Government of **Western Australia**
School Curriculum and Standards Authority

ATAR course examination, 2017

Question/Answer booklet

AVIATION

Please place your student identification label in this box

Student number: In figures

In words

Time allowed for this paper

Reading time before commencing work:	ten minutes
Working time:	two and a half hours

Materials required/recommended for this paper

To be provided by the supervisor
This Question/Answer booklet
Multiple-choice answer sheet

Number of additional answer booklets used (if applicable):

To be provided by the candidate

Standard items:	pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters
Special items:	non-programmable calculators approved for use in this examination, navigation plotter (or ruler and protractor), flight computer

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Ref: 17-008

Structure of the examination

The Aviation ATAR course examination consists of a written component and a practical (performance) component.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of written examination
Section One Multiple-choice	20	20	30	20	20
Section Two Short answer	22	22	120	116	80
				Total	100

Instructions to candidates

1. The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2017*. Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions according to the following instructions.

   Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

   Section Two: Write your answers in this Question/Answer booklet.

3. Working or reasoning should be shown clearly when calculating or estimating answers.

4. You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.

5. Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Section One: Multiple-choice **20% (20 Marks)**

This section has **20** questions. Answer **all** questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 30 minutes.

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1. When using a GPS, a position fix is obtained by

   (a) the aircraft receiver measuring the phase angle of the signal received from a number of satellites in known positions.
   (b) measuring the time taken for an aircraft transmission to travel to a number of satellites in known positions and return to the aircraft receiver.
   (c) measuring the time taken for a transmission to reach the aircraft receiver from a minimum number of satellites in known positions.
   (d) the aircraft transmitting a coded signal to all satellites within range and a ground-based computer system relaying back a positive position fix to the aircraft.

2. Which of the following are components of the Instrument Landing System (ILS)?

   (i) localiser
   (ii) marker beacons
   (iii) VHF Omni-directional Radio Range (VOR)
   (iv) glide path

   (a) i, ii and iii
   (b) ii and iii
   (c) i, ii and iv
   (d) i, ii, iii and iv

3. A build-up of carbon monoxide in the cockpit of an aircraft is dangerous because it

   (a) is highly acidic, can attack the pilot’s eyes and can seriously affect vision.
   (b) is poisonous and destroys the lining of the lungs.
   (c) indicates to the pilot that the engine is faulty and it may cease operating.
   (d) attaches to haemoglobin in the blood and reduces the supply of oxygen to body cells.

4. The tail rotor on a helicopter is

   (a) used to eliminate gyroscopic precession.
   (b) not needed if contra-rotating rotors are fitted.
   (c) to prevent rotor coning.
   (d) to stop Coriolis effect.

5. Updrafts are a feature of thunderstorms. In the life of a thunderstorm, updrafts are **most** likely to exist in the

   (a) developing stage only.
   (b) dissipating stage only.
   (c) mature and dissipating stages.
   (d) developing and mature stages.

6. Decompression sickness is due to the formation of gas bubbles in the blood system. Which one of the following gases is responsible?

   (a) Hydrogen
   (b) Oxygen
   (c) Helium
   (d) Nitrogen

7. A shock stall is similar to a conventional stall in that

   (a) lift is destroyed and airflow separation occurs.
   (b) both can occur at any airspeed.
   (c) the pilot must accelerate to recover.
   (d) both can occur at any angle of attack.

8. The part/s of the ear **most** involved with balance is/are the

   (a) Eustachian tube.
   (b) cochlea.
   (c) malleus, incus and stapes.
   (d) vestibular apparatus.

9. Degradation of the night vision of pilots of light aircraft flying below 5000 ft is said to be **most** frequently caused by

   (a) pilots smoking cigarettes.
   (b) the aircraft being pressurised.
   (c) pilots not receiving adequate practice in dark adaptation.
   (d) pilots having consumed alcohol.

10. Which is the **most** important factor in flying an aircraft in such a way as to ensure that it will stay airborne for the longest possible time on a given load of fuel?

   (a) flying at best glide speed
   (b) flying at the speed for maximum range
   (c) flying at the speed for minimum power
   (d) flying at the speed for minimum thrust

See next page

11. The pilot of a light training aircraft is flying to a country airfield that has two runways, designated 07/25 and 14/32. The forecast indicates that the wind velocity on arrival will be 090/20 kt. Which runway should she be expected to land on?

(a) 07
(b) 25
(c) 14
(d) 32

12. According to a *Civil Aviation Advisory Publication*, the recommended fixed fuel reserve for a piston-engined aircraft with a fuel flow of 36 litres/hour would be

(a) 18 litres.
(b) 27 litres.
(c) 32 litres.
(d) 45 litres.

13. If an aircraft is tracking over the ground 045° M and the variation is 10° E, the true track is

(a) 035° T.
(b) 045° T.
(c) 055° T.
(d) 325° T.

14. An aircraft flying at a density height of 10 000 ft had a calibrated airspeed of 150 knots. The true airspeed would be equivalent to

(a) 150 knots.
(b) 128 knots.
(c) 175 knots.
(d) unknown: cannot calculate without actual QNH and OAT.

15. Hypermetropia is difficulty

(a) seeing distant objects.
(b) seeing near objects.
(c) hearing high-pitched tones.
(d) hearing low-pitched tones.

16. A strong crosswind from the left while taxiing on level ground will cause the aircraft to tend to

(a) yaw to the left.
(b) yaw and roll to the right.
(c) roll to the left.
(d) pitch to the left.

17. Given: Track = 355° T and W/V 060/20 kt, the wind components are

(a) 9 kt headwind with 18 kt crosswind from left.
(b) 9 kt headwind with 18 kt crosswind from right.
(c) 9 kt tailwind with 18 kt crosswind from left.
(d) 9 kt tailwind with 18 kt crosswind from right.

18. An accumulator located in the hydraulic system is designed to

(a) remove excess pressure from the system.
(b) store pressurised gases for release into the system if needed.
(c) help reduce pressure fluctuations in the system.
(d) store the hydraulic fluid until the system is activated.

19. An aerofoil is said to be stalled

(a) at the stalling angle.
(b) after the stalling angle has been exceeded.
(c) at the angle corresponding to the maximum lift coefficient.
(d) when the laminar flow across the wing first transitions to turbulent.

