LUI							Ve	enue coo	de				
Schoo	l nam	e											
Given	name	e/s									ı your		
Famil	y nam	e						ba	arco	de 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	В	С	D
Example:				0

	A	В	С	D
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Section 2

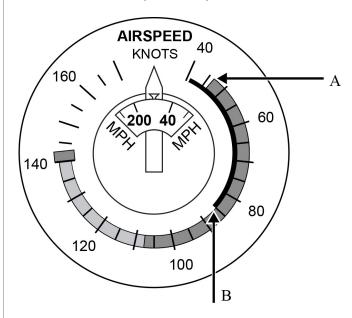
Instructions

- 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.	
·	

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.

Explain the operation and purpose of a TCAS system. Include a sketch in the space below that shows the patial relationships between aircraft to support your explanation.					
JESTION 18	(4 marks)				
t four advantage	s of using turboprop eng	gines in comparison	n to turbojet engine	es.	

QUESTION 19 (6 marks)					
A VFR pilot with no IFR training was undertaking a flight between two airports in a rural area. The pilot was the only person on board and was appropriately qualified to fly the GA aircraft involved. The aircraft					
did not arrive at the destination by the planned ETA just before last light and a search was subsequently					
undertaken. The aircraft wreckage was discovered 10 nm south-east of the intended destination. At the time					
of the accident the weather in the area was broken cloud at 1000 feet AGL and frequent rain showers. Visibility was poor.					
Use the concept of situational awareness to evaluate the factor/s that most likely caused the accident.					
ose the concept of situational awareness to evaluate the factorys that most likely caused the accident.					

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

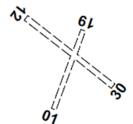
AVFAX CODE 2231

ELEV 530

ELEV 250

FULL NOTAM SERVICE NOT AVBL

UTC +10 YWHC VAR 9 DEG E UNCR



HANDLING SERVICES AND FACILITIES

E 143 04.3

METEOROLOGICAL INFORMATION PROVIDED

- METAR/SPECI.
- 2. Report faults to BoM.

AERODROME AND APPROACH LIGHTING

NSW

S 30 51.1

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.

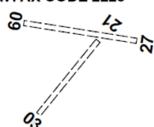
CHARTS RELATED TO THE AERODROME

WAC 3355.

Airport B

AVFAX CODE 2229

FULL NOTAM SERVICE NOT AVBL UTC +10 **YWCA** S 31 31.6 E 143 22.5 VAR 9 DEG E UNCR



HANDLING SERVICES AND FACILITIES

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

PASSENGER FACILITIES

METEOROLOGICAL INFORMATION PROVIDED

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

ATS COMMUNICATIONS FACILITIES

MELBOURNE CENTRE 124.9 Circuit Area

NSW

CTAF 126.7

ADDITIONAL INFORMATION

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

CHARTS RELATED TO THE AERODROME

WAC 3355.

valuate the information in the ERSA on the previous page to provide a justified recommendation for the ost appropriate airport for the stopover.					

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				

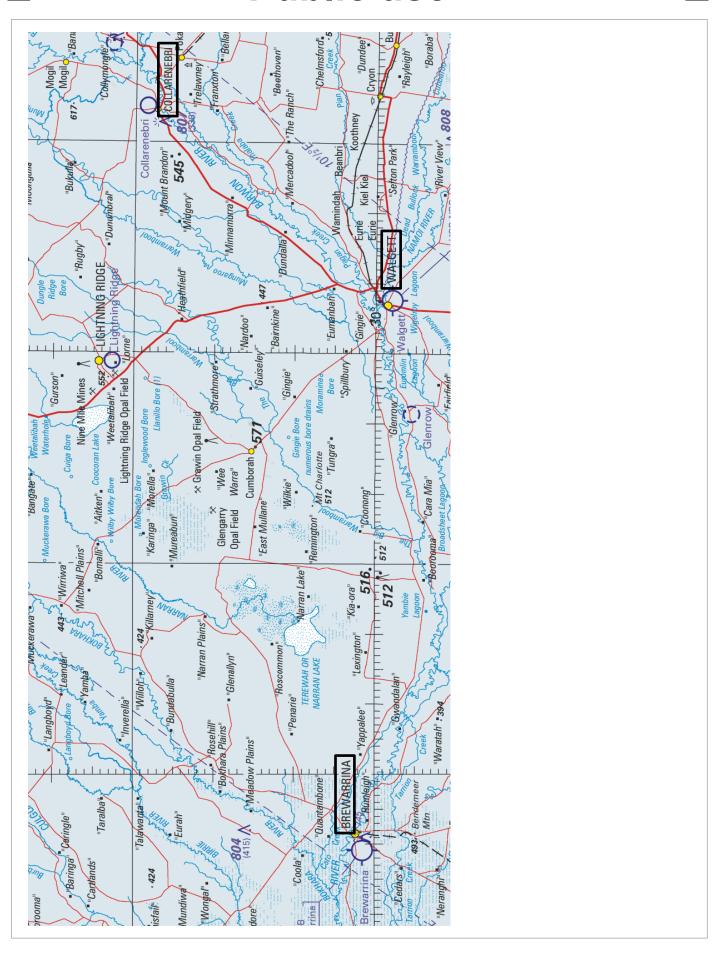
a) Use the WAC extract on the next page and the aircraft specifications above to complete the flight plan and fuel use forms below and include an ETA for Brewarrina. [5 marks]

