

AVIATION/NAUTICAL INFORMATION:

- Port = left; starboard = right; fore = in front of; aft = behind
- Red right returning nun even
 - On your way inland, the right side has a red light, numbered evenly increasing, the buoys are nun, triangle tops
 - Left hand is green, odd numbered, and the buoys are can, cylinders, square.
- Boating Right of way
 - 2 powered vessels
 - head on, both vessels give-way starboard (right)
 - crossing paths, vessel on operators left is give-way vessel. vessel on operators right is stand-on and can maintain course.
 - overtaking, the one overtaking is the give-way, pass on either side
 - power vs sail
 - powered is always give-way vessel, sailing vessel is stand-on
 - overtaking, whichever one is overtaking is the give-way, pass on either side
 - sail vs sail
 - wind on same side; the leeward (downwind) is the stand-on vessel and maintains course
 - wind on different sides; head on, the vessel with wind on its starboard side is the stand-on.
 - if operating power driven, you must give way to
 - any vessel not under command
 - vessel restricted in ability to maneuver
 - engaged in commercial fishing
 - sailing vessel unless it is overtaking
 - sailing vessel must give way to
 - same as above minus the last one.
- Aircraft Right of way
 - Aircraft in distress always has the right of way
 - Approaching head on - both aircraft give way to the right
 - Overtaking aircraft - must pass slower aircraft to the right and stay well clear
 - When aircraft of same category are converging, the aircraft to the others right has right of way.
 - When two aircraft are converging or approaching from the side, the aircraft to the left must give way to the aircraft on the right.
 - General rule regarding converging aircraft of different categories, the least maneuverable aircraft has right of way.
 - Balloon > Glider > Aircraft Refueling > Airship > Airplane / Rotorcraft
 - When approaching for a landing, the aircraft of lower altitude has right of way.
 - Aircraft in approach for landing has right of way over others in the pattern and those on the ground.
- Axis
 - Longitudinal - along the fuselage
 - provides lateral stability
 - movement about: banking
 - Lateral - along the wings
 - provides longitudinal stability
 - movement about: pitching
 - Vertical - perpendicular, through the top and bottom of the fuselage
 - movement about: yawing

- Wing span = wing tip to wing tip
 - Longer wings result in a shallower glide angle, in comparison to short wings.
 - If wing area is doubled, lift and drag will be doubled
- During takeoff, a headwind will shorten the takeoff run and increase the angle of climb. A tailwind during takeoff will increase the takeoff run and decrease the angle of climb.
- Windlass - designed for handling the anchor chain
- Nautical mile - 6076 ft
 - Nautical / Statute mile ratio = 8/7
- Standard Weights
 - Gasoline - 6 lb / gallon
 - Oil - 7.5 lb / gallon
 - Water - 8.35 lb / gallon
- Objects not established for the sole purpose of assisting a navigator in fixing a position are not considered to be an "aid to navigation"
- Fog generally forms at night when warmer air moves over colder water.
 - Determined by differences between the wet-and-dry bulb temperatures. Fog usually forms when the wet-bulb depression is less than 4 degrees.
- Lights: red=port, green=starboard, white indicates the direction it is going, yellow is for special circumstances
- Ship Terminology
 - Freeboard – from water level to deck
 - Draft – from water level to bottom of boat
 - Forecastle – bow half of deck
 - Fantail – stern half of deck
 - Keel - The principal structural member of a ship, running lengthwise along the center line from bow to stern, to which the frames are attached.
 - Lubbers Line - the direction of the ship's bow. fore and aft line of the ship.
 - Course Line - line drawn from the fix in direction in which a ship is moving
- The heading of a ship causes water to push against the side of the rudder, creating a force that swings the stem of the ship to the opposite side. The faster the vessel is moving, the greater the pressure against the rudder and the quicker the turning effect.
- Air weights
 - Humid air is lighter than dry air
 - Warm air is lighter than cold air (heat rises)
- Dead reckoning - relying solely on your compass for direction.
- Terrain association - using the surrounding terrain to guide you along your way.
- Landing into the wind (wind comes from ahead of you) reduces your ground speed (aircraft speed relative to the ground)
- Plane is most likely to stall in great degree of bank turns, or high angles of attack.
- Variable Swept wings
 - Swept position - reduce drag at high speed

