

Abbreviation	Meaning
UHF	ultra-high frequency
UTC	universal time coordinate
V	volts
VHF	very high frequency
VLOS	visual line of sight

Schedule 2 Directory for aeronautical knowledge standards for a RePL training course

Appendix 1 Aeronautical knowledge standards — Common units

Unit code	Unit of knowledge
RBAK	Basic aviation knowledge for RPAS
RACP	Airspace, charts and aeronautical publications for RPAS
RBMO	Basic meteorology for RPAS operations
REES	Electrical and electronic systems for RPAS
RHPF	Human performance for RPAS
RKOP	RPAS knowledge — operations and procedures
RORA	Operational rules and air law for RPAS
RAFM	Automated flight management systems for RPAS — knowledge

Appendix 2 Aeronautical knowledge standards — Aeroplane category

Unit code	Unit of knowledge
RBKA	RPA that is an aeroplane — aircraft knowledge and operation principles

Appendix 3 Aeronautical knowledge standards — Helicopter (multirotor class) category

Unit code	Unit of knowledge
RBKM	RPA that is a multirotor — aeronautical knowledge and operation principles

Appendix 4 Aeronautical knowledge standards — Helicopter (single rotor class) category

Unit code	Unit of knowledge
RBKH	RPA that is a helicopter — aeronautical knowledge and operation principles

Appendix 5 Aeronautical knowledge standards — powered-lift category

Unit code	Unit of knowledge
RBKP	RPA that is a powered-lift aircraft — aircraft knowledge and operation principles

Appendix 6 Aeronautical knowledge requirement — RPA with a liquid-fuel system

Unit code	Unit of knowledge
REFE	RPA with liquid-fuel system — knowledge

Schedule 3 Directory for practical competency standards for a RePL training course

Appendix 1 Practical competency standards — Common units

Unit code	Unit of practical competency
GEL	General English language proficiency
RC1	Perform pre- and post-operation actions and procedures for RPAS
RC2	Energy management for RPAS
RC3	Manage crew, payload and bystanders for RPAS operation
RC4	Navigation and operations of RPAS
RNT	Non-technical skills for operation of RPAS
RAF	Automated flight management systems for RPAS — operation

Appendix 2 Practical competency standards — Aeroplane category

Unit code	Unit of practical competency
RA1	RPA that is an aeroplane — ground operation and launch
RA2	RPA that is an aeroplane — normal operation
RA3	RPA that is an aeroplane — land and recover
RA4	RPA that is an aeroplane — advanced manoeuvres
RA5	RPA that is an aeroplane — abnormal and emergency operations

Appendix 3 Practical competency standards — Helicopter (multirotor class) category

Unit code	Unit of competency
RM1	RPA that is a multirotor — control on ground, launch, hover and landing
RM2	RPA that is a multirotor — normal operations
RM3	RPA that is a multirotor — advanced manoeuvres
RM4	RPA that is a multirotor — abnormal situations and emergencies

Appendix 4 Practical competency standards — Helicopter (single rotor class) category

Unit code	Unit of competency
RH1	RPA that is a helicopter — control on ground
RH2	RPA that is a helicopter — launch, hover and landing
RH3	RPA that is a helicopter — normal operation
RH4	RPA that is a helicopter — advanced manoeuvres
RH5	RPA that is a helicopter — abnormal situations and emergencies

Appendix 5 Practical competency standards — powered-lift category

Unit code	Unit of competency
RP1	RPA that is a powered-lift category aircraft — control on ground, launch, hover and landing
RP2	RPA that is a powered-lift category aircraft — transition to and from vertical flight
RP3	RPA that is a powered-lift category aircraft — climb, cruise & descent
RP4	RPA that is a powered-lift category aircraft — advanced manoeuvres
RP5	RPA that is a powered-lift category aircraft — manage abnormal situations at altitude and near the ground

Appendix 6 Practical competency standards — RPA with a liquid-fuel system

Unit code	Unit of competency
RLF	Medium or large RPA with a liquid-fuel system — operation

