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School code

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School name

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Given name/s

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Family name

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Attach your
barcode ID label here

Book

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of

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books used

External assessment 2024

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



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:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	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"/>

Ensure you have filled an answer bubble for each question.

Do not write outside this box.

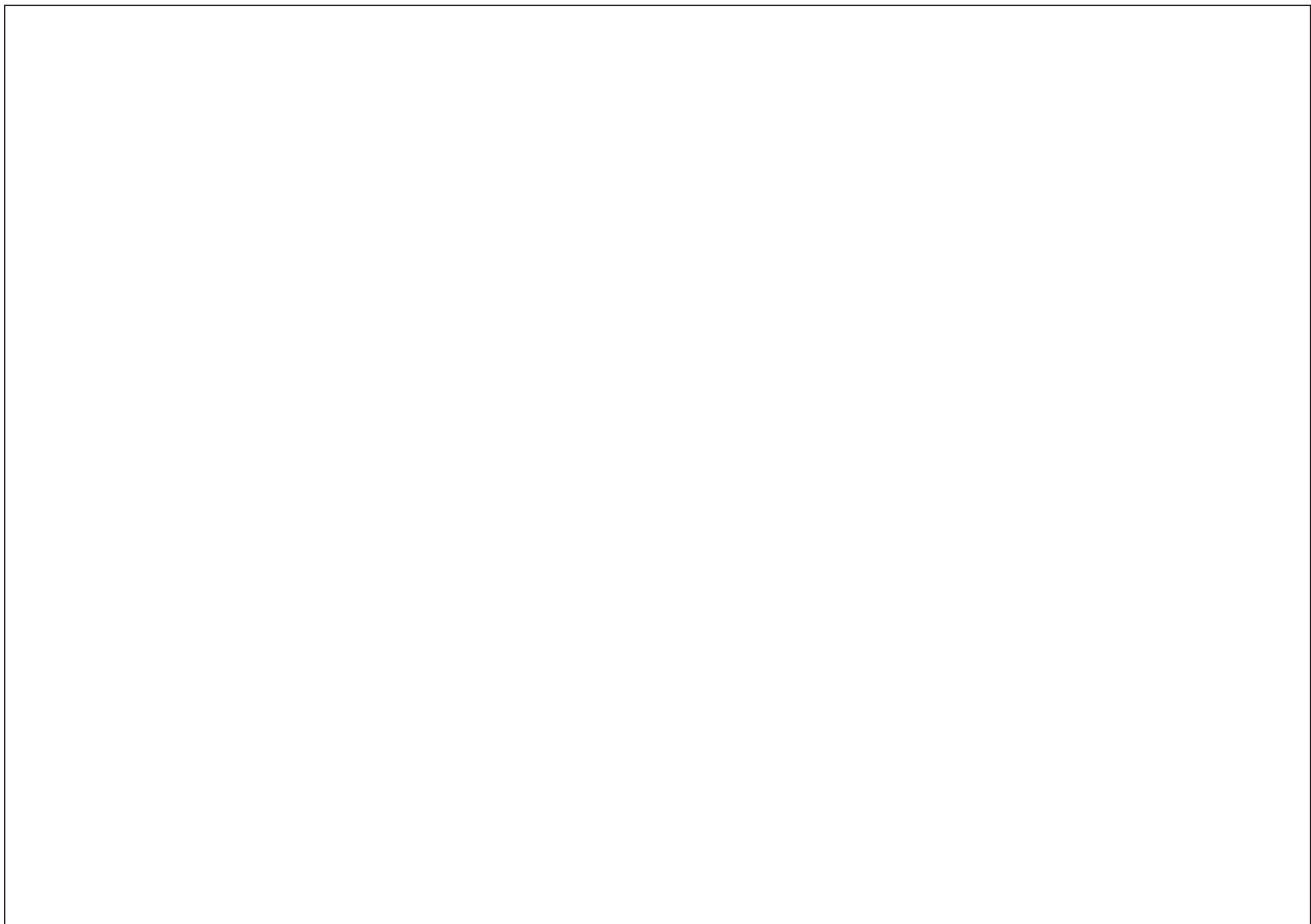
Section 2

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.
-

QUESTION 11 (6 marks)

Sketch and label an aircraft wing, including aileron, flap, fuel tank, spar, ribs, wing tip and wing root.

