2025-05-20 Instruments Lecture 3/HPL Lecture 1

> Date & Time: 2025-05-20 15:32:31
> Location: [Insert Location]
> [Insert Title]
> `pilot health and safety` `hypoxia and aviation physiology` `exam preparation and scheduling`

Theme

This lecture provides an in-depth overview of Human Performance and Limitations (HPL) for pilot training, covering physiological, psychological, and regulatory aspects essential for aviation safety. Topics include hypoxia, hearing protection, vision, fitness, medication, exam scheduling, and ICAO core competencies. Practical advice and regulatory guidelines are given to ensure pilot readiness and compliance with aviation standards.

Takeaways

1. HPL topics: function of the body and how to fly
2. Three hours allocated for initial study
3. Option to study topics together or separately
4. Phase 2 duration: one month and 20 days
5. June will have multiple exams scheduled closely
6. Exams scheduled immediately after finishing each subject
7. KC exam only requires two days of preparation
8. Flight planning exam scheduled on the same day as completion
9. HPL to be finished in two days, exam on 29th
10. Performance subject finishes on 26th, exam on 2nd (Monday)

Highlights

- `"You're gonna have exam after exam. Otherwise, if I'm not gonna, if we're gonna stretch this out, we're not gonna be able to finish."--Speaker 1`

- `"To become a successful pilot it's not only about knowing how to fly and knowing the theory you should have competencies that are approved by ECAL which is International Civil Aviation Organization."-- Speaker 1`
- `"Health is also important."-- Speaker 1`
- `"Always trust your instruments. This is the rule."-- Speaker 1`
- `"The best way of looking at the instrument is looking directly onto it."-- Speaker 1`
- `"So, whenever you're flying, you might have a completely different sensation, completely different. So, obviously, you cannot take drugs, everyone knows it, whenever you're either flying, or driving, or if you're a normal person, okay?"-- Speaker 1`
- `"Every medication that you have to take should be organized and you have to speak with your aviation medical examiner or doctor."-- Speaker 1`
- `"So, do you know this hormone? Have you heard about this hormone, endorphin? Right? So what it does, it just helps to promote a feeling of well-being."-- Speaker 1`

Chapters & Topics

HPL (Human Performance and Limitations) Study Plan

> The plan involves covering two main topics of HPL: the function of the body and how to fly. Three hours are allocated for initial study, with flexibility to study topics together or separately. Exams are scheduled immediately after completion of each subject.

- **Keypoints**
  - Two main HPL topics: function of the body and how to fly
  - Three hours allocated for initial study
  - Option to study topics together or one by one
  - Exams scheduled immediately after finishing each subject
- **Explanation**
  The instructor offers flexibility in how the topics are studied, either together or separately, and ensures that exams are taken right after the completion of each subject to maintain momentum and ensure coverage within the limited time frame.
- **Considerations**
- Students must be prepared for back-to-back exams.
- Time management is crucial due to the tight schedule.
- **Special Circumstances**

- If a student has not completed their medical, they need to schedule an appointment as soon as possible.

Phase 2 Timeline and Exam Scheduling

> Phase 2 lasts for one month and 20 days. Exams are scheduled closely together, especially in June, to ensure all subjects are completed within the timeframe. Some subjects, like KC, require less preparation time (two days).

- **Keypoints**
  - Phase 2 duration: one month and 20 days
  - June will have multiple exams scheduled closely
  - KC exam requires only two days of preparation
  - Flight planning exam scheduled on the same day as completion
  - HPL exam scheduled on 29th after two days of study
  - Performance exam scheduled on 2nd (Monday) after finishing on 26th
- **Explanation**
  The instructor emphasizes the importance of adhering to the schedule to ensure all exams are completed within Phase 2. The schedule is tight, with exams following immediately after the completion of each subject.
- **Considerations**
- Students should be aware of the exam dates and prepare accordingly.
- Efficient study habits are necessary to keep up with the schedule.
- **Special Circumstances**
- If a student is unable to attend an exam on the scheduled date, they must communicate with the instructor immediately.

Eight Core Competencies for Pilots (ICAO)

> The International Civil Aviation Organization (ICAO) defines eight core competencies essential for pilots: aircraft flight path management (manual control), aircraft flight path management (automation), communication, leadership and teamwork, problem solving and decision making, application of procedures (SOP), workload management, and situational awareness.

- **Keypoints**
  - Aircraft flight path management (manual control): Pilots must develop skills to manually control the aircraft throughout their training.
  - Aircraft flight path management (automation): Use of autopilot and automation, especially in multi-phase and instrument flight rules (IFR) scenarios.
  - Communication: Effective communication with ATC and co-pilots, practiced in MCC courses.

    - Leadership and teamwork: Pilots must act as leaders, supporting their partners and fostering teamwork.
    - Problem solving and decision making: Instructors assess decision-making during flight checks, especially in scenarios like low fuel or battery issues.
    - Application of procedures: Adherence to Standard Operating Procedures (SOPs).
    - Workload management: Managing tasks such as communication, navigation, and flight path, especially as experience increases.
    - Situational awareness: Understanding the aircraft's position and environment at all times.
- **Explanation**
  The competencies are introduced as foundational for pilot training, with practical examples such as manual flying, use of simulators for automation, and communication exercises. Leadership is compared to being a team captain, and decision-making is tested during flight checks with scenario-based questions. Workload management becomes easier with experience, and situational awareness is emphasized for safety.
- **Considerations**
- Support your partner and foster teamwork.
- Practice communication with ATC and co-pilots.
- Prepare for scenario-based decision-making assessments.
- Adhere strictly to SOPs.
- Continuously develop situational awareness.

Atmospheric Composition and Pressure Changes with Altitude

> The Earth's atmosphere is composed of 78% nitrogen, 21% oxygen, and 1% other gases. While the percentage of oxygen remains constant with altitude, the partial pressure of oxygen decreases as altitude increases, affecting oxygen availability for pilots.

- **Keypoints**
    - At sea level: 21% oxygen, partial pressure ~2.5 millibars.
    - At 20,000 feet: partial pressure of oxygen ~1.05 millibars.
    - Pressure decreases more rapidly at lower altitudes: 1 mm reduction per 27 feet up to 30,000 feet; above 30,000 feet, 1 mm per 75 feet.
    - Aircraft may require supplementary oxygen above certain altitudes.
- **Explanation**
  The lecture explains that while the oxygen percentage remains constant, the amount available (partial pressure) decreases with altitude. This is critical for pilots, as

reduced oxygen can lead to hypoxia. The pressure decrease is not linear; it's steeper at lower altitudes.

- **Examples**

  > At 5,000 feet: 850 millibars; at 10,000 feet: 700 millibars; at 18,500 feet: 500 millibars; at 30,000 feet: 300 millibars.