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

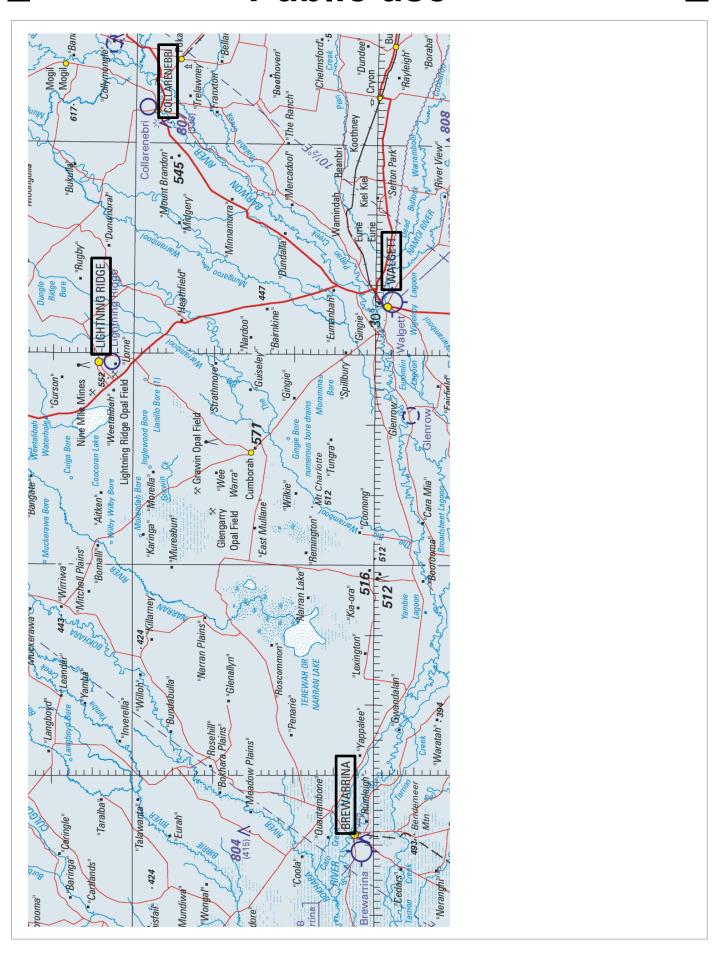
Fuel	Min.	Litres
Climb	10	10
Cruise		
Alternate		
Sub-total		
Fixed reserve	45	
Holding		
Taxi		5
Fuel required		
Fuel margin		
Endurance		

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.



The aircraft departs on time. However, 28 nm from Collarenebri on the Collarenebri to Brewarrina leg, the engine starts to run roughly, and the pilot must make a decision on what to do next. Lightning Ridge, Collarenebri, Walgett and Brewarrina airports all have suitable runways. However, the weather at Lightning Ridge may create difficulties for a VFR flight. b) Use the WAC extract on the next page to evaluate the options available and justify a recommendation for the most appropriate airport for an emergency landing. [3 marks]

