Aerospace Systems subject report

2021 cohort

February 2022

Queensland Government

QCAA Queensland Curriculum & Assessment Authority

220039

For all Queensland schools

ISBN

Electronic version: 978-1-74378-191-3

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Introduction

Despite the challenges brought about by the COVID-19 pandemic, Queensland's education community can look back on 2021 with satisfaction at having implemented the first full assessment cycle in the new Queensland Certificate of Education (QCE) system. That meant delivering three internal assessments and one external assessment in each General subject.

This report analyses that cycle — from endorsing summative internal assessment instruments to confirming internal assessment marks, and designing and marking external assessment. It also gives readers information about:

- applying syllabus objectives in the design and marking of internal and external assessments
- patterns of student achievement.

The report promotes continuous improvement by:

- identifying effective practices in the design and marking of valid, accessible and reliable assessments
- recommending where and how to enhance the design and marking of valid, accessible and reliable assessment instruments
- providing examples of best practice where relevant, possible and appropriate.

Audience and use

This report should be read by school leaders, subject leaders and teachers to:

- inform teaching and learning and assessment preparation
- assist in assessment design practice
- assist in making assessment decisions
- help prepare students for external assessment.

The report is publicly available to promote transparency and accountability. Students, parents, community members and other education stakeholders can learn about the assessment practices and outcomes for General subjects (including alternative sequences (AS) and Senior External Examination (SEE) subjects, where relevant) and General (Extension) subjects.

Report preparation

The report includes analyses of data and other information from endorsement, confirmation and external assessment processes. It also includes advice from the chief confirmer, chief endorser and chief marker, developed in consultation with and support from QCAA subject matter experts.

Subject data summary

Subject completion

The following data includes students who completed the General subject or AS.

For the purposes of this report, while the 2021 summative units for the AS are AS units 1 and 2, this information will be included with the General summative Units 3 and 4.

Note: All data is correct as at 17 December 2021. Where percentages are provided, these are rounded to two decimal places and, therefore, may not add up to 100%.

Number of schools that offered the subject: 13.

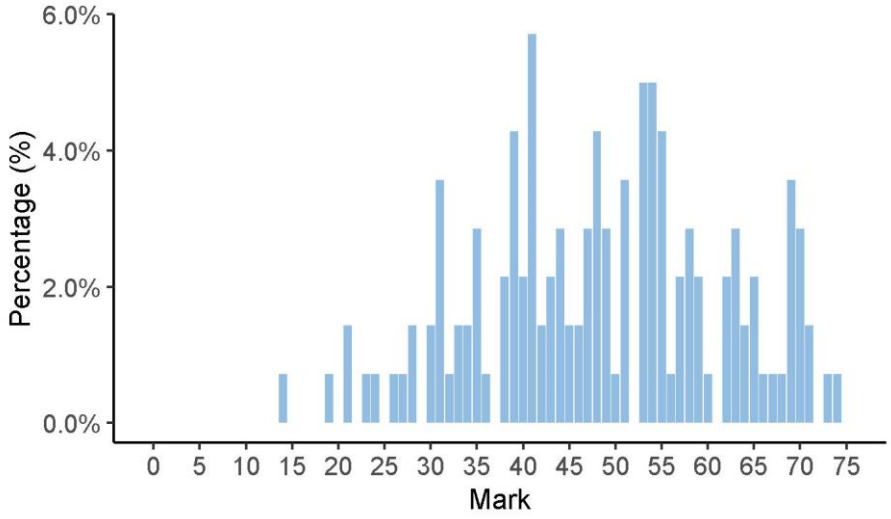
Completion of units	Unit 1	Unit 2	Units 3 and 4
Number of students completed	188	171	140

Units 1 and 2 results

Number of students	Satisfactory	Unsatisfactory
Unit 1	163	25
Unit 2	161	10

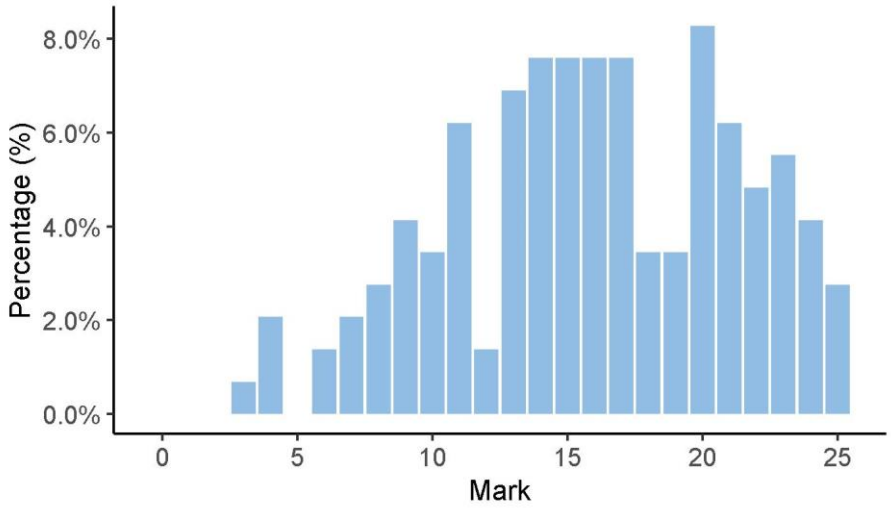
Units 3 and 4 internal assessment (IA) results

Total marks for IA

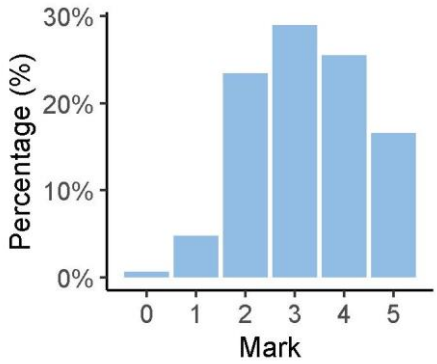


IA1 marks

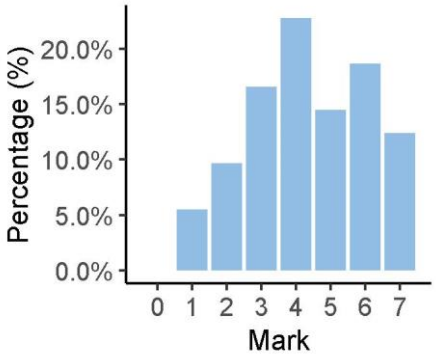
IA1 total



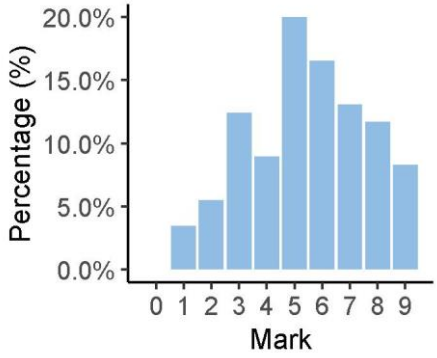
IA1 Criterion: Retrieving and comprehending



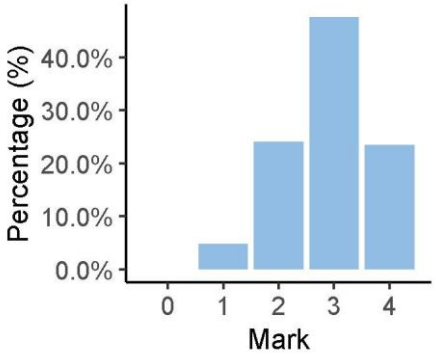
IA1 Criterion: Analysing



IA1 Criterion: Synthesising and evaluating

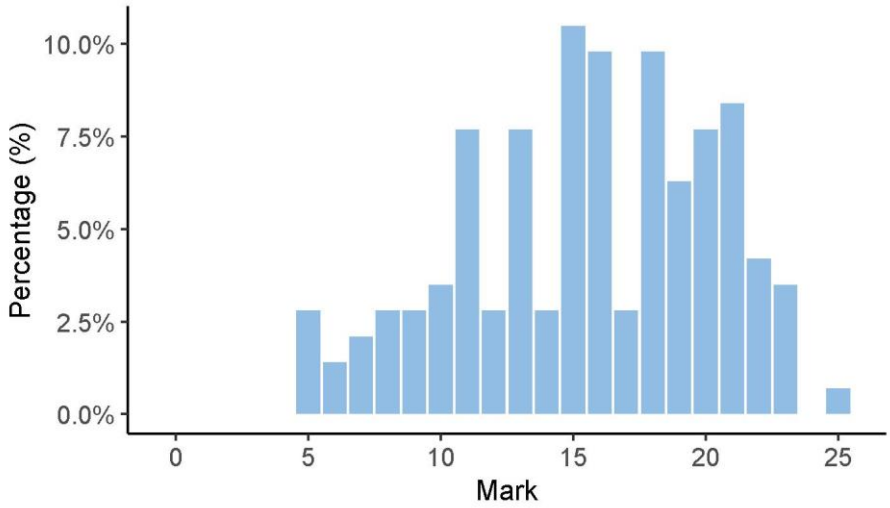


IA1 Criterion: Communicating

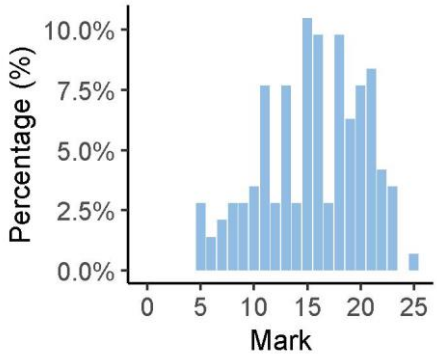


IA2 marks

IA2 total

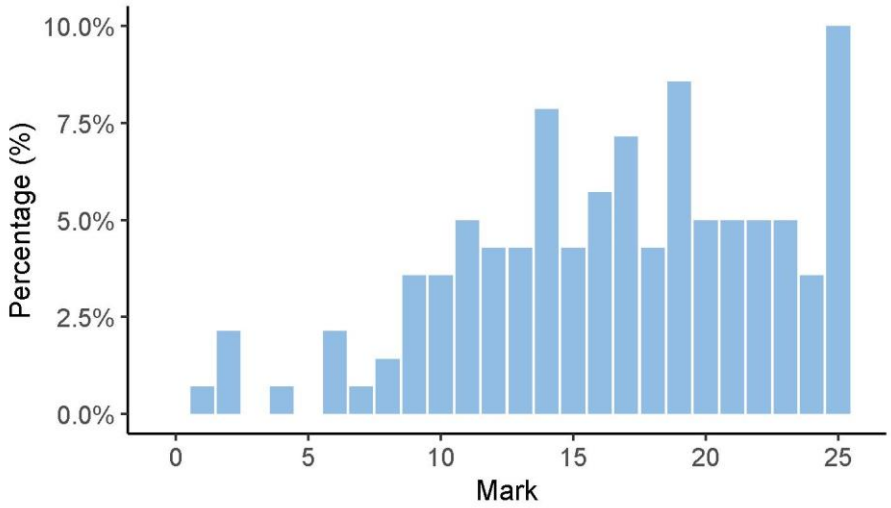


IA2 Criterion: Aerospace systems knowledge and problem-solving

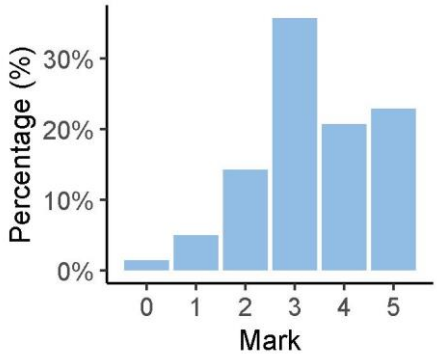


IA3 marks

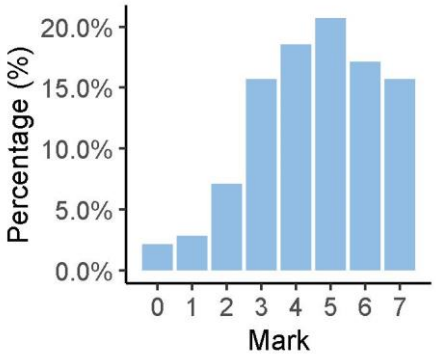
IA3 total



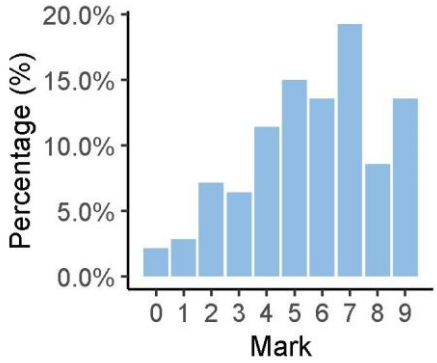
IA3 Criterion: Retrieving and comprehending