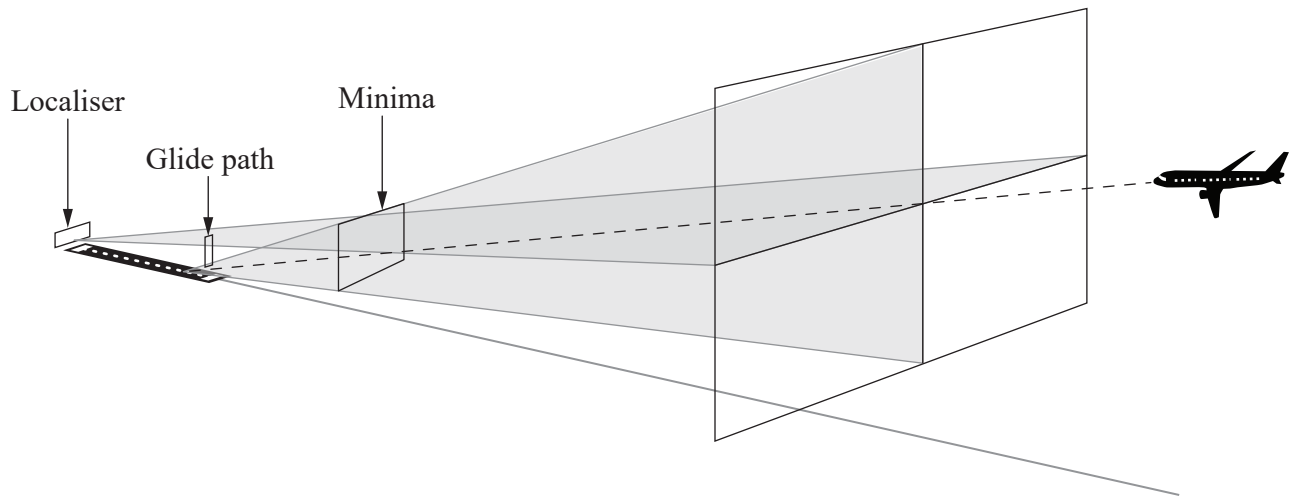


Note: If you make a mistake in the sketch, cancel it by ruling a single diagonal line through your work and use the additional response space at the back of this question and response book.

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QUESTION 12 (6 marks)

Identify this system and explain its features, including two limitations.



Do not write outside this box.

QUESTION 13 (6 marks)

Refer to Stimulus 1 in the stimulus book.

A pilot is planning a flight from Northam Airport to Quairading Airport at night. They plan to fly as low as possible while adhering to all visual flight rules. The lowest safe altitude for night visual meteorological conditions (VMC) is a minimum of 1000 ft above the highest obstacle within 10 NM either side of the planned flight track.

Determine the distance and magnetic bearing from Northam Airport to Quairading Airport. Identify the altitude the pilot would fly and show your reasoning.

Do not write outside this box.

QUESTION 14 (6 marks)

Identify two examples of each of the following illusions.

Vestibular system illusions: _____

Visual/night illusions: _____

Landing illusions: _____

Do not write outside this box.

QUESTION 17 (5 marks)

