

# — Public use —

LUI

Venue code

School name

Given name/s

Family name

Attach your  
barcode ID label here

Sample assessment 2020

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 sheet provided.
- Planning paper will not be marked.

## Section 1 (10 marks)

- 10 multiple choice questions

## Section 2 (65 marks)

- 13 short response questions



## Section 1

### Instructions

- Choose the best answer for Questions 1–10.
- 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.
- 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:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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	A	B	C	D
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Section 2

### Instructions

- Write using black or blue pen.
  - Respond showing full working for calculations where applicable.
  - 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 13 questions and is worth 65 marks.
- 

### QUESTION 11 (4 marks)

Provide two causes of physical fatigue and two causes of mental fatigue that an aircraft pilot might experience.

Physical fatigue

1. \_\_\_\_\_

2. \_\_\_\_\_

Mental fatigue

1. \_\_\_\_\_

2. \_\_\_\_\_

### QUESTION 12 (3 marks)

List the three sensing mechanisms that influence disorientation in aviation.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

**QUESTION 13 (5 marks)**

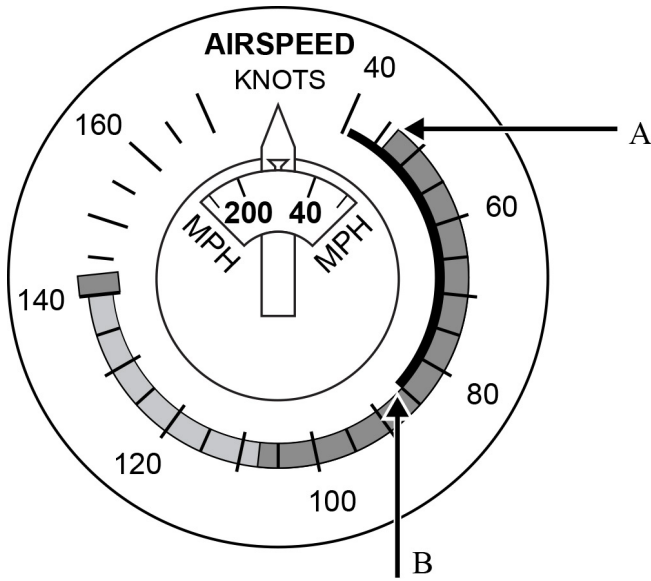
Use a systems thinking feedback loop with annotations to explain the causal relationship between altitude and one aspect of piston engine performance in the space provided below.

**QUESTION 14 (2 marks)**

List two cockpit design factors that improve pilot situational awareness.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_

**QUESTION 15 (4 marks)**



Provide the V speeds identified by the arrows A and B above and describe what each represents.

- (A) V..... \_\_\_\_\_
- (B) V..... \_\_\_\_\_

**QUESTION 16 (5 marks)**

Explain how the internal mechanism of an attitude (artificial horizon) flight instrument functions.

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**QUESTION 17 (6 marks)**

Explain the operation and purpose of a TCAS system. Include a sketch in the space below that shows the spatial relationships between aircraft to support your explanation.

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**QUESTION 18 (4 marks)**

List four advantages of using turboprop engines in comparison to turbojet engines.

1. 

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2. 

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3. 

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4. 

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**QUESTION 20 (5 marks)**

A pilot is planning a flight from Darwin to Melbourne in a small GA piston-engine-powered aircraft. The pilot must choose either airport A or airport B for refuelling and an overnight stay. Each airport has adequate runway length and surface for a landing and take-off. The flight distance from Darwin to each airport is comparable.

**Airport A**

AVFAX CODE 2231

NSW  
S 30 51.1

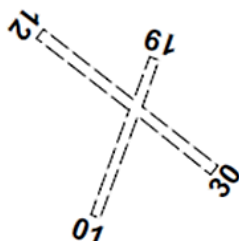
E 143 04.3

**FULL NOTAM SERVICE NOT AVBL**

UTC +10  
VAR 9 DEG E

**ELEV 530**

YWHC  
UNCR



**HANDLING SERVICES AND FACILITIES**

AVGAS AVBL. Phone #####

**METEOROLOGICAL INFORMATION PROVIDED**

1. METAR/SPECI.
2. AWIS PH ##### - Report faults to BoM.

**AERODROME AND APPROACH LIGHTING**

PAL AVBL 120.05 - Contact AD OPR for details

**ATS COMMUNICATIONS FACILITIES**

FIA MELBOURNE CENTRE 124.9 3500FT

CTAF 126.7

**ADDITIONAL INFORMATION**

Animal hazard exists.

