Principle of flight

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Basics, laws and definitions:

The term angle of attack in a two dimensional flow is defined as:

A) the angle between the wing chord line and the direction of the relative wind/airflow.
B) the angle formed by the longitudinal axis of the aeroplane and the chord line of the wing.
C) the angle between the aeroplane climb path and the horizon..
D) the angle for maximum lift/drag ratio.

the density change in the flow is less than:

A) 15%.
B) 1%.
C) 30%.
D) 5%.

The fineness ratio of an airfoil is:

A) thickness / chord ratio.
B) mean chord / thickness ratio.
C) thickness / span ratio.
D) mean camber chord ratio / thickness ratio.

Under what condition is indicated altitude the same as true altitude?

A) When at 18,000 feet MSL with the altimeter set at 29.92.
B) Never.
C) If the altimeter has no mechanical error.
D) At sea level in standard conditions (ISA).

The dynamic pressure increases proportionally with:

A) density and the square of the velocity.
B) velocity and density.
C) the static pressure.
D) velocity and the square of the density.

How is the thickness of an aerofoil section measured?

A) In metres.
B) Related to camber.
C) As the ratio of wing angle.
D) As the percentage of chord.

Which statement is correct about the Cl and angle of attack?

A) For a symmetric aerofoil, if angle of attack = 0, Cl =0.
B) For a symmetric aerofoil, if angle of attack = 0, Cl is not equal to 0.
C) For an asymmetric aerofoil, if angle of attack = 0, Cl =0.
D) For an asymmetric aerofoil with positive camber, if angle of attack is greater than 0, Cl = 0.

The maximum angle of attack for the flaps down configuration, compared to flaps up is:
A) smaller.
B) unchanged.
C) smaller or greater, depending on CG position.
D) greater.

In recovery from a spin:
A) ailerons should be kept neutral.
B) airspeed increases.
C) ailerons used to stop the spin.
D) rudder and ailerons used against the direction of spin rotation.

What is the SI unit that results from multiplying kg and m/s2?
A) Psi.
B) Watt.
C) Joule.
D) Newton.

Compared to a cambered airfoil, the zero lift angle of attack of a symmetrical airfoil is:
A) higher.
B) depending on airspeed.
C) the same.
D) lower.

The correct drag formula is:
A) D = CD 1/2 RHO V S
B) D = CD 2 RHO V2 S
C) D = CD 1/2 1/RHO V2 S
D) D = CD 1/2 RHO V2 S

Mean chord is equal to:
A) wing area divided by wing span.
B) (tip chord + root chord) / 2.
C) mean aerodynamic chord.
D) wing span divided by wing area.

The load factor n is:
A) always equal to 1.
B) smaller, equal to or larger than 1, depending on the manoeuvre.
C) always larger than 1.
D) always smaller than 1.

A wing has a span of 50 feet and an area of 200 square feet. Its mean chord would be:
A) 2.5 feet
B) 4 feet.
C) 7.5 feet
D) 10 feet.

Bernoulli' s equation states that:

A) dynamic pressure equals stagnation pressure.
B) the sum of centre of pressure and dynamic pressure is total pressure.
C) static pressure equals stagnation pressure.
D) the sum of static pressure and dynamic pressure is equal to stagnation pressure.

If temperature in a gas is kept constant and pressure increases, the density:

A) decreases.
B) Nove of the above - it depends on the type of gas.
C) remains constant.
D) increases.

Which of the following statements, about a venturi in a sub-sonic airflow are correct?

1. the dynamic pressure in the undisturbed flow and in the throat are equal.
2. the total pressure in the undisturbed flow and in the throat are equal.

A) 1 is correct and 2 is incorrect.
B) 1 is incorrect and 2 is correct.
C) 1 and 2 are correct.
D) 1 and 2 are incorrect.

The units of the density of the air (I) and the force (II) are:

A) w(I) kg / m?, (II) kg.
B) w(I) kg / m3, (II) N.
C) w(I) N / kg, (II) kg
D) w(I) N / m3, (II) N.

The term angle of attack is defined as the angle:

A) between the wing chord line and the relative wind.
B) between the wing chord line and the local horizon.
C) formed by the longitudinal axis of the airplane and the chord line of the wing.
D) between the airplanes climb angle and the horizon.

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21. Lift is a function of:

A) velocity, wing area, CL and density.
B) velocity, density, wing shape and lift coefficient.
C) velocity, density, gross wing area and CD.
D) velocity, wing shape, wing area and CL.

Considering a positive cambered aerofoil, the pitch moment when Cl=0 is:

A) negative (pitch-down).
B) infinite.
C) positive (pitch-up).
D) equal to zero.

The unit of density is:
A) Bar
B) kg/cm
C) psi
D) kg/ml

Which of the following expressions could represent the relationship between force, mass and acceleration:
A) a = F x m
B) a = m / F
C) m = F x a
D) F = m x a

The angle of attack of a wing profile is defined as the angle between:
A) the local airflow and the mean camber line.
B) the local airflow and the chord line.
C) the undisturbed airflow and the mean camber line.
D) the undisturbed airflow and the chord line.

Where does the lift act on the wing?
A) Suction.
B) Centre of Gravity.
C) Centre of Pressure.
D) Always forward of the CG.

If the IAS is increased by a factor of 4, by what factor would the drag increase?
A) 12
B) 4
C) 16
D) 8

The (subsonic) static pressure:
A) is the total pressure plus the dynamic pressure.
B) decreases in a flow in a tube when the diameter decreases.
C) is the pressure in a point at which the velocity has become zero.
D) increases in a flow in a tube when the diameter decreases.

The wing area divided by the span of a wing is called:
A) fineness ratio.
B) mean cord.
C) aspect ratio.
D) wash out.

The lateral axis is also called the:
A) pitch axis.
B) normal axis.
C) roll axis.
D) horizontal axis.

Which of the following wing planform gives the highest local lift coefficient at the wing root?

A) Tapered.
B) Positive angle of sweep.
C) Elliptical.
D) Rectangular.

Pitch angle is defined as:

A) the angle between the lower wing surface and the relative airflow.
B) the angle between the longitudinal axis of the aircraft and the local horizon.
C) the angle between the chord line and the free stream flow velocity.
D) the angle between the chord line and the relative airflow.

Compared to a wing at sea level at 200kt TAS, a wing at 40,000ft at 400kt TAS and the same angle of attack will have:

A) the same lift.
B) twice the lift.
C) four times the lift.
D) 1.4 times the lift.

What is the effect of deploying trailing edge flaps?

A) Increased glide range.
B) Increased minimum glide angle.
C) Decreased minimum glide angle.
D) Decreased sink rate.

Lift is the component of the total aerodynamic force which is:

A) parallel to the free stream airflow.
B) perpendicular to the longitudinal axis of the aircraft.
C) parallel to the longitudinal axis of the aircraft.
D) perpendicular to the free stream airflow.

Which one of the following statements about the lift-to-drag ratio in straight and level flight is correct?

A) The highest value of the lift/drag ratio is reached when the lift is equal to, the aircraft weight.
B) At the highest value of the lift/drag ratio the total drag is lowest.
C) The highest value of the lift/drag ratio is reached when the lift is zero.
D) The lift/drag ratio always increases as the lift decreases.

The Principle of Continuity states that in a Stream tube of decreasing cross-sectional area, the speed of a subsonic and incompressible airflow will:

A) remain the same.
B) increase.
C) sonic.
D) decrease.

When the stick is moved forward, the stabilizer lift?
A) always remains the same.
B) usually remains the same.
C) increases.
D) decreases.

What are the correct SI units for density and force?
A) Kg/m3, Kg
B) N/m3, Kg
C) Kg/m3, Newton
D) Kg/N, Nm3

If the weight an aircraft is increased, the maximum lift/drag ratio will:
A) decrease.
B) increase.
C) increase although the aircraft will have to be flown more slowly.
D) not be affected.

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41. The following unit of measurement kgm/s^2 is expressed in the SI-system as:
A) Pascal.
B) Newton.
C) Watt.
D) Joule.

In accordance with Bernoulli' s Theorem, where PT = Total Pressure, PS = Static pressure and q = Dynamic pressure:
A) PT - PS = q
B) PS + PT = q
C) PT + PS = q
D) PT = PS - q

The units of wing loading (I) W / S and (II) dynamic pressure q are:
A) (I) N / m?, (II) N / m?.
B) (I) N / m3, (II) kg / m?.
C) (I) N / m, (II) kg.
D) (I) kg / m, (II) N / m?.

Aspect ratio is defined as:
A) span squared / wing area.
B) wing span / mean chord.
C) wing span / mean camber.
D) mean chord / wing area.

The SI unit of energy is:
A) Joule.
B) BTU.
C) Ampere.
D) Watt.

Bernoulli' s theorem states that in a perfect and constant airstream?

A) The sum of static and dynamic pressure is constant.
B) The dynamic pressure is always greater than the static pressure.
C) The dynamic pressure is equal to the static pressure.
D) The sum of dynamic pressure and total pressure is constant.

As a smooth flow of subsonic air at a velocity less than M0.4 flows through a divergent duct:

i. static pressure
ii. velocity

A) (i) decreases and (ii) increases
B) (i) increases and (ii) increases
C) (i) decreases and (ii) decreases
D) (i) increases and (ii) decreases

A line connecting the leading- and trailing edge midway between the upper and lower surface of a aerofoil. This definition is applicable for:

A) the upper camber line.
B) the mean aerodynamic chord line.
C) the camber line.
D) the chord line.

What is the CL and CD ratio at normal angles of attack?

A) CD higher.
B) CL higher.
C) The same.
D) CL much higher.

At a given CAS an aircraft flying below sea level will have:

A) the same TAS as at sea level.
B) a lower TAS than at sea level.
C) the same TAS as at sea level but an increased IAS.
D) a higher TAS than at sea level.

The term angle of attack is defined as:

A) the angle between the wing chord line and the relative wind.
B) the angle between the relative airflow and the horizontal axis.
C) the angle between the wing and tailplane incidence.
D) the angle that determines the magnitude of the lift force.

If a pilot changes the altimeter setting from 30.11 Hg to 29.96 Hg, what will be the approximate change in indication?

A) Depends on the outside temperature.
B) Altimeter will indicate .15 Hg higher.
C) Altimeter will indicate 150 feet higher.
D) Altimeter will indicate 150 feet lower.

The resistance, or skin friction, due to the viscosity of the air as it passes along the surface of the wing is part of the:

A) induced drag.
B) parasite drag
C) form drag.
D) interference drag.

The true airspeed (TAS) is:

A) lower than the indicated airspeed (IAS) at ISA conditions and altitudes below sea level.
B) lower than the speed of the undisturbed airstream about the aeroplane.
C) higher than the speed of the undisturbed airstream about the aeroplane.
D) equal to the IAS, multiplied by the air density at sea level.