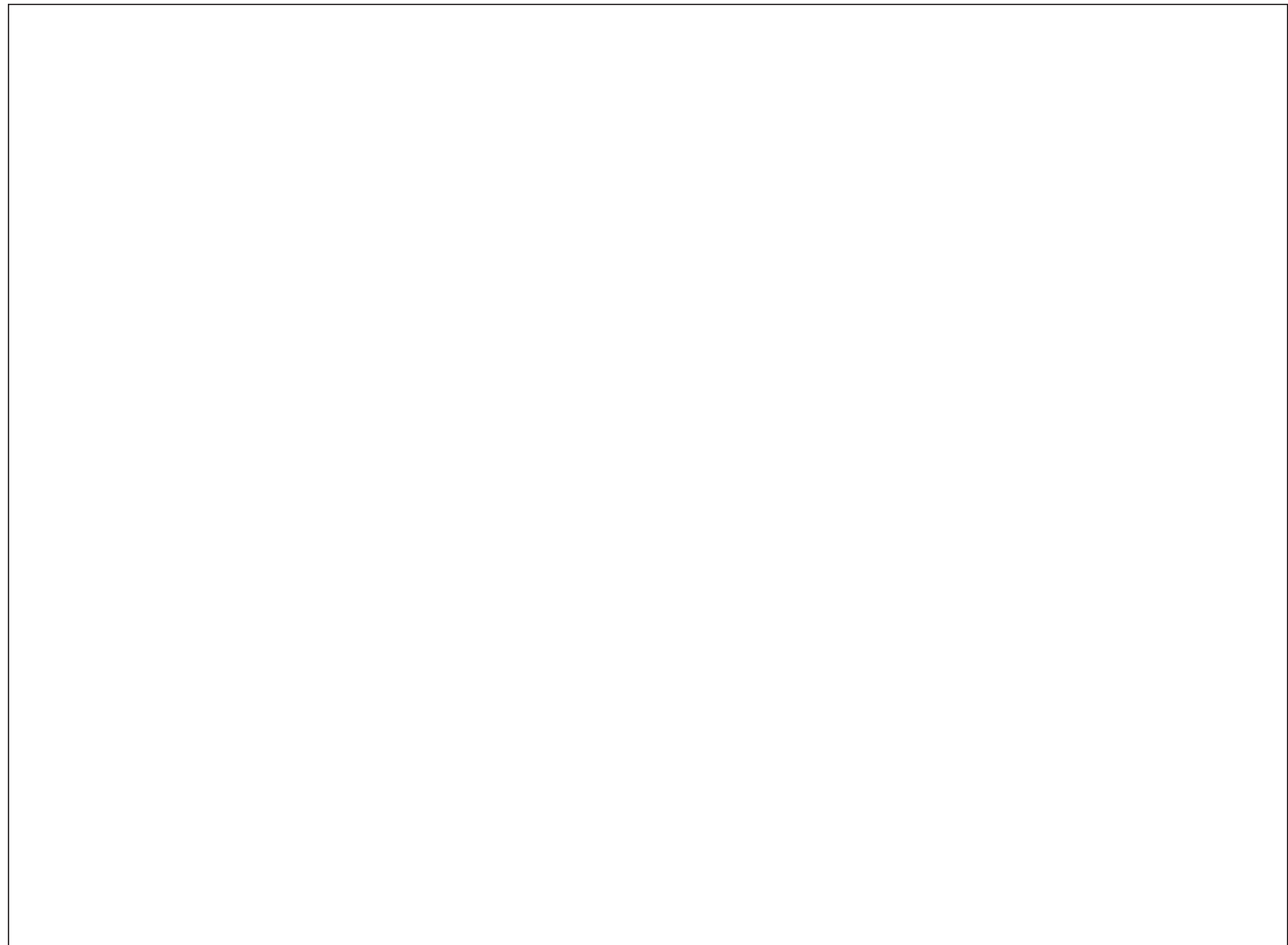
Refer to Stimulus 2 in the stimulus book.

A pilot planned a flight from Orange to Condobolin that departed at 0200 UTC with a ground speed of 120 kts. At 0233 UTC, they determine their position to be over Parkes township, but would like to re-intercept track at $33^{\circ}08' \text{ S } 147^{\circ}34' \text{ E}$.

Determine the following:

- new heading the pilot should fly once they re-intercept track
- new ETA for Condobolin
- track made good to Parkes
- closing angle from Parkes to the re-interception point
- township at the re-interception point.

Show all working.



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

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Do not write outside this box.



QUESTION 18 (8 marks)

A flight from Mudgee to Narrabri needs to divert at time 0500 UTC to an appropriate airfield due to weather. The two airfields selected as possibilities are Coonabarabran and Quirindi.