- Extended position - to provide decreased ground speed during landing; to provide increased lift at low speed.
- Father of the Navy - John Paul Jones
- Key Terms
 - Camber - curvature of the top of a wing or airfoil
 - Angle of attack - angle formed by the chord line of the wing and the oncoming airflow
 - Aspect ratio - ratio of the distance between the wing tips of an airplane to its average wing width
 - Aspect ratio = b^2/s ; where b is wing span, s is surface area of wing
 - High aspect ratio - long and skinny wings
 - Low aspect ratio - short and stubby wings
 - Wing load - Ratio of wing surface area to aircraft weight
 - Fly by wire - control linkages between the cockpit and the planes control surfaces are electronic rather than mechanical
 - Trim tabs - small control surfaces that permit the pilot to balance control forces in steady flight to relieve pressure on the aircrafts controls and thus, pilot fatigue.
 - Autorotation - a maneuver used by helicopter pilots to make an emergency landing when he or she has lost engine power during flight.
 - Compass deviation - the error of a magnetic compass due to local magnetism. It is dependent upon your heading; The difference between your desired grid or map heading and the heading you must follow on your compass due to the effects of local magnetism.
 - Variation - difference between true bearing and magnetic bearing.
- Sonic boom is caused by an abrupt change in pressure across the shock wave.
- F-14 back seater is the Radar Intercept Officer (RIO)
- Airports
 - Blue light = taxiway
 - White white = runway
 - Runway numbers - first 2 numbers in their compass heading (runway 36 is north, not 00).
 - Airport Lights
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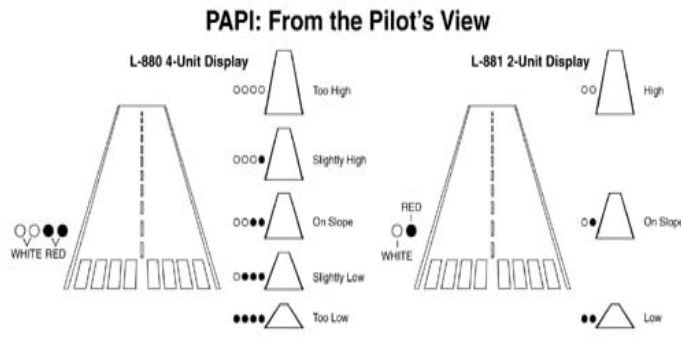
| | Aircraft in flight | Aircraft on the ground | Ground vehicles or personnel |
|----------------------------------|--|---|-------------------------------------|
| Flashing white | N/A | Return to starting point | Return to starting point |
| Steady green | Cleared to land | Cleared for takeoff | Cleared to cross/proceed |
| Flashing green | Cleared to approach airport, or return to land | Cleared to taxi | N/A |
| Steady red | Continue circling, give way to other aircraft | Stop | Stop |
| Flashing red | Airport unsafe, do not land | Immediately taxi clear of runway in use | Clear the taxiway/runway |
| Alternating red and green | Exercise extreme caution | Exercise extreme caution | Exercise extreme caution |

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| Blinking runway lights | Vehicles, planes, and pedestrians immediately clear landing area in use |
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- Pedigree - when the moon is closest to the earth
- Boat Naming (N at the end of CV, SS, CG means nuclear powered)
 - CG - Guided Missile Cruiser
 - CA - Gun Cruiser
 - CV - Aircraft Carrier
 - L** - Amphibious / Landing Craft Carriers
 - BB - Battleship
 - S* - Submarine
 - A* - Combat Logistics
 - M* - Mine warfare
- Helicopters
 - First conflict to see wide use was Korean War
- Sailboats
 - Yawl - double mast sailing vessel where the mizzen or rear mast is aft of the rudder post.
 - Sloop - a single mast sailing vessel
- Tides
 - Spring tide - the large rise and fall of the tide at or soon after the new or full moon (high tides are very high, low tides are very low)
 - Neap tide - Those tides midway between spring tides that attain the least height
 - Ebb tide - when the tide falls after high tide
- Space program
 - Chronologically: Mercury, Gemini, Apollo
 - Alan Shepard - first American in space
 - John Glen - US Marine, 149 combat missions between WWII and Korean War. 5 distinguished flying crosses. First to fly supersonic across the US. First American to orbit the earth in space in the Project Mercury Gemini capsule Friendship 7.
 - Yuri Gagarin - Russian cosmonaut, first man in space.
 - Apollo 11 landed on the moon in 1969 w/ Neil Armstrong, Edwin Aldrin Jr, and Michael Collins
 - 17 total Apollo missions
 - Pioneer 10 - First American spacecraft to explore the outer solar system
 - Ed White - first American to walk in space
- Dumping fuel during an emergency landing is done to increase maneuverability by reducing landing weight.
- Weather
 - Characteristics of warm front - Steady, long period of rain. Fog (warmer air over cooler water).
 - Atmosphere (lowest to highest)
 - Troposphere (20,000 ft at poles, 60,000 ft at equator)
 - Stratosphere (120,000 ft, 20 miles)
 - Mesosphere (300,000 ft, 50 miles)
 - Thermosphere / Ionosphere / Aurora (above and beyond)
 - Boundry between the troposphere and stratosphere is called the tropopause.

