

QUESTIONS (AND ANSWERS)

QA

AIR LAW

1. An aircraft overtaking another in flight must pass to which side?
2. An aircraft's vertical position with the altimeter set to 1013.2 mb (29.92") is reported as what?
3. The Transition Altitude is that at or below which vertical position is controlled by reference to what?
4. What is the minimum radio equipment for Class D airspace?
5. Who is responsible for the safe conduct of a VFR flight?
6. What is an FIR?
7. What is a Control Zone?
8. Is an airway a Control Zone or a Control Area?
9. How is separation provided?
10. What is the minimum time for filing a flight plan?
11. What is a visual contact approach?
12. On what occasions would you consider diversion?
13. What qualification is required for IFR flight in controlled airspace?
14. In IMC at FL 90, what should your magnetic track be?
15. What altimeter setting should be used for terrain clearance en route?
16. When is smoking not allowed in an aircraft?
17. What is the normal circuit direction?
18. What action must be taken to make your licence valid upon receipt?
19. To what side of a line feature should you fly when following it?
20. A flying machine overtaking another while taxiing must do so on which side?
21. Why?
22. For aircraft departing from the same runway and following the same track to use a separation of 2 minutes, the first aircraft has to be how many knots (TAS) faster than the following one?
23. If TORA is 2000 m, ASDA is 2300 m, TODA is 2300 m and LDA is 2000 m, does the runway have a displaced threshold, a stopway, a clearway, or a stopway and clearway?

24. What are the maximum copies outbound for a General Declaration?
25. When departing from a controlled aerodrome in IMC, when are you supposed to call departure control?
26. An obstacle required to be marked near an aerodrome where night operations are carried out is 180 m high. How is it to be marked?
27. Annex 13 of the Chicago Convention relates to what?
28. On a VFR flight approaching an aerodrome, you observe a steady red signal. What does this indicate?
29. Radar-separation between two Heavy aircraft on final should be at least what?
30. The five freedoms of the air deal with the exchange of commercial rights in international civil aviation. Which one is the "privilege to undertake technical (non-commercial) landings in the territory of another state"?
31. Which part of JAR-FCL refers to medical requirements?
32. What licence, as a minimum, do you need to act as a co-pilot in commercial air transportation?
33. During flight, information on navaid serviceability is a part of which service?
34. A contracting State shall take measures for the safety of passengers subject to an act of unlawful interference until when?
35. At night you see the white navigation lights of an aircraft about 3 nm ahead whose range is decreasing. What should you do?
36. The JAR-FCL licence is issued for a maximum period of how long?
37. The obligation of an operator taking passengers from a contracting state shall terminate when they have been definitely admitted into another - True or False?
38. If an arriving aircraft is making a straight in approach, a departing one may take off in any direction which differs by at least 45° from the reciprocal of the direction of approach, if the takeoff will be made at least how many minutes before the arriving is estimated to be over the instrument runway?
39. Whenever AIS information is operationally significant, temporary and of short duration it will be issued as what?
40. The height of registration marks on the fuselage shall be at least how high?
41. Who is responsible for the establishment of a national security program?
42. If a minimum descent height is established for an approach, what kind of approach is it?
43. A one-minute separation between departing aircraft requires how many degrees in a turn immediately after departure?

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44. Following the Chicago Convention and ratification by 26 states, ICAO came into being on 4th April of what year?
45. To avoid confusion, the re-use of identification numbers if a P, R or D-area is cancelled, shall not be done within what time period?
46. When an aircraft subject to an act of unlawful interference must depart from its assigned track or level, the PIC must do what?
47. What signal means "grave and imminent danger threatens, and immediate assistance is requested"?
48. A Cat I precision approach runway uses a decision height not lower than what?
49. The objectives of ICAO were ratified at which conference?
50. Which States can join JAA as members?
51. A Class 1 medical certificate for a 44 year old of age is valid for how long?
52. The governing body of ICAO, elected for 3 years from 33 states is called what?
53. What is the body of ICAO composed of representatives from States?
54. Special VFR normally only applies in control zones. True or False?
55. What is "an airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times"?
56. How many stripes are there in the threshold marking of a 45 m wide runway?
57. How long is a Class 2 medical certificate for a 44-year old valid for?
58. You are on an IFR flight in controlled airspace and are advised that radar service is terminated. What is your action?
59. An entry in a licence stating special conditions, privileges or limitations pertaining to that licence is the definition of what?
60. A licence holder shall, without undue delay, seek the advice of the appropriate authority when becoming aware of a decrease in medical fitness. An example is: "Any illness involving incapacity to function as a member of a flight crew throughout a period of ...?"
61. In an aerodrome circuit, a red flashing light from the Tower means what?
62. Which Annex contains information about aircrew licensing?
63. Who is responsible for determining the Transition Level?
64. The convention dealing with "Damage caused by foreign aircraft to third parties on the surface" was held in 1952 in what city?
65. When does night exist?
66. With no SSR, when is the radar identity of a departing aircraft established?
67. If an aircraft is subject to an unlawful interference, what must the State do?

68. In Annex 8, airworthiness limitations include what loading limitations?
69. What are the three states of frozen water reported by an ATC Unit?
70. On a straight-in approach, departing aircraft may take off in any direction how many minutes before the arriving is estimated to be over the instrument runway?
71. What does OIS mean?
72. A report from an aircraft in flight prepared under requirements for position, and operational and/or meteorological reporting is what?
73. The State of occurrence shall forward a notification of an accident with a minimum of delay to whom?
74. A flight plan shall be submitted at least how long before departure?
75. When an aircraft is no longer airworthy, it can get permission to fly without fare-paying passengers to an aerodrome where it can be restored to an airworthy condition. Who can grant such permission?
76. What do nationality and registration marks consist of?
77. Type ratings shall be established for what types?
78. What is a strayed aircraft?
79. Whenever unlawful interference with an aircraft is suspected, and where automatic distinct display of SSR mode A codes 7500 and 7700 is not provided, the radar controller shall attempt to verify his suspicion by setting the SSR decoder to what?
80. If two aircraft in flight are well separated but on a collision course, the aircraft with the other on its left should do what?
81. Who is responsible for determining the Transition Altitude?
82. What is the difference between Transition Level and Altitude?
83. For a Category B aircraft, the V_{AT} is what?
84. On the manoeuvring area, emergency vehicles shall be given priority over aircraft landing and taking off - true or false?
85. In a CTZ, ATC provides vertical or horizontal separation between what flights?
86. What is the third item in a position report?
87. What is the tolerance value that determines that Mode-C derived level information displayed to the controller is accurate?
88. A service with the object "to ensure the flow of information necessary for the safety, regularity and efficiency of international air navigation" is called what?
89. What colour are runway markings?
90. What does ICAO Annex 9 concern itself with?

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91. Where should the original C of A be at all times?
92. A national airport security program shall be established for what airports?
93. If mixing of passengers subject to security control and those who are not takes place after security control, what action shall the contracting State take?
94. What does a red parachute flare mean?
95. Is a licence holder obliged to seek the advice of the appropriate authority when subject to an illness involving incapacity to function as a member of a flight crew throughout a period of 18 days?
96. Which states can join ECAC as members?
97. What do you call the ICAO documents containing operational practices "that are beyond the scope of Standards and recommended Practices, but with respect to which a measure of international uniformity is desirable"?
98. How many hours multi-pilot time must an applicant for a JAR ATPL have?
99. How long is a Class 1 medical certificate for a 34 year old valid for?
100. For a VFR flight at FL 70 in Class B airspace, what is the demanded flight visibility and distance from cloud?
101. What is the VFR flight visibility VFR at FL 70 in Class D airspace?
102. During simultaneous parallel approaches, radar monitoring is not terminated until the aircraft is visually separated, or until when?
103. "The length of the take-off run available plus the length of the clearway if provided" is the definition of what?
104. What is regarded a significant change in the tailwind component for a controller to report it to an aircraft on final approach?
105. During descent, when is the latest you change from standard setting to QNH?
106. What are the letters in an ATS designator for area-nav routes, forming part of a regional network?
107. What is an area around an aerodrome, from ground level to a specified altitude within which an Air Traffic Control service is provided?
108. What is defined as "A control area or portion thereof established in the form of a corridor equipped with radio navigation aids"?
109. ATC provides separation between what types of flight in Class E airspace?
110. With QFE set, and waiting on the runway, what will your altimeter show?
111. If aircraft A is on a track of 070° and aircraft B is on 290°, what type of track is that?
112. Which part of the AIP concerns "Entry, transit and departure"?

113. Which Annex concerns the entry and departure procedures for passengers and their baggage into other States?
114. What are the aims and objectives of Annex 17 (Security)?
115. Who establishes the national security program?
116. One of the "Freedoms of the Air" contains the right to "fly across the territory of another State without landing". Which one is it?
117. How many Annexes are published by ICAO?
118. Among the 96 articles agreed upon at the Chicago conference was Article 7, dealing with Cabotage. What is the idea behind it?
119. ICAO was formed as a result of which convention?
120. What is the minimum flight time for the issue of the first type rating for a multi-pilot aeroplane?
121. What does a series of green flashes to an aircraft in flight mean?
122. If VFR is permitted above FL 195, a VFR flight on 185° magnetic track may select the next cruising level as FL 275, 300 or 280?
123. What is the signal to an unauthorized aircraft in or about to enter a R-, D- or P-area?
124. A red pyrotechnic from a control tower to a flying aircraft means what?
125. In the absence of ATC, what should your transponder code be?
126. If transition altitude is 3000' and the QNH is 990', what is the transition level?
127. What kind of Air Traffic service is provided in Class F airspace?
128. Flight information service is provided to all aircraft likely to be affected by the information and which are.....?
129. IFR and VFR flights are permitted, all flights are subject to ATC service and are separated from each other. What airspace are you in?
130. An SRA will normally terminate how far from touchdown?
131. What is a controller required to do before providing an aircraft with Air Traffic Control service based on radar information.
132. "Essential traffic information" is issued by ATC when?
133. What does the term "Resume own navigation" mean?
134. How efficient is braking action of 0.25 and below?
135. Aircraft A is maintaining FL 150 in Class C airspace. Aircraft B is at FL 140 requesting descent to FL 70. The area has severe turbulence. When can aircraft A expect descent to FL 140?
136. Which part of the AIP concerns declared distances?

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137. The aerodrome category for rescue and fire fighting is based on what information about the aircraft?
138. A Cat II precision approach is intended for operations under what conditions?
139. A contracting State which requires Cargo Manifests shall, apart from the information in the heading, not require more than what?
140. What is the reply from a surface craft meaning that it is able to comply with a request for assistance from another one in distress?
141. Who are "potentially disruptive passengers"?
142. Isolated parking positions shall be established for aircraft subject to unlawful interference. What is the minimum distance to other parked aircraft, buildings, etc?
143. Who determines the continuing airworthiness of an aircraft, under Annex 8?
144. An applicant for an ATPL must have completed in aeroplanes not less than hours of cross-country and hours PIC time?
145. What is the correct phrase if an intercepting aircraft wants you to follow it?
146. On an IFR flight, an emergency causes you to deviate. What should you do?
147. When should 2 min separation be applied between departing aircraft?
148. During radar approach, the controller should order a missed approach if you are not visible for the last?
149. What is minimum separation between departing aircraft when the proceeding medium is performing an intersection take off behind a heavy?
150. Is Special VFR possible without a radio receiver in the aircraft?
151. In what airspace would IFR and VFR flights receive FIS?
152. An aircraft is at the correct flight level within what limits?
153. What is the lowest limit of a control area?
154. To report unexpected very bad weather, what would you send?
155. What is required separation when utilising an NDB?
156. An aircraft is descending through the flight path of another, and there is no navaid available. What is the required separation?
157. If a runway is closed for one year, where should it be noted?
158. How are flight safety, air navigation and technically related changes be distributed?
159. What fire and rescue category is required for a DHC8-400 which is 30 metres long and 3 metres wide?
160. If a State refuses to receive a passenger, can the operator recover costs?
161. When should safeguards board the aircraft?

162. Who is responsible for initiating an accident investigation?
163. If person has committed, or is about to commit, an offence against an aircraft, what action may the commander take?
164. FIS shall include information on collision hazards to aircraft in what airspace?
165. What flights are Essential Traffic to each other?
166. After changing to a control unit, you are told that they have radar contact. This means?
167. A checklist of NOTAMS in force shall be issued at what maximum intervals?
168. Unaccompanied baggage carried by air shall be cleared under what procedure?
169. If bodyguards on an aeroplane are carrying guns, who is notified?
170. Who finalises SARPS?
171. If you have a CPL(A), what do you need to get night privileges?
172. If an aircraft is at FL 140, and another is at FL 130, starting descent to FL 60, when can the aircraft at FL 140 be cleared for descent?
173. If being radar vectored to an airway, what should you do if you receive the clearance "resume own navigation inbound"?
174. What is minimum radar separation between aircraft established on the localizer?
175. How far from the threshold is the fixed distance marking?
176. The obligation of a carrier to transport any person away from the territory of a contracting state terminates from when such a person has been definitely admitted in other contracting state of destination. True or False?
177. What does braking action "medium to poor" mean?
178. With a PPL(A) with a night qualification, or a CPL(A), what are the requirements for an IR(A)?
179. How long is an IR(A) valid for?
180. What is a skill test?
181. How many night hours do you need for an ATPL?
182. Multi-crew co-operation (MCC) for students on an ATP integrated course consists of 25 hours of theoretical knowledge instruction, and how many hours MCC training?
183. How long are instructor ratings valid for?
184. How many instrument and night hours do you need for a CPL(A)?
185. If an aircraft wishes to divert a surface craft towards another in distress, the first action is what?

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186. The general procedure if two-way communication have failed in IMC is to maintain the last assigned speed and level (or minimum altitude, if higher) for how long following the aircraft's failure to report its position?

187. What is wake turbulence separation time with a Medium behind a Heavy?

188. On arrival in a Contracting State, if a passenger holds a valid passport and no visa is required, should the Contracting State require any more paperwork?

189. On intercepting a distress transmission, what should your first action be?

190. During radar vectoring for independent parallel ILS operations, what is the minimum separation allowed until both aircraft are established on each ILS?

191. What does the designator UR 15 mean?

192. Can radar separation minima be reduced to 3 nm?

193. What is the flight visibility and distance from cloud when VFR in Class C airspace at or above FL100?

194. A heavy aircraft has a maximum take-off mass of more than what?

195. An ATC clearance is authority for an aircraft to what extent?

196. What is the name for a taxiway connected to a runway at an acute angle, designed to allow aeroplanes to turn off at higher speeds than can be achieved on other exits, thus minimising runway occupancy time?

197. What is the width of a taxiway with the code letter D, based on an aircraft with a outer main gear wheel span of less than 9 m?

198. Under radar vectoring, the responsibility for terrain clearance is with whom?

199. Changeover points are at route segments of how long?

200. How high should transition altitude above an aerodrome be?

201. How is a 180m high obstacle near an aerodrome at night marked?

202. What documentation do people need when arriving in a State by air?

203. What is a Crew Member's Certificate (CMC) used for?

204. For how long every day must SAR facilities be provided?

205. Having intercepted a distress call and passed the information to ATC, what is your next action when asked to standby?

206. If 25% of the runway is covered with standing water, how would you expect ATC to describe it?

207. For two aeroplanes departing from the same runway on the same track, what separation must be applied if the second intends to climb through the level of the preceding one?