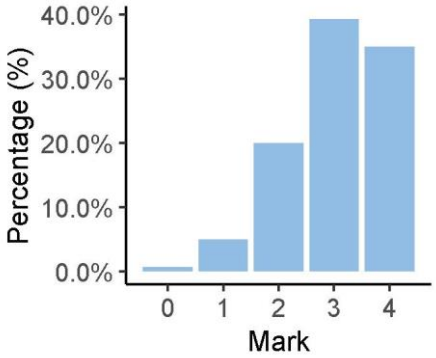
IA3 Criterion: Analysing



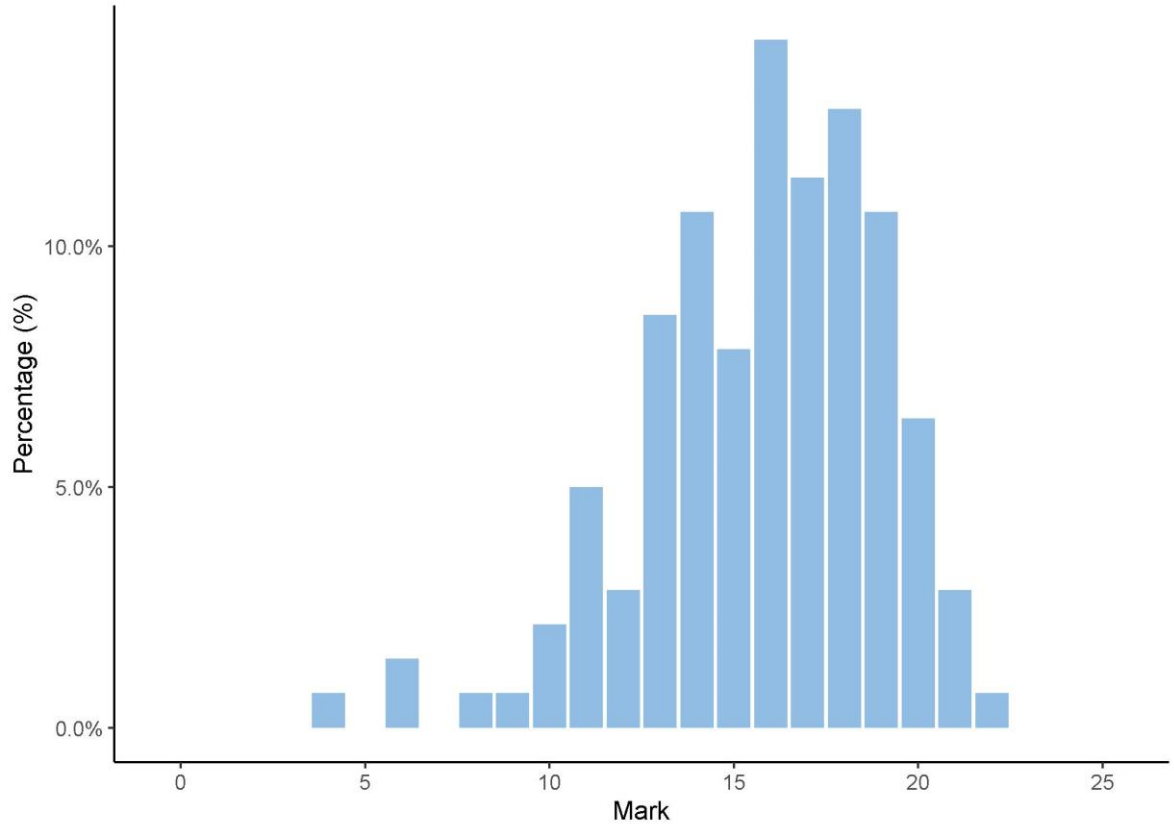
IA3 Criterion: Synthesising and evaluating



IA3 Criterion: Communicating

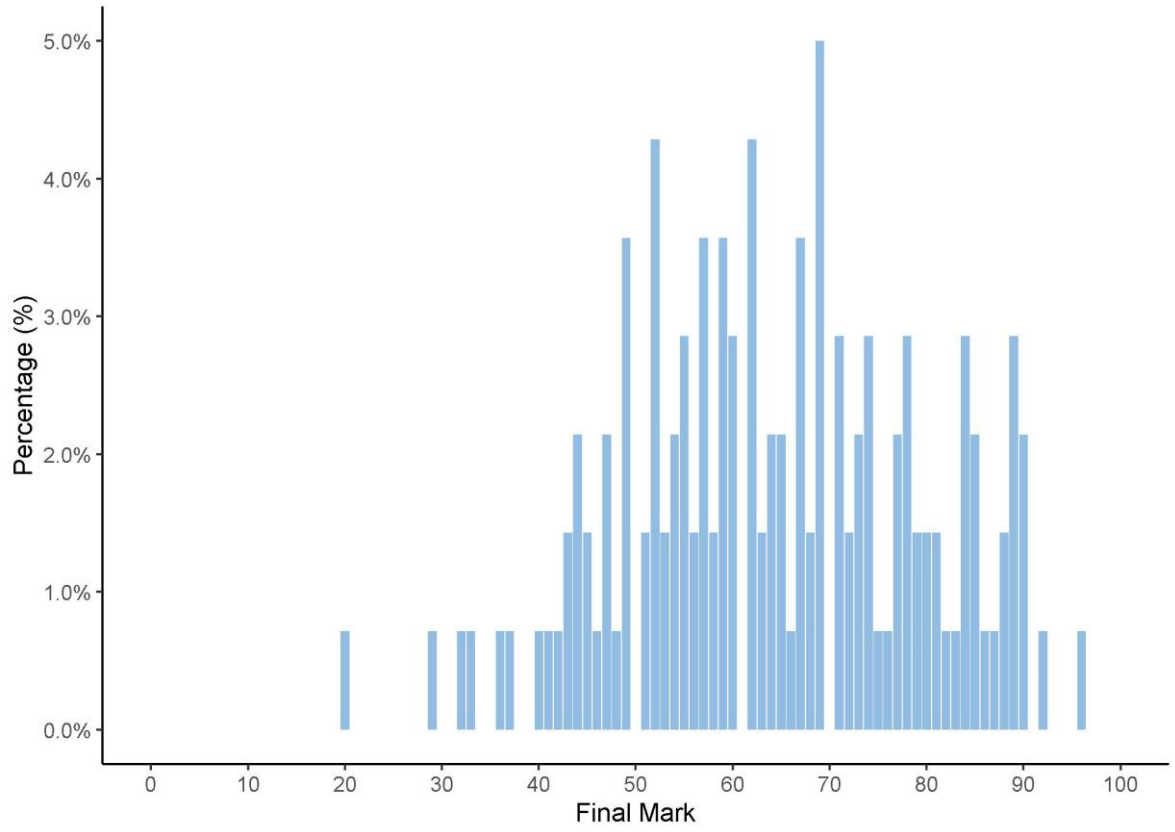


External assessment (EA) marks



Final subject results

Final marks for IA and EA



Grade boundaries

The grade boundaries are determined using a process to compare results on a numeric scale to the reporting standards.

Standard	A	B	C	D	E
Marks achieved	100–83	82–67	66–43	42–19	18–0

Distribution of standards

The number of students who achieved each standard across the state is as follows.

Standard	A	B	C	D	E
Number of students	21	43	67	9	0

Internal assessment

The following information and advice pertain to the assessment design and assessment decisions for each IA in Units 3 and 4. These instruments have undergone quality assurance processes informed by the attributes of quality assessment (validity, accessibility and reliability).

Endorsement

Endorsement is the quality assurance process based on the attributes of validity and accessibility. These attributes are categorised further as priorities for assessment, and each priority can be further broken down into assessment practices.

Data presented in the Assessment design section identifies the reasons why IA instruments were not endorsed at Application 1, by the priority for assessments. An IA may have been identified more than once for a priority for assessment, e.g. it may have demonstrated a misalignment to both the subject matter and the assessment objective/s.

Refer to the quality assurance tools for detailed information about the assessment practices for each assessment instrument.

Percentage of instruments endorsed in Application 1

Number of instruments submitted	IA1	IA2	IA3
Total number of instruments	13	13	12
Percentage endorsed in Application 1	38%	38%	92%

Confirmation

Confirmation is the quality assurance process based on the attribute of reliability. The QCAA uses provisional criterion marks determined by teachers to identify the samples of student responses that schools are required to submit for confirmation.

Confirmation samples are representative of the school's decisions about the quality of student work in relation to the ISMG and are used to make decisions about the cohort's results. If further information is required about the school's application of the ISMG to finalise a confirmation decision, the QCAA requests additional samples.

Schools may request a review where an individual student's confirmed result is different from the school's provisional mark in one or more criteria and the school considers this result to be an anomaly or exception.

The following table includes the percentage agreement between the provisional marks and confirmed marks by assessment instrument. The Assessment decisions section of this report for each assessment instrument identifies the agreement trends between provisional and confirmed marks by criterion.

Number of samples reviewed and percentage agreement

IA	Number of schools	Number of samples requested	Number of additional samples requested	Percentage agreement with provisional marks
1	13	64	25	76.92%
2	13	64	0	92.31%
3	13	64	16	84.62%

Internal assessment 1 (IA1)

Project — folio (25%)

In Aerospace Systems, a folio involves students documenting the application of a problem-solving process in response to an identified real-world aerospace problem. Students will develop a range of cognitive, technical and creative skills and theoretical understandings to provide a solution to an operational systems problem drawn from Unit 3 subject matter.

This may include problems where students are required to:

- investigate why the current location of an airport has created a concern for local community
- investigate an aircraft accident or incident
- investigate an airline that is experiencing a financial loss on several of its routes.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions*
Alignment	7
Authentication	0
Authenticity	1
Item construction	0
Scope and scale	2

*Each priority might contain up to four assessment practices.