20. While cruising in a single piston-engined aircraft fitted with a CSU, with power settings of 23” MAP/2400 RPM, you put the aircraft into a dive. The propeller will go to full

(a) fine then overspeed.
(b) coarse then underspeed.
(c) fine then underspeed.
(d) coarse then overspeed.

End of Section One

Section Two: Short answer **80% (116 Marks)**

This section has **22** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 120 minutes.

Question 21 **(4 marks)**

Given the following data:
- Airfield elevation 229 ft
- QNH 1017
- OAT 28 °C.

(a) Calculate airfield pressure altitude. Show **all** workings. (2 marks)

(b) Calculate airfield density altitude. Show **all** workings. (2 marks)

Question 22 **(4 marks)**

The elevator trim forms part of the tail of a general training light aircraft.

(a) State the purpose of the elevator trim. (1 mark)

(b) Explain the operational principles of the elevator trim. Draw a diagram to assist with your explanation. (3 marks)

Diagram

Question 23 **(2 marks)**

A pilot is about to order fuel for his aircraft. The following data apply:

- Fuel tanks capacity 210 L
- AVGAS specific gravity 0.72.

In order for the aircraft to remain within performance limitations, the **maximum** fuel that can be carried cannot exceed 100 kg.

Determine the maximum number of litres that must be ordered so as to **not** exceed these limitations. Show **all** workings.

Question 24 **(4 marks)**

An aircraft is tracking 020° M and maintaining 140 kt TAS.

Actual winds 125° M/25 kt.

Use your flight computer to resolve the following:

(a) What heading would be required to be flown to maintain the planned track? (1 mark)

(b) What ground speed would the aircraft be maintaining? (1 mark)

(c) Use **only** the 1 in 60 rule to determine the actual Track Made Good (TMG) if, after travelling 20 miles, the aircraft was 4 nm left of track. (2 marks)

Question 25 **(6 marks)**

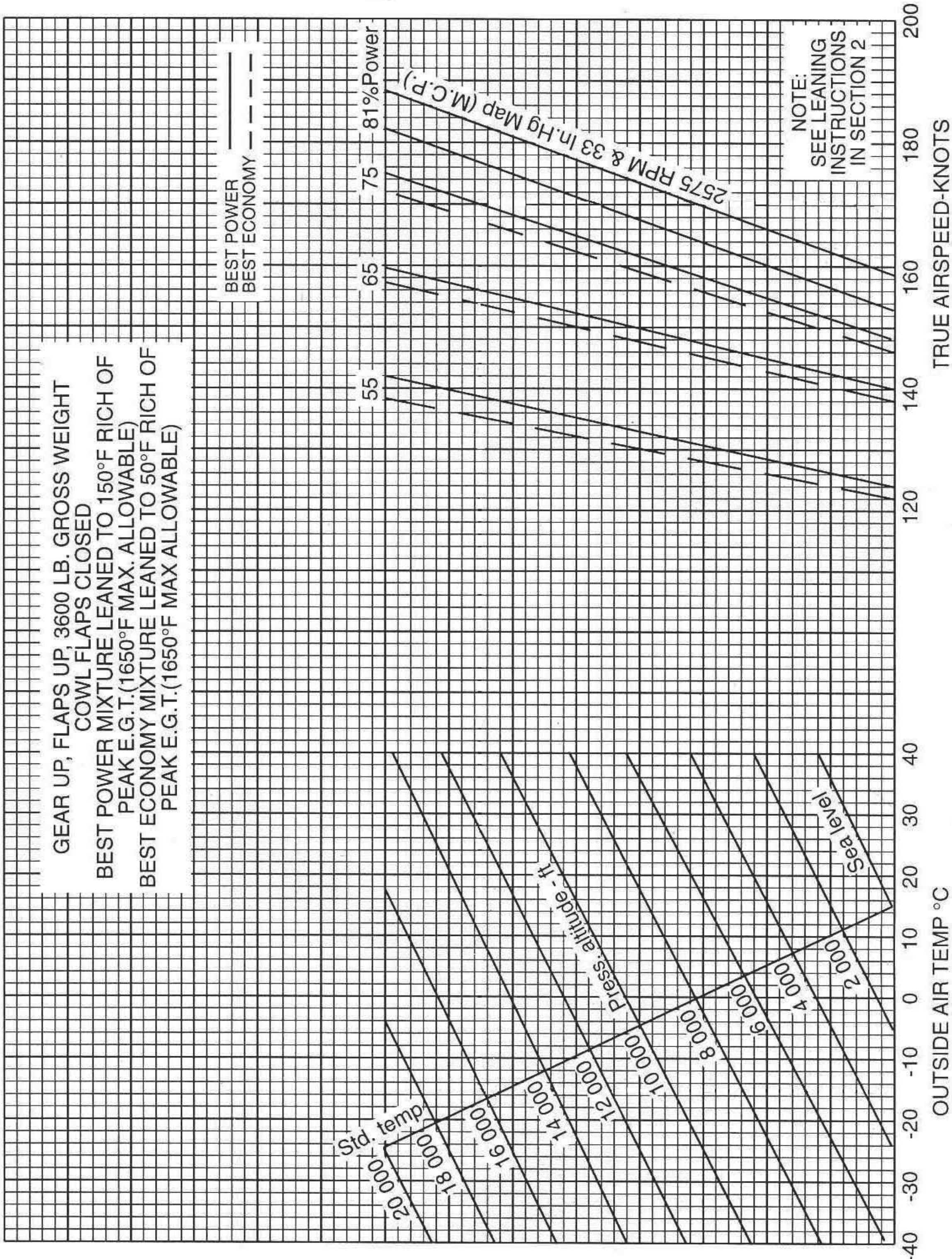
Answer the question parts below using the PA-32RT performance chart on page 11 and the following data:

- outside air temperature 16 °C
- pressure altitude 8000 ft
- power setting 75%.

(a) Determine the TAS for a flight conducted for best power. (2 marks)

(b) Determine the new TAS if the aircraft was set up to fly 75% power for best economy while still maintaining the advised altitude. (2 marks)

(c) To achieve best economy, what should the mixture be leaned to show? (2 marks)



See next page

Question 26 **(4 marks)**

A VFR aircraft is travelling west holding a heading of 270° M. The aircraft passes overhead its initial waypoint at UTC 1625 and has estimated its next waypoint at UTC 1705. The winds are forecast to remain constant and the distance between waypoints is 160 nm.

