

SECTION 3 – AERONAUTICAL KNOWLEDGE TRAINING SYLLABUS

[Go To Section 1](#)
[Go To Section 2](#)

CONTENTS			
1.1. General	3-1	5. Aircraft Type Knowledge	3-12
1.2. Interpreting the Syllabus	3-2	6. Helicopter Aerodynamics	3-13
1.3. Study References	3-2	7. Navigation	3-15
1.4. Industry Examinations	3-3	8. Operations, Performance and Planning	3-18
1.5. CASA Examinations	3-3	9. Meteorology	3-22
2. Aircraft General Knowledge (AGK)	3-4	10. Recommended Pre-study	3-26
3. Flight Rules and Air Law	3-8	11. Human Factors	3-26
4. Radio Telephony	3-12		

1. Introduction

1.1 General

This syllabus of aeronautical knowledge specifies the aeronautical knowledge objectives that must be met by applicants for helicopter pilot licences. The level for each knowledge item has been set out in an objective form so that both students and instructional staff can readily understand the level of knowledge for each item.

To integrate theory training with flight training, the Aeronautical Knowledge syllabus has been divided into two ground training blocks as indicated below:

Pre PPL:

Contains the knowledge requirements to be taught prior to the General Flying Progress Test and nominates specific objectives to be met prior to undertaking the following flights:

- 1st Solo
- General Flying Progress Test (GFPT).

PPL and CPL:

Specifies the knowledge requirements prior to the completion of the:

- PPL training phase
- CPL training phase.

The Performance Standards used to define the relative importance of each syllabus objective are:

STANDARD	LEVEL	DESCRIPTION
A	Essential	Must be known completely relates directly to the safety of the helicopter and occupants.
B	Important	Must be known in considerable depth relates to the efficient and practical operation of a helicopter.
C	Additional	Pre-PPL background knowledge only PPL basic principles should be known CPL should be known in considerable depth.

Note: Where a sequence is left blank the preceding standard applies.

1.2. Interpreting the Syllabus

This syllabus is designed to integrate flight and ground training, and provide guidance on the relative importance of particular topics.

The following example illustrates how to obtain maximum value from the ground training syllabus:

8.5 Helicopter Landing Sites (HLS)	S	GFPT	PPL	CPL
Recall the requirements of Basic and Standard helicopter landing sites (HLS) in respect to: (a) physical specifications (b) operational requirements (c) general conditions for use.		A	A	A

Explanation:

Topics 8.5 (a) (b) and (c) are an ESSENTIAL item of knowledge which must be learnt prior to the GFPT flight and is required knowledge for ALL SUBSEQUENT PHASES of training.

Topics 8.5 (a) (b) and (c):

- may be taught prior to first solo (S), but
- are deemed to be ESSENTIAL knowledge which must be taught prior to the GFPT, and is required knowledge for all SUBSEQUENT PHASES of training.

1.3. Study References

The syllabus itself remains the authority for the content of examinations. However, both mandatory and suggested references will be listed on the CASA web page for CPL examination.

1.4. Industry Examinations

1.4.1. To maintain a measure of ground/flight integration, a student must pass the following examinations, set and marked by the industry, prior to progressing to the next training phase:

- Prior to first solo:
An oral or written examination.
- Prior to the general flying progress test (GFPT):
A written Basic Aeronautical Knowledge (BAK) examination.

1.4.2. Results of the above examinations are to be recorded in a student's flying training record. A pass in the BAK also should be recorded by the CFI in the pilot's log book.

1.4.3. Industry examination – guidance

1.4.3.1. It is suggested that examinations should sample approximately 60% to 70% of "A" topics. The pass mark may be nominated by the training organisation but should not be less than 70%.

1.4.3.2. Though these examinations should, in the main, sample topics appropriate to the phase of training, it is advisable to include some ESSENTIAL knowledge topics from earlier phases, particularly if there has been a prolonged break in training.

1.4.3.3. The three examinations mentioned in paragraph 1.4.1 may be compiled by training organisations other than the flying training organisation using them.

1.5. CASA Examinations

1.5.1. Prior to the PPL or CPL flight test, a person must pass the following CASA examinations:

- (a) For PPL, a single-multiple choice examination which will sample any topic of the syllabus from "1st solo" up to and including topics listed under the "PPL flight test" column
- (b) For CPL, a single-multiple choice examination consisting of a number of subject-part examination, each of which is to be sat separately. The subject-part examination will in general sample any of the respective subject topics of the syllabus.

1.5.2. The pass standards for these examinations are:

- (a) PPL – **70%**
- (b) CPL – **80%** for Flight Rules and Air Law subject-part examination and **70%** for each of the other subject-parts, unless amended by changes to regulations.

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>2. Aircraft General Knowledge (AGK)</p> <p>2.1 Terminology</p> <p>With respect to the items listed below recall the standard abbreviations used and meet the objectives stated:</p> <p>Direction</p> <p>(a) express direction as a three figure group and in the clock code</p> <p>(b) as a two-figure group for runways</p> <p>(c) define True (T), Magnetic (M), and Compass (C) North</p> <p>(d) define heading (HDG), wind velocity (W/V).</p> <p>Distance, Speed and Velocity:</p> <p>(e) state the units used for distance:</p> <ul style="list-style-type: none"> • navigation - nautical miles(nm) • visibility - metres (m), kilometres (km) <p>(f) define a knot (kt)</p> <p>(g) define wind velocity (W/V).</p> <p>Time</p> <p>(h) express time as a 4, 6 and 8 figure group and mentally convert local time (EST, CST, WST), to UTC and vice versa.</p> <p>Vertical Measurement</p> <p>(i) state the unit used (ft) for vertical measurement and differentiate between:</p> <ul style="list-style-type: none"> • height • altitude • elevation <p>(j) state the units used for:</p> <ul style="list-style-type: none"> • runway direction and dimensions - as per ERSA • temperature - degrees Celsius (C) • pressure - hectopascals (hPa) • weight - kilograms (kg), pounds (lb) • volume - litres (l), gallons (gal). 	B	B	B	B
<p>2.2 Fuels and Oils</p> <p>(a) explain the terms:</p> <ul style="list-style-type: none"> • octane rating/performance number • Avgas, Avtur and indicate how to identify Avtur and Avgas • multi grade oils, viscosity and vegetable/mineral/synthetic based oils <p>(b) list sources of fuel contamination i.e. water, ice, other impurities</p> <p>(c) state the advantage of filling tanks prior to overnight parking</p> <p>(d) state when and how a fuel system should be inspected</p>		B	B	A
		A	A	A
		B	B	B
		A	A	A