What phenomena causes induced drag?

A) The span wise flow, inward below the wing and outward above.
B) Wing tanks.
C) The increased pressure at the leading edge.
D) Wing tip vortices.

The Cl - alpha curve of a positive cambered aerofoil intersects with the vertical axis of the Cl - alpha graph:

A) in the origin.
B) nowhere.
C) above the origin.
D) below the origin.

In straight and level flight the center of pressure is behind the center of gravity. With the resultant force from the elevators and tailplane action to maintain straight and level flight, the force would be action:

A) downward.
B) horizontally.
C) upward.
D) in a direction depending on the thrust/drag couple.

The angle between the airflow (relative wind) and the chord line of an aerofoil is:

A) glide path angle.
B) same as the angle between chord line and fuselage axis.
C) climb path angle.
D) angle of attack.

In subsonic flight, which is correct for VMD?

A) CL and CD are minimum.
B) Parasite drag greater than induced drag.
C) Best endurance speed for a piston engine.
D) Best glide range achieved.

Which formula or equation describes the relationship between force (F), acceleration (a) and mass (m)?

A) F = m.a
B) a = F.m
C) m = F.a
D) F = m/a

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61. Which of the following expressions is correct (F=force; m=mass, a=acceleration):

A) F = M x A
B) A = F x M
C) M = F x A
D) A = M / F

Which of the following is the correct formula for drag?

A) 1/2 RHO V2 CD S
B) 1/2 RHO V (CL)2 S
C) 1/2 RHO V2 AR CD S
D) 1/2 RHO V2 CL S

The direction of drag is:

A) parallel to longitudinal axis of the aircraft.
B) perpendicular to the free stream airflow.
C) parallel to the free stream airflow.
D) perpendicular to the longitudinal axis of the aircraft.

Which of the following would tend to increase the density altitude at a given airport?

A) A decrease in relative humidity.
B) An increase in ambient temperature.
C) An increase in barometric pressure.
D) A large tailwind.

An aircraft is flying at sea level with an indicated airspeed of 210kts. What will be the true airspeed at that time?

A) 210 kts.
B) Less than 210 kts.
C) More than 210 kts.
D) 0 kts.

Lift and drag on an aerofoil are vertical respectively parallel to the:

A) longitudinal axis.
B) chord line.
C) relative wind/airflow.
D) horizon.

What is the SI unit which results from multiplying kg and m/s squared?

A) Watt
B) Newton
C) Joule
D) Psi

Load factor is the actual lift supported by the wings at any given time:

A) divided by the surface area of the wing.
B) divided by the aircrafts empty weight
C) divided by the total weight of the aircraft.
D) subtracted from the aircraft' s total weight.

If an aircraft is pitching up:

A) the incidence angle increases.
B) the incidence angle decreases.
C) the incidence angle first increases and than decreases.
D) the incidence angle remains fixed.

What causes deep stall in a swept back wing?

A) Span wise flow from tip to root on wing upper surface.
B) Root stall.
C) CP moves forward.
D) CP moves aft.

The continuity equation states: If the area of a tube is increasing, the speed of the subsonic and incompressible flow inside is:

A) increasing.
B) decreasing.
C) sonic.
D) not changing.

The formula for lift is:

A) L = W
B) L = RHO V S CL
C) L = 1/2 RHO V2 S CL
D) L = 2 RHO V2 S CL

A high aspect ratio wing:

A) has a short span and short chord.
B) has a long span and short chord.
C) has a short span and long chord.
D) has a long span and long chord.

Which of the following statements is true?

A) Energy can be created but not be destroyed.
B) Energy can be created and destroyed.
C) Energy can not be created but destroyed.
D) Energy can not be created nor destroyed.

The Mean Aerodynamic Chord (MAC) for a given wing of any platform is:

A) the wing area divided by the wing span.
B) the chord of a large rectangular wing.
C) the average chord of the actual aeroplane.
D) the chord of a rectangular wing with same moment and lift.

Which of the following wing planform gives the highest local profile lift coefficient at the wing root?

A) Elliptical.
B) Tapered.
C) Rectangular.
D) Positive angle of sweep.

The units of a turning moment are?

A) Rad / second.
B) Newton x meters.
C) Joule.
D) Kilogram.

Which of the following is the correct description of the method for measuring the dihedral angle?

A) The angle between the wing plane and the horizontal.
B) The angle between a line which passes through the 25% wing chord and the horizontal axis.
C) The angle between the 25% chord line and the horizontal axis.
D) The angle between 25% chord and the lateral axis.

VS is 100 kt at n = 1, what will the stall speed be at n = 2?

A) 141 kts
B) 119 kts
C) 100 kts
D) 200 kts

Longitudinal dihedral is:

A) when the wing has anhedral and the tail dihedral.
B) the difference between the wing and tail angle of sweep.
C) the difference between the wing and tail angle of incidence.
D) the difference between the wing and tail dihedral angles.

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81. The mean chord is calculated by:

A) dividing the chord by the maximum thickness.
B) dividing the gross wing area by the root chord.
C) dividing the gross wing area by the wing span.
D) dividing the net wing area by the wing span.

Consider a uniform flow of air at velocity V in a Stream tube. If the temperature of the air in the tube is raised:

A) the mass flow remains constant and the velocity V will increase.
B) the mass flow remains constant and velocity V decreases.
C) the mass flow will increase and velocity V remain constant
D) the mass flow will decrease and velocity V will remain constant.

The Principle of Continuity states that in a tube of increasing cross-sectional area, the speed of a subsonic and incompressible airflow will:

A) remain the same.
B) sonic.
C) increase.
D) decrease.

Maintaining thickness/chord ratio but changing to a supercritical wing section will:

A) lead to more prominent shockwave formation.
B) give the aircraft an increased range.
C) reduce the aft shift of CP in the transonic range.
D) make lateral stability more critical.

The wing dihedral angle is defined as:

A) the inclination of the wing to the vertical axis.
B) another term for the sweepback.
C) the inclination of the wing to the longitudinal axis.
D) the upward inclination of the wing to the lateral axis.

What is the effect on EAS as height is increased when you are holding a constant IAS?

A) EAS rises.
B) The effect depends on the temperature.
C) EAS falls.
D) EAS remains the same.

If an increase in power tends to make the nose of the aircraft to dip, this is the result of the:

A) Centre of lift and centre of gravity being collocated.
B) Centre of lift being ahead of the centre of gravity.
C) Line of thrust passing through the centre of gravity.
D) Line of thrust being above the centre of gravity.

Dihedral of the wing is:

A) the angle between the leading edge of the wing and the lateral axis.
B) the angle between the 0.25 chord line of the wing and the horizon.
C) the angle between the 0.25 chord line of the wing and the lateral axis.
D) the angle between the 0.25 chord line of the wing and the vertical axis.

Which of the following quantities determines the mass flow in a nozzle?

A) Density and flow velocity.
B) Velocity, density and area.
C) Density and the square of the flow velocity.
D) Velocity of flow and section area.

The total pressure is:

A) static pressure minus the dynamic pressure.
B) 1/2 rho V2
C) can be measured in a small hole in a surface, parallel to the local stream.
D) static pressure plus the dynamic pressure.

Bernoulli' s equation can be written as (pt = total pressure, ps = static pressure, q = dynamic pressure):

A) pt - q = ps
B) pt + ps = q
C) pt = q - ps
D) pt = ps - q

The angle of attack of a two dimensional wing section is the angle between:

A) the chord line of the aerofoil and the fuselage centreline.
B) the chord line of the aerofoil and the free stream direction.
C) the chord line and the camber line of the aerofoil.
D) the fuselage core line and the free stream direction.

As it applies to airfoils. which statement is in agreement with Bernoullis Principle?

A) The static pressure of a fluid increases at points where the speed of the fluid increases.
B) The static pressure of a fluid decreases at points where the speed of the fluid decreases.
C) The static pressure of a fluid decreases at points where the speed of the fluid increases.
D) The speed of a fluid increases at points where the static pressure of the fluid increases.

Vectors:

A) have a magnitude and a direction.
B) none of the above.
C) have a magnitude only.
D) have a direction only.

Assuming ISA conditions, which statement with respect to the climb is correct?

A) At constant Mach number the IAS increases.
B) At constant IAS the Mach number increases.
C) At constant TAS the Mach number decreases.
D) At constant IAS the TAS decreases.

The chord line is:

A) a line equidistant between intrados and extrados.
B) a line tangential to the wing surface at the leading edge.
C) a straight line from the leading edge of the wing to the trailing edge of the wing.
D) a line perpendicular to the longitudinal axis of the aircraft.

The static pressure is acting:

A) in all directions.
B) only in direction of the flow.
C) only perpendicular to the direction of the flow.
D) only in the direction of the total pressure.

If pressure is kept constant and temperature increases, the density:
A) decreases.
B) temperature have no effect.
C) remains constant.
D) increases.

When looking at the airflow over the wing, from the wing surface and up, the air is:
A) accelerated to the separation point.
B) accelerated to the transition point.
C) decelerated to the transition point.
D) caused to tend to flow from root to tip over a straight wing.

What happens to total drag when accelerating from CL MAX to maximum speed?
A) Decreases then increases.
B) Increases then decreases.
C) Increases.
D) Decreases.

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101. The angle between the aeroplane longitudinal axis and the chord line is the:
A) angle of attack.
B) climb path angle.
C) angle of incidence.
D) glide path angle.

If the continuity equation is applicable, what will happen to the air density (rho) if the cross sectional area of a tube changes? (low speed, subsonic and incompressible flow:
A) rho1 = rho2
B) rho1 > rho2
C) The density depends on the change of the tube area.
D) rho1 < rho2

Aspect ratio of a wing is defined as the ratio of the:
A) square of the wing span to the wing area.
B) wing spat to the main compression rib.
C) square of the chord to the wingspan.
D) wingspan to the wing root.

If you want to maintain a constant TAS during a climb, you should during the climb:
A) reduce to a lower IAS.
B) increase A.o.A.
C) maintain a stable IAS.
D) increase the IAS.

On a symmetrical aerofoil, the pitch moment for which Cl=0 is:
A) positive (pitch-up).
B) equal to the moment coefficient for stabilized angle of attack.
C) negative (pitch-down).
D) zero.

Angle of attack is the angle between:

A) local airflow and chord line.
B) undisturbed airflow and mean camber line.
C) local airflow and mean camber line.
D) undisturbed airflow and chord line.

In a symmetrical airfoil the mean camber line is?

A) A line joining points of mean camber along the wing.
B) A curve co-incident with the top surface of the airfoil.
C) A straight line co-incident with the chord line.
D) A line joining points of maximum camber along the wing.