  - These values are important for exam questions and for understanding oxygen availability at different flight levels.
- **Considerations**
- Remember key pressure values for different altitudes.
- Understand the need for supplementary oxygen above certain altitudes.
- **Special Circumstances**
- If flying above 10,000 feet for more than 30 minutes in an unpressurized aircraft, supplementary oxygen is required.
- If flying above 13,000 feet at any time, supplementary oxygen must be used at all times.

Human Respiratory System and Oxygen Transport

> The respiratory system includes the trachea, lungs, and alveoli, where oxygen is transferred to the blood. Oxygen binds to hemoglobin in erythrocytes (red blood cells) and is transported throughout the body. Platelets (thrombocytes) help with blood clotting, and leucocytes are part of the immune system.

- **Keypoints**
  - Air travels through the trachea to the alveoli in the lungs.
  - Alveoli are tiny air sacs with a single-cell thickness, surrounded by blood.
  - Depression within alveoli allows oxygen transfer to blood.
  - Oxygen binds to hemoglobin in erythrocytes.
  - Platelets (thrombocytes) help heal wounds.
  - Leucocytes are immune defense cells.
- **Explanation**
  The process is compared to a tree, with the trachea as the trunk and alveoli as leaves. Oxygen transfer occurs due to pressure differences. The brain requires about 20% of the body's oxygen. Carbon dioxide is a waste product expelled during exhalation.
- **Considerations**
- Understand the pathway of oxygen from inhalation to cellular delivery.
- Recognize the roles of different blood cells.

Breathing Rate and Regulation

> The average person inhales and exhales about 50 times per minute, with a heart rate of about 70 beats per minute. The body stores little oxygen but more carbon dioxide, which helps regulate breathing rate. Breathing rate is more sensitive to CO2 levels than to oxygen levels.

- **Keypoints**
  - Breathing rate increases with higher CO2 levels (hyperventilation).
  - Exercise, stress, injury, or illness can affect breathing rate.
  - CO2 is a key regulator of breathing.
- **Explanation**
  The body responds to increased CO2 by increasing breathing rate to expel it. Oxygen is constantly needed due to low storage capacity.
- **Considerations**
- Monitor breathing rate during flight, especially under stress or exertion.

Hypoxia: Definition, Types, Symptoms, and Thresholds

> Hypoxia is a condition where the amount of oxygen available is insufficient for the body's needs. There are two main types: anemic hypoxia (inability to transport oxygen in the blood, often congenital) and hypoxic hypoxia (due to low oxygen at high altitude). Symptoms include personality changes, impaired judgment, loss of coordination, drowsiness, headaches, dizziness, nausea, cyanosis (blue-gray skin), and hyperventilation.

- **Keypoints**
  - Anemic hypoxia: congenital, affects oxygen transport even at sea level.
  - Hypoxic hypoxia: occurs at high altitude due to low oxygen availability.
  - Symptoms: personality changes, impaired judgment, loss of coordination, drowsiness, headaches, dizziness, nausea, cyanosis, hyperventilation.
  - Up to 7,000 feet (sometimes 10,000 feet), the body compensates for low oxygen.
  - Above 10,000 feet, oxygen reduction is rapid; supplementary oxygen is required above certain thresholds.
- **Explanation**
  Anemic hypoxia is not compatible with being a pilot due to susceptibility to pressure changes. Hypoxic hypoxia is a risk for all pilots at altitude. Symptoms can be mistaken for illness, so vigilance is required.
- **Examples**
  > From sea level to 10,000 feet: no supplementary oxygen needed. From 10,000 to 13,000 feet: if flying for more than 30 minutes, supplementary oxygen is required. Above 13,000 feet: supplementary oxygen is required at all times.

  - These thresholds are critical for flight planning and safety.

- **Considerations**
- Monitor for symptoms of hypoxia in yourself and co-pilot.
- Understand and comply with oxygen requirements at various altitudes.
- **Special Circumstances**
- If a co-pilot shows signs of hypoxia, check on them, engage them in conversation, or tell a joke to assess alertness.

Carbon Monoxide Poisoning in Aviation

> Carbon monoxide (CO) is a colorless, odorless gas produced by incomplete combustion of carbon-containing materials, such as aviation fuel. Hemoglobin binds to CO up to 200 times more readily than to oxygen, making even small amounts dangerous. CO poisoning symptoms include headache, weakness, nausea, muscle pain, dizziness, and can be mistaken for common illness.

- **Keypoints**
  - CO is produced by incomplete combustion in engines.
  - Hemoglobin binds to CO 200 times more readily than oxygen.
  - CO detectors (stickers) in aircraft change color when CO is present.
  - Symptoms: headache, weakness, nausea, muscle pain, dizziness.
  - CO poisoning can be mistaken for illness.
- **Explanation**
  CO detectors are essential in aircraft, especially when using the heating system. If CO is detected, open windows and deflectors to ventilate the cockpit. An example is given where pilots noticed the detector changing color during taxi and returned to the stand.
- **Examples**
  > CO detectors are yellow or orange circles that darken when CO is present. Pilots must check the detector, especially when using heating.

  - If the detector shows dark spots, ventilate the cockpit immediately by opening windows and deflectors.
- **Considerations**
- Always check the CO detector when operating the heating system.
- Do not ignore symptoms that could be CO poisoning.
- **Special Circumstances**
- If CO is detected in the cockpit, open windows and deflectors immediately to allow fresh air in and return to the stand if on the ground.

Hypoxia in Aviation

> Hypoxia is a condition where the body or a region of the body is deprived of adequate oxygen supply. In aviation, hypoxia can occur at high altitudes due to reduced atmospheric pressure and oxygen levels, leading to impaired pilot performance and potentially fatal outcomes.

- **Keypoints**
  - Vision is the first sense to be affected by hypoxia, with color vision loss and tunnel vision occurring.
  - Unconsciousness can result if hypoxia is not addressed.
  - Time of useful consciousness varies by altitude: at 20,000 feet, 30 minutes; at 40,000 feet, 15 to 20 seconds.
  - Factors reducing time of useful consciousness include smoking, alcohol, illness, fatigue, stress, workload, and exercise.
  - Symptoms of hypoxia can be exacerbated by high workload and stress due to hyperventilation.
- **Explanation**
  The lecture details how hypoxia affects pilots, emphasizing the importance of knowing the time of useful consciousness at different altitudes. For example, at 20,000 feet, a pilot has 30 minutes before losing consciousness, but at 40,000 feet, only 15 to 20 seconds. Factors such as smoking, alcohol, illness, and stress can further reduce this time. Pilots are advised to be aware of these risks and to descend or use supplemental oxygen as needed.
- **Examples**
  > A Helios Airways 737 Classic climbed to altitude, and the pilots ignored the cabin altitude warning. The cabin pressure rapidly decreased, and after 20 or 30 minutes, everyone on board lost consciousness. F-16s sent to check found all passengers dead or asleep.