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>(e) list the potential consequences of:</p> <ul style="list-style-type: none"> • mixing vegetable, mineral and synthetic based oils • using automobile gasoline or AVGAS of a lower than recommended octane rating. 				
<p>2.3 Engine Icing</p> <p>State the atmospheric conditions conducive to the formation of:</p> <p>(d) throttle ice</p> <p>(e) fuel evaporation ice</p> <p>(f) impact ice:</p> <ul style="list-style-type: none"> • in a carburettor. 		A	A	A
<p>2.4 Engines and Associated Systems</p> <p>Select from a list the statement which best describes:</p> <p>(a) the effects of carburettor heat on mixture and power</p> <p>(b) the need to monitor cylinder head temp and oil temperature in the climb, cruise & descent</p> <p>(c) the potential dangers to engine operation of excessively high or low oil temperatures or pressures</p> <p>(d) the seasonal influence on the choice of appropriate grades of oil viscosity</p> <p>(e) the symptoms of fuel vaporisation and the methods of rectification.</p>		A	A	A
<p>2.5 Engine and Transmission Systems</p> <p>In respect of the following systems and their major components, identify correct statements regarding:</p> <p>(f) the purpose of the system or component</p> <p>(g) the pilot actions necessary to make it function</p> <p>(h) indications of malfunction</p> <p>(i) the precautions which may be taken to prevent malfunction</p> <p>(j) the pilot actions, if any, which can be taken with regard to trouble shooting and rectification of malfunction:</p> <p>(i) exhaust driven supercharger systems (turbochargers):</p> <ul style="list-style-type: none"> • compressors • turbines • waste gates <p>(ii) main and tail rotor systems:</p> <ul style="list-style-type: none"> • abnormal vibrations from main and tail rotor systems • control systems • trimming devices • stabilisers <p>(iii) transmissions:</p> <ul style="list-style-type: none"> • clutches • free-wheel units • rotor brakes <p>(iv) oil systems:</p>			B	B
			B	B
		A	A	A
		A	A	A
		A	A	A

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<ul style="list-style-type: none"> • reservoirs • pressure pumps and filters • pressure gauges • temperature gauges • scavenge pumps • oil coolers • pressure relief valves • oil cooler by-pass valves • dipsticks. 				
<p>2.6 Helicopter Systems</p> <p>In respect of the following systems and their major components, identify correct statements regarding:</p> <p>(a) the purpose of the system or component</p> <p>(b) the pilot actions necessary to make it function</p> <p>(c) the indications of malfunction</p> <p>(d) the precautions which may be taken to prevent malfunction</p> <p>(e) the pilot actions, if any, which can be taken with regard to trouble shooting and rectification of malfunction:</p> <p>(i) electrical systems:</p> <ul style="list-style-type: none"> • generators • alternators • batteries • battery or master switches • generator or alternator switches • alternator field switches • ignition switches • voltage regulators • overvoltage relays • voltammeters • ammeters • battery busbars • main busbars • circuit breakers • circuit breakers and fuses • switches (push button, toggle, micro and rheostat) • piston engine starting systems • dual magneto • external power receptacles • inverters. <p>(ii) fuel systems:</p> <ul style="list-style-type: none"> • pump fed and gravity fed systems • tank venting and pressurisation • booster pumps • tank selectors and crossfeed systems • system drains • fuel quantity transmitters and gauges • fuel filters • fuel pressure gauges • fuel flow gauges. 		B	B	B
		B	B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
(iii) hydraulic systems: <ul style="list-style-type: none"> • reservoirs • pumps (engine driven, electrically driven and hand operated) • shut off valves • unloader valves • pressure relief valves • shuttle valves • restrictors • control valves • actuators • accumulators • emergency air bottles. 		B	B	B
(iv) fixed skid and wheel undercarriage systems.		B	B	B
(v) anti-icing and de-icing systems: <ul style="list-style-type: none"> • pitot heat • carburettor heat • intake heat 		A	A	A
(vi) heating systems: <ul style="list-style-type: none"> • fuel heaters • hot air shrouds • bleed air 		B	B	B
(vii) fire warning and fire extinguishing systems: <ul style="list-style-type: none"> • heat sensitive detectors • warning bells, lights and circuitry • extinguishers and actuators. 		A	A	A
2.7 Instruments In respect of the following engine, flight and navigational instruments identify correct statements regarding:				
(a) the purpose of the instrument and the information displayed		B	B	B
(b) the inputs required to make the engine and flight instruments function		B	B	B
(c) the pilot actions, if any, to make it function		B	B	B
(d) the indications of malfunction		B	B	B
(e) the limitations and errors of the flight and navigational instruments		B	B	B
(f) the precautions which may be taken to prevent malfunction or erroneous indications		B	B	B
(g) the pilot actions, if any, which can be taken with regard to trouble-shooting and rectification of malfunctioning:		B	B	B
(i) engine instruments: <ul style="list-style-type: none"> • manifold pressure gauges • tachometers and tachometer generators • cylinder head temperature gauges 		B	B	B
(ii) flight instruments: <ul style="list-style-type: none"> • artificial horizons/attitude indicators • direction indicators • turn and balance indicators 		B	B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<ul style="list-style-type: none"> • airspeed indicators • altimeters • vertical speed indicators • inertial lead vertical speed indicators • magnetic compasses • remote magnetic compasses. 				
3. Flight Rules and Air Law 3.1 Documentation 3.1.1 Know the requirements for and the method of maintaining a pilot's log book and the purpose of flight progress records. 3.1.2 Given an item of operational significance: (a) Select the appropriate reference document from the list below • CAR CAO AIP CAAP ERSA NOTAMS AIC (b) Extract relevant and current information from these documents. 3.1.3 Extract/decode information contained in ERSA and NOTAMS. 3.1.4 Understand the terms and abbreviations that are relevant to flight in accordance with VFR.		B B A A	B B A A	B B A A
3.2 Pilot licences, Privileges & Limitations 3.2.1 Decide whether a flight can be conducted in accordance with the rules relating to: (a) privileges & limitations of the licence held (b) recent experience requirements. 3.2.2 Extract/apply the rules pertaining to flight and duty time limitations.			A	A B
3.3 Flight Rules and Conditions of Flight 3.3.1 Select documents that shall be carried on board an aircraft during flight in Australian airspace. 3.3.2 Extract/apply the rules relating to: (a) carriage and discharge of firearms (b) aerodromes where operations are not restricted to runways (c) the conditions relating to flight in PRD areas. 3.3.3 (deleted) 3.3.4 Recall/apply the following rules: (a) rules of the air (b) the requirements relating to the operation of aircraft on and in the vicinity of an aerodrome and the conditions relating to turns after take-off and their application to helicopters (c) separation minima between aircraft for take-off and landing at a non-controlled aerodrome (d) visual meteorology conditions for operations below 10,000ft and below 700ft AGL (in relation to helicopters) (e) relating to restrictions on smoking in aircraft during take-off, landing and refuelling			B	B A A A A A A A A

