



## SAMPLE ASSESSMENT TASKS

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### PLANT PRODUCTION SYSTEMS ATAR YEAR 12

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## Sample assessment task

### Plant Production Systems – ATAR Year 12

#### Task 2 – Unit 3

**Assessment type:** Investigation

**Conditions**

Period allowed for completion of the task: One week

**Task weighting**

10% of the school mark for this pair of units

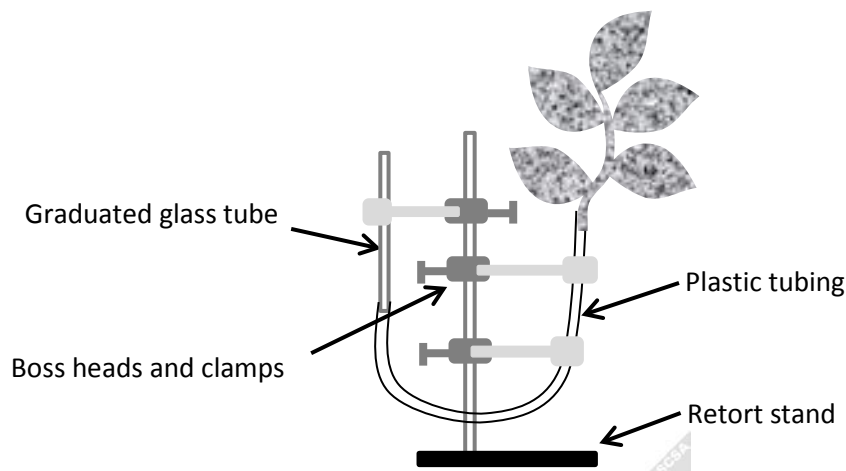
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#### Investigating transpiration

(55 marks)

Plants lose water from their leaves through the process of transpiration. In this investigation, you will explore some of the factors that affect the rate of transpiration.

You will measure the rate of transpiration from leaves using a potometer (Figure 1) which can be made from a graduated glass tube and plastic tubing.



**Figure 1:** Potometer, constructed from a glass tube and plastic tubing

#### The steps involved

Phase 1 – Background research (individual work) and planning (individual, followed by group refinement)

Phase 2 – Carrying out of 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 transpiration. Use the 'Background research' questions on the *Investigating transpiration* research sheet to assist you. Show this to your teacher before the next step.
- (b) As a class, choose one factor that affects the rate of transpiration to investigate.
- (c) After the class has chosen a factor to investigate, working on your own, complete the 'Planning' questions on the *Investigating transpiration* sheet. You will be given 20 minutes of class time to do this. 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.

### Carrying out of experiment

Working in your group, conduct the experiment as described in the *Investigating transpiration* worksheet. There should be at least **five** potometers set up so that there are five different conditions tested for the factor that was chosen for investigation. The allocation of the condition for each group should be done as a class.

### Data processing and analysis and Evaluation

- (a) Initially working on your own, complete the 'Data processing and analysis' and 'Evaluation' questions on the *Investigating transpiration* research sheet. You need to show this to your teacher before the next step.
- (b) Working in your group, discuss your individual data processing and analysis, and evaluation, and refine your ideas through group discussion. Each member of the group will need to submit any revised answers.

## Investigating transpiration

Student's name: \_\_\_\_\_

### Background research

1. What is transpiration? (1 mark)

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2. What structure in a plant leaf primarily controls the rate of transpiration? State how this structure controls transpiration. (2 marks)

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3. Identify at least **three** factors that can influence the rate of transpiration. (3 marks)

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**Planning**

Write the factor that influences the rate of transpiration that is being investigated below.