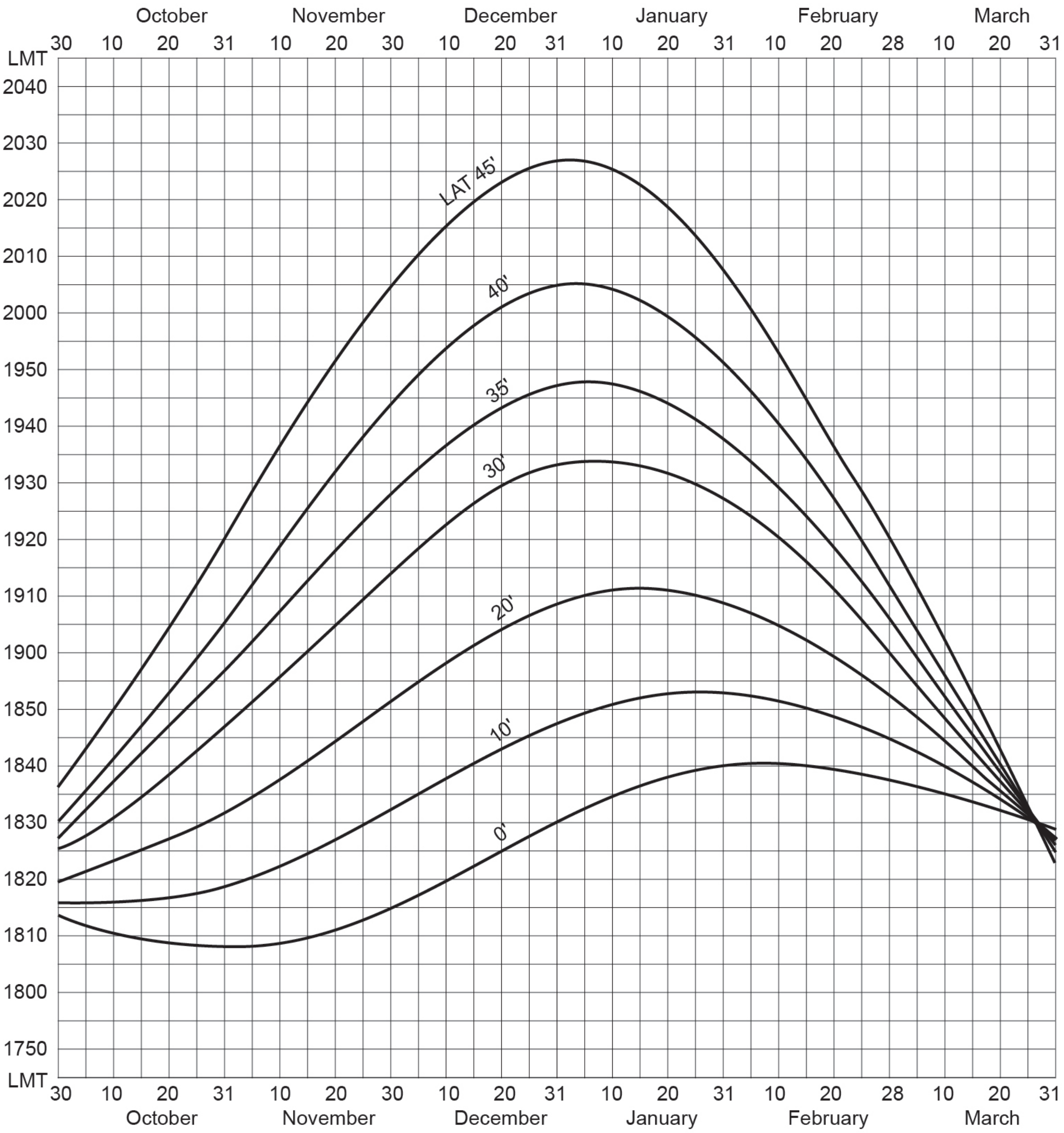
(a) Determine the planned ground speed. (1 mark)

(b) After 40 nm the pilot found that he was 4 nm south of track. Determine the required heading to track direct to the destination waypoint. Show **all** workings. (3 marks)

Question 27 **(3 marks)**

Using the End of daylight chart below, calculate last light in LMT on 10 February for Kalgoorlie (30° 45’S, 121° 30’E). Show **all** workings.

End of daylight



Question 28 **(3 marks)**

The following data apply to an aircraft:

- TAS 145 kt
- altitude 4500 ft
- fuel policy – fixed reserve 45 minutes
  – taxi fuel 5 litres
  – climb and descent requirements are to be ignored.

(a) Determine the ground speed of this aircraft if it flies 305 nm in 105 minutes. (1 mark)

(b) Given a total fuel on board prior to taxi of 185 litres and a fuel flow of 36 litres per hour, determine the safe endurance of this aircraft (in minutes). Show **all** workings. (2 marks)