208. When would you expect to be given the QNH?

209. When does the Flight Data Recorder start running?
210. When must the CVR on a 50-seat turbo prop begin recording?
211. Name some components of a CVR.
212. What is currency for an aircraft commander?
213. What is the maximum time a twin can be from an airfield?
214. If you see a signal for distress at night, what should you do?
215. What should you do if you have to deviate from an ATC instruction?
216. Above FL 410 and going against the NAT track system, what is your action?
217. When is simulated instrument flight permitted?
218. What kind of signal is repeated switching on & off of landing lights?
219. To act as co-pilot for take off or landing, you must have done what?
220. What does a FDR record when combined with a CVR?
221. What does a CVR record?
222. What is the minimum separation, if vertical separation does not exist, between departing aircraft, if a departing will be flown through the level of the preceding, and both propose to follow the same track?
223. An ATC clearance is an authority to what extent?
224. ATC units should inform pilots if substantial delay is expected, and, in any event, if delay is expected to exceed how many minutes?
225. What are the minima for horizontal separation based on DME for aircraft on the same track and at the same level?
226. When may separation be reduced near an aerodrome?
227. The general procedure, if two-way communication has failed in IMC, is to maintain the last assigned speed and level or minimum flight altitude, if higher, for how many minutes following the aircraft's failure to report its position?
228. What is a controlled flight?
229. If transition altitude is 3000 feet and the QNH is 990 mb, what is the transition level?
230. What does section 2 of an air-report consist of?
231. What is the track separation based on the same intersection fix?
232. Who is responsible for complying with a Calculated Take Off Time (CTOT)?
233. For aircraft departing from the same runway, following diverging tracks, 1 minute separation is enough, if the tracks are diverging by at least how much?

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234. To revalidate an all single-engine aeroplane class rating, you must pass a proficiency check, or, within the preceding 12 months of the expiry date, complete a training flight of at least 1 hours' duration with an instructor and ..?

235. When a member state allows police officers, security staff, bodyguards or other agents of foreign states to carry weapons in their territory for the protection of aircraft in flight, permission for the carriage of weapons is conditional upon what?

236. What is a state's obligation for aircraft with unlawful interference?

237. What kind of ATS service shall, as a minimum, be provided in FIRs?

238. What does a PAPI signal of 3 red and 1 white light indicate?

239. Only people with a full ATPL (A) and appropriate type rating can taxi commercial aeroplanes over 5700 kg. True or False?

240. During a night flight, an aircraft is flying from right to left in front of you. What lights would you see?

241. With an explosive decompression at 31,000 ft, what is your initial action?

242. What light is to be illuminated when oxygen is supplied?

243. What is the second freedom of the air?

244. Which part of the AIP contains a list with location indicators?

245. To what kind of operator is Annex 6 applicable to?

246. Who is responsible for operational control?

247. What factors should be considered when determining MFA?

248. What is the maximum cabin altitude without oxygen provision?

249. Can you start a flight if information indicates that, at ETA, a landing at the destination or an alternate would not be possible within the established minima?

Air Law Answers

1. The Right.

2. A Flight Level.

3. Altitude.

4. VHF Comms.

5. The pilot.

6. Flight Information Region, a large area (there are two: London & Scottish) extending up to but not including FL 245.

7. Notified airspace starting at ground level in which ATC service is given to IFR flights, so when VFR you can get away with ATC control, unless it is notified under Rule 21, where you need permission to enter in the first place.

8. A Control Area, since it does not start at the ground.
9. Track and Geographical.
10. 30 mins.
11. An instrument approach with all or part of it completed by visual reference to terrain.
12. Weather below minima, runway obstructed, failure of ground services and unacceptable delays.
13. An Instrument Rating.
14. Between 000-089°.
15. Regional QNH.
16. When the "No Smoking" sign is displayed, or, more technically, when the aircraft commander says so.
17. To the left.
18. It must be signed with ink.
19. To the right.
20. To the left.
21. So you can be seen by the other pilot.
22. 40 kts.
23. Stopway and Clearway.
24. 2.
25. When advised by Tower.
26. With high intensity white flashing lights.
27. Aircraft accident investigation.
28. Give way to other aircraft and continue circling.
29. 4 nm.
30. 2.
31. Part 3.
32. CPL.
33. FIS.
34. Until their journey can be continued.
35. A risk of collision with the aeroplane ahead exists and you should turn right to overtake.
36. 5 years.

- 37. True.
- 38. 3 minutes.
- 39. A NOTAM.
- 40. 30 cm.
- 41. Each contracting State.
- 42. A non-precision approach.
- 43. 45.
- 44. 1947.
- 45. 12 months.
- 46. Attempt to broadcast warnings on the VHF emergency frequency.
- 47. A parachute flare showing red light.
- 48. 200 feet.
- 49. Chicago, 1944.
- 50. All members of ECAC.
- 51. 6 months.
- 52. The Council.
- 53. The Assembly.
- 54. True.
- 55. A Danger Area.
- 56. 12.
- 57. 24 months.
- 58. Resume normal position reports.
- 59. A rating.
- 60. 21 days or more.
- 61. Do not land, aerodrome unsafe.
- 62. Annex 1.
- 63. The ATS unit.
- 64. Rome.
- 65. When the centre of the sun's disc is 6° below the horizon.
- 66. Within 1 nm from the end of the runway used.
- 67. Provision for navigational aids, air traffic services and catering.

68. All limiting mass, centres of gravity position, mass distribution and floor loadings.
69. Thin ice, occasional ice and heavy ice.
70. 5 minutes.
71. Obstacle Identification Surface.
72. An air-report.
73. The State of Registry, The State of the operator, The State of design, The State of the manufacturer and ICAO if the maximum mass is above 2250 kg.
74. 60 minutes.
75. The state of registry.
76. Numbers or letters or a combination.
77. Any type of aircraft when considered necessary by the authority.
78. One that has deviated significantly from track and which has stated that it is lost.
79. Mode A code 7500 and thereafter to code 7700.
80. Maintain course and speed.
81. The state.
82. More than 0' and less than 500'.
83. 91 kts or more but less than 121 KIAS.
84. True.
85. Special VFR and IFR-flights.
86. Time.
87. $\pm 300'$.
88. AIS.
89. White.
90. Facilitation.
91. On the aircraft.
92. Each one serving international civil aviation.
93. Screening of passengers and cabin luggage.
94. It's a distress signal.
95. No - this must be done on the 21st day.
96. All European states.

- 97. PANS.
- 98. At least 500.
- 99. 12 months.
- 100. Flight visibility 5 km and 1000' vertically and 1.5 km horizontally from cloud.
- 101. 5 km.
- 102. 1 nm from touchdown.
- 103. TODA.
- 104. 2 kts.
- 105. Transition Level.
- 106. L, M, N, P.
- 107. A Control Zone.
- 108. An airway.
- 109. All IFR flights.
- 110. 0 feet.
- 111. Reciprocal.
- 112. GEN.
- 113. Annex 9.
- 114. To safeguard civil aviation against acts of unlawful interference.
- 115. Each contracting state.
- 116. The first freedom.
- 117. 18.
- 118. To protect the domestic traffic of Contracting States.
- 119. The Chicago Convention.
- 120. 100 hours.
- 121. Return for landing.
- 122. None of those Flight levels.
- 123. A series of projectiles discharged from the ground at intervals of 10 seconds showing red and green lights or stars.
- 124. Despite previous instructions, do not land for the time being.
- 125. Mode A 2000.
- 126. FL 40.

127. Air traffic advisory to all participating IFR traffic, flight information to other flights.
128. Provided with ATC service or otherwise known to ATS units.
129. Class B.
130. 2 nm.
131. Radar identify the aeroplane and inform the pilot.
132. During VMC climb or descent.
133. Keep on the airway with your own navigational equipment.
134. Medium.
135. When B is leaving FL 130.
136. AD.
137. Overall length and maximum fuselage width.
138. RVR at least 350 m, and a decision height lower than 200 feet.
139. The air waybill number, nature of the goods and number of packages.
140. Hoisting the *Code Pennant* (vertical red and white stripes).
141. Deportees, inadmissible persons and persons in lawful custody.
142. 100 m.
143. The state of registry.
144. 200/100.
145. Follow.
146. Inform ATC of your intentions.
147. When the first departing is 40 kts faster than the next aircraft.
148. 2 nm.
149. 3 minutes.
150. Yes, in Class E airspace.
151. Class G.
152. $\pm 300'$ of the assigned level.
153. 200 metres.
154. Air report.
155. 30° , more than 15 nm.
156. 15 minutes.
157. AIP + Notam.

158. AIRAC.

159. 6.

160. Yes, or at least "the operator shall not be precluded from recovering the costs".

161. Before the passengers.

162. The contracting state in which the accident took place.

163. Deliver such person to the competent authorities.

164. C to G.

165. All IFR in controlled airspace and controlled VFR.

166. Radar identity is established, and radar instructions will be given until it is terminated.

167. 1 month.

168. Accompanied baggage or another simplified customs procedure distinct from that normally applicable to other cargo.

169. The commander, countries of departure and arrival and all countries being overflown.

170. The air navigation commission.

171. 5 hours, + 5 takeoffs and landings at night.

172. When the lower aircraft is reporting passing FL 120.

173. Follow the airways to that position, using your own nav equipment.

174. 3 nm.

175. 300m.

176. True.

177. The coefficient is 0.29 - 0.26.

178. At least 50 hrs PIC cross-country.

179. 1 year.

180. A demonstration of skill for licences or ratings, including oral examinations.

181. 100 hours.

182. 20 hours, which may be reduced to 15 within 6 months.

183. 3 years.

184. 10 hours instrument instruction and 5 hours night.

185. Circle the surface craft at least once to attract attention.

186. 20 minutes.

187. 2 minutes.
188. No.
189. Try to record the position.
190. 1000 feet.
191. Upper air space, regional network.
192. Yes, if capabilities permit.
193. 8 km visibility, 1000' vertically, 1500 m horizontally from cloud.
194. 136,000 kg.
195. To proceed only as far as known air traffic is concerned.
196. Rapid exit taxiway.
197. 18 m.
198. ATC.
199. 60 NM or more.
200. Not below 3000 feet.
201. High Intensity white flashing lights.
202. The same as if they had arrived by ship.
203. Crew identification.
204. 24 hours.
205. Proceed to the position in the distress message.
206. Water patches.
207. 5 minutes.
208. With taxi clearance.
209. Before the aircraft starts moving under its own power.
210. From before the aircraft can move under its own power to after it can no longer.
211. Microphone, Crash/Fire resistant construction.
212. 3 takeoffs and landings in 90 days on an approved sim or on type.
213. 60 mins at 1-engine-out speed.
214. Flash your landing or navigation lights twice.
215. Tell them as soon as possible.
216. Turn through 90° and ensure 30 nm separation from your planned track. Then climb or descend 1000'.

- 217. If the aircraft has dual controls and a safety pilot is carried.
- 218. An urgency signal.
- 219. Acted as PIC or copilot on type in the last 90 days.
- 220. Cockpit voice, radio transmissions, public addresses.
- 221. Radio conversations.
- 222. 5 minutes.
- 223. To proceed only as far as known air traffic is concerned.
- 224. 30 minutes.
- 225. 20 nm.
- 226. If the PIC is in sight of the preceding aircraft and can maintain own separation.
- 227. 20 minutes.
- 228. Any flight subject to ATC clearance.
- 229. FL 40.
- 230. Operational information.
- 231. At least 45° and at least 15 nm from the fix.
- 232. The PIC.
- 233. 45°.
- 234. Do 12 hours flying, to include 6 PIC, and 12 takeoffs and landings.
- 235. Prior notification from the state of embarkation to the foreign state in which the weapons will be carried, and prior notification to the PIC.
- 236. Navigational aids, air traffic services and landing clearance.
- 237. Flight information service and alerting service.
- 238. A little below the glideslope.
- 239. False - such a person need not be a pilot, but must have been trained and capable of talking to ATC (many mechanics can taxi). In fact, they must be: authorised by the operator, fully competent with the aircraft systems, qualified to use RT and instructed in the aerodrome layout and ATC procedures.
- 240. Steady Red.
- 241. Put on the oxygen masks.
- 242. No smoking.
- 243. The right to land for a tech stop.
- 244. GEN.

245. Those conducting scheduled and non-scheduled international commercial air transport operations.

246. The operator.

247. Chart, altimeter or navigation inaccuracy, terrain, weather, airspace restrictions.

248. 10,000 feet.

249. No.

METEOROLOGY

Know significant weather symbols (turbulence, icing, etc). Know what type of air replaces what in fronts and occlusions. Be careful of mixing units when decoding.

1. Complete the following table:

PA	Deviation	OAT
FL 100		-5°C
FL 125	ISA -3°C	
	ISA +3°C	-38°C
FL 310		-52°C
FL 80	ISA +15°C	
	ISA -8°C	-21°C

2. At FL 100, what is your clearance over high ground of 5880 feet amsl, assuming 1 mb = 30 feet and an altimeter setting of 989 mb?

3. You are flying at 2500 feet near an airfield on an altimeter setting of 29.38". What is your separation from an aircraft flying overhead at FL 35?

4. In the Northern Hemisphere, how is your true altitude changing when:

- flying over land at 2000 feet, into a headwind.
- flying over the sea at 500 feet with a tailwind.
- flying at FL 290 with 10° starboard drift.

5. If the wind at 1000 feet at is 360° and 15 kts, what is it likely to be at the surface?

6. If you were heading for a coastal aerodrome with a sea breeze blowing from the South, and the ETA was in the late afternoon, would you expect to land on runway 36, 18 or 21?

7. Flying towards a warm front above the freezing level, you encounter rain. What sort of icing are you most likely to get?

8. Your destination has fog in the early morning, with hardly any wind. If the wind increases to 10 kts, what can you expect when you arrive?

9. A TAF time group of 0220 means what?

10. A VOLMET report for 0500 UTC in the Autumn gives a surface wind of 5 kts, temperature of 9°C, dewpoint of 8°C and 1500m visibility, with no cloud reported. If you plan to arrive at 0600, what weather can you expect?

11. What do these parts of a TAF mean?

0615 15030G401200 BR

12. And these?

TEMPO 1420 8000 SHRA

PROB30 TEMPO 1415 5000

13. On a calm, clear evening, the METAR for the destination contains the figures 04/03. What can you expect on arrival?

14. What is QFF?

15. Define Density.

16. Define Dewpoint.

17. What is the SALR?

18. What is a gust? A squall?

19. At what height is the geostrophic wind?

20. What is an isalobar?

21. What is an anabatic wind?

22. What might you expect from a thunderstorm?

23. What might you expect from icing?

24. When is the best time to fly over mountains on a fine hot Summer's day?

25. You are at FL35 with 1013 set on the altimeter, but the QNH is 1019. The altimeter is indicating 3500' and the true altitude is 3500'. Is it the same as ISA, colder than ISA or warmer than ISA?

26. Which meteorological phenomenon would create an energy gain shortly after take-off - a sudden gust directly towards the aircraft, an encounter with a gust front ahead of a thunderstorm, or flight through a low level wind shear line?

27. What is the diurnal variation of convective cloud over the sea - nil, or very little?

28. The QNH at an aerodrome is 985 hPa. The transition altitude is 3000'. How deep is the transition layer (1 hPa = 30 feet)?

29. What is a cold pool?

30. In which type of cloud are you most likely to find moderate to severe icing?
31. Name one characteristic of a stable air mass.
32. When climbing out of Dhahran, Saudi Arabia on a clear night, why might you lose your rate of climb?
33. What might fair weather cumulus gives an indication of?
34. What cloud type are you least likely to get icing from?
35. Why is clear ice such a problem?
36. What type of icing requires immediate diversion?
37. Which way do the winds blow at a stationary front?
38. In the Northern Hemisphere, with a frontal depression travelling West to East, what will the wind do?
39. How high is the arctic jet core?
40. In temperate latitudes, what would you find in the centre of a Summer high?
41. What types of jet might you meet flying from Stockholm to Rio de Janeiro?
42. In a polar front jetstream in the Northern Hemisphere, where is there likely to be the greatest probability of turbulence?
43. What would you do if you encounter freezing rain?
44. What is the likely hazard association with the Harmattan?
45. In what cloud is icing and turbulence most severe?
46. How long is a microburst?
47. Which formula is used to derive total temperature (TT) from static temperature, T_s ?
48. What is TAT?
49. When are analysis charts issued?
50. What do prognosis charts forecast?
51. At FL 135, with a True Altitude of 13,500 feet, and QNH 1019, is the temperature warmer or colder than ISA?
52. What happens to the wind if a depression moves left to right to your South?
53. When does the monsoon change from SW to NE?
54. What is the wake turbulence separation between a departing Light behind a Medium, from the same runway and take-off position?
55. How much dispersal time is required for wake turbulence from wide-bodies?
56. What is the best position following a heavy aircraft?