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
(f) altimetry procedures for flight below 10,000ft.		A	A	A
3.3.5 Extract/apply the rules relating to:				
(a) the use of drugs and alcohol and recall the minimum period between alcohol consumption and flight departure	A	A	A	A
(b) temporary medical unfitness.		A	A	A
3.3.6 Recall the requirements relating to the minimum heights for flights over:		A	A	A
• populated areas				
• other areas.				
3.3.7 Recall the meaning of the following light signals directed at an aircraft:	A	A	A	A
• steady "green" and steady "red"				
• "green" "red" and "white" flashes.				
3.3.8 Extract/apply the limitations imposed on:		A	A	A
(a) acrobatic flight				
(b) flights over public gatherings.				
3.3.9 Recall the requirement to plan to land prior to the end of daylight.		A	A	A
3.4 Air Service Operations				
3.4.1 Extract/apply the rules relating to:				
(c) a pilot's responsibilities before flight			A	A
(d) aerodrome meteorological minima			A	A
(e) flights over water and in designated remote areas			A	A
(f) carriage of:			B	B
(iii) cargo				
(iv) sick and handicapped persons				
(v) parachutists				
(vi) dangerous goods				
(vii) animals				
(viii) flotation and survival equipment for helicopters				
(g) dropping of articles from aircraft in flight		A	A	A
(h) requirements for first aid kits			A	A
(i) requirements for passenger lists.				B
3.4.2 State the requirements to test radio equipment prior to taxi and maintain a listening watch.			A	A
3.4.3 Extract the restrictions pertaining to the carriage of passengers on certain flights.		A	A	A
3.4.4 Extract/apply the following rules relating to the responsibilities of a pilot in command:		A	A	A
(a) before flight:				
(i) requirements of:				
• fuels and oils				
• fuelling of aircraft				
• starting and ground operation of engines				
(ii) appropriate passenger briefing				
(b) during flight:				

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
(i) requirements regarding the operation & safety of the aircraft & the authority of the PIC.				
3.4.5 Recall the following requirements: (a) before flight: (i) the conditions regarding the: <ul style="list-style-type: none"> • removal of locking devices • security of doors, hatches, tank caps • testing of flight controls • removals of frost and ice • instrument checks (ii) fuel system inspection: <ul style="list-style-type: none"> • when and how (iii) carriage of passengers in a control seat (iv) carriage of infants and children. (b) during flight: (i) seat occupation/seat belts: <ul style="list-style-type: none"> • occupation of seats • wearing of seat belts • adjustment of seat belts (ii) manipulation of aircraft controls: <ul style="list-style-type: none"> • by pilots • not permitted by unauthorised persons. 		A	A	A
3.4.6 Recall the precautions pertaining to the security of safety harnesses and other equipment prior to solo flight in dual control aircraft.	A	A	A	A
3.5 Aerodromes				
3.5.1 Identify and explain the purpose of the following aerodrome, LA and HLS markings: (a) runway markers (b) runway threshold markings (c) runway end markers (d) cone and gable markers (e) taxiway markings (f) holding points/bays (g) a double white cross adjacent to a primary wind indicator (h) a horizontal white dumbbell (i) movement areas (j) HLS markings.		A	A	A
3.5.2 Identify the following positions in a circuit: (a) downwind leg (b) base leg (c) crosswind leg (d) upwind leg and (e) dead side of the circuit.	A	A	A	A
3.5.3 Explain the significance of a white cross on the movement area.	A	A	A	A
3.6 Airspace and Traffic Services – General				
3.6.1 Differentiate between the various classifications of airspace.			B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
3.6.2 Explain the terms: (a) flight information service (b) air traffic control service (c) radio "reports" and "broadcasts" (d) VFR route and lanes of entry (e) PRD areas (f) CTAF(R) areas.			B	B
3.6.3 Extract/apply permitted tracking tolerances for VFR aircraft to avoid controlled airspace.			B	B
3.6.4 Know the requirements and procedures to be adopted when operating: (a) in any class of airspace (b) from or into: <ul style="list-style-type: none"> • any licensed aerodrome • a CTAF(R). 			A	A
3.6.5 Altimetry: (a) recall the datum height from which an altimeter indicates height when the following are set on the sub-scale: <ul style="list-style-type: none"> • Area QNH • Local QNH • QFE • Standard Pressure Setting (b) recall the procedures that are carried out with the altimeter at the Transition Altitude and the Transition Level on climb and descent (c) derive from AIP the Transition Level for any given area QNH (d) recall the method of using an altimeter to derive Local QNH		A	A	A
(e) calculate height error caused by setting the altimeter sub-scale incorrectly (f) recall the meaning of the following: <ul style="list-style-type: none"> • height • altitude • flight level (g) recall the following parameters from the ICAO Standard Atmosphere: <ul style="list-style-type: none"> • mean sea level temperature and pressure lapse rate. 				
3.7 Emergencies, Accidents and Incidents 3.7.1 Extract emergency procedures from the ERSA. 3.7.2 State the conditions under which a pilot may declare a mercy flight and select occasions when a mercy flight must not be undertaken. 3.7.3 Extract from AIP the responsibilities of a pilot regarding the notification of accidents and incidents. 3.7.4 (deleted) 3.7.5 Cite examples of "hazards to navigation" that must be reported by pilots.			A B B B	A B B B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
3.8 Security				
3.8.1 Explain the term ADIZ and extract: (a) the general requirements for operations in this zone (b) the action by the pilot of the intercepted aircraft.			A	A
3.8.2 State the powers vested in a pilot in command.			A	A
3.9 Emergencies and SAR				
3.9.1 Recall the intermittent use of navigation and landing lights by an aircraft to indicate that it is in difficulty.	A			
3.9.2 Differentiate between an accident and an incident.		B		
3.9.3 Extract the requirements applicable to the notification of accidents and incidents.		B		
3.9.4 Explain the terms: • FULLSAR, SARTIME • INCERFA, ALERFA, DETRESFA.		B		
4. Radio Telephony				
4.1 Recall the phonetic alphabet and the method of transmitting numerals. Recall pertinent (local) procedures and radio phraseology for: (a) circuit flying (b) flights to and from the local training area(s).	A	A	A	A
4.2 State the purpose of the following radio controls: (a) avionics master switch (b) on/off switches (c) frequency selector (d) squelch control (e) transmit button (f) mute switch.	A	A	A	A
4.3 Extract from the ERSA transponder codes for radio failure and an emergency.		A	A	A
4.4 Given an area of operation decide whether it is necessary to use a transponder.			A	A
4.5 Emergencies: (a) recall the procedures to be adopted in the event of loss of radio (b) explain the difference between a distress message and an urgency message (c) given an operational situation where an aircraft is experiencing an emergency, list in the correct order the information that should be transmitted, if time permits, in a distress message.	A	A	A	A
4.6 Know the limitations of VHF and HF in terms of quality of reception and range.			B	B
4.7 List the factors that may affect VHF and HF reception.			B	B
5. Aircraft Type Knowledge				
5.1 Know the limitations and all normal and emergency procedures specified in the flight manual of the helicopter for which a student pilot has been approved to fly as pilot in	A	A	A	A

