AEROMEDICAL FACTORS

Katherine Wilcoxson

OBTAINING A MEDICAL CERTIFICATE

Medical Certificate

- Routine medical exam from an FAA authorized AME (Aviation Medical Examiner)
- 3 classes, each with different requirements and uses – First, Second, Third class
- Self regulated
- https://medxpress.faa.gov/MedXpress/Login.aspx
- SODA – Statement of Demonstrated Ability § 67.401(b)
- Special Issuance § 67.401(a)

BasicMed

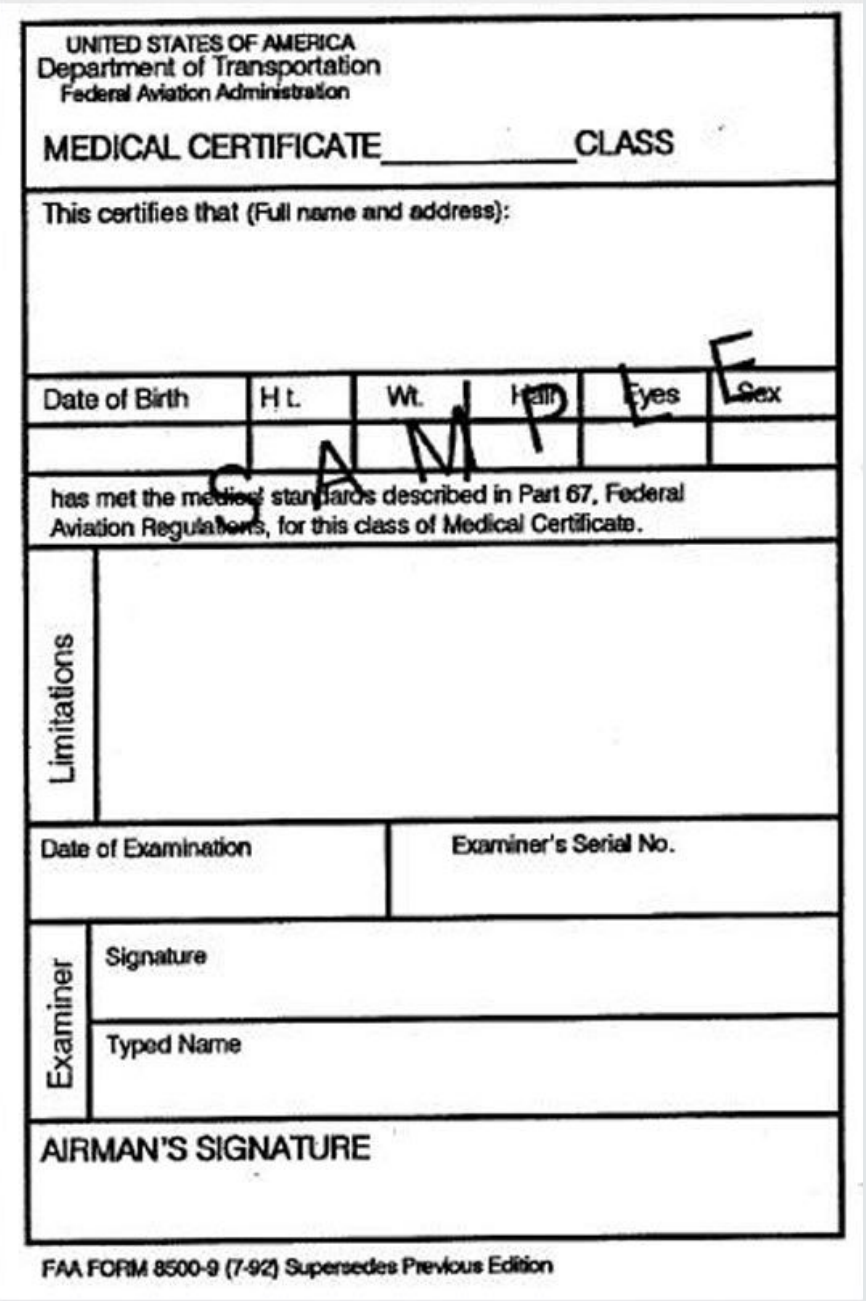
- Allows you to fly without a medical certificate, if you meet certain requirements
- VFR only, not for compensation or hire
- 6,6,18,25
    - 6000lbs, 6 seats (incl pilot), 18,000ft altitude limitation, 250kt limitation

Drivers License

- Can be used in place of a medical in certain situations (Basic Med)

GET A MEDICAL CERTIFICATE

- To obtain a medical certificate you must be examined by an FAA-designated Aviation Medical Examiner (AME). As the airman you should follow these steps to apply for and obtain your medical certificate:
  - Use MedXPress, to complete the initial portion of the application.
  - Schedule an appointment with an Aviation Medical Examiner (AME) in your area.
- At your scheduled appointment, the AME will complete your medical examination and the remainder of the FAA application form. If you meet the required medical standards, the AME will issue you a medical certificate.


UNITED STATES OF AMERICA
Department of Transportation
Federal Aviation Administration

MEDICAL CERTIFICATE_____CLASS

This certifies that (Full name and address):

SAMPLE

Date of Birth	Ht.	Wt.	Hair	Eyes	Sex

has met the medical standards described in Part 67, Federal Aviation Regulations, for this class of Medical Certificate.

Limitations

Date of Examination | Examiner's Serial No.

Examiner: Signature; Typed Name

AIRMAN'S SIGNATURE

FAA FORM 8500-9 (7-92) Supersedes Previous Edition

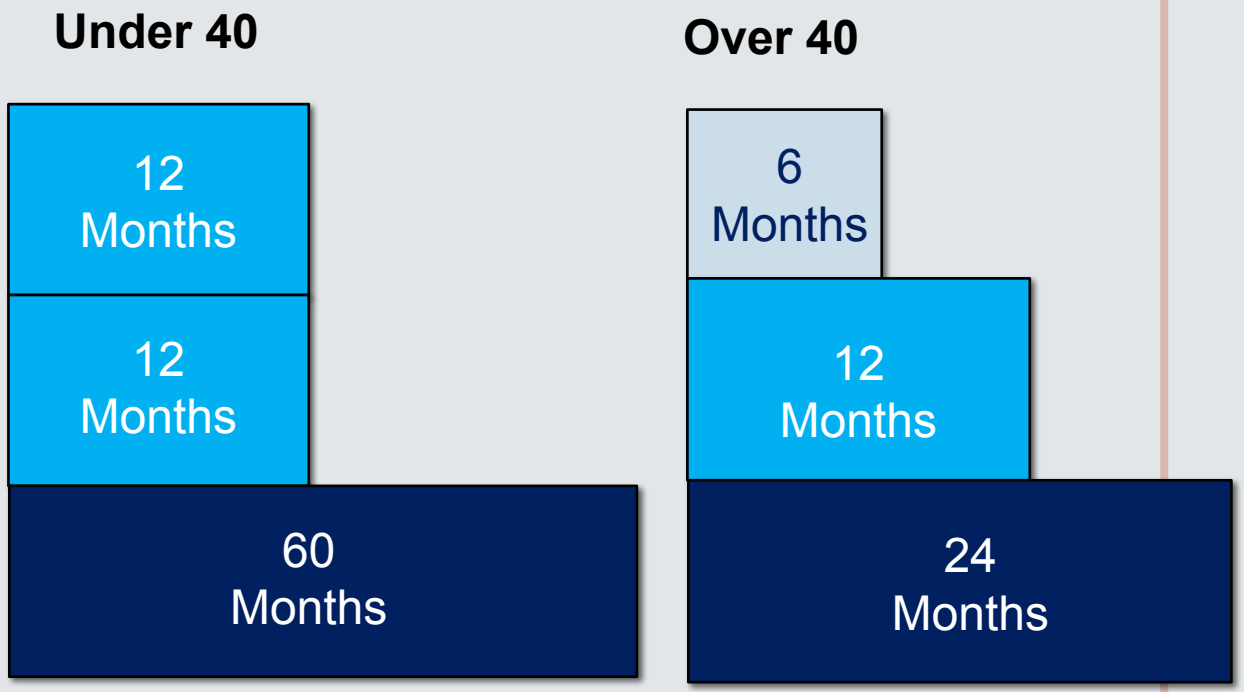
MEDICAL CERTIFICATES PER 14 CFR § 61.23

- **14 CFR FAR 61.23**

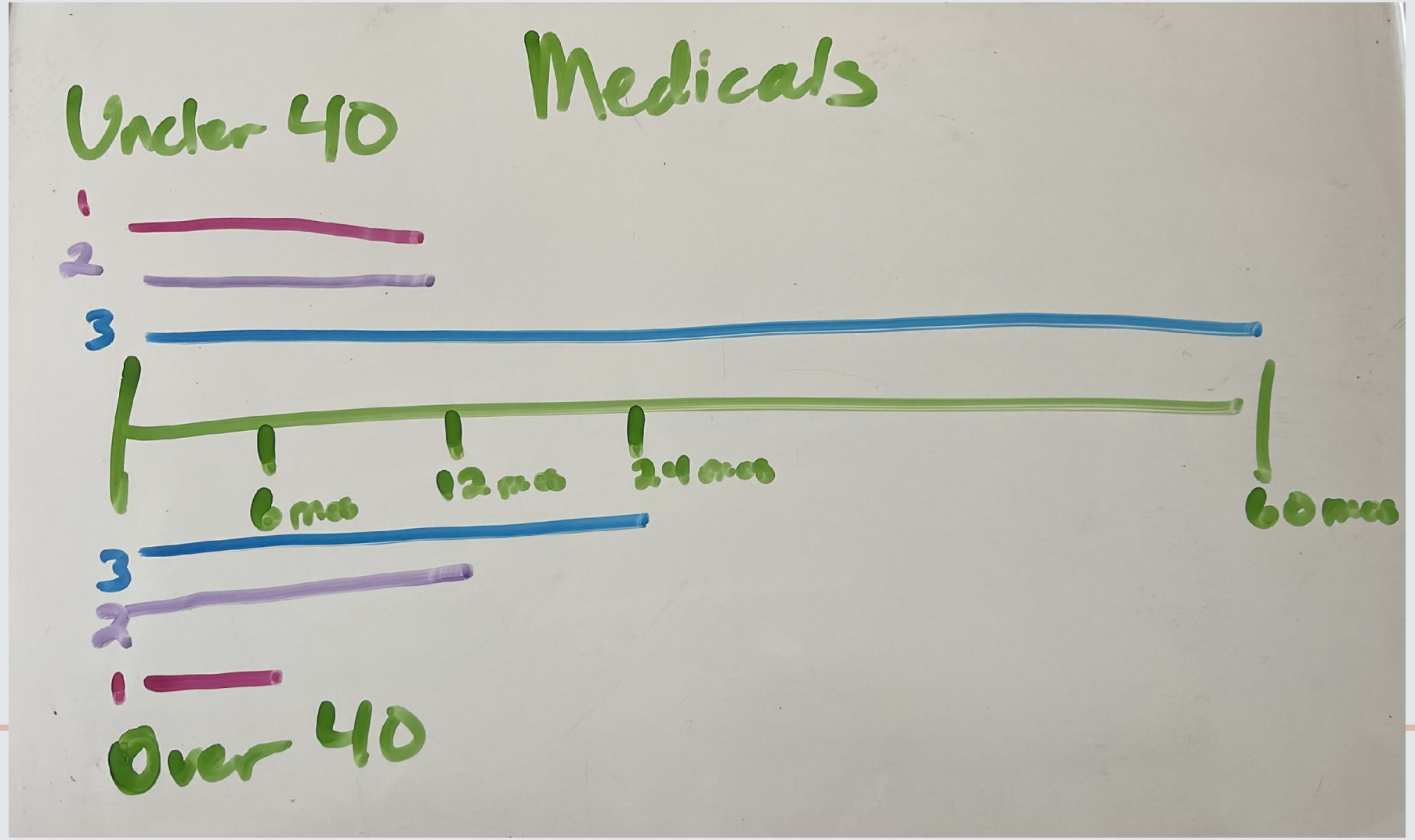
1st Class Medical
- Required to act as PIC of Airline Transport Pilot Certificate In Part 121

2nd Class Medical
- Required to act as PIC With Commercial Pilot Certificate

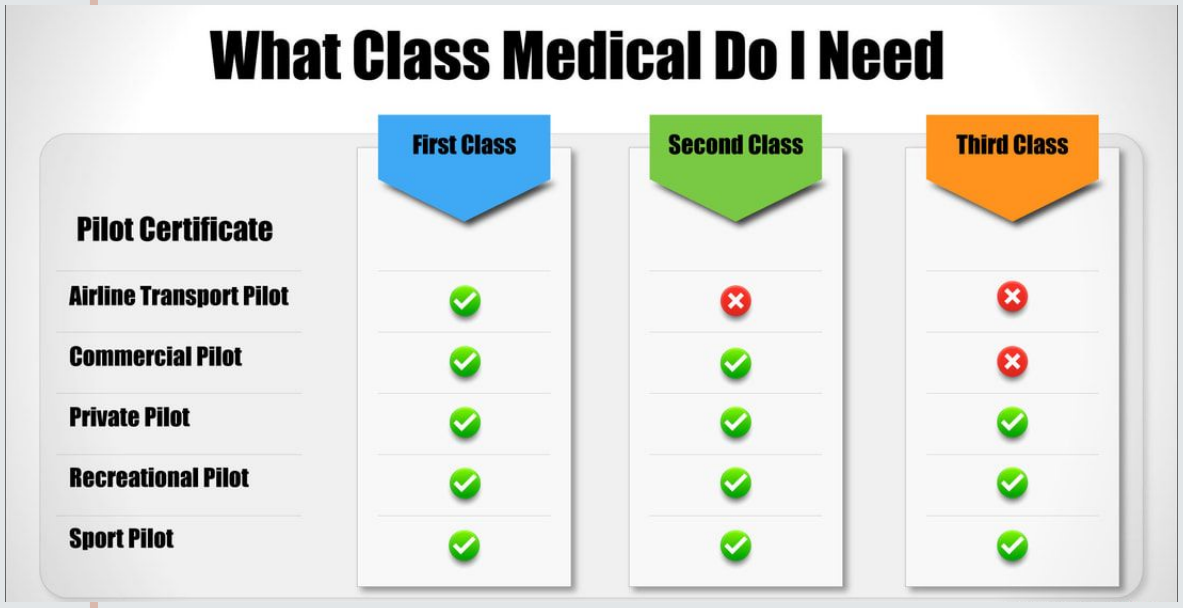
3rd Class Medical
- Required to act PIC With Recreational, Sport, Student, Private Pilot, Or Flight Instructor Certificate

