Quiz

02/09/2026

Aerodynamics of Lift

Question 1

Which basic flight maneuver increases the load factor on an airplane as compared to straight-and-level flight?

M+

- Climbs.
- Stalls.
- **Turns.**

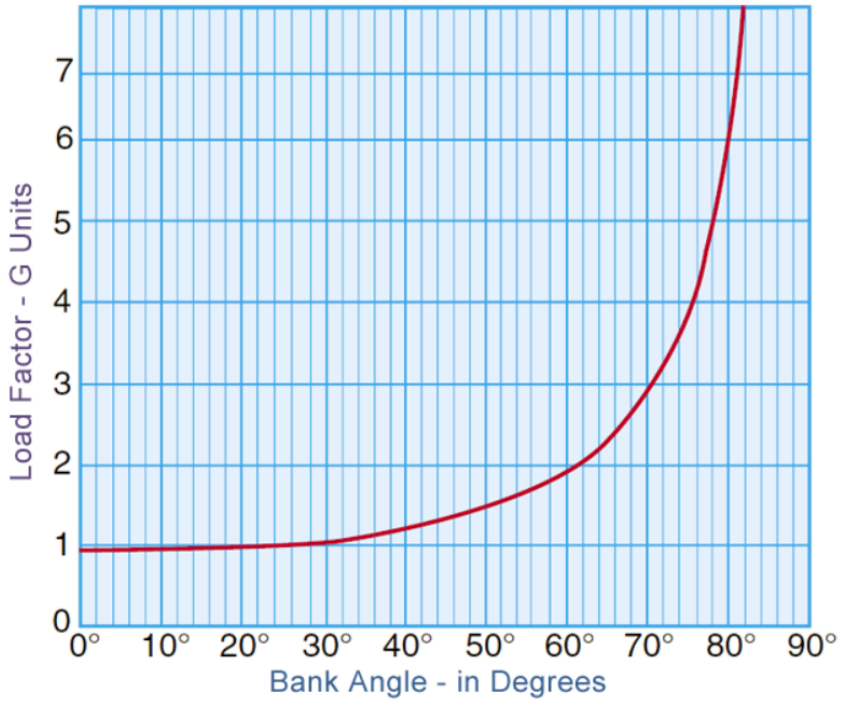
Question 1

Remember: load factor equals G-force. G force is an accelerative force, not a steady force.

You may recall from high school physics that an object traveling in a circular course (as a turn) is in a state of constant acceleration. ***Turns* increase the G-force; turns increase the load factor.**

Climbs are aerodynamically the same as straight as level flight as far as acceleration goes, so there is no increase in load factor (exception: you can feel changes in load factors with excessively rapid pitchups or pitchdowns, but turns is still the best answer). Stalls likewise do not increase the load factor.

Angle of Bank	Load Factor
0°	1
10°	1.015
30°	1.154
45°	1.414
60°	2
70°	2.923
80°	5.747
85°	11.473
90°	∞



Question 2

The greatest vortex strength occurs when the generating aircraft is

- heavy, dirty, and fast.
- heavy, clean, and slow.
- light, dirty, and fast.

