitable varieties of the crop chosen for your location, giving reasons for their selection.

Description	Marks
Two varieties identified with suitable reason (1 mark each)	1–2
Total	**2**
Answer could include, but is not limited to:	
Variety depends on crop type. Suitable reasons include • length of growing season suits rainfall and temperature outlook • minimal susceptibility to pests and diseases • salt tolerance suits soil conditions • long term yields are favourable • limited frost susceptibility • seed quality – germination rates are around 90% or more • grain quality matches an identified market	

13. For **one (1)** of the varieties, identify a suitable market and explain your choice.

Description	Marks
Identifies a suitable market	1
Explains reasons for the choice of market	2
Total	**3**
Answer could include, but is not limited to:	
Answer depends on the crop type and variety selected. Example: Baudin is a barley variety suitable for the malting barley market, particularly China, south-east Asia and Japan, principally for brewing. Malting varieties behave differently in the malting process, for example, their optimal germination temperature can vary. Baudin has excellent malt characteristics which makes it a premium malting barley variety.	

Sample assessment task

Plant Production Systems – General Year 11

Task 5 — 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

Year 11 General Plant Production Systems

PLANT STRUCTURE AND FUNCTION AND PLANT ENVIRONMENT TEST

Time allowed for this paper

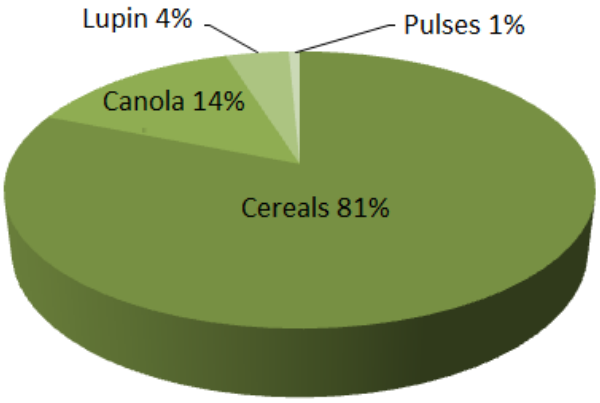
Reading time before commencing work: 5 minutes

Working time for paper: 55 minutes

Section	Suggested working time	Number of questions	Marks
ONE Multiple-choice	25 minutes	20	20
TWO Short answer	30 minutes	3	25
		Total	**45**

Section One: Multiple-choice **(20 marks)**

Question 1 refers to the following diagram



Relative size (A$ million) of the Western Australian pulse, lupin, canola and cereal industries.

(Source: Department of Agriculture and Food Western Australia)

1. Which one of the following statements about the graph is correct?

   a) Cereal production is relatively small in Western Australia.
   b) The size of the Canola industry in Western Australia is twice that of the Lupin industry.
   c) The Pulse industry in Western Australia is relatively large compared with other industries.
   d) The Cereal industry is approximately twenty times the size of the Lupin industry in Western Australia.

2. A feature of many legumes is their

   a) high oil content.
   b) root nodules that contain nitrogen-fixing bacteria.
   c) ability to decompose organic material.
   d) natural pest resistance.

3. The climate of the Wheatbelt region of Western Australia is referred to as

   a) polar.
   b) tropical.
   c) mediterranean.
   d) semi-arid.

4. The Wheatbelt climate is characterised by

   a) hot, wet summers and cool, dry winters.
   b) hot, dry summers and cool, wet winters.
   c) mild summers and cool, dry winters.
   d) mild summers and warm, wet winters.

5. On a synoptic weather chart, isobars are used to indicate

   a) points of equal atmospheric pressure.
   b) movement of air from high to low pressure.
   c) wind direction.
   d) cold fronts.

6. The female reproductive flower part responsible for receiving pollen is called the

   a) stigma.
   b) ovary.
   c) anther.
   d) style.

7. Four factors essential for photosynthesis are

   a) hydrogen, water, carbon dioxide and chlorophyll.
   b) water, air, soil and light energy.
   c) carbon dioxide, water, chlorophyll and light energy.
   d) nutrients from soil, water, light and chlorophyll.

8. In photosynthesis, plants store energy in what substance?

   a) simple sugar
   b) starch
   c) cellulose
   d) sucrose

9. Transpiration is the process by which plants

   a) convert sugar and starch into energy for growth and reproduction.
   b) combine sugar with oxygen and give off carbon dioxide.
   c) transport nutrients to provide energy to their cells.
   d) take in water through their roots and evaporate it through their leaves.

10. A reduced ability for soils to grow plants is known as soil

    a) fertility.
    b) degradation.
    c) biodiversity.
    d) ecology.

11. A soil profile is

    a) the composition of the soil, such as the proportions of sand, silt and clay.
    b) a vertical section of soil from the soil surface to the underlying parent material.
    c) the nutrient status of the soil.
    d) a test for organic matter.

12. The most accurate way to determine the levels of major elements available to plants is to carry out tests on

    a) plant samples about mid-way through the growing season.
    b) soil samples taken in late autumn just before seeding.
    c) plant residues collected after harvest.
    d) soil samples at harvest.

13. Which one of the following is a plant micronutrient?

    a) potassium
    b) phosphorus
    c) nitrogen
    d) zinc

14. Which one of the following is not typically used as an indicator of soil health?

    a) colour
    b) aggregation
    c) pH
    d) water holding capacity

15. Crops that have an optimum pH range of less than 4.5 are described as

    a) acid tolerant.
    b) salt tolerant.
    c) basic.
    d) alkaline tolerant.

16. Respiration is the process in plants and animals where they

    a) take in oxygen and give off water vapour.
    b) move nutrients about to provide energy to their cells.
    c) take in water through their roots and give it off through their leaves.
    d) combine carbon compounds with oxygen to produce energy.