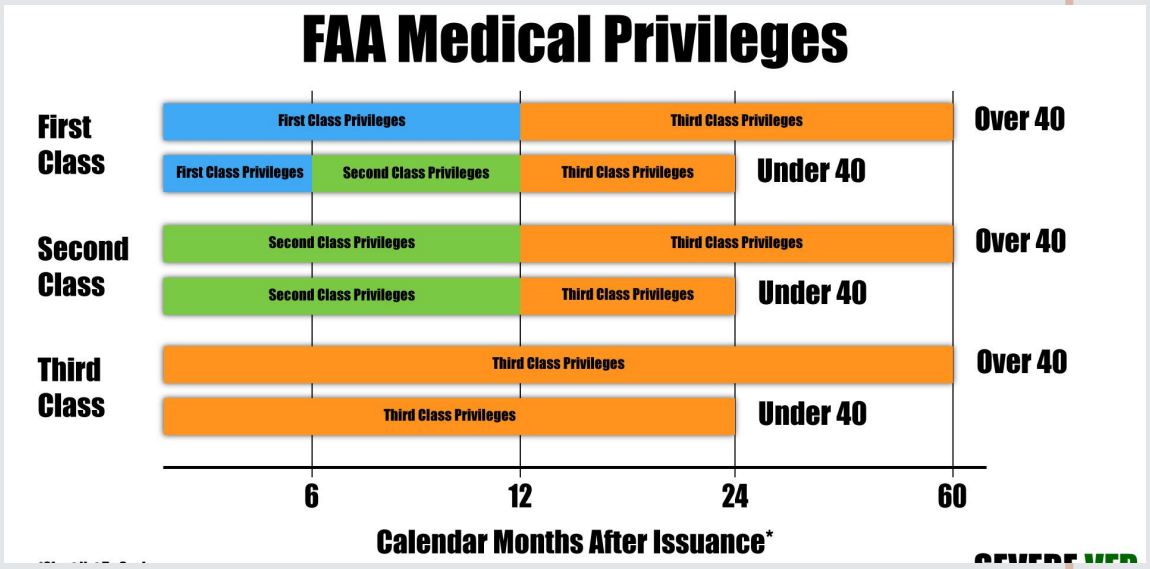


MEDICAL CERTIFICATES



MEDICALS CONT.





FAA Medical Comparison

FAA Pilot Medical & Certificate Information

AviatorsHQ.com	Class I	Class II	Class III
Type of Pilot	(ATP) Airline Transport Pilot	Commercial Pilot	Private, Student, Recreational Pilots
Certificate Duration	≥ 40 Years Old - 6 Months < 40 Years Old - 12 Months	12 Months	≥ 40 Years Old - 2 Years < 40 Years Old - 5 Year
Distant Vision	20/20 in each eye, with or without correction	20/20 in each eye, with or without correction	20/40 in each eye, with or without correction
Intermediate Vision (32 inches - panel)	≥ 50 Years Old - 20/40 with or without correction	≥ 50 Years Old - 20/40 with or without correction	N/A
Near Vision (16 inches)	20/40 in each eye, with or without correction		
Color Vision	Colors Necessary for safe performance of airman duties		
Hearing	Conversational voice at 6 feet with both ears or audiometry		
Blood Pressure	No standard. If medication required, will need cardiovascular workup. Current guideline maximum is 155/95.		
EKG Electrocardiogram	At age 35 Yearly after 40	N/A	N/A
Other Disorders	No disease causing vertigo or disturbance of speech or equilibrium		

SODA – STATEMENT OF DEMONSTRATED ABILITY

- SODA – Statement of Demonstrated Ability § 67.401(b) At discretion of the Federal Air Surgeon, may expire. Used in situations where, for example, the applicant has a disqualifying condition but it has been treated in a manner acceptable to the FAA and does not present a safety of flight issue. Usually requires treatment by FAA-designated specialists, and working with one or more Aviation Medical Examiners.

SPECIAL ISSUANCE

Special Issuance § 67.401(a) At discretion of the Federal Air Surgeon, may expire. Used in situations where, for example, the applicant has a disqualifying condition but it has been treated in a manner acceptable to the FAA and does not present a safety of flight issue. Usually requires treatment by FAA-designated specialists, and working with one or more Aviation Medical Examiners.

Federal Aviation Administration

Eastern Regional Medical Office
Aerospace Medicine Division, AEA-320
(718) 553-3300

1 Aviation Plaza
Jamaica NY 11434

AUGUST 14, 2018

[redacted]

RE: FI # 2242004
MED # 2180008297031
APP ID # 1998550936

AUTHORIZATION FOR SPECIAL ISSUANCE OF
A MEDICAL CERTIFICATION [AUTHORIZATION]

Dear Mr. [redacted]:

DISQUALIFYING CONDITIONS

- Angina Pectoris
- Bipolar Disorder
- Cardiac Valve Replacement
- Coronary Heart Disease that has been treated or, if untreated, that has been symptomatic or clinically significant
- Diabetes Mellitus requiring hypoglycemic medication
- Disturbance of Consciousness without satisfactory explanation of cause
- Epilepsy
- Heart Replacement (Cardiac Transplant)
- Myocardial Infarction
- Permanent cardiac pacemaker
- Personality Disorder that is severe enough to have repeatedly manifested itself by overt acts
- Psychosis
- Substance Abuse
- Substance Dependence

BasicMed vs Third-Class Medical

BASIC MED	Med exam every 4 years	Any state-licensed physician can conduct the exam	Online medical course completion every 2 years	Limitations on aircraft and flight plans	Airman completes medical exam checklist
THIRD-CLASS MEDICAL	Medical exam every 2 years(if over 40), 5 years(if under 40)	An Aviation Medical Examiner(AME) must conduct the exam	No online courses required	No limitation on qualifying aircraft and flight plans	FAA recieves more medical details and information

pilotmall.com

BASIC MED

BasicMed is an alternate way for pilots to fly without holding an FAA medical certificate as long as they meet certain requirements. Print off a FAA Form 8700-2; BasicMed Comprehensive Medical Examination Checklist (CMEC) and get your physical exam with a state-licensed physician. Then complete an online medical course and you're ready to fly!

There are two, free online courses to choose from:

- Mayo Clinic BasicMed Online Training Course
- AOPA's BasicMed Medical Self-Assessment: A Pilot's Guide to Flying Healthy

- **What do I need to do in order to fly under Basic Med?**
- Comply with the general BasicMed requirements (possess a U.S. driver's license, have held a medical after July 14, 2006).
- Get a physical exam with a state-licensed physician, using the Comprehensive Medical Examination Checklist
- Complete a BasicMed medical education course;
- Go fly!

Memory Aid: 6, 6, 18, 25

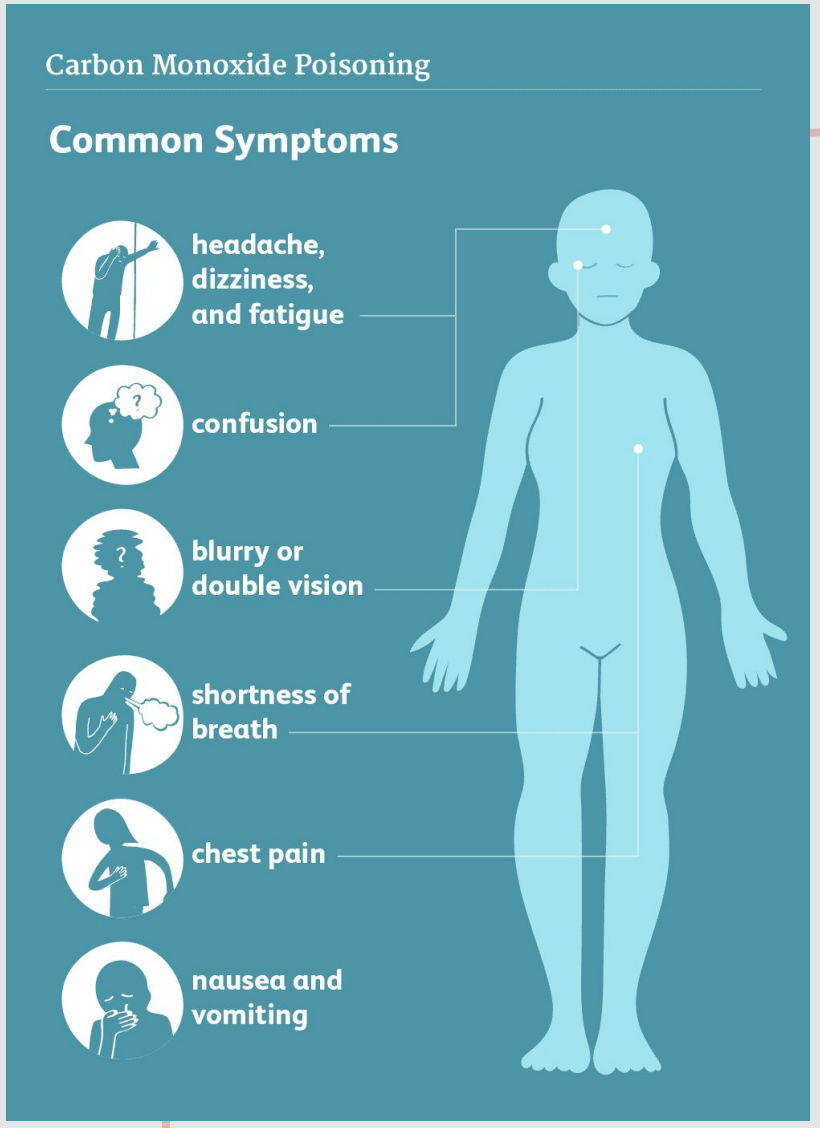
6000lbs, 6 seats (incl pilot), 18,000ft altitude limitation, 250kt limitation

HYPOXIA

- 4 Types
  - Hypoxic – Not enough oxygen to the lungs (blocked airway, high altitudes)
  - Hypemic – Not enough oxygen to the cells (loss of blood, carbon monoxide poisoning)
  - Stagnant – Not enough oxygen to the tissues (constricted artery, excessive Gs)
  - Histotoxic – Cells can't use the oxygen (alcohol and other drugs)
- Symptoms
  - Cyanosis, headache, decreased reaction time, impaired judgment, euphoria, visual impairment, drowsiness, lightheaded, tingling fingers / toes, numbness
- Time of Useful Consciousness

Altitude	Time of Useful Consciousness
40,000'	15 to 20 seconds
30,000'	1 to 2 minutes
22,000'	5 to 10 minutes

- Treatment – Use supplemental oxygen immediately and get to a lower altitude



CO LVL HIGH

Carbon Monoxide Poisoning

How it Happens
- Colorless, odorless gas produced by the engine
- Heater / Defrost vents can provide path to the cabin in the case of an exhaust leak

CO and the Body
- Attaches to hemoglobin in the blood 200 times more easily than oxygen
- Prevents hemoglobin from carrying oxygen to cells, resulting in Hypemic Hypoxia
- Smoking also causes CO poisoning (smoking at sea level is similar to flying at 8,000' MSL)

Effects of CO Poisoning
- Headache, Blurred vision, Dizziness, Drowsiness, Loss of muscle power

Detecting and Correcting
- CO Detectors – Assume carbon monoxide if a strong odor of exhaust gas is present
- Turn off heater, Open fresh air vents, Use supplemental oxygen, Land

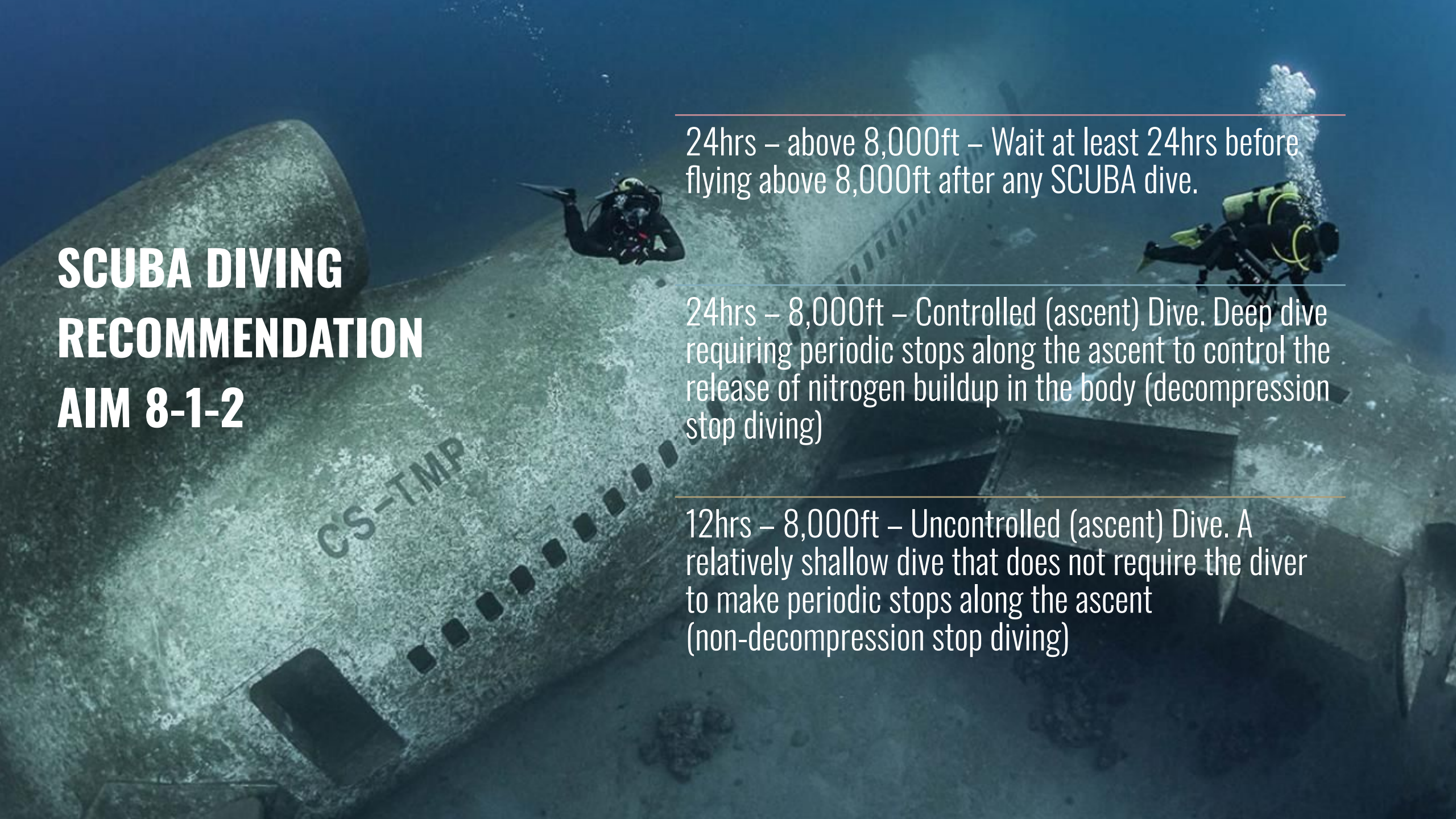
*If CO Poisoning is suspected seek medical attention