Flying at the maximum rate of climb speed (Vy) you will obtain maximum:

A) altitude at maximum boost setting.
B) altitude in the shortest distance and time
C) altitude in the shortest time.
D) altitude in the shortest distance.

In a subsonic flow venturi the relationship between total pressure, static pressure and dynamic pressure of undisturbed air and air in the throat of will be:

i. Dynamic pressure will be constant, static pressure will decrease
ii. Total pressure will be constant, dynamic pressure will increase

A) both (i) and (ii) are incorrect
B) (i) is correct and (ii) is incorrect
C) (ii) is correct and (i) is incorrect
D) both (i) and (ii) are correct

What are the SI units of the following?

A) Density is Newton' s per cubic metre, Force is kilograms.
B) Density is kilograms per Newton, Force is Newton-metre squared.
C) Density is kilograms per cubic metre, Force is Newton' s.
D) Density is kilograms per square metre, Force is kilograms.

High Aspect Ratio, as compared with low Aspect Ratio, has the effect of:

A) increasing lift and drag.
B) decreasing induced drag and critical angle of attack.
C) increasing lift and critical angle of attack
D) increasing induced drag and decreasing critical angle of attack.

A laminar boundary layer is a layer, in which:

A) the temperature varies constantly.
B) the velocity is constant.
C) no velocity components exist normal to the surface.
D) the vortices, are weak.

The angle of attack (aerodynamic angle of incidence) of an aerofoil is the angle between the:
A) bottom surface and the chord line.
B) chord line and the relative undisturbed airflow.
C) bottom surface and the Horizontal.
D) bottom surface and the relative airflow.

If density is kept constant, the dynamic pressure increases proportionally with:
A) inversely with the square of the velocity
B) the static pressure.
C) velocity.
D) the square of the velocity.

What is the unit of measurement for power?
A) N/m
B) Nm/s
C) Pa/m2
D) kgm/s2

For an aircraft in level flight, if the wing center of pressure is aft of the center of gravity and there is no thrust/drag couple, the tailplane load must be:
A) upward.
B) unknown-insufficient information has been provided.
C) zero.
D) downward.

In a stream tube, if density is halved, drag will be reduced by a factor of:
A) 8
B) 4
C) 6
D) 2

The service ceiling of an aircraft is:
A) the altitude where rate of climb is zero.
B) the altitude above which cruising speed cannot be maintained.
C) the altitude where a low specific rate of climb is achieved.
D) the highest altitude permitted for flight because of manoeuvre capability.

What happens when the CG is on the forward limit?
A) Vs increases, stall angle increases.
B) Vs decreases, stall angle decreases.
C) Vs increases, stall angle remains constant.
D) Vs decreases, stall angle remains constant.

When does P-factor cause the airplane to yaw to the left?
A) In a vertical dive.
B) When the angle of attack on both wings is high.
C) When the angle of attack on both wings is low.
D) When the aircraft is flying at high airspeeds.

121. As subsonic air flows through a convergent duct:

i. static pressure
ii. velocity

A) (i) decreases and (ii) decreases
B) (i) decreases and (ii) increases
C) (i) increases and (ii) decreases
D) (i) increases and (ii) increases

When the undercarriage is lowered in flight:

A) form drag will increase and the aircrafts nose down pitching moment will increase.
B) induced drag will decrease and the aircrafts nose down pitching moment will increase.
C) induced drag will increase and the aircrafts nose down pitching moment will increase.
D) form drag will increase and the aircrafts nose down pitching moment will be unchanged.

The SI unit of force is:

A) Newton.
B) Kilogram.
C) Joule.
D) Watt.

The movement of an aircraft is defined along three axes which all pass through:

A) the centre of gravity.
B) the intersection of the normal vertical datum.
C) the centre of pressure.
D) the intersection of the centrelines of the fuselage and wings.

What is the MAC of a wing?

A) Area of wing divided by the span.
B) The mean chord of the whole aeroplane.
C) The 25% chord of a swept wing.
D) The same as the mean chord of a rectangular wing of the same span.

The CP on a swept wing aircraft will move forward due to:

A) tip stall of the wing.
B) boundary layer fences and span wise flow.
C) change in wing angle of incidence.
D) flow separation at the root due to span wise flow.

What does parasite drag vary with?

A) CLmax.
B) Surface area.
C) Speed.
D) Square of the speed.

Wing loading is:

A) the ratio of lift to aircraft weight.
B) the ratio of wing area to wing weight.
C) the ratio of lift to wing weight.
D) the ratio of aircraft weight to wing area.

Which of the following statements are correct?

A) Drag acts in the same direction as the relative airflow and lift perpendicular to it.
B) Drag acts parallel to the chord and opposite to the direction of motion of the aircraft and lift acts perpendicular to the chord.
C) Lift acts perpendicular to the horizontal and drag parallel in a rearwards direction.
D) Lift acts at right angles to the top surface of the wing and drag acts at right angles to lift.

The point about which the wing pitching moment is independent of angle of attack is called:

A) the pitching centre.
B) the centre of pressure.
C) the centre of gravity.
D) the aerodynamic centre.

Wing span is defined as the distance:

A) from wing tip to wing tip.
B) between top and bottom of the wing at the thickest point.
C) from leading edge to trailing edge.
D) from wing tip to fuselage centre line.

Consider a certain stream line tube. The velocity of the stream in the tube is V. An increase of temperature of the stream at constant value of V will:

A) increase the mass flow.
B) not affect the mass flow.
C) decrease the mass flow.
D) increase the mass flow when the tube is divergent in the direction of the flow.

Under which condition will pressure altitude be equal to true altitude?

A) Never.
B) When indicated altitude is equal to the pressure altitude.
C) When standard atmospheric conditions exist.
D) When the atmospheric pressure is 29.92 Hg.

Drag is in the direction of - and lift is perpendicular to the:

A) relative wind/airflow.
B) longitudinal axis.
C) chord line.
D) horizon.

What effect does aspect ratio have on induced drag?

A) Increased aspect ratio reduces induced drag.
B) Increased aspect ratio increases induced drag.
C) Changing aspect ratio has no effect.
D) Induced drag will equal 1+3 x aspect ratio/chord ratio.

Bernoulli' s Theorem states:

A) dynamic pressure is maximum at stagnation point.
B) dynamic pressure increase and static pressure decrease.
C) dynamic pressure increase and static pressure increase.
D) zero pressure at zero dynamic pressure.

On an airfoil the centre of pressure will be most forward:

A) just below the stalling angle.
B) at the optimum angle.
C) just above the stalling angle.
D) at the stalling angle.

At a constant CAS when flying below sea level an aircraft will have:

A) a higher TAS than at sea level.
B) the same TAS as at sea level.
C) the same TAS, but an increased IAS.
D) a lower TAS than at sea level at ISA conditions.

Static pressure acts:

A) parallel to dynamic pressure.
B) downwards.
C) parallel to airflow.
D) in all directions.

Dynamic pressure is expressed as:

A) q*Cd*surface
B) (density/2)*V
C) (density/2)* V^2
D) q*Cl*surface

---

141. The fineness ratio is:

A) the inverse of the thickness-to-chord ratio.
B) equal to the thickness-to-chord ratio.
C) equal to the taper ratio.
D) the inverse of the taper ratio.

What effect on stall speed do the following have?

A) Fitting a T tail will reduce stall speed.
B) Increased anhedral increases stall speed.
C) Increasing sweepback decreases stall speed.
D) Decreasing sweep angle decreases stall speed.

The relative thickness of an aerofoil is expressed in:

A) degrees cross section tail angle.
B) meters.
C) camber.
D) % chord.

A symmetrical aerofoil section at CL = 0 will produce?

A) A positive (nose up) pitching moment.
B) Zero pitching moment.
C) No aerodynamic force.
D) A negative (nose down) pitching moment.

The angle of attack is the angle between:

A) the direction of the airflow and the longitudinal axis.
B) chord line and the longitudinal axis.
C) wing and lateral axis.
D) the chord line and the direction of the airflow.

Which one of the following statements about Bernoulli' s theorem is correct?

A) The dynamic pressure decreases as static pressure decreases.
B) The dynamic pressure increases as static pressure decreases.
C) The total pressure is zero when the velocity of the stream is zero.
D) The dynamic pressure is maximum in the stagnation point.

What are the standard temperature and pressure values for sea level?

A) 1013.25Pa and 13° C.
B) 59° C and 1013.2 millibar.
C) 15° C and 29.92 Hg.
D) 59° F and 29.92 millibar

The airfoil chord line is:

A) a straight line from the wing leading edge to the trailing edge.
B) a line tangential to the wing surface at the point of maximum curvature.
C) a line equidistant from the upper and lower wing surfaces.
D) a line drawn at 15% chord from the root to the tip.

The two dimensional airflow above an aerofoil:

Which of the following is the most effective type of flap system?
A) Slotted.
B) Fowler.
C) Plain.
D) Split.

Which of the following is the greatest factor causing lift?
A) Increased airflow velocity below the wing.
B) Decreased airflow velocity above the wing.
C) Increased pressure below wing.
D) Suction above the wing.

Lift is created over a wing because:
A) airflow accelerates of the top surface of the airfoil creating a reduction in static pressure.
B) airflow slows down on the extrados causing a reduction in static pressure.
C) airflow speed increases over the wing surface causing a increase in dynamic pressure.
D) airflow slows down over a wing causing an increase in static pressure.

Increasing the angle of attack in flight will cause the:
A) separation point to move aft.
B) stagnation point to move down and aft.
C) laminar flow to increase.
D) boundary layer to become thinner.

If the angle of attack is maintained constant, what happens to the coefficient of lift when flaps are deployed?
A) Increased.
B) Changes with the square of IAS.
C) Remains constant because angle of attack remains the same.
D) Decreased.

When the angle of attack increases in straight and level flight, we will observe:
A) lateral movement of the centre of gravity.
B) forward movement of the centre of pressure.
C) forward movement of the centre of gravity.
D) a reduction in varying loads due to g.

The point, where the aerodynamic lift acts on a wing is:
A) the centre of pressure.
B) the point of maximum thickness of the wing.
C) the c.g. location.
D) the suction point of the wing.

What is the purpose of a slat on the leading edge?
A) Thicken the laminar boundary layer over the top surface.
B) Increase the camber of the wing.
C) Allow greater angle of attack.
D) Decelerate the air over the top surface.

Which statement is correct?
A) The stagnation point is always situated on the chord line, the centre of pressure is not.
B) As the angle of attack increases, the stagnation point on the wings profile moves downwards.
C) The centre of pressure is the point on the wings leading edge where the airflow splits up.
D) The stagnation point is another name for centre of pressure.

When an aircraft pitches up, the angle of attack of the tailplane will:
A) depend solely upon the rigger´ s angle of incidence.
B) decrease.
C) remain the same.
D) increase.