57. What is the worst wind situation if the aircraft departing before you is a heavy, and you are in a light?
58. What is the Chinook?
59. What clues might indicate windshear?
60. On the approach you get a decrease in tailwind. What will the aircraft do?
61. What is the average height of the tropopause at 50°N?
62. To reduce QFE to QNH, what else do you need to know?
63. In what hPa range is a chart for FL 340 situated?
64. Between which latitudes might you find the sub-tropical high-pressure belt?
65. Where is the core of the polar jet stream normally found?
66. What might a Cb at mid-latitudes in Summer contain?
67. What type of fog do you get when air near its dewpoint flows over a cooler sea?
68. What does OCNL CB mean?
69. Is convergence a factor in distributing heat in the troposphere?
70. What does an inversion do?
71. How might you guess you were flying in stable air?
72. What would you expect the wind to do during a climb to 3,000 feet?
73. From Rome to London, would you get better winds North or South of a high?
74. How is cloud formed in a low?
75. If you are currently getting light to moderate icing, and you suddenly start seeing ice crystals, what might happen to the icing?
76. If you see snow whilst flying towards a stable warm front, what comes next?
77. What is freezing rain a positive indication of?
78. What conditions assist in the formation of clear ice?
79. If you see clear ice forming, what does it indicate?
80. When would you expect fog to form?
81. What is required for the formation of all types of fog?
82. With clear skies, light winds and moist air, what of fog do you get?
83. What process causes fog and cloud?
84. What can cause upslope fog?
85. What causes extensive fogs ahead of warm fronts?
86. What is pressure altitude?

87. You are at 6,000 feet passing over a hill, elevation 2,000 feet. Although the correct altimeter setting is 28.60, you have 30.15 set. How close are to the hill?
88. What do you need to start a thunderstorm?
89. How do you tell that a thunderstorm has reached the mature stage?
90. How do you tell that a thunderstorm has reached the dissipating stage?
91. Where do you find the roll cloud associated with a thunderstorm?
92. Why is airframe icing dangerous?
93. With a normally aspirated piston engine and a constant speed unit for the prop, what will give you an indication of carb icing?
94. If a large jet crosses your path, how do you best avoid wake turbulence?
95. Flying along, the sun begins to look milky against a monotonous grey sky, the cloudbase gets lower and it starts to rain. The wind has also turned more to the South and increased - what's going on?
96. If the temperature is colder than standard, what is the relationship between true and indicated altitude?
97. If temperature is warmer than standard, where is density altitude relative to indicated?
98. What is the primary cause of all changes in the Earth's weather?
99. When saturated air moves downhill, what happens to its temperature?
100. When is the temperature normally at a minimum during any 24-hour period?
101. What will cause weather on the lee side of a large lake?

Meteorology Answers

1. ISA 0°C, -13°C, FL 280, ISA -5°C, +14°C, FL 140.
2. The difference between the altimeter and 1013.2 mb (29.92") is 24 mb, or 720 ft, so the PA of high ground is 6600 ft. Subtract from 10,000 ft for 3400 ft clearance.
3. 29.38 from 29.92 is .54, or 540 ft, so your PA is 3040 ft. Separation is 460 ft.
4. The answers in order:
 - At 2000 feet, wind is unaffected by surface friction. With no drift, you are parallel to the isobars and true altitude is constant.
 - Your true altitude is decreasing, because the 500-foot wind is backed with reference to the wind at 2000 feet, and you are crossing the isobars from high to low pressure because of the drift you have to apply.
 - Wind at FL 290 is primarily thermal, and it is coming from the left (hence starboard drift), so the low temperature (and hence low pressure) area is ahead of you. True altitude is decreasing.

QUESTIONS (AND ANSWERS)

Meteorology

5. Wind speed will reduce by about 20%, so coriolis effect will automatically reduce by about 20°. Thus, 360-20 is 340°, and 20% of 15 is 3, so the speed will be 12 kts.
6. At first, it would be 18, but in late afternoon, the Coriolis effect could make it 21.
7. The airframe is cold (you are below freezing). You will most likely get clear ice.
8. Thin low stratus cloud.
9. It is valid between 2 in the morning and 8 at night.
10. As the wind is light, and the temperature is very close to the dewpoint, you are very likely to see radiation fog, because there is no cloud and it is very near dawn. The visibility is already poor, and will get worse, before possibly clearing by mid-morning after solar heating. Note the minimum RVR for visual approach is 800m.
11. Valid between 6 in the morning and 3 in the afternoon (UTC, of course), the wind is from 150° at 30 kts, gusting 40, visibility 1200 metres in mist. 3-4 oktas of cloud at 800'.
12. Temporarily between 1400 and 2000, 8000 m visibility in showers and rain. 30% probability of a temporary reduction in vis to 5000 m between 1400 and 1500.
13. Temperature is 4°C and dewpoint 3°C, meaning that, if the temperature falls, as it is likely to if it is calm and clear, moisture will condense out and form mist or fog.
14. The QFE reduced to MSL pressure using ambient temperature lapse rate. It gives a more accurate estimation of sea level pressure and is used for surface charts.
15. Mass per unit volume.
16. The temperature to which air must be cooled, without change of pressure, for the air to just become saturated. Any further cooling results in condensation.
17. The Saturated Adiabatic Lapse Rate is the rate at which a parcel of saturated air changes temperature with height.
18. Temporary increases in prevailing windspeed. A squall is normally associated with thunderstorms and lasts longer.
19. Around 2000 feet.
20. A line joining points of equal rate of change of pressure.
21. The reverse of a katabatic wind, flowing uphill (at a slower pace).
22. Hail, icing, lightning, static electricity, turbulence and windshear.
23. More weight and drag, less lift, stuck controls, less vis, radio interference and blockages.
24. In the morning, because later in the day you would get thermal and anabatic turbulence, and maybe CB buildup in the afternoon.
25. Colder. The altimeter should be under-reading, but it isn't, so temperature error is in the reverse sense to barometer error, so the air mass must be cooler.

26. A sudden gust directly towards the aircraft is the most correct answer - you shouldn't be taking off near a thunderstorm anyway.
27. Very little, as the sea temperature doesn't change much between night and day.
28. 160 feet.
29. Cold air from the Arctic behind fast moving frontal systems crossing the Atlantic West to East.
30. Nimbostratus.
31. A lapse rate of $3^{\circ}/1000'$.
32. Marked temperature inversion.
33. Turbulence.
34. Ci.
35. It is very heavy and can affect aircraft controls and surfaces.
36. Severe.
37. Parallel to the isobars and front.
38. Continually back.
39. 30,000 ft.
40. Calm winds, haze.
41. Polar front jet, then 1 or 2 subtropical jets.
42. Looking downstream, to the left.
43. Climb to the warmer air above.
44. Poor visibility (dust and sand).
45. Cb.
46. 5 minutes.
47. $TT = Ts(1 + 0.2KRM^2)$.
48. SAT + ram rise in temperature due to adiabatic compression.
49. At 00 and 12Z each day.
50. Moderate to severe icing, significant cloud layers, mountain waves, freezing levels at 10,000' and surface position of highs and lows.
51. Colder (True Altitude is 13680').
52. It backs from S - E - N.
53. In Winter.
54. 2 minutes.

- 55. 3 minutes.
- 56. Upwind and above its flight path.
- 57. A wind at 5 kts straight from the side - it keeps the wake from the upwind side standing on the runway. If you cannot lift off well before the preceding, wait a bit.
- 58. A warm dry wind on the lee side of the Rockies.
- 59. First is a change in IAS, and divergent wind patterns, indicated by grass, crops or trees beaten down.
- 60. It will climb above the glide path and TAS will decrease.
- 61. 11 km.
- 62. Airfield elevation.
- 63. 300-200 hPa.
- 64. 25-35°.
- 65. In tropical air below the tropopause.
- 66. Ice crystals, water droplets and supercooled water droplets.
- 67. Advection fog.
- 68. Well-separated Cb clouds.
- 69. No - it has more to do with causing air to rise.
- 70. It acts as a barrier to vertical motion, possibly causing layer-type clouds to form.
- 71. Poor visibility, possibly from accumulating haze and smoke.
- 72. Veer and increase speed.
- 73. South.
- 74. Convergence and ascending air.
- 75. It will decrease in intensity.
- 76. Ice pellets and freezing rain.
- 77. Warm air aloft.
- 78. Thin wing, large supercooled water droplets, temperature just below zero.
- 79. Large droplets, temperature just below zero, high catch efficiency.
- 80. With a high moisture content, lots of nuclei and a condensation process.
- 81. High relative humidity.
- 82. Radiation fog.
- 83. Advection.
- 84. Expansional cooling.

85. Cold air becomes saturated by rain falling from the warm air.
86. The altitude where a given pressure is found in the standard atmosphere.
87. The difference between pressures is 1.55", or 1550'. A higher pressure is set, so the machine thinks it is lower, so subtract the difference (4,000 feet), for 2450'.
88. Lifting agent, high relative humidity and unstable air.
89. Rain appears at the surface.
90. Downdraughts.
91. On the lead side, near the base.
92. Weight and drag increase, and lift reduces.
93. Reduction in manifold pressure (the reductions in RPM experienced by fixed pitch props are masked by the CSU).
94. Fly slightly above its path.
95. You are flying towards a warm front.
96. True altitude is lower.
97. Higher.
98. Variations in Solar energy at the surface.
99. It will increase, but at a slower rate than dry air because vapourisation uses heat.
100. For up to 1 hour after sunrise. Overnight cooling has a momentum that is only stopped when solar radiation exceeds it.
101. Warm air flowing over the lake gets saturated and cooled in its lower levels through contact with water, causing extensive fog on the lee side.

PRINCIPLES OF FLIGHT

1. What factors affect the amount of lift produced by an aerofoil?
2. Name the 3 axes an aircraft moves round, and associated stabilities.
3. Why does an increase in all-up-weight lower speed in a helicopter?
4. What is the relationship between aspect ratio and wing tip vortices?
5. What is the boundary layer?
6. Why does the cyclic control in a helicopter move across the cabin towards the retreating blade side when the hydraulics fail?
7. Why does RPM of a fixed pitch propeller increase during takeoff?
8. At zero angle of attack in flight, what will a symmetrical wing section produce?

QUESTIONS (AND ANSWERS) •

Principles of Flight •

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9. How does profile drag vary with speed?
10. As fuel is used during a level cruise at high level, what happens to induced drag?
11. Where will a high aspect ratio wing have most of its induced drag?
12. Extending airbrakes during an approach will do what to minimum drag speed?
13. Which motion occurs about the longitudinal axis?
14. With two multi-engined aircraft, one a turbojet and the other with co-rotating propellers, after an engine failure, which one has the greater rolling tendency?
15. How do you increase the rate and decrease the radius of a turn at the same time?
16. How does rate of turn vary against radius if you increase airspeed with a constant angle of bank?
17. How does increasing airspeed affect a turn with constant angle of bank and altitude?
18. What happens to the shock wave angle at increasing Mach number?
19. With a propeller feathered, is the drag minimum or maximum?
20. If a 2,000 lb aircraft became subject to a 6,000 lb load in flight, what would the load factor be?
21. Dynamic longitudinal stability also requires what?
22. In what directions does static pressure act?
23. What should you do if the Mach trim is unserviceable?
24. What does the Mach trimmer do?
25. What is interference drag?
26. What is rotor profile drag?
27. Should you increase collective to counteract dynamic rollover?
28. What is phase lag?
29. What is the pitch angle of a helicopter rotor blade?
30. How would you counteract blade sailing?
31. If its propeller rotates anticlockwise, which way does an aircraft yaw on takeoff?
32. Which way does the nose pitch if you turn right with a right hand propeller?
33. What causes wingtip vortices?
34. How would you set up an aircraft for maximum speed?
35. The angle of bank for a rate 1 turn varies with what?
36. Would changing pitch cause a climb at lower or higher speeds?

37. How are the vertical components of lift and sink rate affected as angle of bank is increased?
38. What causes torsion on a wing, out of sweep, dihedral, wingtip vortices and prop wash?
39. If speed increases by 10%, how much does profile drag increase by?
40. What balances thrust in a steady climb?

POF Answers

1. The angle of attack, air density, velocity of airflow, surface area.
2. Longitudinal (roll) - lateral stability, lateral (pitch), longitudinal stability, yawing-directional stability.
3. More collective is required and the retreating blade will stall earlier.
4. The higher the aspect ratio, the smaller the vortices are.
5. The layer of retarded air immediately in contact with the skin.
6. Feedback from the pitch operating arms to the control orbit.
7. The blade angle of attack is more efficient.
8. Zero lift with some drag.
9. It is proportional to the square of the speed.
10. It will decrease.
11. At the root.
12. Reduce it.
13. Rolling.
14. The propeller-driven one.
15. Steepen the bank and reduce the airspeed.
16. The rate will decrease and radius will increase.
17. The rate of turn decreases with no change in load factor.
18. It increases.
19. Minimum.
20. 3G.
21. Positive static longitudinal stability.
22. In all directions.
23. Limit the Mach number at which you fly.
24. It compensates for nose down pitching at transonic speeds - it prevents high speed tuck.

QUESTIONS (AND ANSWERS) •

Airframes, Engines & Systems •

25. That from the interaction of individual boundary layers at the junction of major aircraft components.
26. From rotor blades at zero pitch, occurring purely because the blades are rotating.
27. No, no, a thousand times, No!
28. The rotor disc behaves like a gyroscope, and is subject to precession, meaning that an input doesn't have an effect until 90° later in the direction of rotation (see *Instruments* for more on this). Thus, if you pushed the cyclic forward, and the controls were not corrected, you would actually move left or right, according to which way round the blades were going. To cater for this, control inputs are applied in advance of the blades' movement. Their delayed response is *phase lag*.
29. That between the blade's chord line and the spin axis of the main blades, and the plane of rotation, which is parallel to it (usually above).
30. Park the helicopter away from the downwind side of obstructions or the downwash or slipstream of other machines, keep the collective down, or accelerate and decelerate the blades as quickly as possible. In addition, point the nose out of wind, so the lowest deflection is away from the tail boom.
31. To the right (the downgoing blade has the higher angle of attack). Blade rotation is viewed from the cockpit.
32. Down, due to gyroscopic effect.
33. Air spills from the bottom of the wing to the top, at the tip.
34. Maximum thrust, minimum drag.
35. TAS (divide by 10 and multiply by 7 to get a good estimate).
36. Higher speeds, above L/D_{MAX} .
37. Lift decreases, sink rate increases.
38. They all do, but the most correct answer is sweep, for the exam, at least. With large wing tip vortices, there will be more induced downwash at the tips, and a reduced local alpha, and different pressure patterns (and aerodynamic centres) over the wing. With dihedral, drag at the wingtips will twist the leading edge up.
39. At constant weight, profile drag varies with the square of the speed (V_2), so 10% being the same as a factor of 1.1, 1.1² is 1.21, or 21%.
40. Drag + $W \sin \Gamma$.