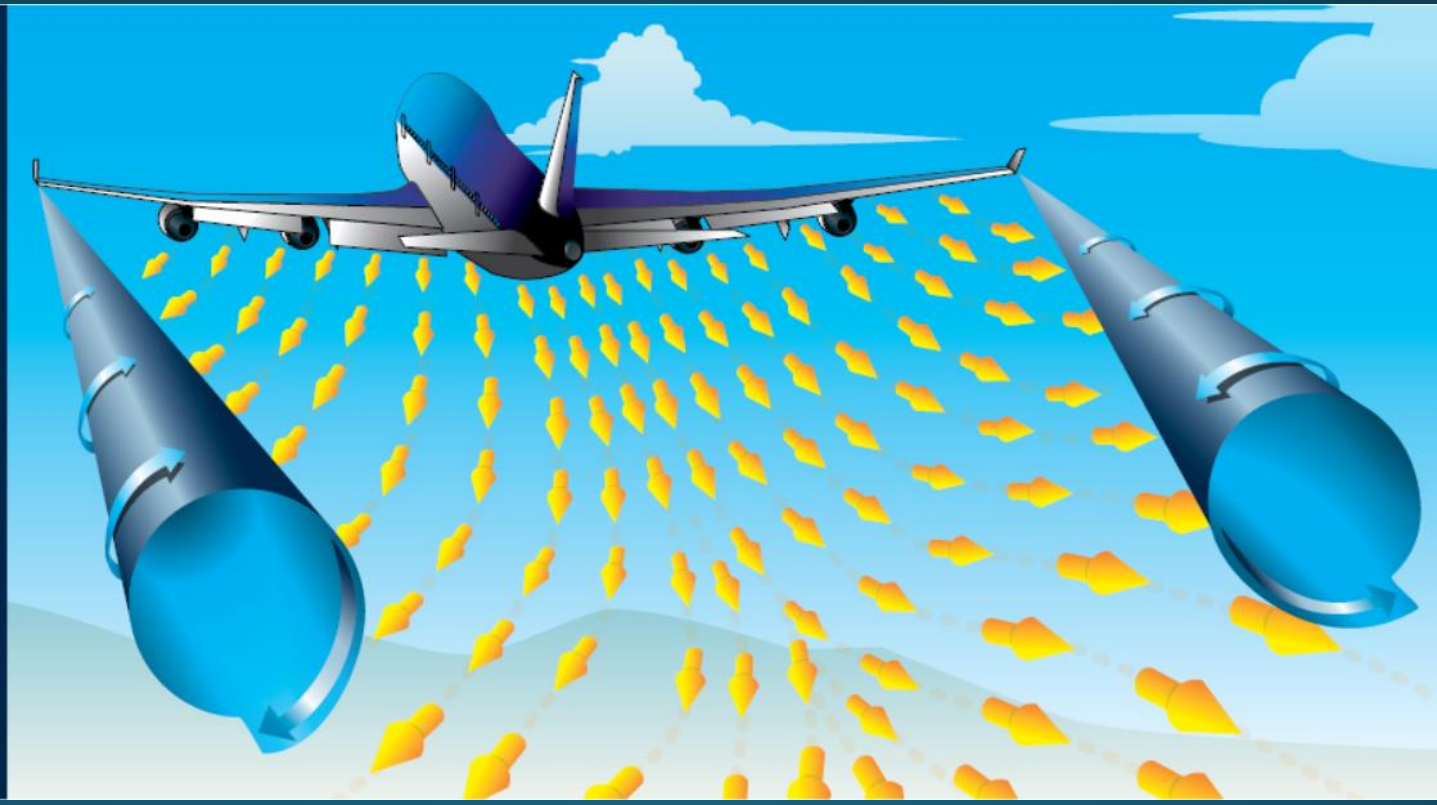
Question 2

The aircraft shown here is generating wake turbulence which is potentially hazardous to other aircraft.

This aircraft shown shows almost a 'worst case' scenario for wake turbulence generation as the aircraft is

HEAVY (it's a Boeing 747)
CLEAN (the gear are up, though the flaps are down)
SLOW (it appears to be taking off or on a go-around)

If the flaps were completely up, all else being the same, the aircraft would be aerodynamically even cleaner and thus would generate even more wake turbulence.