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4. What is the aim of your investigation? (1 mark)

Individual ideas

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Any refinements after group discussion

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5. What is the independent variable (i.e. variable to be varied) in the investigation? (1 mark)

Individual ideas

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Any refinements after group discussion

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

Individual ideas

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Any refinements after group discussion

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7. What variables need to be controlled in the investigation? (2 marks)

Individual ideas

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Any refinements after group discussion

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8. Write a hypothesis for the investigation. (2 marks)

Individual ideas

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Any refinements after group discussion

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9. Predict what you think will happen. (1 mark)

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### Carrying out of experiment

#### Equipment and materials

- grape vines or citrus tree cuttings (or other suitable plant cutting)
- graduated glass tubes and plastic tubing for construction of potometer
- retort stands
- boss heads and clamps
- parafilm
- syringe
- scalpel or sharp scissors
- millimetre ruled graph paper

10. List any additional equipment you may need to investigate the factor chosen. (2 marks)

Individual ideas	Any changes after group discussion

11. For the chosen factor, 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. Show your plan to your teacher. (4 marks)

Individual ideas

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14. After completing the measurements of the movement of the water level, carefully remove the leaves from the plant stem, place them on the graph paper and trace around them to measure their surface area.

Once having traced the leaves, determine the total surface area of the leaves used in your experiment and express the transpiration rate in units of millilitres of water lost per square centimetre of leaf surface area ( $\text{mL}/\text{cm}^2$ ).

Share your results with the other groups and collect the results from the other groups.

(4 marks)

### Results

15. Present your results and the results from the other groups in an appropriate table. This can be done on paper or using a spread sheet which can be printed and attached to your report.

(4 marks)

### Data processing and analysis

16. Draw a graph of your data. This can be done on graph paper or using a graphing program and the printed graph attached to your report.

(4 marks)

17. Describe any patterns or trends in your data.

(2 marks)

Individual ideas

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Any refinements after group discussion

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18. Using science concepts, explain the patterns, trends or relationships you have identified in your data. (2 marks)

Individual ideas

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Any refinements after group discussion

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### Evaluation

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

Individual ideas

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Any refinements after group discussion

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20. 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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21. Identify any sources of experimental error. (2 marks)

Individual ideas

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Any refinements after group discussion

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22. Suggest how the experimental design may have been improved. 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

**Questions 16–22** 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 2 – Unit 3

1. What is transpiration?

Description	Marks
Recognition that transpiration is water loss from plant leaves	1
<b>Total</b>	<b>/1</b>

2. What structure in a plant leaf primarily controls the rate of transpiration? State how this structure controls transpiration.

Description	Marks
Recognition that stomata control transpiration	1
Recognition that control is achieved by the opening and closing of stomata	1
<b>Total</b>	<b>/2</b>

3. Identify at least **three** factors that can influence the rate of transpiration.

Description	Marks
Lists any three factors that can influence the rate of transpiration (1 mark each factor)	1–3
<b>Total</b>	<b>/3</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>• light intensity</li> <li>• wind</li> <li>• humidity</li> <li>• temperature</li> <li>• structural features on the leaf surface, e.g. hairs on the leaf, waxy leaf coating</li> </ul>	

4. What is the aim of your investigation?

Description	Marks
Recognition that aim of investigation is to measure transpiration rates under different conditions of light, air flow, humidity or temperature	1
<b>Total</b>	<b>/1</b>

5. What is the independent variable (i.e. variable to be varied) in the investigation?

Description	Marks
Independent variable correctly identified	1
<b>Total</b>	<b>/1</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>• light intensity</li> <li>• wind</li> <li>• humidity</li> <li>• temperature</li> <li>• structural features on the leaf surface, e.g. hairs on the leaf, waxy leaf coating (this can be done if different sources of plants are available for testing)</li> </ul>	

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

Description	Marks
Recognition that dependent variable is rate of transpiration	1
<b>Total</b>	<b>/1</b>

7. What variables need to be controlled in the investigation?

Description	Marks
Recognition of control variables	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
Controlled variables will depend on what is chosen as the independent variable. For example, if temperature is the independent variable, air flow, humidity and light intensity need to be controlled; also plant type and age	

8. Write a hypothesis for the investigation.

Description	Marks
Hypothesis stated in terms of how independent variable will affect dependent variable	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
For example, increased temperature will increase the rate of transpiration	

9. Predict what you think will happen.

Description	Marks
Prediction appropriate to hypothesis provided	1
<b>Total</b>	<b>/1</b>

10. List any additional equipment you may need to investigate the factor chosen.

Description	Marks
List of additional equipment appropriate to chosen independent variable provided	1–2
<b>Total</b>	<b>/2</b>

11. For the chosen factor, 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. Show your plan to your teacher.

Description	Marks
Description of method including indication of how	
• variables will be controlled to achieve a fair test	1–2
• how dependent variable will be measured	1
• frequency of measurements	1
<b>Total</b>	<b>/4</b>

12. To assist with setting up your potometer, watch the YouTube video <http://www.youtube.com/watch?v=ce-4Q2NxiNE> which demonstrates how to prepare your potometer. After watching the video, set up your potometer. Use a paper towel to dry any water from the leaves.