17. Foliar fertilisers are

    a) direct drilled at the time of sowing, with the seed.
    b) applied to the soil surface.
    c) slower to act than granular fertiliser.
    d) absorbed by the plant leaves.

18. Nutrient toxicity can occur when

    a) soil pH is below 5.5 or above 8.5.
    b) soil pH is between 6.0 and 8.0.
    c) too much of any element is applied to soil.
    d) soils are deficient in water.

19. Urea is a fertiliser applied to correct a soil deficiency in

    a) calcium.
    b) potassium.
    c) molybdenum.
    d) nitrogen.

20. The two main plant nutrients applied as fertilisers that are problematic for waterways are

    a) potassium and nitrogen.
    b) nitrogen and phosphorus.
    c) sulfur and calcium.
    d) phosphorus and hydrogen.

Section Two: Short answer **(25 marks)**

Attempt all questions. Place your answers in the spaces provided on this paper.

21. Complete the following table by identifying **two (2)** functions of plant macro nutrients and describing a symptom of each nutrient deficiency. (12 marks)

Nutrient	How the nutrient supports plant growth	Symptom of deficiency
Phosphorus		
Nitrogen		
Potassium		

22. List **three (3)** factors that affect transpiration in plants, and describe how they affect the process. (6 marks)

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23. The equation below is a simplified version of what happens in photosynthesis**.**

$$6\,CO_2 + 12\,H_2O \xrightarrow[\text{chlorophyll}]{\text{light energy}} C_6H_{12}O_6 + 6\,O_2 + 6\,H_2O$$

a) Identify the substances required for photosynthesis and their source. (2 marks)

_____

_____

_____

b) Identify what is produced in the reaction and where these products go. (3 marks)

_____

_____

_____

c) What is chlorophyll and where is it found? (2 marks)

_____

_____

_____

ACKNOWLEDGEMENTS

Section One

Question 1 Diagram from: Department of Agriculture and Food. (2014). *Relative size (A$ million) of the Western Australian pulse, lupin, canola and cereal industries*.Retrieved November, 2014, from www.agric.wa.gov.au/grains-research-development/western-australian-pulse-industry

Marking key for sample assessment Task 5 — Unit 1 and Unit 2

Section One: Multiple-choice **(20 marks)**

Question	Answer
1	d
2	b
3	c
4	b
5	a
6	a
7	c
8	a
9	d
10	b
11	b
12	a
13	d
14	a
15	a
16	d
17	d
18	c
19	d
20	b

Section Two: Short answer **(25 marks)**

21. Complete the following table by identifying **two (2)** functions of plant macro nutrients and describing a symptom of each nutrient deficiency.

Description	Marks
Identifies two ways the nutrient supports plant growth (1 mark each)	1–6
Describes symptoms of deficiency (2 marks each nutrient)	1–6
Total	**12**

Answer could include, but is not limited to:

Nutrient	How the nutrient supports plant growth	Symptom of deficiency
Phosphorus	• Enhances many plant processes including photosynthesis, nitrogen fixation, flowering, fruiting and maturation, nutrient transfer • Promotes early root formation and growth • Improves quality of fruit, vegetables and grains	• Not as easy to recognise as other deficiencies • Stunted • Thin stems • Dark bluish green foliage • In severe cases, yellow leaves and sensescence
Nitrogen	• Supplies plant with energy to grow foliage and develop fruit, and for seed development. • Essential for cell divison • Essential for photosynthesis • A major part of amino acids which are the building blocks of protein • Root growth and development	• Pale, yellowish green colour (chlorosis) • Stunted growth • Thin stems
Potassium	• Regulates the opening and closing of stomata, and therefore water use efficiency • Helps increase root growth, improve crop quality and improve a plant's ability to withstand pests, disease and harsh environmental conditions • Increases photosynthesis • Translocation of starches • Activates enzymes used in plant processes	• Tips and edges of oldest leaves begin to yellow (chlorosis) and die, giving a burnt appearance

22. List **three (3)** factors that affect transpiration in plants, and describe how they affect the process.

Description	Marks
Lists three factors that affect transpiration (1 mark each)	1–3
Describes how each listed factor affects transpiration (1 mark each)	1–3
Total	**6**
Answer could include, but is not limited to:	
• Temperature – warmer air holds more water creating a driving force movement of water out of plant leaves • Relative humidity – less humidity the more water can leave the plant • Wind – more wind reduces the boundary layer around the leaf i.e. moist air around the leaf is removed and replaced constantly by drier air so creating a driving force for water to leave plant • Light level – higher light levels cause stomata to open and so increase rate of transpiration • Soil water – soil water is needed to replace water lost through leaves so if soil water is limited transpiration will slow and eventually cease.	

23. The equation below is a simplified version of what happens in photosynthesis.

$$6\,CO_2 + 12\,H_2O \xrightarrow[\text{chlorophyll}]{\text{light energy}} C_6H_{12}O_6 + 6\,O_2 + 6\,H_2O$$

a) Identify the substances required for photosynthesis and their source.

Description	Marks
Recognition that equation shows that carbon dioxide and water are required for photosynthesis	1
Recognition that the CO_2 comes from the atmosphere (and enters through the leaves) and H_2O comes through the roots from the ground	1
Total	**2**

b) Identify what is produced in the reaction and where these products go.

Description	Marks
Recognition that equation shows glucose (or sugars), oxygen and water are produced in photosynthesis	1
Recognition that glucose is distributed around the plant	1
Recognition that the O_2 and H_2O exit through the leaves (or H_2O distributed around plant)	1
Total	**3**

c) What is chlorophyll and where is it found?

Description	Marks
Recognition that chlorophyll is the green pigment that absorbs sunlight	1
Recognition that it is in leaves (in chloroplasts)	1
Total	**2**