Total number of submissions: 13.

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- gave students the opportunity to demonstrate their understanding of the subject matter for the unit and topics and cover the required assessment objectives and performance-level descriptors of the ISMG
- provided a context relating to the subject matter for the unit/topic and provided a clear overview and framework for the assessment task
- contained authentication strategies that reflected the QCAA guidelines for assuring student authorship

- featured scaffolding that did not repeat or redefine information that was already provided in the assessment instrument and provided clear instructions that informed students about the process they could use to complete the response.

Practices to strengthen

It is recommended that assessment instruments:

- address all assessment specifications for Part A and Part B unaltered, as defined in Syllabus section 4.8.1), e.g. schools should use the syllabus language to reproduce Part A and B specifications directly from the syllabus
- allow for unique student responses — instead of providing limited options (e.g. improve one airline company or one location) give a broader scope and scale, e.g. investigate all GA airline companies in Queensland
- be of an appropriate scale to allow students to respond within the syllabus conditions. Schools that developed operational systems problems that were achievable within 5–7 weeks (a syllabus duration condition) showed a better alignment to the assessment priorities. Schools should apply the school policy for managing response length, e.g. marking to correct task length or allowing students to redact to correct task length so responses do not exceed the syllabus conditions.

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	0
Language	0
Layout	0
Transparency	0

*Each priority might contain up to four assessment practices.

Total number of submissions: 13.

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- avoided bias and inappropriate content, e.g. schools that avoided gender stereotyping and used gender-neutral language throughout contexts and tasks were better aligned to the assessment priorities
- used images, diagrams or other visual elements that were legible, clear, relevant and accessible, e.g. schools that provided images, diagrams or other visual elements with high resolution made these elements easier to view and more accessible for students.

Practices to strengthen

There were no significant issues identified for improvement.

Assessment decisions

Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Retrieving and comprehending	84.62%	15.38%	0%	0%
2	Analysing	84.62%	15.38%	0%	0%
3	Synthesising and evaluating	76.92%	23.08%	0%	0%
4	Communicating	84.62%	15.38%	0%	0%

Effective practices

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- the Retrieving and comprehending criterion at the 2–3 performance level demonstrated
  - competent symbolisation and appropriate explanation of some ideas and a solution, consistently applied using the glossary definitions of the qualifiers from each performance level descriptor including visual representations of visual frameworks, feedback and causal loops
- the Analysing criterion at the 4–5 performance level demonstrated
  - careful and deliberate thought to distinguish the problem characteristics using aerospace systems, technology, and research information
  - clear and sound reasoning of the problem characteristics to establish success criteria
- students demonstrated evidence of coherent and logical synthesis that was clearly identified, possibly with use of tabulated information. This meant the student response aligned to the characteristics and the performance-level descriptor in the Synthesising and evaluating criterion at the 8–9 performance level
- students demonstrated discerning decision-making with fluent use of folio conventions and referencing. This meant the student response aligned to the characteristics and performance-level descriptor in the Communicating criterion at the 3–4 performance level.

Samples of effective practices

The following are excerpts from responses that illustrate the characteristics for the criterion at the performance level indicated. The excerpts may provide evidence of more than one criterion. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

These student response excerpts have been included:

- to demonstrate representations of ideas and relationships using highly skilled causal and feedback loops with valuable and relevant annotations that display intellectual perception about ideas and a solution in relation to the problem.

Retrieving and comprehending (4–5 marks)

- accurate and discriminating recognition and discerning description of the operational systems problem, aerospace technology knowledge, concepts and principles, and systems thinking habits and systems thinking strategies in relation to aerospace management, safety, airline and/or airport operations
- adept symbolisation and discerning explanation of ideas, a solution and relationships in relation to aerospace management, safety, airline and/or airport operations with visual frameworks, causal and feedback loops, flow charts, diagrams, sketches and/or pictures

Excerpt 1

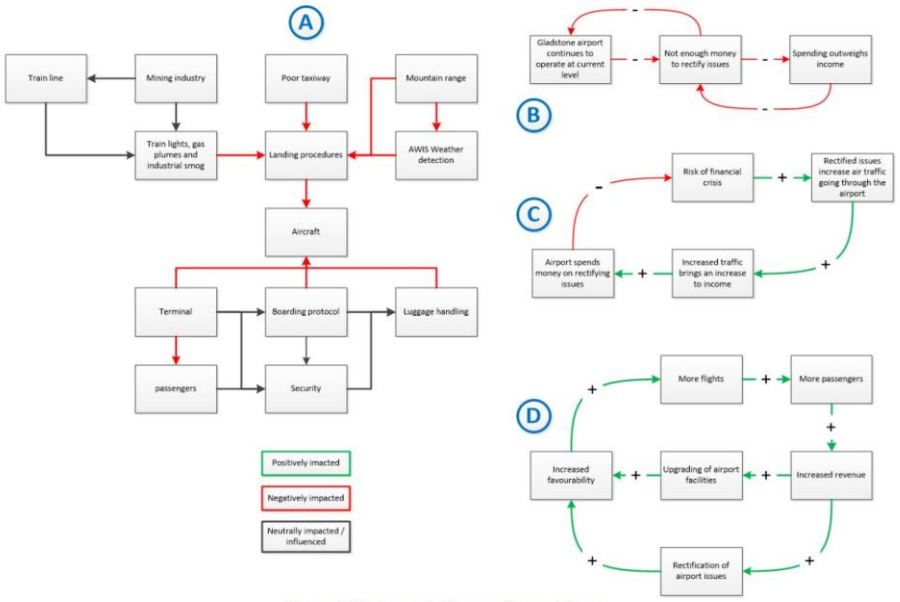


Figure 4: System relations and causal loops

Excerpt 2

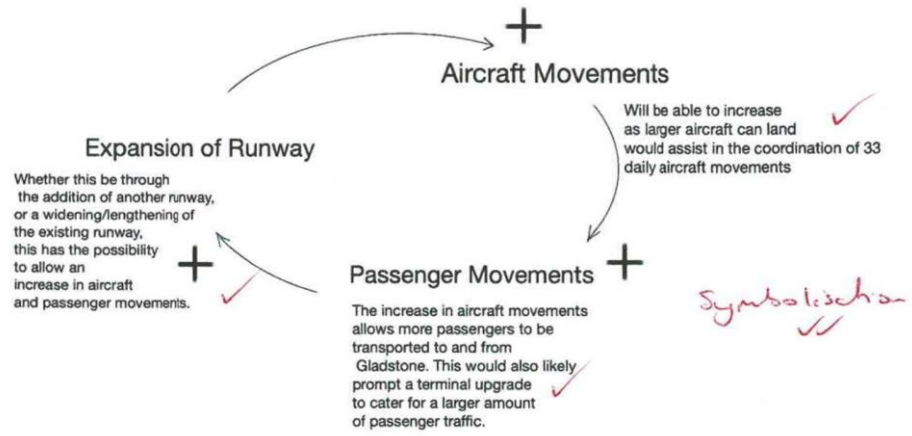


Figure 6: Feedback loop detailing possible effects of expanding the runway area.

These student response excerpts have been included:

- to demonstrate well-structured analysis and synthesis with valid information that is coherent and logical in order to support the student's new understanding

- to show discerning refinement of the ideas and solutions using success criteria
- to demonstrate purposeful generation of solutions to provide valid data to critically assess the feasibility of the proposals.

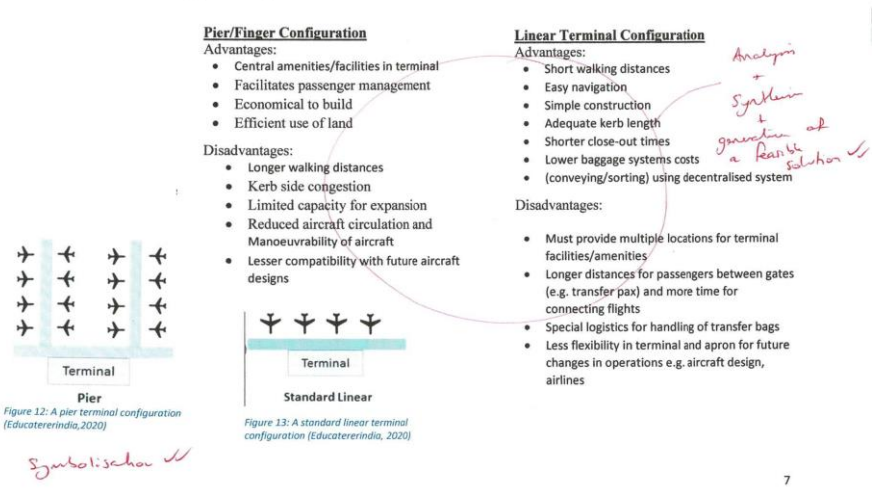
Analysing (4–5 marks)

- considered analysis of the operational systems problem, and relevant aerospace systems, technology, and research information in relation to aerospace management, safety, airline and/or airport operations to identify the relevant elements, components and features, and their relationship to the structure of the problem
- logical determination of effective solution success criteria for the operational systems problem

Synthesising and evaluating (8–9 marks)

- coherent and logical synthesis of relevant aerospace systems, technology and research information, and ideas to propose a possible aerospace management, safety, airline and/or airport operations solution
- purposeful generation of an aerospace management, safety, airline and/or airport operations solution to provide valid data to critically assess the feasibility of a proposal
- critical evaluation and discerning refinement of ideas and a solution using success criteria to make astute recommendations justified by data and research evidence

Excerpt 1



Pier/Finger Configuration

Advantages:

- Central amenities/facilities in terminal
- Facilitates passenger management
- Economical to build
- Efficient use of land

Disadvantages:

- Longer walking distances
- Kerb side congestion
- Limited capacity for expansion
- Reduced aircraft circulation and Manoeuvrability of aircraft
- Lesser compatibility with future aircraft designs

Linear Terminal Configuration

Advantages:

- Short walking distances
- Easy navigation
- Simple construction
- Adequate kerb length
- Shorter close-out times
- Lower baggage systems costs
- (conveying/sorting) using decentralised system

Disadvantages:

- Must provide multiple locations for terminal facilities/amenities
- Longer distances for passengers between gates (e.g. transfer pax) and more time for connecting flights
- Special logistics for handling of transfer bags
- Less flexibility in terminal and apron for future changes in operations e.g. aircraft design, airlines

Terminal

Pier

Figure 12: A pier terminal configuration (Educatererindia,2020)

Terminal

Standard Linear

Figure 13: A standard linear terminal configuration (Educatererindia, 2020)

7

Excerpt 2

Areas of Weakness

It can be said that the proposed removal of the Port Curtis Cemetery could pose a significant ethical issue. Additionally, the repurposing of Clinton Club Park could gain community backlash. The implementation of an additional runway will allow the local businesses an increase in revenue – although will bring significantly more noise risk to the area as the airport historically did not operate during night-time to keep the noise to a minimum for nearby residents. However, as the current position of the airstrip and railway are already in close proximity to the suburban area, it can be argued that the increase will be gradual, and the size of the aircraft will generally stay the same but be more frequent for the most part of the day.

Evaluation

The proposed solution has a very strong fundamental design. It incorporates a variety of important factors, such as terminal configuration, airside operations, terminal revenue, air traffic movements, taxiway and apron designs, runway materials and the carpark capacity.