ITEM		STAGE/LICENCE			
		S	GFP	PPL	CPL
5.2	command. Use the helicopter loading system to distribute load and ensure that the helicopter will not exceed CG limits.		A	A	A
6.	Helicopter Aerodynamics				
6.1	Match each of the following terms with an appropriate definition: (a) aerofoil (b) chord (c) span (d) camber.		B	B	B
6.2	Recall the aerodynamic properties of a rotor blade in respect to: (a) aerofoil shape (b) blade twist and (c) blade taper.		B	B	B
6.3	Bernoulli's Theorem: Recall the relationship between dynamics pressure, static pressure and total pressure in a streamlined flow of an ideal fluid and state how pressure alters in a venturi.				C
6.4	General Helicopter Aerodynamics Match each of the following terms with an appropriate definition: (a) rotor thrust (b) rotor drag (c) total reaction (d) relative airflow (e) rotational airflow (f) induced airflow (g) centrifugal reaction (h) rotor disc (i) coning angle.		B	B	B
6.5	Hovering flight Label a diagram showing the vectors acting on a rotor blade in hovering flight.		B	B	B
6.6	Match each of the following items with an appropriate definition: (a) ground effect (b) tail rotor drift (c) rotor shaft tilt effect (d) re-circulation.		B	B	B
6.7	Select from a list the statement which best describes: (a) vortex ring state (settling with power) (b) loss of tail rotor effectiveness (LTE) (c) the conditions leading thereto (d) the appropriate recovery action.		A	A	A
6.8	Rotor Blade Freedom of Movement Match each of the following terms with an appropriate		B	B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
statement: (a) feathering (b) flapping (c) flapping to equality (d) dragging (e) advance angle (f) phase lag.				
6.9 Forward Flight Match each of the following terms with an appropriate definition: (a) dissymmetry of lift (b) flapback (c) cyclic limits (d) airflow reversal (e) retreating blade stall (f) compressibility (g) inflow roll (h) translational lift.		B	B	B
6.10 Label a diagram showing the vectors acting on various sections of a rotor blade in forward flight.		B	B	B
6.11 Power Requirements Match each of the following terms with an appropriate definition: (a) rotor profile drag (b) induced drag (c) parasite drag.		B	B	B
6.12 Recall the power available and power required curves and best speeds for range and endurance, best rate of climb and best angle of climb.		A	A	A
6.13 Select from a list the statement which best describes: (a) over-pitching (b) the conditions leading thereto (c) the appropriate recovery action.		A	A	A
6.14 Autorotative Flight Match each of the following terms with an appropriate definition: (a) autorotative force (b) autorotative section.		B	B	B
6.15 Select from a list the statement which best describes the effect on autorotative flight of variations in: (a) all-up-weight (b) density altitude (c) airspeed (d) rotor RPM.		A	A	A

ITEM		STAGE/LICENCE			
		S	GFP	PPL	CPL
6.16	Label a diagram showing the vectors acting on a rotor blade section during forward autorotative flight.		B	B	B
6.17	Label a diagram showing the vectors acting on a rotor blade section during an autorotative flare.		B	B	B
6.18	Other Conditions Select from a list the statement which best describes: (a) ground resonance (b) mast bumping (c) dynamic roll-over (d) the condition leading thereto (e) the appropriate recovery action.		A	A	A
7.	Navigation				
7.1	Form of the Earth				
7.1.1	Understand the following items and their relationship to the position of the earth, time differences and distances and direction: (a) the shape and rotation of the earth (b) latitude, longitude (c) meridians of longitude, parallels of latitude (d) equator, Greenwich meridian (e) great circles, small circles, rhumb lines (f) difference between true and magnetic north (g) terrestrial magnetism, magnetic variation and the change in variation with time (h) distance on the earth - relationship between minute of latitude and a nautical mile.			B	B
7.2	Time				
7.2.1	Explain the terms UTC, Local Mean Time, Local (standard) Time, Local summer time.			B	B
7.2.2	Extract (within +/-5 min) the beginning and end of civil twilight from AIP daylight and darkness graphs.			B	B
7.2.3	Carry out conversion between LMT, UTC, Local (standard) times including local summer time.			B	B
7.2.4	List factors which may cause daylight to end earlier than the time extracted from darkness graphs.			B	B
7.2.5	Describe the effect of the earth's rotation and revolution around the sun on the: (a) beginning and end of daylight (b) period of daylight and (c) variation in local mean time with changes in latitude and longitude.				C
7.3	Charts and Publications				
7.3.1	From the list below, select the chart(s)/document(s) which contain information about a given item of operational significance: • ERC Low VTC PCA AIP ERSA.				

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
7.3.2 Extract, decode symbols and apply information displayed on a ERC Low and PCA.			B	B
7.3.3 Interpret topographic detail and decode symbols displayed on a WAC and VTC.			B	B
7.3.4 On a WAC, ERC Low, VTC: (a) measure rhumb line track (b) measure distance using chart and latitude scale and (c) plot a position given (i) latitude & longitude (iii) bearing & distance.			B	B
7.3.5 Apply magnetic variation to obtain magnetic direction.			B	B
7.3.6 Have a basic understanding of the theory of map projections and: (a) identify the following properties of a Lamberts Conformal, Mercator, and Transverse Mercator: • appearance of rhumb lines, great circles • distortion of shapes & areas • scale variation (b) describe the methods of representing scale.				C
7.4 Computations				
7.4.1 Understand the basic principles of circular slide rule including the scales and graduations and the importance of rough estimates to determine the correct value of the answer eg, whether the answer is 0.7 7 70 or 700: (a) carry out conversions between: (i) feet/metres (ii) nm/km (iii) lbs/kg (iv) US gal/litres/kg of avgas/avtur (b) determine head/tail, and x-wind components given W/V and HDG (c) GS, distance, fuel used, fuel required, fuel remaining and fuel consumption problems, given appropriate combinations of these factors		B	B	B
(d) CAS/TAS problems given air temp & pressure height (e) HDG, GS and drift given TAS, W/V, TR (f) TR given HDG, TAS, W/V (g) problems relating to rates/gradients of climb and descent (h) TOPC and TOPD position using average airspeed, W/V and rates of climb/descent.			B	B
			B	B
			B	B
			B	B
			B	B
7.5 Pilot Navigation				
7.5.1 Principles of map reading: (a) describe the method of chart orientation (b) list situations when a pilot should read: (i) from map to ground (ii) from ground to map			B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>(c) select appropriate position lines to assist in determining:</p> <p>(i) ground speed</p> <p>(ii) track error</p> <p>(iii) a fix</p> <p>(d) select appropriate ground features to establish position when flying:</p> <p>(i) at low level (500 ft AGL)</p> <p>(ii) between (approximately) 2000 and 10,000ft AGL</p> <p>(iii) over mountainous terrain, coastal areas, densely populated and sparsely populated areas.</p>				
<p>7.5.2 With reference to a planned or given track and at least fixes or position lines on a WAC:</p> <p>(a) determine track made good (TMG)</p> <p>(b) calculate drift</p> <p>(c) determine alteration of heading or HDG(M) to:</p> <p>(i) parallel track</p> <p>(ii) intercept track at a nominated point</p> <p>(iii) maintain track once track is intercepted</p> <p>(d) revise/confirm estimates or ETA using latest ground speed or time/distance proportion</p> <p>(e) establish a DR position using latest TR & GS</p> <p>(f) mentally apply the one in sixty rule</p> <p>(g) mentally revise estimates and ETAs and</p> <p>(h) estimate TR and ETI to a selected diversion point.</p>			B	B
<p>7.5.3 Monitor flight progress by maintaining an in-flight navigation log.</p>			B	B
<p>7.5.4 Monitor fuel consumption and revise fuel reserves.</p>			A	A
<p>7.5.5 Plan in-flight diversions:</p> <p>(a) around adverse weather</p> <p>(b) to a suitable aerodrome.</p>			A	A
<p>7.6 Radio Navigation Aids</p>				
<p>7.6.1 Describe how to identify an aid and state the frequency of a nominated NDB or VOR.</p>				B
<p>7.6.2 Extract NDB and VOR information from ERSA and ERC Low and state the rated coverage of a VOR up to 10,000 ft.</p>				B
<p>7.6.3 State the effect (in Australia) of the following errors on the reliability of ADF cockpit indications:</p> <p>(a) co-channel interference</p> <p>(b) mountain effect</p> <p>(c) effect of thunderstorms</p> <p>(d) coastal refraction.</p>				B
<p>7.6.4 Explain why information pertaining to broadcasting stations is included in ERSA.</p>				C
<p>7.6.5 Recall the "aggregate" error of a VOR and explain what is meant by "scalloping".</p>				C