AIRFRAMES, ENGINES & SYSTEMS

1. An APU can supply air and what?
2. Name one disadvantage of compressed air systems.

3. Where does an air start system initially get its air from?
4. What happens to the nose when you put the flaps down? Why?
5. What are slats?
6. What does the "LL" in 100LL stand for?
7. How is aviation fuel coloured?
8. What speed do camshafts run at?
9. Why is leaning off in the climb not such a good idea?
10. Aside from pre-ignition, what problems are you likely to get from using MOGAS rather than AVGAS?
11. What does a supercharger do?
12. Where is the waste gate actuator controller?
13. What are the basic parts of a jet?
14. Why can you have a higher temperature for a turbine on startup?
15. What does FADEC stand for?
16. Name two types of air conditioning system.
17. What is "shimmy"?
18. In a modern jet aircraft, landing forces are dampened by what?
19. Which valves are open after the power stroke? Inlet? Inlet and Outlet? Outlet? Or None?
20. What does the ram air turbine provide emergency hydraulics for?
21. When a persistent overexcitation fault is detected on only one AC generator, what does the protection device open?
22. The power output of a piston engine can be calculated by what?
23. How must an artificial feel unit system be mounted?
24. Pulling the fire shut off handle causes some devices to disconnect. What about the AC generator?
25. On an aeroplane with a passenger deck with 61 seats and carrying 31 passengers, how many megaphones are required?
26. How is the breathing oxygen for the cockpit of jet transport aircraft stored?
27. How is the fan stage of a ducted fan turbine engine driven?
28. In a non-stressed skin type wing, the wing structure elements, which take up the vertical bending moments M_x are called what?
29. In transport aeroplanes, overheat detection systems are fitted where?

QUESTIONS (AND ANSWERS)

Airframes, Engines & Systems

30. What is the purpose of static wick dischargers?
31. At FL 390, with 230 maximum passengers, 200 seats fitted, with 180 scheduled passengers, what is the minimum number of inhaler systems in the cabin?
32. What happens when you adjust the mixture ratio of a piston engine when altitude increases?
33. What does a shuttle valve do?
34. What does Protective Breathing Equipment (PBE) do?
35. What is the main function of a torsion link?
36. If a CSD is disconnected during flight it, when can you reset it?
37. Where in the hydraulic system are the overheat indicators?
38. Where is electric heating as ice protection used?
39. What is the basis of operation of low pressure pumps?
40. What is the pressure booster pump range of the fuel system?
41. What are the characteristics of Maximum Zero Fuel Weight?
42. In some aircraft, there is a protection device to avoid gear retraction on ground. What does it consist of?
43. What is the purpose of baffle check valves in fuel tanks?
44. The maximum exhaust gas temperature is theoretically associated with what mass ratio?
45. How does fluid temperature react from internal leaks in a hydraulic system?
46. In gas turbine engines, where is maximum gas temperature attained?
47. What is the purpose of a trim tab device?
48. What extinguisher(s) should be used for flammable gaseous stuff like propane?
49. The point where, in standard conditions, fuel vapour will ignite, is called what?
50. What happens if the continuous element of a fire detection system is heated?
51. When should you warn crew in the case of excessive cabin altitude?
52. When TAS increases, what happens to the pitch angle of a constant speed propeller?
53. What is the purpose of the diluter demand regulator in the oxygen system?
54. Where are thermal plugs?
55. What would be the conditions for highest engine power?
56. If an accumulator has a charge pressure of 800 psi, and the aircraft system has a residual hydraulic pressure of 600 psi, what should the accumulator gas gauge read?

57. What does a thermal relief valve do?
58. What compensates for variations in supply system volume from ram jack displacement?
59. What does hammering in a hydraulic system indicate?
60. Why is a hydraulic fuse used?
61. The Diluter Demand regulator will, on normal selection, supply how much oxygen?
62. When does an unpressurised aircraft require an oxygen supply?
63. What should be closed when a taxi-through de-icing system is being used?
64. In a pneumatic de-icing system, how are the boots deflated?
65. A pilot has to carry out a single pilot IFR flight on a light twin for cargo transport. The automatic pilot should at least be able to hold what?
66. You are in steady cruise at FL 270 and the autothrottle maintains a constant calibrated airspeed. If total temperature increases, what happens to Mach number?
67. When altitude acquisition mode is engaged on a jet transport with autopilot and auto-throttle systems, what happens to IAS?
68. In a steady climb, with the autothrottle maintaining a constant Mach number, if the total temperature remains constant, what happens to the CAS?
69. What does Localizer ARM active on a Flight Director mean?
70. In a steady climb with the autothrottle maintaining a constant CAS, if the total temperature remains constant, what happens to the Mach number?
71. How do you compute Engine Pressure Ratio (EPR)?
72. How do anti-ice systems work?
73. What is the purpose of the ditching control?
74. Why would you use cross feeding from fuel tanks?
75. What happens to pressure when the combustion gases pass through a turbine?
76. Why is hydraulic oil entering the pumps slightly pressurized?
77. How is hydraulic power expressed?
78. What are fuel system boost pumps used for?
79. What happens if cabin pressure becomes negative?
80. During a normal pressurized climb after take-off, what happens to the cabin pressure relative to atmospheric pressure?
81. What happens to the angle of attack of fixed and constant pitch propellers when increasing TAS?

QUESTIONS (AND ANSWERS)

Airframes, Engines & Systems

82. An EPR gauge reading normally, shows the ratio of what?
83. What produces the greater part of thrust in a high by-pass ratio turbo jet?
84. How do you change power in a gas turbine engine?
85. In a modern jet, how can the landing gear be extended if there is a complete hydraulic system failure?
86. If the cabin altitude rises in an aircraft in level flight, what happens to the differential pressure?
87. What hydraulic device is similar to an electronic diode?
88. For a fan jet engine, what is the by-pass ratio?
89. What happens to temperature when combustion gases pass through a turbine?
90. Concerning the anti-skid system, what happens to pressure?
91. In a bootstrap cooling system, what first happens to the air?
92. What is the purpose of the pack cooling fans in the air conditioning system?
93. Bleed air for air conditioning and pressurization in turbojet aircraft is usually taken from where?
94. What is the formula for thrust?
95. In the Otto cycle, when does the exhaust valve open?
96. The primary function of an axial flow compressor stator vane is to act as a diffuser. What is its secondary function?
97. What is the main purpose of combustion section secondary air in a turbojet?
98. What purpose does the needle valve have in a carburettor?
99. What are the advantages of a fully fuel-injected engine?
100. When you shut your fuel-injected down on a warm day, what might happen to the fuel supply?
101. Where is Manifold Pressure measured?
102. Where is carburettor icing most likely to occur?
103. How are nozzle guide vanes cooled?
104. Which items use engine bleed air for operation?
105. The two main sources of information for calculating turbojet thrust are what?
106. An aeroplane is in steady descent while the autothrottle maintains a constant calibrated airspeed. If the total temperature remains constant, what happens to the Mach number?
107. In steady cruise at FL 270, with autothrottle maintaining a constant calibrated airspeed, if the total temperature decreases, what happens to the Mach number?

108. If an autopilot is selected On in altitude hold mode, and the pilot alters the pressure on the subscale of the altimeter, what happens?
109. When is an autopilot capable of holding at least altitude and heading mode compulsory?
110. The purpose of autotrim?
111. An aeroplane with a Flight Director (with crosshair trend bars) is heading 270°, in HDG mode. If 360° is selected, what happens to the vertical trend bar?
112. What should you check after an overweight heavy landing on a short runway?
113. A stall warning system on a large aircraft always includes what?
114. What document could you refer to if you had a defect when parked?
115. When the pressurisation system fails, what will the RCDI show?
116. As cabin altitude increases, what happens to differential pressure?
117. What might gradual, or slow, decompression be caused by?
118. What do you do with smoke coming from the air conditioning?
119. What happens in a pressurisation malfunction?
120. Why is it useless to use passenger oxygen masks with smoke in the cabin?
121. In jet aeroplanes, how is the thermal anti-ice system supplied?
122. Where would electric heating be used for ice protection on a large aeroplane?
123. What precaution should you take before refuelling?
124. When do automatic shutoff valves operate when refuelling?
125. What is the purpose of an ignition switch?
126. Why is the mixture rich when starting an engine, or when at idle?
127. Why is a check of an exhaust-manifold cockpit heating system important?
128. What is a synchroscope for?
129. With servo tabs on a main control surface, what do controls do at low speed?
130. What is the reason for having a trim system on power-assisted flying controls?
131. If an elevator becomes jammed, what is the effect of a servo tab?
132. The flaperon is a control which operates simultaneously as what?
133. Where are flight director modes displayed?
134. The autopilot is on heading hold, on 270°. If you change the heading on the panel to 360°, what will happen?
135. What are the basic functions of an autopilot?
136. What happens to the glideslope signal at 50 feet during autoland?

QUESTIONS (AND ANSWERS) •

Airframes, Engines & Systems •

- 137. What does a yaw damper indicator show?
- 138. The autothrottle is set to climb at a constant mach number. If the temperature does not change, what happens to the CAS?
- 139. Where would you check the autothrottle mode?
- 140. What minimum autopilot do you need for single pilot IFR?
- 141. In the cruise, what holds the height and what holds the airspeed?
- 142. In a semi-automatic landing, when is the autopilot disengaged?
- 143. Where is autoland complete?
- 144. How is approach height indicated during a Cat II ILS?
- 145. What is the minimum autopilot for an aircraft over 5700 kg?
- 146. When is a landing automatic?

Engines, Airframes & Systems Answers

- 1. Electrical.
- 2. Air is compressible, it is more difficult to detect leaks, and you need storage bottles.
- 3. The APU, which starts only the master engine.
- 4. The nose goes down because the Centre of Pressure is move backwards, creating a couple with the C of G.
- 5. Small aerofoils that open forward of the wing to smooth out airflow.
- 6. Low Lead.
- 7. 80/87 is red, 100LL is blue and 100/130 is green.
- 8. Half the speed of the crankshaft.
- 9. Petrol has a high latent heat content, and the excess inside a cylinder from a rich mixture has a cooling effect when it evaporates.
- 10. You can expect more fuel and carb icing, as it contains more water.
- 11. To extend the service ceiling, by compressing the fuel/air mixture to maintain sea level power at altitude, or to increase normal power lower down.
- 12. Downstream of the actuator.
- 13. The inlet, the compressor, combustor, turbine and nozzle.
- 14. Because the turbine is not turning fast enough for blade creep.
- 15. Full Authority Digital Electronic Control.
- 16. Air cycle and vapour cycle.
- 17. A potentially damaging vibration of the nose wheel.

18. Nitrogen and viscous fluid. Other choices might be nitrogen, hydrogen or oxygen, but landing is the clue here - the struts contract during the process.
19. The exhaust stroke is after the power stroke, and the inlet and outlet valves will be both open, but only because of valve overlap, so the inlet valve will be mostly closed. However, after the power stroke, the piston will be at BDC, so no valves should be open. Abtrick question - the answer lies in the interpretation of "after".
20. Flight controls when engine-driven hydraulic pressure fails.
21. The tie breaker.
22. Torque x RPM.
23. In parallel on an irreversible servo control unit.
24. The exciter control relay and generator breaker open.
25. 1.
26. Gaseous.
27. The low pressure turbine.
28. Spars.
29. Landing gear bays, wheel wells.
30. Dissipate static to avoid radio interference from static discharge during flight.
31. 220.
32. You decrease fuel flow to compensate for decreasing air density.
33. To switch hydraulic units to the most appropriate pressure supply - in other words, it allows two pressure sources to operate one unit.
34. Protects crew against fumes and noxious gasses.
35. To avoid rotation of the position rod to the oleo strut.
36. On the ground only after engine shutdown.
37. At the pumps.
38. Pitot tubes.
39. Centrifugal type.
40. 20 to 50 psi.
41. It is set by regulation, designed for maximum load factor and is due to maximum bending moments at the wing root.
42. A latch on the landing gear lever.
43. To stop fuel moving to wingtips.
44. 1:15.

QUESTIONS (AND ANSWERS) •

Airframes, Engines & Systems •

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45. It increases.
46. Within the combustion chamber.
47. To reduce or cancel control forces.
48. BCF and CO₂.
49. The flash point.
50. The resistant decreases and the leakage current increases.
51. When over 10,000' cabin altitude.
52. It reduces.
53. To deliver oxygen when inhaling.
54. In a wheel rim.
55. In cold, dry air at high pressure.
56. 800 psi.
57. It senses fluid pressure and prevents pressure build up in the reservoir due to an increase in ambient temperature.
58. The reservoir.
59. There may be a risk of pipe fracture which should be investigated asap.
60. For hydraulic leaks downstream, it prevents total fluid loss.
61. 100% at 32,000'.
62. At or above 10,000'
63. The main engine and APU bleeds.
64. With vacuum.
65. Heading and altitude.
66. It remains constant.
67. It is maintained by the autopilot with the elevator.
68. It decreases.
69. The system is armed for localizer approach and coupling will occur on capturing the centreline.
70. It increases.
71. Divide turbine discharge pressure by compressor inlet pressure.
72. It uses bleed air from engines.
73. To close the outflow valve.
74. It allows feeding to any engine.

75. It drops.
76. To prevent pump cavitation.
77. System pressure + flow volume.
78. To stop bubbles accumulating and feed the line with fuel, to direct it to the engine at a positive pressure.
79. The negative pressure relief valve opens.
80. It decreases more slowly.
81. It reduces on fixed pitch props, increases on constant speed ones.
82. Jet pipe pressure against compressor inlet pressure.
83. The fan.
84. Change the amount of fuel supplied.
85. Mechanically.
86. It decreases.
87. A check valve.
88. External airflow mass divided by the internal air flow mass.
89. It drops.
90. It decreases on the slower turning wheels.
91. It is compressed, then goes through a heat exchanger and across an expansion turbine.
92. Supplying heat exchangers with cooling air during slow flight and ground ops.
93. The engine compressor section.
94. Force = mass x acceleration.
95. Before BDC of the power stroke (valve lead).
96. To control the direction of the air to each stage of the compressor.
97. Cooling of the liner gases.
98. It controls the amount of fuel inside the float chamber.
99. It is fully aerobatic and not so susceptible to inlet icing.
100. It might get vapour locked (use the fuel boost pumps).
101. At the appropriate point in the induction system.
102. Venturi and throttle valve.
103. With bleed air from the compressor section.
104. NGV, turbine blades, pneumatic anti-icing

QUESTIONS (AND ANSWERS) •

Airframes, Engines & Systems •

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105. Fan rotation speed (N_1) or EPR (Engine Pressure Ratio).
106. It decreases.
107. It remains constant.
108. The aircraft remains at the same altitude, and the autopilot takes its information from the static source.
109. Single-pilot IFR or night flights.
110. To control the elevator trim tab in order to relieve elevator load.
111. It deviates to the right and will be centred as soon as you roll the aircraft to the bank angle calculated by the flight director.
112. Brake temperature.
113. Various inputs, including a landing gear micro switch, a warning module and an aural warning.
114. The Minimum Equipment List.
115. A climb.
116. It decreases, other things equal.
117. A window or door leak, or a pressurisation system failure.
118. Don your oxygen mask.
119. Noise increases, with changes in the RCDI, pressure differential decreases.
120. Because they mix oxygen with the cabin air.
121. With engine bleed air.
122. Pitot tubes.
123. All bonding and connections to the earth terminal between ground equipment and the aircraft should be made before filler caps are removed.
124. When reaching a predetermined volume or mass.
125. To control the primary circuit of the magneto.
126. The choke valve is closed.
127. To stop exhaust gases (CO) getting into the cockpit through leaks.
128. To inspect HP compressor blades on a jet engine.
129. They are less effective.
130. It enables the stick force gradient to be reduced to zero.
131. It will reverse the direction of pitch input.
132. Flaps and ailerons.
133. ECAM.