The solution has been evaluated against the success criteria. It complies with the majority of airport design standards set by ICAO and CASA and should be able to cope with the estimated tripling of air traffic by 2051. Efficient passenger movements both within the aerodrome (landside and airside interactions) and the wider community will be maximised by the refinement of car parking and apron design. Throughout the report, the elements of airport design have been investigated in order to support the proposed development to cater for the increase in demand, whilst considering the underlying safety of airport personnel and property.

Excerpt 3

Runway Ideas

Figure 4:Redcliffe Airport with the current runway extended

The easiest solution would be the extension of Redcliffe Airports Current runway 07/25, The runway could be extended to allow for larger aircraft to take off and land however due to the current proximity to residential houses, extending that runway any longer then its current 853m span, would result in a circuit approach over residential houses as well as retain the challenging crosswind conditions. This is likely to frustrate local residents and therefore the possibility of further operation restrictions being imposes on the airport. Along with this the taxiways would need to be made wider as well as larger hangers built over the existing ones.

An alternative approach to this problem would be an "X" strip layout would work in this scenario as two runways could be established onsite each benefitting the operation of the airport in different times of the year however, this poses a much greater construction cost and would be only operational for part of the year. Therefore, a way of using both runways throughout the year whilst only taking off one each season would prove a much more beneficial way of operating the aerodrome.

Plus:	Minus:	Interesting:
The "X" strip layout would allow aircraft movements in undesirable wind conditions	Construction costs are increased and only 1 runway can be used at a time	Intersecting runways are a great option for airports with limited space and big changes in wind directions

In order to connect these two runways a new network of new taxiways will be required to connect the new runways to the existing airport facilities as well as the new facilities to be constructed as follows. The new taxiways would need to be made to support the airports critical aircraft size to ensure the aircraft landing are able to taxi between the runway and aprons, alongside this the existing movements areas should be made wider with the proposal that Redcliffe airports current runway is decommissioned and used as a taxiway for aircraft to come from the existing hanger sector to the new runways.

Redacted for copyright

Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG for this IA, it is recommended that:

- the syllabus glossary be used to unpack the cognitions and qualifiers, along with the assessment specifications, to analyse each performance-level descriptor to determine the evidence that would be expected in student responses at each level
- mark allocation conventions within performance levels be adhered to, specifically when awarding the top mark range of a performance level, e.g. the evidence found in the response must correlate to all descriptors for that performance level — or with some descriptors for a higher performance level — to award the upper mark of the range
- all attributes of the descriptors for each criterion be addressed prior awarding a mark, e.g. inclusion of overt systems thinking strategies and visual frameworks, feedback and causal loops
- teachers use the checkpoints and draft to ensure students submit their responses within the specified limits of the syllabus. They should apply the school assessment policy and refer to the *QCE and QCIA policy and procedures handbook*.

Additional advice

- Teachers should encourage students to focus on the success criteria, as both the Analysing criterion and the Synthesising and evaluating criterion rely on student inclusion of clear success criteria. Explicit inclusion ensures the evidence can be clearly identified.

Internal assessment 2 (IA2)

Examination (25%)

This assessment is a supervised test that assesses the application of a range of cognitions to multiple provided items — questions, scenarios and problems drawn from Unit 3 subject matter.

This may have included items which ask students to respond to the following activities:

- sketching, drawing, graphs, tables and diagrams
- writing multiple choice, single-word, sentence or short-paragraph responses
- calculating using concepts and principles drawn from Unit 3 Topic 5 subject matter
- responding to seen or unseen stimulus materials.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions*
Alignment	5
Authentication	0
Authenticity	2
Item construction	4
Scope and scale	4

*Each priority might contain up to four assessment practices.

Total number of submissions: 13.

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- gave students the opportunity to demonstrate their understanding of the subject matter for the unit and topics and cover the required assessment objectives and performance-level descriptors of the ISMG
- featured a range of Unit 3 subject matter, assessing a balance across the assessment objectives and using a range of item types, including multiple choice, single-word, sentence, short-paragraph and calculation responses that allowed for unique student responses.

Practices to strengthen

It is recommended that assessment instruments:

- assess a balance across the assessment objectives and the percentage allocation of marks must match the following specifications — ~20% complex unfamiliar, ~20% complex familiar and ~60% simple familiar questions, which must be correctly labelled and have the correct complexity
- follow the conventions for item construction as per Section 9.5.2 of the *QCE and QCIA policy and procedures handbook* , e.g. multiple choice items should be carefully constructed to align with the conventions for this item type, including
  - stems that use an accepted format (question, problem, incomplete statement or situation), contain only relevant information, avoid negative phrasing if possible and use a stimulus if required
  - distractors that seem plausible to some students
  - options that are mutually exclusive, follow the grammatical structure of the stem, avoid using ‘all of the above’ or ‘none of the above’ and are listed in a logical order
  - keys that are varied in their placement and not sequenced in a predictable pattern of correct responses.
- feature items that suit the local school context and are sufficiently different from the QCAA sample instrument to ensure students are able to demonstrate authentic responses, e.g. complex unfamiliar questions must be significantly different to QCAA sample questions
- feature appropriate scope and scale of the exam questions and are reflective of the syllabus conditions, e.g. short paragraph of 50–150 words, and are indicative to the information, knowledge and skills students are required to demonstrate when completing the task.

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	2
Language	4
Layout	0
Transparency	4

*Each priority might contain up to four assessment practices.

Total number of submissions: 13.

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- avoided bias and inappropriate content, e.g. schools that avoided gender stereotyping and used gender-neutral language throughout contexts, stimulus and items were better aligned to the assessment priorities
- featured an appropriate layout that is accessible for students.

Practices to strengthen

It is recommended that assessment instruments:

- provide clear instructions using cues that align with the cognitions in the assessment objectives and clarity of what is expected of the students to provide a suitable response
- be free of errors and model accurate spelling, grammar, punctuation and other textual features
- feature images, diagrams or other visual elements that are legible, clear, relevant and accessible; particularly airport diagram reproductions are large enough and clear
- provide clear alignment between the stimulus and the question, e.g. students should not be able to construct a response without the stimulus. If a response to the item can be constructed without using the stimulus, the stimulus serves no real purpose for that question.

Assessment decisions

Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Aerospace systems knowledge and problem-solving	92.31%	0%	0%	7.69%

Effective practices

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

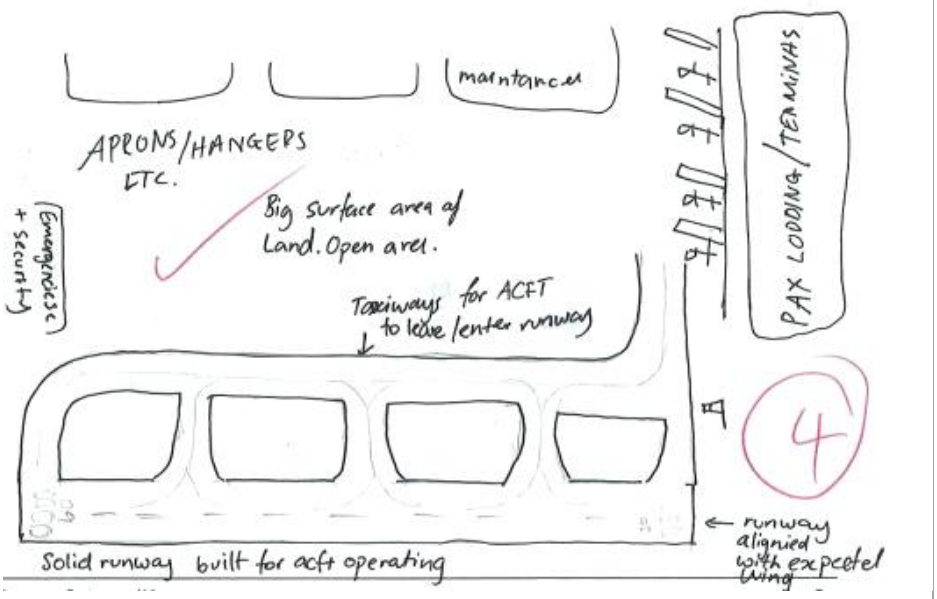
- marking schemes provided a clear indication of how marks were allocated, in terms of marks per question and marks awarded
- marks from the exam were clearly tallied and applied to the ISMG percentage cut-offs.

Samples of effective practices

The following are excerpts from responses that illustrate the characteristics for the criterion at the performance level indicated. The excerpts may provide evidence of more than one criterion. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

These student response excerpts have been included:

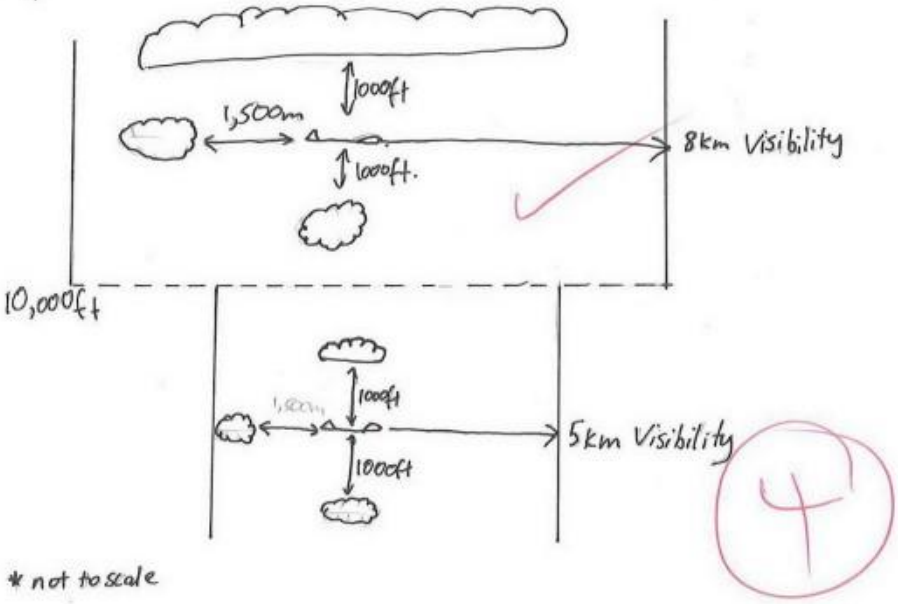
- to demonstrate a high-level response to an explanation question based on airport design considerations
- to demonstrate a high-level response to an explanation question based on VFR and IFR differences including diagrams representing visual meteorological conditions.

Aerospace systems knowledge and problem-solving (4 marks) • accurate and discriminating recognition and discerning description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies • adept symbolisation and discerning explanation of ideas, solutions and relationships • insightful and accurate analysis of problems and information • coherent and logical synthesis of information and ideas to propose possible solutions • critical evaluation and discerning refinement of ideas and solutions to make astutely justified recommendations	**Excerpt 1** 1. Location. The location of an airport is very important, they are best built on flat land in open areas for maximising space. 2. Runways & Taxiways. The runways must be built appropriately to withstand the type of aircraft using it. Built according to winds in the areas. Taxiways must effectively get aircraft on/off runways to terminals or aprons 3. Terminal layout/pax handling. There must be a designated spot for passengers to board the aircraft, as well as luggage handling, etc. 

