FLIGHT PLANNING EXAM 1 – WORKING

Boeing B727

Step 1.

ETA Mildura VOR	1730 UTC
- Fix Griffith VOR	1657 UTC
Time interval	33 minutes

Step 2. Distance Griffith Mildura 198 nm.

Step 3. Find Min Groundspeed required.

Set

Distance 198 nm

Time 33 min

Read Min GS 360 kt

Step 4. Find Head wind Comp (34 kt).

Step 5. Find Min TAS required.
GS required 360 + HWC 34 kt = Min TAS 394 kt.

Step 6. Find Min Mach No required.

Set OAT (-25C) on Mach index arrows.

Read M 0.646 opposite TAS 394 kt.

Answer 'e' is best.

Q 2.

Step 1. Refer B727 manual page 2-9.

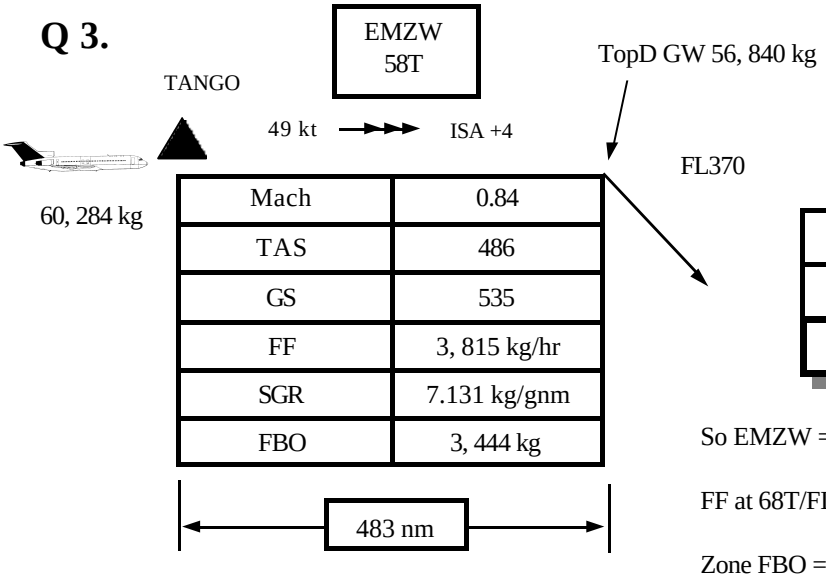
64, 000 kg

FL370 → **2, 650 kg**

Step 2. Find TopC GW.

BRW 64, 000 kg - 2, 650 kg = **61, 350 kg.** ***(Answer 'b' best)***

Q 3.



FLIGHT PROFILE

EMZW calculation.

Mach 0.84 SAR	10.3
TWC (49 x .02)	- 0.98
Approx SGR	**9.32**

So EMZW = 60, 284 kg - (241.5 x 9.32) = 58T

FF at 68T/FL370/M 0.84/ISA +4 = 3, 815 kg/hr.

Zone FBO = 483 nm x 7.131 kg/nm = 3, 444 kg.

So TopD GW = 60, 284 - 3, 444 kg = **56, 840 kg**

Answer 'a' best !

Q 4.

Step 1. Answers 'a', 'b', and 'c' are Easterly IFR Levels so reject these first.

Step 2. Refer B727 manual page 2-14.

FL	Optimum GW
350	67, 400 kg
Current GW	**68, 000 kg**
310	81, 600 kg

Step 3. Assess which levels optimum GW is closest to the current GW of 68, 000 kg. In this case FL350 is optimum FL at this weight.

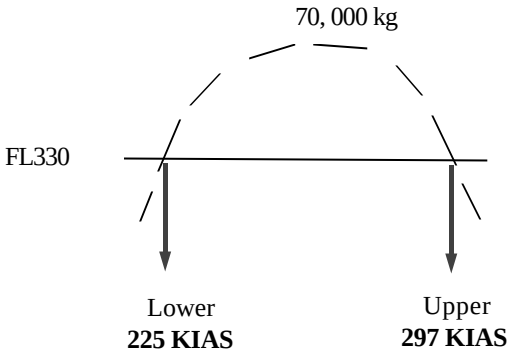
Answer 'd' best !