**CHARTS RELATED TO THE AERODROME**

WAC 3355.

**Airport B**

AVFAX CODE 2229

NSW  
S 31 31.6

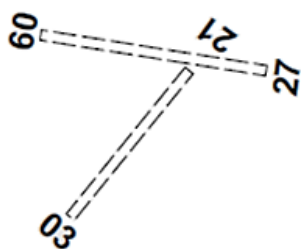
E 143 22.5

**FULL NOTAM SERVICE NOT AVBL**

UTC +10  
VAR 9 DEG E

**ELEV 250**

YWCA  
UNCR



**HANDLING SERVICES AND FACILITIES**

BP - Phone ##### AVGAS, JET A1.

**PASSENGER FACILITIES**

WC/PT (local only)/ACC #####

**METEOROLOGICAL INFORMATION PROVIDED**

1. METAR/SPECI.
2. AWIS PH ##### - Report faults to BoM.

**ATS COMMUNICATIONS FACILITIES**

FIA MELBOURNE CENTRE 124.9 Circuit Area

CTAF 126.7

**ADDITIONAL INFORMATION**

1. Animal & bird hazard exists.
2. AD not suitable for gliding OPS.

**CHARTS RELATED TO THE AERODROME**

WAC 3355.





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## QUESTION 21 (8 marks)

A pilot is planning a flight from Walgett (YWLG) to Collarenebri (YCBR) to Brewarrina (YBRW) in a Piper Warrior PA28 with an ETD of 2200 UTC. The magnetic variation in the region is 10° E, time to cruise altitude is 10 minutes and the Area Forecast winds are 040/20 for all levels to A095. The heading overhead must be set to cruise altitude before proceeding to the first destination.

Piper Warrior PA28			
TAS	110 knots	Useable fuel	166 L
Fuel burn (Lycoming IO360)	38 L/hr	Best glide speed and ratio	70 knots and 10:1