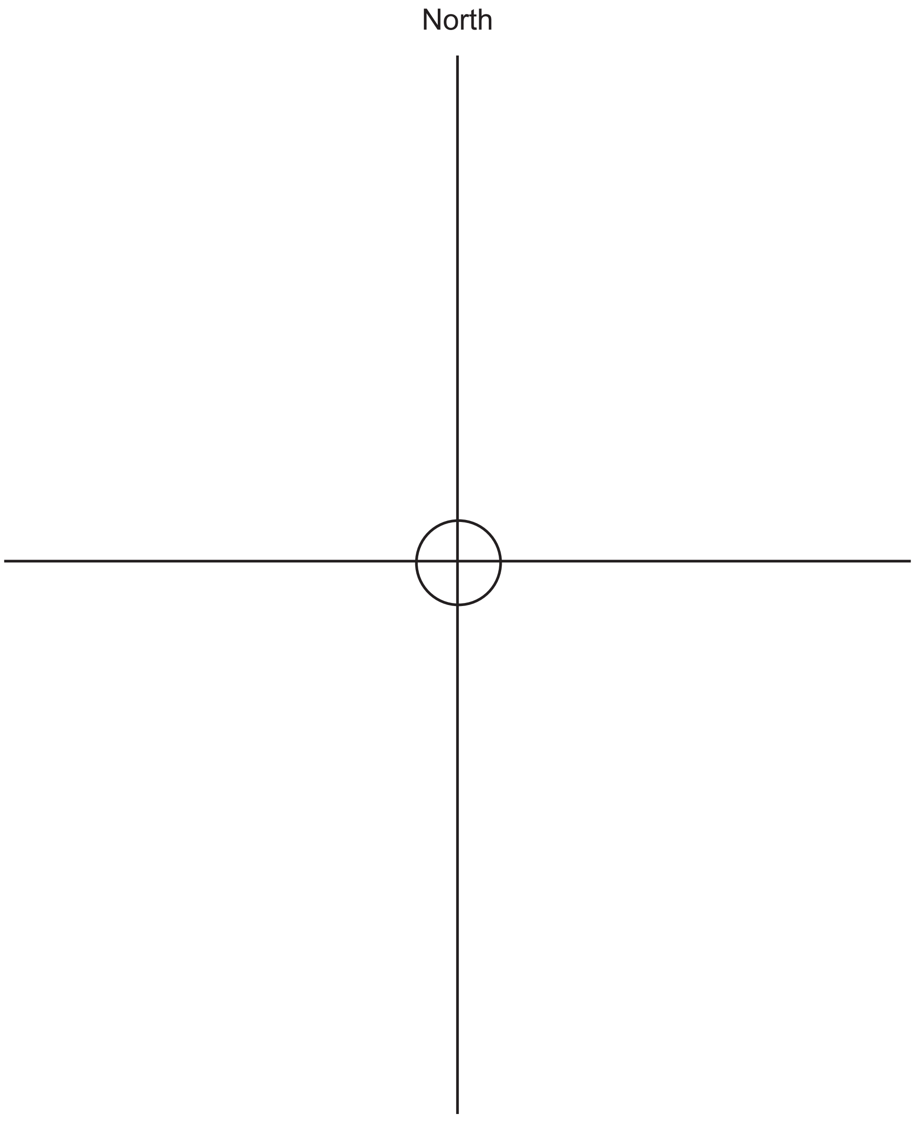
Question 29 **(2 marks)**

The following data apply to an aircraft:

- heading 090° M
- navigation instrumentation
  DME – 30 nm
- VOR information
  OBI 120
  flag shows TO
  CDI – centred.

Plot the aircraft's position and orientation as accurately as possible using your navigational plotter and WAC scale ruler on the basic orientation diagram below.

Note: Circle represents collocated VOR/DME.



Question 30 **(4 marks)**

Compare primary surveillance radar (PSR) to secondary surveillance radar (SSR) and state **two** advantages of each.

Primary radar – advantages

One: ____

____

Two: ____

____

Secondary radar – advantages

One: ____

____

Two: ____

____

Question 31 **(5 marks)**

(a) State **three** of the environmental conditions that would be required for the formation and continuance of an extensive dust storm in Central Australia. (3 marks)

One: ______________________________

Two: ______________________________

Three: ______________________________

(b) Explain how these three environmental conditions interact with each other to form and sustain the dust storm. (2 marks)

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____

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Question 32 **(4 marks)**

Use your flight computer to calculate and complete the following table.

TAS	Track magnetic	Winds magnetic	Angle of drift	Direction of drift	Heading	GS
115 kt	070°	125/25				

Question 33 **(11 marks)**

Using the information table below and the Take-off and Performance charts provided on pages 19–21, complete the following question parts that relate to a proposed flight in a Piper PA-32RT-300T Turbo Lance from Alpha to Bravo.

Conditions	Alpha	Bravo	En route	
Pressure height	2000 ft	500 ft	Distance	325 nm
Runway surface	Short dry grass	Bitumen	Cruise level	Alt 6500 ft
Runway slope	Nil	Nil	Fuel flow	13.7 gph
Take-off weight	1630 kg		Headwind	Nil
Temperature	20 °C	25 °C	OAT	0 °C
Wind	Nil	Nil	TAS	145 kt

(a) Determine the minimum take-off distance required at Alpha. Show **all** workings clearly on the appropriate chart. (2 marks)

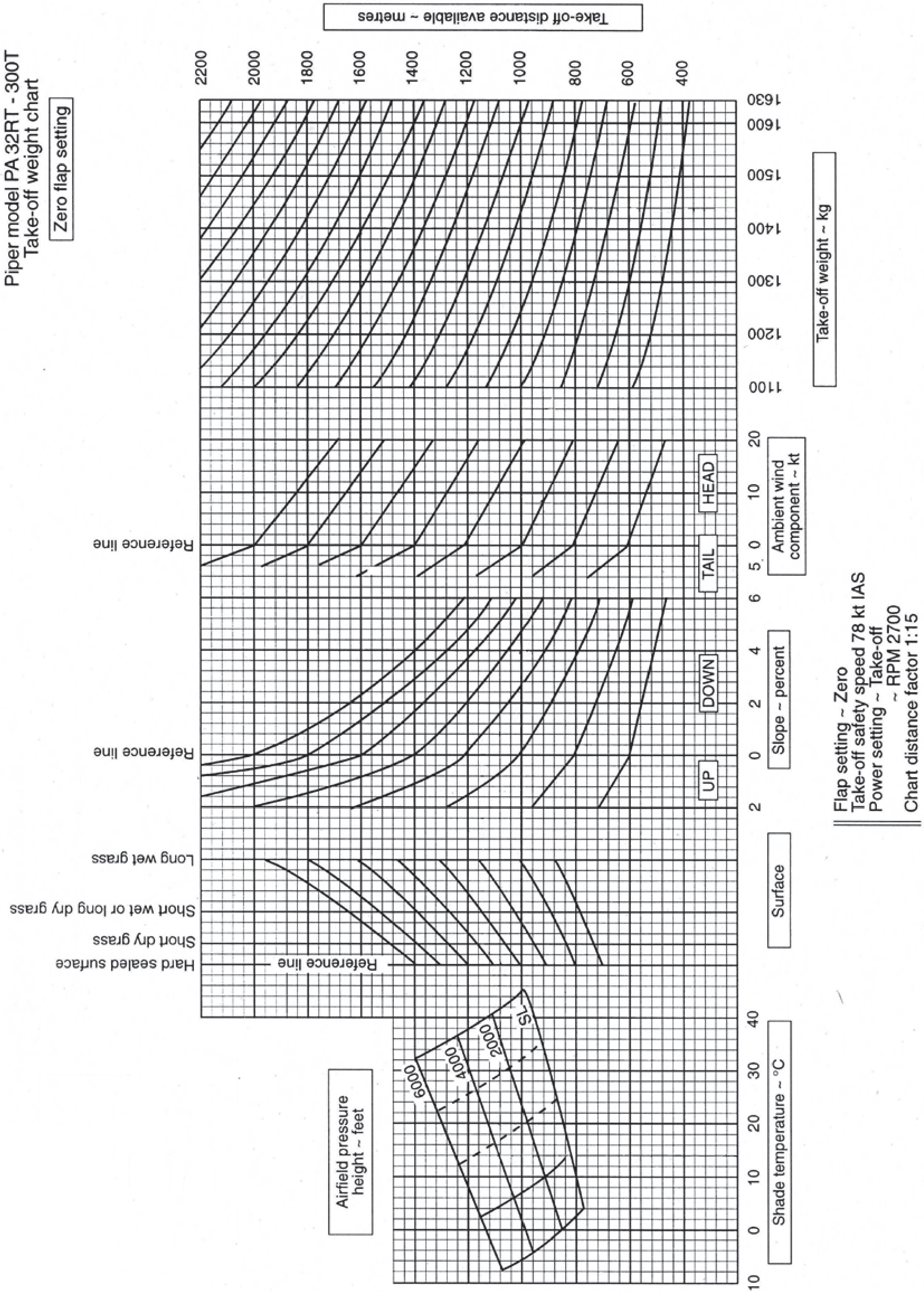
(b) Determine climb, cruise and descent data to complete the table below to find the