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
7.6.6 Establish a position line given: (a) HDG & ADF data (b) VOR indications.				B
7.6.7 Describe how to use the VOR to determine TR to or from a station.				B
7.6.8 Describe how to use an ADF or VOR to home to a station, and recognise instrument indications that signify station passage. Note: CPL students are expected to apply drift when tracking inbound to an NDB.				B
7.6.9 Establish fixes using a DME distance and: (a) HDG & ADF data or (b) VOR indications and use these fixes to make off track corrections.				B
8. Operations, Performance and Planning				
8.1 Helicopter Limitations Recall the reason for: (a) maximum rotor RPM - power on (b) maximum rotor RPM - power off (c) minimum rotor RPM - power on (d) minimum rotor RPM - power off (e) never exceed speed - power on (f) never exceed speed - power off (g) maximum sideways speed (h) maximum rearward speed (i) maximum take-off weight (j) maximum all up weight (k) minimum operating weight (l) maximum positive and negative flight load factors.		A	A	A
8.2 Flight Manual Select from a list the information, which may be obtained from a flight manual.		B	B	B
8.3 Density Altitude Match each of the following terms with an appropriately worded definition: (a) pressure altitude (b) density altitude (c) ambient conditions (d) forecast conditions		B	B	B
8.4 Calculate density altitude given pressure altitude (or elevation and QNH) and temperature.		B	B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>8.5 Helicopter Landing Sites (HLS)</p> <p>Recall the requirements of Basic and Standard helicopter landing sites (HLS) in respect to:</p> <p>(a) physical specifications</p> <p>(b) operational requirements</p> <p>(c) general conditions for use.</p>		A	A	A
<p>8.6 Take-off and Landing Weight</p> <p>Select from a list the statement which best describes:</p> <p>(a) the effect of the following variables on the take-off and/or landing performance of a helicopter:</p> <p>(i) weight</p> <p>(iv) power</p> <p>(v) ground effect</p> <p>(vi) density altitude and</p> <p>(vii) ambient wind component and</p> <p>(b) the easiest way of determining pressure altitude from a sensitive altimeter.</p>		A	A	A
<p>8.7 Determine hover performance in and out of ground effect given the following:</p> <p>(a) gross weight</p> <p>(b) pressure altitude</p> <p>(c) temperature</p> <p>(d) flight manual performance charts.</p>		A	A	A
<p>8.8 Forward Climb Performance</p> <p>Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter extract:</p> <p>(a) the best rate of climb for various conditions of pressure altitude, temperature and weight</p> <p>(b) the service ceiling for various conditions of pressure altitude, temperature and weight.</p>		A	A	A
<p>8.9 Cruise Performance</p> <p>Given graphical or tabular information typical of that provided in a flight manual for a single-engine helicopter, calculate:</p> <p>(a) maximum payload which may be carried after determining the fuel requirements and the nature of the operation</p> <p>(b) endurance for holding or search for various combinations of helicopter weight and fuel</p> <p>(c) the maximum range, given weight, fuel carried and cruising altitude.</p>		B	B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>8.10 Weight and Balance. Recall the meaning of the following terms used in the computation of weight and balance data:</p> <ul style="list-style-type: none"> (a) datum (b) arm (c) moment (d) station (e) centre of gravity range (f) lateral centre of gravity range (g) empty weight (h) operating weight (i) maximum take-off weight (MTOW). 		B	B	B
<p>8.11 Given a typical manual for a single-engine helicopter:</p> <ul style="list-style-type: none"> (a) extract the following weight and balance information: <ul style="list-style-type: none"> (i) MTOW (ii) capacity and arm of the baggage lockers (iii) capacity, arm, grade and specific gravity of the fuel (iv) location and arms of the seating (b) determine the forward, aft and lateral limits of the C of G for a given weight in the case of the above helicopter (c) determine whether the helicopter is safely loaded for flight given various combinations of weight and balance data using arithmetical methods or the specified loading system for the helicopter (d) calculate the adjustment of load required to achieve a C of G within specified limits if previously determined to be outside limits (e) calculate where to position additional load items so that the C of G is retained within the specific limits. 		A	A	A
<p>8.12 Flight Plan Preparation Extract/apply the responsibilities of a pilot in command with regard to weather and operational briefing prior to planning a VFR flight.</p>			A	A
<p>8.13 Given a route applicable to:</p> <ul style="list-style-type: none"> • the level of licence • type of operation viz: OCTA/CTA: <ul style="list-style-type: none"> (f) select appropriate charts for the flight (g) list the operations for which it is mandatory to obtain a weather briefing (h) list the weather services available, and nominate the sources and methods of obtaining this information (i) state the minimum flight notification required, the method(s) of submitting this notification, and identify flight plan details that must be submitted. 			A	A
<p>8.14 Given an aerodrome forecast, decide whether it is necessary to:</p> <ul style="list-style-type: none"> (a) nominate an alternate aerodrome or (b) carry additional fuel for holding and if so: <ul style="list-style-type: none"> • nominate an appropriate alternate aerodrome • determine the quantity of additional fuel required for holding or flight to the alternate. 			A	A