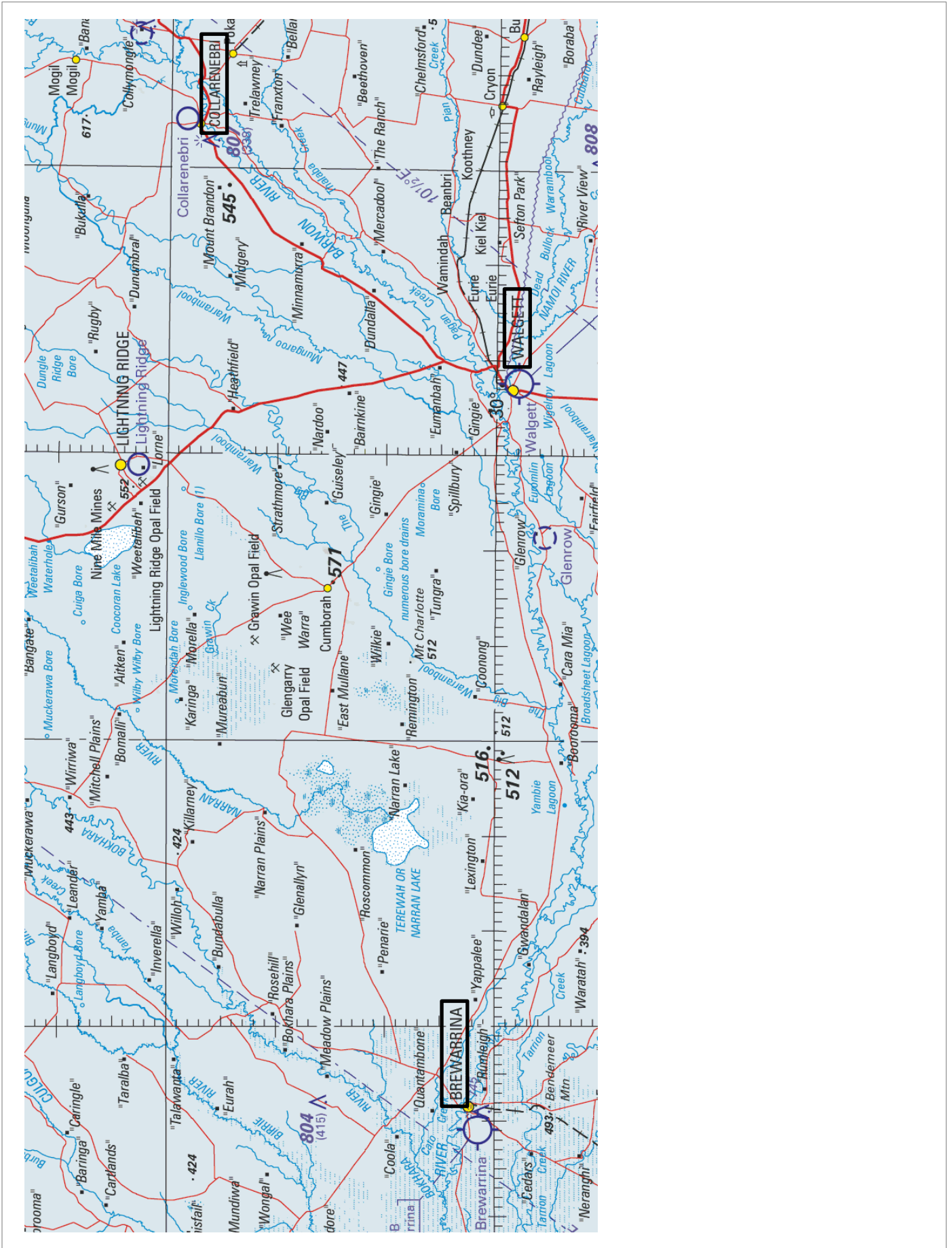
- a) Use the WAC extract on the next page and the aircraft specifications above to complete the flight plan and fuel use forms below and include an ETA for Brewarrina. *[5 marks]*

