LUI | | | | | | | | | | | School code | | | | |

School name

Given name/s

Family name

Attach your barcode ID label here

Book of books used

External assessment 2025

Question and response book

Aerospace Systems

Time allowed

- Perusal time — 10 minutes
- Working time — 120 minutes

General instructions

- Answer all questions in this question and response book.
- QCAA-approved calculator permitted.
- QCAA-approved flight calculator permitted.
- Protractor and ruler or plotter required.
- QCAA formula and data book provided.
- Planning paper will not be marked.

Section 1 (10 marks)

- 10 multiple choice questions

Section 2 (70 marks)

- 12 short response questions

Clear zone — margin trimmed off after completion of assessment

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

DO NOT WRITE ON THIS PAGE

THIS PAGE WILL NOT BE MARKED

Section 1

Instructions

- This section has 10 questions and is worth 10 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- Choose the best answer for Questions 1–10.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	●	○	○	○

	A	B	C	D
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○

Ensure you have filled an answer bubble for each question.

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Section 2

Instructions

- Write using black or blue pen.
- If you need more space for a response, use the additional pages at the back of this book.
  - On the additional pages, write the question number you are responding to.
  - Cancel any incorrect response by ruling a single diagonal line through your work.
  - Write the page number of your alternative/additional response, i.e. See page …
  - If you do not do this, your original response will be marked.
- This section has 12 questions and is worth 70 marks.

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QUESTION 11 (5 marks)

a) Define *aircraft ergonomics*. *[1 mark]*

b) Explain how cockpit design in general aviation aircraft assists pilots during periods of high stress. Provide two examples to support your response. *[4 marks]*

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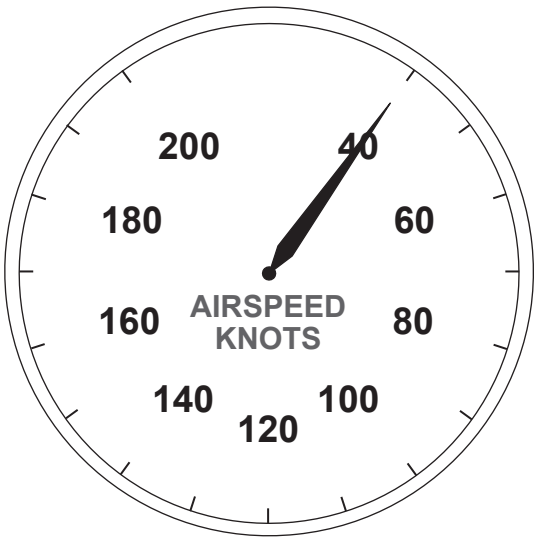
QUESTION 12 (4 marks)

An incomplete airspeed indicator is shown. Complete and label the diagram to identify the Vne, Vno, Vfe and Vfo.



Note: If you make a mistake, cancel it by ruling a single diagonal line through your work and use the additional response space at the back of this book.

Do not write outside this box.

QUESTION 13 (4 marks)

Describe how cultural background and language affect crew resource management (CRM) in aviation. Provide one example of each.

Do not write outside this box.

QUESTION 14 (8 marks)

Explain the operation of the following navigation and radio communication aids, including one limitation of each.

a) ADS-B *[2 marks]*

b) PSR *[2 marks]*

Do not write outside this box.

c) SSR *[2 marks]*

d) TCAS *[2 marks]*

Do not write outside this box.

QUESTION 15 (4 marks)

Provide one example to illustrate how each of the following can affect decision-making in an aerospace context.

a) Bias *[1 mark]*

b) Perception *[1 mark]*

c) Assumptions *[1 mark]*

d) Situational awareness *[1 mark]*

Do not write outside this box.

QUESTION 16 (7 marks)

a) Describe the operation of a head-up display (HUD) in an aerospace context. *[2 marks]*

b) Define Vs, Vs1 and Vs0. *[3 marks]*

Vs:

Vs1:

Vs0:

c) Explain one benefit of using a HUD in relation to Vs. In your response, justify how the HUD improves safety. *[2 marks]*

Do not write outside this box.

QUESTION 17 (6 marks)

In training, pilots are alerted to the potential dangers of empty field myopia as part of their instruction on human factors.

a) Define *empty field myopia* and explain its relationship to the physiology of the eye. *[2 marks]*

b) Describe an aerospace scenario where empty field myopia could result in an aviation accident. In your description, identify the flight conditions that pose the greatest risk of empty field myopia. *[3 marks]*

c) Describe a technique to minimise the risk of empty field myopia. *[1 mark]*

Do not write outside this box.

QUESTION 18 (4 marks)

Optimal human performance in an aerospace context relies on pilots being fit and healthy in relation to body mass index (BMI), diet and hydration.

Explain the relationship between these three factors and human performance, identifying a positive or negative effect of each in an aerospace context.