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common units

Unit 1 RBAK — Basic aviation knowledge for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>Direction of flight and wind</i></p> <p>(a) expressing direction of flight:</p> <p> (i) as a 3-figure group;</p> <p> (ii) in the clock code;</p> <p> (iii) as cardinal and ordinal compass points;</p> <p>(b) difference between aircraft heading and track;</p> <p>(c) wind velocity;</p> <p>(d) the relationship between true and magnetic heading.</p>	A
2	<p><i>Time</i></p> <p>(a) time as a 4, 6 and 8-figure group;</p> <p>(b) UTC;</p> <p>(c) converting local and standard time to and from UTC.</p>	B
3	<p><i>Units of measurement for aeronautics</i></p> <p>(a) differences between height, altitude and elevation;</p> <p>(b) units of measurement for:</p> <p> (i) horizontal distance;</p> <p> (ii) vertical distance;</p> <p> (iii) speeds;</p> <p> (iv) visibility;</p> <p> (v) temperature;</p> <p> (vi) atmospheric pressure;</p> <p> (vii) weight;</p> <p>(c) converting between different units of measurement.</p>	A
4	<p><i>Energy</i></p> <p>Aircraft energy, including:</p> <p>(a) potential energy;</p> <p>(b) kinetic energy;</p> <p>(c) inertia.</p>	B
5	<p><i>Aerodynamics, weight and balance</i></p> <p>(a) terminology:</p> <p> (i) aerofoil, angle of attack and relative airflow;</p> <p> (ii) centre of pressure and centre of gravity;</p> <p> (iii) lift, weight, thrust and drag;</p> <p>(b) “Bernoulli’s principal”, “Coandra effect” and “Newton’s third law”;</p>	A

Item	Aeronautical knowledge topics	Priority
	(c) basic weight and balance principles; <ul style="list-style-type: none"> (i) empty weight; (ii) operating weight; (iii) maximum gross weight; (iv) arm, moment, datum, station and index unit; (v) centre of gravity limits; (vi) loading limits. 	
6	<i>Lift and drag</i> <ul style="list-style-type: none"> (a) changes to lift and drag resulting from: <ul style="list-style-type: none"> (i) airspeed changes; (ii) angle of attack changes; (b) types of drag, including: <ul style="list-style-type: none"> (i) parasite (zero lift), form, interference and skin friction; (ii) induced (lift dependent). 	B
		C
7	<i>Propellers and rotors</i> <ul style="list-style-type: none"> (a) terminology; (b) blade angle, helix angle or pitch; (c) propeller/rotor thrust and torque; (d) propeller/rotor principles. 	B
8	<i>Principles of operation — flight control</i> <ul style="list-style-type: none"> (a) longitudinal, lateral and vertical axes; (b) pitch, roll and yaw; (c) skid and slip; (d) effect of changes in power on vertical and horizontal speed; (e) relationship between control inputs and aircraft movements; (f) angle of climb and rate of climb; (g) trim controls. 	A
9	<i>Principles of operation — remote pilot station</i> Features of a remote pilot station: <ul style="list-style-type: none"> (a) transmitter; (b) command and control link; (c) flight controls; (d) other controls; (e) antennas/aerials; (f) software, including firmware and updates; (g) telemetry; (h) non-payload communications; (i) power supply. 	C

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common units (contd.)

Unit 2 RACP — Airspace, charts and aeronautical publications for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>Airspace</i></p> <ul style="list-style-type: none"> (a) classification of airspace; (b) airspace depiction on aeronautical charts, including: <ul style="list-style-type: none"> (i) flight information area; (ii) Class G airspace; (iii) controlled aerodromes; (iv) control area; (v) control zone; (vi) VFR route and lane of entry; (vii) prohibited areas; (viii) restricted areas; (ix) danger areas; (x) common traffic advisory frequencies and associated airspace; (xi) radio frequency boundaries; (c) airspace in relation to the circumstances in which an aeronautical radio qualification is required: <ul style="list-style-type: none"> (i) Air Traffic Control (ATC); (ii) in the vicinity of non-controlled aerodromes. 	A
2	<p><i>Obtaining information or approval</i></p> <ul style="list-style-type: none"> (a) permissions for RPA operations in restricted areas; (b) aeronautical information publications, including: <ul style="list-style-type: none"> (i) AIP; (ii) ERSA; (iii) NOTAM. 	A
3	<p><i>NOTAMs</i></p> <ul style="list-style-type: none"> (a) obtaining NOTAMs for operational areas; (b) decoding NOTAMs. 	A
	<p><i>NOTAM publication</i></p> <ul style="list-style-type: none"> (c) Submitting a NOTAM for publication. 	C

Item	Aeronautical knowledge topics	Priority
4	<p><i>Form of the earth, aeronautical charts and maps</i></p> <ul style="list-style-type: none"> (a) features on an aeronautical chart (other than airspace); (b) cardinal and ordinal points of the compass; (c) latitude and longitude; (d) depiction of height and elevation on charts; (e) distance on the earth and in charts; (f) magnetic variation; (g) relationship between magnetic heading and magnetic bearing. 	A
5	<p><i>Electronic flight bag</i></p> <ul style="list-style-type: none"> (a) electronic maps and charts; (b) CASA verified drone safety app. 	C

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common units (contd.)