PSN	L SALT	ALT	TAS	TR (m)	Wind	HDG (m)	G/S	DIST	ETI	EET	PLN EST

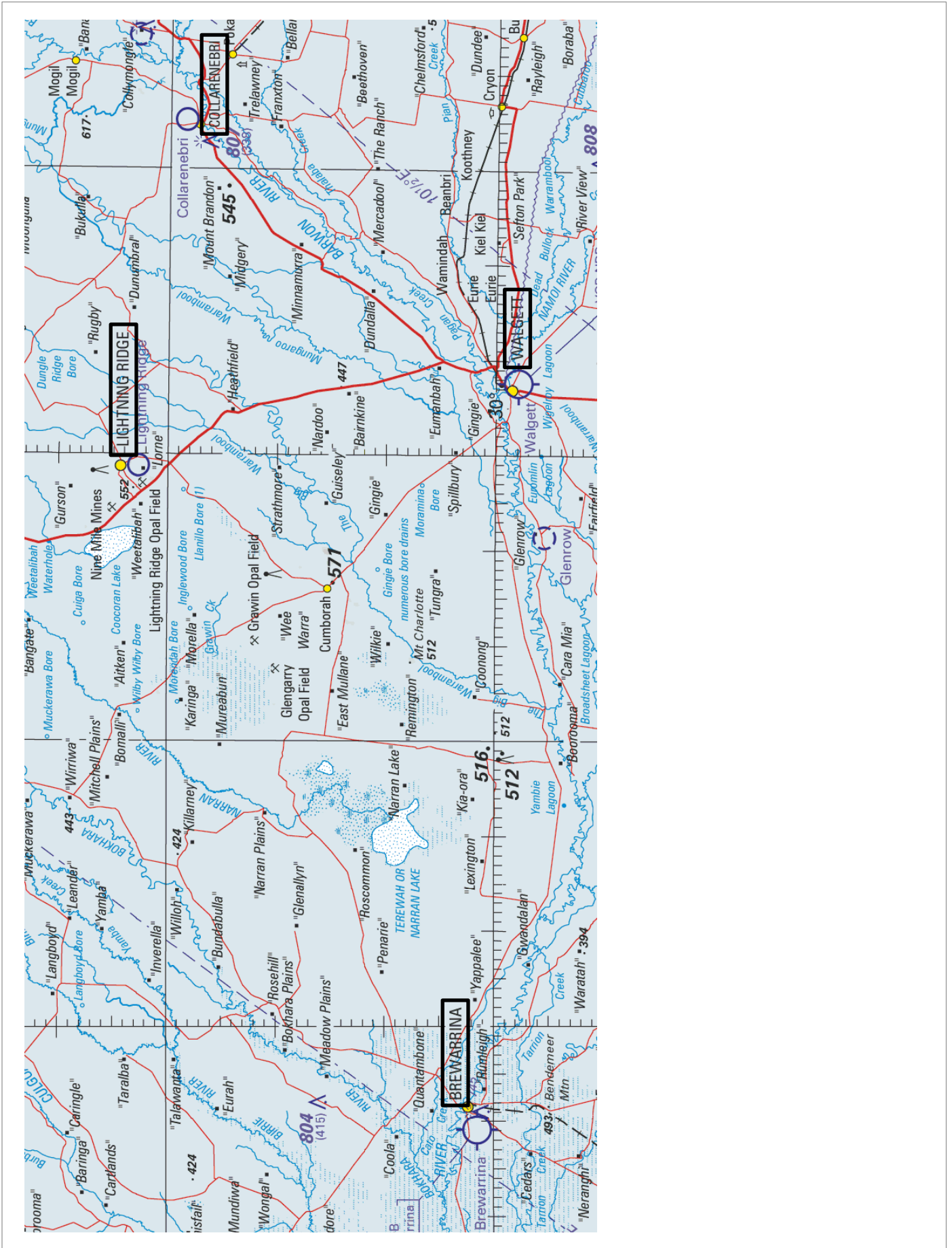
Fuel	Min.	Litres
Climb	10	10
Cruise		
Alternate		
Sub-total		
Fixed reserve	45	
Holding		
Taxi		5
Fuel required		
Fuel margin		
Endurance		

ETA Brewarrina is \_\_\_\_\_

**Note:** If you make a mistake on the table, cancel it by ruling a single diagonal line through your work and use the additional table provided on page 19 of this question and response book.