Note: You need to ensure that no air bubbles are in the tube or the xylem of the stem.

Description	Marks
Potometer set up	
• with plant stalk and graduated glass tube sealed into plastic tube with no leaks	1
• no air bubbles in tube	1
• secured safely to retort stand	1
<b>Total</b>	<b>/3</b>

13. Mark allocation for carrying out the experiment is as follows:

- appropriate variables are controlled
- measurements taken and recorded appropriately
- safe work practices
- equipment cleaned and stored at conclusion of experiment

Description	Marks
Variables controlled	1–2
Measurements taken and recorded appropriately	1–2
Safe work practices	1–2
Equipment cleaned and stored at conclusion of experiment	1–2
<b>Total</b>	<b>/8</b>

14. After completing the measurements of the movement of the water level, carefully remove the leaves from the plant stem, place them on the graph paper and trace around them to measure their surface area.

Once having traced the leaves, determine the total surface area of the leaves used in your experiment and express the transpiration rate in units of millilitres of water lost per square centimetre of leaf surface area ( $\text{mL}/\text{cm}^2$ ).

Share your results with the other groups and collect the results from the other groups.

Description	Marks
Total leaf surface area determined	1–2
Transpiration rate expressed in $\text{mL}/\text{cm}^2$	1–2
<b>Total</b>	<b>/4</b>



15. Present your results and the results from the other groups in an appropriate table. This can be done on paper or using a spread sheet which can be printed and attached to your report.

Description	Marks
Table has appropriately labelled columns	1
Appropriate units given for columns	1–2
All results recorded	1
<b>Total</b>	<b>/4</b>

16. Draw a graph of your data. This can be done on graph paper or using a graphing program and the printed graph attached to your report.

Description	Marks
Data accurately plotted	1
Axes labelled	1
Units included on axes labels	1
Graph titled	1
<b>Total</b>	<b>/4</b>

17. Describe any patterns or trends in your data.

Description	Marks
Description of trend – statement relates dependent variable to independent variable	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
For example, if temperature was the independent variable, transpiration rate may, initially, rise steeply with increasing temperature. Over a longer time frame, the rate of increase in the transpiration rate may slow and possibly stabilise.	

18. Using science concepts, explain the patterns, trends or relationships you have identified in your data.

Description	Marks
Suitable reasons for pattern provided	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>• For temperature, the trend may occur because the higher temperatures allow the air to hold more water vapour so more water will diffuse away from the surface of the leaf, thus allowing more transpiration. The rate may slow or even stabilise in the longer term because stomata may close to reduce water loss from the plant.</li> <li>• Higher wind lowers the concentration of water vapour near to the leaf surface so more water vapour can leave the stomata and enter the air surrounding the leaf.</li> <li>• Higher humidity means the concentration of water vapour in the air is higher, so limiting the amount of water vapour that can leave the stomata and enter the air surrounding the leaf.</li> <li>• Higher light intensity causes more stomata to open, allowing more water vapour to exit the leaf. Over the longer term, under higher light intensity, the transpiration rate may slow or even stabilise because stomata may close to reduce water loss from the plant.</li> </ul>	

19. Do the data support the hypothesis? Explain.

Description	Marks
Makes a valid statement relating hypothesis to results	1–2
<b>Total</b>	<b>/2</b>

20. State a conclusion that relates to the aim and hypothesis.

Description	Marks
States a conclusion related to aim and hypothesis	1–2
<b>Total</b>	<b>/2</b>

21. Identify any sources of experimental error.

Description	Marks
Identifies relevant sources of error in the experimental design	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>• lack of replicates</li> <li>• lack of repeats for averaging</li> <li>• other factors dependent on particular experimental design</li> </ul>	

