Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Queensland Curriculum and Assessment Authority

# Aerospace Systems 2025 v1.2

## IA2: Sample assessment instrument

This sample has been compiled by the QCAA to assist and support teachers in planning and developing assessment instruments for individual school settings.

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|---|---|
| **Student name** | sample only |
| **Student number** | sample only |
| **Teacher** | sample only |
| **Exam date** | sample only |

## Marking summary

| Criterion | Marks allocated | Provisional marks |
|---|---|---|
| Aerospace systems knowledge and problem solving | 25 | |
| **Overall** | **25** | |

# Conditions

| | |
|---|---|
| **Technique** | Examination — combination response |
| **Unit** | Unit 3: Aerospace ecosystems |
| **Topic/s** | Topic 1: Aerospace regulatory systems<br>Topic 2: Human performance<br>Topic 3: Safety management systems and human factors<br>Topic 4: Operational accident and incident investigation processes<br>Topic 5: Airport and airline operation systems |
| **Time** | Time allowed:<br>• perusal time: 5 minutes<br>• working time: 120 minutes |
| **Seen / Unseen** | Unseen |
| **Other** | • The teacher must provide the QCAA Aerospace Systems formula sheet.<br>• Students may use:<br>  – a non-programmable scientific calculator<br>  – a QCAA-approved analog slide rule type and aviation plotter or protractor and ruler.<br>• Students must not bring notes into the examination.<br><br>. |

# Instructions

Answer all questions in the paper in the space provided.

- For multiple-choice questions, circle the letter next to the correct answer. If you want to change your answer, cross out your initial choice and circle the letter next to your new answer.
- Some questions may require different types of responses, such as calculations, sketching, drawing, graphs, tables and diagrams.
- Show all working for questions requiring calculations.

# Section 1 — multiple choice, single-word or sentence response items

**Question 1 (1 mark)**

The Australian Transport Safety Bureau (ATSB) investigates transport accidents and other safety occurrences to:

**A** take administrative, regulatory or criminal action.

**B** discover those persons who were to blame for the accident.

**C** identify those persons who have legal liability for the accident.

**D** improve safety and build public confidence in aviation transportation.

**Question 2 (1 mark)**

The ATSB's primary focus in aviation is to:

**A** collect accident data.

**B** investigate accidents.

**C** ensure the safety of the travelling public.

**D** recommend improvements in safety standards.

**Question 3 (1 mark)**

The International Civil Aviation Organization (ICAO) is a specialised agency of the:

**A** United Nations.

**B** Civil Aviation Safety Authority.

**C** International Air Transportation Association.

**D** Provisional International Civil Aviation Organization.

**Question 4 (1 mark)**

The Chicago Convention applies only to:

**A** civil aircraft.

**B** domestic aircraft.

**C** state or military aircraft.

**D** civil and state or military aircraft.

**Question 5 (1 mark)**

How does noise affect performance, and what is the ear’s role in balance?

**A** Noise boosts focus; ear detects sound for balance.

**B** Noise impairs cognition; ear’s vestibular system aids balance.

**C** Noise has no effect; ear’s balance role is sound based.

**D** Noise aids coordination; ear’s outer part controls orientation.

# Section 2 — sentence response and calculation items

**Question 6 (1 mark)**

How does impaired binocular vision affect aerospace performance?

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**Question 7 (2 marks)**

Which two sensory systems in the human body can cause disorientation when disrupted?

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**Question 8 (2 marks)**

Sketch a typical airport sign that would communicate to pilots in an aircraft that they are moving on taxiway C and about to cross taxiway A.

**Question 9 (1 mark)**

The SHELL model is used to represent the relationships between aviation system resources and the ..... component in the aviation system.

**Question 10 (4 marks)**

When referring to the SHELL model, what do the letters in the abbreviation stand for?

S.....

H.....

E.....

L.....

**Question 11 (2 marks)**

Explain how alcohol and drugs impair human performance.

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**Question 12 (3 marks)**

Describe three effects G-forces have on the human body during aerospace manoeuvres.

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**Question 13 (1 mark)**

A workplace atmosphere of trust where people are encouraged to provide safety-related information is known as a …….

**Question 14 (1 mark)**

After hours of flying, a pilot struggled with depth perception and misjudged a runway distance due to fatigue.

Which vision issue was the pilot affected by?.....

**Question 15 (2 marks)**

Explain how empty field myopia affects pilots during flight.

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**Question 16 (6 marks)**

List six considerations used when designing an airport.

1. .....

2. .....

3. .....

4. .....

5. .....

6. .....

**Question 17 (3 marks)**

Outline three key elements of a safety management system, including how human factors are integrated into one of them.

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**Question 18 (5 marks)**

Compare and contrast ‘point-to-point’ and ‘hub-and-spoke’ airline transportation network design models and discuss the impacts of these models on passengers and airlines.

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**Question 19 (8 marks)**

Analyse the airport precincts shown in the images below and evaluate the effectiveness of each in relation to revenue opportunities and customer experiences.

**Figure 1**


Rutledge, D 2010, https://www.flickr.com/photos/45923218@N00/4836370711

**Figure 2**


Lee, S 2013, www.flickr.com/photos/seeminglee/8558922303

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**Question 20 (5 marks)**

Explain James Reason's 'Swiss cheese' model of accident causation, including the terms 'active failures' and 'latent conditions'. Include a diagram to support your explanation.

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**Question 21 (8 marks)**

During a pitch-black night flight, a pilot had a near-miss when attempting to land on a brightly lit runway.