134. The heading command bar disappears and the heading hold disengages.
135. To hold pitch attitude, wings level and altitude.
136. It is factored for range.
137. The damper's movement of the rudder position.
138. It increases if OAT decreases.
139. The Navigation Display (ND).
140. Altitude hold.
141. Autothrottle, Autopilot.
142. At DH.
143. At DH.
144. With a radio altimeter.
145. One capable of altitude and heading hold (i.e. two-axis).
146. When the autopilot does the work until the flare, and the flare and ground roll are automatic.

INSTRUMENTS (AGK 4)

1. You've just lost all your electrics, and you are left with a map and the E2B compass. Can they be relied on to get you home?
2. Draw a diagram to show a heading of 050°, with 15° E variation and a deviation of -4°.
3. Do RAS and TAS increase, decrease or remain constant during a climb at constant Mach number?
4. What do TAS and Mach number do in a climb at constant RAS?
5. When is an artificial horizon likely to give a slightly incorrect indication of attitude under what conditions?
6. In an offset entry to a hold, the required track divergence from the reciprocal inbound track from the fix towards the outbound end is what?
7. Where does the initial approach segment begin and end?
8. In an instrument approach procedure, the segment on which alignment and descent for landing is done is called what?
9. The approach segment where descent is kept as shallow as possible and the aircraft speed and configuration are adjusted is what?

QUESTIONS (AND ANSWERS)

Instruments (AGK 4)

10. When entering a hold with an offset entry you will, after the holding fix, make good a track 30° from the reciprocal of the inbound track on the holding side. If time is specified, for how long do you fly outbound at FL 140 or below?
11. The optimum and maximum distance for locating the FAF relative to the threshold is?
12. If timing is specified for a holding pattern, what is it on the outbound track at FL 140 or below?
13. You have been cleared to join a left turn holding pattern with an inbound track of 200° . If your magnetic track is 050° , what kind of entry is required?
14. When holding at FL 100 under normal conditions, the maximum speed for a category B aircraft should be what?
15. If a stepdown fix is established in a stepdown procedure using DME and you are on final approach, how should the descent be handled?
16. You are required to carry out an offset entry to a holding pattern. What is the required track divergence from the reciprocal inbound track from the fix towards the outbound end?
17. A turning departure is constructed if a departure requires a turn of more than how many degrees?
18. Where does a SID terminate?
19. The Final Approach Segment for an ILS begins and ends where?
20. If established on a precision approach, the airline determines the lowest level allowed before either proceeding visually or making a missed approach, called what?
21. After a visual manoeuvring area is established, how is the OCA/H determined?
22. A holding pattern is established on a fix position with an inbound heading of 180° (M). You are approaching the fix from Southwest. What type of entry is required?
23. If timing is specified for a hold, what is it on the outbound track above FL 140?
24. Is the length of the outbound leg of a holding pattern always expressed in terms of time?
25. What is the maximum acceptable angle between the final approach track and the runway centre line if a non-precision-approach is to be considered as a straight-in-approach?
26. After departure, straight flight is assumed until an altitude above DER (Departure End of Runway) elevation of at least how much?
27. In a standard hold, in which direction are all turns performed?

28. What obstacle clearance do you have in the primary area of the intermediate approach segment?
29. During circling, what is OCH for a Cat C aircraft?
30. In a procedure turn 45°/180°, Cat C, your outbound timing is?
31. What is max circling speed for a Cat B aircraft?
32. What is outbound timing in a hold at FL 140?
33. How wide is the sector on the arrival route where you get obstacle clearance?
34. What is the maximum timing for the outbound leg of an offset entry?
35. On a non-precision approach, the company determines the lowest level before either proceeding visually or making a missed approach. What is that level called?
36. How many Missed Approach Procedures are published?
37. The PDG of a departure is, unless otherwise specified, how many %?
38. If a minimum descent height is established for an approach, what kind is it?
39. For how large an area is Minimum Obstacle Clearance (MOC) provided?
40. Your magnetic track is 250°. What kind of entry is needed to join a standard holding pattern with an inbound track of 100°?
41. Entry procedures for holding patterns are divided into 3 sectors, such as what?
42. MSA is based on a circle around an aerodrome, to provide obstacle clearance of at least how much?
43. You are established in a standard holding pattern. ATC has issued an EAT of 10:22. When are you allowed to leave the pattern?
44. What is the optimum descent gradient in an instrument approach procedure?
45. What is the maximum intercept angle between the initial and intermediate approach tracks for a precision approach?
46. You are being radar vectored by ATC and have been cleared for an ILS. When are you allowed to descend below the glidepath?
47. A new EAT is transmitted to an aircraft if it differs from the previous one by more than how long?
48. An aircraft is flying at an indicated altitude of 16,000ft. The OAT is -30°C. What is the true altitude of the aircraft?
49. What is Density Altitude?
50. What is QNH?
51. Why fit vibrators to altimeters?
52. On board an aircraft true altitude is shown from what?

QUESTIONS (AND ANSWERS)

Instruments (AGK 4)

- 53. If an aircraft at a constant true altitude flies into a colder air mass, what does the altimeter do?
- 54. If an aircraft is flying at a constant indicated altitude over a warm airmass, what will the altimeter reading be?
- 55. There are two altimeters on an aircraft. One is compensated for position error and one is not. What will happen?
- 56. An aircraft has two static sources either side of the fuselage, and the one on the right is blocked. In a sideslip to the right what does the altimeter do?
- 57. What is CAS?
- 58. At what height is visual circling carried out?
- 59. Is the outbound leg of a holding pattern always expressed as time?
- 60. What may a GPWS indicate?
- 61. At a constant weight, irrespective of altitude, the aircraft always lifts off at the same CAS. True or False?
- 62. If an ASI has a "barber's pole" what does it indicate?
- 63. If an ASI pitot source is blocked, the drain hole is blocked and the static source is open, what will the ASI do?
- 64. Descending from FL 390 at maximum groundspeed, what are you limited by?
- 65. If the pitot tube and drains are blocked by icing in the cruise during descent, what will the ASI do?
- 66. At sea level in ISA conditions does TAS equal CAS?
- 67. The upper and lower limits of the yellow arc on an ASI are what?
- 68. What does the blue line on the ASI of a twin engine piston aircraft indicate?
- 69. What does the white arc on an ASI indicate?
- 70. If the pitot tube in an unpressurised aircraft is leaking and the pitot drain is blocked, what will the ASI do?
- 71. An ASI circuit consists of pressure sensors. What does the pitot probe measure?
- 72. When descending through an isothermal layer at constant CAS, what does the TAS do?
- 73. What does the machmeter consist of?
- 74. What are the indications of a machmeter independent of?
- 75. Mach number is the ratio of what to what?
- 76. An aircraft flying level at FL 270 at constant CAS experiences a reduction in OAT. What does the Mach number do?

77. What is the speed of sound at sea level in ISA conditions?
78. Calculate the speed of sound at 30,000 ft and -40°C.
79. If a constant CAS is maintained in the climb, what happens to the Mach no?
80. If the static vent on an unpressurised aircraft gets blocked what can you do?
81. How is lag on a VSI reduced?
82. The air data computer obtains altitude information from where?
83. What are the inputs to the Air Data Computer?
84. What are advantages of an Air Data Computer over a pitot/static system?
85. A two axis gyro measuring vertical changes will have what characteristics?
86. Name two properties of a gyro.
87. A DGI has what characteristics?
88. What characteristics does the vertical reference of a data generator have?
89. Where might a rate integrating gyro be used?
90. What are the factors that affect a turn indicator?
91. What are indications from a Rate of Turn indicator proportional to?
92. What will a turn indicator show when with an attitude indicator?
93. What is the maximum drift of a gyroscope because of earth rate?
94. What is the apparent wander rate of an aircraft flying a northerly true track from 05°S to 05°N?
95. What are the errors of a DGI?
96. When turning through 090° at a constant attitude and bank, what will a classic artificial horizon indicate?
97. To obtain heading information from a gyro stabilised platform, what should the gyros have?
98. What instrument uses gravity erection on a vertical gyroscope?
99. If a turn and slip indicator shows the needle to the left and the ball to the right, what does it indicate?
100. If the needle and ball of a turn and slip indicator are both displaced to the right, what does it indicate?
101. What angle of bank is required for a rate one turn at 120kts?
102. What is the purpose of the latitude nut in a DI?
103. How is the rigidity of a gyro improved?

QUESTIONS (AND ANSWERS)

Instruments (AGK 4)

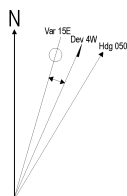
- 104. An aircraft with a classic artificial horizon conducts a level right turn visually at a constant angle of bank and speed. After 270°, the artificial horizon indication is what?
- 105. In a DGI, what error is caused by movement of the gyroscope relative to the earth?
- 106. An aircraft is turning right while taxiing. What are the correct turn and slip indications?
- 107. What will the direct compass of an aircraft landing in a northerly direction indicate?
- 108. Do non-ferrous metals affect a direct reading magnetic compass?
- 109. What is the main cause of error in a direct reading magnetic compass?
- 110. What does the torque motor of a gyro-stabilised magnetic compass do?
- 111. Name one factor leading to error on a direct reading magnetic compass.
- 112. If an aircraft with a direct reading magnetic compass takes off on a Westerly heading in the northern hemisphere, what will the compass indicate?
- 113. In a gyro magnetic compass, what does the flux gate transmit information to?
- 114. An aircraft is taking off on a runway heading of 045° in still air with no deviation, on an agonic line in the northern hemisphere. What will the compass indicate?
- 115. True heading can be converted to magnetic heading with a compass and what?
- 116. What power does the flux valve in a remote indicating magnetic compass use?
- 117. What is a compass swing for?
- 118. What is the Schuler period?
- 119. Why is the Inertial Reference Mode Panel of an IRS programmed with coordinates during alignment?
- 120. What are the selections available on an IRS Mode Select Unit?
- 121. What is displayed on the Primary Flight Display?
- 122. What are the inputs to the FMS?
- 123. What is a cost index of zero on an FMS?
- 124. What is the first page on an FMS CDU?
- 125. What FMS CDU entries for published waypoint identifiers are stored in the database?
- 126. What are the characteristics of a radio altimeter?
- 127. What is the frequency for a low altitude radio altimeter?
- 128. Do radio altimeters use FM?

129. What are the input(s) to a basic stall warning system?
130. Where would you expect to find the Flight Data Recorder?
131. How long must an FDR on an aircraft over 5700 kg after April 1998 be capable of recording specified parameters for?
132. When does the Flight Data Recorder start running?
133. What does a Cockpit Voice Recorder record?
134. An altitude alerting system must at least be capable of alerting the crew of what?
135. Name some modes of GPWS?
136. Between what heights is GPWS active between?
137. Does a GPWS system require sound?
138. Name some inputs to the Stick Shaker.
139. What does a vibration meter measure?
140. Put the following in order of pressure measurement, from lowest to highest: bourdon tube, bellows and capsule.
141. Name some ways of measuring temperature.
142. What happens to the ASI if you depart from level flight with a blocked pitot?
143. What measures inlet pressure?
144. What does a bourdon tube measure?
145. What type of pressure sensor is used to measure LP fuel pump output?
146. What does a bellows measure?
147. What are the disadvantages of a float gauging system?

Instruments (AGK 4) Answers

1. You can rely on the map, but the compass will have been swung with the electrics on, so all the local magnetic fields will have changed with them off. You can therefore expect large deviation errors, so be careful.

2.



3. Temperature normally decreases with altitude, so the local speed of sound will do so as well. TAS must decrease to keep it constant, so RAS will do so as well.

QUESTIONS (AND ANSWERS) •

Instruments (AGK 4) •

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4. TAS will increase with altitude, but the local speed of sound will decrease, so the Mach number will increase as well (they will both decrease in a descent).
5. During acceleration or deceleration, or during a turn.
6. 30°.
7. Between IAF - IF.
8. The final approach segment
9. The intermediate approach segment.
10. 60 seconds.
11. 5 and 10 nm.
12. 60 seconds.
13. Offset entry.
14. 170 kts.
15. Pass the fix not below the specified crossing altitude.
16. 50°.
17. 15°.
18. Where you join the en-route phase.
19. FAP - MAP.
20. DA.
21. For each category of aircraft.
22. Parallel entry.
23. 90 seconds.
24. No, where DME is used, it may be expressed in terms of distance.
25. 30°.
26. 394 feet.
27. To the right.
28. 150 metres.
29. 591 feet.
30. 1 minute, 15 seconds.
31. 135 kts.
32. 1 minute.
33. 5 nm each side of the centre.
34. 1.5 minutes.

35. MDA.
36. One for each approach procedure.
37. 3.3%.
38. A non-precision approach.
39. The width of the primary area.
40. Offset entry.
41. Parallel, Offset and Direct entry.
42. 984 feet.
43. You cannot without ATC clearance.
44. 300 ft/nm.
45. 90°.
46. You are not allowed to descend below glide path.
47. 6 minutes.
48. 15,200 ft.
49. The pressure altitude corrected for prevailing temperature.
50. The equivalent sea level pressure at the airfield.
51. To overcome friction.
52. The pressure altitude.
53. It will overread.
54. Less than the true altitude.
55. The ADC compensates and there will be no error. One static source is compensated during installation to give zero position error and the other is not. Position errors are determined during flight testing and corrections can be applied in the ADC. If the position error is compensated the SSR pressure altitude readout from the ADC will be correct.
56. The altimeter will overread. If only the left port is sensing static, in a sideslip to the right, it will be behind the fuselage and experience local low pressure, causing the overread.
57. IAS corrected for position and instrument error.
58. Yes, if you treat it as a non-precision approach.
59. OCH for the aerodrome.
60. No, there are DME holds.
61. True.

QUESTIONS (AND ANSWERS) •

Instruments (AGK 4) •



62. V_{MO} and temperature.
63. It will behave like an altimeter.
64. The maximum speed that the flaps can be operated.
65. It will underread.
66. Yes.
67. V_{NE} and V_{NO} .
68. V_{YSE} .
69. V_{SO} at the lower end and V_{FE} at the upper end.
70. It will underread.
71. Total pressure.
72. It decreases.
73. An airspeed indicator with an altimeter capsule.
74. Temperature.
75. TAS to Local Speed of Sound.
76. It remains the same.
77. 661 kt.
78. 595 kt.
79. It increases.
80. Break the VSI glass.
81. By two dashpots that respond to acceleration.
82. Barometric data from the static source.
83. TAT, static pressure, electrical power, pitot pressure and AOA.
84. Position error and compressibility are corrected, lag is reduced, many instruments fed.
85. Two degrees of freedom, and a vertical axis.
86. Rigidity and precession.
87. Two degrees of freedom and a horizontal spin axis.
88. A vertical axis with two degrees of freedom.
89. An inertial attitude unit and inertial navigation unit.
90. Angle of bank and aircraft speed.
91. TAS.
92. Direction of turn, angular velocity about a true vertical axis.

93. 15° an hour.
94. 0° an hour.
95. Earth rate, transport wander, banking when pitched up and mechanical problems.
96. Too much nose up and too low a bank angle.
97. One degree of freedom and a horizontal axis.
98. An artificial horizon.
99. A left turn with not enough bank.
100. A turn to the right and too much bank.
101. 18°.
102. To correct for earth rate.
103. By increasing the RPM and concentrating the mass on the periphery of the rotor.
104. Nose up, turn underreads.
105. Transport Wander.
106. Needle right, ball left.
107. No change.
108. No.
109. Turning.
110. It precesses the directional gyro.
111. Acceleration on East/West headings.
112. A turn to the north.
113. Error detector.
114. Less than 045°.
115. A map with isogonal lines.
116. AC.
117. To align compass north with magnetic north.
118. 84 minutes.
119. Establish the trihedron with reference to the earth.
120. OFF, ALIGN, NAV, ATT. A stand-alone INS would also have standby.
121. The flight path.