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>8.15 Given a typical flight scenario including:</p> <ul style="list-style-type: none"> • departure and landing points within and outside controlled airspace • weather and operational briefing • appropriate performance data: <p>(a) select safe route/cruise levels to comply with VFR</p> <p>(b) select cruise levels:</p> <ul style="list-style-type: none"> • to comply with VFR and the table of cruising levels • which meets passenger and fuel economy requirements 			A	A
<p>(c) determine:</p> <ul style="list-style-type: none"> (i) the minimum fuel required (ii) the maximum payload (passengers/cargo and fuel) that may be carried whilst meeting the appropriate requirements (iii) whether intermediate refuelling is necessary (iv) ETD/ETA after considering VFR (Day) requirements and flight/duty time limitations <p>(d) complete a Flight Plan and a loading system.</p>				
<p>8.16 Equi-time point (ETP), Point of no return (PNR), Diversions.</p> <p>(a) cite/recognise situations which may require the calculation of an ETP or PNR</p> <p>(b) assuming a constant cruise altitude and TAS, indicate the position of an ETP between two points</p> <p>(c) given fuel on board, use planned/given ground speed to decide which of the following courses of action would require the least fuel (including reserves):</p> <ul style="list-style-type: none"> (i) proceed to destination (v) return to the departure aerodrome (vi) proceed to a suitable alternate. 				B
<p>8.17 Calculate time and distance to an ETP or PNR between two points, using planned or given data.</p>				B
<p>8.18 Airworthiness and Equipment</p> <p>(a) state the purpose of certificates of airworthiness and registration</p> <p>(b) given a typical scenario, extract the communication and normal and emergency equipment required to be on board an aircraft</p> <p>(c) state the responsibilities of a pilot in command with regard to:</p> <p>(d) daily inspections</p> <p>(e) recording/reporting aircraft defects</p> <p>(f) know the types of maintenance that may be carried out by a PPL or CPL holder, as appropriate</p> <p>(g) given a copy of a maintenance release:</p> <ul style="list-style-type: none"> (i) determine its validity (vii) list the class(es) of operation applicable to the aircraft 			B A A B A	B A A B A

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
(viii) list outstanding defects/endorsements and decide whether these affect the airworthiness of the aircraft.				
9. Meteorology				
9.1 Local Weather Demonstrate a basic knowledge of local weather, in particular the likely occurrence of: <ul style="list-style-type: none"> • thunderstorms • low cloud • poor visibility • turbulence and describe how these phenomena may affect the safe operation of an aircraft.		B	B	B
9.2 Demonstrate an understanding of weather forecasts, reports and broadcasts that are pertinent to the area of operation.		B	B	B
9.3 Recognise signs which may indicate the presence of: <ul style="list-style-type: none"> (a) turbulence, thermals, dust devils (b) wind gradient, wind shear and describe the effect of these phenomena on flight characteristics. Note: "Signs" means forecast conditions and pilot observations.		B	B	B
9.4 Composition of the Atmosphere Know the vertical divisions of the atmosphere viz: <ul style="list-style-type: none"> (a) troposphere (b) tropopause (c) stratosphere (d) and that most weather effects occur below the stratosphere. 			B	B
9.5 In the standard atmosphere, recall: <ul style="list-style-type: none"> (a) sea level temperature and pressure (b) temperature and pressure lapse rates in the troposphere. 			B	B
9.6 Heat, Temperature, Pressure and Humidity Know the means of measurement of surface air temperature, and that actual local temperatures may differ eg, higher immediately above a runway.			B	B
9.7 Know the meaning of the terms: <ul style="list-style-type: none"> (a) isotherm, temperature inversions (b) radiation, advection, convection, conduction (c) isobar, horizontal pressure gradient (d) saturated air, relative humidity, dew point (e) evaporation, condensation, freezing. 			B	B
9.8 List the effects of changes in temperature, pressure and humidity on air density.			A	A
9.9 List the factors that influence the diurnal variation of surface air temperature and explain the temperature gradient between land and sea surfaces.				C

ITEM		STAGE/LICENCE			
		S	GFP	PPL	CPL
9.24	Compare surface and gradient winds in terms of direction and strength.			B	B
9.25	List the “factors” which affect the diurnal variation of wind and describe typical “variations” in surface wind strength during a 24-hour period.			B	B
9.26	<p>Air Masses and Fronts</p> <p>Describe typical “flying weather” associated with:</p> <ul style="list-style-type: none"> (a) cold fronts (b) warm fronts (c) wave depressions (d) occluded fronts (e) tropical cyclones (f) the equatorial trough. <p>Note: The term ‘flying weather’ embraces:</p> <ul style="list-style-type: none"> • temperature (warm/cooler) • wind changes (back/veer, stronger/weaker) • stability and turbulence • cloud type(s) and approximate amount(s), precipitation. 			A	A
9.27	<p>Flight Considerations</p> <p>With respect to the phenomena listed below:</p> <ul style="list-style-type: none"> • state the conditions favourable to their development and, where applicable, their dispersal • recognise signs which may indicate their presence • describe their affect on flight condition • where applicable, state the pilot actions required to minimise their affect on an aircraft in flight: <ul style="list-style-type: none"> (a) thermals, turbulence (b) dust devils and dust storms (c) wind gradient, wind shear and low level jet streams (d) anabatic and katabatic winds (e) mountain waves and fohn winds (f) land and sea breezes (g) inversions and fog (h) thunderstorms and microbursts (i) downdrafts associated with terrain/cloud (j) atmospheric stability and instability (k) hoar frost, rime and clear airframe ice. 			B	B
9.28	<p>Synoptic Meteorology</p> <p>Given a Mean Sea level analysis chart, identify:</p> <ul style="list-style-type: none"> (a) high and low pressure systems (b) a trough, a ridge, a col (c) warm, cold and occluded fronts (d) a tropical cyclone. 			B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>9.29 Describe typical weather characteristics associated with the items listed in sub-paras 9.28 (a) and (b). Items (c) and (d) are covered in 9.26. The term “weather characteristics” embraces: (a) approximate wind direction (b) moisture content (dry/humid) (c) cloud (stratoform or cumuloform) (d) clear skies (e) turbulent or smooth air (f) good or poor visibility.</p>			B	B
<p>9.30 Weather Services For given locations, extract from AIP the availability of aviation forecasts, meteorological reports and weather briefing, and state the method of obtaining this information.</p>			B	B
<p>9.31 State/select the conditions under which it is mandatory to obtain a forecast.</p>			A	A
<p>9.32 With reference to AIP extract, decode and apply information contained in: (a) ARFOR (b) TAF (c) METAR (d) SPECI (e) AIRMET (f) SIGMET. “Decode” means ability to: <ul style="list-style-type: none"> • decide whether a particular forecast is valid for a flight • interpret any coded information into plain language. </p>			B	B
<p>9.33 Given a typical weather briefing, evaluate weather information applicable to a flight: (a) assessing likely changes in weather during the flight (b) list those phenomena which could adversely affect the flight. “Weather” is defined in sub-para 9.29 and includes “fine weather”.</p>			B	B
<p>9.34 List the conditions that require a pilot to submit a short AIREP.</p>			B	B
<p>9.35 State the purpose of VOLMET, AERIS and ATIS broadcasts and indicate how this information is obtained.</p>			B	B
<p>9.36 State what is meant by a TAT or TAST service.</p>			B	B
<p>9.37 Climatology Describe typical seasonal weather conditions in different regions of Australia with reference to: (a) visibility (good/poor) (b) prevailing winds (c) typical cloud patterns and precipitation (d) seasonal pressure and frontal systems - including the ITCZ and equatorial trough.</p>			B	B

