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

Science in Practice
General course

Externally set task sample one
Marking key

Total marks for this task: 34

Question 1   **(13 marks)**

(a)   Identify **two** ways in which the procedure given above would not allow for the collection of valid and reliable data.   **(2 marks)**

Description	Marks
Any two of	
• volume of water not stated • experimental set up not stated • no description of how data was to be recorded • no description of how all variables would be controlled • no mention of repeat trials • no risk assessment done • no description of what temperature it needs to be heated to	1–2
Total	**2**
Accept other relevant answers.	

(b)   Modify the student's procedure to ensure that valid and reliable data would be collected.   **(5 marks)**

Description	Marks
Procedure written sequentially	1
Controlled variables mentioned, including units where appropriate	1
Procedure used for data collection stated	1
Implementation of independent variable stated, including units where appropriate	1
Repeat trials stated	1
Total	**5**
Answers could include: 1. Place 100 mL of water into a beaker 2. Place thermometer into beaker 3. Heat water using a Bunsen burner 4. Using a stopwatch time how long it takes for the water to reach 100 °C 5. Repeat steps 1 to 4 using 100 mL of water two more times 6. Repeat steps 1 to 4 for other volumes of water for three trials 7. Calculate the average time taken for each volume of water.	

(c)   Construct a table that could be used to collect the data from the student's experiment.
(4 marks)

Description	Marks
Appropriate title	1
Column headings (including units)	1
All three trials included	1
Average column included	1
Total	**4**

Answers could include:

Time taken for different volumes of water to reach boiling point

Water volume (mL)	Time for liquid to reach 100 °C (s)			
	Trial 1	Trial 2	Trial 3	Average time

Accept other relevant answers.

(d)   Describe **one** way the students have improved their investigation to increase the
accuracy of their results.   (2 marks)

Description	Marks
Describes a way the students could improve their investigation	2
States a way the students could improve their investigation	1
Total	**2**

Answers could include:

- correct reading of the thermometer for each reading
- use the same thermometer for each reading
- use a data logger/temperature probe which is more accurate than the (alcohol) thermometer
- read the volume in the measuring cylinder from the bottom of the meniscus/same place each time each time

Accept other relevant answers.

Question 2 **(11 marks)**

(a)   Identify **two** types of information that should be included on a safety data sheet (SDS).
                                                                                                    (2 marks)

Description	Marks
Any two of	
• identity of the chemical product • identify its ingredients, • the hazards of the chemical/health hazards/physical hazards/environmental hazards, • physical properties of the chemical • safe handling • storage procedures for the chemical, • what to do in the event of an emergency or spill • first aid information • transport information	1–2
Total	**2**

(b)   Prepare a risk assessment identifying **one** potential hazard, a risk associated with the
        hazard and a suggested management strategy for each hazard.   (3 marks)

Description	Marks
Identifies a potential hazard for the clean up after accident	1
Identifies a risk associated with the hazard	1
Suggests a management strategy for the risk	1
Total	**3**

Answers could include:

Hazard	Risk	Management strategy
Containers break releasing vapours/gas into air/when cleaning up acid vapours could be released	Breath in vapours	Wear full face masks with filter/use respiratory/breathing equipment
Containers break releasing acid onto road/surfaces/when cleaning up acid could splash on skin	Contact with skin	Wear acid-resistant protective clothing and gloves
Containers could break splashing acid into eyes/when cleaning up acid could splash in eyes	Splashed in eyes	Use eye protection
Spilt acid could contact metals/cars etc	Corrosion of metal	Clean all contaminated surfaces with an excess/plenty of water
Split chemical could run/wash into drains/waterways	Acid enters waterways/drains	Cover drains/collect, bind and pump off spills/take up with liquid-absorbent/neutralising material

Accept other relevant answers.
Note: accept follow through for risk and management strategy if hazard is incorrect or not linked to the accident clean up.

(c)   Outline **two** reasons why a risk assessment is essential.   (2 marks)

Description	Marks
Any two of	
• identify potential hazards • prevent potential incidents • prevent injuries	1–2
Total	**2**
Accept other relevant answers.	