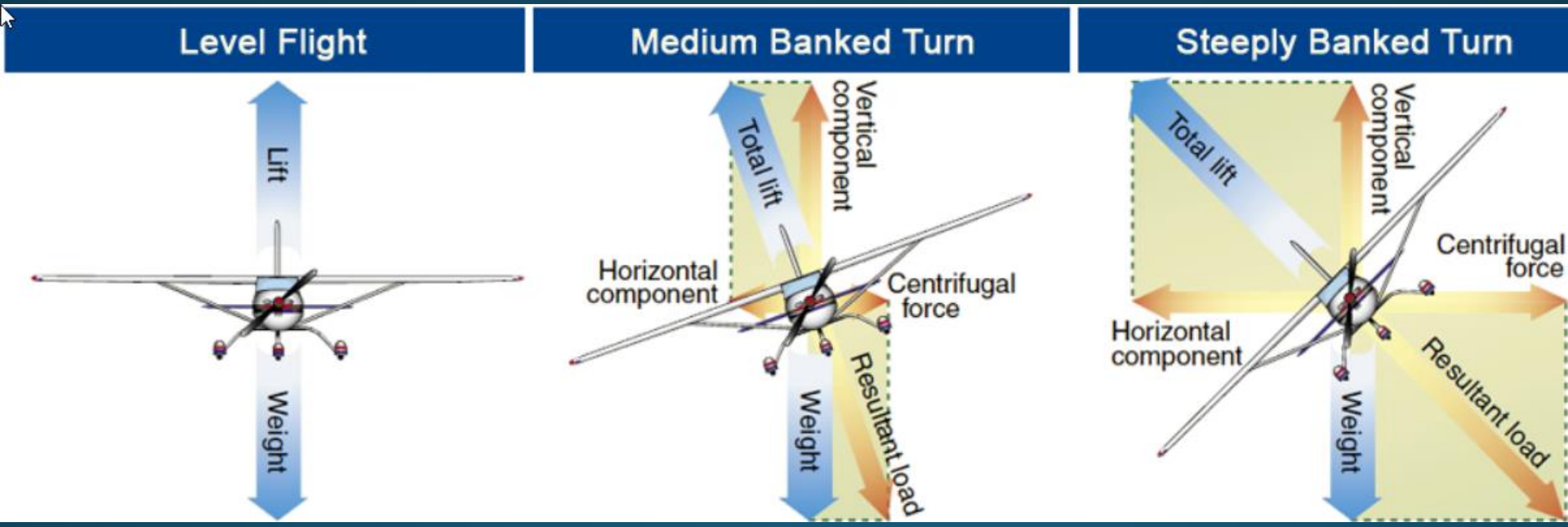


Question 3

What force makes an airplane turn?

- The vertical component of lift.
- Centrifugal force.
- **The horizontal component of lift.**

Question 3


Level Flight
Lift
Weight
Medium Banked Turn
Total lift
Vertical component
