



JACK STELTER
HELICOPTER PILOT EDUCATIONAL BLOG

JS1707: Helicopter Aerodynamics

Students: This quiz tests your knowledge of basic aerodynamic concepts as they apply to helicopters. Circle the correct answer.

Instructors: The answer key is on a separate page, complete with references for each answer to use in scoring and reviewing the student's responses.

1. _____ is produced when a mass of air is deflected, and it always acts perpendicular to the resultant relative wind.
 - a. Thrust
 - b. Weight
 - c. Lift
 - d. Drag

2. As air flows through a venturi constriction, static pressure _____ as velocity _____.
 - a. decreases; decreases
 - b. decreases; increases
 - c. increases; increases
 - d. none of the above

3. For every action there is an equal and opposite reaction. This is _____.
 - a. Venturi Effect
 - b. Bernoulli's Principle
 - c. Hall Effect
 - d. Newton's Third Law of Motion

4. The G-load factor at _____ of bank is twice that of level flight.
 - a. 60 degrees
 - b. 45 degrees
 - c. 30 degrees
 - d. 15 degrees

5. Which of the following is not a type of drag?
- Parasite
 - Profile
 - Induced
 - Produced
6. On an airfoil cross-section, a straight line intersecting the leading and trailing edges of the airfoil is called the _____.
- mean camber line
 - chord line
 - blade span
 - None of the above
7. The airflow relative to an airfoil, created by movement of an airfoil through the air, is called _____.
- resultant relative wind
 - relative wind
 - angle of attack
 - induced flow
8. The _____ caused by the downward flow of air through the rotor disk modifies relative wind to create _____.
- induced flow; resultant relative wind
 - induced drag; resultant relative wind
 - produced flow; angle of attack
 - induced flow; angle of attack
9. The rotational speed of a main rotor disk is _____ inboard than outboard.
- faster
 - slower
 - no different
 - None of the above
10. To provide equal lift across the rotor disk, the inboard portion of the blade is twisted to a(an) _____ pitch angle than the outboard portion.
- equal
 - lower
 - higher
 - None of the above

- 11. As relative wind is reduced, the required angle of attack _____ to maintain the same amount of lift.**
- remains the same
 - decreases
 - increases
 - None of the above
- 12. The increased efficiency of the rotor system caused by interference of the airflow when near the ground is called _____.**
- venturi effect
 - induced flow
 - hover effect
 - ground effect
- 13. While hovering a helicopter with a single main rotor, the aircraft tends to drift in the direction of tail rotor thrust if uncorrected. This is called _____.**
- Translational Lift
 - Effective Translational Lift
 - Translating Tendency
 - Pendular Action
- 14. Due to pendular action, which of the following is a hazard of reward flight?**
- Settling with power
 - Tail strike
 - Loss of tail rotor effectiveness
 - None of the above
- 15. _____ is the unequal lift between the advancing and retreating halves of the rotor disk, which is caused by the different velocities of wind flow across each half.**
- Effective Translational Lift
 - Loss of Tail Rotor Effectiveness
 - Settling with Power
 - Dissymmetry of lift
- 16. To correct the condition defined in question 15, the rotor blades are allowed to individually _____ on the advancing side and _____ on the retreating side.**
- flap up; flap down
 - flap down; flap up
 - flap up; flap up
 - None of the above

17. Improved rotor efficiency resulting from directional flight is called _____.

- a. Effective translational lift
- b. Translating tendency
- c. Translational thrust
- d. Translational lift

18. Between approximately 16 and 24kts, the rotor system completely outruns the recirculation of old vortices and begins to work in relatively undisturbed air, effectively increasing angle of attack. This is called _____.

- a. Effective translational lift
- b. Translating tendency
- c. Translational thrust
- d. Translational lift

19. As the tail rotor begins to work more effectively in progressively less turbulent air as airspeed increases, _____ occurs.

- a. Effective translational lift
- b. Translating tendency
- c. Translational thrust
- d. Translational lift

20. In an autorotation, the region(s) of the rotor disk producing drag is/are the _____ region(s).

- a. Driven
- b. Driving
- c. Stalled
- d. A & C

ANSWER KEY:

All answers can be reviewed in Chapter 2 of the Helicopter Flying Handbook (FAA-H-8083-21A)

1. C.
2. B.
3. D.
4. A.
5. D.
6. B.
7. B.
8. A.
9. B.
10. C.
11. C.
12. D.
13. C.
14. B.
15. D.
16. A.
17. D.
18. A.
19. C.
20. D.

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