Q 5. Refer B727 manual page 2-14.

ISA +10

FL350/M 0.82 → ***70, 500 kg*** ***Answer 'e' best !***

Q 6. Refer B727 manual page 2-12.



Answer 'a' best !

Q 7.

Refer B727 manual page 4-3.
When using descent data CASA want you to round to the nearest 5, 000 kg (ie: 64, 999 = LW 60, 000, 65, 000 or higher round to LW 70, 000 kg). In this case use 70, 000 kg data.

FL	Time (min)	Dist (air nm)
370	24	124
Add for 30 kt TWC for 24 min		+12
	Total	**136 gnm**

Answer 'b' is best !

Q 8.

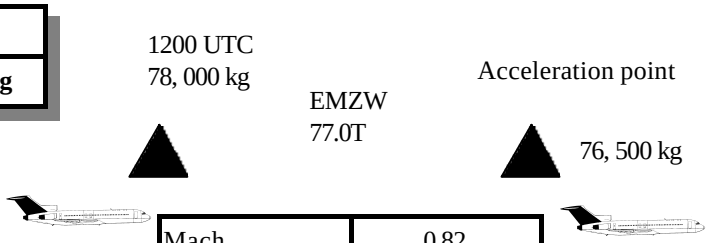
Step 1. Refer B727 manual page 2-14 for FL vs Mach/Temp/Acceleration GW. Find Max acceleration GW.

FL	Crz Schedule	ISA
330	0.84	**76, 500 kg**

Step 2. Find EMZW which is half way between current GW and acceleration weight. EMZW rounds to 77, 000 kg.

Step 3. Find SGR and divide it into the FBO required. This will define the position at which the aircraft can accelerate directly to M 0.84.

$$\frac{\text{1, 500 kg}}{8.804} = \text{170 nm}$$



Mach	0.82
TAS	477 kt
GS	537 kt
FF	4, 728 kg/hr
SGR	8.804
FBO required	1, 500 kg
Distance	**170 nm**

M 0.84

Answer 'b'

FLIGHT PROFILE

Q 9. Step 1. Refer to B727 manual page 3-106. Find ISA value for Mach 0.80/FL350.

FL	ISA temp (static air)	Mach 0.80
		TAT
350	-54C	-26C

Step 2. Ram Rise is difference between static ISA air temp, and the Mach 0.80 indicated temp. In this case 28 degreesC.

Answer 'a' best !

Q 10. Step 1. Refer to B727 manual page 1-17. Fuel policy, Normal ops Departure to Destination.

Item	**Fuel (kg)**
Flight fuel	9, 320
VR (10%)	932
FR	3, 300
Wx hold	2, 000
Traffic hold	1, 333
F/taxi	100
I/taxi	150
Min ramp FOB	**17, 135**

Answer 'a' best !

Q 11.

