



Queensland Curriculum and Assessment Authority

# Aerospace Systems 2019 v1.2

IA2: Sample assessment instrument

## Examination — short response (25%)

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

**Student name**

**Student number**

**Teacher**

**Exam date**

## Marking summary

Criterion	Marks allocated	Provisional marks
Aerospace systems knowledge and problem-solving	25	
<b>Overall</b>	<b>25</b>	

# Conditions

<b>Technique</b>	Examination — short response
<b>Unit</b>	Unit 3: Aerospace operational systems
<b>Topic/s</b>	Topic 1: International and national operational and safety systems Topic 2: Airspace management Topic 3: Safety management systems Topic 4: Operational accident and incident investigation processes Topic 5: Airport and airline operation systems
<b>Time</b>	2 hours + 10 minutes perusal
<b>Seen/Unseen</b>	Unseen questions
<b>Other</b>	Only the QCAA formula sheet must be provided Notes are not permitted Use of technology is required: non-programmable scientific calculator only permitted Protractor and ruler required.

# 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.
- Word length for short-paragraph responses is 50–150 words per item.
- 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

- E United Nations.
- F Civil Aviation Safety Authority.
- G International Air Transportation Association.
- H 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)**

The organisation responsible for managing Australian airspace is

- A Air Traffic Control.
- B Airservices Australia.
- C the Civil Aviation Safety Authority.
- D the International Civil Aviation Organization.

**Question 6 (1 mark)**

The most common type of radio used to communicate between aircraft and air traffic control in general aviation is.....

**Question 7 (2 marks)**

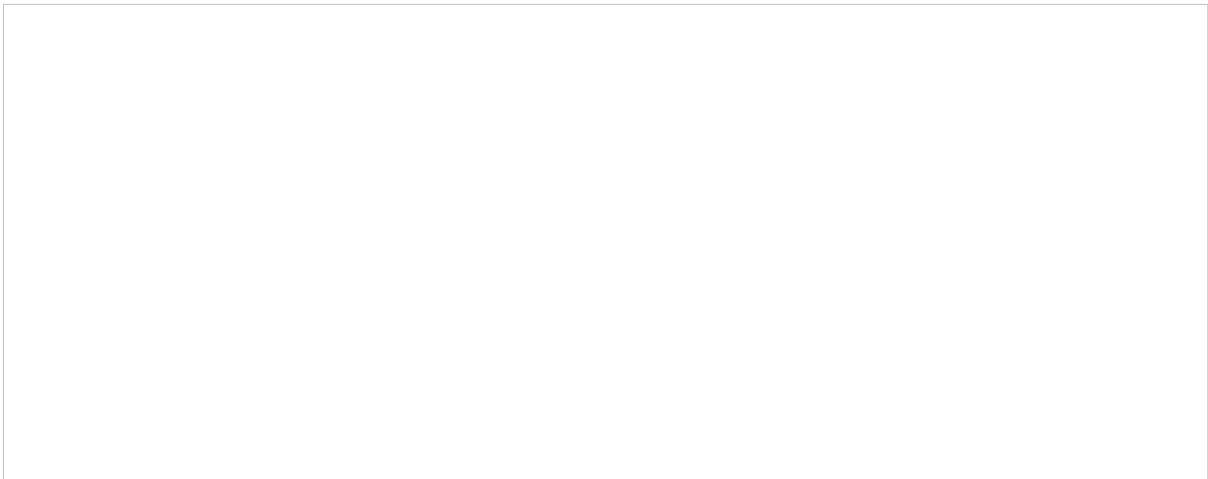
What do the abbreviations VFR and IFR represent?

VFR .....

IFR.....

**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)**

**Up to 50 word response**

Contrast 'on-occurrence' and 'scheduled' aircraft maintenance.

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**Question 12 (3 marks)**

Represent IGNORE using the phonetic alphabet

I.....

G.....

N.....

O.....

R.....

E.....

**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)**

**Up to 50 word response**

A time zone is defined as .....

.....

**Question 15 (2 marks)**

**Up to 50 word response**

Local time in a time zone is defined as.....  
.....  
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**Question 16 (6 marks)**

**Up to 50 word response**

List six considerations used when designing an airport.

1. ....
2. ....
3. ....
4. ....
5. ....
6. ....



## Section 2: Sentence response and calculation items

**Question 17 (3 marks)**

**Up to 80 word response**

Explain why the phonetic alphabet is used during aircraft radio communications.

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**Question 18 (5 marks)**

**Up to 150 word response**

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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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



Figure 2



Lee, S 2013, [www.flickr.com/photos/seeminglee/8558922303](http://www.flickr.com/photos/seeminglee/8558922303), <https://creativecommons.org/licenses/by/2.0/>

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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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Use feedback loops to explain the relationship between air traffic control (ATC), VFR, IFR, separation standards, and aircraft in Class A, Class C and Class D airspace.



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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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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f) .....

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

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

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

## Criterion: Aerospace Systems knowledge and problem-solving

### Assessment objectives

1. recognise and describe problems, aerospace technology knowledge, concepts and principles, and systems thinking habits and systems thinking strategies in relation to aerospace operational systems
2. symbolise and explain ideas, solutions and relationships in relation to aerospace operational systems
3. analyse problems and information in relation to aerospace operational systems
5. synthesise information and ideas to propose possible aerospace operational systems solutions
7. evaluate and refine ideas and solutions to make justified recommendations

The student work has the following characteristics:	Cut-off	Marks
<ul style="list-style-type: none"> <li>• across the full range of simple familiar, complex familiar and complex unfamiliar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 96%	25
	> 93%	24
<ul style="list-style-type: none"> <li>• in a comprehensive range of simple familiar, complex familiar and complex unfamiliar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 89%	23
	> 86%	22
<ul style="list-style-type: none"> <li>• in a comprehensive range of simple familiar situations, and in complex familiar and complex unfamiliar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 82%	21
	> 78%	20

The student work has the following characteristics:	Cut-off	Marks
<ul style="list-style-type: none"> <li>• in a range of simple familiar situations, and in complex familiar and complex unfamiliar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 75%	19
	> 71%	18
<ul style="list-style-type: none"> <li>• in a range of simple familiar situations and in complex familiar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 68%	17
	> 64%	16
<ul style="list-style-type: none"> <li>• in a range of simple familiar situations and in some complex familiar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 60%	15
	> 57%	14
<ul style="list-style-type: none"> <li>• in simple familiar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 53%	13
	> 50%	12
<ul style="list-style-type: none"> <li>• in simple familiar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 46%	11
	> 42%	10
<ul style="list-style-type: none"> <li>• in some simple familiar situations               <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> </ul>	> 37%	9
	> 33%	8

The student work has the following characteristics:	Cut-off	Marks
<ul style="list-style-type: none"> <li>in a limited range of simple familiar situations               <ul style="list-style-type: none"> <li>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.</li> </ul> </li> </ul>	> 28%	7
	> 24%	6
<ul style="list-style-type: none"> <li>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.</li> </ul>	> 19%	5
	> 14%	4
<ul style="list-style-type: none"> <li>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.</li> </ul>	> 10%	3
	> 5%	2
<ul style="list-style-type: none"> <li>isolated and unclear statements about aspects of aerospace operational systems problems, knowledge, concepts and principles.</li> </ul>	> 0%	1
<ul style="list-style-type: none"> <li>does not satisfy any of the descriptors above.</li> </ul>		0



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