22. Suggest how the experimental design may have been improved. If you think no changes are needed, explain why.

Description	Marks
Suggests possible improvements or justifies lack of need for changes to experimental design	1–2
<b>Total</b>	<b>/2</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>• inclusion of replicates</li> <li>• inclusion of repeats for averaging</li> <li>• provides appropriate suggestions to address other factors identified in q.21</li> </ul>	

## Sample assessment task

### Plant Production Systems – ATAR Year 12

#### Task 6 – Unit 3 and Unit 4

**Assessment type:** Test

**Conditions**

Time for the task: 60 minutes

**Task weighting**

4% of the school mark for this pair of units

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# TEST

## Plant health

**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	32
		<b>Total</b>	<b>42</b>

**Section One: Multiple-choice questions**

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

1. Ploughing a paddock to reduce the survival of insect eggs is an example of what type of control?
- (a) chemical
  - (b) physical
  - (c) cultural
  - (d) biological

Question 2 relates to the statements below.

- I Systemic herbicides work on all plant processes at the same time.
  - II Systemic herbicides need to be absorbed into the plant and act from within.
  - III Systemic herbicides take longer to have an effect on plants than do contact herbicides.
2. Which of the above statements about systemic herbicides are correct?
- (a) I and II
  - (b) II and III
  - (c) I and III
  - (d) II only
3. An example of a hormone-based herbicide is
- (a) Glyphosate.
  - (b) 2,4-D.
  - (c) Paraquat.
  - (d) Diuron.
4. When the population of a pest and its predator are in equilibrium, this is known as
- (a) an economic threshold.
  - (b) an economic injury level.
  - (c) a positive feedback loop.
  - (d) a negative feedback loop.

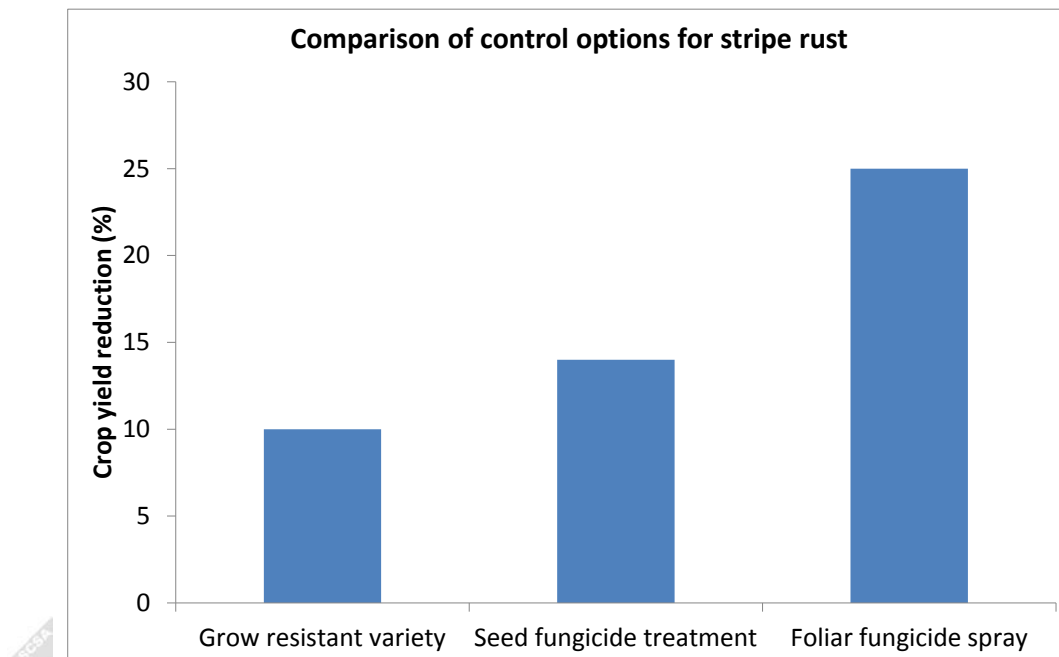
Question 5 relates to the information in the table below.