(i) total flight time

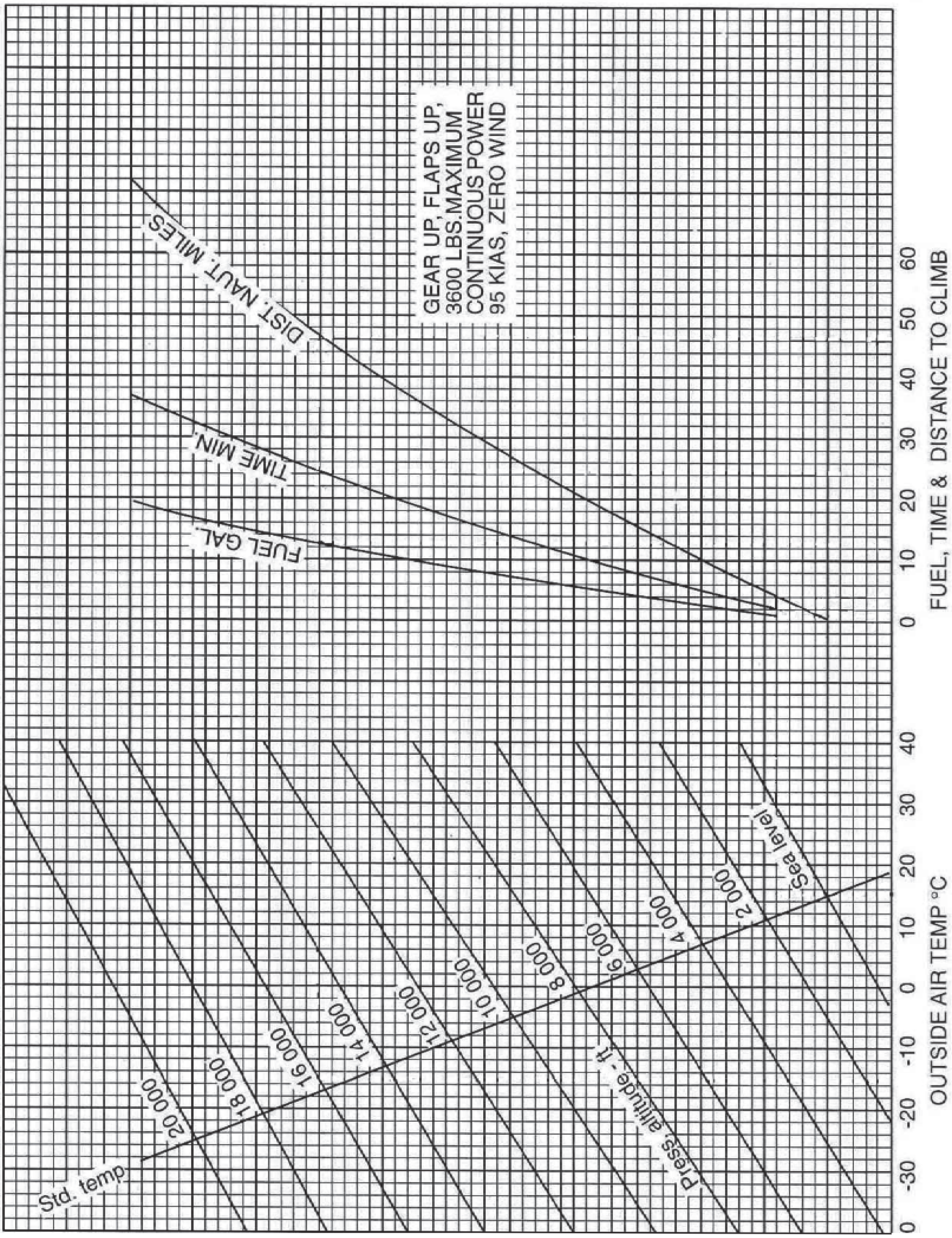
(ii) total flight fuel required, i.e. excluding reserves, taxi and unusable fuel.