Unit 3 RBMO — Basic meteorology for RPA operations

Item	Aeronautical knowledge topics	Priority
1	<p><i>Weather phenomena</i></p> <p>(a) causes and effects of the following weather phenomena in relation to RPA operations:</p> <ul style="list-style-type: none">(i) thunderstorms;(ii) low cloud;(iii) poor visibility (fog, mist, dust, haze);(iv) turbulence;(v) extreme heat and cold;(vi) strong winds and windshear;(vii) rain and humidity;(viii) convection;(ix) precipitation static; <p>(b) the meaning of symbols used on weather maps.</p>	B
2	<p><i>Weather observations</i></p> <p>Indications of the presence of:</p> <ul style="list-style-type: none">(a) turbulence, thermals or dust devils; and(b) wind gradient and wind shear.	B
3	<p><i>Aeronautical forecasts</i></p> <ul style="list-style-type: none">(a) obtaining aeronautical forecasts for the area of operations;(b) decoding an aeronautical forecast;(c) using public weather forecasts and reports.	B

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common units (contd.)

Unit 4 REES — Electrical and electronic systems for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>Electrical terms</i></p> <ul style="list-style-type: none"> (a) volts; (b) amps; (c) watts; (d) ohms; (e) hertz. 	B
2	<p><i>Function of electrical components</i></p> <ul style="list-style-type: none"> (a) electrical components of an RPA: <ul style="list-style-type: none"> (i) electronic speed controller; (ii) battery eliminator circuit; (iii) receiver and remote receivers; (iv) telemetry module; (v) flight batteries; (vi) receiver battery; (vii) circuit breakers and fuses; (viii) servomechanisms; (ix) aerials/antennas; (x) GPS receivers; (xi) altimeters (radio, radar, laser, acoustic); (xii) collision avoidance sensors; (b) equipment redundancy; (c) malfunctions and system back-ups; (d) consequences of a malfunction; (e) remedial actions in the event of failure. 	A
3	<p><i>Electric motors</i></p> <ul style="list-style-type: none"> (a) current draw through the motor in relation to rotor or propeller diameter or pitch; (b) current draw through the motor in relation to rotor or propeller loads; (c) determination of appropriate “Kv”. 	A
4	<p><i>Batteries</i></p> <ul style="list-style-type: none"> (a) types of batteries: <ul style="list-style-type: none"> (i) nickel metal hydride batteries; (ii) lithium polymer batteries; (iii) alkaline batteries; (iv) nickel cadmium batteries; 	A

Item	Aeronautical knowledge topics	Priority
	<ul style="list-style-type: none"> (v) fuel cells; (b) battery specifications and abbreviations (types, voltage; amperage etc); (c) characteristics of batteries used as an energy source for the RPA: <ul style="list-style-type: none"> (i) cell count; (ii) nominal voltage; (iii) battery configuration: <ul style="list-style-type: none"> (A) parallel; (B) series; (iv) battery capacity; (v) maximum current draw; (vi) discharge rate; (vii) main power plug; (viii) balance plug; (d) batteries classified as dangerous goods for air transportation. 	
5	<p><i>Charging/discharging batteries</i></p> <ul style="list-style-type: none"> (a) charging procedures for batteries; (b) discharging procedures for batteries; (c) cell balancing in multi-cell batteries; (d) state of charge of a battery with reference to capacity and voltage. 	A
6	<p><i>Battery limitations</i></p> <ul style="list-style-type: none"> (a) “continuous C-rating” and “maximum burst C-rating”; (b) trade-off between battery size and flight endurance of an electrically-powered RPA; (c) battery serviceability; (d) battery checkers. 	B
7	<p><i>Electromagnetic radiation</i></p> <ul style="list-style-type: none"> (a) radio waves; (b) characteristics of radio waves, wave propagation, transmission including: <ul style="list-style-type: none"> (i) the radio frequency band ranges (MF, HF, VHF, UHF); (ii) effective range of transmissions; (iii) factors affecting the propagation of radio waves, including: <ul style="list-style-type: none"> (A) terrain; (B) ionosphere; (C) sun spot activity; (D) interference from electrical equipment; (E) thunderstorms; (c) radio characteristics, optimisation and shielding: <ul style="list-style-type: none"> (i) digital and analogue signals; 	A

Item	Aeronautical knowledge topics	Priority
	(ii) command and control link range testing; (iii) radio frequencies for RPA operations.	
8	<p><i>Global Positioning System (GPS)</i></p> <p>(a) components of a GPS;</p> <p>(b) how GPS works, including accuracy of different systems;</p> <p>(c) factors that affect the performance of GPS, including the following:</p> <ul style="list-style-type: none"> (i) number of satellites available; (ii) path interference; (iii) type of software; (iv) signal availability; (v) indications of faulty GPS equipment. 	A
9	<p><i>Electromagnetic signal reliability and hazards</i></p> <p>(a) electromagnetic interference (EMI);</p> <p>(b) powerlines;</p> <p>(c) LTE and Wi-Fi.</p>	B

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common units (contd.)