Horizontal component
Centrifugal force
Weight
Resultant load
Steeply Banked Turn
Total lift
Vertical component
Centrifugal force
Horizontal component
Weight
Resultant load

Question 4

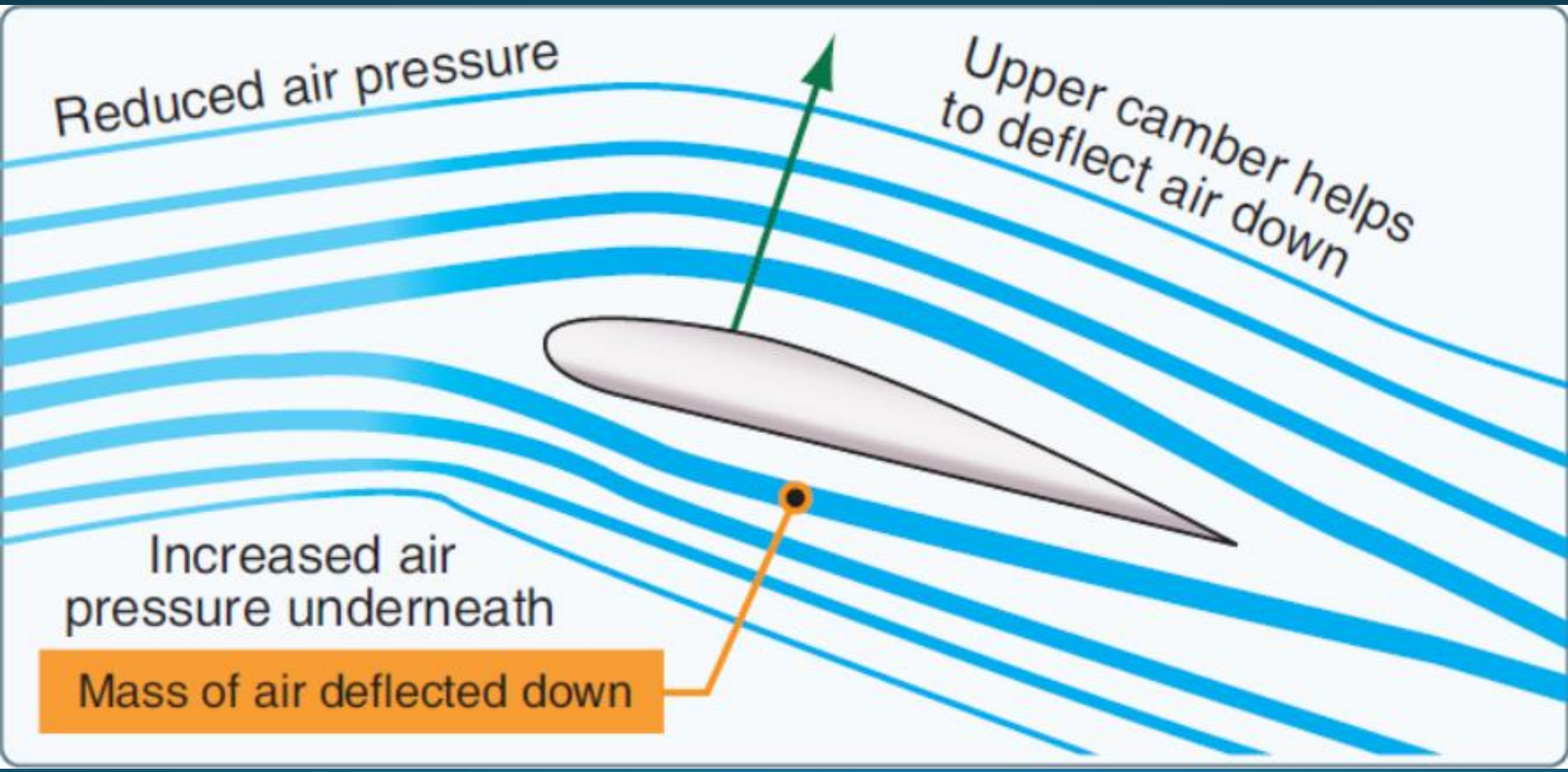
Which statement relates to Bernoulli's principle?