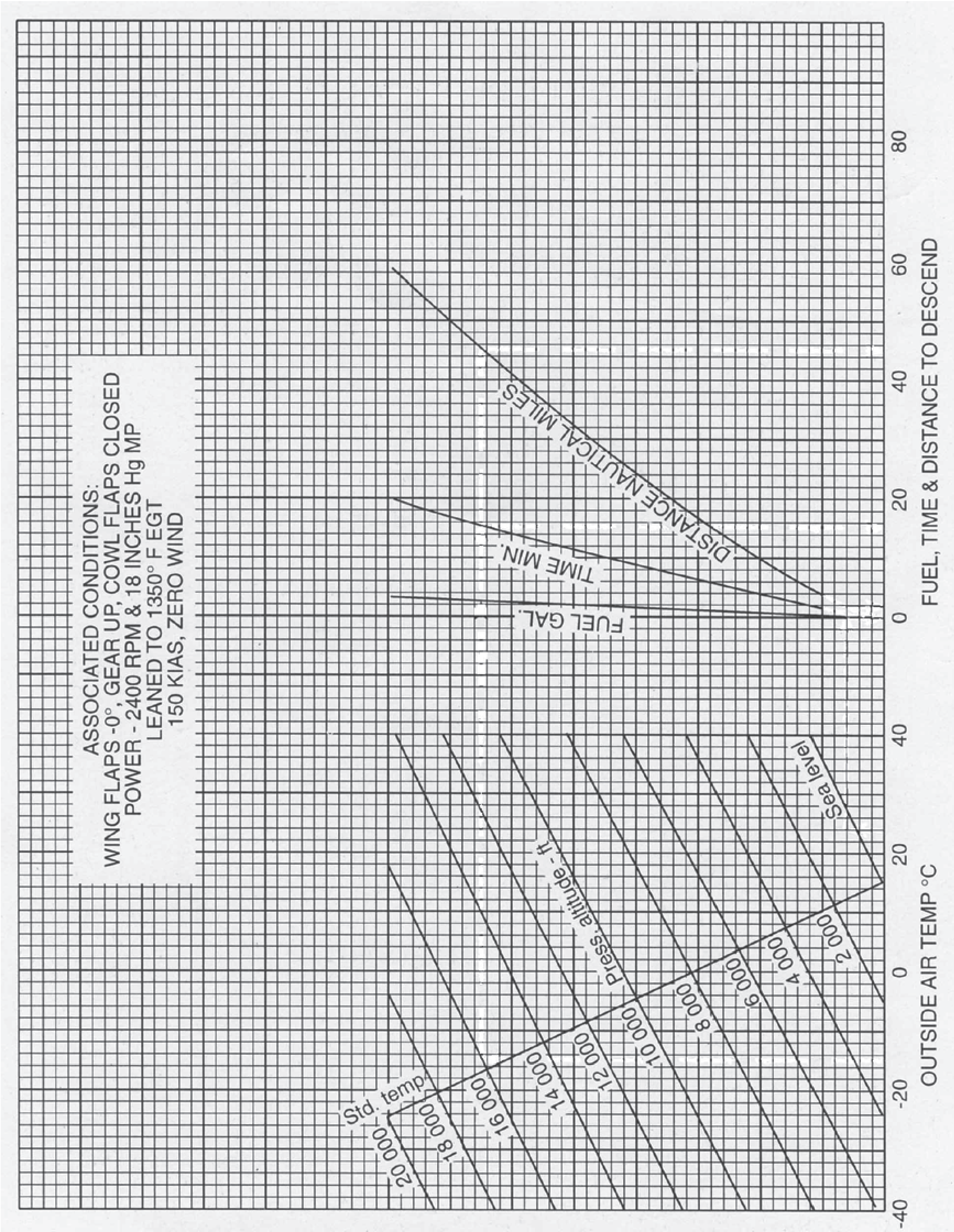
Ignore all winds in the climb, cruise and descent. Show **all** workings clearly on the appropriate charts. (9 marks)

	Climb	Cruise	Descent	Total
Fuel (gal)				
Time (min)				
Distance (nm)				325 nm


Piper model PA 32RT - 300T
Take-off weight chart
Zero flap setting
Take-off distance available ~ metres
2200
2000
1800
1600
1400
1200
1000
800
600
400
Take-off weight ~ kg
1630
1600
1500
1400
1300
1200
1100
Reference line
Ambient wind component ~ kt
TAIL
HEAD
5
0
10
20
Reference line
Slope ~ percent
UP
DOWN
2
0
2
4
6
Long wet grass
Short wet or long dry grass
Short dry grass
Hard sealed surface
Reference line
Surface
Airfield pressure height ~ feet
6000
4000
2000
SL
Shade temperature ~ °C
10
0
10
20
30
40
Flap setting ~ Zero
Take-off safety speed 78 kt IAS
Power setting ~ Take-off
~ RPM 2700
Chart distance factor 1:15

Question 33 (continued)




ASSOCIATED CONDITIONS:
WING FLAPS -0°, GEAR UP, COWL FLAPS CLOSED
POWER - 2400 RPM & 18 INCHES Hg MP
LEANED TO 1350° F EGT
150 KIAS, ZERO WIND
DISTANCE NAUTICAL MILES
TIME MIN.
FUEL GAL.
Press. altitude - ft
Std. temp.
Sea level
2 000
4 000
6 000
8 000
10 000
12 000
14 000
16 000
18 000
20 000
-40
-20
0
20
40
60
80
OUTSIDE AIR TEMP °C
FUEL, TIME & DISTANCE TO DESCEND

Question 34 **(21 marks)**

The pilot of a pressurised turboprop aircraft was operating an instrument flight rules (IFR) flight above the transition layer in G class airspace at flight level (FL) 150, using 1013 on the altimeter subscale, between Esperance (YESP) and Perth Airport (YPPH) in the southern part of Western Australia.

The forecast indicated that a cold front with an associated low pressure system of 983 hPa would be encountered en route to YPPH. In order to minimise the effect of strong winds, the pilot decided to descend the aircraft to 8000 ft. At this point Melbourne Centre advised the pilot that there was opposite direction traffic maintaining 10 000 ft on the area QNH and that their estimated time of passing was 1025 UTC. As this was only a few minutes away the pilot elected to halt the descent at FL110 and watch for the aircraft to pass underneath.

At 1025 UTC the opposite direction traffic passed underneath but the pilot was surprised to see the aircraft was only about 100 ft below. After passing, the aircraft recommenced descent to 8000 ft and continued the flight.

Soon afterwards, the pilot could see a line of thunderstorms that had formed across the track approximately at the location of the front. The pilot decided to try to pick a path through them. Unfortunately the storm cells grew faster than was anticipated while the aircraft was conducting this manoeuvre, thereby forcing it to penetrate one of the storms. As a result, the aircraft was significantly damaged.

After leaving the storm, the pilot reviewed the options and found that a continuation to YPPH was the most suitable and the aircraft landed without further incident.