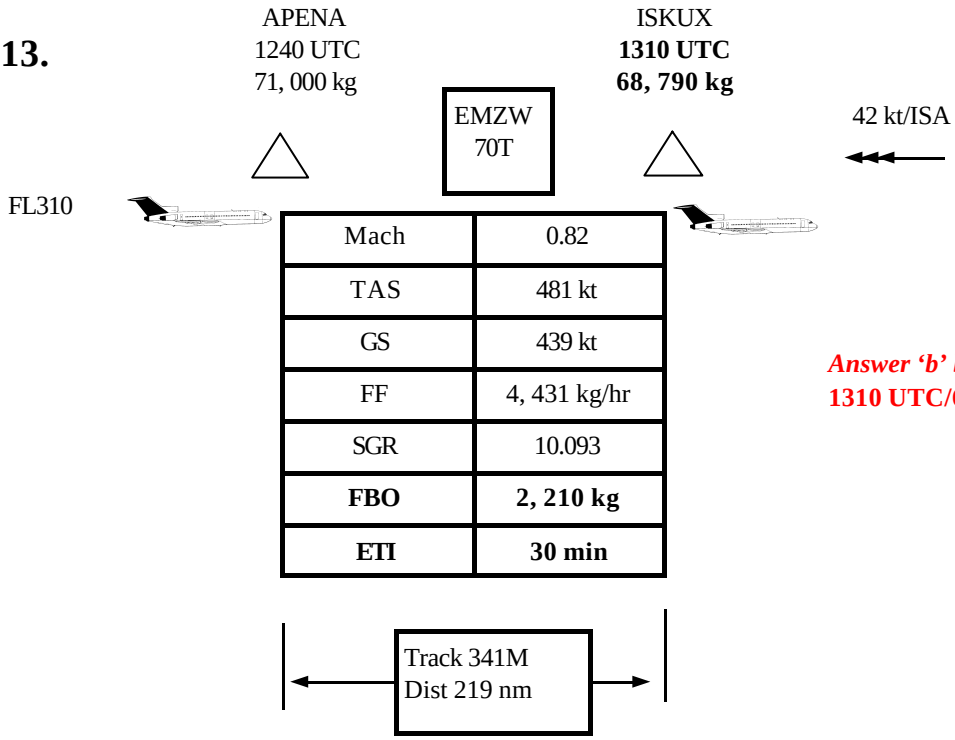
Step 1. Eliminate answers a, and e as they are Easterly IFR levels.
Step 2. Refer B727 manual page 2-14 (3 engine altitude capability table).

FL	**Mach No.**	**ISA +10C**	
FL350	0.80	72, 900 kg	NOT possible
FL310	0.80	82, 900 kg	Avialable
FL280	0.80	88, 550 kg	Available

Flight Level 310 is the highest IFR level available. ***Answer 'd' best.***

Q 12. Refer B727 manual page 1-3, yaw damper limits. FL290 **max KIAS 280 kt.** ***Answer 'b' best !***

Q 13.