For every action there is an equal and opposite reaction.

An additional upward force is generated as the lower surface of the wing deflects air downward.

Air traveling faster over the curved upper surface of an airfoil causes lower pressure on the top surface.

Question 4

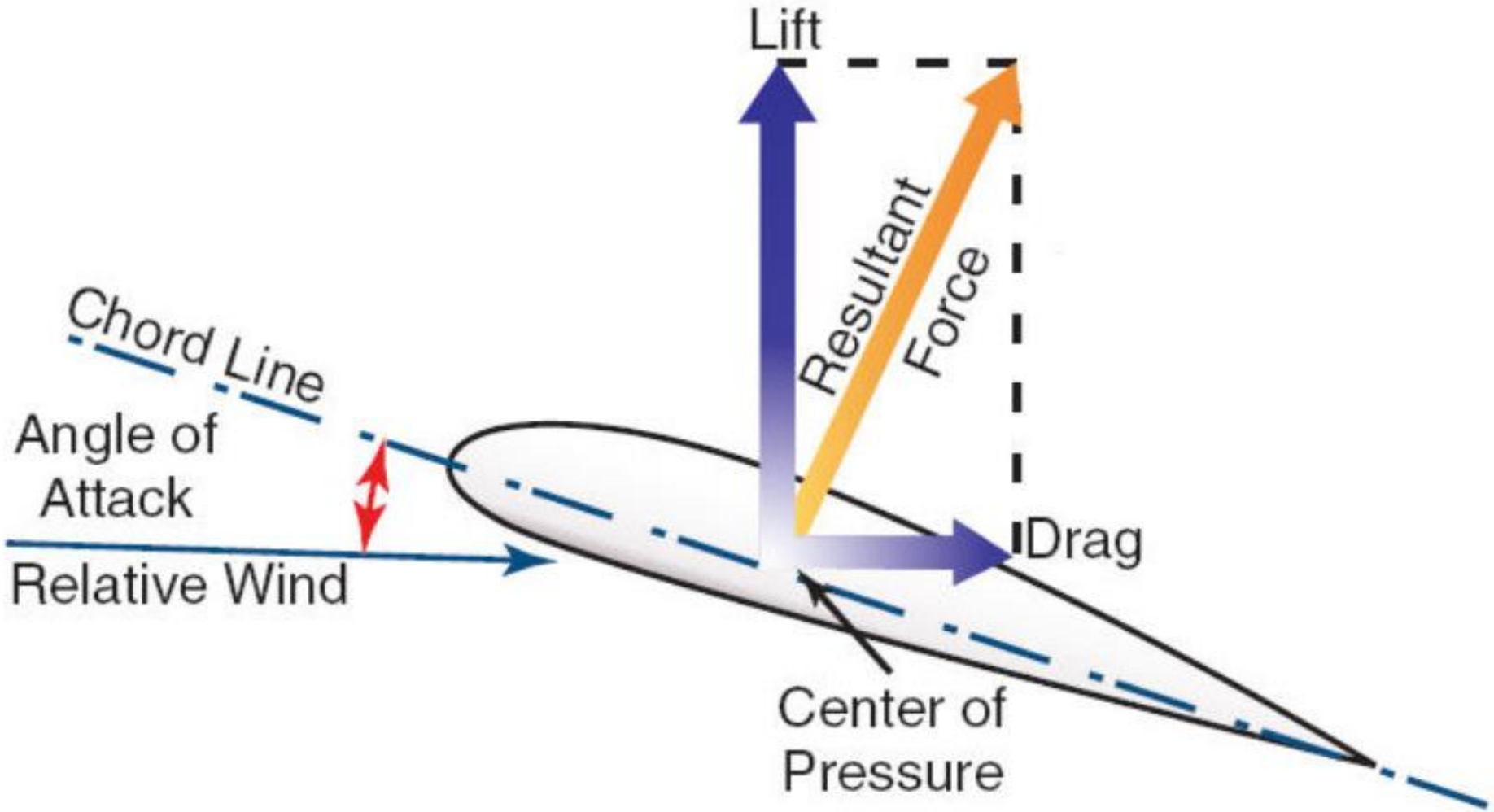

Reduced air pressure
Upper camber helps to deflect air down
Increased air pressure underneath
Mass of air deflected down

Question 5

Angle of attack is defined as the angle between the chord line of an airfoil and the

- pitch angle of an airfoil.
- direction of the relative wind.
- rotor plane of rotation.

Question 5


Lift
Resultant Force
Chord Line
Angle of Attack
Relative Wind
Drag
Center of Pressure

Question 6

What is the best indicator to the pilot of the load factor on the airplane?

How firmly the pilot is pressed into the seat during a maneuver.

Amount of pressure required to operate the controls.

Airspeed when pulling out of a descent.

Question 6

Since the leverage in the control system varies with different aircraft (some types employ "balanced" control surfaces while others do not), the pressure exerted by the pilot on the controls cannot be accepted as an index of the load factors produced in different aircraft. In most cases, load factors can be judged by the experienced pilot from the feel of seat pressure. Load factors can also be measured by an instrument called an "accelerometer," but this instrument is not common in general aviation training aircraft. The development of the ability to judge load factors from the feel of their effect on the body is important. A knowledge of these principles is essential to the development of the ability to estimate load factors.