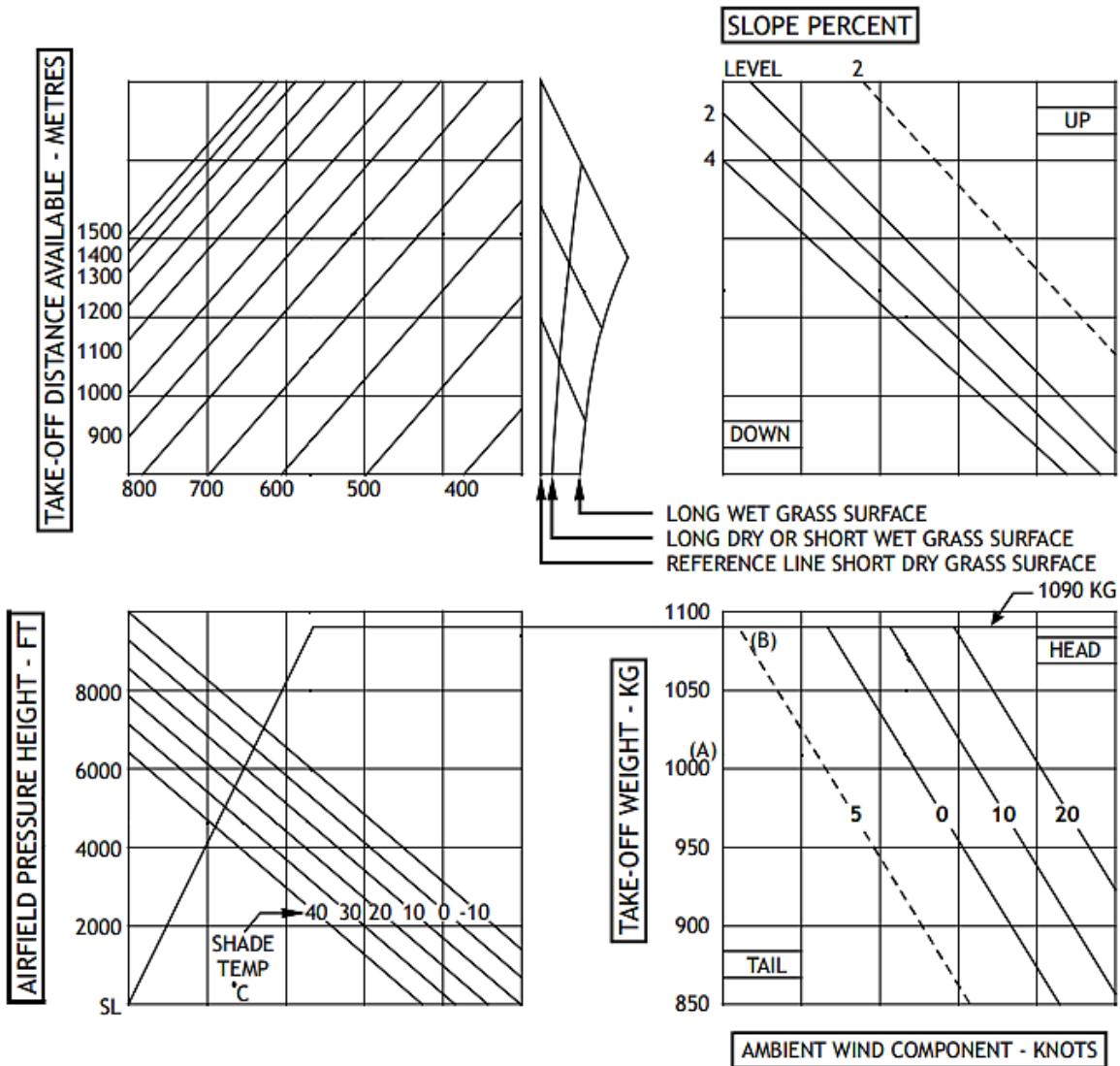


**QUESTION 23 (8 marks)**

An aircraft was attempting to take off from runway 35 at Kanborn airport when it failed to get airborne and ran off the end of the runway. When interviewed, the pilot made several statements such as ‘the aircraft just wouldn’t get off the ground’, ‘it was slow to accelerate’ and ‘we waited until the rain stopped before we attempted the take-off’. The magnetic variation for the region is 8° E.

**METAR YKNB 272200UTC 32020KT 9999 SCT050 FEW030 20/13 Q1001**

Kanborn airport data	
Runway 17/35	Length 740 m Slope 2% down towards the north Short grass surface
Airport elevation	3640 ft











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## ADDITIONAL RESPONSE SPACE FOR QUESTION 21

If you want this table to be marked, rule a diagonal line through the table provided on page 9.