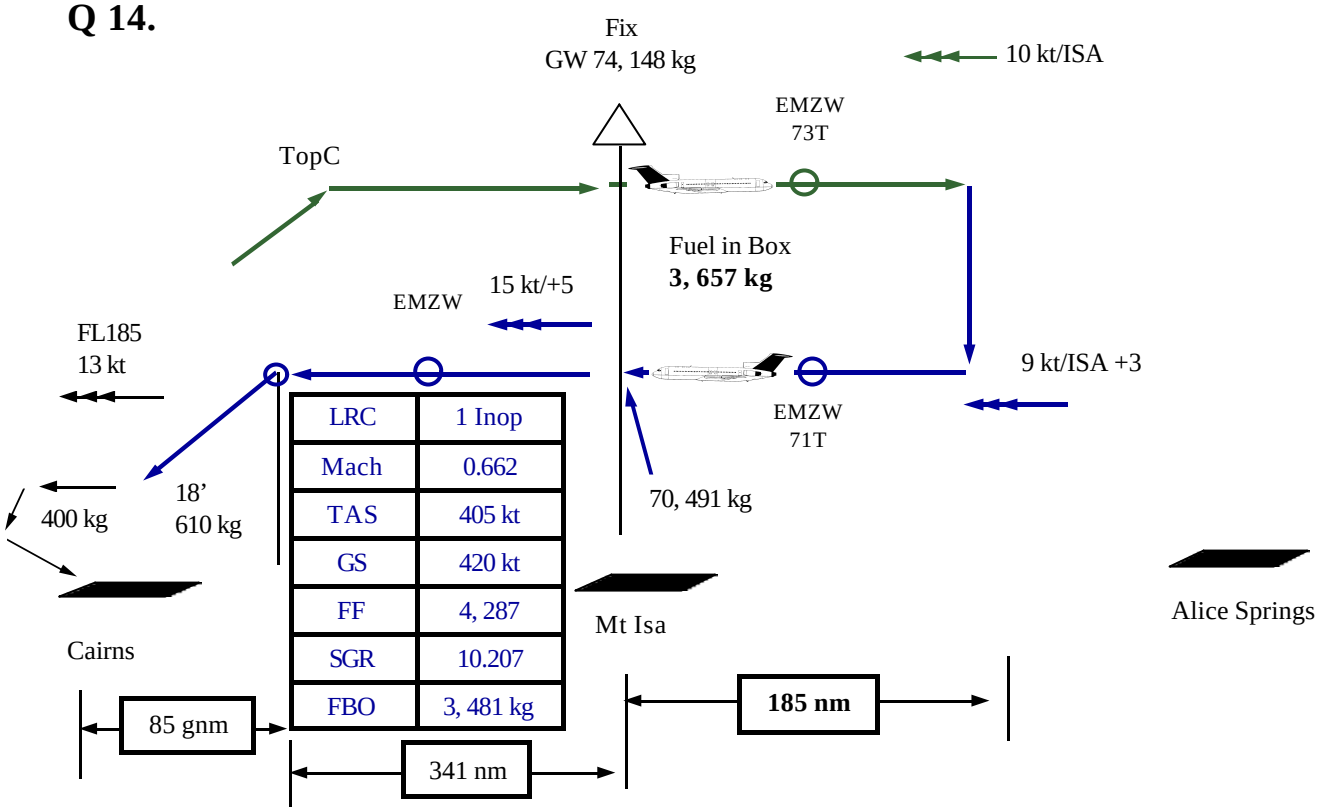


Mach	0.82
TAS	481 kt
GS	439 kt
FF	4, 431 kg/hr
SGR	10.093
FBO	**2, 210 kg**
ETI	**30 min**

Answer 'b' best !
1310 UTC/68, 800 kg

FLIGHT PROFILE

Q 14.



FLIGHT PROFILE

Step 1. FOB at BR is 17, 150 kg (at ramp) - 150 kg = 17, 000 kg.

Step 2. Calculate fuel available for FLIGHT.

FOB at BR	17, 000 kg
FR 1 Inop	1, 500 kg
Final taxi	100 kg
110 % fuel avail	15, 400 kg
100% fuel avail	**14, 000 kg**

Step 3. Find LW Cairns.
BR 80, 000 kg - flight fuel 14, 000 kg = 66, 000 kg.

Step 4. Find descent data FL230.

LW 66, 000 kg + APP 400 + Descent 610 = 67, 010 kg.

Step 5. Find 1 Inop cruise data from Mt Isa to TopD.
(refer profile above)

Step 6. Find GW o/head Mt Isa at end of 'BOX'.

Step 7. Find Fuel in BOX.
GW at Fix 74, 148 kg - 70, 440 kg = 3, 657 kg.

Step 8. Find EMZW OUT and BACK by dividing the Fuel in the BOX by 4.

Step 9. Find data OUT Normal Ops/FL310, and data home 1 Eng Inop FL230. (refer next page)

Data OUT Normal Ops.

Mach	.79
TAS	463 kt
GS	453 kt
FF	4, 272
SGR	9.430

Data HOME 1 Eng Inoperative.