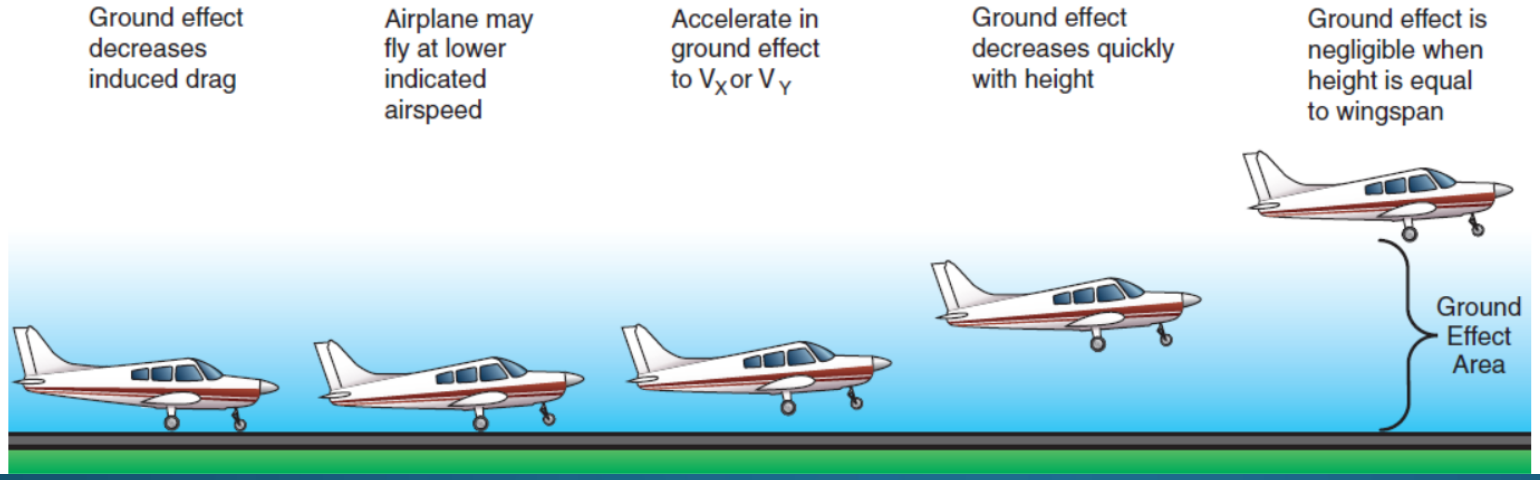
Question 7

Ground effect is most likely to result in which problem?

- Settling to the surface abruptly during landing.
- **Becoming airborne before reaching recommended takeoff speed.**
- Inability to get airborne even though airspeed is sufficient for normal takeoff needs.

Question 7

When an airplane is flown at approximately one wing span or less above the surface, the vertical component of airflow is restricted and modified, and changes occur in the normal pattern of the airflow around the wing and from the wingtips. This change alters the direction of the relative wind in a manner that produces a smaller angle of attack. This means that a wing operating in ground effect with a given angle of attack will generate less induced drag than a wing out of ground effect. Therefore, it is more efficient. While this may be useful in specific situations, it can also trap the unwary into expecting greater climb performance than the airplane is capable of sustaining. **In other words, an airplane can take off, and while in ground effect establish a climb angle and/or rate that cannot be maintained once the airplane reaches an altitude where ground effect can no longer influence performance.** Conversely, on a landing, ground effect may produce "floating," and result in overshooting, particularly at fast approach speeds.



Question 8

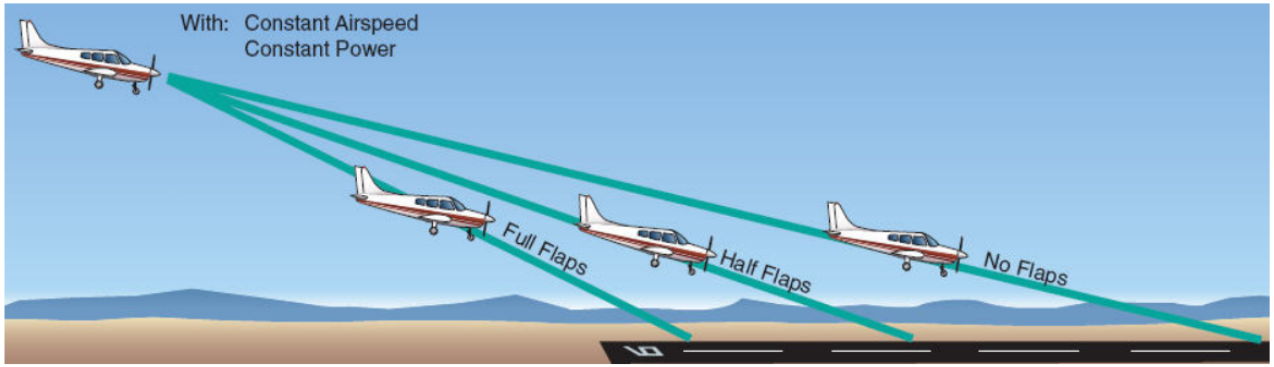
One of the main functions of flaps during approach and landing is to

- decrease the angle of descent without increasing the airspeed.
- increase the angle of descent without increasing the airspeed.
- permit a touchdown at a higher indicated airspeed.

Question 8

Wing flaps enable the pilot to make steeper approaches to a landing without increasing the airspeed. They do this, in part, by varying the effective chord of the wing--that imaginary line that goes from the frontmost part of the leading edge to the rearmost part of the trailing edge.

In general, Flaps are extended during an approach to a landing. Flaps increase, not decrease the angle of descent without increasing the airspeed. This allows touchdowns at a lower, not higher, airspeed ("indicated" is fairly irrelevant in that wrong answer).

