



***VIRGINIA FLIGHT SCHOOL SAFETY ARTICLE – NO 07/08***

**SAFETY QUIZ - PHYSIOLOGY**

**1. Humans use three sensory systems for spatial orientation. They are the \_\_\_\_.**

- Visual, skeletal, and somatosensory systems
- Visual, muscular, and vestibular systems
- Visual, vestibular, and somatosensory systems

**2. Fatigue can negatively affect pilot performance.**

- True
- False

**3. \_\_\_\_\_ describes a state of oxygen deficiency in the body.**

- Hyperventilation
- Hypoxia
- Hemolysis
- Assimilation

**4. Which items can render the body more susceptible to hypoxia?**

- Alcohol (beer, wine, etc.)
- Antihistamines (allergy medications: Benadryl, Actifed, etc.)
- Sedatives (medications with calming effects: sleeping pills, Valium, etc.)
- Analgesics (pain and fever reducers: aspirin, acetaminophen, ibuprofen, etc.)

5. Above what cabin pressure altitude is the flight crew required to be on oxygen at all times?

- 12,000 feet msl
- 12,500 feet msl
- 14,000 feet msl
- 15,000 feet msl

6. The AIM recommends not flying for at least 24 hours after a scuba dive, except if the flight is \_\_\_\_\_.

- Up to 8,000 feet msl after a dive not requiring a controlled ascent
- Above 8,000 feet msl after a dive not requiring a controlled ascent
- Up to 8,000 feet msl after a dive requiring a controlled ascent
- Above 8,000 feet msl after a dive requiring a controlled ascent

7. A passenger looks pale and clammy and is having muscle spasms; he or she is most likely suffering from \_\_\_\_\_.

- Hypoxia
- Hyperventilation
- Fatigue
- Dehydration

8. A pilot's night vision can be impaired by \_\_\_\_\_.

- Cabin pressure altitudes above 5,000 feet
- Carbon monoxide
- Deficiency of vitamin A
- Prolonged exposure to sunlight
- All of the above

9. The first noticeable effect of \_\_\_\_\_ is fatigue, followed by dizziness, weakness, nausea, tingling of hands and feet, and abdominal cramps.

- Hypemic Hypoxia
- Hypoxic Hypoxia
- Dehydration
- Hypertension

10. Smoking can make a person more susceptible to carbon monoxide poisoning.

- True
- False

ANSWERS ON NEXT PAGES

Humans use three sensory systems for spatial orientation. They are the \_\_\_\_.

- Visual, skeletal, and somatosensory systems
- Visual, muscular, and vestibular systems
- Visual, vestibular, and somatosensory systems

The visual, vestibular, and somatosensory systems are used for spatial orientation. The visual system is relied upon the most for orientation. Both the vestibular (the semicircular canals in the inner ear) and somatosensory (the combination of nerves in the skin, muscles, and joints) systems provide additional information to the brain.

When there are no visual references, the vestibular and somatosensory systems can quickly get even an experienced pilot into an unusual attitude. In conditions of reduced visibility—whether due to night or weather—use the instruments for reference.

2. Fatigue can negatively affect pilot performance.

- True

Fatigue slows reaction times, decreases performance and judgment, and often is not noticed until serious errors are made. According to the *Instrument Flying Handbook*, fatigue can be categorized into two groups: physical fatigue and mental fatigue. "Physical fatigue can result from sleep loss, exercise, or physical work. Factors such as stress and prolonged performance of cognitive work can result in mental fatigue."

Normal, everyday fatigue is known as *acute*, or short-term, fatigue. Acute fatigue is treated by sufficient amounts of sleep (about 8 hours), exercise, and a good diet. If not addressed, prolonged acute fatigue may result in *chronic*, or long-term, fatigue.

\_\_\_\_\_ describes a state of oxygen deficiency in the body.

Hyperventilation

Hypoxia

Hypoxia is a state of oxygen deficiency in the body. The same amount of oxygen exists at higher altitudes, but at a reduced barometric pressure. This makes it difficult for the oxygen to get into the lungs. Although the percentage of oxygen in the atmosphere remains constant (approximately 21 percent), the partial pressure of oxygen decreases proportionately as atmospheric pressure decreases, making fewer molecules available at the pressure required for them to pass between the membranes in the respiratory system.

Hemolysis

Assimilation

4. Which items can render the body more susceptible to hypoxia?

Alcohol (beer, wine, etc.)

Antihistamines (allergy medications: Benadryl, Actifed, etc.)

Sedatives (medications with calming effects: sleeping pills, Valium, etc.)