HYPERVENTILATION

- Occurs when experiencing stress, fright, or pain, and breathing increases
    - Excessive loss of carbon dioxide from the blood
- Symptoms
    - Very similar to Hypoxia
    - Visual impairment, lightheadedness, tingling and hot / cold sensations, muscle spasms, unconsciousness
- Treatment
    - Breathe normally (best prevention and cure)
    - Breathe into a paper bag, or talk out loud
    - If unsure, treat for Hypoxia (more dangerous condition)

NITROGEN & SCUBA DIVING

- Nitrogen and Flying
  - Scuba diving subjects the body to increased pressure which allows more nitrogen to dissolve in the body
  - Reduced pressures associated with flying can release the excess nitrogen
  - Nitrogen bubbles can form in the bloodstream, spinal cord, or brain
  - DCS (Decompression Sickness) symptoms include severe pain, impairment, death in extreme cases (Bends, Chokes, Neurological)
- Provide time to allow nitrogen to return to normal levels before flying
  - Wait at least 12 hours after a dive not requiring a controlled ascent before flight up to 8,000’ MSL
    - 24 hours for flight above 8,000’ MSL
  - Wait at least 24 hours after a dive requiring a controlled ascent before flight up to 8,000’ MSL
  - MSL altitudes, not pressurized cabin altitudes, to account for decompression



SCUBA DIVING RECOMMENDATION AIM 8-1-2

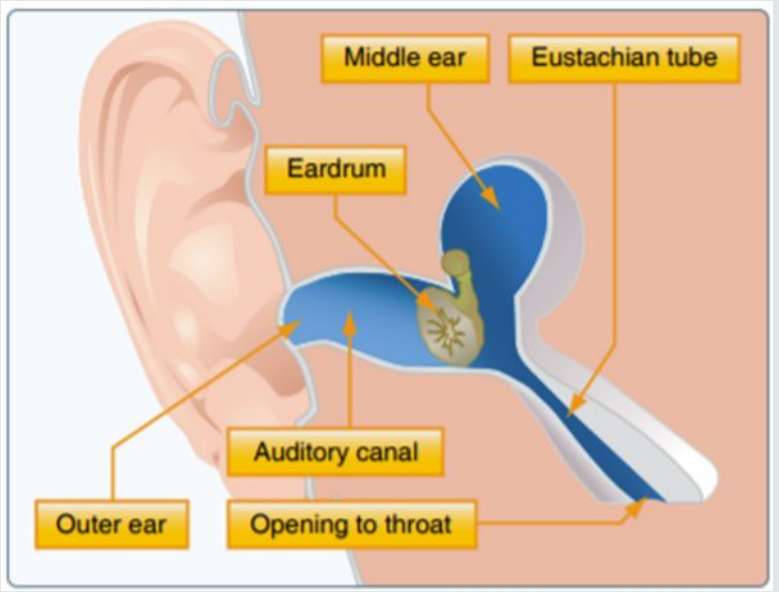
24hrs – above 8,000ft – Wait at least 24hrs before flying above 8,000ft after any SCUBA dive.

24hrs – 8,000ft – Controlled (ascent) Dive. Deep dive requiring periodic stops along the ascent to control the release of nitrogen buildup in the body (decompression stop diving)

12hrs – 8,000ft – Uncontrolled (ascent) Dive. A relatively shallow dive that does not require the diver to make periodic stops along the ascent (non-decompression stop diving)

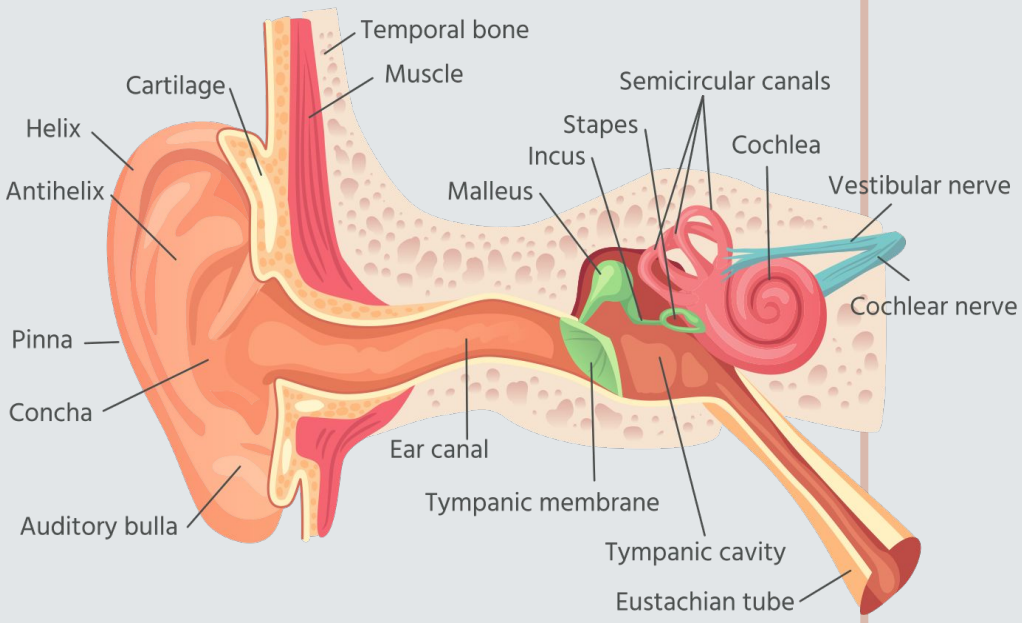
MIDDLE EAR AND SINUS ISSUES

- Middle Ear
  - Difference in air pressure in the middle ear and outside the body
  - Symptoms: Pain, Reduced hearing sensitivity
  - Climb: Eardrum bulges outward
  - Descent: Eardrum bulges inward
  - Treatment: Chew gum, stretch jaw, Valsalva, medicine
    - Valsalva only in a descent
- Sinus
  - Congestion prevents the pressure in the sinuses from equalizing with the cockpit pressure
  - Symptoms: Sinus and / or Upper tooth pain, Bloody mucus
  - Treatment: Slow descent rates, Do Not Fly

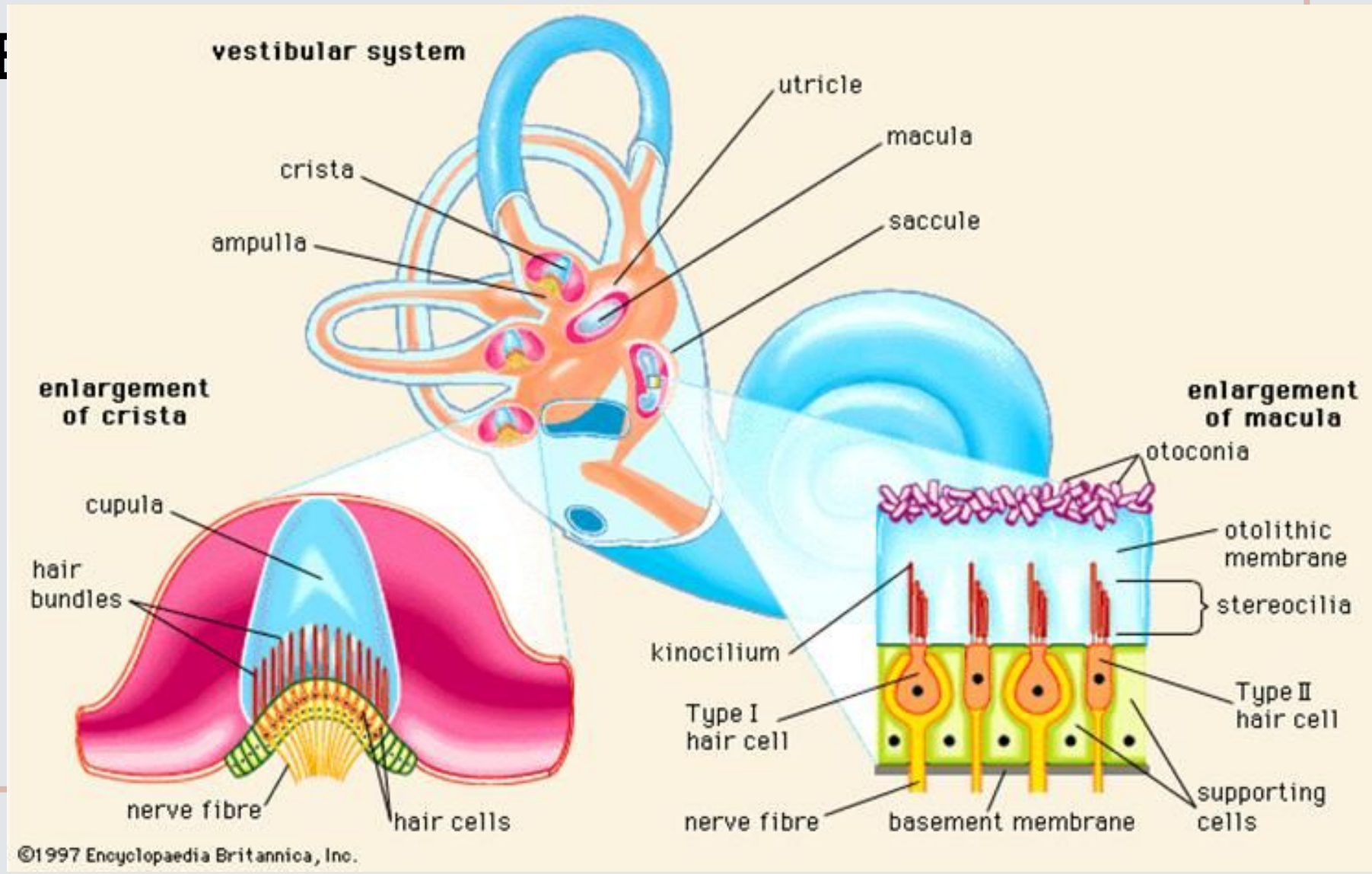


EAR BLOCK

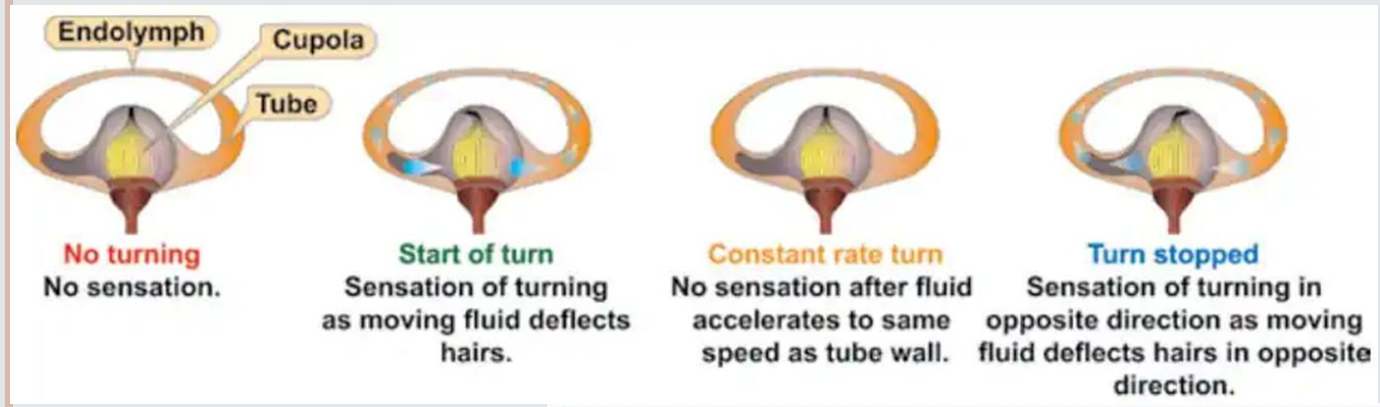
1. As the aircraft cabin pressure decreases during ascent, the expanding air in the middle ear pushes the eustachian tube open, and by escaping down it to the nasal passages, equalizes in pressure with the cabin pressure. But during descent, the pilot must periodically open the eustachian tube to equalize pressure. This can be accomplished by swallowing, yawning, tensing muscles in the throat, or if these do not work, by a combination of closing the mouth, pinching the nose closed, and attempting to blow through the nostrils (Valsalva maneuver).
2. Either an upper respiratory infection, such as a cold or sore throat, or a nasal allergic condition can produce enough congestion around the eustachian tube to make equalization difficult. Consequently, the difference in pressure between the middle ear and aircraft cabin can build up to a level that will hold the eustachian tube closed, making equalization difficult if not impossible. The problem is commonly referred to as an “ear block.”
3. An ear block produces severe ear pain and loss of hearing that can last from several hours to several days. Rupture of the ear drum can occur in flight or after landing. Fluid can accumulate in the middle ear and become infected.
4. An ear block is prevented by not flying with an upper respiratory infection or nasal allergic condition. Adequate protection is usually not provided by decongestant sprays or drops to reduce congestion around the eustachian tubes. Oral decongestants have side effects that can significantly impair pilot performance.
5. If an ear block does not clear shortly after landing, a physician should be consulted.