(d)   Explain why DFES has recommended motorists wash their cars with plenty of water if they have travelled past the science of the accident.   (4 marks)

Description	Marks
(sulfuric) acid may have splashed on the car	1
(sulfuric) acid is corrosive to metal	1
washing the car will remove/dilute acid	1
preventing/reducing the chances of corrosion	1
Total	**4**

Question 3   **(10 marks)**

(a)   Graph the data on the grid provided.   (5 marks)

Description	Marks
Title includes both independent and dependent variable	1
Axes are labelled correctly and include units	1
Scale shown and even	1
Data plotted correctly	1
Appropriate graph drawn	1
Total	**5**

Answers could include:

Total pollen count from Australian plants over three months
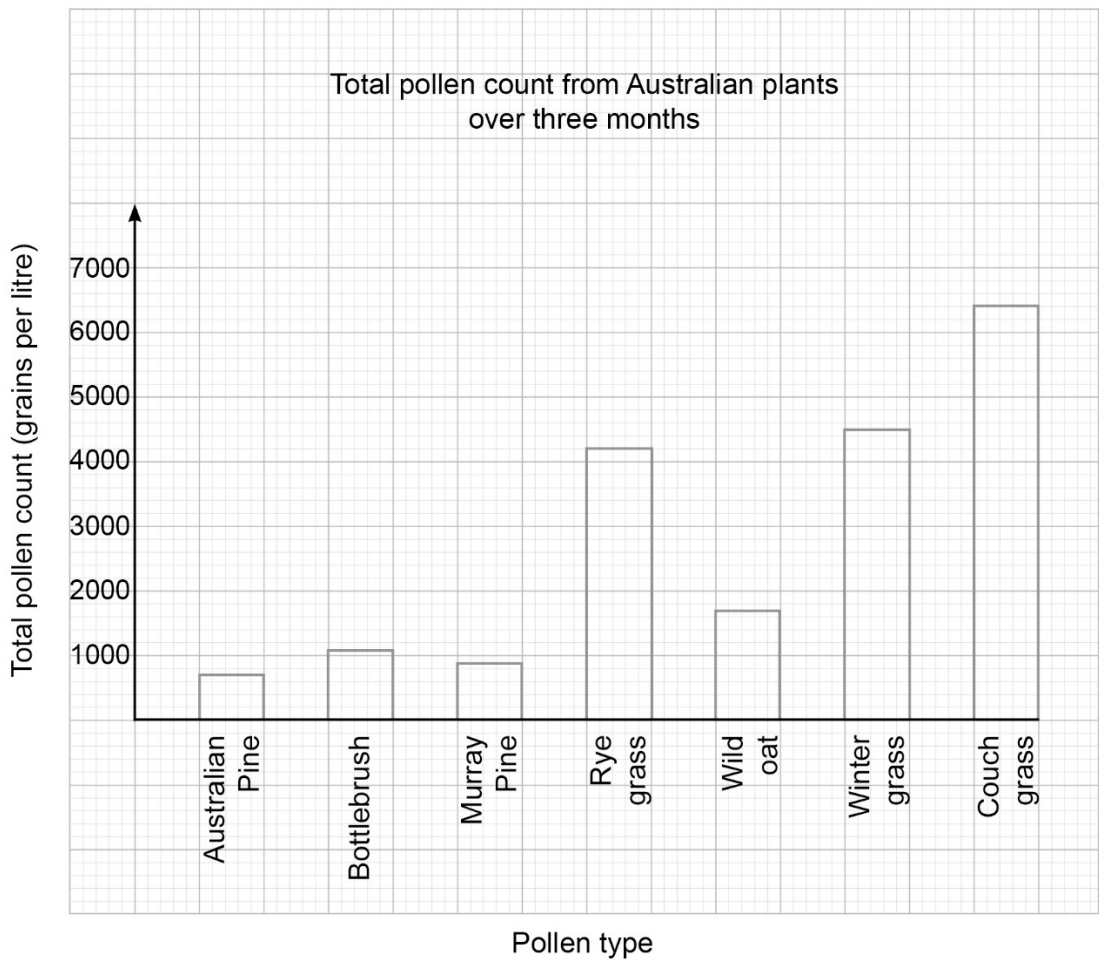
(b)   (i)   State **one** conclusion you can draw from your graph.   (1 mark)

Description	Marks
Any one of	
• grass species are the highest pollen contributors • pine trees are the lowest pollen contributors	1
Total	1
Accept other relevant answers.	

(ii)   Based on your conclusion, propose a hypothesis that could be used as the basis
for a new investigation about pollen counts.   (2 marks)

Description	Marks
Hypothesis in appropriate format/written as a testable statement	1
Hypothesis links independent and dependent variable	1
Total	2
Answers could include: • grasses produce the highest levels of pollen grains per litre over a period of three months • pine trees produce the lowest amounts of pollen grains over three months	
Accept other relevant answers.	
Note: if hypothesis does not link to the conclusion from part (d)(i), award maximum of 1 mark.	

(iii)   Identify the independent and dependent variables for your new hypothesis.
(2 marks)

Description	Marks
Independent: type of plant	1
Dependent: amount of pollen produced	1
Total	2
Accept other relevant answers.	
Note: do not penalise for consequential/follow through errors.	