QUESTIONS (AND ANSWERS)

Instruments (AGK 4)

- 122. Radio aids, engine parameters, air data, route data, terminal data and operating data. Some are automatic, some manual.
- 123. Maximum range, or the most economical use of fuel. On the B737 the highest value is 200, which represents minimum time.
- 124. IDENT.
- 125. The 737-400 Flight Crew Technical Manual says: Airport ICAO identifier, waypoint name, navaid identifier and runway number.
- 126. It is aircraft-based and measures true height, or that of the wheels in approach attitude above the ground.
- 127. 4200 MHz - 4400 MHz.
- 128. Yes.
- 129. Angle of attack.
- 130. As far to the back as possible.
- 131. FDRs must record for 25 hours on aircraft over 5700 kg or with more than 9 seats. Those on modern aircraft registered after 1988 and weighing less than 5700 kg need only record for 10 (before 1998 they need a 30 minute CVR and after 1998 a 2 hour CVR).
- 132. Both the FDR and CVR must run from before the aircraft starts to move under its own power until after it stops.
- 133. Radio conversations, PA announcements when selected on the flight deck, Navigation aid identification and the aural environment of the flight deck.
- 134. The JAR OPS requirement is to alert the crew when approaching a selected altitude and to alert them by at least an audible tone when deviating from it.
- 135. Excessive sink rate, altitude loss after take-off or go-around, excessive glideslope deviation and flaps in the incorrect position.
- 136. 50-2450 ft.
- 137. An audible warning is the only JAR OPS requirement.
- 138. Angle of attack, flap and gear positions. The primary is alpha, the flap position modifies the alpha output with flap selected and the gear position stops the system going off on the ground.
- 139. Relative amplitude.
- 140. A capsule is the least efficient followed by bellows followed by a bourdon tube but the question does not ask about efficiency. Be careful!
- 141. Thermocouple, resistance, mercury, bi-metallic strip.
- 142. Increase during climb and decrease during descent.

143. A bourdon tube, although some old engines like the Avon used bellows. Modern ones use pressure transducers which often also incorporate minute bellows.

144. Pressure.

145. The only pressure sensors at the LP fuel pump outlet are the LP fuel low pressure light switches which most systems show as transducers. The B737 maintenance manual shows a bellows symbol next to the pressure switch.

146. Pressure.

ELECTRICITY & RADIO (AGK 2)

1. Calculate the frequency for a wavelength of 400 KHz.
2. Given a frequency of 2 GHz, calculate the wavelength.
3. If a wavelength is 20 km, what is the frequency?
4. Why does attenuation occur?
5. As frequency increases, does the dead space become larger or smaller? What happens to the skip distance?
6. What is the Maximum Useable Frequency?
7. What is QDM? QDR? QTE?
8. When will the VOR flag appear?
9. If you are tracking towards a VOR on the 180° radial, and drift is 15° to port, what is your heading?
10. On a 3° glidepath at 4 nm from the threshold, what is your height above touchdown?
12. What is the spacing between DME frequencies?
13. A radio set has a switch marked ON and OFF. In which position do you expect the best reception?
14. What letters are on radar when you squawk 7700, 7600 and 7500?
15. How many codes has Mode C?
16. What frequencies do SSR transmitters use?
17. What is the maximum distance apart for VOR and DME aerials to be co-located?
18. What frequency is DME in?
19. For a frequency of 5.5 MHz at night, would you expect to use 3, 12, 15 or 18 MHz during the day?

QUESTIONS (AND ANSWERS) •

Electricity & radio (AGK 2) •

- 20. What happens if your transmit button gets stuck?
- 21. How do you ask for the QFE using the phonetic alphabet?
- 22. What does "wilco" mean?
- 23. What do you say if you are having trouble with communications and want everything repeated twice?
- 24. What words do you use for clarity or confirmation?
- 25. What does H24 mean?
- 26. What words precede a message to everyone on frequency?
- 27. What does monitor mean?
- 28. What word corrects a mistake?
- 29. What word means "That is correct"?
- 30. When receiving radar vectors, you are told to turn on to a heading of 180°. What is the correct reply?
- 31. What is the correct action if your transponder fails when IFR?
- 32. What is the correct reply to "Climb to FL280"?
- 33. ATIS broadcasts shall not be transmitted on the voice channel of an ILS - True or False?
- 34. The phrase "Squawk low" with transponder equipment means what?
- 35. The nominal accuracy of a VOR-station providing track is what?
- 36. List 3 elements that must be included in a distress message?
- 37. Which of these is NOT a distress frequency - 121.5 Mhz, 243.0 Mhz, 2182 Khz and 2430 Khz?
- 38. What is the DME fix tolerance?
- 39. If data link communications are utilised by an ATS unit, to what tolerance is the time check tied to?
- 40. With reference to Sky Wave Propagation what is the Critical Angle?
- 41. A Radio signal has a frequency of 225 MHz and is transmitted through a typical dipole aerial. For it to work efficiently what is the required length of the aerial?
- 42. When is MF fading most common?
- 43. When do you need a Beat Frequency Oscillator?
- 44. What does the ionosphere consist of by day?
- 45. What frequency band would a signal with a 40 cm wavelength belong to?

46. An aircraft transmits on HF from 16,000 ft to ATC, with its receiver aerial on top of the Control Tower at 120 ft. At what range could you expect to make radio contact?
47. What does skin effect do?
48. How is the electrolyte from a Nickel Cadmium battery neutralised?
49. How is the voltage of a DC aircraft generator controlled?
50. A differential relay as fitted to a twin generator system ensures what?
51. What does an open circuit in an electrical system mean?
52. What does the term flashing the field when used in conjunction with DC Generators mean?
53. How is load sharing between DC Generators achieved?
54. What is the accuracy of ADF within the DOC by day?
55. Name some errors associated with ADF?
56. What must happen to receive a bearing from an ADF?
57. What is the wavelength for a frequency of 375 KHz?
58. What is the maximum range a VDF station at 325 ft can provide a service to an aircraft at FL 80?
59. How many satellites are required to produce a 3D fix?
60. What frequency band are NAVSTAR/GPS L1 and L2 frequencies in?
61. What are the NAVSTAR/GPS segments?
62. Is the WGS84 model of the earth a geoid?
63. What is the frequency of AWR?
64. In what mode does the AWR uses the cosecant squared beam?
65. Can AWR detect snow?
66. In an AWR with a 5° beamwidth, how do you orientate the scanner to receive returns from clouds at or above your level?
67. Name an advantage of MLS.
68. What is the maximum range of ground radar limited by?
69. The coverage of MLS is degrees either side of the centreline to a distance of nm?
70. What does PRR refer to?
71. What band is MLS in?
72. Where does a Cat III ILS provide accurate guidance down to?

QUESTIONS (AND ANSWERS)

Electricity & radio (AGK 2)

73. The time from transmission of the interrogation pulse to receiving the reply from a DME ground station is 2000 microseconds (ignore the delay at the DME). What is the slant range?
74. What is the colour recommended in JAR 25 for engaged modes?
75. What is the colour recommended in JAR 25 for armed modes?
76. How may the phantom station in a 2D RNAV system be generated?
77. What is the JAR 25 colour for selected heading?
78. In NAV and EXP NAV modes, what does 1 dot on the EHSI mean?
79. For position fixing, what does the FMC use?
80. When is the FMS position likely to be least accurate?
81. How accurate is a precision RNAV (P-RNAV) system?
82. Using differential GNSS for a non-precision approach, what is the height reference?
83. Which GNSS system can be used for IFR flights in Europe?
84. How many satellites can provide a 3D fix without RAIM?
85. What is the maximum PRF for a range of 50nm?
86. How is the best picture on a primary radar obtained?
87. On a CVOR the phase difference between the AM and FM signals is 30°. What is the VOR radial?
88. Using a VOR beyond the limits of the DOC may result in what?
89. With a 5-dot CDI, how many would show on the edge of an airway 100 nm from the beacon?
90. When an aircraft at FL 360 is directly above a DME, what will the range displayed be?
91. Where does TCAS II obtain information from?
92. Where is TCAS displayed?
93. What is the correct pilot response to TCAS RA?
94. What symbol is used to represent a TCAS RA?
95. What does "wilco" mean?
96. What is characteristic of Ohm's Law?
97. What do you get when you connect two 12v, 40 amp/hour batteries in parallel?
98. What is a relay?
99. What must you do to ensure that DC generators loadshare properly in parallel?

100. If there is heavy corrosion on fuselage skin mountings, is the aircraft properly bonded?
101. If you are homing to a beacon with a relative bearing of zero, what kind of drift are you getting if the magnetic heading increases?
102. What is the VOR frequency range?
103. What is the order of priority of messages in the aeronautical mobile service?
104. What frequency do you make the first Mayday call on?
105. How do you transmit the frequency 118.1?
106. How are fuses rated?
107. What would be a correct abbreviated reply to "Golf India Tango, radar service terminated"?
108. If you change an OBS from 170° - 180° , what will the needle do?
109. Name one disadvantage to using VOR at high altitudes.
110. Why would there be no TO/FROM reading abeam a VOR?
111. Heading West at 140 kts, you cross the 360° of a VOR at 1000. At 1002 you are on the 350° radial. How far are you from the VOR?
112. Where is the greatest DME slant range error?
113. What causes ADF night effect?
114. When is ADF night effect most pronounced?
115. What do Precipitation Static, Thunderstorm and Night Effects do to an ADF needle?
116. Where is Precipitation Static most likely to occur?
117. Aside from causing ADF needles to fluctuate, what else might Thunderstorm Effect do?
118. At what angle across the coast is refraction error most pronounced?
119. If you change the subscale on your altimeter, what will ATC see on their screen?
120. What is a ratiometer?
121. Why use a single phase tachogenerator instead of a DC one?
122. What can you expect from TCAS 2 with a mode C transponder?
123. What is the GPWS Mode 3 audible alert?
124. What corrective action is given by TCAS?
125. How is "Other traffic" assessed as not being a threat indicated by a TCAS system?

QUESTIONS (AND ANSWERS)

Electricity & radio (AGK 2)

- 126. GPWS is active between what heights?
- 127. What is the correct response to a TCAS RA?
- 128. What symbol represents an RA on a TCAS PPI?
- 129. Is monitor vertical speed a preventative RA?
- 130. What input is there to TCAS 2?
- 131. What must an altitude alerting system at least be capable of alerting the crew on?
- 132. Where is TCAS displayed?
- 133. What is the basis of operation of TCAS?
- 134. When an intruder aircraft has no altitude reporting facility (i.e. Mode A transponder), what can you expect from TCAS?

Electricity & Radio (AGK 2) Answers

1.

$$\lambda = \frac{300000000}{400000}$$

1500m.

2.

$$\lambda = \frac{300000000}{2000000000}$$

.15m, or 15 cm.

3.

$$F = \frac{300000000}{20000}$$

15,000 Hz, or 15 KHz.

4. The circumference of the wave front increases, the Earth's surface absorbs some of the energy, and so does the ionosphere.

5. It gets larger. The skip distance increases.

6. The frequency that causes the first returning sky wave to fall just short of the receiving station.

7. QDM is the magnetic great circle bearing of a station from an aircraft, or the great circle heading to fly to the station in still air conditions. QDR is the reciprocal

of the QDM, often referred to as a radial. QTE is the true great circle bearing of an aircraft from a station.

8. When transmissions are faulty, you are out of range or the signal path, or there is a power failure.

9. 015° . You are on the 180° radial, so you are pointing towards the VOR. Just add the drift. (in an exam, you might be asked to draw a diagram referencing more than one beacon).

10. Divide the range in feet ($6080 \times 4 = 24320$) by 60 and multiply it by the glideslope angle to get 1216 feet. The gotcha is that you must add 50 feet (the screen height) to get 1266, as the glideslope is focussed there.

12. 63 MHz.

13. Only checking you are awake!

14. SOS, RTF and HIJ.

15. 4096.

16. Ground bases transmit on 1030 MHz and receive on 1090 MHz and vice versa for airborne transmitters.

17. 100 feet in terminal areas (for approaches) and 2000 feet if used only for en-route navigation.

18. UHF.

19. Although not exactly correct, 12 MHz is the answer, as frequencies should be double during day.

20. Noone else uses the frequency.

21. Request Quebec Foxtrot Echo.

22. Have received your last message and will comply.

23. Words twice.

24. I say again.

25. Operating 24 hours.

26. All Stations.

27. Listen out on the frequency.

28. Correction.

29. Correct.

30. One eight zero degrees, Golf Whiskey India Zulu Zulu (or any variation ATC have already used).

31. Inform ATC immediately.

32. "Climb to Flight Level Two, Eight Zero".

QUESTIONS (AND ANSWERS) •

Electricity & radio (AGK 2) •



33. True.
34. Squawk ident.
35. $\pm 5^\circ$.
36. MAYDAY x 3, callsign & intentions.
37. 2430 KHz.
38. ± 0.25 nm + 1.25% of distance to the antenna.
39. Within 1 second of UTC.
40. The angle from the Normal at which a Radio Wave can be refracted back towards the Earth.
41. 2/3 metre.
42. At night, due to the reception of both sky waves and ground waves.
43. When a signal is received which is an Unmodulated Carrier Wave.
44. 4 layers between 100 and 300km above the earth.
45. UHF.
46. 171.8 km.
47. Causes apparent resistance of a wire to increase with frequency.
48. A solution of Boric acid.
49. By varying the resistance of the generator field circuit.
50. The generators can be paralleled when their voltages are almost equal.
51. Equipment connected into that circuit will not operate.
52. DC current is passed through the generator field to restore residual magnetism or correct polarity.
53. Extra coils in each generator's voltage regulator modify the exciter current to each field winding.
54. $\pm 5^\circ$.
55. Mountain effect, station interference, static interference.
56. The loop and sense aerials must receive the signal.
57. 800m.
58. 134 nm.
59. 4.
60. UHF.
61. Space, control, user.

62. Yes.
63. 9375 MHz.
64. MAP.
65. No.
66. 2.5° uptilt.
67. It can be used in inhospitable terrain.
68. The pulse recurrence rate (PRR).
69. 40 degrees, 20 nm.
70. Pulses per second.
71. SHF.
72. The surface of the runway.
73. 165 nm.
74. Green.
75. White.
76. With VOR or DME.
77. Magenta.
78. 2 nm.
79. DME/DME or VOR/DME.
80. TOD.
81. 1 nm standard deviation or better.
82. Barometric.
83. NAVSTAR/GPS.
84. 4.
85. 1620 pps.
86. Short wavelength, narrow beam.
87. 330.
88. Interference from other VORs on the same frequency.
89. 1.5.
90. 6 nm.
91. Pressure encoding from mode S transponder, radio altimeter, aircraft configurations (aerial transmission patterns change when full flap is selected) and inertial reference unit.

QUESTIONS (AND ANSWERS) •

Electricity & radio (AGK 2) •

- 92. Normally on a combined VSI/TCAS display or the PFD and ND in an EFIS aircraft.
- 93. Disengage the autopilot and smoothly and immediately follow the climb or descent commands.
- 94. Red square.
- 95. I understand your last message and will comply.
- 96. Current is directly proportional to applied emf.
- 97. A 12v, 80 amp/hour one.
- 98. An electromagnetically operated switch in the form of a solenoid.
- 99. Keep voltages almost equal.
- 100. No.
- 101. Right drift.
- 102. 118-117.95 MHz.
- 103. Flight safety, meteorological, flight regularity.
- 104. The one currently in use.
- 105. One one eight decimal one.
- 106. By the amount of current they can hold, in amps.
- 107. Golf India Tango.
- 108. Swing left if going TO the VOR (or right if going FROM).
- 109. You might get station overlap and erroneous readings.
- 110. You are in the zone of ambiguity.
- 111. 28 nm.
- 112. At high altitude and a short distance from the station.
- 113. Returning sky waves interfere with ground waves.
- 114. When the receiver is furthest away from the station.
- 115. They cause the needle to fluctuate excessively.
- 116. In snow and/or ice crystals.
- 117. Make the needle point towards the storm.
- 118. Less than 30°.
- 119. Nothing, because the subscale is not geared to the encoder.
- 120. A moving coil indicator that uses the ratio of two currents to position a needle and is unaffected by voltage changes.