LRC	1 Inop
Mach	.672
TAS	410 kt
GS	419 kt
FF	4, 378
SGR	10.471

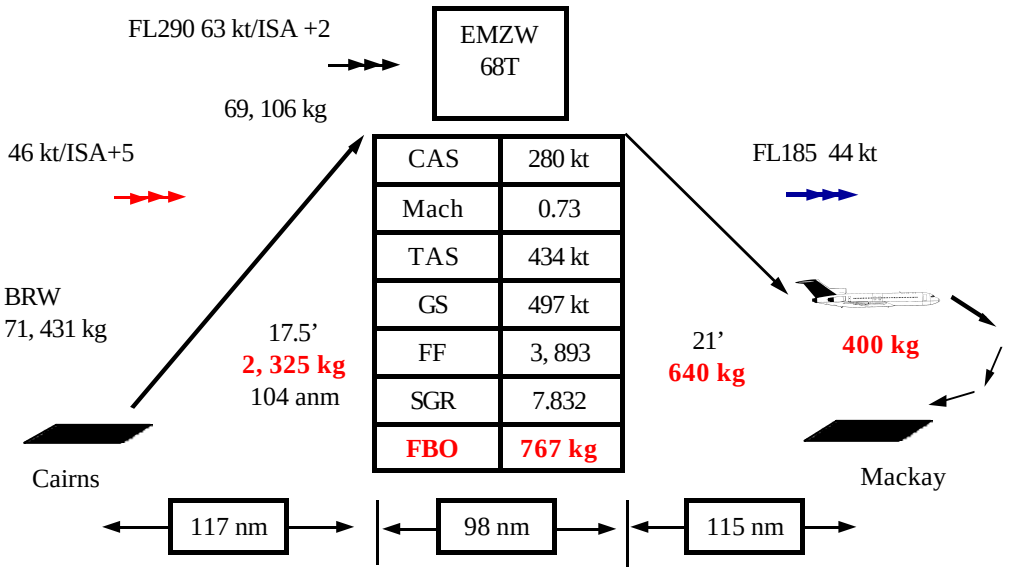
Step 10. Find length of BOX.

$$\frac{\text{Fuel in BOX}}{\text{SGR OUT + SGR Home}} = \frac{3,657 \text{ kg}}{9.430 + 10.471} =$$

183 nm past Mt Isa
Answer 'd' best.

1. We do NOT care what the weather is like at Alice Springs or Mt Isa if we are planning to return to Cairns following the loss of an engine, which is the scenario this PNR is based on. It is Cairns weather that will effect our operation in this case.
2. Watch out for distance from Bibhoora VOR to Cairns - it is NOT shown on ERC chart ... refer TAC chart.

Q 15.



FLIGHT PROFILE

Continued on next page !

- Refer page 1-3 for max speed/FL info. FL290 available IFR.
- Refer page 5-25 for yaw damper FF data.
- Use nav computer to get Mach No., then TAS from it.

Fuel Summary

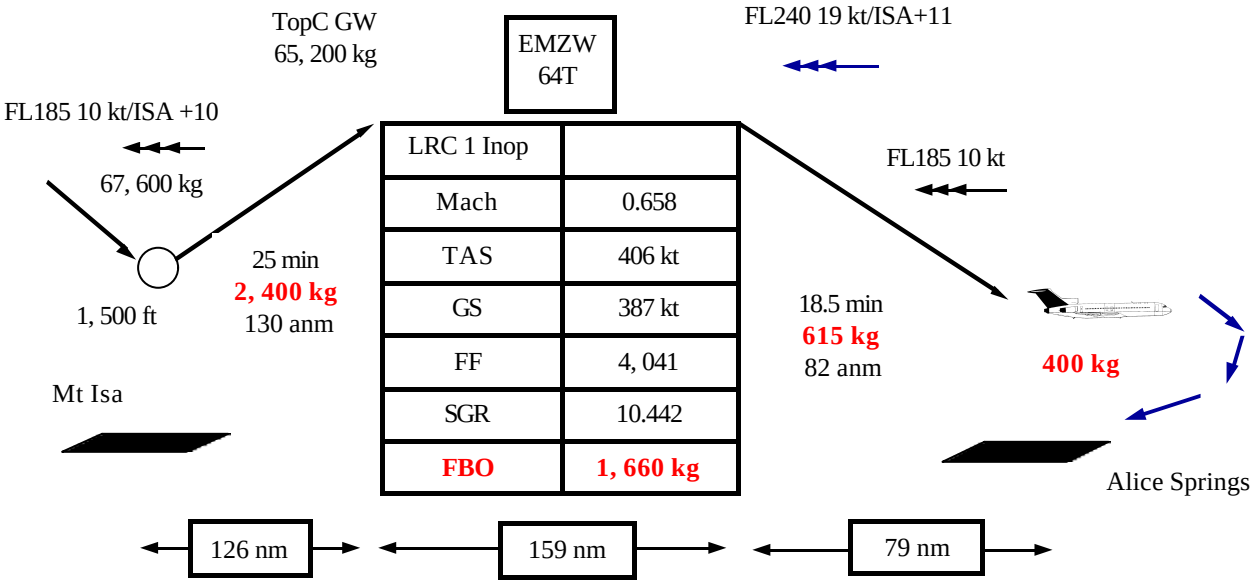
Item	Kg
Flight Fuel	4, 132
VR	413
FR	3, 300
Taxi OUT	150
Taxi IN	100
Min FOB at ramp	**8, 095 kg**