Unit 5 RHPF — Human performance for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p>General</p> <ul style="list-style-type: none"> (a) airmanship (including, “aviate”, “navigate”, “communicate”); (b) differences between the sensory information available to a person operating an RPA compared to the pilot of manned aircraft; (c) situational awareness during RPA operations; (d) information processing and decision making in relation to the following factors: <ul style="list-style-type: none"> (i) personality traits; (ii) pride, peer pressure or employer pressure; (iii) desire to get the task done; (iv) anxiety, overconfidence, boredom or complacency; (v) long- or short-term memory; (vi) memory limitations; (vii) <i>aide-memoires</i> and rules of thumb; (viii) workload and overload; (ix) skill, experience and recency; (e) methods of enhancing decision-making skills; (f) temporal factors relating to system latency. 	C
2	<p>Basic health</p> <p>Medical and psychological factors that may affect pilot performance in relation to operating RPA:</p> <ul style="list-style-type: none"> (a) upper respiratory tract infections, including colds, hay fever, congestion of air passages and sinuses; (b) a headache, including a migraine; (c) an injury; (d) ageing; (e) dehydration and heat stroke; (f) fatigue; (g) alcohol use and smoking; (h) drug use, including prescription and over-the-counter medications; (i) emotions, including anger, anxiety, depression and fear. 	C

Item	Aeronautical knowledge topics	Priority
3	<p><i>Vision, spatial disorientation, illusions</i></p> <p>(a) anatomy of the eye and its functioning during the day and at night;</p> <p>(b) limitations of the eye:</p> <ul style="list-style-type: none"> (i) the ability to discern objects/aircraft at a distance and height; (ii) empty field myopia; (iii) glare; (iv) colour discrimination; (v) myopia, hyperopia, astigmatism, presbyopia and parallax; <p>(c) enhancing vision within the definition of VLOS:</p> <ul style="list-style-type: none"> (i) prescription spectacles; (ii) suitable sunglasses; <p>(d) disorientation during RPA operations;</p> <p>(e) visual illusions:</p> <ul style="list-style-type: none"> (i) typical illusions, including relative motion; (ii) conditions under which visual illusions may occur; (iii) how to overcome sensory illusions. 	B
4	<p><i>Stress in relation to operating RPA</i></p> <p>(a) the effects of short- and long-term stress on the performance and health of a person operating an RPA;</p> <p>(b) symptoms of stress in an excessively hot, cold, windy, vibrating or noisy environment;</p> <p>(c) causes and effects of domestic or work-related stress;</p> <p>(d) principles of stress management, including:</p> <ul style="list-style-type: none"> (i) cognitive or behavioural techniques for managing stress; (ii) relaxation; (iii) time management. 	C
5	<p><i>Threat and error management</i></p> <p>(a) principles of threat and error management in relation to operating RPA;</p> <p>(b) processes to identify and manage threats and errors during RPA operations;</p> <p>(c) the use of checklists and standard operating procedures to prevent errors;</p> <p>(d) crew resource management;</p> <p>(e) risk perception when remote from the location of RPA operation;</p> <p>(f) strategic versus tactical risk management.</p>	B
6	<p><i>Coordinating crew</i></p> <p>(a) verbal and non-verbal communication, including the following factors:</p> <ul style="list-style-type: none"> (i) barriers to communication; 	C

Item	Aeronautical knowledge topics	Priority
	<ul style="list-style-type: none"> (ii) listening skills; (iii) assertion skills; (b) aspects of individuals that may affect the safe operation of the RPA: <ul style="list-style-type: none"> (i) personality; (ii) judgement; (iii) leadership style. 	

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common units (contd.)