Mode of action	Examples
Group A	Hoegrass, Tristar
Group B	Logran, Broadstrike
Group C	Atrazine, Diuron
Group D	Teflan, Prothal

5. Which combination of herbicides will help prevent weeds becoming herbicide resistant?
- Hoegrass and Tristar
  - Broadstrike and Logran
  - Teflan and Prothal
  - Tristar and Teflan

Question 6 relates to the information in the graph below.

To minimise the impact of stripe rust on a crop, a producer compares the effectiveness of three different control options (values are the mean  $\pm$  standard deviation).



6. The best option for minimising the impact of stripe rust on crop yield is to
- grow a more resistant variety.
  - apply seed fungicide treatment.
  - apply foliar fungicide spray.
  - do nothing.

7. Synthetic auxins are used in plant production to improve
  - (a) selective weed control.
  - (b) water use efficiency.
  - (c) fruit colour.
  - (d) net photosynthesis.
  
8. Keeping records of pesticides that have been sprayed on crops is an example of
  - (a) integrated pest management.
  - (b) prevention of pesticide resistance.
  - (c) quality assurance.
  - (d) intergenerational equity.
  
9. State border restrictions on plant product movement are important for preventing
  - (a) local outbreaks of pests and diseases.
  - (b) international outbreaks of pests and diseases.
  - (c) seed contamination of plant varieties.
  - (d) national outbreaks of pests and diseases.
  
10. Integrated weed management (IWM) is advocated mainly because
  - (a) no single control method will eradicate the weed.
  - (b) weeds exist as populations of species.
  - (c) it integrates tactical and strategic controls.
  - (d) it can avoid shifts in weed flora to species and biotypes more difficult to control.

**End of Section One**

**Section Two: Short-answer questions**

**(32 marks)**

11. A farmer is growing a canola crop and finds weeds emerging following crop germination.

- (a) Explain why it is preferable to use a selective herbicide for control of weeds in a crop after the crop has germinated. Your answer needs to include the reason for avoiding use of broad-spectrum (or non-selective) herbicides on the crop. (2 marks)

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It is possible to grow 'Roundup'-ready canola which has been genetically modified to contain genes that give it resistance to the herbicide glyphosate.

- (b) Discuss possible advantages and disadvantages associated with using a herbicide resistant crop such as 'Roundup'-ready canola. (4 marks)

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12. The native budworm is a pest of a number of crops in South-Western Australia, including chickpea. Economic damage to the crop is mainly determined by the number of caterpillars in the crop. To determine the economic threshold for this pest, the Department of Agriculture and Food of Western Australian (DAFWA) has developed the following formula

$$ET = C \div (K \times P)$$

Where:

- ET = economic threshold (numbers of grubs in 10 sweeps)
- C = control cost (includes price of chemical + application) (\$ per ha)
- K = loss in yield as kilogram (kg) per hectare (ha) eaten for every one caterpillar netted in 10 sweeps
- P = price of grain per kg (price per tonne  $\div$  1000)

Research by the DAFWA produced the following data for chickpea crops.

<b>P</b> Grain price per tonne	<b>C</b> Control costs (\$ per ha)	<b>K</b> Loss for each grub in 10 sweeps (kg/ha/grub)
\$420	\$10	\$30

To determine if a chickpea crop needs spraying, a farmer carries out five lots of 10 sweeps of the crop with a net to collect any caterpillars. The sweeps result in a total of three caterpillars being collected.

- (a) Determine if the farmer should spray the crop for budworm caterpillars. Support your answer with a suitable calculation. (5 marks)

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- (b) Give a reason why the farmer did five lots of 10 sweeps rather than a single set of 10 sweeps. (1 mark)