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
10. Recommended Pre-study				
<p>10.1 A knowledge of mathematics and physics is necessary to meet the aeronautical knowledge objectives in this syllabus. The subjects are not examined independently, but applicants below standard in mathematics and physics are advised to seek tuition until they are able to meet the laid down objectives. Failure to do so may make the aeronautical knowledge objectives difficult to achieve.</p> <p>10.2 For mathematics the requirement is to solve problems requiring the use of:</p> <p>(a) basic arithmetic:</p> <p>(i) vulgar fractions</p> <p>(ix) decimal fractions</p> <p>(x) percentages</p> <p>(xi) averages</p> <p>(xii) squares</p> <p>(b) ratio and proportion:</p> <p>(i) direct and inverse proportion and</p> <p>(xiii) representative fractions</p> <p>(c) circular slide rule:</p> <p>(i) multiplication and division</p> <p>(xiv) conversion problems between the following units:</p> <ul style="list-style-type: none"> • nautical miles, statute miles and kilometres • degrees Fahrenheit and degrees Celsius • pounds and kilograms • imperial gallons, US gallons and litres <p>(xv) squares and square roots</p> <p>(d) basic trigonometry:</p> <p>(i) sine, cosine and tangent</p> <p>(xvi) simple problems involving solution of right-angled triangles.</p> <p>10.3 For physics the requirements are:</p> <p>(a) solve problems relating to time, speed (velocity) and distance</p> <p>(b) define velocity, acceleration, weight, mass, force momentum, work, energy, power, static equilibrium, density, specific gravity and pressure</p> <p>(c) solve graphically the wind triangle</p> <p>(d) solve problems relating to the principle of moments and centre of gravity</p> <p>(e) given the specific gravity and fuel quantity calculate fuel weight.</p>				
11. Human Factors				
<p>11.1 Basic Health</p> <p>11.1.1 Know the effect and importance on pilot performance of the following factors:</p> <p>(a) diet, exercise</p> <p>(b) coronary risk factors - smoking, cholesterol, obesity, hereditary factors</p>		B		A

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
(c) upper respiratory tract infection eg, colds, hay fever, congestion of air passages and sinuses (d) food poisoning and other digestive problems (e) headaches and migraines (f) pregnancy: <ul style="list-style-type: none"> • when to stop flying • impact on cockpit ergonomics (g) injuries (h) ageing (i) alcohol and smoking (j) blood donations (k) dehydration (l) emotional <ul style="list-style-type: none"> • anxiety, depression, fear 	B		A	
11.1.2 Know that a pilot is not to fly when on any medication unless a medical clearance from DAME has been obtained.	A			
11.1.3 Know the responsibilities of pilots with regard to being medically fit for flight		B	A	
11.2 Reserved				
11.3 Health and Fitness				
11.3.1 Know the: <ul style="list-style-type: none"> (a) reasons for and frequency of physical examinations and that a CASA network of Designated Aviation Medical Examiners (DAMEs) exists (b) process of obtaining a medical examination (c) role of the CASA with regard to medical fitness and that only those conditions which present a flight safety hazard are disqualifying. 		C	B	A
11.3.2 Alcohol <ul style="list-style-type: none"> (a) Explain how alcohol is absorbed and excreted (b) state and explain what a 'hangover' is (c) explain the effect a 'hangover' may have on flying performance (d) explain the relationship between a 'hangover' and level of blood alcohol in a person (e) explain the relationship between the level of blood alcohol and the recovery period from a 'hangover' (f) state the factors that affect the elimination of alcohol from the body and describe the effects of illicit drugs and alcohol on proficiency eg: <ul style="list-style-type: none"> • judgement, comprehension, attention to detail • the senses, co-ordination and reaction times. 	C	B		A
11.3.3 Drugs: Explain that: Drug abuse is a behavioural problem and is independent of: <ul style="list-style-type: none"> • dependence (addiction) • frequent use. 	C	B		A

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>Define illicit or non-illicit psychoactive substances.</p> <p>Explain the adverse effects of illicit or non-illicit psychoactive substances.</p> <p>Explain the effects and duration of such effects on human performance related to perception, speed of processing information, and reaction time of such drugs as:</p> <ul style="list-style-type: none"> cannabis-based substances eg, marijuana, ganja amphetamine-based substances eg, Ecstasy opium-based substances eg, codeine, heroin. <p>Have a broad knowledge of the undesirable effects of over-the-counter and prescription drugs. In particular, the side effects of:</p> <ul style="list-style-type: none"> aspirin, antihistamines, nasal decongestants amphetamines, tranquillisers, sedatives, antibiotics. 				
<p>11.3.4 Blood Donations:</p> <p>(a) state the effect on flying after giving a blood donation</p> <p>(b) state the recommended period between giving blood and the next flight and know that this period can vary between individuals.</p>	C	B		A
<p>11.4 Hyperventilation</p> <p>11.4.1 Know how to recognise and combat hyperventilation.</p> <p>11.4.2 Know what hyperventilation is and its causes.</p>	B			A
<p>11.5 Atmospheric Pressure Changes</p> <p>11.5.1 Trapped gases:</p> <p>(a) know the effect of changes in pressure on gases trapped in the body cavities</p> <p>(b) describe the effect on normal bodily function</p> <p>(c) state/list measures for prevention/treatment.</p> <p>11.5.2 Know the effects of flying after a period of underwater diving and state the precautions to be taken if intending to fly after underwater diving.</p>	B			A
<p>11.6 Basic Knowledge of the Anatomy of the Ear</p> <p>(a) Know its function in receiving sound transmissions</p> <p>(b) explain the purpose of the Eustachian tube and effects of atmospheric/cabin pressure changes</p> <p>(c) state the effects of noise exposure on:</p> <ul style="list-style-type: none"> hearing loss: long/short term speech intelligibility fatigue <p>(d) describe recommended methods of hearing protection.</p>	B B C	C C B	B C A	A A A
<p>11.7 Vision, Spatial Disorientation, Illusions</p> <p>11.7.1 Have a knowledge of the anatomy of the eye and its function during the day and at night</p> <p>11.7.2 Know factors which affect night vision and identify methods of "dark adaptation".</p>		C C	B B	A A