Unit 6 RKOP RPAS knowledge — operations and procedures

Item	Aeronautical knowledge topics	Priority
1	<p><i>General operations</i></p> <p>(a) general considerations relating to:</p> <ul style="list-style-type: none"> (i) starting and ground running of motors/engines; (ii) bystanders; (iii) crew briefing; <p>(b) responsibilities of the remote pilot:</p> <ul style="list-style-type: none"> (i) under Part 101 of CASR; (ii) in relation to the operator’s documented practices and procedures; (iii) keeping operational, remote pilot and technical logs in accordance with MOS sections 10.05 to 10.06; <p>(c) considerations:</p> <ul style="list-style-type: none"> (i) after an operation has ended; (ii) in relation to aircraft noise and wildlife. 	A
2	<p><i>Risk assessment and management</i></p> <p>(a) the strategic risk assessment process relevant to RPAS operations, including:</p> <ul style="list-style-type: none"> (i) hazard identification; (ii) risk identification; (iii) risk mitigation measures; <p>(b) elements of a job safety assessment for the operation of an RPA;</p> <p>(c) completing a job safety assessment for the operation of an RPA.</p>	A
3	<p><i>Airworthiness — general</i></p> <p>(a) determine RPAS serviceability for a specific operation;</p> <p>(b) use of the RPA technical log;</p> <p>(c) responsibilities of the holder of a remote pilot licence in relation to the continuing airworthiness of the RPA, including:</p> <ul style="list-style-type: none"> (i) conducting inspections of the RPA; (ii) reporting defects or unserviceability in relation to the RPAS. 	A
4	<p><i>Role equipment or sensors</i></p> <p>Safety and performance implications of various payloads, including cameras and other sensors.</p>	B

Item	Aeronautical knowledge topics	Priority
5	<p><i>Accident and incident reporting</i></p> <p>(a) definitions of accident and incidents;</p> <p>(b) requirements for accident and incident reporting (however described) mentioned in the <i>Transport Safety Investigation Regulations 2003</i> and the <i>Transport and Safety Investigation (Voluntary and Confidential Reporting Scheme) Regulation 2012</i>.</p>	A
6	<p><i>Abnormal operations</i></p> <p>Considerations in the event of the following:</p> <p>(a) if the engine or motors of an RPA fails in the following circumstances:</p> <ul style="list-style-type: none"> (i) immediately after launch; (ii) on approach to landing; (iii) when operating within controlled airspace under ATC control; (iv) in a built-up area; (v) in the vicinity of bystanders; <p>(b) a control link failure;</p> <p>(c) a remote pilot station failure;</p> <p>(d) if a fire takes hold on the RPA during flight or on the ground;</p> <p>(e) if the RPA is attacked by a bird.</p>	A
7	<p><i>Fail-safe procedures and emergency actions</i></p> <p>Fail-safe systems and emergency actions, including:</p> <p>(a) the “return to home” system;</p> <p>(b) regain link holding pattern;</p> <p>(c) the RPA flies to a predetermined holding point;</p> <p>(d) emergency parachute deployment;</p> <p>(e) immediate landing;</p> <p>(f) flight termination;</p> <p>(g) carbon fibre containment in the event of a crash.</p>	A
8	<p><i>Operation of RPA near aerodrome</i></p> <p>(a) considerations in relation to operating an RPA near an aerodrome:</p> <ul style="list-style-type: none"> (i) the location at an aerodrome of each runway threshold, each runway threshold centrepoint, and the movement areas; (ii) the structure of the approach and departure paths for aerodromes and helicopter landing sites (HLS); <p>(b) the prohibitions in Part 101 of CASR relating to operating an RPA at or near aerodromes and HLS;</p> <p>(c) the process to obtain a permission, approval or exemption (however described) under CASR in relation to operating an RPA at or in the approach and departure paths of a particular aerodrome;</p> <p>(d) determining the runway or runways in use at an aerodrome;</p> <p>(e) traffic patterns at aerodromes;</p>	A

Item	Aeronautical knowledge topics	Priority
	(f) limitations on the operation of an RPA near an aerodrome if the aerodrome has more than 1 runway; (g) limitations imposed by the Part 101 MOS with respect to operations in controlled and non-controlled airspace.	
9	<i>Operations of RPA above 400 ft AGL</i> Considerations relating to operations of an RPA above 400 ft AGL: (a) airspace classification; (b) aeronautical radio use and qualifications; (c) identifying the location of non-controlled aerodromes; (d) use of RPA observers; (e) the process to obtain a permission, approval or exemption (however described) under CASR in relation to operating an RPA above 400 ft AGL.	A

Schedule 4 Aeronautical knowledge units

Appendix 1 Any RPA — Common units (contd.)