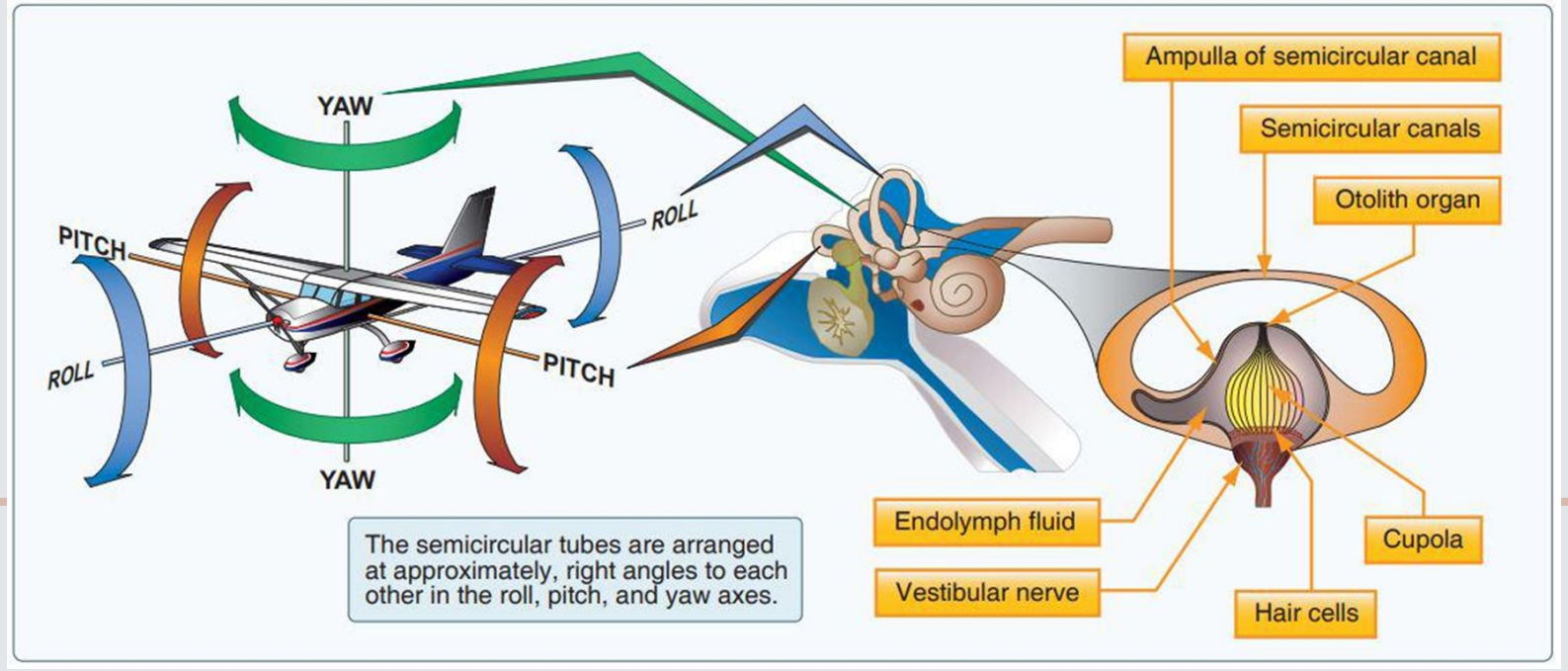


PARTS OF THE EAR



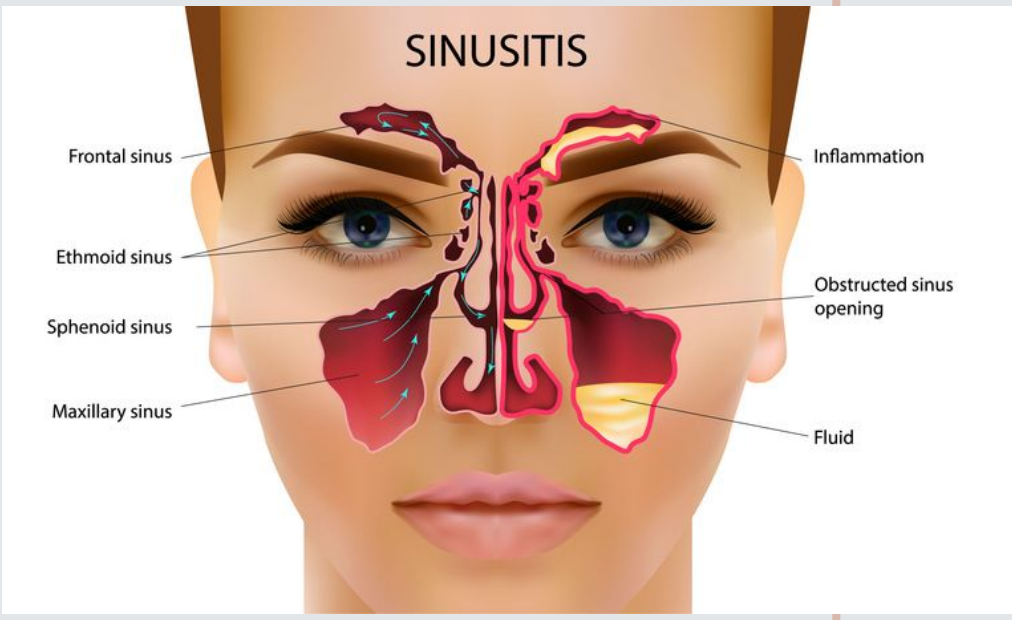
WHAT DO THE PARTS OF THE EAR TELL US?





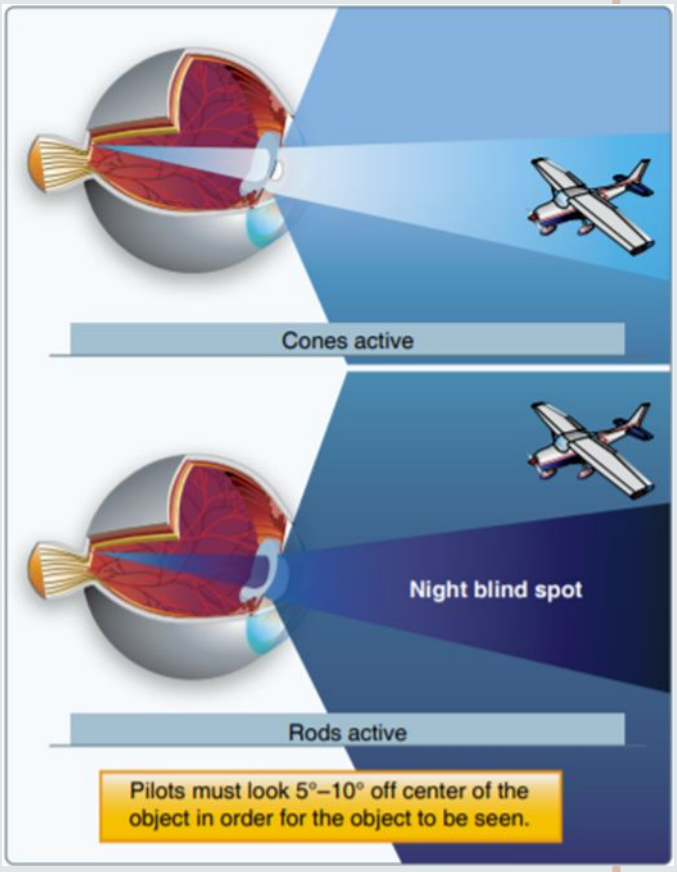
SINUS BLOCK

- During ascent and descent, air pressure in the sinuses equalizes with the aircraft cabin pressure through small openings that connect the sinuses to the nasal passages. An upper respiratory infection, such as a cold or sinusitis, or a nasal allergic condition can produce enough congestion around an opening to slow equalization, and as the difference in pressure between the sinus and cabin mounts, eventually plug the opening. This “sinus block” occurs most frequently during descent.
- A sinus block can occur in the frontal sinuses, located above each eyebrow, or in the maxillary sinuses, located in each upper cheek. It will usually produce excruciating pain over the sinus area. A maxillary sinus block can also make the upper teeth ache. Bloody mucus may discharge from the nasal passages.
- A sinus block is prevented by not flying with an upper respiratory infection or nasal allergic condition. Adequate protection is usually not provided by decongestant sprays or drops to reduce congestion around the sinus openings. Oral decongestants have side effects that can impair pilot performance.
- If a sinus block does not clear shortly after landing, a physician should be consulted.



VISUAL SCANNING OVERVIEW

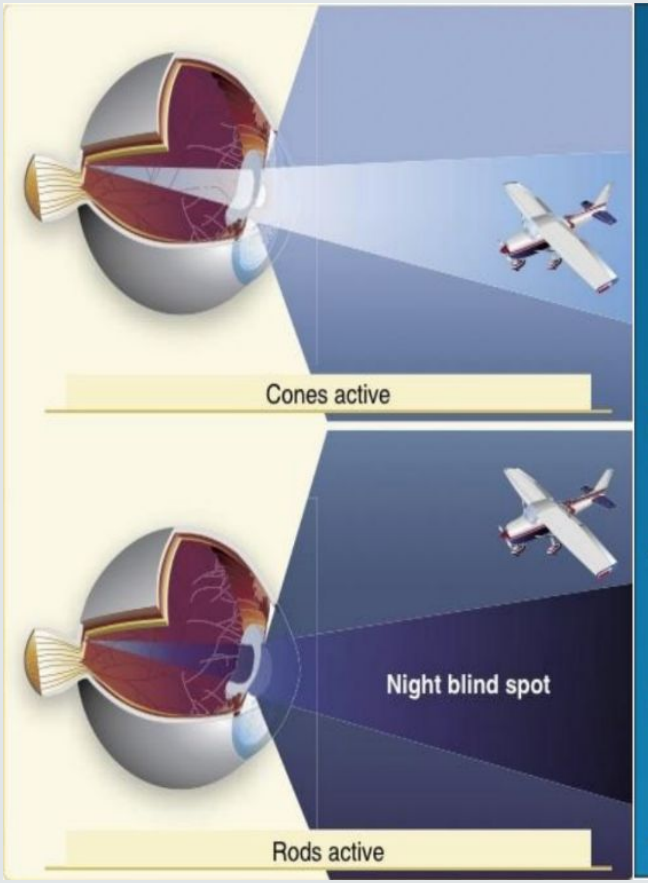
- Eyes
  - Day: Only a small area, called the fovea (center of vision), has the ability to send a clear image to the brain
  - At night, the fovea is effectively a blind spot
    - Must use peripherals which are more effective at night
- Effective Scan
  - Short, regularly spaced eye movements bringing successive areas of the sky into the center of vision
    - 10 degree sectors observed for at least 1 second
  - Night: Look 5-10 degrees off center of an object
  - Peripheral Vision
    - Very useful in spotting collision threats –detect relative movement
    - Visual scanning at night depends almost entirely on the peripherals
- Poor scanning increases the risk of midair collisions

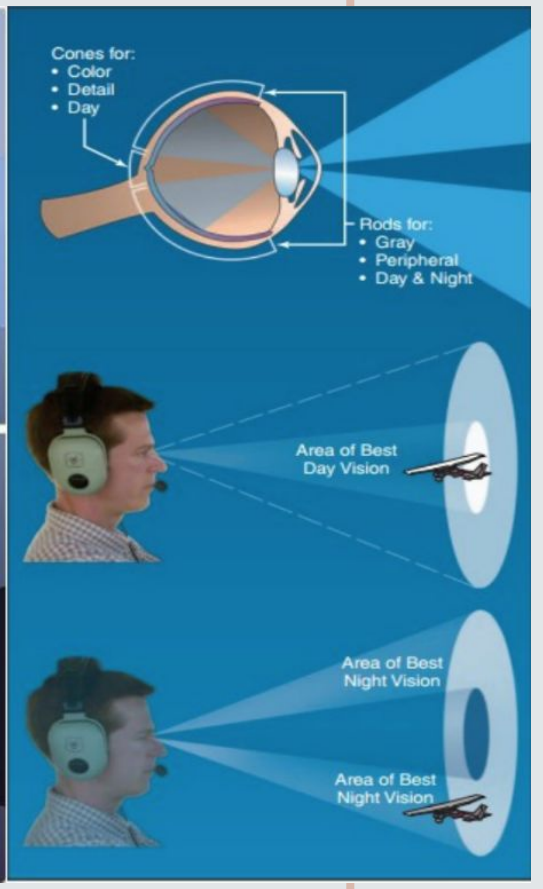


VISUAL IN FLIGHT: RODS AND CONES

- Cones
  - Color
  - Center of eye
  - Details
  - Effective in day

- Rods
  - Grey
  - Periphery of eye
  - Movement
  - 10,000x more light sensitive than cones
  - 30 minutes to adapt to darkness