  - The accident illustrates the dangers of hypoxia at altitude.
  - Ignoring cabin altitude warnings led to a fatal loss of consciousness for all on board.
  - The time frame (20 or 30 minutes) matches the time of useful consciousness at certain altitudes.
- **Considerations**
- Know the time of useful consciousness at various altitudes.
- Be cautious with alcohol and smoking before flying.
- Monitor for symptoms of hypoxia, especially at high altitudes.
- **Special Circumstances**
- If feeling unfit to fly due to illness or fatigue, cancel the flight for safety.
- If experiencing symptoms above 10,000 feet, assume hypoxia and descend if possible.

Hyperventilation in Pilots

> Hyperventilation is a condition where breathing is deeper and more rapid than necessary, leading to a decrease in carbon dioxide levels in the blood. Its symptoms can mimic those of hypoxia and can be dangerous if not recognized and treated promptly.

- **Keypoints**
  - Symptoms include dizziness, light-headedness, tingling in extremities, vision impairments, hot and cold feelings, and eventually unconsciousness.
  - Symptoms can be confused with flu-like symptoms.
  - Treatment involves re-breathing exhaled air to restore carbon dioxide levels, such as breathing into a bag.
  - Hyperventilation is more likely below 10,000 feet.
- **Explanation**
  The lecture explains that hyperventilation can occur due to stress or workload, and its symptoms are similar to hypoxia. Pilots are advised to slow their breathing or re-breathe exhaled air using a bag to restore normal carbon dioxide levels. Above 10,000 feet, hypoxia is more likely, while below 10,000 feet, hyperventilation is more probable.
- **Considerations**
- Distinguish between hypoxia and hyperventilation based on altitude.
- Treat hyperventilation by slowing breathing or re-breathing exhaled air.
- **Special Circumstances**
- If a pilot is unsure whether symptoms are due to hypoxia or hyperventilation, treat as hypoxia above 10,000 feet by descending.

Decompression Sickness (DCS) and Barotrauma

> Decompression sickness (DCS), also known as ‘the bends,’ occurs when dissolved gases (mainly nitrogen) come out of solution in bubbles and can affect various body tissues due to rapid pressure changes. Barotrauma refers to injuries caused by pressure differences between the inside and outside of the body, commonly affecting ears, sinuses, and teeth.

- **Keypoints**
  - DCS can occur if flying soon after diving due to pressure changes.
  - Rule: Do not fly within 24 hours of diving with compressed air, or within 12 hours if diving did not exceed 10 meters.
  - Symptoms of DCS include fatigue, muscle and joint pain, numbness, tingling, weakness, vertigo, difficulty breathing, and chest pain.

    - Barotrauma can also affect ears and teeth due to trapped air expanding at altitude.
- **Explanation**
  The lecture provides specific rules for pilots who dive: wait 24 hours after diving with compressed air before flying, or 12 hours if the dive was less than 10 meters. Symptoms of DCS are described, and the importance of slow ascent after diving is emphasized. Barotrauma can also occur due to pressure changes, especially if the pilot has a cold or blocked sinuses.
- **Examples**

  > Several participants shared their diving experiences, including diving to 40 meters in the Philippines and Turkey. The instructor emphasized the importance of waiting the required time before flying after such dives.

    - Diving to depths greater than 10 meters requires a 24-hour wait before flying.
    - Failure to observe this can result in decompression sickness.
- **Considerations**
- Wait the appropriate time after diving before flying.
- Ascend slowly to the surface after diving to avoid DCS.
- Avoid flying with blocked sinuses or after recent dental work.
- **Special Circumstances**
- If experiencing symptoms of DCS after flying or diving, seek medical attention immediately.
- If sick or with blocked nose, consider not flying to avoid barotrauma.

Cockpit Noise and Hearing Protection

> Aircraft cockpits, especially those with propellers and engines close to the cockpit, can have high noise levels that may cause long-term hearing damage if proper protection is not used.

- **Keypoints**
    - Cockpit noise levels can reach 100 decibels in cruise and up to 115 decibels during full power climb.
    - Prolonged exposure to sound levels above 80 decibels can cause noise-induced hearing loss.
    - Headsets reduce noise by 25 to 30 decibels.
    - Hearing range for humans is 20 Hz to 20,000 Hz, which decreases with age.
- **Explanation**
  The instructor explains the importance of using headsets to protect hearing in noisy cockpits. Headsets with rubber seals can reduce noise by 25 to 30 decibels, helping to prevent noise-induced hearing loss. Regular medical checks are required for older pilots as hearing range decreases with age.

- **Considerations**
- Always use headsets in the cockpit to protect hearing.
- Be aware of the risk of long-term hearing loss from cockpit noise.

Dietary Considerations Before Flying

> Certain foods and drinks can increase the amount of gas in the stomach, which can expand at altitude due to decreased pressure, causing discomfort and difficulty breathing.

- **Keypoints**
  - Avoid beer, beans, and highly spiced foods before flying.
  - Milk or other foods that cause stomach upset should also be avoided if they affect you.
  - Pressure changes can cause a ‘bubbling effect’ in the stomach.
- **Explanation**
  The instructor advises avoiding foods and drinks that produce gas before flying, as the reduced pressure at altitude can cause bloating and discomfort, making it harder to breathe.
- **Considerations**
- Plan meals before flights to avoid foods that cause gas or stomach upset.

Active Noise Reduction (ANR) and Dynamic Noise Reduction (DNR) in Aviation Headsets

> Modern aviation headsets use ANR and DNR technologies to reduce noise levels by up to 45 decibels. These systems emit special sound waves into the ear to cancel out ambient noise, improving hearing protection for pilots.

- **Keypoints**
  - ANR and DNR can reduce noise by up to 45 decibels.
  - These technologies use sound waves to cancel out external noise.
  - Recommended to turn off noise reduction during critical flight phases (takeoff and landing) to hear engine sounds.
- **Explanation**
  The lecture explains that while ANR and DNR are beneficial for protecting hearing, they may prevent pilots from hearing important engine sounds during takeoff and landing. Therefore, pilots should turn off noise reduction during these phases.
- **Examples**
  > If you have the newest Bose or similar headset, turn off the noise reduction system during takeoff and landing to ensure you can hear the engine’s regime.

  - During critical phases, auditory cues from the engine are important for safety.

    - Noise reduction may mask these cues, so disabling it is advised.
- **Considerations**
- Turn off noise reduction during takeoff and landing.
- Use noise reduction for comfort during cruise or as a passenger.
- **Special Circumstances**
- If flying a jet or piston engine aircraft during takeoff or landing, turn off ANR/DNR to monitor engine sounds.

Noise-Induced Hearing Loss and Age-Related Hearing Loss (Presbycusis)

> Hearing loss in pilots can be caused by exposure to loud noise (noise-induced) or by natural aging (presbycusis). Proper hearing protection can prevent noise-induced loss, but not age-related loss.