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QUESTION 19 (7 marks)

A charter operator looking to expand their fleet has obtained specifications for two potential aircraft, A and B, as shown in the table. Advise the operator which aircraft is more suitable for conditions that include mountain flying and landing at over 14 000 ft.

In your response, provide four reasons for your aircraft selection. Justify each reason using data from the table.

	Aircraft A	**Aircraft B**
Engine	Lycoming TIO turbine engine	Lycoming IO piston engine
Minimum RWY needed	800 m	800 m
Service ceiling	20 000 ft	18 100 ft
Power output	235 hp	230 hp
Cruise speed	165 kts	145 kts

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Do not write outside this box.

QUESTION 20 (7 marks)

Refer to Stimulus 1 and 2 in the stimulus book.

A pilot has been tasked with taking over the flight planning for a night charter.

- QNH = 983 hPa
- The temperature and wind at both airports are the same.
- The slope at destination is level.

a) Use Stimulus 1 to determine the landing distance required. *[1 mark]*

b) Calculate the density altitude using Stimulus 2. *[2 marks]*

c) Calculate the airfield elevation using the pressure altitude. *[1 mark]*

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d) Determine the arrival airport and departure airport. *[2 marks]*

e) Sketch the destination runway, identifying which windsock/s the pilot will use. *[1 mark]*

Note: If you make a mistake, cancel it by ruling a single diagonal line through your work and use the additional response space at the back of this book.

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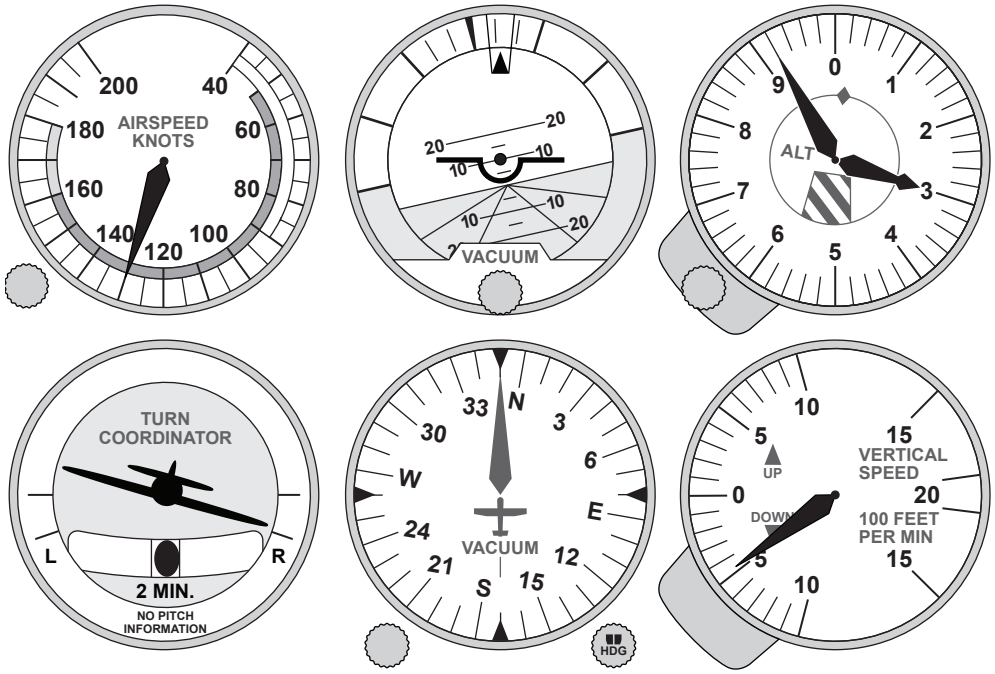
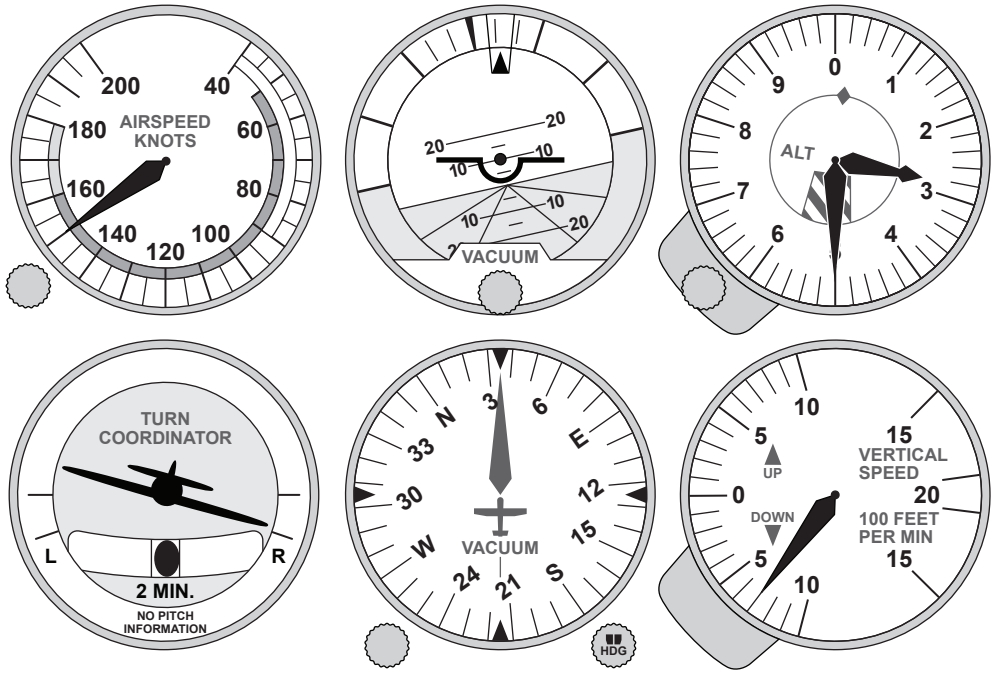
QUESTION 21 (5 marks)