Analyse and compare the ERSAs extracts, associated TAFs and aircraft information to determine the best airfield for diversion. Use data to justify your response.

TAF information

TAF CBB 280130Z 2802/2814

18017KT 9999 -SHRA BKN020

RMK

T 25 20 19 18 Q 995 1000 1000 1002

TAF QDI 280130Z 2802/2814

26030KT 9999 -SHRA BKN020

RMK

T 28 30 28 28 Q 995 990 990 990

Aerodrome information

- QDI pressure height is 1490'

- QDI density height is 3644'

Aircraft information

- Max crosswind: 15 kts

- Landing distance required: 1100 m

- For every 1000' density height, add 30' to runway length available

- Can only land on sealed runways

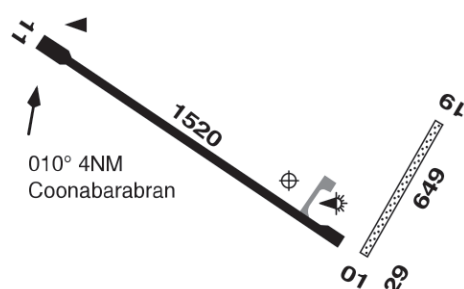
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ERSA update for Coonabarabran

COONABARABRAN

ELEV 2117

AVFAX CODE 2033



NSW
311957S 1491602E UTC +10 YCBB
VAR 11 DEG E CERT
AD OPR Warrumbungle Shire Council, PO Box 191,
Coonabarabran, NSW, 2357. PH 02 6849 2000. ARO 6849
2000. Fax 6842 1337.

AERODROME OBSTACLES

1. LIT COM TWR 2,222FT AMSL, 312008.10S
1491712.76E BRG 084 MAG 1,770M FM ARP.
2. LIT COM TWR 2,939FT AMSL, 311919.50S
1491124.42E BRG 266 MAG 7,600M FM ARP.

METEOROLOGICAL INFORMATION PROVIDED

1. TAF CAT D, METAR/SPECI.
2. AWIS PH 02 9353 6415 - Report faults to BoM.
3. AWIS FREQ 125.45 (requires one-second pulse to activate) - Report faults to AD OPR.

PHYSICAL CHARACTERISTICS

01/19	019	21c	Unrated. Grass.	WID 60	RWS 90
11/29	112	50a	PCN 12 /F /C /580 (84PSI) /T	WID 30	RWS 150

AERODROME AND APPROACH LIGHTING

RWY 11/29 LIRL PAL+AA 119.2

ATS AND AERODROME COMMUNICATION FACILITIES

FIA BRISBANE CENTRE 127.1 Circuit area

FLIGHT PROCEDURES

Pilots are requested to avoid overflight of the Siding Spring Observatory (BRG 277 MAG 10.8NM FM ARP).

CTAF 126.7

ADDITIONAL INFORMATION

Animal and bird hazard exists. Kangaroos are likely at dusk and at night.

CHARTS RELATED TO THE AERODROME

1. WAC 3356, 3357.
2. Also refer to AIP Departure and Approach Procedures.

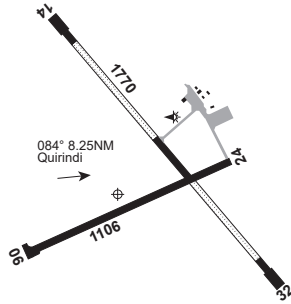
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ERSA update for Quirindi

QUIRINDI

ELEV 800

AVFAX CODE 2024



NSW 312955S 1503105E UTC +10 VAR 12 DEG E YQDI CERT
AD OPR Liverpool Plains Shire Council, PO Box 152, Quirindi, NSW, 2343.
PH 02 6746 1755. Website: www.liverpoolplains.nsw.gov.au

REMARKS

AD Charges: refer to the Council's fees and charges on website.

PASSENGER FACILITIES

PT/WC

AERODROME OBSTACLES

Powerlines on APCH at NW end 1,380M FM RWS end.

