Agricultural Science 2019 v1.2

IA1 sample marking scheme

August 2018

Data test (10%)

This sample has been compiled by the QCAA to model one possible approach to allocating marks in a data test. It matches the examination mark allocations as specified in the syllabus (~ 30% apply understanding, ~ 30% analyse evidence and ~ 40% interpret evidence) and ensures that a balance of the objectives are assessed.

Assessment objectives

This assessment instrument is used to determine student achievement in the following objectives:

2. apply understanding of animal production, plant production or agricultural enterprises to given algebraic, visual or graphical representations of scientific relationships and data to determine unknown scientific quantities or features
3. analyse evidence about animal production, plant production or agricultural enterprises to identify trends, patterns, relationships, limitations or uncertainty in datasets
4. interpret evidence about animal production, plant production or agricultural enterprises to draw conclusions based on analysis of datasets.

Note: Objectives 1, 5, 6 and 7 are not assessed in this instrument.

Queensland Government | Queensland Curriculum & Assessment Authority

For all Queensland schools

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Instrument-specific marking guide (ISMG)

Criterion: Data test

Assessment objectives

2. apply understanding of animal production, plant production or agricultural enterprises to given algebraic, visual or graphical representations of scientific relationships and data to determine unknown scientific quantities or features
3. analyse evidence about animal production, plant production or agricultural enterprises to identify trends, patterns, relationships, limitations or uncertainty in datasets
4. interpret evidence about animal production, plant production or agricultural enterprises to draw conclusions based on analysis of datasets

The student work has the following characteristics:	Cut-off	Marks
• consistent demonstration, across a range of scenarios about animal production, plant production or agricultural enterprises, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct and appropriate use of analytical techniques to correctly identify trends, patterns, relationships, limitations and uncertainty – correct interpretation of evidence to draw valid conclusions.	> 90%	10
	> 80%	9
• consistent demonstration, in scenarios about animal production, plant production or agricultural enterprises, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations and uncertainty – correct interpretation of evidence to draw valid conclusions.	> 70%	8
	> 60%	7
• adequate demonstration, in scenarios about animal production, plant production or agricultural enterprises, of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual and graphical representations of scientific relationships and data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations or uncertainty – correct interpretation of evidence to draw valid conclusions.	> 50%	6
	> 40%	5

The student work has the following characteristics:	Cut-off	Marks
• demonstration, in scenarios about animal production, plant production or agricultural enterprises, of elements of – selection and correct application of scientific concepts, theories, models and systems to predict outcomes, behaviours and implications – correct calculation of quantities through the use of algebraic, visual or graphical representations of scientific relationships or data – correct use of analytical techniques to correctly identify trends, patterns, relationships, limitations or uncertainty – correct interpretation of evidence to draw valid conclusions.	> 30%	4
	> 20%	3
• demonstration, in scenarios about animal production, plant production or agricultural enterprises, of elements of – application of scientific concepts, theories, models or systems to predict outcomes, behaviours or implications – calculation of quantities through the use of algebraic or graphical representations of scientific relationships and data – use of analytical techniques to identify trends, patterns, relationships, limitations or uncertainty – interpretation of evidence to draw conclusions.	> 10%	2
	> 1%	1
• does not satisfy any of the descriptors above.	≤ 1%	0

Task

See the sample assessment instrument for IA1: Data test (10%) (available on the QCAA Portal).

Sample marking scheme

Criterion	Marks allocated	Result
Data test Assessment objectives 2, 3, 4	10	—
Total	**10**	**—**

Marking scheme symbols and abbreviations

Symbol or abbreviation	Meaning
✓	The preceding section of the expected response is worth one mark.
/	Separates acceptable alternative wordings in the expected response.
()	Terms in brackets are not necessary in the response for the mark to be awarded.
shaded and underlined text	Shaded and underlined text must be included in the response for the mark to be awarded.
Accept converse.	Award the mark even if the answer is stated in its converse form, e.g. 'A comes before B' can be stated as 'B comes after A'.
Accept *min–max*.	Award the mark for any numerical answer that falls within the specified range, e.g. 'Accept 1.5–1.9' means that any answer between 1.5 and 1.9 should be considered correct. This is used in items that involve a multi-step calculation where differences in rounding in the intermediate steps could result in slight differences in the final answer.
Allow for FT error …	Means 'allow for follow-through error'. Initial errors should only be penalised once. Marks should be awarded for subsequent steps that are correct.
Allow FT error for transcription only.	Follow-through error is only allowed if the student has written down information incorrectly but processed it correctly.
AND	Separates two parts of the response that are both required for the mark to be awarded.
Correct d.p. required.	The answer must be stated to the number of decimal places indicated in the item for the mark to be awarded.
Correct s.f. required.	The answer must be stated to the correct number of significant figures indicated in the item for the mark to be awarded.
Max. # marks.	The maximum number of marks that can be awarded for the response is indicated by #.
OR	Separates acceptable alternative wordings.
OWTTE	Means 'or words to that effect'. This is used in questions where students are unlikely to use the exact wording given in the expected response. If the student's response has the same meaning as the expected response, then the mark should be awarded.
Working not required.	Evidence of working, reasoning or calculations is not required for the mark to be awarded.