Excerpt 2

VFR stands for Visual Flight Rules. VFR pilots fly visually, and navigate with reference to ground or water. In order to fly VFR, VMC must be maintained. IFR ~~pilots~~ stands for instrument flight rules, they are to fly in conditions worse than VMC, ~~mamely~~, namely, IMC. A pilot may elect to fly IFR in VMC, due to preference or benefits of ATC seperation.

Requirements for Class C airspace:



* not to scale

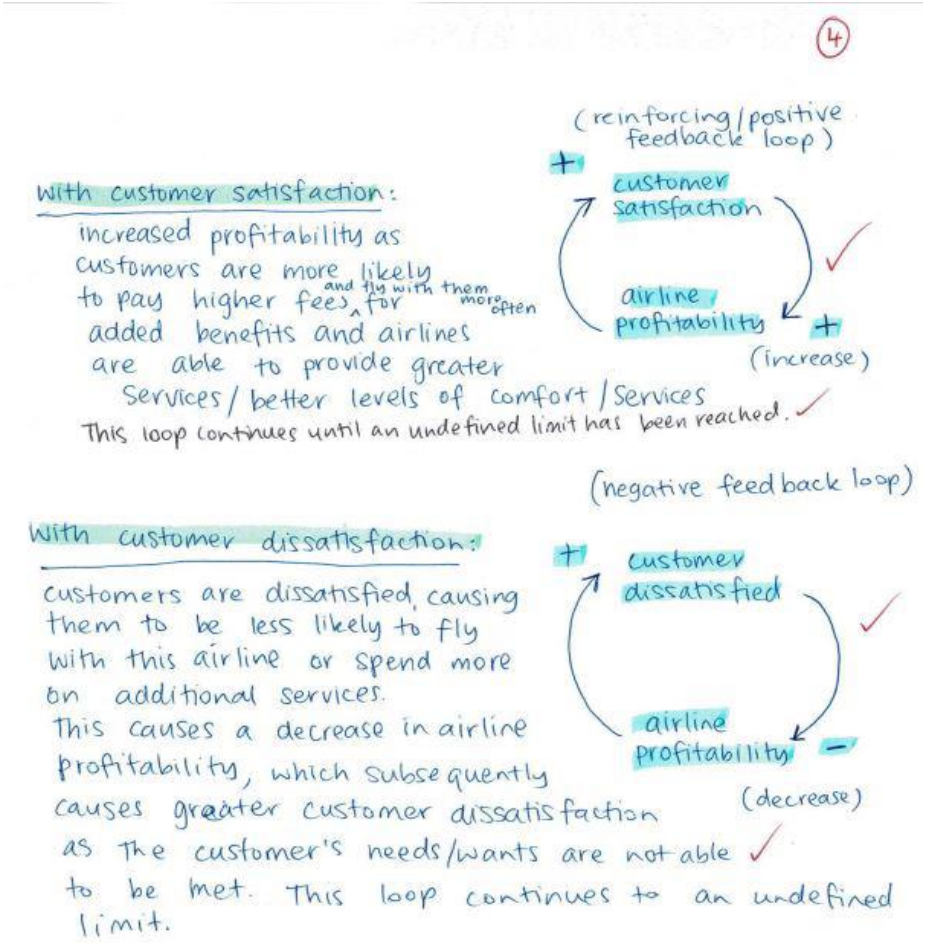
These student response excerpts have been included:

- to demonstrate a high-level level response to a question that requires feedback loops
- to show a high-level response to complex unfamiliar question-based VFR and IFR differences, including diagrams representing visual meteorological conditions.

Aerospace systems knowledge and problem-solving (4 marks)

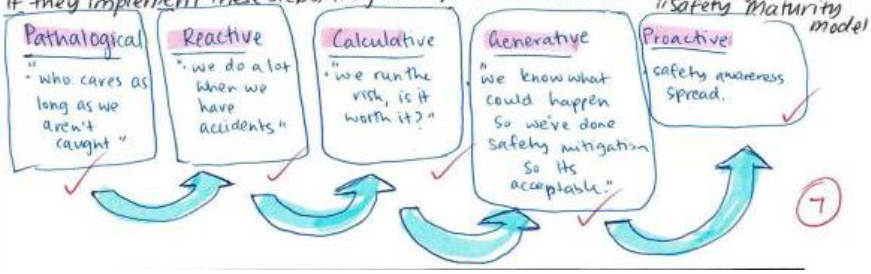
- accurate and discriminating recognition and discerning description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies
- adept symbolisation and discerning explanation of ideas, solutions and relationships
- insightful and accurate analysis of problems and information
- coherent and logical synthesis of information and ideas to propose possible solutions
- critical evaluation and discerning refinement of ideas and solutions to make astutely justified recommendations

Excerpt 1



Excerpt 2

Patrick Hudson's "Safety Maturity Model" has 5 levels. These levels include pathological, reactive, calculative, generative and proactive, as indicated in the diagram below. Currently, Alpha Airlines has a pathological level of safety, in which staff cover up detrimental incidents and error due to possible repercussions from management. This current operating level will need major work to reach the "generative" stage, by which any risks will be ~~calculated~~ generated and assessed, with a just culture established throughout the organisation. In this stage, no blame will be assigned to errors, however willful violations won't be tolerated. The management will take responsibility for assessing each risk and providing strategies to mitigate them. Safety will be their number one priority. Staff will work symbiontally with management to identify possible risks and hazards and their likelihood and severity. If they implement these steps, they will operate at the Generative stage of the "Safety Maturity model"



Route A:
LF: 70%
available Seating: 20 + 140 = 160

$LF = \frac{\text{Seats filled}}{\text{Seats available}} \times 100$

$0.70 = \frac{SF}{160}$

SF = 112 seats filled (revenue passengers)

Available Seat km (ASK) = ASK × D
= 160 × 1670
= 267200 ASK

Total revenue: Seats filled × price
~~first~~ business: 14 × 490 = $ 6860
economy: 98 × 175 = $ 17150
total: $ 24010

These student response excerpts have been included:

- to demonstrate the correct application of percentage cut-off calculations.

Aerospace systems knowledge and problem-solving • appropriate recognition and description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies • competent symbolisation and appropriate explanation of ideas and solutions • appropriate analysis of problems and information • simple synthesis of information and ideas to propose possible solutions • feasible evaluation and adequate refinement of ideas and solutions to make fundamental recommendations	**Excerpt 1** • in a range of simple familiar situations and in complex familiar situations – appropriate recognition and description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies; competent symbolisation and appropriate explanation of ideas and solutions; appropriate analysis of problems and information; simple synthesis of information and ideas to propose possible solutions; feasible evaluation and adequate refinement of ideas and solutions to make fundamental recommendations. > 68% — 17 66% / > 64% — 16 66% $\frac{33}{50} = \frac{16.5}{25}$ Aerospace Systems General Senior Syllabus Queensland Curriculum & Assessment Authority ISMG v1.1 May 2018 **Excerpt 2** **Marking summary** Criterion — Marks allocated — Provisional marks Aerospace systems knowledge and problem-solving — 25 — 16 **Overall** — **25**

This student response excerpt has been included:

- to demonstrate the correct application of percentage cut-off calculations.

Aerospace systems knowledge and problem-solving • appropriate recognition and description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies • competent symbolisation and appropriate explanation of ideas and solutions • appropriate analysis of problems and information • simple synthesis of information and ideas to propose possible solutions • feasible evaluation and adequate refinement of ideas and solutions to make fundamental recommendations	A: Hardware failures ✗ B: Unsafe supervision ✓ C: Preconceptions ✗ D: Unsafe Acts. ✓ 2.

Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG for this IA, it is recommended that:

- marks allocated be provided, with correct application of the percentage calculated to determine marks, particularly using the need for a percentage greater than a given figure to allocate marks.

Additional advice

- Care should be taken when uploading marking scheme files, as version control was an issue where the marking schemes provided did not match the endorsed task in terms of questions or marks allocated.
- Schools should deliver the endorsed task unaltered from the QCAA's Endorsement application, or ensure any amendments to the task are approved through the Endorsement application prior to distribution.
- Marking schemes should align with each question.
- Marking schemes should include specific information about how marks are allocated and provide clarity about how marks are compiled and determined.
- Marking schemes should indicate the marks to be awarded as per the mark allocation specifications for complex unfamiliar questions. Some previous questions were nominated as complex unfamiliar but did not enable students to provide any sustained analysis, synthesis and evaluation of relevant information to develop responses.
- Item stimulus, graphs, tables and diagrams should be checked for clarity and to ensure they match the question.
- Teachers should cross-mark to check that the marks are added correctly and the percentage cut-offs are applied accurately for each sample.
- The scan quality of student work should be checked to ensure it is clear and legible.
- Care should be taken to ensure that student work is uploaded correctly, with accurate marks transcribed, in the Endorsement application.

Internal assessment 3 (IA3)

Project — folio (25%)

In Aerospace Systems, a folio involves students documenting the application of a problem-solving process in response to an identified real-world aerospace problem. Students will develop a range of cognitive, technical and creative skills and theoretical understandings to provide a solution to an aircraft systems and/or human factors problem drawn from Unit 4 subject matter.

This may have included problems where students were required to investigate:

- an aircraft's cockpit design to support greater pilot situational awareness
- the planning of a multi-stage flight with diversions
- a case study of an aircraft accident associated with human factors to develop an education program.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions*
Alignment	1
Authentication	0
Authenticity	0
Item construction	0
Scope and scale	1

*Each priority might contain up to four assessment practices.

Total number of submissions: 12.

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- used suitable checkpoints aligned to the authentication strategies that reflected QCAA guidelines for assuring student authorship
- used scaffolding that provided clear instructions to inform students about the processes they could use to complete their response.

Practices to strengthen

It is recommended that assessment instruments:

- address all assessment specifications for Part A and Part B unaltered, as defined in Syllabus section 4.8.1, e.g. schools should use the syllabus language to reproduce Part A and B specifications directly from the syllabus
- are of an appropriate scale to allow students to respond within the syllabus conditions. Schools that developed operational systems problems that were achievable within duration conditions of the syllabus of 5–7 weeks showed a better alignment to the assessment priorities. Schools should apply the school policy for managing response length, e.g. marking to correct task length or allowing students to redact to correct task length so responses do not exceed the syllabus conditions.

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	0
Language	0
Layout	0
Transparency	0

*Each priority might contain up to four assessment practices.

Total number of submissions: 12.

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- used appropriate language drawn from Unit 4 subject matter that avoided unnecessary jargon, e.g. tasks that used language from the unit and avoided technical language outside the topics in Unit 4
- used appropriate formatting features such as bold, or italics only where relevant, e.g. tasks with a clear, unambiguous layout that used headings and subheadings and did not overuse bold or italics
- used images, diagrams or other visual elements that were legible, clear, relevant and accessible, e.g. tasks that provided images, diagrams or other visual elements with high resolution.

Practices to strengthen

There were no significant issues identified for improvement.

Assessment decisions

Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Retrieving and comprehending	92.31%	0%	0%	7.69%
2	Analysing	92.31%	0%	0%	7.69%
3	Synthesising and evaluating	92.31%	7.69%	0%	0%
4	Communicating	92.31%	7.69%	0%	0%

Effective practices

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- the Retrieving and comprehending criterion at the 2–3 performance level demonstrated
  - accurate recognition and appropriate description of the aircraft systems and/or human factors problem with use of aerospace technology knowledge that were clearly annotated to support evidence identified in student responses with the characteristics from the performance-level descriptors
  - competent symbolisation and appropriate explanation of some ideas, and a solution was consistently applied using the glossary definitions of the qualifiers from each performance-level descriptor
- the Analysing criterion at the 4–5 performance level demonstrated
  - considered analysis that was clearly identified with evidence of research information that described the contributing factors and weaknesses that had direct bearing on the aircraft performance systems and/or human factors problem.