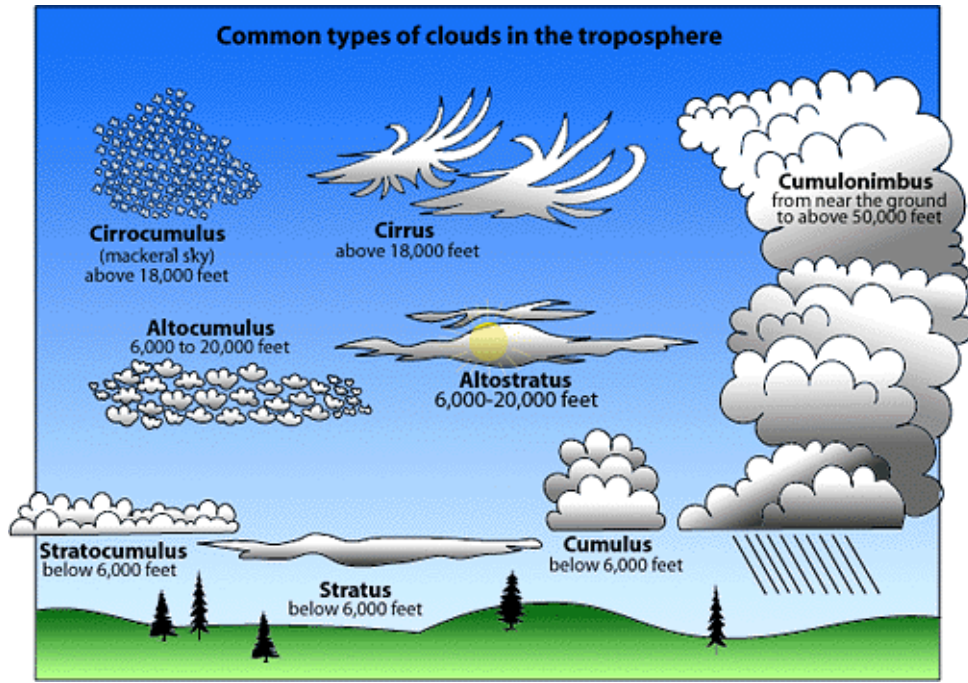
- Ozone layer is in the higher end of the stratosphere.
- Air
 - 78% Nitrogen ; Oxygen 21% ; Argon 1% ; The rest is traces of Carbon Dioxide, hydrogen, and other rare gases.
 - You typically need oxygen if you fly above 10,000 ft.
- Officers
 - Company grade - Ensigns and Lieutenants, Captains also
 - Flag officers - Commodores and Admirals
- Bonhomme Richard was a sailing frigate in the United States Navy.
- Latitude / Longitude
 - Latitude are the lines across the globe. Measured from equator.
 - Longitude are the lines from the poles. Measured from prime meridian in Greenwich, England.
 - UTC - coordinated universal time, the time at the prime meridian, through the observatory at Greenwich, England, longitude 000 degrees.
 - Time zones are divided into 15 degree intervals of longitude. $360/15=24$ time zones
- Transponder
 - 7500 for hijacking
 - 7600 for loss of communication
 - 7700 for emergency
 - 7777 for military flight or interceptor
- Health Effects to Flying
 - Hypoxia - too little oxygen in the blood stream, resulting in a blackout
 - Vertigo - can also occur after long flights where the mind gets used to turbulence, resulting in a person's feeling as if he is moving up and down
- Airspace
 - Class A - 18,000 ft MSL up to FL600 (= really high ??)
 - Class B - surface to 10,000 ft MSL, surrounds major airports
 - Class C - surface to 4,000 ft AGL, around busy airports
 - Class D - surface to 2,500 ft AGL, surrounds airports with operational control tower
 - Class G - surface to either 1,200 ft AGL or 700 ft AGL
 - Class E - everything else
- Airports
 - Taxiway markings are yellow
 - Centerline is solid yellow line
 - Edges are double solid yellow
 - Holding lines are double solid yellow and double dashed yellow lines across width of taxiway
 - Runway holding position sign: red with white characters
 - Runway markings
 - Displaced Threshold – start of landing portion of runway, white block with white arrows
 - Chevrons – only usable in case of an emergency
 - Large white X – marks an unusable runway
 - Lights