The annotations are written descriptions of the expected response for each question and are related to the assessment objectives.

Assessment objective — annotation	Expected response Note: ✓ = 1 mark	Mark allocation
Item 1		**1 mark**
Apply understanding The item uses the cognitive verb 'identify'. The expected response is an unknown scientific quantity.	Mean height after 6 days = 14 cm✓	1 mark for mean height.
Item 2		**2 marks**
Apply understanding The item uses the cognitive verb 'determine'. The expected response is an unknown scientific quantity.	**Control group** Daily average growth rate $= \frac{(7.5 - 1)}{(10 - 2)}$ = 0.8 cm/day✓ **Gibberellic acid group** Daily average growth rate $= \frac{(25.5 - 1)}{(10 - 2)}$ = 3.1 cm/day✓	1 mark for each average growth rate.
Item 3		**2 marks**
Analyse evidence The item uses the cognitive verb 'contrast'. The expected response is a pattern.	The dwarf peas treated with gibberellic acid grew faster than the untreated dwarf peas.✓ (Although the plants in both groups started at approximately the same mean height) the peas treated with gibberellic acid had a greater mean height (26.5 cm) at Day 10 than the untreated dwarf peas (8.5 cm).✓	1 mark for identifying which group grew faster. Accept converse. 1 mark for identifying which group had a greater height at Day 10. Accept converse.

Assessment objective — annotation	Expected response Note: ✓ = 1 mark	Mark allocation
Item 4		**2 marks**
Analyse evidence The item uses the cognitive verb 'contrast'. The expected response identifies uncertainty in a dataset.	There is greater variation in the data for the gibberellic acid group than for the control group.✓ The standard error for the gibberellic acid group (2.1 cm) is greater than the standard error for the control group (1.3 cm). OR The range for the gibberellic acid group (9.2 cm) is greater than the range for the control group (6.7 cm).✓	1 mark for identifying which group has greater variation in the data. Accept converse. 1 mark for contrasting the standard error values or the ranges. Accept converse.
Item 5		**1 mark**
Apply understanding The item uses the cognitive verb 'determine'. The expected response is an unknown feature.	Heavy feeder market.✓	1 mark for correctly identifying the market.
Item 6		**1 mark**
Apply understanding The item uses the cognitive verb 'identify'. The expected response is an unknown quantity.	Maximum live weight is 500 kg.✓	1 mark for correct weight. Accept 490–510 kg.
Item 7		**1 mark**
Apply understanding The item uses the cognitive verb 'determine'. The expected response is an unknown quantity.	Expected carcass weight = 340 kg.✓	1 mark for correct carcass weight. Accept 335–345 kg.

Assessment objective — annotation	Expected response Note: ✓ = 1 mark	Mark allocation
Item 8		**2 marks**
Analyse evidence The item uses the cognitive verb 'identify'. The expected response is a relationship.	Example calculation using data for Percy. $\frac{243}{425} \times 100\% = 57\%$✓ HSCW = $0.57 \times LW$ OR HSCW : LW = 0.57 : 1✓	1 mark for working or reasoning to find the ratio of HSCW to live weight. No penalty for decimal places. 1 mark for stating the relationship as an equation or a ratio or in another appropriate form. Allow for FT error.
Item 9		**2 marks**
Interpret evidence The item uses the cognitive verb 'draw conclusions'. The expected response draws a conclusion based on analysis.	The school is not feeding a ration sufficient in metabolisable energy (ME). OR The school did not start feeding the cattle early enough with the correct ration to allow the crossbred cattle to 'finish'.✓ The P8 fat levels are at the lower end of the range for both the heavy feeder and export markets.✓	1 mark for identifying the deficiency in the ration. 1 mark for justification linking insufficient energy to depth of fat or P8 measurement.
Item 10		**6 marks**
Interpret evidence The item uses the cognitive verb 'draw conclusions'. The expected response draws a conclusion based on analysis.	The optimum phosphorus rate will produce the maximum leaf area and pods per plant.✓ The maximum mean leaf area occurs at a phosphorus rate of 20 kg/ha.✓ This result is statistically different to the results for the other phosphorus rates because the confidence intervals do not overlap.✓ The maximum mean number of pods per plant occurs at a phosphorus rate of 20 kg/ha.✓ This result is statistically different to the results for the other phosphorus rates because the confidence intervals do not overlap.✓ The optimum level of fertiliser is 20 kg/ha.✓	1 mark for identifying the criterion for optimisation. 1 mark for identifying the phosphorus rate for maximum mean leaf area. 1 mark for identifying that this result is significantly different with evidence. 1 mark for identifying increases in growth (leaf area). 1 mark for identifying that this result is significantly different with evidence. 1 mark for a correct conclusion about optimum fertiliser level.