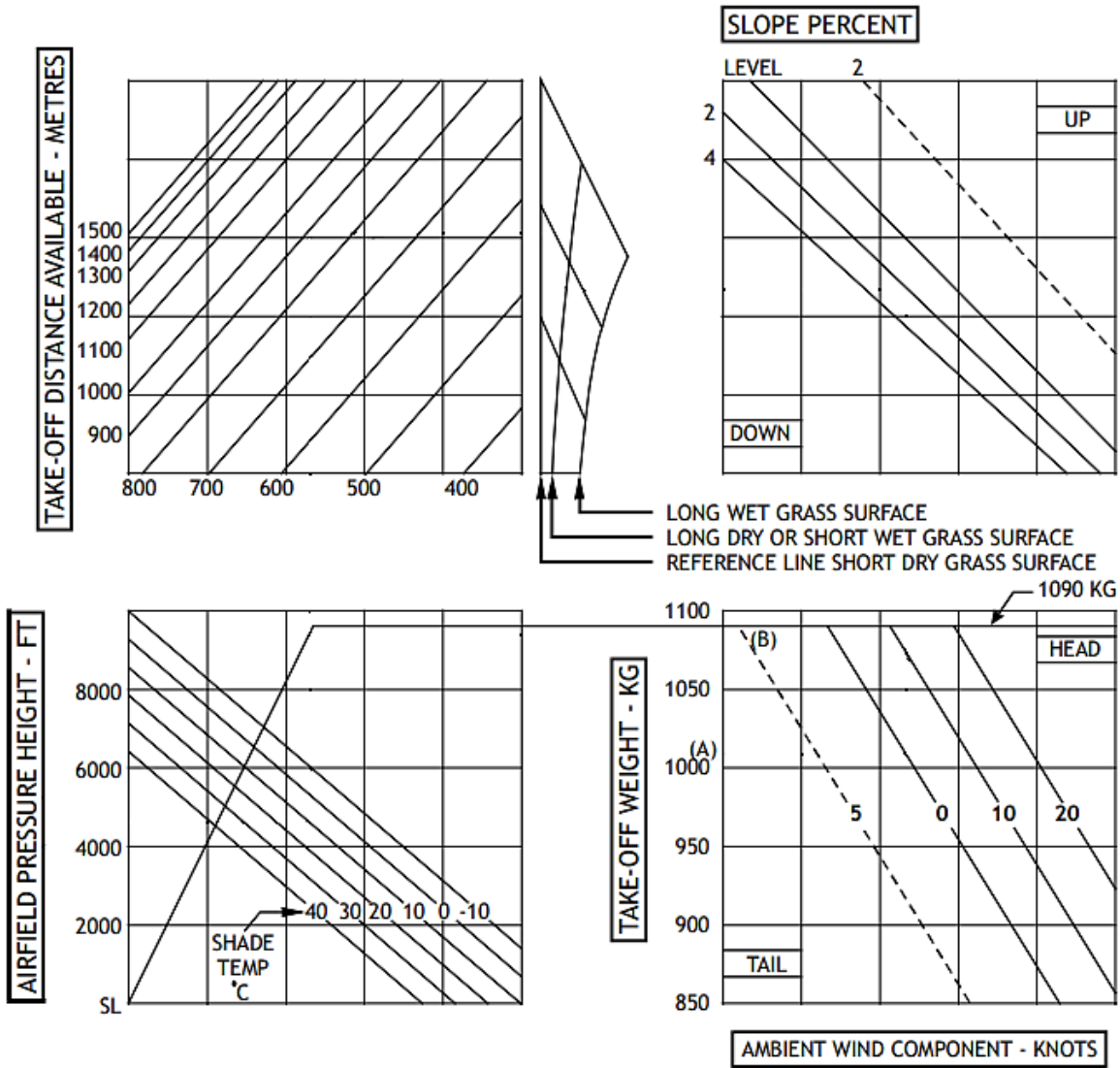
PSN	L SALT	ALT	TAS	TR (m)	Wind	HDG (m)	G/S	DIST	ETI	EET	PLN EST

Fuel	Min.	Litres
Climb	10	10
Cruise		
Alternate		
Sub-total		
Fixed reserve	45	
Holding		
Taxi		5
Fuel required		
Fuel margin		
Endurance		

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## ADDITIONAL RESPONSE SPACE FOR QUESTION 23

If you want this take-off weight chart to be marked, rule a diagonal line through the chart provided on page 15.



## References

Airservices Australia 2019, 'Aeronautical information package — En Route Supplement Australia (ERSA)', [www.airservicesaustralia.com/aip/aip.asp?pg=40&vdate=08NOV2018&ver=2](http://www.airservicesaustralia.com/aip/aip.asp?pg=40&vdate=08NOV2018&ver=2).

Civil Aviation Safety Authority 2018, *SP107 — Flight planning notepad*,  
<https://shop.casa.gov.au/products/flight-planning-notepad-flight-planning-notepad>.

Civil Aviation Safety Authority 2018, *RPL, PPL & CPL (Aeroplane) Workbook Version 2 — 08 November 2018* (training workbook), [www.casa.gov.au/sites/default/files/rpl-ppl-cpl-aeroplane-workbook.pdf](http://www.casa.gov.au/sites/default/files/rpl-ppl-cpl-aeroplane-workbook.pdf).

Wikimedia Commons 2009, *Air speed indicator with V speeds marked*,  
<https://commons.wikimedia.org/wiki/File:ASI01b.jpg>.

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