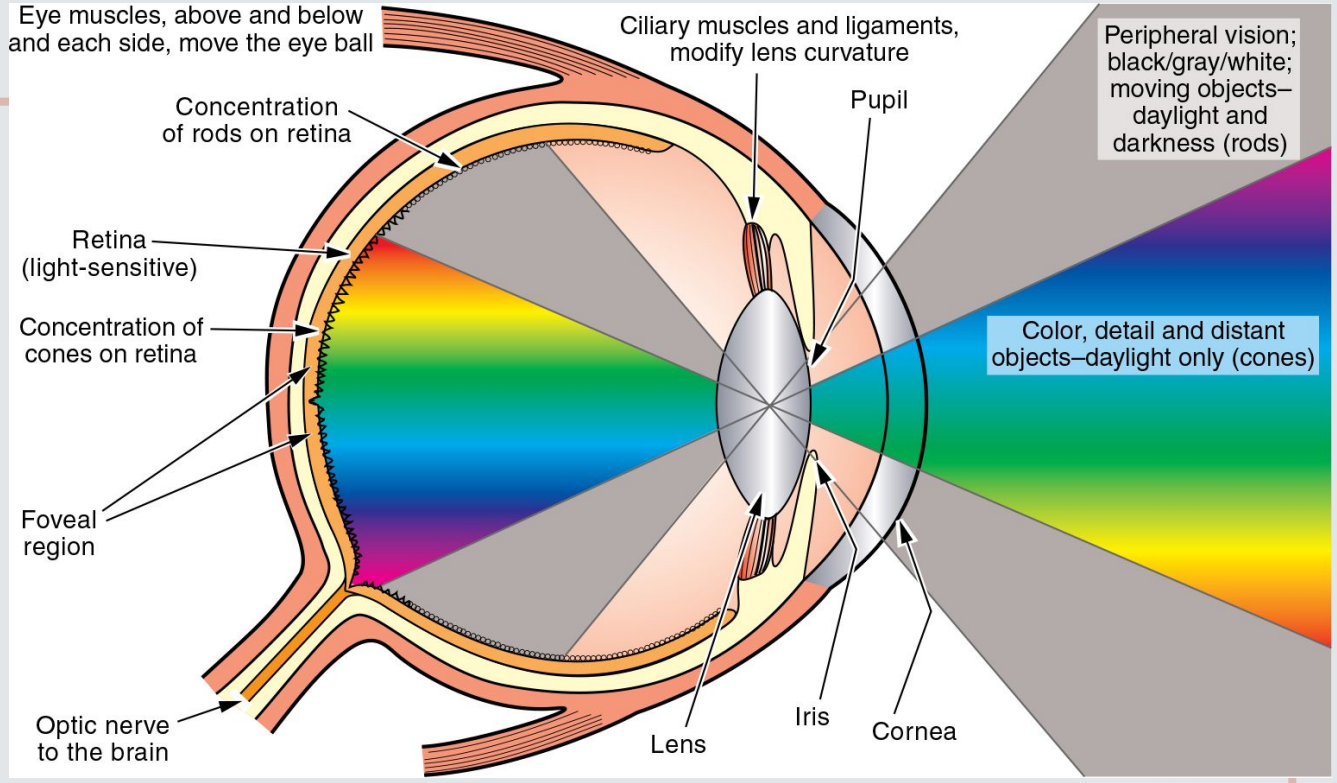
TYPES OF VISION

Photopic

Mesopic

Scotopic

VISION TYPES



Types of Vision

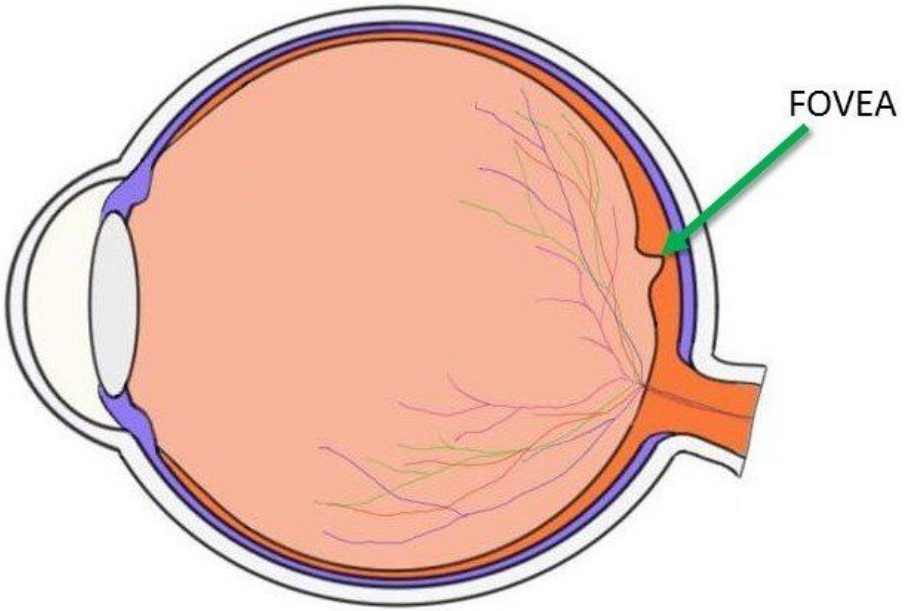
Types of vision used	Light level	Technique of viewing	Color perception	Receptors used	Acuity best	Blind spot
Photopic	High	Central	Good	Cones	20/20	Day
Mesopic	Medium/Low	Both	Some	Cones/Rods	Varies	Day/Night
Scotopic	Low	Scanning	None	Rods	20/200	Day/Night

LIMITATIONS OF VISION- FOVEA

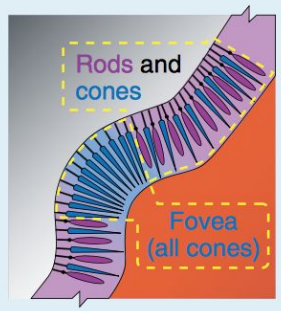
Most of the human retina does not sense high-detail images

Small section at the center of the visual field called the **Fovea**

- Sees detail well during daylight or well lit area
- Contains both cones and rods
    - Senses color as well as intensity



The rods and cones (film) of the retina are the receptors which record the image and transmit it through the optic nerve to the brain for interpretation.



Fovea centralis

Rod concentration

Optic disk (blind spot)

Lens

Iris

Optic nerve

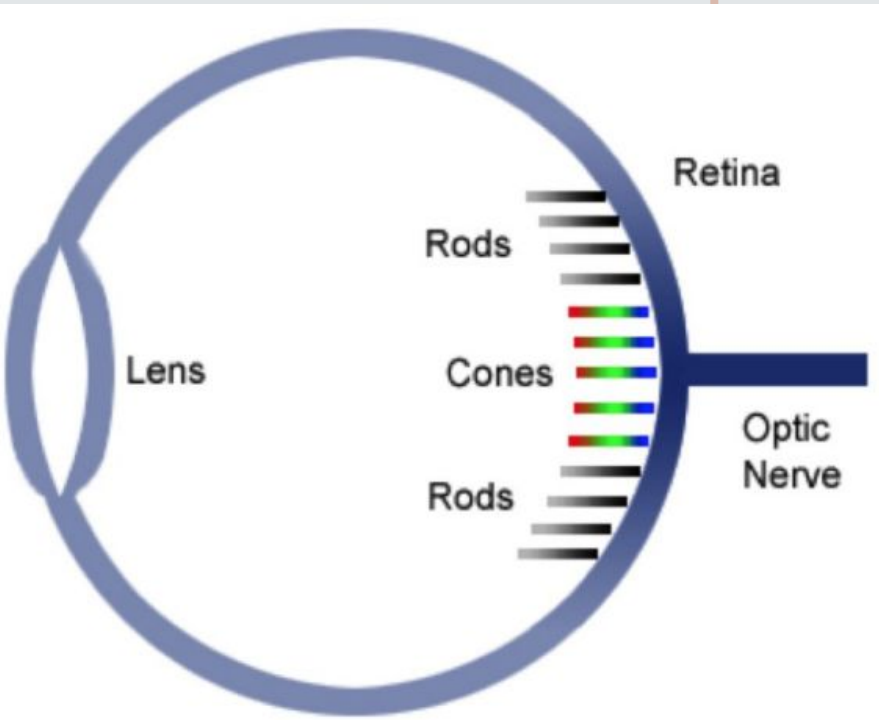
Retina

PUPIL

The **pupil** (aperture) is the opening at the center of the iris. The size of the pupil is adjusted to control the amount of light entering the eye.

CORNEA

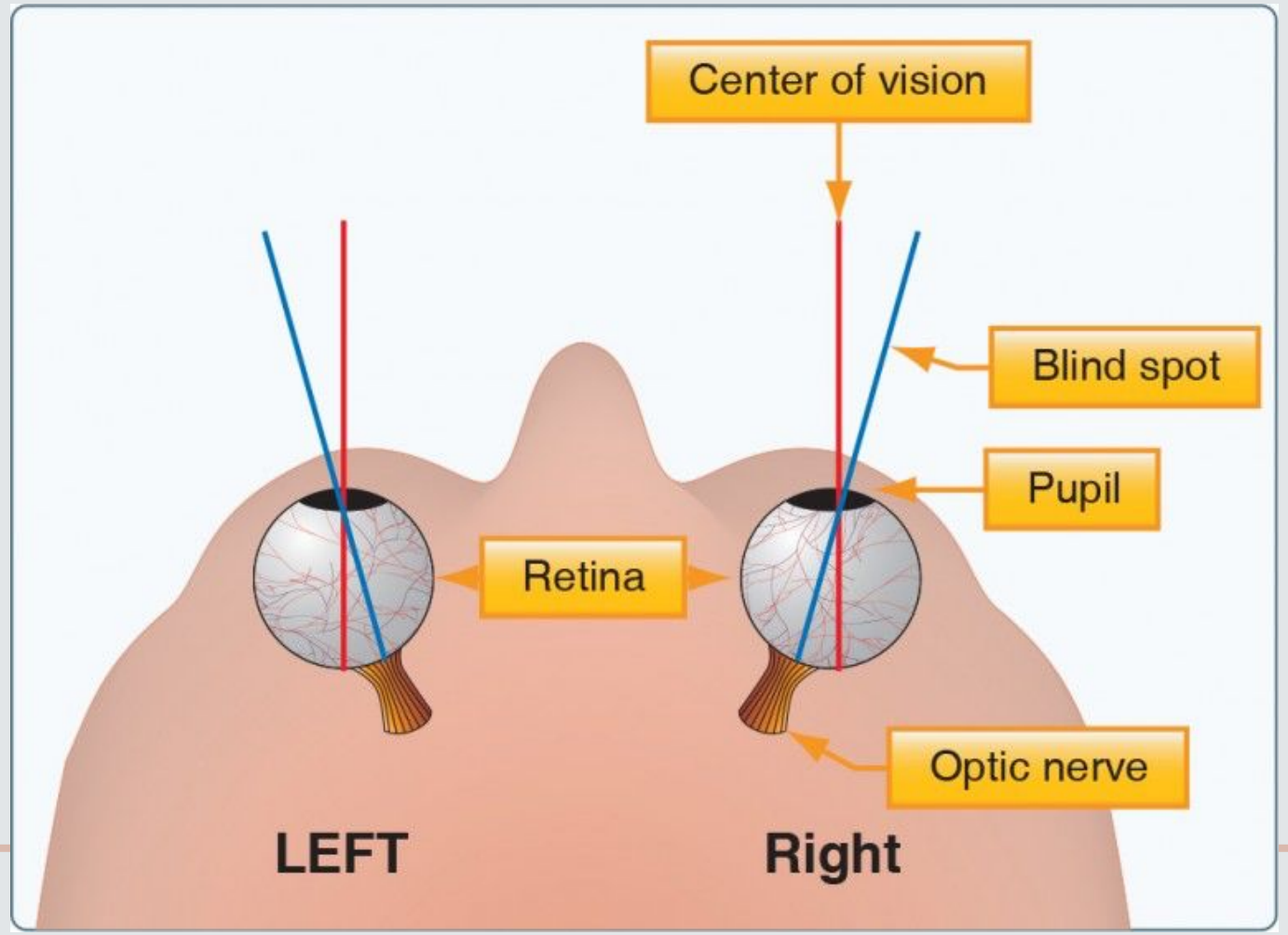
Light passes through the **cornea** (the transparent window on the front of the eye) and then through the **lens** to focus on the retina.



VISUAL ILLUSIONS: OPTIC NERVE BLIND SPOT

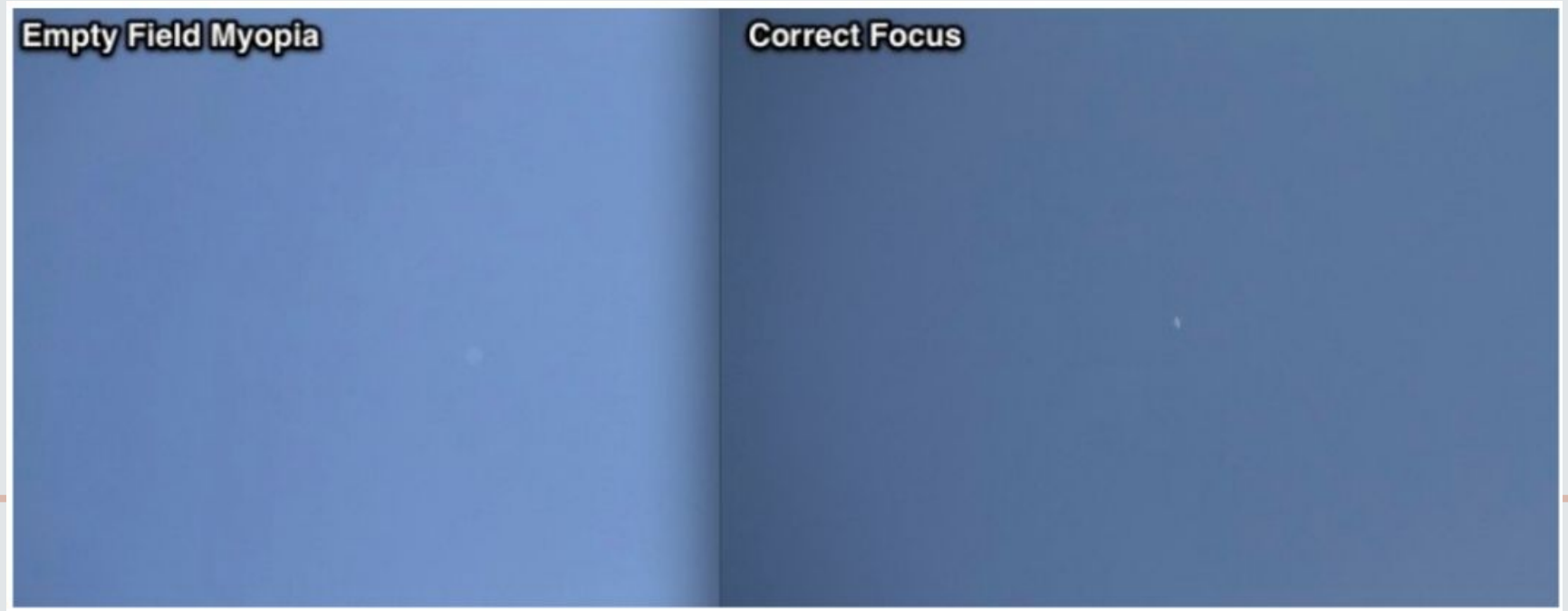
Cover right eye and look at the black X. See the plane disappear from your eyes natural blindspot!