When the angle of attack is increased, the stagnation point moves ... and the separation point moves...
A) Forward; Backwards
B) Backwards; Back
C) Forward; Forward
D) Backwards; Forward

Which statement is true for a symmetrical wing section:
A) the centre of pressure is at the aerodynamic centre of the wing.
B) the centre of pressure is infinitely far behind the wing.
C) the centre of pressure is in the front of the aerodynamic centre of the wing.
D) the centre of pressure is behind the aerodynamic centre of the wing.

In a two-dimensional flow pattern, where the streamlines converge the static pressure will:
A) increase.
B) not change.
C) decrease.
D) increase initially, then decrease.

Subsonic flow over a cambered airfoil at 4° angle of attack will cause:
A) a decrease in speed and drop in pressure over the upper surface and an increase in speed and a drop in pressure over the lower surface.
B) an increase in speed and drop in pressure over the upper surface and an increase in speed and a drop in pressure over the lower surface.
C) an increase in speed and drop in pressure over the upper surface and a decrease in speed and a rise in pressure over the lower surface.
D) a decrease in speed and drop in pressure over the upper surface and a decrease in speed and a drop in pressure over the lower surface.

In a stationary subsonic streamline flow pattern, if the streamlines converge, in this part of the pattern, the static pressure will (I) and the velocity will (II):
A) (I) decrease; (II) decrease
B) (I) decrease; (II) increase
C) (I) increase; (II) decrease
D) (I) increase; (II) increase

When Fowler flaps are deployed?
A) Only the area increases.
B) They move downwards then backwards.
C) They move backwards then downwards.
D) They move forwards.

On an asymmetrical, single curve aerofoil, in subsonic airflow, at low angle of attack, when the angle of attack is increased, the centre of pressure will (assume a conventional transport aeroplane):
A) remain unaffected.
B) move aft.
C) remain matching the airfoil aerodynamic centre.
D) move forward.

The lift force, acting on an aerofoil:
A) increases, proportional to the angle of attack until 40 degrees.
B) is mainly caused by overpressure at the underside of the aerofoil.
C) is maximum at an angle of attack of 2 degrees.
D) is mainly caused by suction on the upper side of the aerofoil.

In flight the C of P by increasing angle of attack, will reach its most forward point on an airfoil:
A) at the optimum angle of attack.
B) just below the stalling angle.
C) at the stall.
D) at the stalling angle.

Consider an aerofoil with a certain camber and a positive angle of attack. At which location will the highest flow velocities occur?
A) Upper side.
B) Lower side.
C) In the stagnation point.
D) In front of the stagnation point.

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21. The vane of a stall warning system with a flapper switch is activated by the change of the:
A) point of lowest pressure.
B) centre of pressure.
C) stagnation point.
D) centre of gravity.

With increasing angle of attack, the stagnation point will move (I) and the point of lowest pressure will move (II).
A) (I) up, (II) forward.
B) (I) down, (II) aft.
C) (I) up, (II) aft.
D) (I) down, (II) forward.

Cambered wing sections give... maximum CL at a relatively... angles of attack.
A) high; high
B) low; high
C) low; low
D) high; low

If the angle of attack is increased, the centre of pressure will:
A) move forward or aft, depending on the location of the centre of gravity.
B) move aft.
C) will remain stationary.
D) move forward towards the aerodynamic centre of the wing.

The airflow over the upper surface of the wing of an aircraft in level flight compared to the free stream air will:
A) have greater velocity, resulting in increased pressure.
B) have the same velocity, resulting in reduced pressure.
C) experience an increase in velocity and a reduction in pressure.
D) experience a reduction in velocity producing increased pressure.

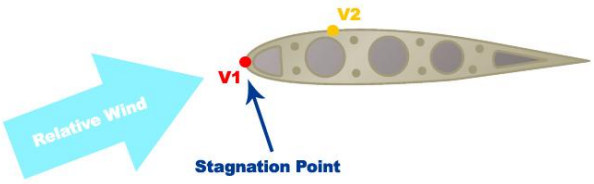
At zero angle of attack in flight, a symmetrical wing section will produce:
A) some lift and drag.
B) zero lift with some induced and profile drag.
C) zero lift and drag.
D) zero lift with some drag.

On a cambered airfoil the zero lift angle of attack will be:
A) dependent on the wing aspect ratio.
B) negative.
C) positive.
D) zero.

What is true regarding deployment of Slats / Krueger flaps?
A) Krueger flaps form a slot, Slats do not.
B) Slats form a slot, Krueger flaps do not.
C) Krueger flaps increase the critical angle of attack, Slats do not.
D) Slats increase the critical angle of attack, Krueger flaps do not.

Lift is generated when:
A) the shape of the aerofoil is slightly cambered.
B) an aerofoil is placed in a high velocity air stream.
C) a certain mass of air is accelerated downwards.
D) a certain mass of air is retarded.

With reference to attached diagram, how do the speeds relate to relative wind/airflow (V)?
A) V1 < V2 and V2 < V
B) V1 = 0 and V2 = V
C) V1 > V2 and V2 < V
D) V1 = 0 and V2 > V



If the camber of an aerofoil is increased:
A) the critical Mach-number will decrease.
B) the coefficient of lift will increase for a given angle of attack.
C) the stalling angle will decrease.
D) all of the above.

On a swept back wing, in which of the following locations would Krueger Flaps be fitted?
A) The leading edge.
B) Inboard leading edge.
C) Outboard leading edge.
D) The trailing edge.

The coefficients:

An aeroplane maintains straight and level flight while the IAS is doubled. The change in lift coefficient will be:

A) x 0.25
B) x 4.0
C) x 2.0
D) x 0.5

What changes in angle of attack must be made to maintain altitude while the airspeed is being increased?

A) Increase the angle of attack to produce more lift than drag.
B) Decrease the angle of attack to compensate for the increasing drag.
C) Maintain a constant angle of attack until the desired airspeed is reached, then increase the angle of attack.
D) Decrease the angle of attack to compensate for the increasing lift.

If IAS is increased from 80 kt to 160 kt at a constant air density TAS will double. What would be the effect on (i) CDI and (ii) DI?

A) (i) 1/16; (ii) 1/4
B) (i) 2; (ii) 2
C) (i) 4; (ii) 2
D) (i) 1/4; (ii) 4

A body is placed in a certain airstream. The density of the airstream decreases to half of the original value. The aerodynamic drag will decrease with a factor:

A) 4
B) 8
C) 2
D) 1.4

Wing tip vortices have the highest intensity during:

A) high speed.
B) take off.
C) cruise.
D) turns.

The terms q and S in the lift formula are:

A) static pressure and wing surface area.
B) square root of surface and wing loading.
C) dynamic pressure and the area of the wing.
D) static pressure and dynamic pressure.

The L/D ratio in flight will be at its highest value at:

A) an angle of attack between 5 degrees and 8 degrees.
B) the optimum angle of attack.
C) a point just below the stalling angle.
D) the stalling angle.

Aerodynamic forces and moments exerted on a body moving through a fluid stem from two sources:

A) pressure distribution and airstream velocity.
B) bending force and torsion moment.
C) pressure distribution and shear stress distribution.
D) water and wind.

An aeroplane performs a straight and level horizontal flight at the same angle of attack at two different altitudes: (all other factors of importance being constant, assume ISA conditions and no compressibility effects)

A) the TAS at the higher altitude is higher.
B) the TAS at the higher altitude is lower.
C) the TAS at the higher altitude cannot be determined.
D) the TAS at both altitudes is the same.

CDI is proportional to which of the following?

A) CL
B) the square root of the CL
C) CL2
D) CLmax

When considering an angle of attack versus coefficient of lift graph for a cambered aerofoil, where does the lift curve intersect the vertical CL axis?

A) To the left of the origin.
B) Above the origin.
C) At the point of origin.
D) Below the origin.

An increase in the speed at which an airfoil passes through the air increases lift because:

A) the impact pressure of the air on the lower surface of the airfoil creates less positive pressure.
B) the increased speed of air passing over the airfoils upper surface decreases the pressure, thus creating a greater pressure differential between upper and lower surface.
C) the increased velocity of the relative wind increases the angle of attack.
D) the increased speed of the airflow creates a lesser pressure differential between The upper and lower airfoil surfaces.

Comparing the lift coefficient and drag coefficient at normal angle of attack:

A) CL is much lower than CD.
B) CL has approximately the same value as CD.
C) CL is much greater than CD.
D) CL is lower than CD.

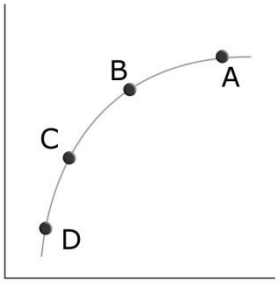
A body is placed in a certain airstream. The airstream velocity increases by a factor 4. The aerodynamic drag will increase with a factor:

A) 4
B) 16
C) 8
D) 12

The aerodynamic drag of a body, placed in a certain airstream depends amongst others on:

A) the specific mass of the body.
B) the airstream velocity.
C) the weight of the body.
D) the c.g. location of the body.

Which point shown in the figure corresponds with CL for minimum horizontal flight speed?



A) Point B
B) Point C
C) Point A
D) Point D

The aerofoil polar is:

A) a graph, in which the thickness of the wing aerofoil is given as a function of the chord.
B) a graph of the relation between the lift coefficient and the angle of attack.
C) a graph of the relation between the lift coefficient and the drag coefficient.
D) the relation between the horizontal and the vertical speed.

In order to remain in level balanced flight:

A) the wing lift must be equal to weight.
B) the wing lift must be greater than weight, if the tailplane is giving a download for balance.
C) the wing lift has to be less than weight, if the tailplane is giving a download for balance.
D) the wing lift must be less than weight at all times.

The lift formula is:

A) L= W
B) L= CL 2 RHO V? S
C) L= n W
D) L= CL 1/2 RHO V? S

For large Reynolds numbers, the... forces are of much greater importance than the... forces.

A) viscosity, inertia
B) hear, viscosity
C) inertia, viscosity
D) pressure, bending

21. The drag coefficient of a sphere is approximately:
A) 0.0015
B) 0.25
C) 250
D) 2

The frontal area of a body, placed in a certain airstream is increased by a factor 3. The shape will not alter. The aerodynamic drag will increase with a factor:
A) 3
B) 6
C) 1.5
D) 9

Increasing dynamic (kinetic) pressure will have the following effect on the drag of an aeroplane (all other factors of importance remaining constant):
A) the drag decreases.
B) the drag is only affected by the ground speed.
C) this has no effect.
D) the drag increases.

Extending the flaps while maintaining a constant angle of attack (all other factors constant):
A) the aircraft will roll.
B) the aircraft will climb.
C) the aircraft will yaw.
D) the aircraft will sink suddenly.