Samples of effective practices

The following are excerpts from responses that illustrate the characteristics for the criterion at the performance level indicated. The excerpts may provide evidence of more than one criterion. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

These student response excerpts have been included:

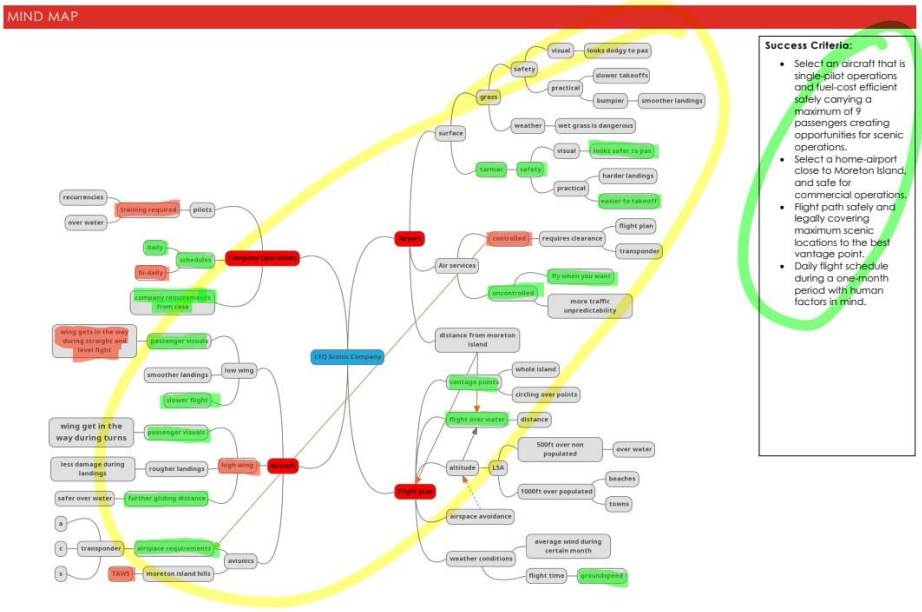
- to demonstrate careful and deliberate thought to distinguish the problem characteristics using aerospace systems, technology, and research information with a clear and sound reasoning of the problem characteristics to establish success criteria

- to illustrate the relationships between the elements, components and features of the aircraft performance systems problem, including contributing factors and areas of weakness.

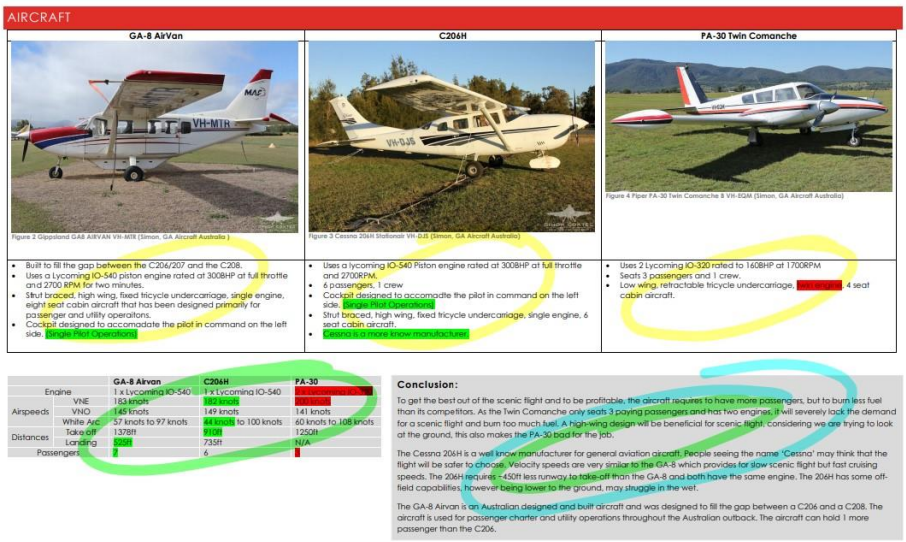
Retrieving and comprehending (4–5 marks)

- accurate and discriminating recognition and discerning description of the aircraft performance systems and/or human factors problem, aerospace technology knowledge, concepts and principles, and systems thinking habits and systems thinking strategies in relation to aircraft performance systems and/or human factors
- adept symbolisation and discerning explanation of ideas, a solution and relationships in relation to aircraft performance systems and/or human factors with visual frameworks, causal and feedback loops, flow charts, diagrams, sketches and/or pictures

Excerpt 1



Excerpt 2



Aircraft images by Simon Coates http://gaaircraftaus.blogspot.com/ Used with permission.

Excerpt 3

Criterion: Analysing

Assessment objectives

3. analyse the aircraft performance systems and/or human factors problem and information in relation to aircraft performance systems and/or human factors
4. determine solution success criteria for the aircraft performance systems and/or human factors problem

The student work has the following characteristics:	Marks
• insightful analysis of the aircraft performance systems and/or human factors problem and relevant aerospace systems, technology, and research information in relation to aircraft performance systems and/or human factors to identify the relevant elements, components and features, and their relationship to the structure of the problem • astute determination of essential solution success criteria for the aircraft performance systems and/or human factors problem.	6–7
• considered analysis of the aircraft performance systems and/or human factors problem and relevant aerospace systems, technology, and research information in relation to aircraft performance systems and/or human factors to identify the relevant elements, components and features, and their relationship to the structure of the problem • logical determination of effective solution success criteria for the aircraft performance systems and/or human factors problem.	4–5 5

These student response excerpts have been included:

- to demonstrate coherent and logical synthesis of relevant aerospace systems, technology, and research information and ideas to propose a possible aircraft performance system and/or human factors solution
- to demonstrate purposeful generation of an aircraft performance systems and/or human factors solution to provide valid data to critically assess the feasibility of a proposal
- to show evidence of critical evaluation and discerning refinement of ideas and a solution using success criteria to make astute recommendations justified by data and research evidence.

Synthesising and evaluating (8–9 marks)

- coherent and logical synthesis of relevant aerospace systems, technology, and research information and ideas to propose a possible aircraft performance systems and/or human factors solution
- purposeful generation of an aircraft performance systems and/or human factors solution to provide valid data to critically assess the feasibility of a proposal
- critical evaluation and discerning refinement of ideas and a solution using success criteria to make astute recommendations justified by data and research evidence

Excerpt 1

Flight planning Summary Table:

Airports	Leg Distance (NM)	Altitude (FT)	Track (T)	Track(M)	HDG	TAS (Kts)	ETI	EET	GPWT INFO	GAF INFO
Redcliffe (YRED)	-	-	-						120/15/21	SCT ST BKN CU/SC 3000-8000FT
Archerfield (YBAF)	23	1000	187	176	169	92	0.3	0.3	120/15/21	SCT ST BKN CU/SC 3000-8000FT
Stanthorpe (YSPE)	86	6500	219	208	210	103	0.8	1.1	340/5/11	>10km, BKN SC 2000-6000
Inverell (YIVL)	88	6500	210	199	201	99	0.9	2.0	260/2/10	>10km, BKN SC 2000-6000
Dubbo (YSDU)	195	4500	223	212	211	90	2.2	4.2	200/11/15	>10Km Nil Weather
Narrandera (YNAR)	185	4500	215	204	207	89	2.1	6.3	230/13/13	>10Km Nil Weather
Shepparton (YSHT)	118	2500	208	197	200	83	1.4	7.7	180/18/16	>10km, SCT CU/SC 4500/600ft FEW FM 09Z
Avalon (YMAV)	107	2500	204	193	195	85	1.3	9	180/16/09	>10Km, BKN CU/SC 0/6000FT base 3000

6a. Synth/eval: purposeful generation of a solution to provide valid data to critically assess the feasibility of the proposal

Figure 17: Flight planning Table

Initial calculations showed it would take 8 hours to complete flight. However once wind was factored in it would find it would take 9 hours due to headwinds on the way down. It was found that the G2 would only benefit from a tailwind through one leg of the flight from Archerfield to the Stanthorpe waypoint. The weather is forecast to remain consistent with only slight variations in conditions. Slight cloud cover of scattered and broken is seen through the initial stages of the flight however at this point the aircraft will be flying well below the cloud, as the weather improves the G2 will then commence a climb up to 6500ft in order to comply with the VFR Legislation, (AIP ENR 1.7: Flying at cruising levels. when above 5000ft or if practicable below 5000 (CAR173). Heading (0-179 degrees)- Odd thousands of feet plus 500 feet, heading (180-359)- even thousands plus 500 feet.) as the terrain altitude increases over the Great Dividing Range. Once clear of the range the weather improves for majority of the way with only flight increases in headwind. Therefore, no alternate airports or fuel is required only a fixed reserve, however as previously mentioned the route will track overhead multiple airports along the way should and emergency occur.

6a. Synt

Cost Summary:

Cost:	Amount:
2x G2 Hourly rate $500/hour (Inc fuel)	$18000
Accommodation (2x nights)	$300
Transport	$100
Food	$300
Total:	**$18700**

Seen to the left is a cost summary table which includes the total cost of the return trip from Redcliffe to Avalon including the overnight stop in Dubbo. Note the hourly rate for the G2 is a wet rate and includes fuel. The total cost for the return trip was approximately 18 700.00 which seems like a large amount of money however in the aviation industry and the larger outlook of things, this cost is minimised, for example if a student were to come and train at Redcliffe in a G2 they would be looking in the vicinity of $80 000 therefore, just the prospect of one

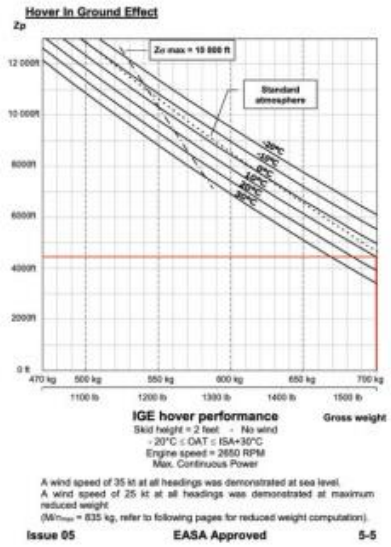
5a. Synth/eval: coherent and logical synthesis of relevant aerospace systems, technology and research information, and ideas

Excerpt 2

student following through with training would well and truly cover the cost of the course. Another consideration of why they money is well spent as an investment is to grow the reputation of training with Aeropower and Redcliffe Airports Operators, provides the foundations of relationships that could help other operators at YRED as well as other ariel work conducted by Aeropower Helicopters.

Aircraft Performance:

The Cabri G2 has a Basic empty weight of 430kg, therefore two pilots at 77kg as well as 12kg of luggage can take 144 litres of fuel onboard before reaching the MTOW. At the MTOW the aircraft is able to still hover at IGE at 4450ft, the highest elevation required to take-off from is Stanthorpe airport which has an elevation of 2934ft therefore as seen on the chart below the aircraft will have no problem flying through this higher altitude section of the flight especially considering the temperature of the day being below the ISA temperature, further increasing the aircraft performance.