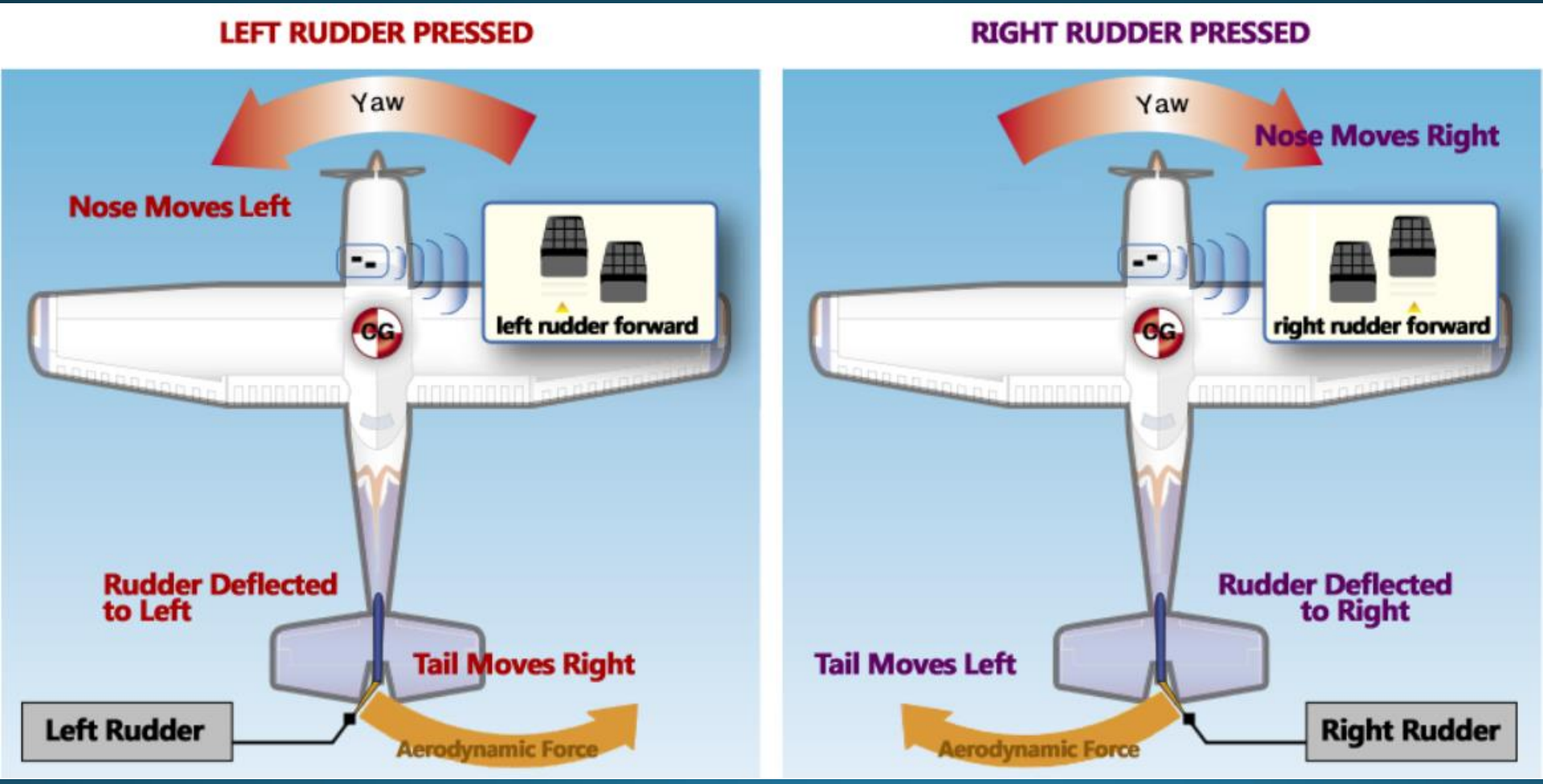


Question 9

What is the purpose of the rudder on an airplane?

- To control roll.
- To control overbanking tendency.
- **To control yaw.**

Question 9


LEFT RUDDER PRESSED
Yaw
Nose Moves Left
CG
left rudder forward
Rudder Deflected to Left
Tail Moves Right
Left Rudder
Aerodynamic Force
RIGHT RUDDER PRESSED
Yaw
Nose Moves Right
CG
right rudder forward
Rudder Deflected to Right
Tail Moves Left
Right Rudder
Aerodynamic Force