The three-dimensional airflow above an airplane:

The span-wise flow is caused by the difference between the air pressure on top and beneath the wing and its direction of movement goes from:
A) the top to beneath the wing via the leading edge.
B) beneath to the top of the wing via the trailing edge.
C) beneath to the top of the wing via the wing tip.
D) the top to beneath the wing via the wings trailing edge.

Induced drag on a wing in level flight:
A) is uniform across its span.
B) is greatest at the tip.
C) is greatest at the leading edge.
D) is greatest at the wing root.

The wake vortices behind a large aircraft begin on takeoff ... and end on landing...
A) on rotation; as the nosewheel goes down.
B) at V2; in the flare.
C) at V1; when lift dump is selected.
D) at 80kt; on touchdown.

Induced drag is also known as:
A) form drag.
B) vortex drag.
C) interference drag.
D) skin friction drag.

Which of the following wing planform produces the lowest induced drag? (all other relevant factors constant)
A) Circular.
B) Elliptical.
C) Tapered.
D) Rectangular.

What pitching moment will be generated when Fowler flaps are deployed on an aircraft with a high mounted (T tail) tailplane?
A) The nose up pitching moment will be balanced by the nose down pitching moment.
B) An aircraft nose down pitching moment.
C) An aircraft nose up pitching moment.
D) The resultant aircraft pitching moment will depend upon the relative position of the CP and CG.

The induced angle of attack is the result of:
A) downwash due to tip vortices.
B) change in direction of flow due to the effective angle of attack.
C) a large local angle of attack in a two dimensional flow.
D) downwash due to flow separation.

Which ratio is defined as the aspect ratio of a wing?
A) Ratio between the span and the square of the gross wing area.
B) Ratio between the square of the span and the mean chord.
C) Ratio between span and mean chord.
D) Ratio between wing span and gross wing area.

An increase in aspect ratio will:
A) have no effect on a wing or airfoil section.
B) cause VIMD to be reduced.
C) cause VIMD to be increased.
D) cause induced drag to increase.

The relationship between induced drag and the aspect ratio is:
A) a decrease in the aspect ratio increases the induced drag.
B) there is no relationship.
C) an increase in the aspect ratio increases the induced drag.
D) induced drag = 1.3 aspect ratio value.

Induced drag at constant IAS is affected by:
A) aeroplane wing location.
B) aeroplane weight.
C) engine thrust.
D) angle between wing chord and fuselage centre line.

Increasing the aspect ratio of a wing...
A) increases induced drag.
B) decreases induced drag.
C) decreases skin friction drag.
D) has no effect on induced drag.

Which relationship is correct when comparing drag and airspeed?
A) If you double the airspeed the induced drag is reduced to 1/4.
B) If you double the airspeed the parasite drag is doubled.
C) If you double the airspeed the induced drag is halved.
D) If you double the airspeed you double the induced drag.

Which of the following descriptions most accurately describes the airflow that causes wing tip vortices?
A) From the tip to the root on the top surface and from the root to the tip on the bottom surface over the wing tip.
B) From the root to the tip on the top surface and from the tip to the root on the bottom surface over the wing tip.
C) From the tip to the root on the top surface and from the root to the tip on the bottom surface over the trailing edge.
D) From the root to the tip on the top surface and from the tip to the root on the bottom surface over the trailing edge.

What is the effect on induced drag of weight and speed changes?
A) Induced drag decreases with decreasing speed and induced drag decreases With increasing weight.
B) Induced drag increases with increasing speed and induced drag increases with decreasing weight.
C) Induced drag decreases with increasing speed and induced drag decreases with decreasing weight.
D) Induced drag decreases with decreasing speed and induced drag increases with increasing weight.

Geometric washout means that:
A) the horizontal tail has less angle of attack than the wing.
B) there is an airflow along the wing that keeps it clean.
C) the tip of the wing has more angle of attack than the root.
D) the tip of the wing has less angle of attack than the root.

Induced drag may be reduced by:
A) an increase in aspect ratio.
B) a decrease of the aspect ratio.
C) the use of a wing tip with a much thinner aerofoil.
D) an increase in the taper ratio of the wing.

A cambered airfoil with zero angle of attack, will in flight produce:
A) some lift with no drag.
B) no lift but some drag.
C) no lift and no drag
D) some lift and some drag.

With flaps deployed, at a constant IAS in straight and level flight, the magnitude of tip vortices:
A) remains the same.
B) increases or decreases depending upon the initial angle of attack.
C) increases.
D) decreases.

The wind condition that requires maximum caution when avoiding wake turbulence on landing is?
A) Strong headwind.
B) Strong crosswind.
C) Light, quartering tailwind.
D) Light, quartering headwind.

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21. How do vortex generators work?
A) Re-direct slantwise flow.
B) Reduce the adverse pressure gradient.
C) Take energy from free stream and introduce it into the boundary layer.
D) Reduce kinetic energy to delay separation.

A wing with higher span compared with a lower wing span has (equal wing surface):
A) lower induced drag.
B) a higher lift/drag ratio.
C) higher profile drag.
D) higher induced drag.

That portion of the aircrafts total drag created by the production of lift is called?
A) Parasite drag, and is greatly affected by changes in airspeed.
B) Induced drag, and is greatly affected by changes in airspeed.
C) Profile drag, and is not affected by changes in airspeed.
D) Induced drag, and is not affected by changes in airspeed.

Which statement about induced drag and tip vortices is correct?
A) Tip vortices can be diminished by vortex generators.
B) The flow direction at the upper and under side of the wing, both deviate in wing tip direction.
C) The flow direction at the upper side of the wing has a component in wing root direction, the flow at the underside of the wing in wing tip direction.
D) The wing tip vortices and the induced drag decrease at increasing angle of attack.

The characteristics of a high aspect ratio wing has are:
A) long span, long chord.
B) long chord, short span.
C) short chord, short span.
D) short chord, long span.

An aeroplane accelerates from 80 kt to 160 kt at a load factor equal to 1. The induced drag coefficient (i) and the induced drag (ii) alter with the following factors:
A) (i) 1/4 (ii) 2
B) (i) 1/2; (ii) 1/16
C) (i) 1/16 (ii) 1/4
D) (i) 1; (ii) ½

An increase in angle of attack (below the stalling angle of attack) increases lift because:
A) induced drag is reduced.
B) the lift coefficient increases.
C) the impact pressure of the air on the lower surface of the airfoil creates less positive pressure.
D) the vertical component of weight is reduced.

The induced drag coefficient, CDi is proportional with:
A) CL^2
B) CL
C) square root (CL)
D) CLmax

The induced drag:
A) has no relation to the lift coefficient.
B) increases as the magnitude of the tip vortices decreases.
C) increases as the lift coefficient increases.
D) increases as the aspect ratio increases.

Induced drag is created by the:
A) interference of the air stream between wing and fuselage.
B) propeller wash blowing across the wing.
C) span wise flow pattern resulting in the tip vortices.
D) separation of the boundary layer over the wing.

At the tip of the wing in level flight, the air flows:
A) from the lower surface to the upper surface and then diverges away from the fuselage.
B) from the upper surface to the lower surface.
C) to produce induced drag at its lowest value.
D) from the lower surface to the upper surface and then down at the trailing edge.

How will frost on the wings of an airplane affect takeoff performance?
A) Frost will disrupt the smooth flow of air over the wing, adversely affecting its lifting capability.
B) Frost will cause the airplane to become airborne with a higher angle of attack, decreasing the stall speed.
C) Frost will change the camber of the wing, increasing its lifting capability.
D) Frost has no influence on airplane performance.

Induced drag:
A) increases when reducing the wing aspect ratio.
B) increases when increasing the wing aspect ratio.
C) is proportional to the square of the speed.
D) always exceeds profile drag.

Low speed pitch up is caused by the:
A) Mach trim system.
B) span wise flow on a swept back wing.
C) span wise flow on a swept forward wing.
D) wing tip vortex.

At zero angle of attack, a symmetrical wing section (viscous flow) will produce:
A) zero lift and zero drag.
B) zero lift and some profile drag.
C) zero lift and some induced drag.
D) only induced drag.

What is the effect of high aspect ratio of an aeroplanes wing on induced drag?
A) It is reduced because the effect of wing-tip vortices is reduced.
B) It is increased because high aspect ratio produces greater downwash.
C) It is unaffected because there is no relation between aspect ratio and induced drag.
D) It is increased because high aspect ratio has greater frontal area.

When landing behind a large aircraft, the pilot should avoid wake turbulence by flying:
A) above the large aircrafts final approach path and landing before the large aircrafts touchdown point.
B) below the large aircrafts final approach path and landing before the large aircrafts touchdown point.
C) above the large aircrafts final approach path and landing behind the large aircrafts touchdown point.
D) below the large aircrafts final approach path and landing behind the large aircrafts touchdown point.

For a given angle of attack, a swept wing will:
A) have the same lift coefficient as an equivalent straight one.
B) have reduced lateral stability than an equivalent straight one.
C) have a lower lift coefficient than an equivalent straight one.
D) have the same lateral stability as an equivalent straight one.

Winglets:
A) create an elliptical lift distribution.
B) increase the manoeuvrability.
C) decrease the static lateral stability.
D) decrease the induced drag.

Which location on the aeroplane has the largest effect on the induced drag?
A) Wing root junction.
B) Wing tip.
C) Engine cowling.
D) Landing gear.

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41. Excluding constants, the coefficient of induced drag (CDi) is the ratio of:
A) CL and b (wing span).
B) CL? and S (wing surface).
C) CL? and AR (aspect ratio).
D) CL and CD.

When taking off or landing at an airport where heavy aircraft are operating, one should be particularly alert to the hazards of wingtip vortices because this wake turbulence tends to:
A) remain in the vicinity of the airport for hours.
B) sink into the flight path of aircraft operating below the aircraft generating the turbulence.
C) increase its strength during the first minutes after creation.
D) rise very rapidly, creating a local low pressure area.

A function of vortex generators in the transonic regime is to:
A) increase directional static stability.
B) reduce boundary layer separation drag when shockwaves form.
C) prevent the rearward shift of CP on swept wing stalls.
D) reduce wing root compression effects.

The greatest vortex strength occurs when the generating aircraft is:
A) heavy, dirty, and fast.
B) light, dirty, and fast.
C) heavy, clean, and slow.
D) dirty.

The Total Drag

Increasing air pressure will have the following effect on the drag of an aeroplane (angle of attack, OAT and TAS are constant):
A) the drag is only affected by the ground speed.
B) the drag decreases.
C) the drag increases.
D) this has no effect.

Minimum total drag of an aircraft occurs:
A) at the best rate of climb speed.
B) at the stalling speed.
C) when profile drag equals induced drag.
D) when induced drag is minimum.