Weight and Balance:

Station	Weight (KG)	Arm (mm)	Moment (/100)
A/C EW	430	2208	9494.4
Row 1	154	1300	2002
Baggage	12	1854	37.08
ZFW	596		11533.5
Fuel	104	1886	1960.4
Total	700	1927	13493.9

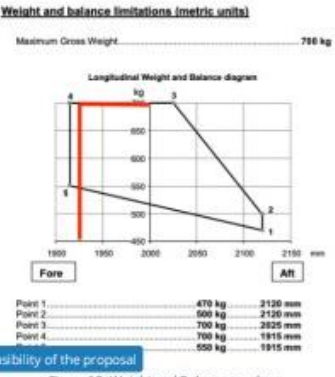


Figure 18: Weight and Balance envelope

val: purposeful generation of a solution to provide valid data to critically assess the feasibility of the proposal

In order to be able to achieve this take off performance the overwater floats and tank were removed to save 20kg and increase the fuel range. This decision was justified as the trip posed no long over water crossings therefore the floats weren't a necessity for concern.

It can be seen above that the aircraft loaded with both pilots as well as their baggage and full fuel reaming within the COG tolerances of the aircraft. With the Arm boundary being 1915mm the found arm was 1927mm placing it within the box along the 700kg line. It's important to note the empty weight used was not a basic empty weight therefore included the 5.7l of oil required onboard the aircraft. An average pilot mass of 77kg was used as its accepted as the industry standard for weight and balance sample calculations.

ropose a solution

Excerpt 3

Evaluation and Refinement

Success Criteria Met

Solution Success Criteria	Was it met, partially met or not met?
• The solution can be considered a success if the flight plan successfully routes the aircraft on the most efficient route possible only stopping where necessary, optimising fuel burn and stops.	This criterion was met as the selected aircraft was able to fly an efficient route to Avalon from Redcliffe, the route was chosen to closely follow the straight-line distance, whilst avoiding terrain and overflying airports in case of an emergency and for the three fuel stops along the way. Consequently, the fuel burn was optimised by carrying slightly less fuel on the higher altitude legs to increase cruise speed and climb performance.
• The solution can be considered a success if it can adequately transport the group of pilots from Redcliffe to Avalon including their baggage and belongings within the weight and balance limitations of the chosen aircraft.	This criterion was met as the two Cabri G2 helicopters were able to factor in the pilots load as well as their baggage and fuel and still fall within the centre of gravity limitations envelope of the aircraft. It was found in the weight and balance that the aircraft fell comfortable into the envelope and spared the room for some of the fuel to burn off however it is acknowledged that this approximation would result in a decrease of weight likely minimizing the effect on the centre of gravity.
• The solution could be considered a success if the chosen aircraft from Redcliffe is able to demonstrate its flight training capability and performance to the visitors at Avalon Air Show.	This criterion was met as the aircraft is able to fly from Redcliffe to Avalon, and back demonstrating is cross country flight abilities to those who see it on display, furthermore the show covers are able to see the aircraft and all of its technological systems and safety features. Should the opportunity arise for the aircraft to conduct an ariel display it could effortlessly leverage its performance abilities by flying a few simple manoeuvres.
• The solution can be considered a success if it effectively analysis and acknowledges the human factors phenomena relevant to a flight of this nature.	This criterion was partially met as the solution acknowledged the rest intervals required so pilots don't get fatigued, however suggestions into the foods the pilots should eat to help stabilise their gastrointestinal system and reduce the likelihood of illness in the air. Factors such as hypoxia were considered however it was acknowledged that the given altitudes would not make then suspectable to this phenomenon. The final suggestion to be made would be for the pilots to wear sunglasses to reduce any induced fatigue as a result of flicker vertigo, a phenomenon caused by bright sunlight filtering through the blades.
• The solution could be considered a success if the operation and all its included and additional costs are within reason and viable to the company operating the aircraft.	This criterion was met as the final cost of the flight exercise from Redcliffe (YRED) to Avalon (YMAV) would cost approximately $18 700. This cost included the wet hire time of the aircraft for the 18 hours of total flying time as well as accommodation and food for the pilots each way. It was justified through the perspective that the cost would be easily covered by the prospect of just once student coming to fly with Aeropower for their pilot's license, it also provided valuable training time for the pilots helping them gain cross country experience.

Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG for this IA, it is recommended that:

- synthesis of information of ideas be applied consistently, using the glossary definitions of the qualifiers and characteristics based on evidence in the student response, e.g. where there is insufficient evidence in a response to warrant the answer being deemed *simple*, the school should re-engage with the *rudimentary* qualifier that is defined as undeveloped or in *basic* form to assist teachers with making a judgment for the Synthesising and evaluating criterion.

Additional advice

- The full problem-solving process, with adequate time and folio space given to the evaluation and refinement of a solution, including clear documentation of the evaluation process, needs to be worked through thoroughly.
- Schools should continue to take care when uploading files to the Confirmation application in the QCAA Portal. They should ensure all required documents are included and all pages are orientated correctly.

External assessment

External assessment (EA) is developed and marked by the QCAA. The external assessment for a subject is common to all schools and administered under the same conditions, at the same time, on the same day.

Short response — Examination (25%)

Assessment design

The assessment instrument was designed using the specifications, conditions and assessment objectives described in the summative external assessment section of the syllabus. The examination consisted of one paper:

- Section 1 consisted of 10 multiple choice questions (10 marks)
- Section 2 consisted of 13 short response questions (70 marks)

The examination assessed subject matter from Unit 4. Questions were derived from the context of:

- Topic 1: Aircraft performance
- Topic 2: Aircraft navigation
- Topic 3: Advanced navigation and radio communication technologies
- Topic 4: Human performance and limitations.

The assessment required students to respond to activities including:

- sketching, drawing and creating graphs, tables and diagrams
- writing multiple choice, single-word, sentence or short-paragraph responses drawn from Unit 4 subject matter
- calculating using formulas drawn from across Unit 4 subject matter
- responding to unseen stimulus materials.

The stimulus was purposefully chosen to elicit a range of unique responses linked to the syllabus objectives and Unit 4: Topic 2 Aircraft navigation subject matter. The stimulus provided real-world contexts for students to demonstrate their knowledge of aeronautical charts and information, which was designed to elicit unique responses to unfamiliar contexts.

The types of stimulus used were:

- Basic flight instruments
- Grid-Point Wind and Temperature Forecasts (GPWT)
- World Aeronautical Charts (WAC)
- Visual Navigation Chart (VNC)
- En Route Supplement Australia (ERSA)
- Terminal Area Forecasts (TAF).

Assessment decisions

Assessment decisions were made by markers by matching student responses to the external assessment marking guide (EAMG). The external assessment papers and the EAMG are published in the year after they are administered.

Multiple choice item responses

There were 10 multiple choice items in Paper 1.

Percentage of student responses to each option

Note:

- The correct answer is **bold** and in a blue shaded table cell.
- Some students may not have responded to every question.

Question	A	B	C	D
1	13.67	27.34	**52.52**	4.32
2	11.51	**70.5**	2.16	12.95
3	**41.73**	10.07	1.44	45.32
4	30.22	**37.41**	7.91	21.58
5	10.79	**14.39**	42.45	30.94
6	6.47	13.67	30.22	**48.2**
7	17.27	13.67	24.46	**41.01**
8	30.94	29.5	**29.5**	7.91
9	**24.46**	17.27	25.9	30.22
10	3.6	5.04	**49.64**	39.57

Effective practices

Overall, students responded well to:

- recognition and description of aerospace technology knowledge, concepts and principles across simple familiar and some complex familiar questions
- symbolisation and explanation of ideas, solutions and relationships in relation to aircraft performance systems and human factors
- determining solutions to problems supported by calculations where relationships and interactions were obvious and had few elements, and all of the information to solve the problem was clearly provided in the question.

Samples of effective practices

The following excerpts have been selected to illustrate effective student responses in one or more of the syllabus assessment objectives. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

Short response

Assessment objectives: 2. Explaining and 3. Analysing

Question 17

This question required students to analyse a scenario and explain how the flight conditions could have caused the pilot's illusions, with a description of the reliability of the vestibular system.

Effective student responses:

- described the vestibular system as responsible for balance and spatial orientation [1 mark]
- referred to pitch, roll and yaw [1 mark]
- provided a plausible analysis of the reliability of the vestibular system in the scenario [1 mark]
- provided an explanation of a plausible illusion [1 mark]
- provided an explanation of another plausible illusion [1 mark].

This student response excerpt has been included:

- as an example description of the vestibular system and what it is responsible for, using the pilot's position in space and the acceleration/tilt they were experiencing
- as an example of a plausible analysis of the reliability of the vestibular system — 'the system is usually reliable in normal conditions'; the pilot had 'no visual reference, thus rendering this component inoperable'
- because it provides an explanation of two plausible illusions the pilot may have experienced in the scenario.

Explaining and Analysing (4 marks)	The vestibular system is ~~used~~ the system that provides the pilot with their position in space and any acceleration / tilt. It consists of the inner ear, vision & skeletal muscles & joints. This system is usually reliable in normal conditions when all three components are working in sync, otherwise they can cause illusions. The pilot in question had no visual reference, thus rendering this component inoperable. Additionally the noise & vibrations will have affected the function of the inner ear and the muscles would not have picked up on any changes. It's likely that the pilot experienced (a) the illusion of turning, where they were flying straight but felt like they were turning and turned to 'correct it' or (b) felt like they were going straight but were actually turning and did not correct it. (a) actually felt turn to correct ∴ heading wrong way (b) feels straight actually here ∴ heading wrong way.

Assessment objectives: 1. Recognising, 3. Analysing and 5. Synthesising

Question 19

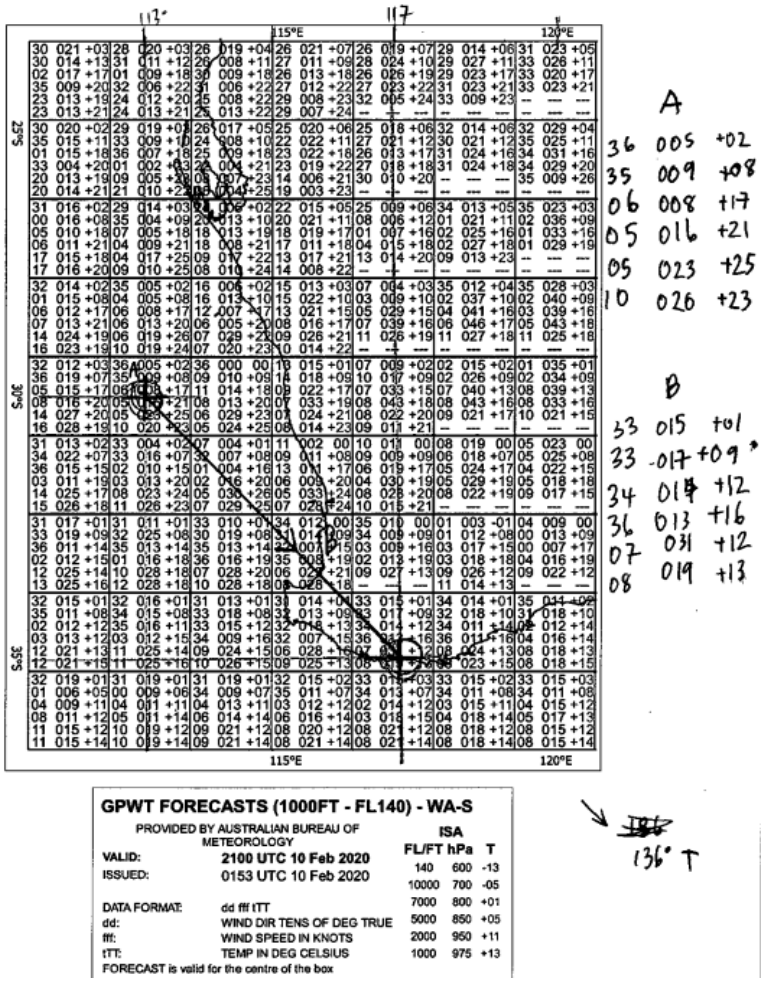
This question required students to analyse the aircraft's coordinates and the Grid-Point Wind and Temperature Forecast (GPWT) to plot the aircraft's track with the most appropriate altitude, using justified examples.