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
11.7.3 Describe the limitations of the eye in discerning objects at night and the “off-centre” method of identifying objects at night.		C	B	A
11.7.4 Know the limitations of the eye with respect to: (a) the ability to discern objects during flight eg, • other aircraft, transmission lines etc. (b) empty field myopia (c) glare (d) colour vision in aviation (e) common visual problems, viz: • myopia, hyperopia, astigmatism, presbyopia. (f) rotor flicker and its effects (helicopters only)	B			A
11.7.5 Be aware of the importance of: (a) seeking experienced professional advice for spectacles prescriptions (b) selecting suitable sunglasses.		C	C	
11.7.6 Know of the factors which are conducive to mid-air collisions and describe/practice techniques for visual “scanning”.	B		A	
11.7.7 Understand and define the term “disorientation”.	C	B		A
11.7.8 Know the sensory systems involved in maintaining body equilibrium – ie, that: • equilibrium is normally maintained by use of the eyes, inner ear and proprioceptive system (“seat of pants”)	C	B	A	
11.7.9 Understand that these mechanisms were developed for use by land based mammals and do not provide reliable information under all conditions of flight.	C		B	A
11.7.10 Describe illusion(s) that may be associated with the factors listed below: (a) “leans” (b) linear and angular accelerations: (c) unperceived changes in the pitch roll yaw (d) autokinetic illusions (e) “graveyard spin” illusion. (f) somatogravic illusion		C	B	A
11.7.11 Know: (a) that sensory illusions usually occur when external visual clues are poor or ambiguous and that they are predictable (b) the importance of an artificial visual reference system and a pilot’s ability to use the system (c) the factors that may make a person more susceptible to disorientation (d) how to overcome sensory illusions.		C	B	A
	C	B	A	

ITEM		STAGE/LICENCE			
		S	GFP	PPL	CPL
11.7.12	<p>Know what illusions may result from the following flight factors</p> <p>(a) false horizontal clues eg:</p> <ul style="list-style-type: none"> sloping cloud formations and sloping terrain <p>(b) depth perception eg:</p> <ul style="list-style-type: none"> flying over water, snow, desert and other featureless terrain effect of fog: haze dust <p>(c) optical characteristics of windscreens</p> <p>(d) landing illusions:</p> <ul style="list-style-type: none"> approach angles: steep shallow width and slope of runway slope of (approach) terrain approaches over water <p>(e) relative motion between objects.</p>	C	B		A
11.8 Motion Sickness		C	B		
11.8.1	State the basic cause of motion sickness				
11.8.2	List factors which may aggravate motion sickness.				
11.8.3	List methods of combating motion sickness in flight.				
11.9 Acceleration “g” Effects	<p>Know the effects of positive and negative accelerations on the human body including:</p> <p>(a) on the cardiovascular system</p> <p>(b) vision and</p> <p>(c) consciousness</p>	C	B		
11.10 Toxic Hazards		B		A	
11.10.1	Know the sources, symptoms, effects and treatment of carbon monoxide poisoning.				
11.10.2	Know the effect of breathing air contaminated by fuel and other noxious or toxic aviation products.				
11.11 The Atmosphere and Associated Problems		C		B	A
11.11.1	State the chemical composition of the atmosphere and recall the variation of temperature and pressure with altitude.				
11.11.2	Have a basic concept of the circulatory and respiratory systems in terms of the distribution of oxygen and the excretion of carbon dioxide.				
11.11.3	Describe what is meant by the partial pressure of oxygen.				

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
11.12 Hypoxia	C	B		A
11.12.1 (a) List the causes of hypoxia and recognise the symptoms of hypoxia particularly: <ul style="list-style-type: none"> • its effect on night vision • the dangers of behavioural changes eg, lack of self criticism, over-confidence and a false sense of security (b) know that symptoms are difficult to detect in healthy individuals and can develop much faster at higher altitudes - eg, 14, 000 ft. (c) list factors which may increase a person's susceptibility to hypoxia (d) state the approximate time of useful consciousness (Effective Performance Time: EPT) at 20,000, 25,000 and 30,000 feet and list factors which affect EPT (e) list methods of combating various forms of hypoxia.				
11.13 Human Factors Considerations:				
11.13.1 Know the concepts of information processing and decision making including: <ul style="list-style-type: none"> (a) how sensory information is used to form mental images (b) the influence of the following factors on the decision making process: <ul style="list-style-type: none"> • personality traits eg, introvert/extrovert • pride, peer pressure, employer pressure • the desire to get the task done • anxiety, over-confidence, boredom, complacency • types of memory - long/short term • memory limitations • aides memoire, rules of thumb • work load/overload • skill, experience, currency. 	C			B
11.13.2 Discuss the general concepts behind decision making and the methods of enhancing decision making skills.	C			B
11.13.3 Concepts of Stress <ul style="list-style-type: none"> (a) Know the interaction between stress and arousal and the effects of short and long term stress on pilot performance and health (b) know the symptoms, causes and effects of environmental stress: <ul style="list-style-type: none"> • working in an excessively hot, cold, vibrating or noisy environment (c) know the symptoms and effects of domestic and work related stress (d) know the effects of stress on performance and (e) know the principles of stress management – eg: <ul style="list-style-type: none"> • cognitive/behavioural techniques • relaxation • time management. 		C	B	

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
<p>11.13.4 Concepts of Fatigue</p> <p>(a) identify causes of fatigue and describe its effect on pilot performance</p> <p>(b) differentiate between acute and chronic fatigue</p> <p>(c) discuss coping strategies – eg:</p> <ul style="list-style-type: none"> • sleep management • relaxation • fitness and diet. 		C	B	
<p>11.13.5 Basic Ergonomics</p> <p>(a) discuss principles of control design and the design features of conventional and modern displays</p> <p>(b) discuss problems associated with:</p> <ul style="list-style-type: none"> • poorly designed controls/positioning of controls • interpreting instrument presentations <p>(c) know the following information regarding safety harnesses:</p> <ul style="list-style-type: none"> • types, how to assess their maintenance • inertia reels, how to assess their maintenance. 			C	
<p>11.13.6 Basic Principles of Crew Co-ordination</p> <p>(a) discuss factors which:</p> <p>(i) influence verbal and non-verbal</p> <p>(ii) communication between flight deck</p> <p>(iii) crew viz:</p> <ul style="list-style-type: none"> • barriers to communication • listening skills • assertion skills <p>(iv) affect the decision making process viz:</p> <ul style="list-style-type: none"> • communication attitude • personality • judgement • leadership style <p>(b) discuss ideal leadership qualities</p> <p>(c) review aircraft accidents which resulted from poor crew co-ordination.</p>			C	
<p>11.14 Principles of First Aid and Survival</p> <p>The student should be aware of the first aid and survival information contained in ERSA and preferably be exposed to practical instruction in the terms of first aid given in this document.</p>		C	B	

ITEM	STAGE/LICENCE			
	S	GFP	PPL	CPL
11.15 Threat and Error Management				
Basic principles of TEM				
(a) Explain the principles of TEM and detail a process to identify and manage threats and errors during single pilot operations.		C	A	
(b) Define 'threats' and give examples of threats.		A		
(c) Give an example of a committed error and how action could be taken to ensure safe flight.		C	B	A
(d) Explain how the use of checklists and standard operating procedures can prevent errors.		B	A	
(e) Give examples of how an undesired aircraft state can develop from an unmanaged threat or error.		B		
(f) Explain what resources a pilot could identify and use to avoid or manage an undesired aircraft , state such as being lost or entering adverse weather.		C	A	
(g) Explain the importance of ensuring that tasks are prioritised to manage an undesired aircraft state.		C	A	
(h) Give examples of how establishing and maintaining interpersonal relationships can promote safe flight			B	

[Go To Section 1](#)

[Go To Section 2](#)



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