Answer 'a' best !

Q 16.

Note:

- The climb tables are based on a BRW, NOT a weight at 1, 500 ft as you will likely be given in an exam question. Add 400 kg to the 1, 500 ft GW to get an "as if" BRW. In this case BRW would be 68, 000 kg.
- Use normal ops climb data, then reduce this by the climb from RWY to 1, 500 ft. Then add the 1 Eng Inop penalty from page 2-2a.
- FR now 1, 500 kg for 1 Inop, and no final taxi fuel required as we are in flight at the fix.



FLIGHT PROFILE

Refer next page for working.

Step 1. Climb data 68, 000 kg/ISA +10

Step 2. Find descent data at approx LW of 60, 000 kg.

N/ops 0-FL240	13'/1, 800 kg/70 anm
Less 0-1, 500 ft	2'/400 kg/0 anm
N/ops 1, 500-FL240	11'/1, 400 kg/70 anm
Plus 1 Inop penalty	14'/1, 000 kg/60 anm
1 Inop climb 1, 500-FL240	25'/2, 400 kg/130 anm

18.5 min/615 kg/82 anm
HWC of 10 kt reduces descent distance to 79 gnm.

TWC adds 4 nm to give 126 gnm.

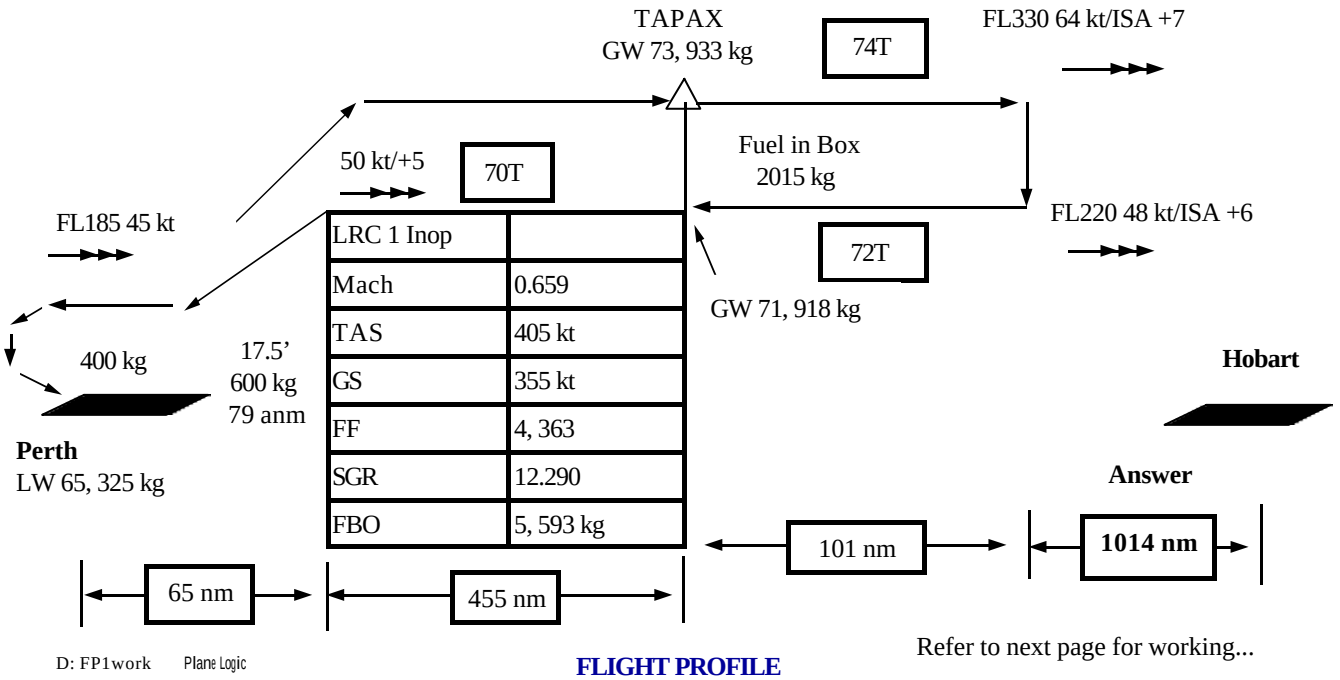
Step 3. Cruise distance is 159 gnm.
Refer flight profile data for 1 Eng Inop cruise.