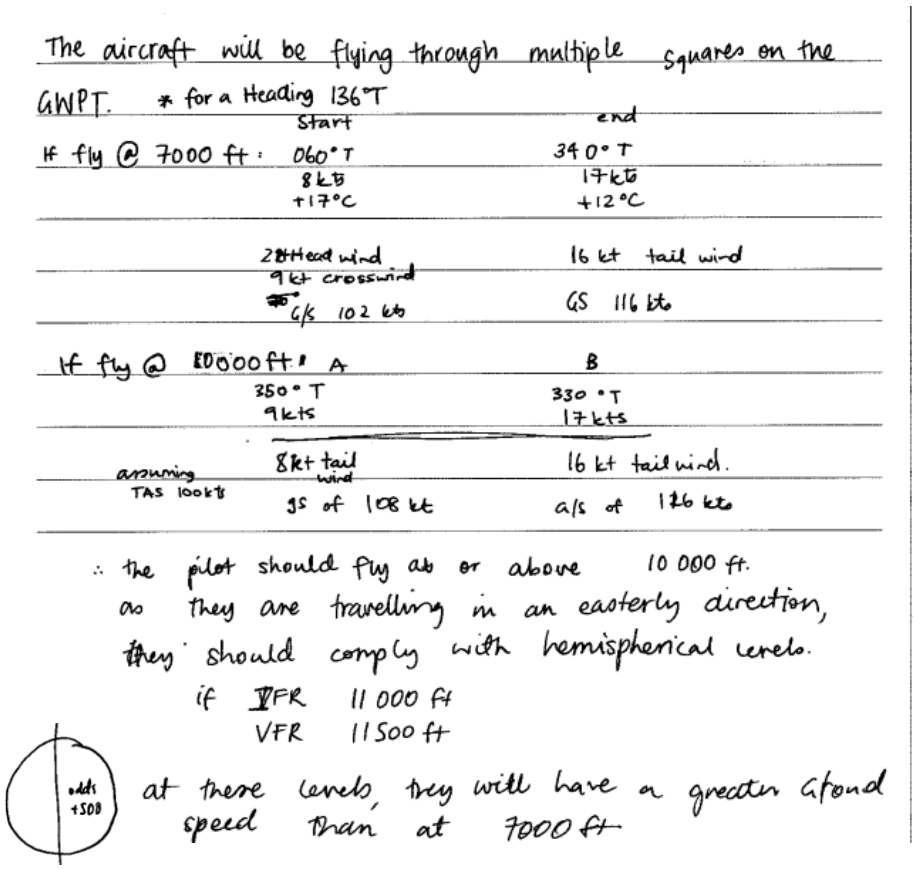
Effective student responses:

- provided a correctly plotted aircraft track [1 mark]
- identified GPWT wind direction as north west [1 mark]
- identified the appropriate altitude [1 mark]
- provided an example to justify the chosen altitude [1 mark]
- provided a second example to justify the chosen altitude [1 mark].

This student response excerpt has been included:

- to show the provision of the correctly plotted aircraft track with a justified altitude ('therefore the pilot should fly at or above 10 000 ft')
- because it provides evidence of a north westly bearing between 310° and 350°
- because it provides evidence that tailwinds are present at the 10 000 ft forecast height, which will increase the ground speed supported by GS calculations.

Recognising, Analysing and Synthesising (4 marks)	



Assessment objectives: 3. Analysing, 5. Synthesising and 7. Evaluating

Question 21

This question required students to analyse a scenario and to identify the strengths and weaknesses of pilot preconceptions and the impact they have on situation awareness and decision-making abilities of pilots in difficult situations identified in an evaluation.

Effective student responses:

- identified strengths of pilot preconceptions [1 mark]
- identified limitations of pilot preconceptions [1 mark]
- identified the impact of pilot preconceptions on situational awareness [1 mark]
- identified the impact of pilot preconceptions on decision-making [1 mark]
- evaluated a strength and its influence on aircraft safety in difficult situations [1 mark]
- evaluated a limitation and its influence on aircraft safety in difficult situations [1 mark].

This student response excerpt has been included:

- as it provides evidence of advantages and disadvantages of pilot preconceptions in an analysis table
- as it provides synthesised information identifying the impact of pilot preconceptions on situational awareness and decision-making abilities in stressful situations
- to demonstrate an evaluation identifying strengths and limitations of aircraft safety in a difficult situation context.

Analysing, Synthesising and Evaluating (6 marks)

Preconceptions are ideas a pilot might have of how the aircraft will react in a scenario, how to respond in a scenario, what a scenario could be and other visualisations and expectations they may ~~know~~ think before a flight.

ADVANTAGES.	DISADVANTAGES.
• allow quicker response time than an unprepared pilot • allow quick manouverability of the aircraft • smooth flight (preplanned manouvers and procedures • smooth and efficient aircraft handling • relieves stress ∴ better decisions	• If the scenario is different to preconception, correct response may be delayed or pilot may respond incorrectly • can cause loss of situational awareness if focussed on only one idea.

During a difficult flight situation, a pilot may have preconceptions about the aircraft, route, terrain and most practical path of action. If this path aligns with the incident at hand, the pilot can promptly react and handle the aircraft efficiently and effectively, maintaining situational awareness and making better decisions to to less stressors acting upon them.① However, if the preconception allows no room for external...

* continued page 14

① leading to greater aircraft safety in difficult flight situations.

Question 21 continued.

... input, the pilot is likely to lose situational awareness, and experience higher levels of stress. They may make incorrect decisions due to the scenario being different to the one they anticipated and were prepared for. This ~~could~~ influences the safety to decrease significantly as it can cause the aircraft to crash.

Assessment objectives: 3. Analysing, 5. Synthesising and 7. Evaluating

Question 22

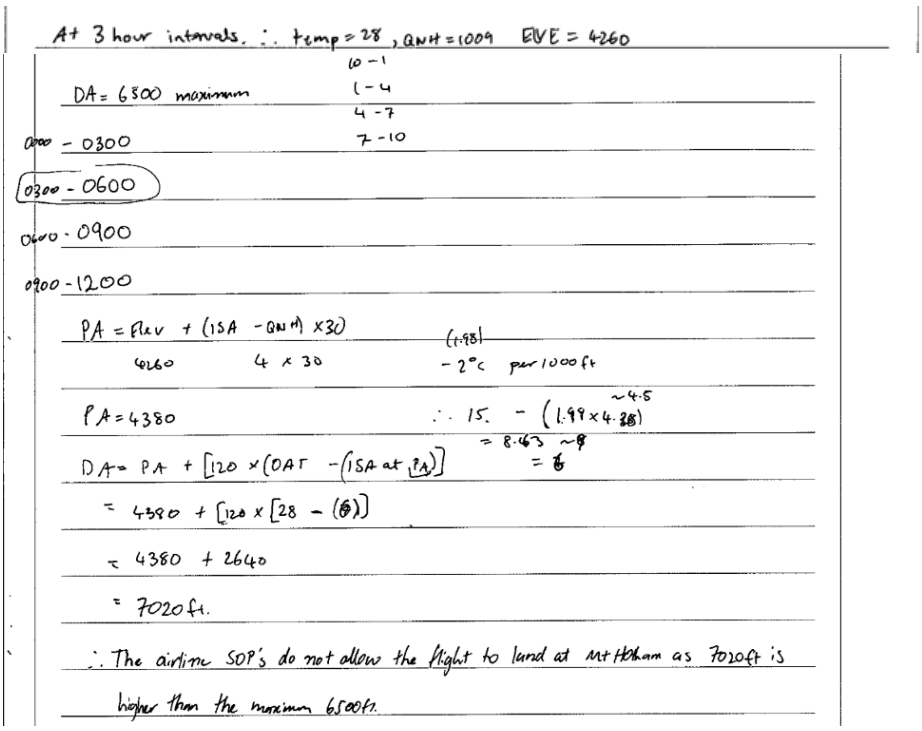
This question required students to analyse a scenario, ERSA and TAF to determine whether an aircraft could land at the identified aerodrome, using calculations to synthesise and propose a solution with a justified recommendation.

Effective student responses:

- correctly identified the QNH and temperature [1 mark]
- included use of airfield elevation [1 mark]
- correctly determined the pressure altitude (PA) [1 mark]
- correctly determined the ISA temperature [1 mark]
- correctly determined the density altitude [1 mark]
- made a statement supported by calculations about the aircraft's ability to land [1 mark].

This student response excerpt has been included:

- to show the correctly identified QNH of 1009 and temperature of 28 °C
- to show the correctly identified airfield elevation of 4260
- to show the correctly determined pressure altitude of 4380 ft, ISA temperature of 6 °C and density altitude of 7020 ft
- because it provides evidence that the aircraft SOP does not permit the aircraft to land at the aerodrome.

Analysing, Synthesising and Evaluating (6 marks)	

Practices to strengthen

It is recommended that when preparing students for external assessment, teachers consider:

- providing more opportunities for students to engage with complex unfamiliar situations that require an in-depth analysis of problems and information (Assessment objective 3) and evaluation where students are required to refined ideas and solutions to make justified recommendations (Assessment objective 7). It is recommended that emphasis be placed on the selection and prioritising of relevant criteria that are used to weigh up or assess an aerospace systems issue or circumstance using knowledge drawn from Unit 4 subject matter. For instance, an evaluation of pilot situational awareness and preconceptions in the context of safe operation of an aircraft requires students to identify criteria using subject matter knowledge that supports an assessment of strengths and weaknesses, e.g. pilot preconceptions about difficult flight circumstances save time but can lead to inaccurate or poor decision-making, which may negatively impact on aircraft safety. The criteria of time and accuracy are used to evaluate aircraft safety in relation to pilot preconceptions and difficult flight circumstances
- increasing students' knowledge and use of different aeronautical charts and stimulus information from Unit 4, such as Grid-Point Wind and Temperature Forecasts (GPWT), World Aeronautical Charts (WAC), Visual Navigation Chart (VNC), En Route Supplement Australia (ERSA), Terminal Area Forecasts (TAF) and CASA flight plan format (SP107)
- providing further learning experiences that require students to use the aerospace systems formula sheet, flight computers and plotters, which will enable them to work more efficiently under examination conditions.