- **Keypoints**
    - Noise-induced hearing loss is preventable with correct hearing protection.
    - Presbycusis is the natural loss of hearing with age and cannot be prevented.
    - Medical checks for pilots include hearing tests.
- **Explanation**
  Pilots undergo hearing tests during medical exams. Using proper headsets and hearing protection is essential to prevent noise-induced hearing loss, but age-related decline is inevitable.
- **Considerations**
- Always use appropriate hearing protection when flying.
- Regularly check hearing during medical exams.
- **Special Circumstances**
- If experiencing hearing loss, consult a medical professional before flying.

Conductive Deafness: Causes and Prevention

> Conductive deafness occurs when the natural movement of sound through the external or middle ear is blocked, preventing sound from reaching the inner ear. Common causes include earwax blockage or a perforated eardrum.

- **Keypoints**
    - Blockage of the ear (e.g., earwax) or a hole in the eardrum can cause conductive deafness.
    - Clearing ears before flying is important.
- **Explanation**
  Pilots should ensure their ears are clear before flight to avoid conductive deafness, which can impair hearing and safety.
- **Considerations**

- Clear your ears before flying.
- **Special Circumstances**
- If experiencing ear blockage or pain, avoid flying until resolved.

Eustachian Tube Function and Barotrauma

> The Eustachian tube equalizes pressure between the middle ear and the environment. During ascent, it opens to release air; during descent, it may close, requiring actions like swallowing or yawning to equalize pressure and prevent barotrauma.

- **Keypoints**
  - During ascent, the Eustachian tube opens to release air.
  - During descent, the tube may close, making it harder to equalize pressure.
  - Barotrauma can occur if pressure is not equalized.
- **Explanation**
  Pilots and crew may need to swallow, yawn, or pinch their nose and blow to open the Eustachian tube and equalize pressure, especially during descent.
- **Examples**
  > Closing the nose holes and blowing out air can expand the Eustachian tube, allowing air to enter and balance pressure.

  - This maneuver helps prevent barotrauma during descent.
- **Considerations**
- Do not fly with a cold or blocked sinuses.
- Equalize ear pressure during ascent and descent.
- **Special Circumstances**
- If you have a cold or sinus blockage, do not fly to avoid barotrauma.

Vestibular Apparatus and Spatial Disorientation

> The vestibular apparatus, consisting of semicircular canals and otoliths, helps maintain balance and sense of movement. However, it can be fooled, leading to spatial disorientation and illusions during flight.

- **Keypoints**
  - Semicircular canals detect rotational movement (yaw, pitch, roll).
  - Otoliths detect linear acceleration and gravity.
  - Prolonged or sudden movements can cause illusions, making pilots feel level when turning or vice versa.
  - Spatial disorientation can occur even with a functioning vestibular system.

- **Explanation**
  Pilots may experience illusions during prolonged turns or after returning to level flight, feeling as if they are turning in the opposite direction. Trusting instruments over bodily sensations is crucial.
- **Examples**
  > During a continuous 360-degree turn, the vestibular apparatus may reset, making the pilot feel level even while turning.
    - When the aircraft returns to level flight, the pilot may feel as if turning in the opposite direction.
- **Considerations**
- Always trust flight instruments over bodily sensations.
- **Special Circumstances**
- If experiencing spatial disorientation, rely on instruments and avoid flying by sensation.

Motion Sickness: Symptoms and Prevention

> Motion sickness can occur in flight, with symptoms similar to illness: yawning, fatigue, increased salivation, dizziness, nausea, vomiting, headache, sweating, and chills. Prevention includes fresh air, focusing on the horizon, and controlled breathing.

- **Keypoints**
  - Symptoms: yawning, fatigue, increased salivation, dizziness, nausea, vomiting, headache, sweating, chills.
  - Prevention: breathe fresh air, look at a fixed point on the horizon, keep head still, focus attention elsewhere, control breathing, stay hydrated, lower cabin temperature.
- **Explanation**
  Pilots can prevent motion sickness by opening windows for fresh air, focusing on the horizon, keeping the head still, and practicing slow, deep breathing. Staying hydrated and lowering cabin temperature also help.
- **Considerations**
- Bring water to stay hydrated.
- Open windows or deflectors for fresh air.
- Focus on a fixed point outside.
- **Special Circumstances**
- If feeling motion sick, use breathing techniques and focus on the horizon.

Structure and Function of the Human Eye

> The eye contains vitreous and aqueous humor to maintain shape. The cornea is transparent, followed by the colored iris, which controls the amount of light entering the pupil. The lens focuses light onto the retina, where rods and cones detect light and color.

- **Keypoints**
  - Cornea is transparent and at the front of the eye.
  - Iris controls the size of the pupil and amount of light entering.
  - Lens adjusts shape for focus.
  - Retina contains rods and cones for light and color detection.
  - Fovea is the most sensitive part of the retina.
- **Explanation**
  Light passes through the cornea, iris, and lens, focusing on the retina. Electrical impulses from rods and cones are sent to the brain for vision.

Rods and Cones: Differences and Roles in Vision

> Rods function in low light and are not sensitive to color. Cones function in bright light and are responsible for color sensitivity and sharp vision, especially in the fovea.

- **Keypoints**
  - Rods: work in low light, not color sensitive.
  - Cones: work in bright light, color sensitive, concentrated in the fovea.
  - Cones provide photopic (light) vision and sharpest vision.
- **Explanation**
  Rods allow vision in dim conditions but without color. Cones enable color vision and detail in bright light. The fovea, rich in cones, gives the sharpest vision.

Visual Acuity and 20-20 Vision

> Visual acuity measures the eye’s ability to distinguish shapes and details at a given distance. 20-20 vision means seeing at 20 feet (6 meters) what a normal person can see at that distance.

- **Keypoints**
  - Visual acuity is compared to normal vision at 20 feet (6 meters).
  - 20-20 vision is the standard for normal eyesight.
- **Explanation**
  Visual acuity is tested by comparing an individual’s sight to standard charts at a set distance.

Visual Field: Horizontal and Vertical Ranges

> The human eye can see approximately 120 degrees horizontally and 150 degrees vertically. There is a 60-degree overlapping area in the center for binocular vision.

- **Keypoints**
  - Horizontal visual field: approximately 120 degrees.
  - Vertical visual field: approximately 150 degrees.
  - Binocular vision overlap: 60 degrees.
- **Explanation**
  These measurements define the range of vision without moving the eyes, with central overlap allowing depth perception.

Binocular and Monocular Vision

> Binocular vision uses both eyes together for depth perception, while monocular vision refers to the field and acuity of a single eye.

- **Keypoints**
  - Binocular vision: both eyes, central overlap, depth perception.
  - Monocular vision: single eye, used to describe field and acuity.
- **Explanation**
  The overlapping area of vision from both eyes allows for depth perception, while each eye also has its own field.

Blind Spot in the Eye

> Each eye has a blind spot of 5 degrees where the optic nerve leaves the eyeball and no rods or cones are present. The brain compensates for this using information from the other eye.