PHYSICAL CHARACTERISTICS

06/24	054	36a	5700/ Sealed.	WID 18	RWS 90
14/32	128	58c	5700/580 (84PSI) Gravel. 185M FM each RWY end and central 295M sealed only.	WID 30	RWS 150

AERODROME AND APPROACH LIGHTING

RWY 14/32 LIRL PAL+AA 125.3

OTHER LIGHTING

TWY LGT: Blue edge.

ATS AND AERODROME COMMUNICATIONS FACILITIES

FIA BRISBANE CENTRE 127.1 Circuit Area

RADIO NAVIGATION AND LANDING AIDS

NDB QDI 386 312934.2S 1503125.6E Range 40 (HN 40) (1)
(1) Pilot monitored.

LOCAL TRAFFIC REGULATIONS

1. All ACFT movements restricted to designated RWY, TWY and APN only.
2. Light ACFT with tail skid must not taxi on gravel.

CTAF 127.8

ADDITIONAL INFORMATION

1. Bird hazard exists.
2. Loose SFC stones.
3. High intensity military CT4B operations are likely MON-FRI 0800-1700 local in Quirindi CTAF and D523, SFC to A080. Aircraft conducting instrument approach training and circuits will broadcast as callsign Roller, Charlie or Check on CTAF 127.8 and monitor BN CEN 127.1. Information regarding scheduling can be requested from BAE Operations on 02 6768 5199.

CHARTS RELATED TO THE AERODROME

1. WAC 3357.
2. Also refer to AIP Departure and Approach Procedures.

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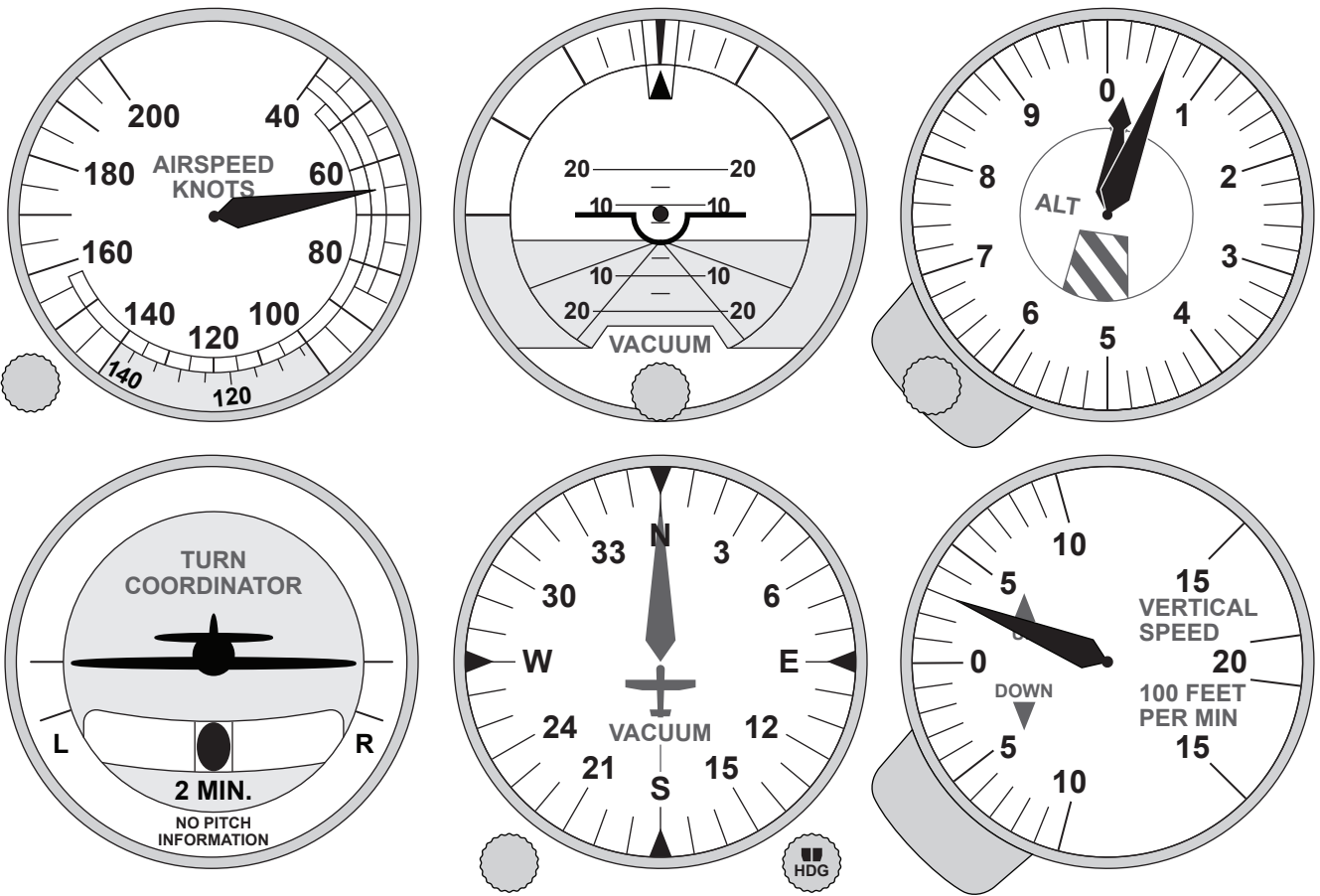