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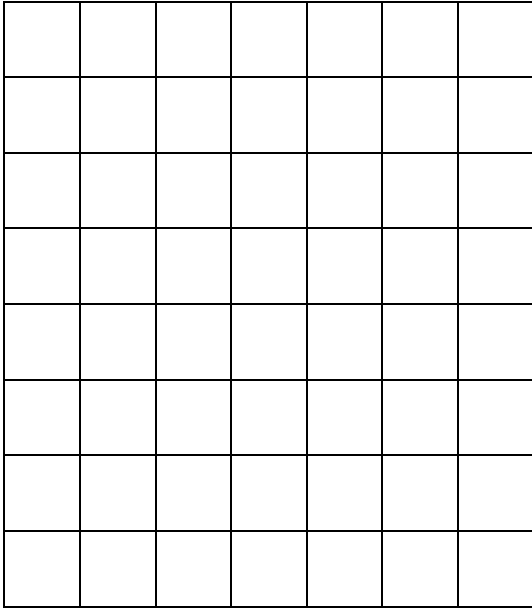
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13. It has been predicted by authorities that there is a high probability of an aphid outbreak occurring this year, so you decide to start monitoring the number of aphids in your crop. Below is a summary of your observations over a one month period.

Days	Average number of aphids per plant
0	2
5	2
10	10
13	20
16	30
19	35
22	36
25	35
30	35

(a) Graph the number of aphids observed over time on the grid below, with time on the x-axis. (4 marks)



(b) Suggest **one** reason for the stabilisation of the aphid population at about 19 days. (1 mark)

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- (b) Explain, with **one** specific example, how farmers can avoid the development of pesticide resistance. (3 marks)

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## Marking key for sample assessment task 6 – Unit 3 and Unit 4

### Section One: Multiple-choice

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

Description	Marks
1 mark for each question	1–10
<b>Total</b>	<b>/10</b>

11. A farmer is growing a canola crop and finds weeds emerging following crop germination.
- (a) Explain why it is preferable to use a selective herbicide for control of weeds in a crop after the crop has germinated. Your answer needs to include the reason for avoiding use of broad-spectrum (or non-selective) herbicides on the crop.

Description	Marks
A broad-spectrum (or non-selective) herbicide may kill the crop as well as weeds	1
A selective herbicide should target primarily the weeds, leaving the crop with no, or minimal, damage	1
<b>Total</b>	<b>/2</b>

It is possible to grow 'Roundup'-ready canola which has been genetically modified to contain genes that give it resistance to the herbicide glyphosate.

- (b) Discuss possible advantages and disadvantages associated with using a herbicide resistant crop such as 'Roundup'-ready canola.

Description	Marks
At least one advantage given	1
At least one disadvantage given	1
For a further one mark each, either: <ul style="list-style-type: none"> <li>two more advantages</li> <li>two more disadvantages, or</li> <li>one more advantage and one more disadvantage.</li> </ul>	1–2
<b>Total</b>	<b>/4</b>

Answer could include, but is not limited to:
Possible disadvantages include: <ul style="list-style-type: none"> <li>• can use a non-selective herbicide so more weeds may be controlled</li> <li>• cost savings from not having to spray multiple times to try to control different weed types.</li> </ul>
Possible advantages include: <ul style="list-style-type: none"> <li>• can lead to higher use of the herbicide and consequent environmental problems</li> <li>• weeds can develop resistance to the herbicide faster</li> <li>• gene flow from the genetically modified crop may occur to transfer resistance to related non-genetically modified plants.</li> </ul>

12. The native budworm is a pest of a number of crops in South-Western Australia, including chickpea. Economic damage to the crop is mainly determined by the number of caterpillars in the crop. To determine the economic threshold for this pest, the Department of Agriculture and Food of Western Australian (DAFWA) has developed the following formula

$$ET = C \div (K \times P)$$

Where:

- ET = economic threshold (numbers of grubs in 10 sweeps)
- C = control cost (includes price of chemical + application) (\$ per ha)
- K = loss in yield as kilogram (kg) per hectare (ha) eaten for every one caterpillar netted in 10 sweeps
- P = price of grain per kg (price per tonne  $\div$  1000)

Research by the DAFWA produced the following data for chickpea crops.

P	C	K
Grain price per tonne	Control costs (\$ per ha)	Loss for each grub in 10 sweeps (kg/ha/grub)
\$420	\$10	\$30

To determine if a chickpea crop needs spraying, a farmer carries out five lots of 10 sweeps of the crop with a net to collect any caterpillars. The sweeps result in a total of three caterpillars being collected.