- **Keypoints**
  - Blind spot: 5 degrees in each eye.
  - No rods or cones at the optic nerve exit.
  - Brain fills in missing information from the other eye.
- **Explanation**
  The blind spot does not usually affect vision because the brain uses data from both eyes to compensate.

Peripheral Vision and Its Importance in Landing

> Peripheral vision is what is seen to the sides without focusing directly. It is crucial during landing for adjusting vertical speed and ensuring a smooth touchdown.

- **Keypoints**
  - Peripheral vision detects movement and orientation to the sides.

    - Important for flaring and adjusting descent during landing.
    - Cannot distinguish fine details, but helps with spatial awareness.
- **Explanation**
  During landing, pilots use peripheral vision to judge height and descent rate, looking at the end of the runway rather than directly below.

Depth Perception and Parallax Error

> Depth perception is the ability of the human eye to distinguish and identify the detail and height of an object from different viewpoints. Parallax error occurs when the apparent position of an object differs when viewed from different angles, leading to misjudgment of size or position.

- **Keypoints**
    - Viewing an object from different angles can cause illusions about its size (e.g., a wooden stick appears 72 mm, 65 mm, or 59 mm depending on the viewpoint).
    - Parallax error: A more distant object appears to move relative to a closer object when viewed from an angle other than 90 degrees.
    - Best practice: Always view instruments or objects directly (perpendicularly) to avoid parallax error.
- **Explanation**
  Examples were given such as reading a speedometer from the passenger seat versus the driver's seat, and reading analog instruments in aircraft from different positions. The illusion is caused by the angle of view, and the correct measurement is only possible when viewed directly.
- **Examples**
  > When viewing a wooden stick from the side, it appears to be 72 mm tall; from the center (correct position), it is 65 mm; from above, it appears 59 mm.

    - The difference in perceived height is due to the angle of observation.
    - This demonstrates the importance of viewing objects directly to avoid misjudgment.

  > A passenger may perceive the car's speed as 90 or 80 km/h while the driver sees 100 km/h, due to the viewing angle.

    - The speedometer is calibrated for direct viewing by the driver.
    - Viewing from the side introduces parallax error.
- **Considerations**
- Always read instruments directly to avoid parallax error.
- Be aware of illusions caused by viewing angles in both daily life and aviation.
- **Special Circumstances**

- If you must read an instrument from an angle, cross-check with another observer or reposition yourself to view directly.

Cues for Depth Perception

> Several visual cues help the human eye perceive depth and distance, including parallax, perspective, relative size, relative motion, overlapping motion, and aerial perspective.

- **Keypoints**
  - Parallax: Head movement causes distant objects to move relative to each other.
  - Perspective: Converging parallels (e.g., railway lines, runways) appear to meet at a distance.
  - Relative size: Distant objects appear smaller.
  - Relative motion: Closer objects appear to move faster.
  - Overlapping motion: Objects in front of others must be closer.
  - Aerial perspective: Distant objects appear bluer due to light scattering (atmospheric perspective).
- **Explanation**
  These cues are used by the brain to interpret spatial relationships and distances. Memorizing their definitions is suggested for exams.
- **Considerations**
- Be aware of visual illusions in aviation and daily life.
- Memorize definitions for exam purposes.

Protection of Eyes from UV and Sunglasses Recommendations

> Proper eye protection is essential, especially in aviation, due to increased UV exposure at altitude. Sunglasses should provide 100% UV protection, be made of plastic, and have unpolarized lenses. Polarized and photo-sensitive lenses are not recommended for pilots.

- **Keypoints**
  - Sunglasses should offer 100% UV protection.
  - Plastic lenses are preferred over glass to prevent injury if broken.
  - Unpolarized lenses are recommended; polarized lenses can block avionics screens due to their construction.
  - Photo-sensitive lenses are not recommended as they do not react quickly enough to changing light conditions.
  - UV levels increase by 5% per 1,000 feet of altitude.
- **Explanation**
  Polarized lenses can make avionics screens appear black if their filters align. Photo-

sensitive lenses may not adapt quickly when moving between sunlight and shadow. UV exposure increases with altitude, latitude, time of day, season, weather, and surface reflectivity.

- **Examples**

  > When wearing polarized sunglasses in a multi-engine aircraft, tilting the head caused the avionics screen to go black.

  - This is due to the alignment of polarizing filters in both the lenses and the screen.
  - Unpolarized lenses do not cause this issue.
- **Considerations**
- Always use sunglasses with 100% UV protection.
- Avoid polarized and photo-sensitive lenses in aviation.
- Prefer plastic lenses for safety.
- **Special Circumstances**
- If you already have sunglasses, check if they are unpolarized and UV-protected before using them in flight.

Light Adaptation Mechanisms of the Eye

> The eye adapts to changes in light through two mechanisms: rapid adjustment of pupil diameter and slower chemical changes in the retina. Full adaptation to darkness can take up to 30 minutes, while adaptation to bright light takes about 10 seconds.

- **Keypoints**
  - Pupil enlarges quickly in darkness to let in more light.
  - Chemical adaptation of rods and cones in the retina is slower.
  - Full adaptation to low light: up to 30 minutes.
  - Adaptation from low to high light: 10 seconds.
- **Explanation**
  When moving from bright to dark environments, the eye needs up to 30 minutes to fully adapt. When moving from dark to bright, adaptation is much faster (10 seconds).
- **Considerations**
- Allow sufficient time for eyes to adapt before night flights.
- Dim cockpit displays during night operations.
- Use red flashlights to preserve night vision.
- **Special Circumstances**
- If sudden exposure to bright light occurs during night flight, expect temporary loss of night vision for up to 10 seconds.

Accommodation and Common Vision Problems

> Accommodation is the eye’s ability to focus on both nearby and distant objects. Myopia (short-sightedness), hyperopia (long-sightedness), presbyopia (age-related long-sightedness), and astigmatism (irregular cornea or lens shape) are common vision problems.

- **Keypoints**
  - Myopia: Easier focus on nearby objects; difficulty with distant objects.
  - Hyperopia/Presbyopia: Easier focus on distant objects; difficulty with nearby objects. Presbyopia increases with age, especially over 45.
  - Astigmatism: Irregular cornea or lens shape causes blurry or distorted vision.
  - Most people with astigmatism need glasses at all times during flight.
- **Explanation**
  Vision problems affect the ability to focus and may require corrective lenses. Surgical correction requires approval from an aviation medical examiner, who will assess eye health and suitability.
- **Considerations**
- Consult an aviation medical examiner before any eye surgery.
- Wear prescribed corrective lenses during flight if needed.
- **Special Circumstances**
- If considering eye surgery, obtain approval from an aviation medical examiner based on a thorough eye examination.

Hypoxia and Time of Useful Consciousness

> Hypoxia symptoms can occur at altitudes above 12,000 feet. Time of useful consciousness decreases with altitude: at 22,000 feet, it is approximately 5 to 10 minutes; at 20,000 feet, it is 30 minutes; at 30,000 feet, it is 1 to 2 minutes.