Analgesics (pain and fever reducers: aspirin, acetaminophen, ibuprofen, etc.)

All of the above

All of these items can render a pilot susceptible to hypoxia. Because of the varying effects that medications and alcohol have on body chemistry, the ability to make efficient use of available oxygen is reduced.

5. Above what cabin pressure altitude is the flight crew required to be on oxygen at all times?

12,000 feet msl

12,500 feet msl

14,000 feet msl

FAR 91.211 states at cabin pressure altitudes above 14,000 feet msl, the required minimum flight crew must be provided with, and use, supplemental oxygen during the entire flight time. Remember: The fact that it's legal doesn't mean it's safe. AIM 8-2-1 recommends the use of supplemental oxygen above 10,000 feet msl during the day and 5,000 feet msl at night.

15,000 feet msl



6. The AIM recommends not flying for at least 24 hours after a scuba dive, except if the flight is \_\_\_\_\_.

Up to 8,000 feet msl after a dive not requiring a controlled ascent

AIM 8-1-2(d) recommends that there should be at least a 12-hour wait period between a scuba dive that did not require a controlled ascent and a flight below 8,000 feet msl.

A 24-hour wait period is recommended after a dive that requires a controlled ascent, or if the flight is above 8,000 feet. This wait period is designed to allow all of the excess nitrogen that was dissolved in the body during the dive to leave the body. If the nitrogen is released too fast, which can result from a fast ascent in the scuba dive or flying at a high altitude, the rapid decrease in pressure can form bubbles in the blood and body tissues, known as the bends. Severe cases of the bends can result in paralysis or even death.

- Above 8,000 feet msl after a dive not requiring a controlled ascent
- Up to 8,000 feet msl after a dive requiring a controlled ascent
- Above 8,000 feet msl after a dive requiring a controlled ascent

7. A passenger looks pale and clammy and is having muscle spasms; he or she is most likely suffering from \_\_\_\_\_.

Hypoxia

Hyperventilation

According to the *Instrument Flying Handbook*, "hyperventilation may produce a pale, clammy appearance and muscle spasms compared to the cyanosis [blue fingernails and lips] and limp muscles [muscles that are not trembling or shaking] associated with hypoxia." Since most of the symptoms of hyperventilation and hypoxia are similar, and the mistreatment of one can further agitate the other, it is important to correctly identify the condition.

It is possible to suffer from both hypoxia and hyperventilation at the same time; thus, Cessna Aircraft Company recommends that if the symptoms are experienced while using oxygen, the oxygen system should be checked first before treating for hyperventilation.

- Fatigue
- Dehydration

8. A pilot's night vision can be impaired by \_\_\_\_\_.

- Cabin pressure altitudes above 5,000 feet
- Carbon monoxide
- Deficiency of vitamin A
- Prolonged exposure to sunlight
- ✓  All of the above

AIM 8-1-6 states "dark adaptation is impaired by exposure to cabin pressure altitudes above 5,000 feet, carbon monoxide inhaled in smoking and from exhaust fumes, deficiency of vitamin A in the diet, and by prolonged exposure to bright sunlight."

9. The first noticeable effect of \_\_\_\_\_ is fatigue, followed by dizziness, weakness, nausea, tingling of hands and feet, and abdominal cramps.

- Hypemic Hypoxia
- Hypoxic Hypoxia
- ✓  Dehydration

According to the *Instrument Flying Handbook*, "**the first noticeable effect of dehydration is fatigue.**" Extended periods of flight on hot days, or at high altitudes, makes passengers in an airplane more susceptible to dehydration. This is because the low humidity (dry air) increases the water consumption and expiration from the body. If dehydration is not treated by replenishing the body with more the water, "...fatigue progresses to dizziness, weakness, nausea, tingling of hands and feet, abdominal cramps, and extreme thirst."

- Hypertension

10. Smoking can make a person more susceptible to carbon monoxide poisoning.

- ✓  True

Carbon monoxide (CO) is the toxic, colorless, and odorless byproduct of incomplete combustion. CO attaches to blood molecules in the place of oxygen, thus disrupting the transportation of fresh oxygen throughout the body. When carbon monoxide and blood molecules combine, they form carboxyhemoglobin.

Typically, nonsmokers have carboxyhemoglobin level under three percent, while smokers have up to a ten percent carboxyhemoglobin level, making them more susceptible to CO poisoning than nonsmokers. A 20 percent carboxyhemoglobin level is known to impair a pilot's ability to fly by causing dizziness, headaches, mental confusion, and nausea.