Extending flight spoilers (air brake) during flight:
A) increases minimum drag speed (VDmin).
B) has no effect on minimum drag speed (VDmin).
C) reduces minimum drag speed (Vdmin).
D) is never allowed for structural reasons.

How does aerodynamic drag vary when airspeed is doubled? By a factor of:
A) 2
B) 16
C) 4
D) 1

How does the total drag vary as speed is increased from stalling speed (VS) to maximum IAS (VNE) in a straight and level flight at constant weight?
A) Decreasing, then increasing.
B) Increasing.
C) Increasing, then decreasing.
D) Decreasing.

The aeroplane drag in straight and level flight is lowest when the:
A) parasite drag equals twice the induced drag.
B) parasite drag is equal to the induced drag.
C) induced drag is equal to zero.
D) induced drag is lowest.

Induced drag can be reduced by:
A) use of a wing tip with a thinner aerofoil section.
B) increased taper ratio.
C) increased taper ratio.
D) increased aspect ratio.

Which of the following is the cause of wing tip vortices?
A) Span wise flow vector from the tip to the root on the bottom surface of the wing.
B) Air spilling from the bottom surface to the top surface at the left wing tip and from the top. surface to the bottom surface at the right wing tip.
C) Air spilling from the bottom surface to the top surface at the wing tip.
D) Air spilling from the top surface to the bottom surface at the wing tip.

With increasing altitude the following occurs:
A) drag remains the same for a given indicated airspeed.
B) the stalling angle reduces for a given indicated airspeed.
C) drag reduces for a given indicated airspeed.
D) the stalling angle increases for a given indicated airspeed.

The induced drag of an aircraft in level flight:
A) is not affected by airspeed.
B) increases with increasing speed.
C) increases as the wing aspect ratio is increased.
D) decreases with increasing airspeed.

At an aeroplanes minimum drag speed, what is the ratio between induced drag Di and profile drag Dp (Di/Dp)?
A) 1/2
B) 2/1
C) It varies between aeroplane types.
D) 1/1

The effects of very heavy rain (tropical rain) on the aerodynamic characteristics of an aeroplane are:
A) increase of CLmax and increase of drag.
B) decrease of CLmax and decrease of drag.
C) increase of CLmax and decrease of drag.
D) decrease of CLmax and increase of drag.

Extending airbrakes during an approach will:
A) reduce the minimum drag speed (VDmin).
B) increase induced drag.
C) increase minimum drag speed (VDmin).
D) decrease profile drag.

Induced drag is caused by:
A) wing mounted fuel tanks.
B) wing tip vortices and downwash.
C) increased pressure at the leading edge stagnation point.
D) winglets and washout.

Balancing of the weight component along the flight path in a glide is achieved by:
A) thrust.
B) lift.
C) thrust and drag.
D) drag.

Total Drag at high Mach numbers is a combination of:
A) induced drag, wave drag, form drag, skin friction drag and interference drag.
B) induced drag, form drag, interference drag and zero lift drag.
C) wave drag, interference drag, form drag, and induced drag.
D) profile drag, form drag, induced drag and wave drag.

Interference drag can be reduced using:
A) fairings, winglets and wing fences.
B) winglets.
C) fairings.
D) wing fences

During cruise, VDmin (Minimum drag speed) will:
A) decrease.
B) increase.
C) remain unchanged.
D) increase or decrease depending on the centre of gravity position.

Two identical aircraft of the same weight fly at two different altitudes (in straight and level flight and the same angle of attack). All other important factors remaining constant, assuming no compressibility and ISA conditions, what is the TAS of each:
A) Greater in the lower aircraft.
B) Altitude has no effect on TAS.
C) Greater in the higher aircraft.
D) The same.

For a given Indicated airspeed (IAS), a swept wing compared to a straight wing of the same wing area and same angle of attack produces:
A) less lift, reduced lateral stability and less total drag.
B) less lift, improved lateral stability and less total drag.
C) the same lift, increased lateral stability, with the same total drag.
D) increased lift, increased lateral stability, and less total drag.

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21. The speed in flight at which the power required is at a minimum, is:
A) minimum drag speed Vmd.
B) below Vmd.
C) above Vmd.
D) usually a constant at all altitudes.

For a constant aircraft weight at constant IAS and in level flight:
A) VIMD will reduce with increased altitude.
B) VIMD will constantly vary regardless of altitude.
C) VIMD will remain the same regardless of altitude.
D) VIMD will increase with increased altitude.

The interference drag is created as a result of:
A) separation of the induced vortex.
B) downwash behind the wing.
C) the addition of induced and parasite drag.
D) interaction between aeroplane parts (e.g. wing/fuselage).

An aircraft flying straight and level; if density halves, aerodynamic drag will:
A) decrease by a factor of four.
B) increase by a factor of two.
C) increase by a factor of four.
D) decrease by a factor of two.

What are the effects of tropical rain on:
i. CLMAX
ii. Drag
A) (i) decrease (ii) decrease
B) (i) increase (ii) decrease
C) (i) increase (ii) increase
D) (i) decrease (ii) increase

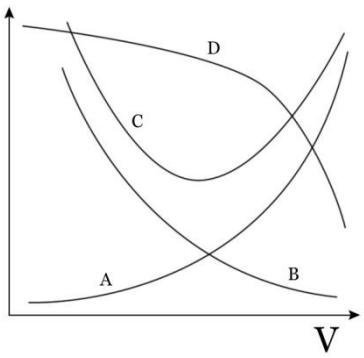
The value of the parasite drag in straight and level flight at constant weight varies linearly with the:
A) square of the speed.
B) angle of attack.
C) speed.
D) square of the angle of attack.

Profile drag in straight and level flight:
A) is the sum of induced drag and skin friction drag.
B) is proportional to the square of the speed.
C) is inversely proportional to the square of the speed.
D) depends mainly on the gross weight of the aircraft.

Which of the following will reduce induced drag?
A) Elliptical lift distribution.
B) Extending the flaps.
C) Flying at high angles of attack.
D) Low aspect ratio.

If dynamic (kinetic) pressure increases, what is the effect on total drag (if all important factors remain constant)?
A) Drag increases.
B) Drag only changes with changing ground speed.
C) It has no effect on drag.
D) Drag decreases.

Which line represents the total drag line of an aeroplane?



A) Line a.
B) Line b.
C) Line d.
D) Line c.

If you are flying at 100 kts and you increase your airspeed to 200 kts, profile drag:
A) remains the same.
B) quadruples.
C) decreases with 200%.
D) increases with 100%.

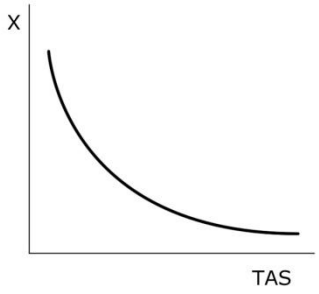
In straight and level flight, which of the following would cause induced drag to vary linearly if weight is constant:
A) 1/V
B) V2
C) 1/V2
D) V

If pressure increases, with OAT and TAS constant, what happens to drag?
A) Drag is dependant only on dynamic pressure.
B) Decrease.
C) Remain constant.
D) Increase.

Which of the following decreases induced drag?
A) Anhedral.
B) Wing fences.
C) Low aspect ratio plan form.
D) Winglets.

Total Drag is the sum of:
A) profile drag, form drag, induced drag and wake drag.
B) induced drag, pressure drag, skin friction drag and interference drag.
C) wake drag, interference drag and form drag.
D) induced drag, form drag, interference drag and zero lift drag.

The diagram shows the parameter X versus TAS. If a horizontal flight is considered the axis X shows:



A) the induced drag.
B) the lift force.
C) the parasite drag.
D) the total drag.

If the aspect ratio of a wing (for a given wing area) is decreased:
A) induced drag, for a given angle of attack, increases.
B) induced drag decreases for a given angle of attack.
C) lift coefficient remains unaffected at a given angle of attack.
D) lift coefficient increases for a given angle of attack.

As the speed of an aircraft at 20,000ft increases, profile drag:
A) increases as the square of the TAS.
B) increases at first, then decreases at Mcrit.
C) decreases at first, then increases.
D) decreases.

High aspect ratio:
A) reduces manoeuvrability
B) increases stalling speed.
C) reduces parasite drag.
D) reduces induced drag.

The Ground effect:

What effect on induced drag does entering ground effect have:
A) Increase.
B) Remain the same.
C) Decrease.
D) Induced drag will increase, but profile drag will decrease.

When an aircraft enters ground effect:
A) the total reaction vector is inclined forwards, increasing drag.
B) the total reaction vector is unaffected.
C) the total reaction vector is inclined rearwards, increasing drag.
D) the total reaction vector is inclined forwards, reducing drag.

What is ground effect?
A) The result of an alteration in airflow, increasing induced drag on the wings of an airplane.
B) The effect of hitting the ground.
C) The result of interference of the surface of the Earth with the airflow around the wing and tailplane.
D) The result of disturbing airflow around the wings of an airplane to the point where the wings will no longer support the airplane in flight.

Ground effect has the following influence on the landing distance:
A) does not change.
B) increases, only if the landing flaps are fully extended.
C) decreases.
D) increases.

If EAS is increased by a factor of 4, by what factor would profile drag increase?
A) 8
B) 16
C) 12
D) 4

Ground Effect occurs:
A) during the approach to landing.
B) acts like a decrease in aspect ratio.
C) is only effective up to 1 wingspan from the ground..
D) aids landing by increasing the induced drag..

The influence of ground affect on landing distance will be to:
A) increase landing distance.
B) decrease landing distance.
C) depend on flap position.
D) have no affect on landing distance.

When an aircraft enters ground effect:
A) the lift vector is unaffected, the cushion of air increases.
B) the lift vector is inclined forwards which reduces the thrust required.
C) the lift vector is inclined rearwards which increases the thrust required.
D) the lift vector is inclined forward which increases the thrust required.

What is the effect on induced drag on entering the ground effect?
A) Induced drag increases.
B) Induce drag increases, but profile drag decreases.
C) Induced drag decreases.
D) Induced drag remains the same.

What will happen in ground effect?
A) The wing downwash on the tail surfaces increases.
B) The induced angle of attack and induced drag decreases.
C) A significant increase in thrust required.
D) An increase in strength of the wing tip vortices.

On the approach to land, ground effect will begin to be felt at:
A) upon elevator deflection.
B) half the wingspan above the ground.
C) twice the wingspan above the ground.
D) when the angle of attack is increased.

Ground effect is most likely to result in which problem?
A) Inability to get airborne even though airspeed is sufficient for normal takeoff needs.
B) Becoming airborne before reaching recommended takeoff speed.
C) Deep stall.
D) Hard landings.