Fuel Summary

Item	Kg
Flight Fuel	5, 075
VR	508
FR	1, 500
Wx Hold YPAS	2, 000
Traffic Hold YPAS	NIL
Taxi IN	NIL
Min FOB at ramp	**9, 083 kg**

Answer 'a' is best !

Q 17.



FLIGHT PROFILE

Refer to next page for working...

Q 17 continued ...

Step 1. FOB at BR Perth is 19, 893 kg - Taxi Out 150 kg = 19, 743 kg.

Step 2. Calculate flight fuel.

Item	Kg
FOB at BR	19, 743
FR 1 Inop	1, 500
Perth Wx hold	2, 000
Final taxi	100
110 % fuel	16, 143 kg
100% fight fuel	**14, 675 kg**

Step 3. LW Perth = BR 80, 000 - flight fuel 14, 675 kg = 65, 325 kg.

Step 4. Find descent data (page 4-3) FL 220/70, 000 kg. 17.5 min/600 kg/79 anm/65 gnm.

Step 5. Find TopD GW.
LW 65, 325 kg + 400 + 600 = 66, 325 kg.

Step 6. Find EMZW TopD to below TAPAX, then calculate the cruise data for this zone. It is 5, 593 kg.

Step 7. GW at end of box below TAPAX is
TopD GW of 66, 325 kg + 5, 593 kg = 71, 918 kg.

Step 8. Find fuel in box starting at TAPAX.
TAPAX GW 73, 933 kg - GW below TAPAX 71, 918 kg = 2, 015 kg.

Step 9. Find EMZW's OUT/HOME.

Step 10. Data OUT Normal ops, and HOME 1 Eng Inop.

Data OUT

Mach	0.80
TAS	472 kt
GS	536 kt
FF	4, 415 kg/hr
SGR	8.236

Data HOME

LRC 1 Inop	
Mach	0.665
TAS	410 kt
GS	362 kt
FF	4, 509 kg/hr
SGR	12.456

Step 11. Find length of box.

$$\frac{\text{Fuel in Box}}{\text{SGR OUT + HOME}} = \frac{\text{2, 105 kg}}{\text{8.236 + 12.456}} =$$ 101 nm past TAPAX, which is **1014 nm from Hobart.**

Answer 'e' is best !

Q 18. Refer to page 1-22 for fuel dumping rates, and page 2-2a for 1 Inop climb penalty data.

Step 1. Using BRW given, get climb data.