- (a) Determine if the farmer should spray the crop for budworm caterpillars. Support your answer with a suitable calculation.

Description	Marks
Converting grain price per tonne to grain price per kilogram	1
$ET = 10 \div (30 \times 420 \div 1000)$	1
$ET = 0.8$ grubs for one set of 10 sweeps	1
$ET = 0.8 \times 5 = 4$ grubs for five sets of 10 sweeps	1
Only three caterpillars collected, which is below the economic threshold so no spraying needed	1
<b>Total</b>	<b>/5</b>

- (b) Give a reason why the farmer did five lots of 10 sweeps rather than a single set of 10 sweeps.

Description	Marks
This produces greater reliability in the number of caterpillars	1
<b>Total</b>	<b>/1</b>

13. It has been predicted by authorities that there is a high probability of an aphid outbreak occurring this year, so you decide to start monitoring the number of aphids in your crop. Below is a summary of your observations over a one month period.

Days	Average number of aphids per plant
0	2
5	2
10	10
13	20
16	30
19	35
22	36
25	35
30	35

- (a) Graph the number of aphids observed over time on the grid below, with time on the x-axis.

Description	Marks
Graph title appropriate	1
Number of aphids correctly plotted	1
y-axis linear scale	1
x-axis linear scale	1
<b>Total</b>	<b>/4</b>

- (b) Suggest **one** reason for the stabilisation of the aphid population at about 19 days.

Description	Marks
One appropriate reason provided	1
<b>Total</b>	<b>/1</b>
<b>Answer could include, but is not limited to:</b>	
Possible reasons include:	
<ul style="list-style-type: none"> <li>• natural predators of the aphid may have controlled its population</li> <li>• the supply of nutrients from the plants may be limiting further population growth</li> <li>• the plant's natural defence mechanisms (such as producing phytotoxins) may be controlling the population</li> </ul>	

(c) Define the term 'economic injury level'.

Description	Marks
Recognition that the economic injury level refers to the stage where the value of lost production, due to the pest population if left uncontrolled, is equal to the cost of control	1–2
<b>Total</b>	<b>/2</b>

(d) Outline a strategy for controlling the aphid outbreak at local, national and international levels.

Description	Marks
Local strategies provided	1–2
National strategies provided	1–2
International strategies provided	1–2
<b>Total</b>	<b>/6</b>
<b>Answer could include, but is not limited to:</b>	
Possible local strategies include: <ul style="list-style-type: none"> <li>• early control</li> <li>• limiting movement of machinery between paddocks</li> <li>• on-farm biosecurity measures, such as cleaning machinery</li> </ul> Possible national strategies include: <ul style="list-style-type: none"> <li>• avoid selling produce interstate</li> <li>• source clean seed</li> <li>• report any incidence to local authorities</li> <li>• quarantine</li> </ul> Possible international strategies include: <ul style="list-style-type: none"> <li>• strict airport and port quarantine inspections</li> <li>• checking and certifying imported produce as aphid free</li> </ul>	

14. (a) Explain how pesticide resistance develops in a plant pest population.

Description	Marks
The pest population is repeatedly exposed to the same chemical group (same mode of action)	1
Initially a small percentage of the population is resistant and survives exposure to the chemical	1
The surviving pests reproduce and pass on their resistance to the next generation	1
Over a number of life cycles of the pest population, the proportion of pest population with resistance increases	1
<b>Total</b>	<b>/4</b>

- (b) Explain, with **one** specific example, how farmers can avoid the development of pesticide resistance.

Description	Marks
Example stated	1
Methods appropriate to example provided	1–2
<b>Total</b>	<b>/3</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"><li>• use pesticides with different modes of action (from different chemical groups) to avoid the repeated exposure of the pest population to a single chemical group</li><li>• include non-chemical techniques for control, e.g. burning weeds, cropping techniques that limit pest development; on-farm hygiene practices</li><li>• introducing predators, e.g. wasps for caterpillars; leaf miners for Paterson's Curse</li></ul>	



## Sample assessment task

### Plant Production Systems – ATAR Year 12

#### Task 11 – Unit 3 and Unit 4

**Assessment type:** Production project

#### Conditions

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

#### Task weighting

2.5% of the school mark for this pair of units

### Production and Marketing Decisions

**(55 marks)**

The selection of a crop variety to grow is influenced by a number of factors, including market requirements, weather conditions, and disease and pest susceptibility of the variety.