BLIND SPOT


Center of vision
Blind spot
Pupil
Retina
Optic nerve
LEFT
Right

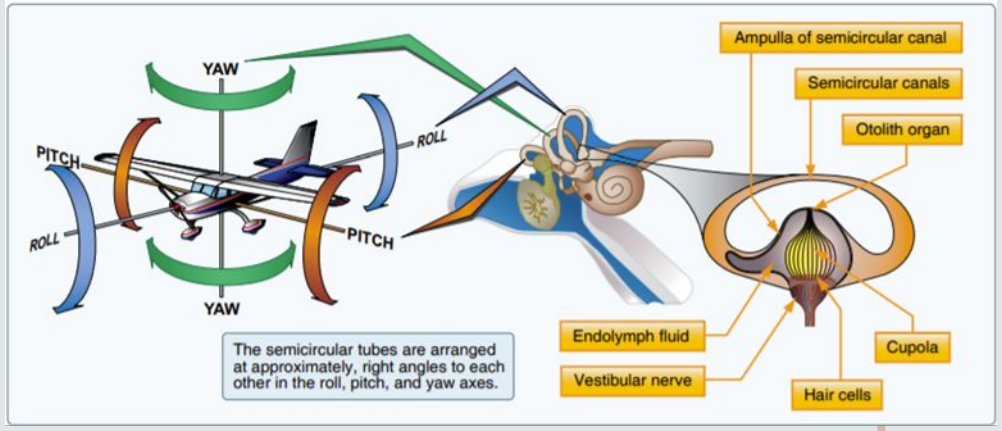
VISUAL ILLUSIONS: EMPTY FIELD MYOPIA

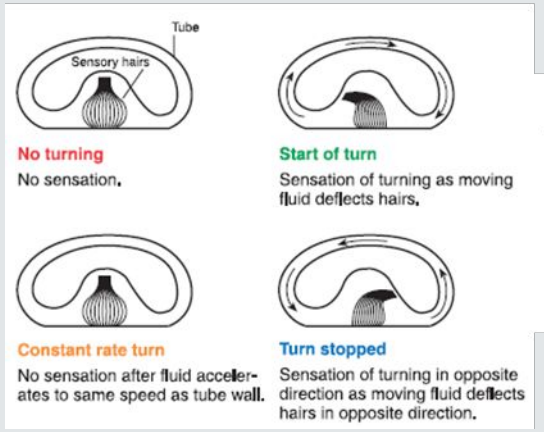
With nothing to focus on, your eyes settle automatically on a point slightly ahead of the plane(10-30ft), which gives you an artificial nearsightedness. Can be prevented from searching out and focusing on distant light sources and proper scanning techniques

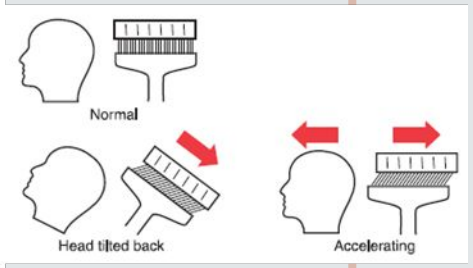


SPATIAL DISORIENTATION

- Lack of orientation of the position, attitude, and / or movement of the plane in space
- Orientation Systems
  - Visual: Eyes, largest source of information
    - Eliminated in IMC
  - Somatosensory: Nerves that sense position based on gravity / feeling
  - Vestibular: Motion sensing system in the inner ears
    - Semicircular Canals – Angular acceleration
    - Otolith Organs – Linear acceleration
- Recognize and disregard false sensations, rely solely on the instruments







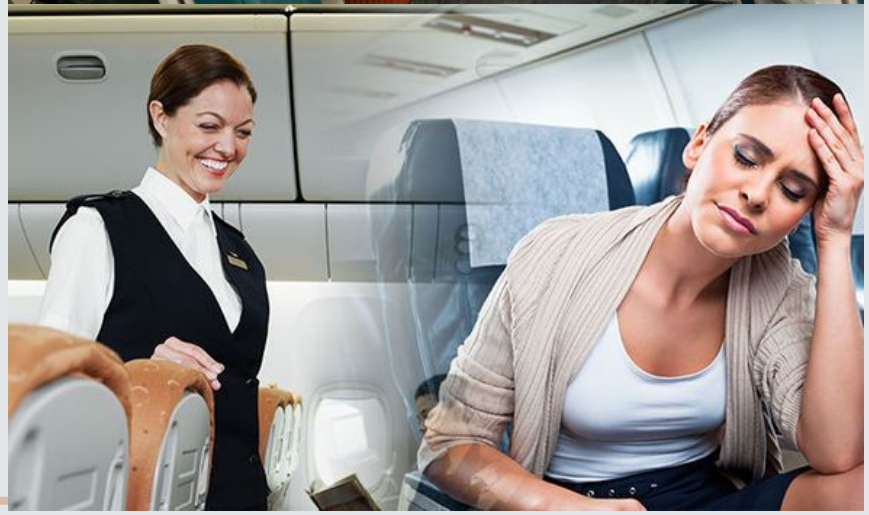
VERTIGO

- A feeling of dizziness and disorientation caused by doubt in visual interpretation
- Distractions and problems can result from a flickering light in the cockpit, anti-collision light, strobe lights, or other aircraft lights and can cause flicker vertigo
- Often experienced from a lack of a well-defined horizon (common at night)
- Also experienced leaving a well-lit area (a runway) into darkness
- Possible physical reactions include nausea, dizziness, grogginess, unconsciousness, headaches, or confusion

Antidote: Trust your instruments. Maintain your instrument scan.

MOTION SICKNESS

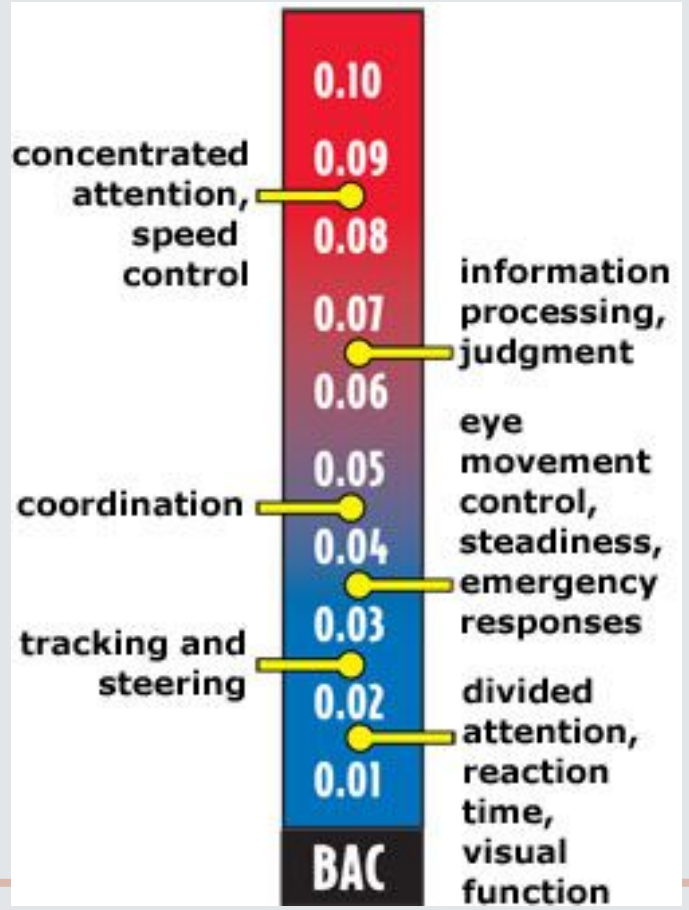
- Causes
  - Brain receiving conflicting messages about the state of the body
  - Anxiety and stress
- Symptoms
  - Discomfort, Nausea, Dizziness, Paleness, Sweating, Vomiting
  - May occur during initial flights, but generally goes away after the first few lessons
- Treatment
  - Open fresh air vents
  - Focus on objects outside the airplane
  - Avoid unnecessary head movement
  - Take control of the plane and fly smoothly



ALCOHOL & DRUGS

- Alcohol
  - Even small amounts can impair judgement, and decrease performance / mental cognition
  - Altitude multiplies the effects of alcohol on the brain (form of histotoxic hypoxia)
  - FAR 91.17 – 8 hours “from bottle to throttle”
- Medications / Drugs
  - Basic Guideline: Do not fly while taking any medications, unless approved by the FAA
    - Drugs that cause no side effects on the ground may create serious problems airborne
  - FAR 61.53 – Prohibits flying if taking medication that would prevent obtaining a medical certificate
  - FAR 91.17 – Prohibits drug use that affects a person in any way contrary to safety

ALCOHOL



Have you had any alcohol in the last eight hours?
Are you hungover?

Even small amounts of alcohol, drugs and over the counter medication can impair judgement, and decrease performance / mental cognition.

- FAR 91.17 –
  - 8 hours “from bottle to throttle”
  - Cannot be under the influence of alcohol
  - Must have 0.04% BAC (blood alcohol content) or lower
  - No pilot may allow a person who appears to be intoxicated to be carried in the aircraft
  - Altitude multiplies the effects of alcohol on the brain (form of histotoxic hypoxia)
  - Closely linked to performance deterioration, impaired judgement, decreased sense of responsibility, reduced coordination, constricts the visual field, diminishes memory, reduces reasoning ability, lowers attention pan

ALCOHOL & DRUGS

Type Beverage	Typical Serving (oz)	Pure Alcohol Content (oz)
Table wine	4.0	.48
Light beer	12.0	.48
Aperitif liquor	1.5	.38
Champagne	4.0	.48
Vodka	1.0	.50
Whiskey	1.25	.50

0.01–0.05% (10–50 mg)	average individual appears normal
0.03–0.12%* (30–120 mg)	mild euphoria, talkativeness, decreased inhibitions, decreased attention, impaired judgment, increased reaction time
0.09–0.25% (90–250 mg)	emotional instability, loss of critical judgment, impairment of memory and comprehension, decreased sensory response, mild muscular incoordination
0.18–0.30% (180–300 mg)	confusion, dizziness, exaggerated emotions (anger, fear, grief), impaired visual perception, decreased pain sensation, impaired balance, staggering gait, slurred speech, moderate muscular incoordination
0.27–0.40% (270–400 mg)	apathy, impaired consciousness, stupor, significantly decreased response to stimulation, severe muscular incoordination, inability to stand or walk, vomiting, incontinence of urine and feces
0.35–0.50% (350–500 mg)	unconsciousness, depressed or abolished reflexes, abnormal body temperature, coma, possible death from respiratory paralysis (450 mg or above)

* Legal limit for motor vehicle operation in most states is 0.08 or 0.10% (80–100 mg of alcohol per dL of blood).

Figure 17-8. *Impairment scale with alcohol use.*

Substance	Generic Or Brand Name	Treatment for	Possible Side Effects
Alcohol	Beer Liquor Wine	N/A	Impaired judgment and perception Impaired coordination and motor control Reduced reaction time Impaired sensory perception Reduced intellectual functions Reduced tolerance to G-forces Inner-ear disturbance and spatial disorientation (up to 48 hours) Central nervous system depression
Nicotine	Cigars Cigarettes Pipe tobacco Chewing tobacco Snuff	N/A	Sinus and respiratory system infection and irritation Impaired night vision Hypertension Carbon monoxide poisoning (from smoking)
Amphetamines	Ritalin Obetrol Eskatrol	Obesity (diet pills) Tiredness	Prolonged wakefulness Nervousness Impaired vision Suppressed appetite Shakiness Excessive sweating Rapid heart rate Sleep disturbance Seriously impaired judgment
Caffeine	Coffee Tea Chocolate No-Doz	N/A	Impaired judgment Reduced reaction time Sleep disturbance Increased motor activity and tremors Hypertension Irregular heart rate Rapid heart rate Body dehydration (through increased urine output) Headaches
Antacid	Alka-2 Di-Gel Maalox	Stomach acids	Liberations of carbon dioxide at altitude (distension may cause acute abdominal pain and may mask other medical problems)
Antihistamines	Coricidin Contac Dristan Dimetapp Ornade Chlor-Trimeton Diphenhydramine	Allergies Colds	Drowsiness and dizziness (sometimes recurring) Visual disturbances (when medications also contain antispasmodic drugs)
Aspirin	Bayer Bufferin Alka-Seltzer	Headaches Fevers Aches Pains	Irregular body temperature Variation in rate and depth of respiration Hypoxia and hyperventilation (two aspirin can contribute to) Nausea, ringing in ears, deafness, diarrhea, and hallucinations when taken in excessive dosages Corrosive action on the stomach lining Gastrointestinal problems Decreased clotting ability of the blood (clotting ability could be the difference between life and death in a survival situation)

Figure 17-9. *Adverse affects of various drugs.*

EMOTIONS, PHYSICAL HEALTH & EATING

Are you experiencing any emotional problems that might affect your ability to fly?

In order to maintain safe control of an aircraft or listen and comply with ATC instructions or other traffic.

- Pilots must manage their emotions and eating habits, which can be quite a difficult task for any person.
- An emotionally disturbed pilot can transform a safe flight into a highly dangerous one since he or she will have problems focusing on the main task, flying the aircraft.
    - Situations such as family, relationships and finance problems, poor diet, lack exercise or simply not eating may cause feelings of anger, depression, or anxiety.
    - Your well-being and acts of self-care is very important, for your safety and others take time to take care of yourselves before you fly!

EMOTIONS, PHYSICAL HEALTH & EATING

Did you have time to eat before your flight? Are you carrying enough water and food to get you through a long flight?

A well-balanced diet ensures that pilots have the energy and mental alertness required for long flights and complex decision-making.

Adequate hydration is also essential to prevent dehydration, which can negatively impact cognitive function.

Additionally, physical fitness is vital for pilots to handle the physical demands of operating an aircraft, especially during emergency situations that may require strength and agility.

Overall, prioritizing health through proper nutrition and fitness helps enhance pilots' overall well-being, concentration, and ability to perform effectively, contributing to the safety of both the pilot and passengers during flight.