N/ops 0-10, 000 ft	6'/1, 000 kg
Less 0-1, 500 ft	3'/450 kg
N/ops 1, 500-10, 000 ft	3'/550 kg
Plus 1 Inop penalty	6'/500 kg
1 Inop climb 1500-10, 000 ft	**9'/1, 050 kg**

Step 2. ETA at TopC 1309 UTC/GW at TopC 74, 450 kg.

Step 3. Fuel to dump is 74, 450 - 73, 500 kg = 1, 050 kg
= 1 minute. **So ETA to start approach is 1310 UTC.** ***Answer 'c' best !***

Q 19. Refer B727 manual page 4-4.

70, 000 kg

FL250 1230 kg/Eng/Hr @ ISA

So 3 Eng FF @ ISA is 3, 690 kg/hr.
Correct for ISA-5 by reducing FF by 1%.
ISA-5 FF in racetrack pattern is 3, 653 kg/hr. ***Answer d best !***

Q 20.

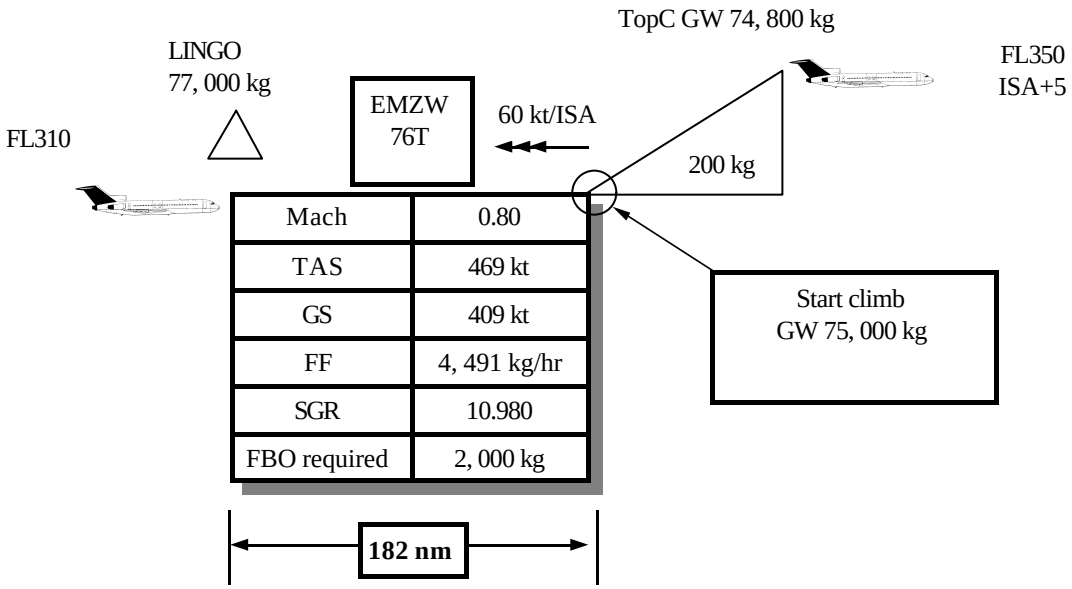
Step 1. Refer B727 manual page 2-14 an find maximum arrival weight at FL350/Mach 0.80 in ISA+5 conditions is 74, 800 kg.

Step 2. Add 50 kg per 1, 000 ft climbed to get start of step climb GW. In this case 74, 800 + 200 kg = 75, 000 kg.

Step 3. Find FBO required before the start can be commenced. (ie: 77, 000 kg - 75, 000 kg = 2, 000 kg.

Step 4. Find EMZW. It is half way between GW at LINGO and Start climb weight. EMZW is 76, 000 kg.

Step 5. Find cruise data to get SGR, then divide the FBO required of 2, 000 by the SGR. This gives distance to step climb position. (Refer flight profile below). Step climb position **is 182 nm.** ***Answer 'd' best !***



FLIGHT PROFILE

Note well: You may disregard distance and any time lost in the climb.

Boeing B727

END OF WORKING FILE 1.