Analyse the illusion encountered, and explain how the eyes, inner ear, and skeletal muscles/joints contributed to the pilot's disorientation. Evaluate which safety management system element failed and propose three mitigation strategies to ensure future safety.

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**Question 22 (6 marks)**

In Australia, the number of safety incident reports submitted by high-capacity commercial airlines has risen in proportion to the growing number of Australian airport arrivals and departures. Boeing predicts that aircraft movements in the Asia-Pacific region will increase by 5.5% every year to 2032. Despite the increasing number of aircraft movements and the growth of air transportation worldwide, records show that there has been one major jet aircraft accident for every 8.7 million flights.

Evaluate the effectiveness of CASA's role in the safe operation of aircraft in Australia and overseas.

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**Question 23 (6 marks)**

An airline operates an aircraft between two regional cities. Data for a flight on this route is shown below.

**Seating**

- First class: 6 seats filled of 8 available
- Business class: 12 seats filled of 14 available
- Economy class: 131 seats filled of 148 available

**Ticket pricing**

- First class: $1200
- Business class: $875
- Economy class: $230

**Flight distance**

- 2155 km

**Fuel**

- 2240 L per hour of flight
- $1.46 per litre

**Ground speed**

- 765 km/hr

**Total operating costs (not including fuel)**

- $22 475

Using the provided data, calculate:

a. revenue passenger kilometres (RPK)
b. passenger yield (PY)
c. available seat kilometres (ASK)
d. total flight fuel consumption
e. total flight fuel cost.

a. .....

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b. .....

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c. .....

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d. .....

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e. .....

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**Question 24 (6 marks)**

Analyse the data provided in the table below to evaluate the performance of Airline 1 and Airline 2. Both airlines transport customers on the same routes using identical aircraft. Use mathematical reasoning to support your evaluation.

| **Statistics**<br>**January to July 2018** | **Airline 1** | **Airline 2** |
|---|---|---|
| **Passengers carried** | 3 475 657 | 2 756 482 |
| **Load factor** | 84% | 93% |
| **RASK** | $0.16 | $0.17 |
| **CASK** | $0.13 | $0.12 |

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# Instrument-specific marking guide (IA2): Examination — short response (25%)

| The student work has the following characteristics: | Cut-off | Marks |
|---|---|---|
| • across the full range of simple familiar, complex familiar and complex unfamiliar situations<br>– 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 | > 96% | 25 |
| | > 93% | 24 |
| • in a comprehensive range of simple familiar, complex familiar and complex unfamiliar situations<br>– 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 | > 89% | 23 |
| | > 86% | 22 |
| • in a comprehensive range of simple familiar situations, and in complex familiar and complex unfamiliar situations<br>– accurate recognition and effective description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies; methodical symbolisation and effective explanation of ideas, solutions and relationships; considered analysis of problems and information; logical synthesis of information and ideas to propose possible solutions; reasoned evaluation and effective refinement of ideas and solutions to make considered recommendations | > 82% | 21 |
| | > 78% | 20 |
| • in a range of simple familiar situations, and in complex familiar and complex unfamiliar situations<br>– accurate recognition and effective description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies; methodical symbolisation and effective explanation of ideas and solutions; considered analysis of problems and information; logical synthesis of information and ideas to propose possible solutions; reasoned evaluation and effective refinement of ideas and solutions to make considered recommendations | > 75% | 19 |
| | > 71% | 18 |
| • in a range of simple familiar situations and in complex familiar situations<br>– 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 |
| | > 64% | 16 |
| • in a range of simple familiar situations and in some complex familiar situations<br>– appropriate recognition and description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems | > 60% | 15 |
| | > 57% | 14 |

| The student work has the following characteristics: | Cut-off | Marks |
|---|---|---|
| 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 | | |
| • in simple familiar situations<br>– appropriate recognition and description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies; variable 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 | > 53%<br>> 50% | 13<br>12 |
| • in simple familiar situations<br>– variable recognition and superficial description of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies; variable symbolisation and superficial explanation of ideas and solutions; superficial analysis of problems and information; rudimentary synthesis of information and ideas to propose possible solutions; superficial evaluation and adequate refinement of ideas and solutions to make elementary recommendations | > 46%<br>> 42% | 11<br>10 |
| • in some simple familiar situations<br>– variable recognition and superficial description of aspects of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies; superficial explanation of ideas and solutions; superficial analysis of problems and information; rudimentary synthesis of information and ideas to propose partial possible solutions; superficial evaluation of ideas and solutions to make elementary recommendations | > 37%<br>> 33% | 9<br>8 |
| • in a limited range of simple familiar situations<br>– variable recognition and superficial description of aspects of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies; superficial explanation of ideas and solutions; superficial analysis of aspects of problems and information; unclear combination of information and ideas; superficial evaluation of ideas and solutions | > 28%<br>> 24% | 7<br>6 |
| • disjointed recognition and statements about aspects of aerospace operational systems problems, knowledge, concepts and principles, and systems thinking habits and systems thinking strategies; identification of a change about ideas, solutions and information; unclear combination of information and ideas | > 19%<br>> 14% | 5<br>4 |
| • statements about aspects of aerospace operational systems problems, knowledge, concepts and principles; statements about ideas, solutions and information; isolated and unclear combination of information and ideas | > 10%<br>> 5% | 3<br>2 |
| • isolated and unclear statements about aspects of aerospace operational systems problems, knowledge, concepts and principles. | > 0% | 1 |
| • does not satisfy any of the descriptors above. | | 0 |