- **Keypoints**
  - Initial symptoms of hypoxia may include a false sense of security and poor performance.
  - At 22,000 feet, time of useful consciousness is 5 to 10 minutes.
  - At 20,000 feet, it is 30 minutes.
  - At 30,000 feet, it is 1 to 2 minutes.
- **Explanation**
  Quiz questions and group discussion reinforced the importance of knowing these physiological limits for flight safety.
- **Considerations**
- Monitor altitude and oxygen supply carefully.
- Be aware of hypoxia symptoms and act promptly.

- **Special Circumstances**
- If oxygen supply fails at high altitude, descend immediately to a safe altitude.

Sound Pressure and Hearing Loss Thresholds

> Prolonged exposure to sound pressure levels above 90 decibels is likely to cause temporary apparent hearing loss.

- **Keypoints**
  - 80 decibels is a reference, but 90 decibels is the accepted threshold for temporary hearing loss.
- **Explanation**
  Quiz discussion clarified the threshold for hearing loss due to sound exposure.
- **Considerations**
- Use hearing protection in high-noise environments.

Cockpit Lighting and Night Flight Considerations

> During night flights, cockpit displays should be dimmed, and a red flashlight should be available to preserve night vision.

- **Keypoints**
  - Dim displays to reduce glare and preserve night vision.
  - Red light is less disruptive to night vision than white light.
- **Explanation**
  Red flashlights are recommended because the eye is less sensitive to red light, helping maintain night vision.
- **Considerations**
- Always carry a red flashlight in the aircraft for night operations.

Body Mass Index (BMI) and Pilot Health

> BMI is a number calculated as the ratio between weight in kilograms and height in meters squared. Over 25 is considered overweight, and over 30 is considered obese. High BMI increases the risk of diseases such as diabetes and high blood pressure, which can disqualify a pilot from flying.

- **Keypoints**
  - BMI = weight (kg) / [height (m)]^2
  - BMI over 25: overweight; over 30: obese
  - Diseases like diabetes and hypertension increase rapidly with BMI > 30
  - Pilots with high BMI may not be able to enjoy or be cleared for flying

- **Explanation**
  The World Health Organization's BMI is used to assess whether a person is underweight, normal, overweight, or obese. Pilots are encouraged to calculate their BMI at home. If BMI exceeds 30, the risk of diabetes and high blood pressure increases, which can affect medical clearance for flying.
- **Examples**

  > Pilots are encouraged to calculate their BMI using their weight in kilograms and height in meters squared. For example, a pilot weighing 80 kg and 1.8 meters tall would have a BMI of 80 / (1.8*1.8) = 24.7.

  - Measure your weight in kilograms.
  - Measure your height in meters.
  - Square your height.
  - Divide your weight by your squared height.
  - Interpret the result: over 25 is overweight, over 30 is obese.
- **Considerations**
- Pilots should monitor their BMI regularly.
- BMI over 30 may disqualify from flying.
- **Special Circumstances**
- If BMI is over 30, seek medical advice and consider lifestyle changes before flying.

Coronary Heart Disease

> Coronary heart disease occurs when the heart's blood supply is blocked or interrupted by fatty substances in the coronary arteries, leading to pain (angina) or heart attack (myocardial infarction).

- **Keypoints**
  - Blockage or narrowing of coronary arteries reduces blood flow.
  - Symptoms: chest, neck, or shoulder pain during exercise, subsiding at rest (angina).
  - Sudden blockage can cause severe chest pain, collapse, and heart stoppage (heart attack).
  - Risk factors: age, family history, unhealthy diet, lack of exercise, smoking.
- **Explanation**
  Fatty substances build up in the arteries, causing narrowing or hardening. This impairs blood flow, leading to angina or heart attack. Prevention includes healthy diet, exercise, maintaining healthy weight, quitting smoking, and controlling blood pressure.
- **Examples**

  > A pilot experiences chest pain during exercise, which subsides upon resting. This is a sign of angina due to narrowed coronary arteries.

    - Pilot exercises and feels chest pain.
    - Pain stops when resting.
    - This indicates reduced blood flow due to narrowed arteries.
    - Pilot should consult a general practitioner.
- **Considerations**
- Pilots should maintain a healthy lifestyle to reduce risk.
- Consult a doctor if experiencing chest pain.
- **Special Circumstances**
- If experiencing chest pain during exercise, stop and consult a general practitioner immediately.

Hypertension (High Blood Pressure)

> Hypertension is high blood pressure, typically defined as blood pressure above 120 to 180. It increases the risk of heart attack and may disqualify a pilot from flying.

- **Keypoints**
    - Normal blood pressure: 120 to 180.
    - Hypertension increases stress on heart and arteries.
    - Most people have no symptoms; some may have headaches, shortness of breath, or nosebleeds.
    - Risk factors: overweight, high salt intake, low fruit/vegetable intake, lack of exercise, excessive alcohol/caffeine, smoking, poor sleep.
- **Explanation**
  Pilots are advised to monitor blood pressure regularly, especially after age 20. Both hypertension and hypotension can disqualify a pilot from medical clearance. Lifestyle factors such as diet and exercise play a significant role.
- **Examples**
    > A pilot regularly measures blood pressure after age 20 to detect hypertension early.

    - Use a blood pressure monitor.
    - Record readings regularly.
    - Consult a doctor if readings are consistently high.
- **Considerations**
- Monitor blood pressure regularly.
- Avoid excessive salt, alcohol, caffeine, and maintain healthy weight.
- **Special Circumstances**
- If diagnosed with hypertension or hypotension, seek medical advice before flying.

Alcohol and Drug Use Regulations for Pilots

> Pilots must not perform duties under the influence of psychoactive substances or alcohol. The IASA regulation sets strict limits for blood and breath alcohol concentration, and certain drugs are strictly prohibited.

- **Keypoints**
  - Blood alcohol concentration (BAC) must not exceed 0.02% (0.2 grams per liter).
  - Breath alcohol concentration (BRAC) must not exceed 90 micrograms per liter.
  - No alcohol consumption within 8 hours of duties.
  - Drugs such as cannabis, cocaine, LSD, ecstasy disqualify pilots.
  - Alcohol increases error ratio exponentially.
- **Explanation**
  The IASA issued a Safety Information Bulletin after several accidents involving alcohol. Pilots must adhere to strict BAC and BRAC limits. Alcohol leaves the body at a rate of 0.01% per hour (0.10 grams per hour).
- **Examples**
  > A pilot drinks 12 glasses of wine, finishing at 1:00. Using the elimination rate of 0.10 grams per hour, the pilot will be sober by 16:00 (4 p.m.), 15 hours later, not within 8 hours.

  - Pilot drinks 12 glasses of wine, last at 1:00.
  - Alcohol leaves body at 0.10 grams per hour.
  - Calculate time to reach zero BAC: 15 hours.
  - Pilot is sober at 16:00 (4 p.m.).
- **Considerations**
- Strictly follow BAC and BRAC limits.
- Do not consume alcohol within 8 hours of flying.
- Never use psychoactive drugs.
- **Special Circumstances**
- If unsure about sobriety, use a BAC calculator before flying.
- If caught under suspicion of drugs or alcohol, disqualification from course and possible legal consequences.