(a) Given that the aircraft in this case study was flying at FL110 and the opposite direct traffic was flying at an altitude of 10 000 ft, explain why they passed with so little altitude between them. (2 marks)

(b) Identify **two** key threats and **two** key errors associated with all aspects of the descent from FL150 to A080. Give a reason for your answer for each threat and each error. (8 marks)

Threat one: ______________________________

Reason: ______________________________

____

Threat two: ______________________________

Reason: ______________________________

____

Error one: ______________________________

Reason: ______________________________

____

Error two: ______________________________

Reason: ______________________________

____

(c) What would be the **most** likely trigger for the thunderstorms experienced during this flight? (2 marks)

____

____

____

____

(d) With which season of the year would the weather conditions experienced on this flight be **most** commonly associated? (1 mark)

____

See next page

Question 34 (continued)

(e) Although the case study does not detail the damage received by the aircraft, outline **two** hazards that could have caused the damage. (4 marks)

One: ______________________________

____

____

____

Two: ______________________________

____

____

____

(f) What term would be used to describe the **most** applicable temperature lapse rate while the aircraft was inside the storm cell? State the amount of the lapse rate. (2 marks)

Term: ______________________________

Lapse rate amount: ______________________________

(g) The pilot had a valid ARFOR, TAF, TTF and METAR available for Perth Airport (YPPH). Immediately after leaving the storm, which forecast type would be the **most** appropriate to use for the arrival at YPPH? Give a reason your answer. (2 marks)

Forecast type: ______________________________

Reason: ______________________________

____

Question 35 **(7 marks)**

Weight and balance are important parameters for aircraft.

(a) Complete the table below for a Piper PA-32RT-300T Turbo Lance aircraft to show the weight, position of the centre of gravity and moment at zero fuel weight. (4 marks)

Position	Weight (lb)	Arm (in)	Moment (lb/in)
Aircraft	2335.8		195086
Front	340.0	85.5	
Centre	25.0	118.1	
Rear	340.0	157.6	
Forward baggage	unavailable	42.0	
Aft baggage	0	178.7	
Zero fuel weight			

(b) The aircraft is then loaded with 438 lb of fuel. Complete the table below to show the weight, position of the centre of gravity and moment for the aircraft at ramp prior to taxi. (3 marks)

Position	Weight (lb)	Arm (in)	Moment (lb/in)
Fuel		93.6	
Ramp weight			

Question 36 **(4 marks)**

State the **two** main factors affecting directional stability in an aircraft. State how each could increase directional stability.

One: ____________________

Increases directional stability by: ____________________

Two: ____________________

Increases directional stability by: ____________________

Question 37 **(3 marks)**

Threat and Error Management (TEM) forms a large part of the strategies adopted by the aviation industry globally to enhance safety. Using a scenario based example, explain how the application of TEM can be utilised pre-flight by a pilot.

Question 38 **(3 marks)**

Given a time of 1935 Local Mean Time (LMT) and a position of 32° 15’S 123° 20’E, use the Conversion of Arc to Time chart below to convert LMT to Coordinated Universal Time (UTC). Show **all** workings.

CONVERSION OF ARC TO TIME												
DEGREES							**MINUTES**					
	Time			**Time**				**Time**			**Time**	
Long Deg	**Hours**	**Min**	**Long Deg**	**Hours**	**Min**		**Long Min**	**Min**	**Sec**	**Long Min**	**Min**	**Sec**
110	7	20	140	9	20		0	0	00	30	2	00
111	7	24	141	9	24		1	0	04	31	2	04
112	7	28	142	9	28		2	0	08	32	2	08
113	7	32	143	9	32		3	0	12	33	2	12
114	7	36	144	9	36		4	0	16	34	2	16
115	7	40	145	9	40		5	0	20	35	2	20
116	7	44	146	9	44		6	0	24	36	2	24
117	7	48	147	9	48		7	0	28	37	2	28
118	7	52	148	9	52		8	0	32	38	2	32
119	7	56	149	9	56		9	0	36	39	2	36
120	8	00	150	10	00		10	0	40	40	2	40
121	8	04	151	10	04		11	0	44	41	2	44
122	8	08	152	10	08		12	0	48	42	2	48
123	8	12	153	10	12		13	0	52	43	2	52
124	8	16	154	10	16		14	0	56	44	2	56
125	8	20	155	10	20		15	1	00	45	3	00
126	8	24	156	10	24		16	1	04	46	3	04
127	8	28	157	10	28		17	1	08	47	3	08
128	8	32	158	10	32		18	1	12	48	3	12
129	8	36	159	10	36		19	1	16	49	3	16
130	8	40					20	1	20	50	3	20
131	8	44					21	1	24	51	3	24
132	8	48					22	1	28	52	3	28
133	8	52					23	1	32	53	3	32
134	8	56					24	1	36	54	3	36
135	9	00					25	1	40	55	3	40
136	9	04					26	1	44	56	3	44
137	9	08					27	1	48	57	3	48
138	9	12					28	1	52	58	3	52
139	9	16					29	1	56	59	3	56

Question 39 **(3 marks)**

Define Newton's Third Law and give an example to demonstrate its application in aviation. (Draw and label a diagram if it helps you to explain.)

Question 40 **(4 marks)**

If the term CAVOK was shown in the forecast for an aerodrome, what specific information would that indicate to a pilot?

Question 41 **(4 marks)**

Many low-cost carriers (LCCs) have been launched throughout the world in recent years: for example, Jetstar Airways, AirAsia and Tigerair.

The impact and success of these LCCs depends on a variety of market conditions. Outline **four** key components that would contribute to the ongoing success of a new LCC entering the market.

One:

Two:

Three:

Four:

Question 42 **(11 marks)**

An aircraft is loaded and balanced for flight at zero fuel weight (1) and for the take-off weight (1) as shown in the table below.

	Weight (lb)	**Arm (in)**	**Moment (lb/in)**
Zero fuel weight (1)	2950	92.8	273760
Take-off weight (1) Includes fuel 550 lb	3500	92.9	325150

A passenger has arrived with unexpected extra baggage that can only go in the aft baggage compartment.

(a) Using the formula provided, determine the maximum amount of baggage that could be added to the aft baggage compartment for both zero fuel weight and take-off weight to stay within the centre of gravity for both forward and aft limits. Show **all** workings. (4 marks)

$$\text{Weight to add} = \frac{\text{Gross weight x desired change of centre of gravity}}{\text{Distance between loading station and desired centre of gravity}}$$

The aft baggage centre of gravity position is 178.7 in.

Centre of gravity and maximum gross weight limitation as shown on the centre of gravity vs weight envelope apply. See page 31.