121. The voltage is more stable.
122. TA and RA in vertical plane.
123. DON'T SINK, DON'T SINK continuously.
124. Climb or descend.
125. A hollow cyan diamond.
126. 50-2450 ft.
127. Smoothly and immediately follow climb or descent commands.
128. A red square.
129. Yes.
130. Mode S transponder which co-ordinates avoidance manoeuvres.
131. Approaching selected altitude, excessive deviation from it.
132. Either on its own screen or on the EFIS.
133. Transponders in the aircraft.
134. TA only.

NAVIGATION

1. How far will you fly in 2 hrs 38 mins at a groundspeed of 364 kts?
2. If you flew 60 nm in 14 minutes with a TAS of 250 kts, what is the wind?
3. With a wind velocity of 260/15 and a track of 296°T, what heading and airspeed should be flown to maintain a groundspeed of 120 kts on track?
4. If a Mercator chart's scale is 1/1000000 at the equator, what is its scale at 60°N?
5. Is a rhumb line or a great circle nearer the pole?
6. When does a great circle match the direction of a rhumb line?
7. To reduce speed from 450 kts to 350, and delay your ETA of 1200 by 10 minutes, when do you pull the levers back?
8. If you are at 100° E, with a local time of 1200, what is the GMT?
9. If the time in Question 8 changes to 0200 on Jan 4th, what is the GMT and date?
10. You are due to depart from 120° W at 2000 on June 20th, for an airfield at 120° E. If your flight planned time is 10 hours, when will you arrive?
11. At 1400 hrs Mountain Time (in Canada), what is the standard time in Spain?
12. What is the LMT of sunrise at 53° N on July 9th?

13. An aircraft on a magnetic heading of 090° has a fixed card ADF indication of 060°. What is the magnetic track from the station?
14. Using the information in q 12 to intercept an outbound track of 360° at a 45° intercept, what magnetic heading should be flown?
15. Using the information in q 13 upon track interception, what relative bearing should be shown?
16. Aphelion is where the sun is furthest away from the Earth. When is that?
17. What are the capabilities of the FMS on the 737-400?
18. When encountering a windshear, what will change indication first?
19. How long is a Great Circle track between 56°N 70°W and 62°N 110°E?
20. Having started at 60°N 10°W, you track 090°T for 315 km. What is your longitude when you land?
21. If the ellipticity of the Earth is 1/297 and the semi-major axis at the axis of the Equator is 6378.4 km, what is the semi-major axis at the axis of the Poles?
22. On a chart, 12" represents 45 nm. What is its scale?
23. On a chart, 20 cm represents 20 sm. What is its scale?

Navigation Answers

1. 960 miles. Line up 60 against 364 on the outer scale, look against 158 mins.
2. Line up 14 on the inner scale against 60 on the outer, to see the groundspeed of 257 kts against the 60 triangle. As this is more than the TAS, there is a 7 kt tailwind.
3. 292° at 132 kts.
4. Scale expansion varies as the secant of the latitude (or the reciprocal of the cosine), so you multiply it by whatever the Equator scale is. In this case, to make things easy, the secant of 60° is 2, so:

$$60^\circ = 1/1000000 \times 2$$

which becomes:

$$60^\circ = 2/1000000$$

or:

$$60^\circ = 1/500000$$

The scale will always be smallest at the Equator.

5. Great circle.
6. At the midpoint of the track.
7. 5 mins at the original groundspeed is 37.5 nm. At 100 kts (the speed reduction), this is 22½ minutes. You need to arrive at 1210, so subtract this figure to get

1247.5 (call it 1248). As for distance, 22 ½ minutes at reduced groundspeed (250 kts) is 125 nm.

8. Being noon, the Sun is overhead, but 400 minutes (100 x 4) away from Greenwich, so GMT is 0520.

9. The difference is still 400 minutes, but it's the day before, so it's 1920 on Jan 3rd.

10. If you work through GMT, the date will take care of itself. You start off from a point 480 minutes (in time) before GMT, so GMT is 0400 on the 21st. If you add 10 hours to that, you arrive at 1400 GMT (on the 21st). The local time difference at the destination is also 480 minutes, so the LMT on arrival is 2200.

11. Mountain time is 7 hours behind GMT, and Spain is 1 hour ahead, so the standard time in Spain is 2200.

12. Part of the table in the Air Almanac for the relevant time will look like this:

	7	10
54N	0337	0340
52N	0348	0351

Naturally, the latitude and date will not be specifically mentioned, so you have to interpolate. It is midway between 0339 and 0350, or 0345 to the nearest minute.

13. 330°.

14. 045°.

15. 135°.

16. The beginning of July.

17. It has an automatic performance system and automatic guidance.

18. The ASI.

19. This is easier than it looks. The change of longitude is 180° (110+70), so the shortest route is over the Pole, minus the change in latitude, which is 62° (34+28). Multiply that by 60 to get 3720 minutes, or 3720 nm.

20. First convert the km to nm, to get 170. Then use the departure formula to divide that by the cosine of 60° to get 340', or 5° 40'. The answer is 4° 40'W.

21. What this is really asking is how long is half the polar circumference of the Earth - you know the Equatorial circumference is 43 km larger, so half of that is 21.5 km, which you subtract from the figure given. 6378.4 - 21.5 is 6356.9.

22. CD/ED means 12/3283200, so 27400 is the answer (actually, it's 273600, but the exam gives the former as the nearest choice).

23. 20 sm in cm is 3218688, so 160934.4 is the answer (but you might see 161,000 in an exam).

FLIGHT PLANNING (1)

1. You have a climb gradient of 10%, with an obstruction 900 m high at 10,000 m from where screen height is achieved. If your height at reference zero is 15 m, by how much will you clear the obstruction?
2. There is an obstacle 1,000 ft high at 1.8 nm in line with the runway. Given a climb rate of 1250 fpm and a TAS of 92 kts, will you clear it?
3. If the Climb gradient in still air is 3.2%, and the height achieved 640', what is the distance travelled?
4. An aerodrome elevation is 2000 ft AMSL, TODR is 2700 m and the runway slope is 2% downhill. If there is an obstacle with an elevation of 3700 ft AMSL 7000 m from the Brake Release Point, what is its height above Reference Zero?
5. Calculate the still air gradient, given that the aircraft climbs at 1500 at 300 kts TAS with a 50 kt tailwind.
6. How does temperature decrease affect performance?
7. If a balanced field is used for takeoff calculations when the actual field distances are unbalanced, what will happen to Take Off Mass?
8. What is the minimum semi-width of the en-route obstacle domain permitted by the JAA?
9. If a runway is contaminated with 15 mm (0.6") of snow, can you take off?
10. What is JAR Takeoff performance based on?
11. What is the effect of a contaminated runway on the field limit mass?
12. What is affected with anti-skid inoperative?
13. What is the relationship between V_X and V_Y ?
14. With which conditions would you expect V_{MC} to be the lowest?
15. Is this the correct order for the following: V_{MCG} , V_1 , V_R , V_2 ?
16. Descending below the tropopause from FL 370 to FL 250 at a steady Mach no, then FL 250 to FL 100 at a constant CAS. What happens to the descent angle?
17. With constant weight and Mach no, what angle of attack will a higher altitude require?
18. When approaching a wet runway, with the risk of hydroplaning, what technique should you adopt?
19. What does flying close to coffin corner give?
20. What is the main reason for using the stepped climb technique?
21. Ignoring compressibility, what would C_L do with an increase in altitude?
22. What is climb gradient a ratio of?

23. When takeoff mass is limited by V_{MBE} , what will an increase in uphill slope allow?
24. What is Reference Zero?
25. What do you need to maintain angle of attack and altitude at higher gross weight?
26. How may the coefficient of lift be increased?
27. An aircraft is certified to land with flaps at either 25 or 35°. If the pilot selects the higher setting, what will be the effect?
28. Which conditions are most suited to using low flap for take off?
29. $V_{2\text{ MIN}}$ is determined by what (excluding V_{MCA})?
30. If the flap setting is changed from 10 to 20°, what happens to V_2 ?
31. For a turbojet, when does the second segment of the climb begin?
32. For a turbojet, when does the third segment of climb begin?
33. What does the buffet onset boundary chart tell you?
34. Two identical turbojets are at the same altitude and speed, with the same fuel consumption. Plane 1 weighs 130,000 kg and fuel flow is 4,300 kg/hr. If the other weighs 115,000 kg, what is its fuel flow?
35. Is the speed for minimum power required in a turbojet faster than the speed for minimum drag?
36. In wet conditions, what extra percentage over the calculated landing distance must be available for a turbojet?
37. In dry conditions, when landing at an alternate in a turbojet, by what factor should LDA be changed for landing distance?
38. What landing distance requirements must be met at an alternate airfield compared to a destination for a turboprop?
39. How is Absolute Ceiling defined?
40. How is V_{REF} for a Class B aircraft defined?
41. Should V_R for a jet aircraft be faster than $1.05 V_{MCA}$, and greater than V_1 ?
42. What will happen when landing on a runway with 5 mm wet snow?
43. You are taking off on a runway with standing water, 0.5 cm deep. Compared to a dry runway, what will happen to field length limited mass?
44. With increase in temperature, what happens to maximum brake energy limited mass?
45. What will happen to pitch angle during descent at constant mach no?

QUESTIONS (AND ANSWERS) •

Flight Planning (1) •

- 46. How will climbing to cruise altitude with a headwind affect decreased time to climb?
- 47. Why is there a requirement for an approach climb gradient?
- 48. What is drift down for?
- 49. A light twin is climbing from the screen height of 50 ft, with an obstacle 10,000 m along the net flight path. If the net climb gradient is 10%, there is no wind and the obstacle is 900 m above the aerodrome elevation what will the clearance be?
- 50. How long is Take Off Run Required for a jet, with one engine inoperative?
- 51. How is a jet aircraft's maximum altitude usually limited?
- 52. For en-route diversions, if you believe you will not clear an obstacle, what do you do with the fuel?
- 53. How does the power required graph move with an increase in altitude?
- 54. What factors would cause V_2 to be limited by V_{MCA} ?
- 55. In a climb, at a constant IAS/Mach No of 300 kts/0.78M., what happens at the changeover point (29,500 ft in ISA)?
- 56. If not V_{MBE} or V_{MCG} limited, what would V_1 be limited by ?
- 57. What requires V_1 to be reduced?
- 58. Is V_{MBE} affected by a tailwind?
- 59. During certification of a light twin jet, a distance of 1747 m is measured from brake release to a point equidistant between V_{LOF} and 35 ft. A further distance of 1950 m is measured, having simulated an engine failure at V_1 . What is the distance specified as TORR?
- 60. Two identical aircraft, one with a light load and one with a heavy load are in an idle power descent, from the same height. Both experience the exact same atmospheric conditions. How will the heavy aircraft perform?
- 61. In a headwind, the speed for max range should be.....?
- 62. What is V_{LO} ?
- 63. At the optimum range altitude, what happens to fuel consumption over time?
- 64. What happens to the field limited take off mass with runway slope?
- 65. Cruising with 1 or 2 engines inoperative at high altitude, compared to all engines operative cruise, what happens to the range?
- 66. A turboprop with a maximum all up mass over 5700 kg is limited to what angle of bank?
- 67. Concerning landing gear, which factors limit take off performance?
- 68. In a glide, if pitch angle is increased, what happens to glide distance?

69. Under which conditions would an aircraft need to be flown to achieve maximum speed?
70. Up to which height in NADP 1 noise abatement procedures must $V_2 + 10-20$ Kts be maintained?
71. In a balanced turn, the load factor is dependent on what?
72. How does slush thickness affect V_1 reduction required?
73. What denotes stall speed in the landing configuration?
74. In a gliding manoeuvre, to achieve maximum endurance, what speed should be flown?
75. What happens to the Mach number when descending below the optimum altitude at long range cruise speed?
76. During aircraft certification, the value of V_{MCG} is found with nose wheel steering inoperative. Why?
77. Out of the four forces acting on an aircraft in flight, what balances thrust in the climb?
78. How is fuel consumption affected by the C of G position?
79. With an obstacle which is 160 m above the airfield elevation and 5,000 m from the end of the take off distance (screen height 50 ft), what would the obstacle clearance be with a gradient of 5%?
80. Before takeoff why do you need to check the brake temperature?
81. When descending at a constant Mach number, which speed is most likely to be exceeded first?
82. What happens to V_X and V_Y when lowering the undercarriage?
83. What factors affect descent angle in a glide?
84. What is meant by balanced field available?
85. Does increased altitude decrease the value of V_S ?
86. What is the region of speed instability the same as?
87. What effect does an increase in weight have on V_1 ?
88. V_R for a Class A aeroplane must not be less than what?
89. As speed reduces from V_{MD} to V_{MB} what do power required and drag do?
90. What speed does maximum induced drag occur at?
91. V_{MD} for a jet is approximately equal to what?
92. The best EAS/ Drag ratio is approximately what?
93. What percentages of head and tail wind components are taken into account when calculating the take off field length required?

QUESTIONS (AND ANSWERS) •

Flight Planning (1) •

- 94. For a turbo jet planning to land on a wet runway, the landing distance available.....?
- 95. An aerodrome has a clearway of 500 m and a stopway of 200 m. If the stopway is extended to 500 m, what will be the effect on takeoff mass and V_1 ?
- 96. What is the tyre speed limit?
- 97. What gives you the greatest gliding time?
- 98. For take off performance calculations, what is taken into account?
- 99. Which 3 speeds are effectively the same for a jet aircraft?
- 100. The long range cruise speed gives what?
- 101. At a high ambient temperature (+30°C) and relative humidity as low as 40%, in air free of cloud, fog and precipitation, can serious carburettor icing occur?
- 102. If the main gear tyre pressure is 10.8 bar, what is aquaplaning speed?
- 103. How does snow and ice contamination affect performance?
- 104. If the OAT is 10°C and the dewpoint is 7°C, can you expect carburettor ice?
- 105. If the C of G moves aft, what happens to range and fuel consumption?
- 106. What happens to range when flying above optimum altitude?
- 107. What sort of climb is used for optimum performance?
- 108. What happens to climb-limited takeoff mass if OAT increases?
- 109. Can you take off towards an obstacle when you have a tailwind?
- 110. On rotation, the nose comes up a little too quickly - what is wrong?
- 111. An aircraft weighs 32000 kg, and the operations items weigh 1700 kg, what is the empty mass?
- 112. With a basic mass and arm of 1200 kg and 3 m, giving a C of G at 25% of MAC, if the MAC is 2 m long, what is the C of G at takeoff (in terms of MAC) given pilot and passenger weights at 80 kg each and 140 ltrs of fuel with a density of .714 - the arms are: fronts seats 2.5 m, and fuel at 3m?
- 113. For takeoff and enroute mass limitations, what must the mass at engine start not exceed?
- 114. Name one factor to be taken into consideration when landing mass is calculated.
- 115. For noise abatement, when may takeoff mass exceed the maximum?
- 116. How do V_X and V_Y compare?
- 117. Why might you reduce thrust on take off?
- 118. What approximates V_{MD} for a turbojet?