Caffeine Consumption: Effects and Recommendations

> Caffeine is found in tea, coffee, cola, and energy drinks. Excessive intake can degrade performance. Recommended allowance is 200-250 milligrams, but individual tolerance varies.

- **Keypoints**
  - Filtered coffee: 100 mg caffeine.
  - Cola: 60 mg caffeine.

    - Tea: 75 mg caffeine.
    - Energy drinks can contain 70 mg or more.
    - Recommended daily allowance: 200-250 mg.
    - Excessive caffeine degrades performance.
- **Explanation**
  Pilots should monitor caffeine intake, as excessive consumption can impair performance. Individual tolerance depends on body weight and experience.
- **Examples**
  > A pilot drinks two cups of filtered coffee (200 mg caffeine), which is within the recommended allowance.

    - Filtered coffee contains 100 mg per cup.
    - Two cups equal 200 mg.
    - Stay within recommended daily allowance.
- **Considerations**
- Monitor caffeine intake, especially before flying.
- Be aware of caffeine content in energy drinks.
- **Special Circumstances**
- If experiencing degraded performance after caffeine, reduce intake.

Incapacitation in Aviation

> Incapacitation refers to a pilot's inability to operate due to physical state, often caused by gastroenteritis (infection of stomach or intestines), leading to symptoms like abdominal pain, nausea, vomiting, and diarrhea.

- **Keypoints**
    - Main cause: gastroenteritis (food poisoning, infections, toxins).
    - Symptoms: acute abdominal pain, nausea, vomiting, diarrhea.
    - Pilots are required to eat different meals to minimize risk.
    - Incapacitation is rare but serious.
- **Explanation**
  To minimize risk, pilots are not allowed to eat the same meal. If incapacitated, pilots cannot continue duties. Most medications for these conditions have side effects that may impair performance.
- **Examples**
  > A pilot experiences food poisoning symptoms before a flight and decides not to fly, notifying operations and seeking medical justification.

    - Pilot feels ill before flight.
    - Notifies operations via WhatsApp.

    - Seeks medical justification from hospital.
    - Avoids flying while incapacitated.
- **Considerations**
- Avoid flying when experiencing symptoms of gastroenteritis.
- Do not take medications with drowsiness or blurred vision side effects before flying.
- **Special Circumstances**
- If experiencing incapacitation symptoms, notify operations and seek medical attention before flying.

Hypoglycemia (Low Blood Sugar)

> Hypoglycemia is low blood sugar, which can cause dizziness and loss of energy. It can occur in non-diabetics, especially after long, busy days without proper meals.

- **Keypoints**
    - Symptoms: dizziness, low energy.
    - Can be triggered by stress, anxiety, physical exercise, or missed meals.
    - Immediate remedy: eat something sweet or solid food.
    - Pilots should not skip meals before flying.
- **Explanation**
  Pilots should ensure they eat before flying, even if only a small snack. Hunger can distract from flying duties. If symptoms occur, eat something sweet immediately.
- **Examples**
  > A pilot is about to fly but hasn’t eaten. The instructor urges to fly, but the pilot requests five minutes to eat a napolitana, ensuring enough energy for the flight.

    - Pilot hasn’t eaten before flight.
    - Requests time to eat a small snack.
    - Prevents hypoglycemia and distraction during flight.
- **Considerations**
- Always eat before flying.
- Carry snacks for long or disrupted schedules.
- **Special Circumstances**
- If feeling symptoms of hypoglycemia, eat something sweet or solid immediately.

Medication Side Effects and Flying

> Many medications, such as antihistamines for colds or allergies, can cause drowsiness or blurred vision, impairing pilot performance.

- **Keypoints**
    - Antihistamines can cause drowsiness.

    - Drugs for bowel spasms can cause blurred vision.
    - Most medications have secondary effects that may impair performance.
    - Better to avoid medication before flying.
- **Explanation**
  Pilots are advised to avoid taking medication before flying due to potential side effects. If ill, notify operations and seek medical justification instead of flying under medication.
- **Examples**
  > A pilot feels sick but avoids taking antihistamines before flying, instead notifying operations and seeking medical justification.

    - Pilot feels unwell before flight.
    - Avoids medication due to side effects.
    - Notifies operations and seeks medical justification.
- **Considerations**
- Avoid medication with side effects before flying.
- Notify operations if unable to fly due to illness.
- **Special Circumstances**
- If medication is necessary, consult a doctor about side effects before flying.

Barotrauma and Flying with Illness

> Barotrauma occurs when pressure changes during flight affect the ears, especially if the pilot has a cold or blocked nose. Taking antihistamines may help but can cause drowsiness.

- **Keypoints**
    - Blocked nose increases risk of barotrauma.
    - Antihistamines may help but cause drowsiness.
    - Better to avoid flying when sick.
- **Explanation**
  Pilots with colds or blocked noses should avoid flying to prevent barotrauma. If medication is taken, be aware of side effects.
- **Examples**
  > A pilot with a blocked nose considers taking antihistamines but decides not to fly due to risk of drowsiness and barotrauma.

    - Pilot has a cold and blocked nose.
    - Considers medication but is aware of side effects.
    - Decides not to fly and notifies operations.
- **Considerations**

- Avoid flying with blocked nose or cold.
- Be aware of medication side effects.
- **Special Circumstances**
- If experiencing blocked nose or cold, avoid flying and notify operations.

Paracetamol and Medication Use in Aviation

> Paracetamol is the most common over-the-counter medication available in all pharmacies without prescription. It is often used for minor aches and pains, but may have secondary effects. Pilots are advised to consult with an aviation medical examiner or doctor before taking any medication, as some medications can affect fitness to fly.

- **Keypoints**
  - Paracetamol is widely used for minor pain relief.
  - Secondary effects of medication can impact pilot performance.
  - Consultation with aviation medical professionals is necessary before taking medication.
  - Taking unapproved medication may result in being unfit to fly.
- **Explanation**
  Speaker 1 shared a personal anecdote about a school nurse giving paracetamol for various ailments, highlighting its common use. The importance of checking with an aviation doctor before taking any medication was emphasized, especially before flying.
- **Examples**
  > Speaker 1 recalled that in school, a nurse (not a real nurse) would give paracetamol for any student complaint, such as back pain, arm pain, or tooth pain, as a default solution.

  - This example illustrates the overuse of paracetamol and the psychological effect it may have.
  - It also sets the stage for discussing the importance of proper medical consultation in aviation.
- **Considerations**
- Always consult an aviation medical examiner before taking any medication.
- Be aware of secondary effects that may impair flying ability.
- **Special Circumstances**
- If you need to take medication before a flight, contact your aviation doctor to confirm it is safe.