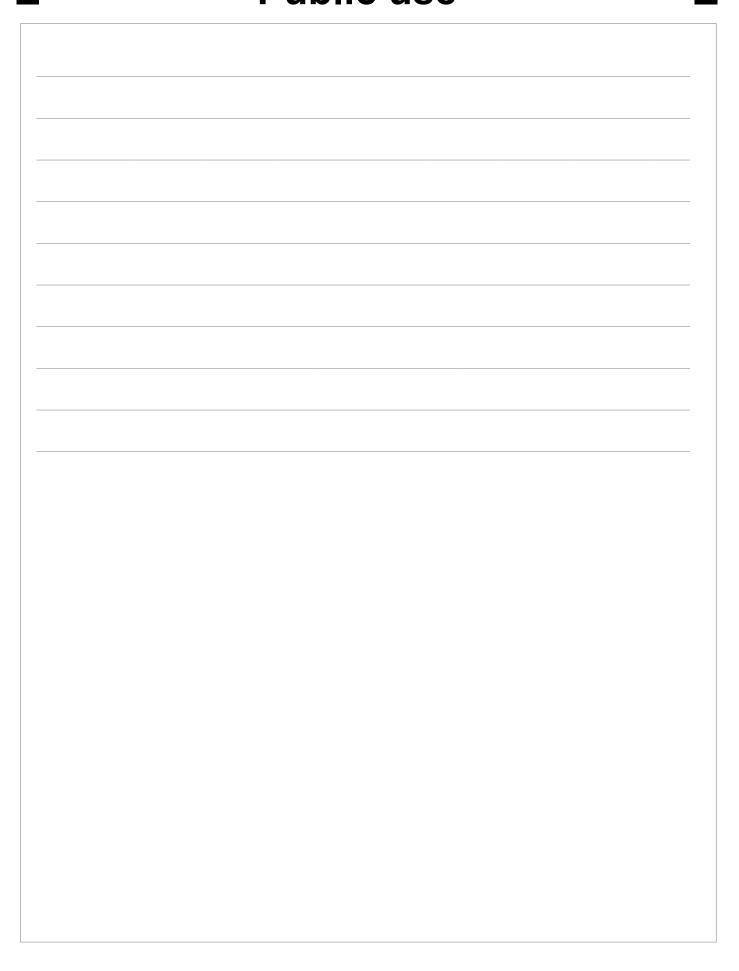


QUESTION 22 (5 marks)

An aircraft is chartered to transport passengers from airport A (take-off 10:00 AEST) to airport B (landing 11:30 AEST) and return to airport A (landing 14:30 AEST).

	Airport A	Airport B
Aerodrome elevation	17'	3400'
QNH (and trend)	1009 (increasing)	1005 (increasing)
Air temperature (and trend)	24 °C (increasing)	27 °C (decreasing)
Main runway, length, surface	RWY 18/36 1523 m sealed	RWY 12/30 1050 m gravel

sing mathematical reasoning, evaluate the aircraft's performance at airport A and at airport B to termine the recommendations you would provide to the pilot before the charter.				

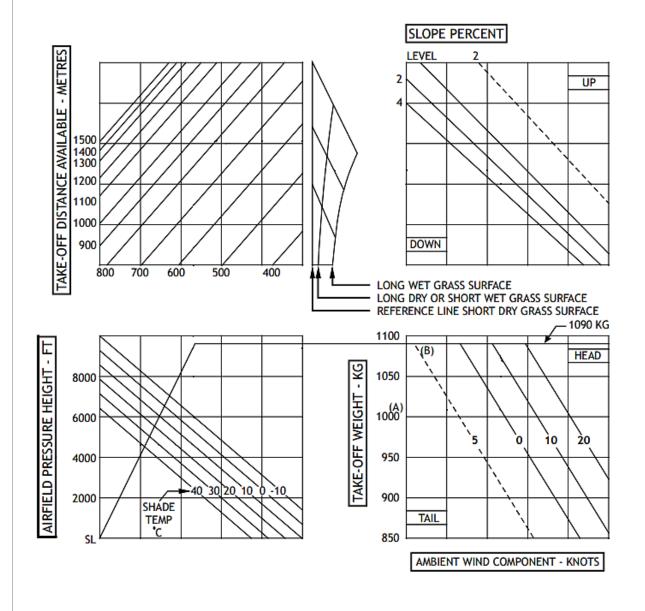


QUESTION 23 (8 marks)

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			



Using the information on the previous page, evaluate the most likely cause of the crash to determine the actions that the pilot should have taken to avoid the accident. Justify your response using graphical and mathematical reasoning and state any assumptions made. Include annotations on the take-off weight chart.					
Note: If you make a mistake on the take-off weight chart, cancel it by ruling a single diagonal line through your work and use the additional chart provided on page 20 of this question and response book.					
END OF PAPER					

ADDITIONAL PAGE FOR STUDENT RESPONSES				
Write the question number you are responding to.				

ADDITIONAL PAGE FOR STUDENT RESPONSES Write the question number you are responding to.					
•	·				

ADDITIONAL RESPONSE SPACE FOR QUESTION 21

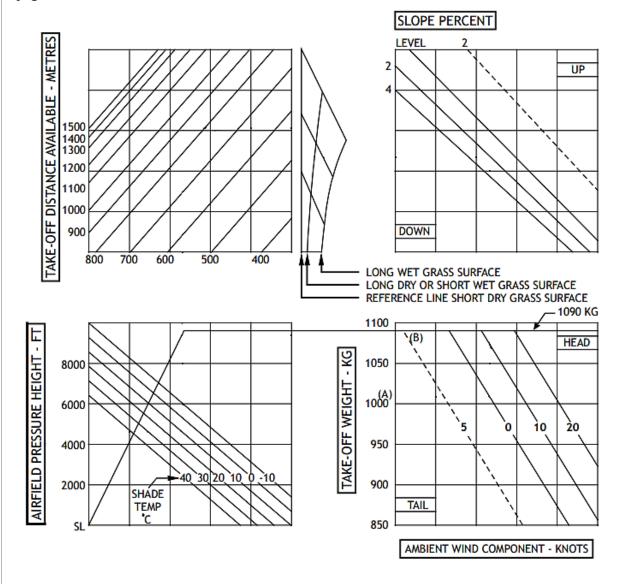
If you want this table to be marked, rule a diagonal line through the table provided on page 9.

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		

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.

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.

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

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