Ground Effect:
A) is usually only considered when the approach phase has commenced.
B) has the same effect as a decrease in aspect ratio.
C) is only effective up to 1 wingspan from the ground.
D) increases induced drag.

If an aeroplane flies in the ground effect:
A) the effective angle of attack is decreased.
B) the lift is increased and the drag is decreased.
C) drag and lift are reduced.
D) the induced angle of attack is increased.

On entering ground effect, maintaining flight at the same speed:
A) less power is required.
B) lift decreases.
C) more power is required.
D) ground effect has no effect on power.

Floating due to ground effect during an approach to land will occur:
A) when the height is less than halve of the length of the wing span above the surface.
B) when a higher than normal angle of attack is used.
C) when the height is less than twice the length of the wing span above the surface.
D) at a speed approaching the stall.

The relation between the lift coefficient and the speed for constant lift:

During acceleration in level flight:
A) the wing stagnation point moves aft.
B) the lift coefficient reduces.
C) the transition point on the wing moves forward.
D) the aircraft centre of gravity moves aft.

As altitude increases, the equivalent airspeed at which an airplane stalls in a particular configuration will:
A) remain equal to the calibrated airspeed.
B) remain the same regardless of altitude.
C) decrease as the true airspeed decreases.
D) decrease as the true airspeed increases.

When an aeroplane is flying at an airspeed which is 1.3 times its basic stalling speed, the coefficient of lift as a percentage of the maximum lift coefficient (CLmax) would be:
A) 59%.
B) 77%.
C) 130%.
D) 169%.

To maintain level flight, if the angle of attack is increased the speed must be:
A) reduced.
B) reduced in the same ratio as the lift/drag ratio increases.
C) increased.
D) increased in the same ratio as the lift/drag ratio decreases.

Flap selection at constant IAS in straight and level flight will increase the:
A) maximum lift coefficient (CLmax) and the drag.
B) lift coefficient and the drag.
C) lift and the drag.
D) stall speed.

In straight and level flight, if airspeed ... the angle of attack ... and the incidence angle...
A) increases; decreases; decreases.
B) increases; increases; decreases.
C) decreases; increases; remains constant.
D) decreases; decreases; decreases.

What must happen to the CL when flaps are deployed while maintaining a constant IAS in straight and level flight?

A) Decrease.
B) Increase.
C) Increase then decrease.
D) Remain constant.

In level flight an increase in angle of attack will cause:

A) the stagnation point to move down and aft.
B) a decrease in pitch angle.
C) the boundary layer to become thinner.
D) the centre of pressure to move aft.

Induced drag in straight and level flight is:

A) always equal to profile drag.
B) constant.
C) proportional to the square of the speed (TAS).
D) inversely proportional to the square of speed (TAS).

If VS is 100 kt in straight and level flight, during a 45 bank turn VS will be:

A) 80 kts
B) 100 kts
C) 140 kts
D) 119 kts

What is the effect on TAS if altitude is increased to 35,000 ft while flying at a constant Mach number?

A) Increase.
B) Increase then decrease.
C) Decrease.
D) Increase then remain constant.

If IAS is doubled, by which of the following factors should the original CL be multiplied to maintain level flight?

A) 0.25
B) 4.0
C) 2.0
D) 0.5

The Stall:

Stick shaker stall warnings should be activated at:
A) VS
B) 1.5 VS
C) 1.05 VS
D) 1.2 VS

When an aircraft is in a steady climb, how will be the wing stalling angle be affected?
A) The stalling angle will remain the same, regardless of altitude.
B) The stalling angle will increase with increasing altitude.
C) The stalling angle will reduce with increasing altitude.
D) The stalling angle will only be affected by airspeed.

The centre of pressure (c.o.p) is in its most forward position:
A) when the angle of attack is exceeds the stalling angle of attack
B) when the angle of attack is equal to the stalling angle of attack.
C) when the angle of attack is smaller than the stalling angle of attack.
D) the centre of pressure on an airfoil has no most forward position.

The angle of attack at which an aircraft stalls:
A) increases with an increase in engine power.
B) varies with gross weight and density altitude.
C) remains constant regardless of gross weight.
D) decreases with an increase in engine power.

The following factors increase stall speed:
A) increasing bank angle, increasing thrust, slat extension.
B) an increase in load factor, a forward c.g. shift, decrease in thrust.
C) a higher weight, selecting a higher flap setting, a forward c .g. shift.
D) a lower weight, decreasing bank angle, a smaller flap setting.

Stall speed in a turn is proportional to:
A) lift.
B) TAS squared.
C) weight.
D) the square root of the load factor.

An aeroplane has a stalling speed of 100 kt in a steady level flight. When the aeroplane is flying a level turn with a load factor of 1.5, the stalling speed is:
A) 141 kt.
B) 122 kt.
C) 150 kt.
D) 82 kt.

A wing stalling angle is:
A) decreased in any turn.
B) increased in a high rate of turn.
C) unaffected by a turn.
D) decreased in a high rate of turn.

What is a high speed stall?
A) A stall due to exceeding the critical angle of attack at high speed during a manoeuvre.
B) A stall caused by increasing the load factor (g) during a manoeuvre.
C) Excessive dynamic pressure causing airflow separation.
D) Separation of the airflow due to shockwave formation.

What effect does an increased load have on an aircraft?
A) The aircraft will suffer immediate structural failure.
B) The aircraft will have a tendency to spin.
C) The aircraft will stall at a higher speed.
D) The aircraft will have a tendency to roll and yaw.

Which stall has the greatest angle of attack?
A) High speed stall (shock stall).
B) Deep stall.
C) Accelerated stall.
D) Low speed stall.

A jet aeroplane cruises buffet free at high constant altitude in significant turbulence. Which type of stall can occur if this aeroplane decelerates?
A) Accelerated stall.
B) Low speed stall.
C) Deep stall.
D) Shock stall.

On a swept wing aeroplane at low airspeed, the pitch up phenomenon:
A) is caused by extension of trailing edge lift augmentation devices.
B) never occurs, since a swept wing is a remedy to pitch up.
C) is caused by wingtip stall.
D) is caused by boundary layer fences mounted on the wings.
Coz loss of lift at wing tip moves CP forward, giving nose up pitching movement.

Which of the following statements about stall speed is correct?
A) Use of a T-tail will decrease the stall speed.
B) Increasing the anhedral of the wing will decrease the stall speed.
C) Increasing the angle of sweep of the wing will decrease the stall speed.
D) Decreasing the angle of sweep of the wing will decrease the stall speed.

How are the wing stalling angle and the lift coefficient affected when altitude increases and EAS is held constant?

A) The lift coefficient remains constant and the wing stalling angle will reduce.
B) The lift coefficient and the wing stalling angle both remain constant.
C) The lift coefficient and the wing stalling angle both decrease.
D) The lift coefficient decreases and the stalling angle remains the same.

The stall speed:

A) does not depend on weight.
B) decreases with an increased weight.
C) increases with an increased weight.
D) increases with the length of the wingspan.

Increase of wing loading will:

A) increase the stall speeds.
B) decrease take off speeds.
C) increase CLmax.
D) decrease the minimum gliding angle.

The most common stall sensing devices are normally located:

A) at or near the wing leading edge.
B) at the transition point.
C) on the upper surface of the wing.
D) on the lower surface of the wing.

If angle of attack is increased beyond the critical angle of attack, the lift coefficient ... and the stagnation point moves...

A) increases; forward.
B) decreases; forward.
C) increases; rearward.
D) decreases; rearward.

In a turn, the wing stalling angle:

A) decreases when the rate of turn is low.
B) remains unchanged.
C) increases when the rate of turn is high.
D) increases on the outer wing.

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21. As the angle of attack of a wing is increased, the centre of pressure will reach its most forward position on the wing...

A) after stall recovery.
B) when the aircraft is stalling.
C) at the optimum angle of attack.
D) just before the wing stalls.

Which of the following are used as stall warning devices?

A) Stick shaker and stall strip.
B) Angle of attack sensor and stall strip.
C) Stick shaker and angle of attack indicator.
D) Angle of attack indicator and speed indicator.

Which kind of boundary layer has the strongest change in velocity close to the surface?

A) Laminar boundary layer.
B) No difference.
C) Turbulent boundary layer.
D) Transition boundary layer.

One disadvantage of the swept back wing is it is stalling characteristics. At the stall:

A) tip stall will occur first, which produces a nose-down moment.
B) leading edge stall will occur first, which produces a nose-down moment.
C) tip stall will occur first, which produces a pitch-up moment.
D) wing root stall will occur first, which produces a rolling moment.

Which of the following aircraft designs would be most prone to super stall?

A) Swept back wing.
B) Pod mounted engines beneath the wing.
C) T-tail.
D) Swept forward wing.

The stall speed in a 60° banked turn increases by the following factor:

A) 1.30
B) 1.07
C) 2.00
D) 1.41

The speed range between high and low speed buffet:

A) increases during a descent at a constant IAS.
B) decreases during a descent at a constant Mach number.
C) increases during climb.
D) is always positive at Mach numbers below MMO.

The boundary layer of a wing is caused by:

A) the normal shock wave at transonic speeds
B) suction at the upper wing side.
C) a turbulent stream pattern around the wing.
D) a layer on the wing in which the stream velocity is lower than the free stream velocity, due to friction.

The most important problem of ice accretion on an aeroplane during flight is:

A) blocking of control surfaces.
B) increase in drag.
C) reduction in CLmax.
D) increase in weight.

The stalling speed in IAS will change according to the following factors?

A) May increase when the c.g. moves forward, with higher altitude and due to the slip stream from a propellor on an engine located forward of the wing.
B) Will increase in a turn, higher temperature and will increase when the c.g. moves aft.
C) May increase with altitude, especially high altitude, will increase during icing conditions and will increase when the c.g. moves forward.
D) Will increase with increased load factor, more flaps and increased bank angle in a turn.

The pitch up effect of an aeroplane with swept wing in a stall is due to the:

A) aft movement of the centre of gravity.
B) forward movement of the centre of gravity.
C) wing tip stalling first.
D) wing root stalling first.

When an aircraft with a typical aerofoil is in level flight at low speed and high angle of attack, the normal axis is:

A) horizontal from front to rear.
B) vertical.
C) horizontal from side to side.
D) nearly vertical.

With increasing angle of attack, the C of P on an airfoil will reach its most forward point:

A) at various points dependent on aircraft weight.
B) above the stalling angle.
C) at the stalling angle.
D) below the stalling angle.

An aeroplane has a stall speed of 78 KCAS at its gross weight of 6.850 lbs. What is the stall speed when the weight is 5.000 lbs?

A) 78 KCAS
B) 91 KCAS
C) 67 KCAS
D) 57 KCAS

What causes a swept wing aircraft to pitch-up at the stall:

A) Rearward movement of the CP
B) Negative camber at the root.
C) Span wise flow.
D) Separated airflow at the root.