#### What to do

You will choose one international market for wheat and identify a wheat variety suited to this market. You will describe the features of the wheat that suit it to the chosen market.

For the identified wheat variety, you will describe its characteristics on a range of criteria related to its growth.

As well, you will need to prepare a farm budget for production of the wheat.

#### Report

1. Describe Australia's agricultural image in respect of wheat production. Briefly describe how farmers protect this image through compliance to industry codes of practice and biosecurity technology. (6 marks)
2. State the market you have chosen for your wheat crop. Describe the characteristics of the wheat that make it suited to this market. (3 marks)
3. Describe the characteristics of the wheat related to its growth in terms of its
  - frost tolerance
  - herbicide tolerance
  - disease resistance
  - length of growing season
  - flowering time
  - expected yield. (12 marks)

As well, provide references for where you obtained your information. Where web-based sources are used, give html addresses, the dates accessed and, ideally, the authors and/or publishers of the websites. (2 marks)

4. Prepare a cash flow budget using a spread sheet to show the costs associated with the production of a wheat crop. Attach the spread sheet to your report. (26 marks)
  
5. Give the price expected for your wheat variety in the chosen market and, based on the estimate of yield for the farm, give the expected income from the wheat. Provide a reference for where you sourced your price for the wheat. (6 marks)

## Marking key for sample assessment task 11 – Unit 3 and Unit 4

- Describe Australia's agricultural image in respect of wheat production. Briefly describe how farmers protect this image through compliance to industry codes of practice and biosecurity technology.

Description	Marks
Description of Australia's agricultural image in respect of wheat production (e.g. clean, green image, reliable)	1–2
Description of relevant codes, including: <ul style="list-style-type: none"> <li>pesticide residue levels</li> <li>food standards codes</li> </ul>	1–2
Description of biosecurity technology	1–2
<b>Total</b>	<b>/6</b>

- State the market you have chosen for your wheat crop. Describe the characteristics of the wheat that make it suited to this market.

Description	Marks
Market stated	1
Description of characteristics of the wheat that make it suited to this market, e.g. protein content, hardness of wheat	1–2
<b>Total</b>	<b>/3</b>

- Describe the characteristics of the wheat related to its growth in terms of its
  - frost tolerance
  - herbicide tolerance
  - disease resistance
  - length of growing season
  - flowering time
  - expected yield.

As well, provide references for where you obtained your information. Where web-based sources are used, give html addresses, the dates accessed and, ideally, the authors and/or publishers of the websites.

Description	Marks
Description of characteristics of the wheat related to its growth in terms of its <ul style="list-style-type: none"> <li>frost tolerance</li> <li>herbicide tolerance</li> <li>disease resistance</li> <li>length of growing season</li> <li>flowering time</li> <li>expected yield</li> </ul>	1–2 1–2 1–2 1–2 1–2 1–2
Clear referencing allowing verification	1–2
<b>Total</b>	<b>/14</b>

4. Prepare a cash flow budget using a spread sheet to show the costs associated with the production of a wheat crop. Attach the spread sheet to your report.

Description	Marks
Budget includes cost estimates for	
• seed purchase	1–2
• fertiliser	1–2
• fuel	1
• pesticides	1
• vehicle registration	1
• land rates	1
• water	1
• electricity and other power costs	1
• telephone	1
• accountant	1
• machinery maintenance	1–2
• farm maintenance	1–2
• equipment, e.g. harvester	1–2
• wages	1–2
• taxes	1–3
• superannuation	1–3
<b>Total</b>	<b>/26</b>

5. Give the price expected for your wheat variety in the chosen market and, based on the estimate of yield for the farm, give the expected income from the wheat. Provide a reference for where you sourced your price for the wheat.

Description	Marks
Wheat price per tonne given including units	1–2
Realistic estimate of yield from farm	1–2
Estimated income from wheat	1
Source of wheat price provided	1
<b>Total</b>	<b>/6</b>