Unit 7 RORA — Operational rules and air law for RPAS

Item	Aeronautical knowledge topics	Priority
1	<p><i>Aviation legislation and information</i></p> <p>(a) documents that contain aviation legislation, aeronautical information and general operating rules that apply to the operation of RPA;</p> <p>(b) obtaining the documents and ensuring that the information is up to date;</p> <p>(c) guidance materials and information sources relating to RPAS operations.</p>	A
2	<p><i>Remote pilot licence</i></p> <p>(a) conditions that apply to a remote pilot licence under Part 101 of CASR;</p> <p>(b) conditions that may apply to a remote pilot licence under other legislation;</p> <p>(c) conditions that apply to a certified RPA operator under Part 101 of CASR.</p>	B

Schedule 4 Aeronautical knowledge units

Appendix 1A Any RPA operated under an automated flight management system

Unit 8 RAFM — Automated flight management systems knowledge

Item	Aeronautical knowledge topics	Priority
1	<p><i>General</i></p> <ul style="list-style-type: none">(a) use of automated flight management systems for RPA;(b) limitations of an automated flight management system;(c) identifying faults with automated flight management system;(d) automated flight management system in abnormal and emergency situations (for example, loss of control, loss of thrust);(e) precautions when programming an automated flight management system;(f) degraded automated flight management systems (for example, no GPS, IMU failure).	A

Schedule 4 Aeronautical knowledge units

Appendix 2 Category specific units — Aeroplane category

Unit 9 RBKA — Aircraft knowledge and operation principles: Aeroplanes

Item	Aeronautical knowledge topics	Priority
1	<p><i>RPA components</i></p> <p>(a) typical components found on the fuselage of the RPA:</p> <ul style="list-style-type: none"> (i) hatches; (ii) vents; (iii) drains; (iv) aerials/antennas; (v) catapult attachment; (vi) airdrop launch attachment; (vii) fail-safe equipment; <p>(b) typical features of the wings of the RPA:</p> <ul style="list-style-type: none"> (i) leading and trailing edges; (ii) ailerons; (iii) flaps; (iv) elevon/flaperons; (v) servomechanisms; <p>(c) typical components found on the tail of the RPA:</p> <ul style="list-style-type: none"> (i) vertical stabiliser; (ii) elevator/stabilator; (iii) rudder; <p>(d) undercarriage and recovery fittings of the RPA:</p> <ul style="list-style-type: none"> (i) wheeled undercarriage; (ii) floats; (iii) brakes; (iv) steering mechanism; (v) hook/skid. 	B
2	<p><i>Aeroplane aerodynamics</i></p> <p>Characteristics of an aerofoil:</p> <ul style="list-style-type: none"> (a) chord; (b) span; (c) aspect ratio; (d) camber; (e) aerodynamic stall; (f) wing loading. 	B

Item	Aeronautical knowledge topics	Priority
3	<p>Launch</p> <p>(a) effects of cross-wind on high- and low-wing aeroplanes during launch and control technique;</p> <p>(b) effects of cross-wind on tail-wheel equipped aeroplanes and control techniques;</p> <p>(c) advantages of launching into wind.</p>	A
4	<p>Climbing</p> <p>Effect on climb rate and angle resulting from changes in the following:</p> <p>(a) weight;</p> <p>(b) power;</p> <p>(c) airspeed (changed from recommended);</p> <p>(d) flap deflection;</p> <p>(e) headwind/tailwind component, windshear;</p> <p>(f) bank angle;</p> <p>(g) altitude and density altitude.</p>	A
5	<p>Straight and level</p> <p>Relationship between attitude, angle of attack and airspeed in level flight.</p>	A
6	<p>Turning</p> <p>(a) concept of balanced turns;</p> <p>(b) effect of increasing or decreasing bank angle on:</p> <p>(i) stall airspeed, including the rate of increase of stall speed with increasing bank;</p> <p>(ii) the aircraft's structure (load factor);</p> <p>(c) precautions during steep turns:</p> <p>(i) shortly after launch; and</p> <p>(ii) during a glide, particularly on approach to land;</p> <p>(d) visual illusions during level turns at low level when turning downwind or into wind.</p>	A
7	<p>Stalling, spinning and spiral drives</p> <p>(a) the characteristics of a stall;</p> <p>(b) visual signs from the ground when the RPA is approaching a stall;</p> <p>(c) stall recovery:</p> <p>(i) the effect of using ailerons when approaching, and during, the stall; and</p> <p>(ii) why the RPA may stall at different speeds;</p> <p>(d) effects of the following on the stall airspeed:</p> <p>(i) power;</p> <p>(ii) flap;</p> <p>(iii) manoeuvres;</p> <p>(iv) weight;</p>	A