Flying After Anesthetic Procedures

> Pilots should not fly within 24 hours after receiving local anesthetic, such as for dental procedures. For general anesthetic, a minimum interval of 48 hours is recommended. The anesthetist should advise on the appropriate waiting period before flying. Operations themselves may bar flying for a longer period, and recertification may require aviation authority approval.

- **Keypoints**
  - 24-hour restriction after local anesthetic.
  - 48-hour minimum after general anesthetic.
  - Consult anesthetist for specific guidance.
  - Operations may require longer recovery before flying.
  - Aviation authority may need to approve recertification.
- **Explanation**
  Speaker 1 described a personal experience of postponing a dental extraction due to an upcoming flight, emphasizing the importance of adhering to post-anesthetic restrictions.
- **Examples**
  > Speaker 1 was advised to have a tooth removed but declined because of a scheduled flight the next morning, planning to address the issue later in their home country.

  - This example demonstrates the practical implications of anesthetic restrictions for pilots.
- **Considerations**
- Always follow the recommended waiting period after anesthetic procedures.
- Coordinate with aviation medical professionals and authorities for recertification.
- **Special Circumstances**
- If you undergo an operation, consult both your surgeon and aviation authority before resuming flying duties.

FAA Recommendation on Viagra Use

> The American FAA recommends that pilots should not fly within hours of using Viagra due to possible visual disturbances.

- **Keypoints**
  - Viagra may cause visual disturbances.
  - Pilots should avoid flying for a certain period after use.
- **Explanation**
  Speaker 1 mentioned this recommendation, noting it may be more relevant for older pilots.
- **Considerations**

- Be aware of medication side effects, including those not directly related to flying.
- **Special Circumstances**
- If you have taken Viagra, follow FAA guidelines and avoid flying for the recommended period.

Circadian Rhythm and Body Temperature

> Circadian rhythm refers to the daily fluctuation of body temperature. Normal temperature is 36.6°C, dropping to a minimum of 36.2°C in the early morning and peaking at 36.8°C in the evening. This rhythm affects alertness and performance.

- **Keypoints**
  - Body temperature follows a daily cycle.
  - Lowest temperature: 36.2°C in the morning.
  - Highest temperature: 36.8°C in the evening.
  - Circadian rhythm impacts pilot performance.
- **Explanation**
  Speaker 1 explained the circadian rhythm using a graph and described how temperature changes throughout the day.
- **Considerations**
- Understand how circadian rhythm may affect alertness during flights at different times of day.

Toxic Gases and Corrosive Materials in Aviation

> Aviation involves exposure to various substances such as fuel, de-icing fluid, and hydraulic fluid, which may be explosive or corrosive. The International Civil Aviation Organization classifies substances with specific numbers and pictograms: 1 for explosives, 2 for gases, etc.

- **Keypoints**
  - Substances in aviation can be hazardous.
  - ICAO uses numbers and pictograms for classification.
  - Pilots must memorize these classifications for exams.
- **Explanation**
  Speaker 1 advised students to memorize the ICAO substance classifications for exams and practical safety.
- **Considerations**
- Memorize ICAO substance classifications for safety and exams.
- **Special Circumstances**
- If unsure about a substance’s classification, refer to ICAO guidelines or ask an instructor.

Mnemonic ‘I’m Safe’ for Pilot Fitness

> ‘I’m safe’ is a mnemonic to help pilots assess their fitness to fly: Illness, Medication, Stress, Alcohol, Fatigue, Eating. If any answer is unfavorable, the pilot should not fly.

- **Keypoints**
  - I: Illness
  - M: Medication
  - S: Stress
  - A: Alcohol
  - F: Fatigue
  - E: Eating
  - All criteria must be met for fitness to fly.
- **Explanation**
  Speaker 1 described the mnemonic and the importance of self-assessment before flying.
- **Considerations**
- Use the ‘I’m safe’ checklist before every flight.
- **Special Circumstances**
- If any checklist item is not satisfied, do not proceed with the flight.

Fitness Programs and Endorphins

> Regular exercise, such as going to the gym, increases endorphin production, promoting a sense of well-being and happiness, which can positively affect pilot performance.

- **Keypoints**
  - Exercise increases endorphin levels.
  - Endorphins promote well-being and happiness.
  - Physical fitness supports mental health for pilots.
- **Explanation**
  Speaker 1 encouraged fitness programs for pilots, explaining the benefits of endorphins.
- **Considerations**
- Incorporate regular exercise into your routine for better mental and physical health.

BMI Calculation

> BMI (Body Mass Index) is calculated as weight in kilograms divided by height in meters squared.

- **Keypoints**
  - BMI = weight (kg) / [height (m)]^2
- **Explanation**
  Speaker 1 referenced the BMI formula during a quiz.

Risk Factors for Diabetes

> Being overweight increases the risk of developing diabetes, as the body struggles to clear fatty substances from arteries.

- **Keypoints**
  - Overweight individuals have higher diabetes risk.
  - Fatty substances in arteries contribute to the risk.
- **Explanation**
  Speaker 1 discussed this during a quiz question.

Carbon Monoxide Poisoning

> Carbon monoxide poisoning can be caused by smoking, as cigarettes contain carbon monoxide.

- **Keypoints**
  - Smoking is a source of carbon monoxide poisoning.
- **Explanation**
  Speaker 1 addressed this in a quiz question.

Alcohol Elimination Time

> Four units of alcohol are eliminated from the blood in approximately four hours.

- **Keypoints**
  - 4 units of alcohol = 4 hours for elimination.
- **Explanation**
  Speaker 1 and Speaker 2 discussed this during a quiz.
- **Considerations**
- Ensure sufficient time has passed after alcohol consumption before flying.
- **Special Circumstances**
- If unsure about alcohol elimination, err on the side of caution and do not fly.

Gastroenteritis and Pilot Incapacitation

> Gastroenteritis is the most common cause of in-flight pilot incapacitation and renders the pilot unfit to fly.

- **Keypoints**
  - Gastroenteritis can incapacitate pilots during flight.
  - Pilots with gastroenteritis should not fly.
- **Explanation**
  Speaker 1 highlighted this as a key medical risk during a quiz.
- **Considerations**
- Do not fly if experiencing symptoms of gastroenteritis.
- **Special Circumstances**
- If symptoms develop before or during flight, seek medical attention and do not continue flying.

Assignments & Suggestions

- Take and share a group picture as instructed.
- Remember key pressure values at different altitudes for the HPL exam: 5,000 feet (850 millibars), 10,000 feet (700 millibars), 18,500 feet (500 millibars), 30,000 feet (300 millibars).
- Calculate your body mass index (BMI) at home using your weight in kilograms and height in meters squared.
- If you are unsure about your blood alcohol concentration before a flight, use an online BAC calculator to estimate your sobriety time.
- Memorize ICAO substance classification numbers and pictograms.
- Memorize the ‘I’m safe’ mnemonic and what each letter represents.