- Taxiway lighting - either green lights on the centerline or blue lights on the edge
- Runway - threshold is green, sideline is white, runway end is red.
- Obstructions - red lights
- VASI - visual approach slope indicators
 - Red = low ; White,amber = high ; Green = on slope ; even number of white and red = on slope.
- PAPI - precision approach path indicators



- Traffic Pattern
 - Normal pattern is flown @ 1,000 ft AGL, 5 legs
 - Upwind leg
 - Crosswind leg
 - Downwind leg
 - Base leg
 - Final approach
- For any helicopter, the higher the density altitude, the less the rate of climb.
- Lift varies directly with the density of air. As air density increases, lift and drag increase.
- Instruments:
 - Beaufort Scale - estimates wind speed
 - Fathometer - electronic device used in making deep-sea soundings.
 - Sextant - precision instrument used in celestial navigation to measure angles.
 - Capstan - An apparatus used for hoisting weights, consisting of a vertical spool-shaped cylinder that is rotated manually or by machine and around which a cable is wound.
- 4 methods of determining position
 - Piloting, dead reckoning, celestial navigation, electronic navigation.
- Docks
 - Pier - right angle to the shore
 - Wharf - parallel to the shore
 - Slip - space between adjacent piers

- Clouds



- **Cumulus:** In Latin, this means "heap." Cumulus clouds look like a heap of cotton balls or whipped cream.
 - They are often low in the air and look like cotton wool or like cauliflower on top with a flat base. Cumulus is Latin for 'heap'. Clusters of small white cumulus clouds are usually a sign of fine weather. Sometimes cumulus clouds develop into the storm cloud cumulonimbus which brings lightning and thunder. Cumulonimbus Clouds are called 'the King of Clouds'. The base of a cumulonimbus cloud is often low but it may be as high as 10 kilometers.
- **Stratus:** It's Latin for "covering" or "blanket." Stratus clouds look like a flat blanket in the sky.
 - These appear as light grey clouds that look like even sheets and cover all or part of the sky. They are composed of fine water droplets that become larger as they collide with each other and are often very low in the air.
- **Cirrus:** It's Latin for "curl." Cirrus clouds look like curls of white hair.
 - These are the whitest, highest clouds made of tiny ice crystals. They are often wispy in appearance.
- Levels
 - High level (base @ 20,000 ft)
 - Ice crystals, below freezing upper atmosphere
 - Cirrus, cirrocumulus, cirrostratus
 - Middle level (base above 6,500 ft)
 - Altopcumulus, altostratus, nimbostratus
 - Low level (base below 6,000 ft)
 - Stratocumulus, stratus, cumulus, nimbostratus
 - Towering, vertical rising (mushroom clouds)
 - Cumulonimbus, towering cumulus