Item	Aeronautical knowledge topics	Priority
	(v) airframe frost and ice; (vi) air density; (e) manoeuvres during which the RPA may stall at an angle which appears to be different to the true stalling angle; (f) differences between a spin and a spiral dive; (g) spiral dive recovery.	
8	<i>Descent</i> (a) angle of descent and attitude relating to: (i) power; (ii) flap; (iii) aircraft nose position; (b) effect of headwind/tailwind; (c) rate and angle of descent.	A
9	<i>Landing/recovery</i> (a) achieving a smooth landing; (b) effects of a cross-wind on high- and low-wing aeroplanes during landing/recovery; (c) advantages of landing into the wind; (d) differences between a flapless approach and an approach with flap in terms of: (i) approach path angle; and (ii) threshold and touchdown speeds; and (iii) landing distance required; (e) deep stall landings; (f) use of a recovery net.	A

Schedule 4 Aeronautical knowledge units

Appendix 3 Category specific units — Helicopter (multirotor class) category

**Unit 10 RBKM — Aeronautical knowledge and operation principles:
Multirotor**

Item	Aeronautical knowledge topics	Priority
1	<p><i>RPA components</i></p> <p>(a) typical components of the RPA:</p> <ul style="list-style-type: none"> (i) the centre body; (ii) the arm attachments; (iii) the battery mounting; (iv) the motors and motor attachments; (v) the landing gear; (vi) other components of the RPA; <p>(b) location and function of electrical components of the RPA:</p> <ul style="list-style-type: none"> (i) its electronic speed controller(s); (ii) its receiver and antenna; (iii) its gyros/Inertial Management Unit; (iv) its flight controller; (v) its battery; (vi) its battery eliminator circuit; (vii) its GPS sensor/antenna. 	B
2	<p><i>Weight and balance — launch and landing and recovery</i></p> <p>Effects of the following changes to the performance of the RPA:</p> <ul style="list-style-type: none"> (a) weight; (b) power; (c) ground effect; (d) wind. 	A
3	<p><i>Aerodynamics — multirotor lift and drag</i></p> <p>(a) aerodynamic properties of a rotor blade:</p> <ul style="list-style-type: none"> (i) aerofoil shape; (ii) blade twist; (iii) blade taper; <p>(b) definitions of the following terms:</p> <ul style="list-style-type: none"> (i) rotor thrust; (ii) rotor drag; (iii) relative airflow; (iv) rotational airflow; (v) induced airflow; (vi) torque reaction. 	B

Item	Aeronautical knowledge topics	Priority
4	<p><i>Aerodynamics — hovering and forward flight</i></p> <p>(a) definitions of the terms:</p> <p style="padding-left: 20px;">(i) ground effect;</p> <p style="padding-left: 20px;">(ii) recirculation;</p> <p>(b) translational lift;</p> <p>(c) drag in forward flight.</p>	A
5	<p><i>Principles of operation — flight controls</i></p> <p>(a) primary flight controls and how they affect the movement of a multirotor about its longitudinal, lateral and normal vertical axes, including:</p> <p style="padding-left: 20px;">(i) hover;</p> <p style="padding-left: 20px;">(ii) yaw control;</p> <p style="padding-left: 20px;">(iii) forward operation;</p> <p style="padding-left: 20px;">(iv) ascent and descent;</p> <p style="padding-left: 20px;">(v) lateral horizontal operation;</p> <p>(b) stabilisation;</p> <p>(c) GPS hold.</p>	A
6	<p><i>Aerodynamics — abnormal operations</i></p> <p>(a) direction of rotation of a rotor and the implications of incorrect installation;</p> <p>(b) effects on the operation of the RPA if a motor of the RPA fails.</p>	A
7	<p><i>Launch</i></p> <p>(a) pre-launch checks;</p> <p>(b) post-launch checks.</p>	B
8	<p><i>Climbing</i></p> <p>Effect on climb rate and angle from changes in the following:</p> <p>(a) weight;</p> <p>(b) power;</p> <p>(c) airspeed;</p> <p>(d) a headwind or tailwind or windshear;</p> <p>(e) bank angle;</p> <p>(f) temperature;</p> <p>(g) altitude.</p>	A
9	<p><i>Turning</i></p> <p>(a) banked turns;</p> <p>(b) rotations or flat turns;</p> <p>(c) limitations on steep turns.</p>	B

Item	Aeronautical knowledge topics	Priority
10	<p data-bbox="268 241 719 277"><i>Descending, landing and recovery</i></p> <ul style="list-style-type: none"> <li data-bbox="268 286 986 322">(a) avoiding vortex ring state when operating the RPA; <li data-bbox="268 331 890 367">(b) recovery actions to escape vortex ring state; <li data-bbox="268 376 916 412">(c) advantages of landing/recovery into the wind; <li data-bbox="268 421 580 456">(d) pre-landing checks. 	A