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QUESTION 19 (6 marks)

Consider the instrument panel from an aircraft during normal operations.



Analyse the data to deduce whether the aircraft is landing or taking off. Support your reasoning with data.

Do not write outside this box.

QUESTION 20 (5 marks)

Consider the flight plan information shown.

SP107 — NAV/COMM LOG										
	LSALT	ALT	TAS	TR (m)	WIND	HDG	G/S	DIST	ETI	EET
Lambton										
Yin Creek	A015	A045	110	065	250/15	065	125	57	27	27
Danton	A017	A045	110	079	250/15	080	125	18	9	36

- a) Complete the fuel log form for a fully fuelled four-seat aircraft with a consumption rate of 35L/h.

[4 marks]

Fuel	Min	Litres
Climb	/	/
Cruise		
Alternate	/	/
Sub-total		
VRB RES (15%)	/	/
Fixed RES (45 min)		

Fuel		Min	Litres
Holding	Inter 30 min	/	/
	Tempo 60 min	/	/
Taxi		/	3
Fuel required			
Fuel margin			
Endurance			

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

Do not write outside this box.

b) Determine whether the aircraft will have enough fuel on landing for another one-hour flight and support your decision with data.

[1 mark]

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END OF PAPER

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL RESPONSE SPACE FOR QUESTION 20a)

If you want these fuel log forms to be marked, rule a single diagonal line through your original response.

SP107 — NAV/COMM LOG										
	LSALT	ALT	TAS	TR (m)	WIND	HDG	G/S	DIST	ETI	EET
Lambton										
Yin Creek	A015	A045	110	065	250/15	065	125	57	27	27
Danton	A017	A045	110	079	250/15	080	125	18	9	36

Fuel	Min	Litres
Climb		
Cruise		
Alternate		
Sub-total		
VRB RES (15%)		
Fixed RES (45 min)		

Fuel	Min	Litres
Holding	Inter 30 min	
	Tempo 60 min	
Taxi		3
Fuel required		
Fuel margin		
Endurance		

Do not write outside this box.

References

Question 12

Airservices Australia 2017, 'Factsheet: What is an instrument landing system?', Airservices Australia, <https://engage.airservicesaustralia.com/61288/widgets/309785/documents/181249/download>.

Question 16

Buesnel, G and Crampton, P 2017, 'GPS disruption a full-fledged aviation problem', *GPS World*, <https://www.gpsworld.com/gps-disruption-a-full-fledged-aviation-problem>.

Question 18

Airservices Australia, En Route Supplement Australia (ERSA): Coonabarabran; ERSA: Quirindi, June 2022, <https://www.airservicesaustralia.com/aip/aip.asp?pg=10>.

Question 20

Adapted from CASA 2024, 'Flight planning notepad', Australian Government Civil Aviation Safety Authority, <https://shop.casa.gov.au/products/flight-planning-notepad-flight-planning-notepad>.

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