Zero fuel weight: ____

____

____

____

Take-off weight: ____

____

____

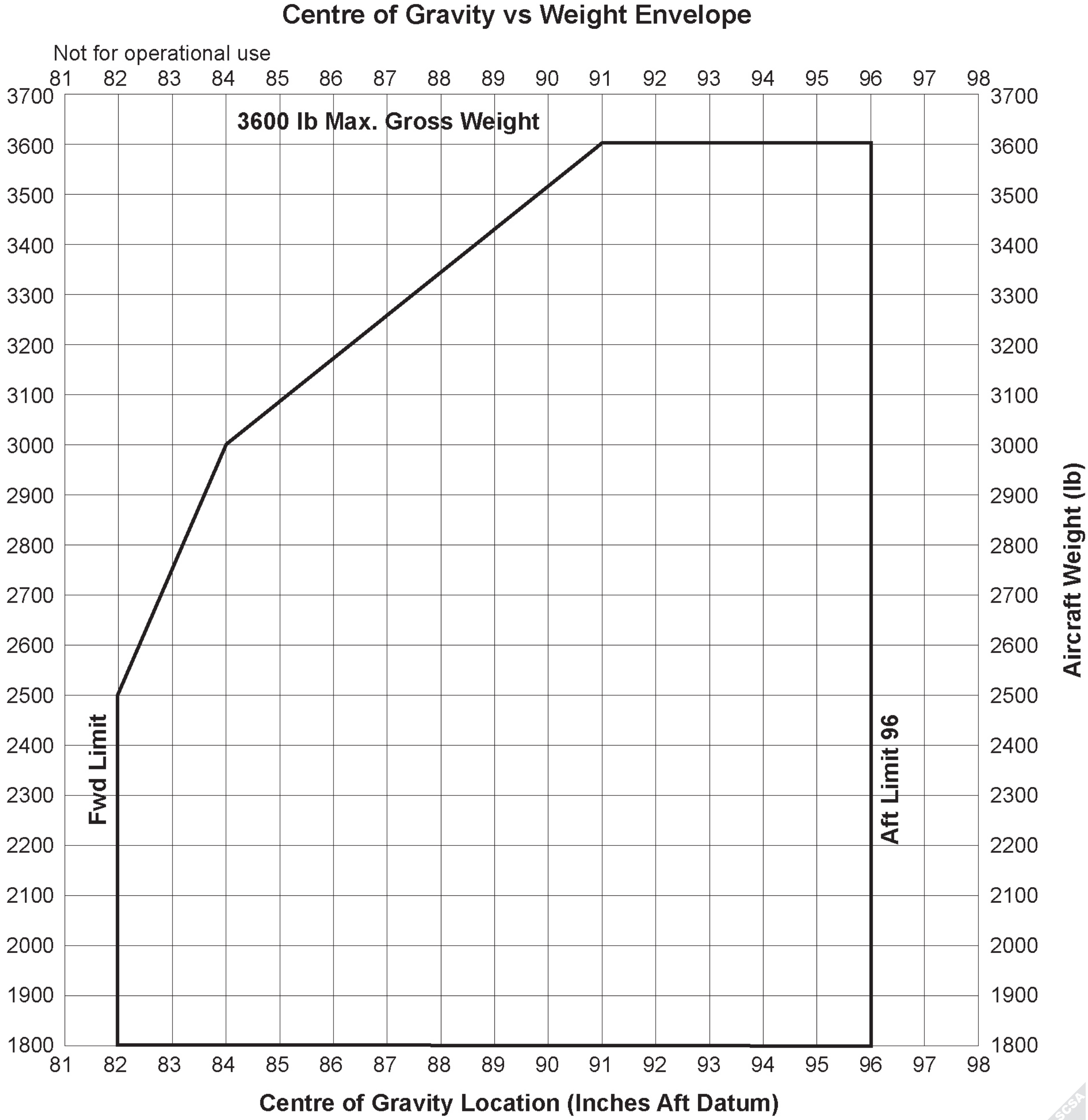
____

(b) Complete the new weights and centre of gravity positions for zero fuel weight (2) and take-off weight (2) based on your answers from part (a) above. (2 marks)

	Weight (lb)	**Arm (in)**	**Moment (lb/in)**
Aft baggage		178.7	
Zero fuel weight (2)			

Aft baggage		178.7	
Take-off weight (2)			

(c) Use the centre of gravity vs weight chart provided to plot and label both the zero fuel weight (2) and take-off weight (2) position. (2 marks)



(d) On the basis of your calculations and observations, determine the maximum baggage that can be added to the aircraft and still remain within **all** limitations. Explain your answer. (3 marks)

Maximum baggage that can be added: ____________________

Explanation: ____________________

____

____

____

End of questions

Supplementary page

Question number: ______________

Supplementary page

Question number: ____________

Supplementary page

Question number: ____________

Supplementary page

Question number: ____________

ACKNOWLEDGEMENTS

Question 25	Piper PA-32RT cruise performance chart from: Yeo, M., Bowers, G., & Bennett, K. (2001). *Handbook of flight* (2nd ed.). Perth: WestOne Services, p. 170. Not for operational purposes.
Question 27	End of daylight chart adapted from: Airservices Australia. (2016). *Aeronautical information publication Australia* (GEN 2.7 – 5). Canberra: Author. Retrieved May, 2016, from www.airservicesaustralia.com/aip/current/aip/general.pdf No part of this work may be reproduced in any form without the prior written consent of Airservices Australia.
Question 33	Piper PA-32RT take-off weight chart from: Yeo, M., Bowers, G., & Bennett, K. (2001). *Handbook of flight* (2nd ed.). Perth: WestOne Services, p. 147. Not for operational purposes. Piper PA-32RT fuel, time and distance to climb chart from: Yeo, M., Bowers, G., & Bennett, K. (2001). *Handbook of flight* (2nd ed.). Perth: WestOne Services, p. 169. Not for operational purposes. Piper PA-32RT fuel, time, and distance to descend chart from: Yeo, M., Bowers, G., & Bennett, K. (2001). *Handbook of flight* (2nd ed.). Perth: WestOne Services, p. 171. Not for operational purposes.
Question 38	Conversion of arc to time chart from: Airservices Australia. (2016). *Aeronautical information publication Australia* (GEN 2.7 – 7). Canberra: Author. Retrieved May, 2016, from www.airservicesaustralia.com/aip/current/aip/general.pdf No part of this work may be reproduced in any form without the prior written consent of Airservices Australia.

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