119. What kind of performance do you get at maximum L/D in a prop-driven aeroplane?
120. Where does max range for a jet occur in relation to L/D_{MAX} ?
121. In wet conditions, what extra percentage over calculated landing distance must be available for a turbojet?
122. What speed should you use for maximum endurance in the glide?
123. How does V_{MCG} change with high elevations and temperatures?
124. If rate of climb is 1,000 fpm, and TAS 198 kts, what is your climb gradient?
125. Where does the second segment of the NFP start for a turbojet?
126. Where are commercial aircraft flown with respect to optimum cruise altitude?
127. Why does a fully loaded twin-engined jet climb better than a fully loaded three or four-engined jet?

Flight Planning (1) Answers

1. 115m.
2. Yes, by 467ft.
3. 3.29 nm.
4. 1877 ft.
5. 4.9%.
6. It will cause a decrease in takeoff distance and increase rate of climb.
7. It will decrease the maximum permissible TOM.
8. 5 nm.
9. No.
10. A hard paved surface that is level and dry.
11. Decreased weight, V_1 , V_R .
12. Landing and takeoff performance.
13. V_Y will always be greater than or equal to V_X .
14. High temperature, pressure altitude and humidity.
15. Yes.
16. Constant increase.
17. A higher one.
18. Positive touch down, full reverse and brakes as soon as possible.
19. Less manoeuvrability.

QUESTIONS (AND ANSWERS) •

Flight Planning (1) •

- 20. To adhere to ATC procedures.
- 21. Remain the same.
- 22. Height gained over distance travelled through the air.
- 23. An increase in mass.
- 24. Where the aircraft reaches 35 ft.
- 25. More airspeed and power.
- 26. By lowering the flaps or increasing angle of attack.
- 27. Reduced landing distance and reduced go-around performance.
- 28. Low airfield elevation, close obstacles, long runway, high temperature.
- 29. $1.2V_S$ for all turbojets.
- 30. Decrease if not limited to V_{MCA} .
- 31. When accelerating from V_2 to where flap retraction speed begins.
- 32. When acceleration from V_{LOF} to V_2 begins.
- 33. The mach number for low speed stall and shock stall for various masses and altitudes.
- 34. 3804 kg/hr.
- 35. Yes.
- 36. 43%.
- 37. 1.67.
- 38. More than destination.
- 39. The altitude where theoretical rate of climb is zero.
- 40. $1.3 V_{SO}$.
- 41. Yes.
- 42. You will get slightly reduced landing distance, due to increased impingement drag.
- 43. Decrease, with a decreased V_1 .
- 44. It will decrease.
- 45. It will decrease.
- 46. It will decrease.
- 47. To maintain minimum altitude on the approach.
- 48. When an engine fails above the altitude for one engine inoperative.
- 49. The aircraft will not clear the object.

50. As for all engines.
51. The altitude at which low and high-speed buffet will occur.
52. Jettison it from the beginning of the drift down (15 mins time limit).
53. Straight across to the right.
54. Flaps at high settings, high pressure and low temperature.
55. The rate of climb would increase, because TAS starts to increase.
56. V_{MU}
57. Improved climb procedure.
58. No.
59. 1747 m.
60. It will descend steeper, at faster speed, with a greater rate of descent.
61. Slightly increased.
62. The maximum speed for landing gear operation.
63. It gradually decreases.
64. It increases with downhill slope.
65. It decreases.
66. 15° up to 400 ft.
67. Wheel rate of rotation, brake energy.
68. It decreases.
69. Maximum thrust and maximum drag.
70. 3000 ft.
71. Bank angle.
72. Smaller reduction if thicker.
73. V_{SO}
74. That for minimum power.
75. It decreases.
76. It must be valid in wet and dry conditions.
77. Drag + $W \sin \theta$?
78. It decreases with forward C of G.
79. 105 m.
80. If they are already hot, they may fade or overheat during a RTO.

QUESTIONS (AND ANSWERS) •

Flight Planning (1) •



81. V_{MO}
82. V_X decreases, V_Y decreases.
83. Configuration and angle of attack.
84. $TODA=ASDA$.
85. No.
86. The region of reversed command.
87. It will cause it to increase.
88. 5% above V_{MCA} .
89. Power required decreases and drag increases.
90. V_{SO}
91. $1.6 V_S$.
92. $1.32 V_{MD}$
93. 50% head- and 150% tailwind.
94. May be less than 15% greater than dry landing distance if the flight manual gives specific data.
95. Both will increase.
96. Max V_{LOF} in ground speed.
97. Being light.
98. OAT, PA, wind, weight.
99. Best angle of climb, Minimum Drag, Endurance.
100. 99% of best cruise range, with an increase in IAS.
101. Yes, at a lower power setting.
102. 112 kts, with water depth equal to tyre tread depth.
103. By increasing the take off run and V_S , and reducing climb gradient.
104. Yes, because saturation point is almost reached.
105. Range will increase and fuel consumption will decrease.
106. It reduces.
107. Step cruise.
108. It decreases.
109. Yes.
110. The C of G is aft.
111. Trick question - the empty mass does not contain operational items.

112. Work out the basic C of G:

Item	Wt	Arm	Mom
A/C	1200	3	3600
Pax	160	2.5	400
Fuel	100	3	300
Total	1460		4300

Divide 4300 by 1460 to get 2.945 m.

The empty C of G is already at 25% MAC, at .5 m, so the MAC leading edge is 2.5 m aft of the datum. Take this away from the C of G position to get .445 m aft of its leading edge, that is, 22.26% MAC.

113. Maximum takeoff mass.

114. Noise abatement.

115. When using a runway with no noise problem.

116. V_Y is always greater than or equal to V_X .

117. The engine lasts longer.

118. $1.6 V_S$.

119. Maximum range and glide distance.

120. Mostly higher.

121. 92%. On a dry runway, LDR is $1.67 \times LD$ (calculated landing distance), increased by a further 15% if wet. $1.67 \times 1.15 = 1.92$.

122. Minimum power, or the lowest energy consumption rate (which is equal to power required, and lower than minimum drag speed).

123. It decreases as they increase.

124. 4.98%.

125. When the landing gear is fully retracted.

126. At optimum altitude whenever ATC instructions permit.

127. It's overpowered to begin with - when it loses an engine, it loses 50% of its power, as opposed to the 33% or 25% of the others.

FLIGHT PLANNING (2)

1. Given a distance of 480 nm, on a track of 090° with a w/v of 270/60, and a TAS of 270 kts, find the distance of the critical point from A, and the time it will take to fly to it.
2. If the distance is 345 nm, the track is 140°, the w/v is 140/50, and the TAS 260 kts (4 engines) and 210 kts (3 engines), find time and distance to the critical point, assuming that engine failure occurs there.
3. On an outbound track of 270°, with 6 hours' fuel on board, a TAS of 240 kts and a wind velocity of 290/45, give the time and distance to the PNR from A. You must land with 2 hours' fuel reserve.
4. If you plan to fly for an hour and a half, and your machine uses 10 gals/hr, and you must land with 10 gals on board, what is your minimum fuel before takeoff?
5. In 5 nm visibility, two aircraft have a closing speed of 500 kts. How much time is there for avoiding action if seen at maximum range?
14. What does UNL mean on a chart in relation to a Danger Area?

Flight Planning (2) Answers

1. The groundspeed home is 180 kts (240-60) and the groundspeed out is 300 (240+60), so the formula is:

$$\frac{480 \times 180}{300 + 180}$$

180 nm at 300 kts is 36 minutes.

As a gross error check, work out the times forward and back to see if they are the same. It's 180 nm from the CP to A, so at 180 kts, it will take an hour to get there. From the CP to B, it's 300 nm which, at 300 kts, is also 1 hour.

2. The groundspeed home is 260 kts (210 + 50) and out is 160 (210 - 50), so the formula is:

$$\frac{345 \times 260}{260 + 160}$$

The distance is 213.5 nm. At 210 kts (all engines working) the time to get there will be 61 minutes. The worst place to get a reduction in power is at the CP itself, where you are at the furthest point in time from a suitable airfield, so the calculations should be done with the appropriate reduced speeds. However, before the engine fails, you are at full power, so using full speed is appropriate for ETA.

3. Your actual endurance is 4 hours (240 minutes), since you must land with 2 hours' worth on board. The groundspeed out is 196kts and back is 283 kts, so the formula is:

$$\frac{240 \times 282}{196 + 282}$$

which works out at 141.5 minutes. At 196 kts, the distance is 462 nm. The gross error check confirms that the flight out and back should take the total endurance. 462 nm at 282 kts is 98.5 minutes, which, added to 141.5 makes 4 hours (240 minutes).

4. 25 gals.

5. About 36 seconds.

14. Unlimited (that is, the area extends to an infinite height).

HUMAN FACTORS

1. What is Time of Useful Consciousness?
2. Which gas normally diffuses from the blood to the alveoli?
3. What can you do to prevent or overcome spatial disorientation?
4. You are crossing the Alps in a non-pressurized aircraft at 15,000'. You do not use the oxygen mask, as you feel fine. Why is this unsafe?
5. What about synergy within crews?
6. How is hyperventilation treated?
7. How is Barotrauma of the sinuses (aero sinusitis) caused?
8. What are the common hazardous thought patterns (attitudes) for pilots to develop?
9. What are pains in the joints (the bends), which suddenly appear, symptoms of?
10. How can you avoid flicker vertigo when flying in clouds?
11. How long should you delay flying after scuba diving?
12. What do you call the process of oxygen being transferred from the blood into the tissue, and carbon dioxide from body cells into blood?
13. What is the DECIDE model based on?
14. At what height does the barometric pressure drop to ½ the pressure level?
15. What is hypoxia caused by?
16. What can you do to help compensate for hypoxia?
17. What are the effects of sleep deprivation on performance?
18. What does experiencing stress depend on?
19. When can a system be said to be tolerant to error?

QUESTIONS (AND ANSWERS) •

Human Factors •



20. What can become the main risk of a *laissez faire* cockpit?
21. What might you suffer from if you fly with a bad cold?
22. What chemical substance in tobacco causes addiction?
23. A pilot accustomed to a runway width of 27 m lands on an unfamiliar one 42 m wide. What might happen?
24. If you experience Negative G what is the effect on your inertia?
25. If you pick up a pen from the floor of the cockpit, you may suffer from what?
26. What is the composition of the atmosphere at 21,000 ft?
27. What factors decrease resistance to DCS?
28. If sensory threshold is increased, what happens to sensitivity.
29. The Gestalt Theory relates to?
30. What is a self-centred cockpit?
31. What are symptoms of hypoxia?
32. A few hours after landing you feel pain in your joints. What is the correct action?
33. Hypothermia causes what?
34. Where do you find haemoglobin?
35. What do you understand by the term Psychosomatic?
36. What is Attitude?
37. In flight, are you allowed to use sunglasses with variable transmission light sensitive Photochromic lenses?
38. When staring at an isolated light at night, what might it do?
39. Even with a small ingestion of alcohol, will you be more susceptible to hypoxia?
40. In conditions of fog, snow or mist, what happens to objects?
41. With a pulse rate of 72 beats a minute and a stroke volume of 70 ml, what is the cardiac output?
42. What is TUC following loss of pressurisation at 35,000 ft?
43. After giving blood, what should you do?
44. Define decision-making.
45. What is personality based on?
46. What does Presbycusis cause?
47. What are the characteristics of blood from the pulmonary artery?

48. Above and below what body temperatures will there be a degradation of mental and physical capabilities?
49. How does the eye adjust?
50. What is the condition that causes a visual image to be focussed in front of the retina?
51. What happens when you look at a near object?
52. Where would you find the ossicles (malleus, incus and stapes)?
53. Vertigo causes what illusion(s) when flying?
54. What is Cardiac Output?
55. What illusion might linear acceleration cause?
56. What should you do when being affected by the "Flicker Effect"?
57. Give the TUCs at 35,000' for sitting, moderate activity, and rapid decompression.
58. Give an example of negative transfer of a habit.
59. Why would you see a doctor after giving blood?
60. What law governs the oxygen transfer at the alveoli?
61. What is the worst type of incapacitation on finals?
62. Above what height can night vision be reduced?
63. What is the duration of STM (short-term memory)?
64. What is the most dangerous type of incapacitation?
65. On recovering from a spin, what strong sensation might you have?
66. Which symptom marks the beginning of hyperventilation?
67. What do subcutaneous pressure receptors sense?
68. Dalton's Law is associated with?
69. What might anxiety affect?
70. Where does the body get energy?
71. What is the normal tidal volume?
72. What should you do to counteract flash blindness in a thunderstorm with lightning?
73. How much CO₂ is in exhaled air?

Human Factors Answers

1. The time in which an individual acts with mental and physical efficiency and alertness, from when the available oxygen supply is lost.



2. Carbon dioxide.
3. Rely on the flight instruments.
4. Judgement could be impaired.
5. It must be built up from the start of the mission (briefing) and be maintained until it comes to an end (debriefing).
6. Talk yourself through the relevant procedure aloud, to calm the emotion and reduce the rate of breathing simultaneously.
7. Differences in pressure between the sinus cavity and the ambient air.
8. Anti-authority, impulsiveness, invulnerability, resignation, machismo complex.
9. Decompression sickness.
10. Switch the strobe light off.
11. 24 hours.
12. Internal respiration.
13. A prescriptive generic model, taking into account the method which seems most likely to come up with the solution.
14. 18,000 feet.
15. A reduced partial oxygen pressure in the lungs.
16. Descend below 10,000', breath 100% oxygen, reduce activity.
17. They increase with altitude and a higher workload.
18. Your interpretation of the situation.
19. When the consequences will not seriously jeopardise safety.
20. Inversion of authority.
21. Sinus pain.
22. Nicotine.
23. The pilot will tend to fly too high an approach and overshoot.
24. Upwards and vertical.
25. Coriolis Effect.
26. 78% N, 21% O₂, 1% CO₂ + traces.
27. Scuba diving, obesity and age.
28. It is reduced.
29. Perception and organisation.
30. Crew members tend to do their own jobs independently without keeping others informed.

31. Impaired judgement, fast and heavy breathing, impairment of vision and muscles.
32. See a doctor as soon as possible.
33. Increase in oxygen demand and eventually unconsciousness.
34. In red blood cells.
35. It refers to the interrelationships of mind and body, or psychological reactions to outside stimuli that cause physiological changes.
36. How you respond to another person, situation or organisation.
37. Not generally.
38. Vary in colour.
39. Oh yes.
40. Objects appear further away than they really are.
41. 5 litres a minute.
42. 30-60 seconds.
43. Aircrew should rest supine for about 15-20 minutes, drink plenty of fluids and not fly for 24 hours.
44. A systematic and analytical process.
45. Heredity, Childhood, Upbringing and Experience.
46. High tone deafness.
47. It is low in oxygen and rich in carbon dioxide.
48. Above 38°C, below 35°C.
49. It can adjust to high levels of illumination in 10 seconds, and darkness in 30 minutes.
50. Myopia.
51. The pupil becomes smaller (the lens also becomes thicker).
52. In the middle ear.
53. Flying straight in a spin, climbing while turning, spinning while flying straight and level.
54. Stroke volume x heart rate.
55. The aircraft climbing.
56. Turn off the strobe lights.
57. 45, 30 and 20 seconds.

QUESTIONS (AND ANSWERS) •

Human Factors •

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58. Selecting the wrong switch when used to doing it the other way in another aircraft.

59. Increased susceptibility to Hypoxia.

60. Gas Diffusion Law - Fick's Law.

61. Gradual.

62. 8,000 ft.

63. Around 20 seconds.

64. Insidious.

65. Turning in a direction opposite to that of the spin.

66. Dizzy feeling.

67. Spatial orientation of the body.

68. Hypoxia.

69. Judgement, Attention, Memory, Concentration.

70. Carbohydrates.

71. 500 ml.

72. Turn up cockpit lights. Don't look out.

73. More than inhaled air.

QA

QUESTIONS (AND ANSWERS)
Human Factors