An aircraft flying in instrument meteorological conditions (IMC) experienced a failure of one of its primary instruments. The images show the instrument panel directly before and after the failure. The pilot's actions remained unchanged during this 15-second interval.

Instrument panel before failure



Instrument panel after failure



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a) Analyse the images to determine which instrument most likely failed. Support your decision with two reasons, using evidence from the instrument panel. *[3 marks]*

b) Provide two solutions for the pilot to maintain safe flight without the use of the failed instrument. *[2 marks]*

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QUESTION 22 (9 marks)

Refer to Stimulus 3 and 4 in the stimulus book.

The pilot of a Cessna 152 is planning a flight from Goolwa Airport (YGWA) to Murray Bridge Airport (YMBD) in South Australia. The magnetic variation is 8° E. The pilot intends to fly as high as possible while remaining outside controlled airspace.

a) Analyse Stimulus 3 and 4 to determine the control area (CTA) and one safety consideration along the flight path. *[2 marks]*

b) Complete the flight plan using Stimulus 3 and 4.
Assume CAVOK conditions for the flight. *[7 marks]*

SP107 — NAV/COMM LOG									
	LSALT	ALT	TAS	TR (m)	WIND	HDG	G/S	DIST	ETI
YGWA									
YMBD	A024		100						

Note: If you make a mistake, cancel it by ruling a single diagonal line through your work and use the additional response space at the back of this book.

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

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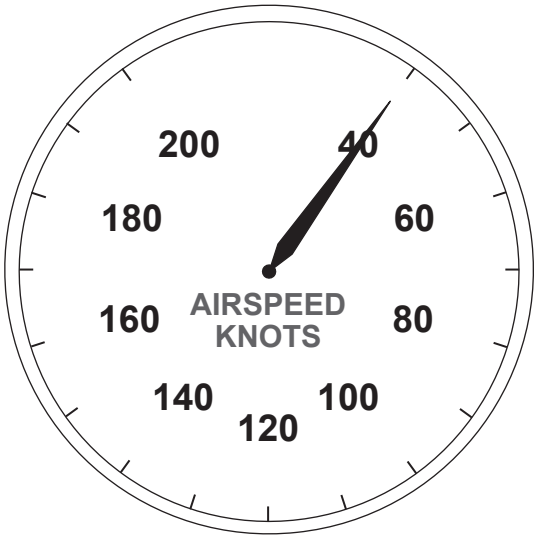
ADDITIONAL RESPONSE SPACE FOR QUESTION 12

If you want this response to be marked, rule a single diagonal line through your previous response.



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ADDITIONAL RESPONSE SPACE FOR QUESTION 22b)

If you want this response to be marked, rule a single diagonal line through your previous response.

SP107 — NAV/COMM LOG									
	LSALT	ALT	TAS	TR (m)	WIND	HDG	G/S	DIST	ETI
YGWA									
YMBD	A024		100						

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References

Stimulus 1

Landing chart adapted from Civil Aviation Safety Authority CASA 2021 RPL, PPL & CPL (Aeroplane) Workbook https://www.casa.gov.au/rpl-ppl-and-cpl-aeroplane-workbook CC BY 3.0

Stimulus 2

Airservices Australia, En Route Supplement Australia (ERSA) (March 2023): Glen Innes; Cooma - Snowy Mountains, https://www.airservicesaustralia.com/aip/aip.asp?pg=10. Used by QCAA with permission.

Stimulus 3

Bureau of Meteorology 2023, Grid Point Wind and Temperature Forecasts (GPWT), http://www.bom.gov.au/aviation/charts/grid-point-forecasts/index.shtml

Stimulus 4

Airservices Australia, Visual Terminal Chart (VTC): Adelaide, December 2022, https://www.airservicesaustralia.com/aip/aip.asp?pg=10. Used by QCAA with permission.