FATIGUE & STRESS

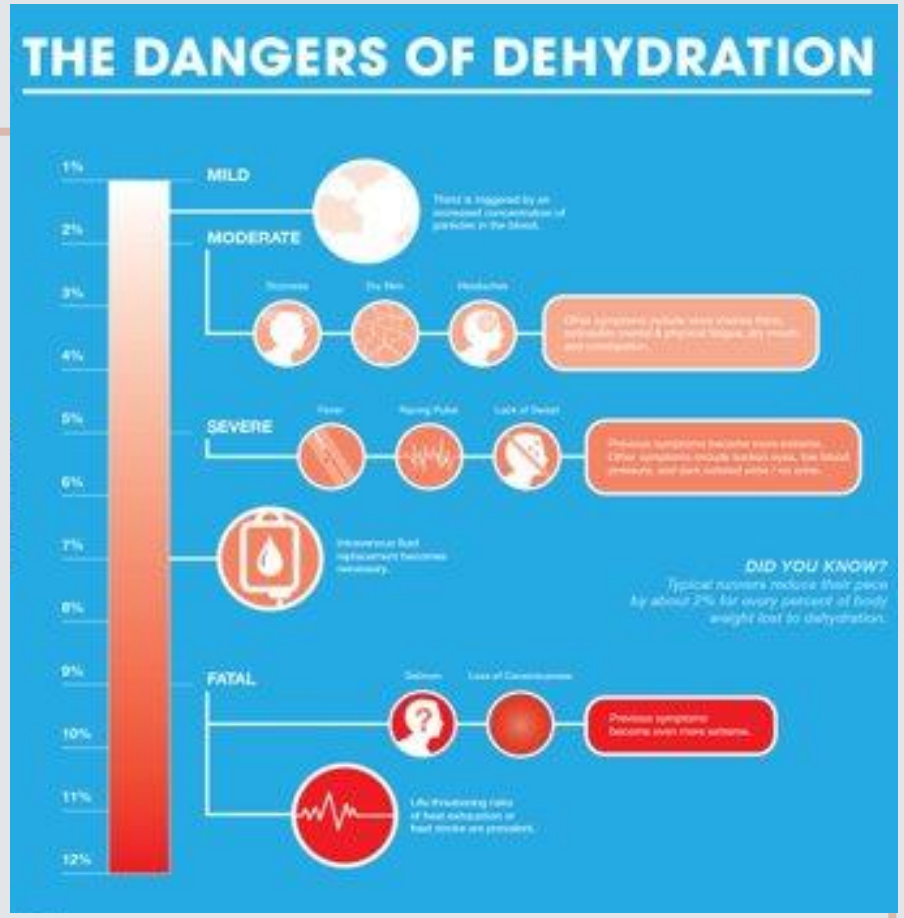
- Fatigue
  - Acute Fatigue
    - Short term, normal occurrence in every day life
    - Skill Fatigue – Type of acute fatigue affecting pilots, effects include timing disruption, and perceptual field disruption
    - Prevention – Proper diet, adequate rest and sleep
  - Chronic Fatigue
    - Long term fatigue, usually with psychological roots or an underlying disease
    - Symptoms – Weakness, tiredness, heart palpitations, headaches, irritability, aches and pains
    - Prevention – Treatment by a physician
  - Stay on the ground if fatigued
- Stress
  - Can be emotional, physical, or psychological
  - The body's response to physical and psychological demands placed upon it
  - Acute Stress (short term)
    - Triggers "fight or flight" response; healthy individuals can usually cope with acute stress
  - Chronic Stress (long term)
    - Psychological pressures such as loneliness, financial worries, relationship or work problems
    - Intolerable burden exceeding one's ability to cope and causing performance to fall sharply
    - DO NOT FLY

FAA Fatigue in Aviation Brochure

DEHYDRATION

Critical Loss Of Water From The Body

- Causes:
  - High Temperature (flightdeck, flight line), wind, humidity, diuretic drinks (coffee, tea, alcohol, soda, etc.)
- Effects:
  - First noticeable sign is fatigue, headaches, sleepiness, dizziness, cramps
  - Physical and mental performance is degraded
- Prevention:
  - Stay hydrated (drink 4 quarts of water within a 24 hour period)
  - Don't wait until you're thirsty
  - Wear light, porous clothing, and a hat
  - Keep the flight deck ventilated
  - Limit soda, caffeine, and alcohol intake



BEWARE OF HEATSTROKE

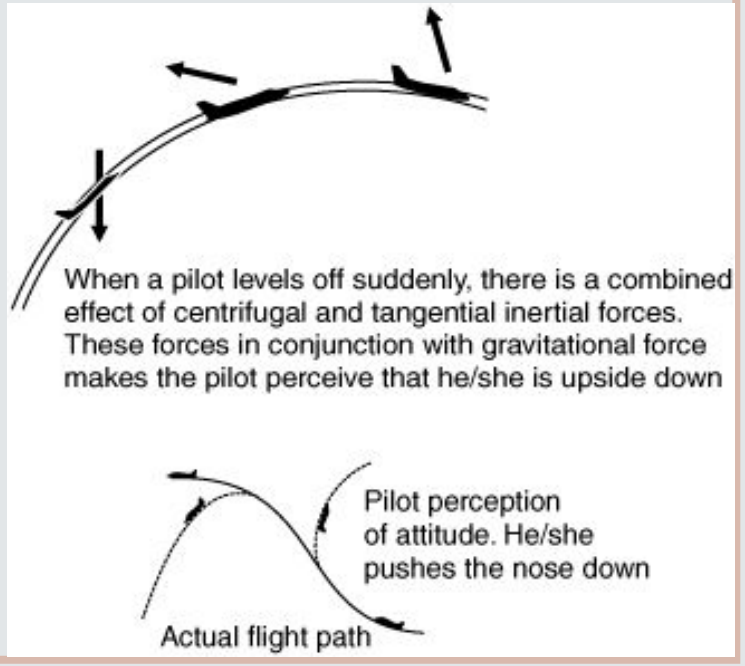
- Caused by an inability of the body to control temperature
- Can be recognized by the symptoms of dehydration but can also cause complete collapse

IMSAFE

- Self Preflight
  - Illness
    - Am I sick?
  - Medication
    - Taking any medications that might affect judgement or cause drowsiness?
  - Stress
    - Consider the effects of stress on performance.
  - Alcohol
    - Have I been drinking in the last 8 hours? 24 hours? Am I hungover?
  - Fatigue
    - Am I adequately rested? Fatigue is one of the most insidious hazards to flight safety
  - Emotion / Eating
    - Am I emotionally upset?
    - He I eaten today? Have I eaten enough today?

INVERSION ILLUSION

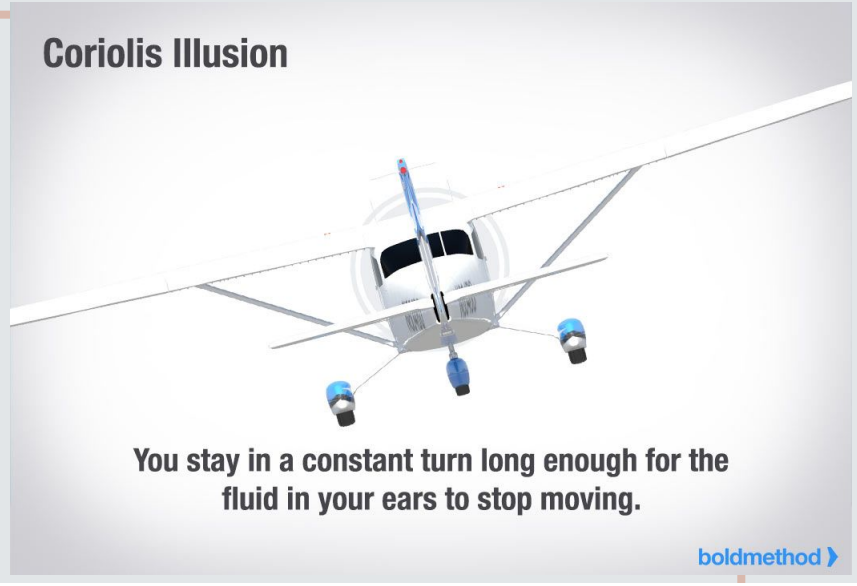
Abrupt change from climb to straight and level will make the pilot feel like he is tumbling backward. The disoriented pilot will push the nose forward (low) and possibly intensify the illusion

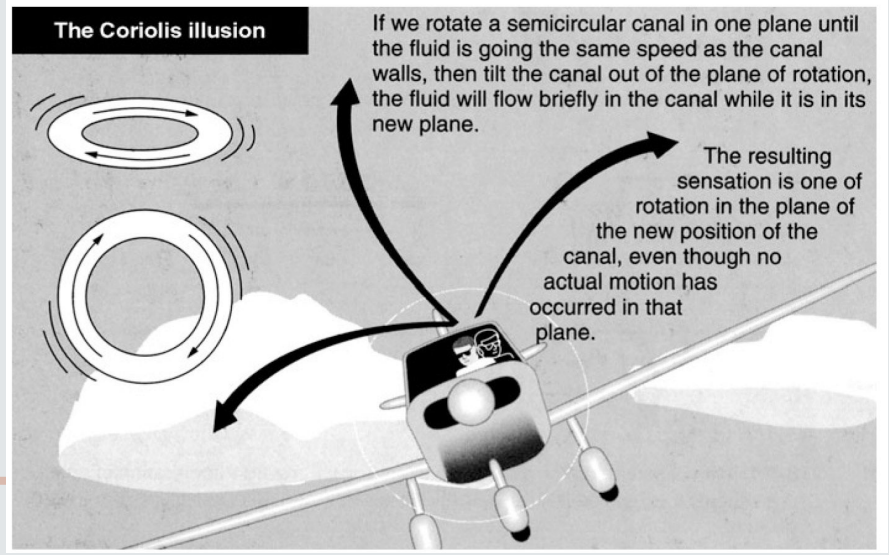


Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

CORIOLIS ILLUSION

Occurs when a pilot has been in a turn long enough for the fluid in the ear canal to move at the same speed as the canal, which is then followed by an abrupt head movement. A movement of the head in a different plane, such as looking at something in a different part of the flight deck or grabbing a chart, may set the fluid moving and create the illusion of turning or accelerating on an entirely different axis. The disoriented pilot may maneuver the aircraft into a dangerous attitude to correct the aircraft's perceived attitude

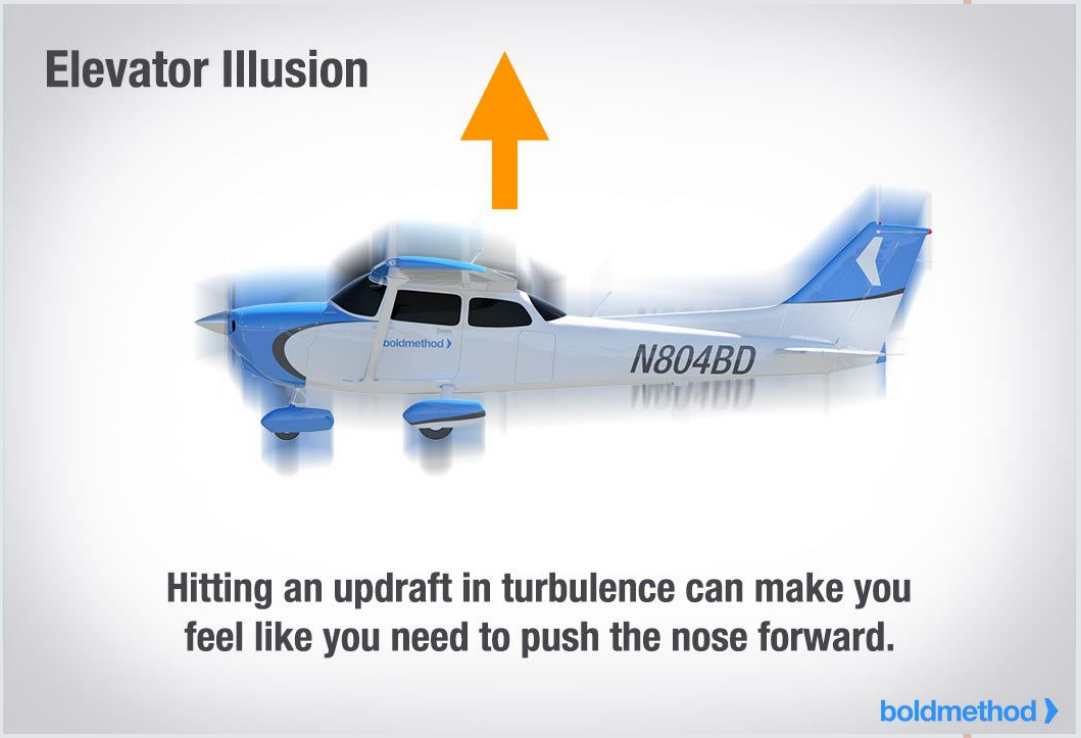




Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

ELEVATOR ILLUSION

Abrupt upward vertical acceleration, as can occur in an updraft, can stimulate the otolith organs to create the illusion of being in a climb. The disoriented pilot may push the aircraft into a nose-low attitude



Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

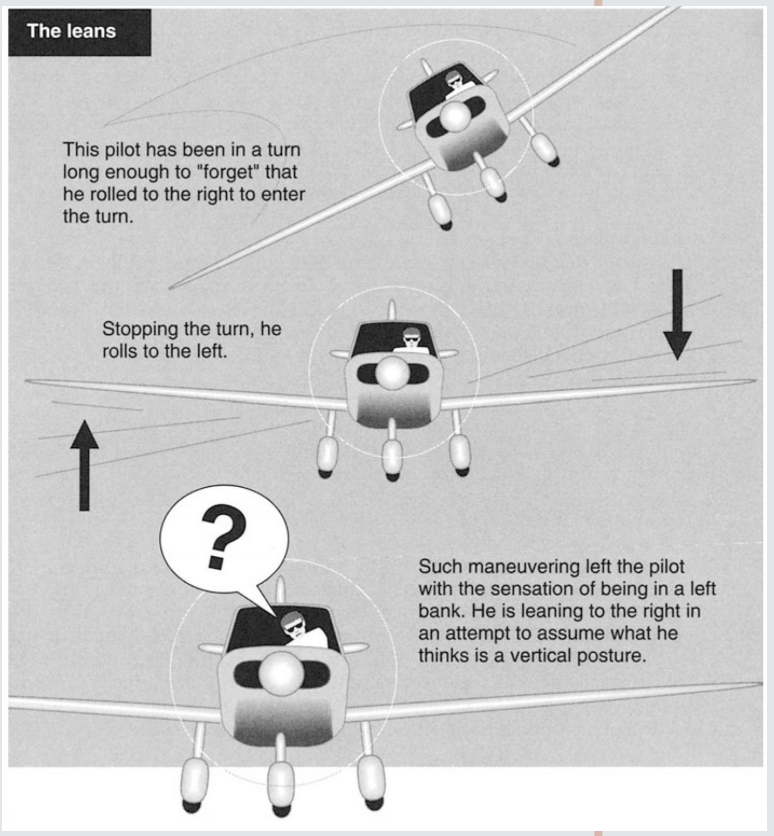
FALSE HORIZON

Dark nights tend to eliminate reference to a visual horizon. Sloping cloud formations, an obscured horizon, a dark scene spread with ground lights and stars, and specific geometric patterns of ground light can make the illusion of not being aligned with the horizon. Geometric patterns of ground light can create illusions of not being aligned correctly with the actual horizon

Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

LEANS ILLUSIONS

If entering a turn too slowly to stimulate the motion sensing system in the inner ear, an abrupt correction of a banked attitude can create the illusion of banking in the opposite direction



Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

AUTOKINESIS ILLUSION

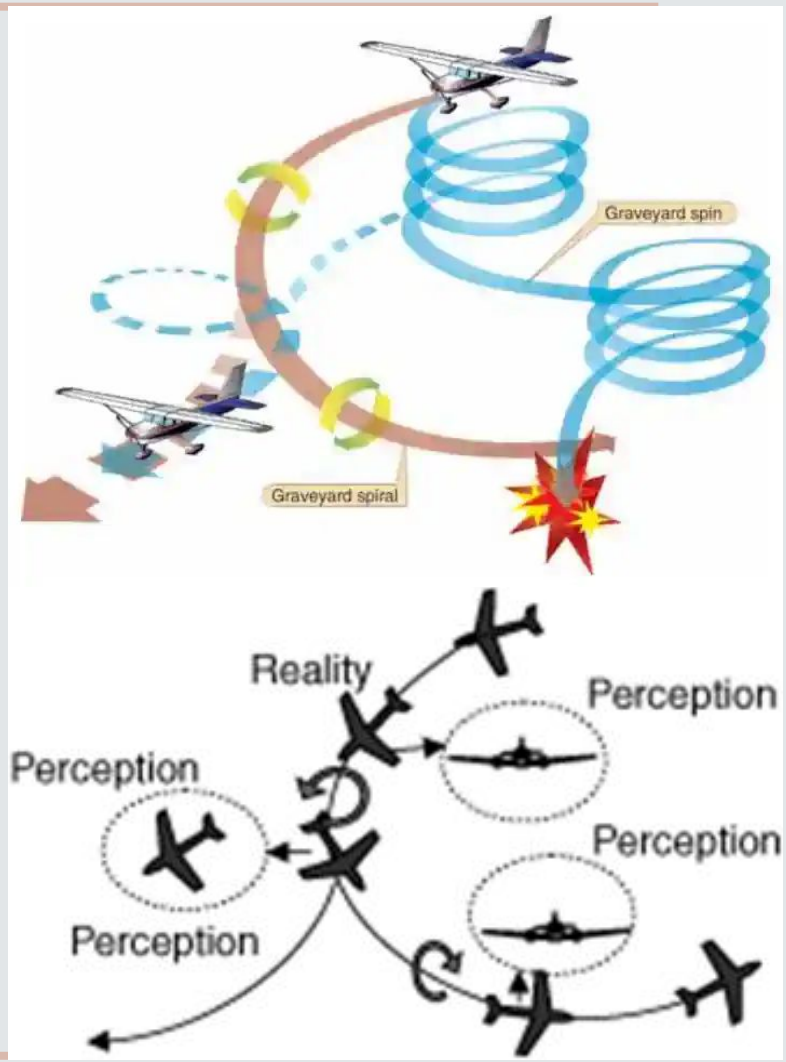
Caused by staring at a single point of light against a dark background for more than a few seconds. After a few moments, the light appears to move on its own. The disoriented pilot will lose control of the aircraft in attempting to align it with the light

Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

GRAVEYARD SPIN / SPIRAL

- A pilot in a prolonged coordinated, constant rate turn will have the illusion of not turning
- An observed loss of altitude during a coordinated constant-rate turn that has ceased stimulating the motion sensing system can create the illusion of being in a descent with the wings level
- During the recovery to level flight, the pilot will experience the sensation of turning in the opposite direction (leans).

Spin Recovery: PARE – Power Idle, Aileron's Neutral, Rudder Opposite, Elevator Forward

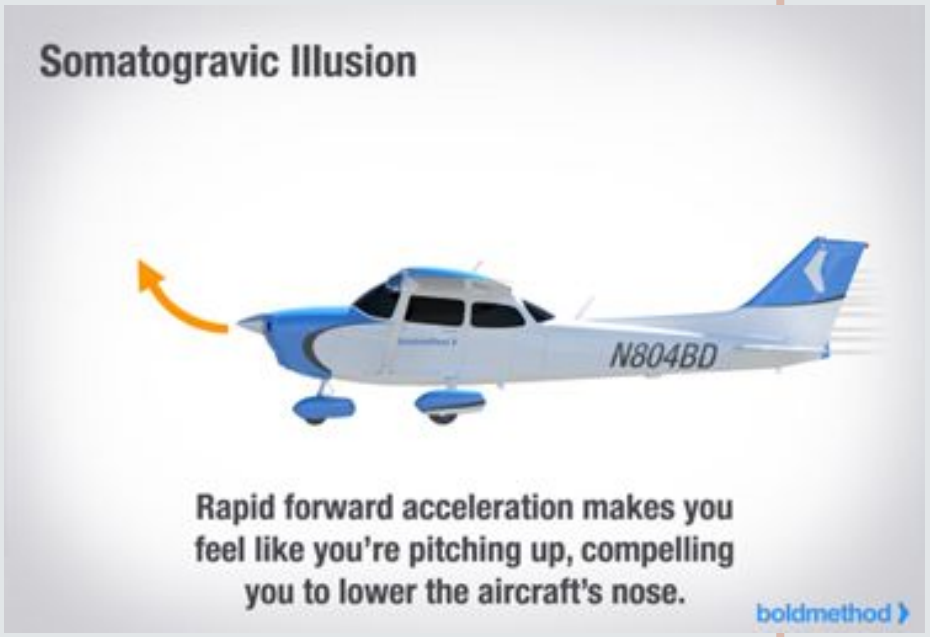


Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

SOMATOGRAVIC ILLUSION

A rapid acceleration, like during takeoff, stimulates the otolith organs in the same way as tilting the head backward. This action creates the illusion of being in a nose-up attitude, especially in situations without good visual references – night. The disoriented pilot may push the aircraft into a nose-low or dive attitude

A rapid deceleration by quick reduction of the throttle(s) can have the opposite effect, with the disoriented pilot pulling the aircraft into a nose-up or stall attitude



Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

BLACK HOLE

A nighttime aviation landing illusion that occurs when only the runway is visible to pilots. With this illusion, pilots overestimate their descent angle, which causes them to overestimate their height, compensate by flying lower, and crash into the ground.

Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

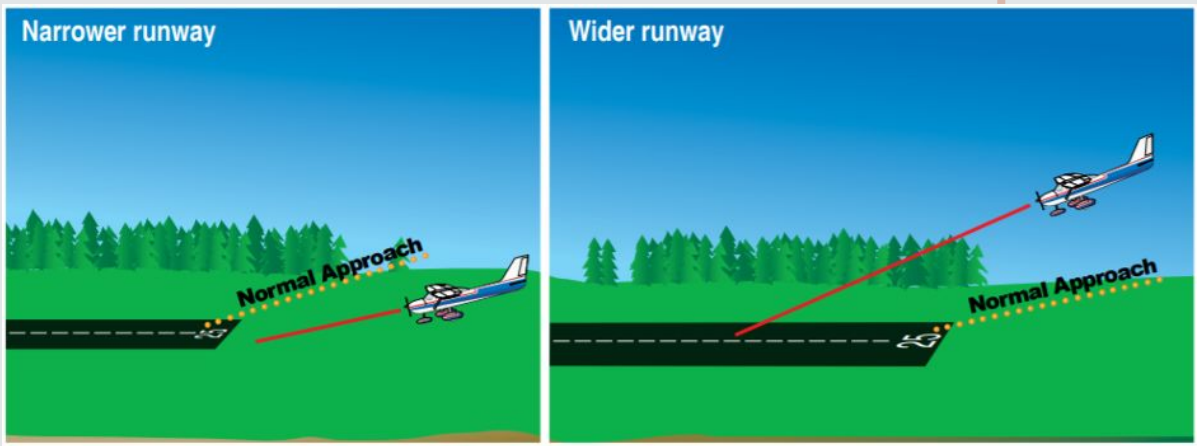
FEATURELESS TERRAIN
(AKA DAYTIME BLACK HOLE)

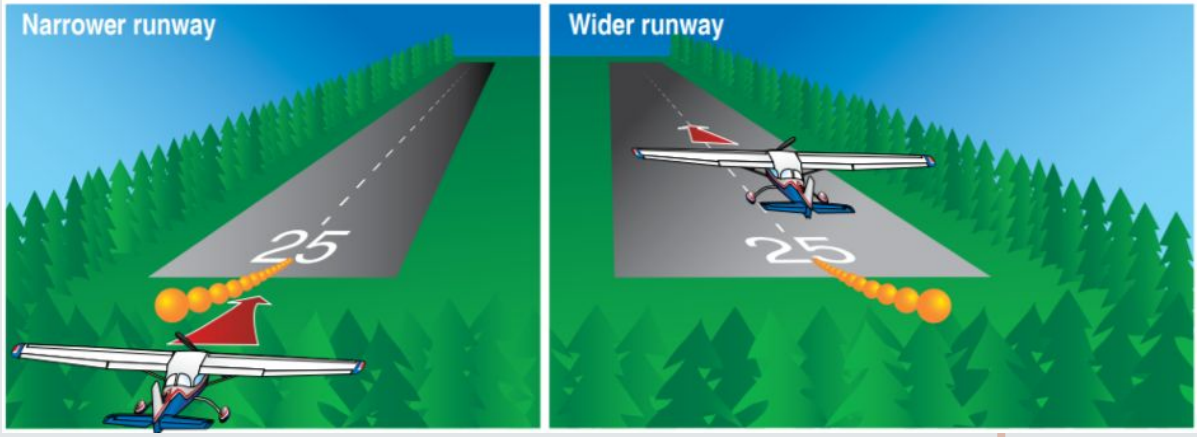
Flight over featureless terrain (such as still water, smooth snow, etc.) creates an illusion of being higher than the actual altitude.

Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

RUNWAY WIDTH ILLUSIONS

A narrower than usual runway can cause the appearance of being above glideslope, causing the pilot to fly excessively low on approach.

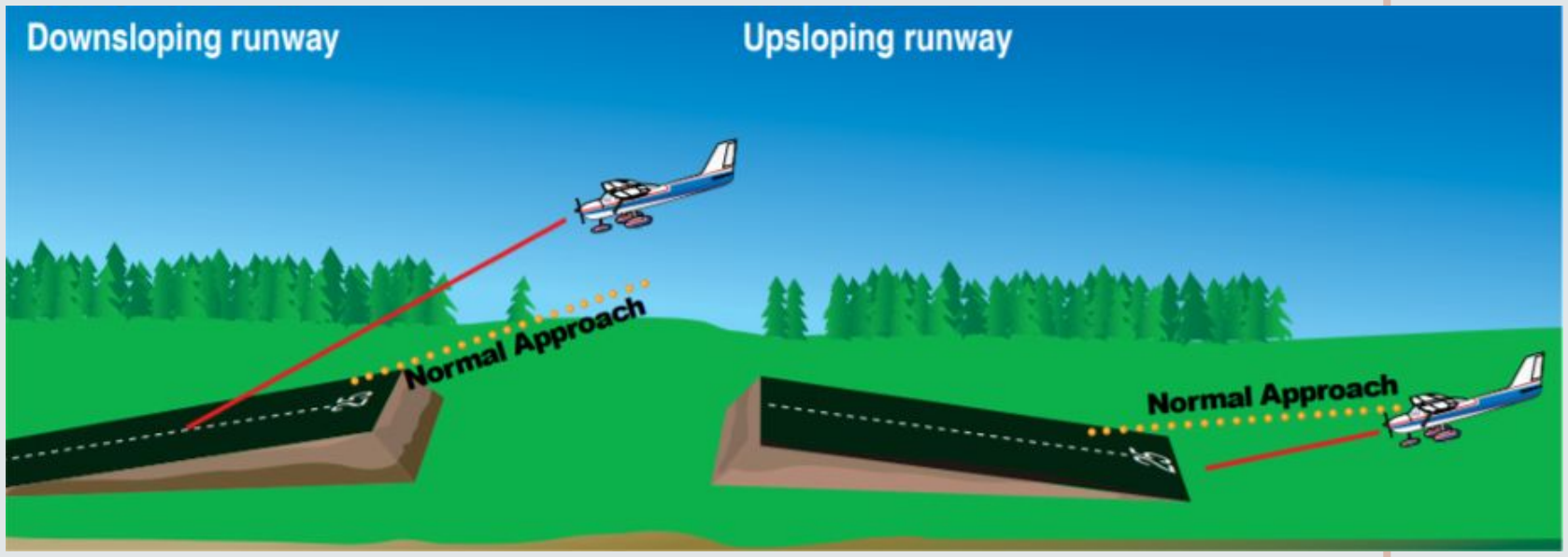




Antidote: Trust your instruments. Maintain your instrument scan. Utilize NAVAIDS

RUNWAY SLOPE ILLUSIONS

An upsloping runway creates the illusion of being higher than normal, and vice-versa.



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