- Winds
 - Land breeze - at night the land cools faster than the water, therefore the air above it cools and descends; the air over the sea rises; surface air moves to sea; higher air moves inland.
 - Sea breeze - during the day, more common on hot sunny days; the land heats and causes the air over the land to rise; the air above the water is cooler and moves in over land and creates a circular pattern
 - Windward - toward the wind, toward the point in which the wind blows
 - Leeward - on the side away from the wind (downwind)
- Thunderstorm
 - Cumulus stage - warm air rises in cumulus clouds, strong updrafts
 - Mature stage - precipitation begins, typically last 20-40 minutes
 - Dissipating stage - downdrafts of cold air overcome rising warm air, the temperature in the clouds warm to match that of the surrounding environment.
- Atmospheric Temperature
 - If it is higher than standard, true altitude will be higher than your indicated altitude.
 - If it is colder than standard, true altitude will be lower than indicated.
 - Mean sea level temperature is +15 degrees Celsius
 - Mean sea level pressure is 29.92 inches Hg (mercury)
- Engine
 - High performance - more than 200 horsepower
 - The horsepower out-put of the engines decrease because its fuel-air mixture is reduced. The propeller develops less thrust because the blades, as airfoils, are less efficient in the thin air. The wings develop less lift because the thin air exerts less force on the airfoils. As a result, the take-off distance is substantially increased, climb performance is substantially reduced and may, in extreme situations, be non-existent.
 - Humidity also plays a part in this scenario. Although it is not a major factor in computing density altitude, high humidity has an effect on engine power. The high level of water vapor in the air reduces the amount of air available for combustion and results in an enriched mixture and reduced power.
- Airspeed
 - Indicated - displayed on your airspeed indicator
 - Calibrated
 - Equivalent
 - True
- Air Pressure
 - If you fly from high pressure to low pressure without resetting altimeter, indicated will read higher altitude than your true altitude.
 - If you fly from low to high pressure, true altitude will be higher than indicated.
- Different types of altitude
 - Indicated - altitude measured and displayed by the altimeter.
 - Pressure - vertical distance above the standard datum plane
 - Density - corrects pressure altitude for nonstandard temperature
 - True - actual height of an object above mean sea level
 - Absolute - actual height of the airplane above the earth's surface over which it is flying
 - Misc:
 - Actual air speed is faster than indicated air speed at high altitudes, where the air is less dense.
 - The higher you go, the less dense the air. This means less lift, but also less drag.
 - You get best lift when the air is dry, you're at a low altitude, and it's cold out (all things that effect density)
- Different types of drag
 - Parasite - caused by any aircraft surface which deflects or interferes with the smooth airflow

around the airplane. Divided into 3 parts. (if airspeed is doubled, parasite drag is increased 4 times; = airspeed squared)

- Form drag - results from the turbulent wake caused by separation of airflow from the surface of the structure. Relative to both the size and shape of the structure which protrudes into the relative wind.
- Interference - occurs when varied currents of air over an airplane meet and interact. Such as the mixing of the air over structures such as wing and tail surface brace struts and landing gear struts.
- Skin friction - caused by roughness of the airplanes surface.
- Induced - Generated by the airflow circulation around the wing as it creates lift. Vortices acting at the downwash and the wing tip. Known as 'drag due to lift'.
 - When are vortices produced? (during lift, drag, or thrust?)
 - Only when a wing produces lift (I think)
- Ground effect - Occurs close to the ground where the earths surface restricts the downward deflection of the airstream from the wing, decreasing induced drag.
- Total - Sum of parasite and induced drag.
- Historical Events
 - Navy Founded
 - Continental Navy - October 13, 1775
 - US Navy - 1798
 - Ader Eole
 - First true aeroplane
 - Steam powered
 - Developed by Clement Ader in 1890
 - LZ1
 - First Zeppelin
 - July 2, 1900 was its first flight - 18 minutes long
 - LZ127
 - First to circumnavigate the globe
 - 21 days, 5 hours, 31 minutes
 - Wright Flyer
 - First successful powered, piloted aircraft
 - Dec 17, 1903.
 - 12 seconds, 120 ft.
 - FW-61
 - Built in 1936, max speed 66 knots.
 - Range of 124 nautical miles
 - First nonstop flight across atlantic
 - Took off June 14, 1919
 - Vickers Vimmy IV
 - Alcock and Brown
 - Charles Lindbergh Jr.
 - First solo non-stop flight across atlantic
 - May 20 - 21, 1927
 - Amelia Mary Earhart
 - First woman to:
 - Receive distinguished flying cross.
 - Fly the Atlantic / Alone / and Twice
 - Fly an Autogyro (small rotorcraft)
 - Cross the US in an Autogyro
 - Fly non-stop across the US
 - Fly non stop from Hawaii to the continental US

- First jet to fly combat missions
 - Messerschmitt ME-262
 - Late 1944
- Chuck Yeager
 - First man to break the sound barrier
 - Bell X-1 rocketplane in 1947
- Eugene Ely - 1910
- USS Pennsylvania - 1911
- Pearl Harbor - December 7, 1941
- D-Day - June 6, 1944
- Atomic bomb
 - August 6, 1945 on Hiroshima
 - August 9, 1945 on Nagasaki