Schedule 4 Aeronautical knowledge units

Appendix 4 Category specific units — Helicopter (single rotor) category

Unit 11 RBKH — Aeronautical knowledge and operation principles: Single rotor

Item	Aeronautical knowledge topics	Priority
1	<p><i>RPA components</i></p> <p>(a) typical components of the fuselage of the RPA, including:</p> <ul style="list-style-type: none"> (i) inspection hatches; (ii) vents; (iii) drains; (iv) antennas/aerials; (v) the boom; (vi) the tail rotor; <p>(b) typical components of the landing gear:</p> <ul style="list-style-type: none"> (i) skids; (ii) floats; <p>(c) other helicopter configurations:</p> <ul style="list-style-type: none"> (i) contra-rotating main rotors; (ii) horizontal tail rotor; (iii) other solutions to centrifugal reaction. 	B
2	<p><i>Helicopter key lift components</i></p> <p>Typical components of the rotor system:</p> <ul style="list-style-type: none"> (a) the flybar; (b) the swash plate; (c) the clutch. 	A
3	<p><i>Aircraft performance</i></p> <p>Effects of the following on aircraft performance:</p> <ul style="list-style-type: none"> (a) the gross weight of the RPA; (b) engine power; (c) ground effect. 	A
4	<p><i>Aerodynamics — lift and drag</i></p> <p>(a) aerodynamic properties of a rotor blade:</p> <ul style="list-style-type: none"> (i) aerofoil shape; (ii) blade twist; (iii) blade taper; <p>(b) definitions of the following terms:</p> <ul style="list-style-type: none"> (i) rotor thrust; (ii) rotor drag; 	B

Item	Aeronautical knowledge topics	Priority
	<ul style="list-style-type: none"> (iii) total reaction; (iv) relative airflow; (v) centrifugal reaction; (vi) rotor disc; (vii) coning angle; (c) terminology in relation to an operating rotor blade: <ul style="list-style-type: none"> (i) feathering; (ii) flapping; (iii) flapping to equality; (iv) dragging; (v) advance angle. 	
5	<p><i>Aerodynamics of hovering</i></p> <ul style="list-style-type: none"> (a) aerodynamic vectors of a rotor blade during hover; (b) terminology relating to hovering: <ul style="list-style-type: none"> (i) ground effect; (ii) tail rotor drift; (iii) rotor shaft tilt effect; (iv) recirculation; (c) abnormal operations: <ul style="list-style-type: none"> (i) vortex ring state (settling with power); (ii) loss of tail-rotor effectiveness; (iii) the appropriate recovery actions to (i) to (ii); (d) effects of the following on hovering: <ul style="list-style-type: none"> (i) the gross weight of the RPA; (ii) pressure altitude; (iii) temperature. 	A
6	<p><i>Aerodynamics — forward operation</i></p> <p>Terminology in relation to forward flight:</p> <ul style="list-style-type: none"> (a) dissymmetry of lift; (b) flapback; (c) cyclic limits; (d) airflow reversal; (e) retreating blade stall; (f) compressibility; (g) inflow roll; (h) translational lift; (i) aerodynamic vectors of a rotor blade during forward flight. 	B

Item	Aeronautical knowledge topics	Priority
7	<p><i>Aerodynamics — power requirements</i></p> <p>(a) power available and power required in relation to the following:</p> <ul style="list-style-type: none"> (i) best speed for range; (ii) best speed for endurance; (iii) best rate of climb; (iv) best angle of climb; <p>(b) “overpitching” — causes and recovery actions.</p>	A
8	<p><i>Principles of flight — helicopter controls</i></p> <p>(a) flight controls:</p> <ul style="list-style-type: none"> (i) cyclic and collective; (ii) trim systems; (iii) tail gyroscope; <p>(b) aerodynamic enhancements:</p> <ul style="list-style-type: none"> (i) a canted tail rotor; (ii) sweep back on tips; (iii) a shrouded tail rotor; (iv) tail surfaces, fins, end plates and stabilators. 	A
9	<p><i>Autorotative flight</i></p> <p>(a) the meaning of the following terms in relation to an RPA that is capable of autorotative flight:</p> <ul style="list-style-type: none"> (i) autorotative force; (ii) autorotative section; <p>(b) the effect on autorotation of the RPA if the following are varied:</p> <ul style="list-style-type: none"> (i) all-up weight; (ii) density altitude; (iii) airspeed; (iv) rotor RPM. 	A
10	<p><i>Effects of particular conditions</i></p> <p>(a) undesirable aircraft states:</p> <ul style="list-style-type: none"> (i) ground resonance; (ii) mast bumping; (iii) dynamic roll-over; <p>(b) avoiding undesirable aircraft states.</p>	A