Load factors has the following meaning:

A) the ratio of a specified load to the mass or the aircraft the former being expressed in terms of aerodynamic and inertia forces
B) the ratio of a specified load to the mass of the aircraft, the former being expressed in terms of aerodynamic forces, inertia forces and ground reactions
C) the loads assumed to occur in the anticipated operating conditions
D) the ratio of a specified load to the weight of the aircraft, the former being expressed in terms of aerodynamic forces, inertia forces and ground reactions

How does the wings centre of pressure move with increasing angle of attack?

A) It does not move at all.
B) To the rear.
C) To the right.
D) Forward.

The stall speed increases, when? (all other factors of importance being constant)

A) weight decreases.
B) pulling out of a dive.
C) spoilers are retracted.
D) minor altitude changes occur e.g. 0-10.000 ft.

Which of the following is the correct order of configuration to give an increasing critical angle of attack?

A) Clean wing, trailing edge flaps extended, slats extended.
B) Trailing edge flaps extended, clean wing, slats extended.
C) Clean wing, slats extended, trailing edge flaps extended.
D) Slats extended, clean wing, trailing edge flaps extended.

The normal stall recovery procedure for a light single engined aeroplane is:

A) idle power and stick roll-neutral nose-down and no other corrections.
B) full power and stick roll-neutral nose-down, correcting for angle of bank with rudder.
C) full power and stick roll-neutral nose-down, correction for angle of bank with stick.
D) idle power and stick neutral, waiting for the natural nose-down tendency.

41. What is the percentage increase in stall speed in a 45 bank turn

A) 19%
B) 45%
C) 41%
D) 10%

When an aircraft wing stalls:

A) a straight wing will tend to stall from the tip and the CP will move backwards.
B) a wing which is not swept back will stall from the root and the CP will move forwards.
C) a swept back wing will stall from the root and the CP will move aft.
D) a swept back wing will stall from the tip and the CP will move forward.

At the same weight, with the CG at its forward limit:

A) VS is lower, the stalling angle is unchanged.
B) VS is higher, the stalling angle is unchanged.
C) VS is higher, the stalling angle is greater.
D) VS is lower, the stalling angle is less.

Stick pusher is installed in aircraft when:

A) The a/c has not yaw damper installed.
B) The a/c is used in supersonic speeds.
C) The aircraft is directional unstable.
D) The a/c has failed to meet the stalling requirements by normal category.

Two identical aeroplanes A and B are flying horizontal steady turns. Further data are:

A. W=1500 kg Bank= 20° TAS= 130 kt
B. W= 1500 kg Bank= 20° TAS= 200 kt

Which of the following statements is correct?

A) The load factor A is larger than the load factor B.
B) The lift coefficient A is smaller than the lift coefficient B
C) The turn radius A is larger than the turn radius B.
D) The rate of turn A is larger than the rate of turn B.

Which of the following situations leads to a decreasing stall speed (IAS)?

A) increasing load factor.
B) decreasing weight.
C) increasing air density.
D) increasing altitude.

The purpose of a fixed spoiler on the leading edge of a wing at the root is to:

A) prevent the wing from stalling at the root.
B) reduce the landing distance required.
C) ensure that the root of the wing stalls before the tip does.
D) imparting fresh momentum to the particles in the boundary layer on the top of the wing.

Which combination of design features is known to be responsible for deep stall:

A) Swept back wings and a T-tail.
B) Swept back wings and wing mounted engines.
C) Straight wings and aft fuselage mounted engines.
D) Straight wings and a T-tail.

In a level turn with 60° lateral bank, the load factor is 2.0 and the stall speed increases by:

A) 10 %
B) 40 %
C) 50 %
D) 20 %

By what approximate percentage will the stall speed increase in a horizontal coordinated turn with a bank angle of 45° ?

A) 52%
B) 19%
C) 41%
D) 31%

The critical angle of attack:

A) changes with an increase in gross weight.
B) remains unchanged regardless of gross weight.
C) increases if the CG is moved forward.
D) decreases if the CG is moved aft.

Which of the following is the correct designation of stall speed in the landing configuration:

A) VS1
B) VS0
C) VS1g
D) VSL

An airplane has been loaded in such a manner that the centre of gravity is located behind the aft centre of gravity limit. One undesirable flight characteristic a pilot might experience with this airplane would be:

A) stalling at higher-than-normal airspeed.
B) the tendency of a wing to stall at high airspeed.
C) a longer takeoff run.
D) difficulty in recovering from a stalled condition.

Vso is defined as the:

A) stalling speed or minimum steady flight speed in the landing configuration.
B) minimum second segment speed.
C) stalling speed or minimum steady flight speed in a specified configuration.
D) stalling speed or minimum takeoff safety speed.

What is the standard stall recovery for a light aircraft?

A) Pitch down, stick neutral roll, do not correct for bank
B) Pitch down, stick neutral roll, correct for bank with aileron.
C) Pitch down, stick neutral roll, correct for bank with rudder.
D) Pitch down, stick neutral, wait for neutral tendency.

An aeroplane has a stall speed of 100 kt at a load factor n=1. In a turn with a load factor of n=2, the stall speed is:

A) 70 kts
B) 141 kts
C) 200 kts
D) 282 kts

During an erect spin recovery:

A) the control stick is moved side ways, in the direction of the angle of bank.
B) the control stick is moved side ways, against the angle of bank.
C) the ailerons are held in the neutral position.
D) the control stick is pulled to the most aft position.

The stalling speed in IAS will change according to the following factors:

A) increase during turn, increased mass and forward c.g. location.
B) decrease in a forward c.g. location, higher altitude and due to the slip stream from a propeller on an engine located forward of the wing.
C) increase with increased load factor, icing conditions and an aft c.g. location.
D) increase with increased load factor, more flaps but will not increase due to the bank angle in a turn.

With the centre of gravity on the forward limit, the stalling speed would be:

A) higher than with the centre of gravity on the aft limit.
B) the same as with the centre of gravity on the aft limit.
C) independent of the centre of gravity position.
D) lower than with the centre of gravity on the aft limit.

With the center of gravity on the forward limit, the stalling speed would be:

A) independent of the center of gravity position.
B) higher than with the center of gravity on the aft limit.
C) lower than with the center of gravity on the aft limit.
D) the same as with the center of gravity on the aft limit.

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61. At the point of stall:

A) lift decreases, drag decreases.
B) lift constant, drag increases.
C) lift decreases, drag increases.
D) lift decreases, drag constant.

The following take place at the transition point on a wing:

A) the laminar flow meets the separation point.
B) the boundary layer makes the transition from laminar flow to the turbulent boundary layer.
C) the airflow separates completely from the wing surface.
D) the total dynamic and static pressure comes to a standstill.

A low wing loading (aircraft weight has been reduced):

A) increases take-off run, stalling speed and landing speed.
B) decreases stalling speed and landing speed.
C) increases stalling speed.
D) does not affect any of the above.

Stalling speed in a 15s bank level turn is 60kt. The stalling speed in a 45s bank level turn will be:

A) 70 kts
B) 85 kts
C) 60 kts
D) 83 kts

Which of the following is the speed in level flight that would activate the stall warning?

A) 1.5VS1G
B) 1.05VS1G
C) 1.2VS1G
D) VS1G + 15kts

How does stalling speed (IAS) vary with altitude?

A) It remains constant at lower altitudes but decreases at higher altitudes due to compressibility effects.
B) It increases with increasing altitude, because the density decreases.
C) It remains constant.
D) It remains constant at lower altitudes but increases at higher altitudes due to compressibility effects.

Which of the following statements about boundary layers is correct?

A) The turbulent boundary layer is thinner than the laminar boundary layer.
B) The turbulent boundary layer gives a lower skin friction than the laminar boundary layer.
C) The turbulent boundary layer has more kinetic energy than the laminar boundary layer.
D) The turbulent boundary layer will separate more easily than the laminar boundary layer.

As the center of gravity is changed, recovery from a stall becomes progressively:
A) more difficult as the center of gravity moves forward.
B) is unaffected by center of gravity position, only by all up weight.
C) more difficult as the center of gravity moves aft.
D) less difficult as the center of gravity moves aft.

Which of the following statements about the spin is correct?
A) During spin recovery the ailerons should be kept in the neutral position.
B) In the spin, airspeed continuously increases.
C) An aeroplane is prone to spin when the stall starts at the wing root.
D) Every aeroplane should be designed such that it can never enter a spin.

The angle of attack at which a wing stalls will:
A) change with an increase in gross weight.
B) increase if the centre of gravity is moved aft.
C) remain the same regardless of gross weight.
D) increase if the centre of gravity is moved forward.

Entering the stall the centre of pressure of a straight (1) wing and of a strongly swept back wing (2) will:
A) (1) move aft, (2) move forward.
B) (1) move aft, (2) not move.
C) (1) not move (2) move forward.
D) (1) move aft, (2) not move.

Compared with stalling airspeed (VS) in a given configuration, the airspeed at which stick shaker will be triggered is:
A) 1.12 VS
B) 1.20 VS
C) greater than VS.
D) 1.30 VS

If an aircraft has a stalling speed of 90 kts IAS (n=1), what will be the stalling speed in a 60° level and coordinated turn?
A) 112 kts
B) 99 kts
C) 127 kts
D) 90 kts

Which of the following statements about the stall of a straight wing aeroplane is correct?
A) The horizontal tail will stall at a higher speed than the wing.
B) Just before the stall the aeroplane will be have a nose-down tendency.
C) Buffeting is the result of flow separation on the tail plane.
D) The nose down effect is the result of increasing downwash, due to flow separation.

A boundary layer fence on a swept wing will:

A) improve the low speed characteristics.
B) improve the high speed characteristics.
C) increase the critical Mach Number.
D) improve the lift coefficient of the trailing edge flap.

Which aeroplane design has the highest probability of a super stall?

A) A T-tail.
B) A low horizontal tail.
C) A canard wing.
D) Swept wings.

If the straight and level stall speed is 100 kt, what will be the stall speed in a 1.5g turn?

A) 81 kts
B) 122 kts
C) 150 kts
D) 100 kts

The function of the stick pusher is:

A) to pull the stick, to avoid a high speed stall.
B) to vibrate the controls.
C) to activate and push the stick forward prior to stick shaker.
D) to activate and push the stick forward at or beyond a certain value of angle of attack.

How does stalling speed vary with load factor?

A) It increases proportionally with the square root of the load factor.
B) It increases proportionally with the load factor.
C) It decreases inversely with the load factor.
D) It decreases inversely with the square root of the load factor.

When entering a stall, the CP of a straight wing will (i) and of a strongly swept wing will (ii):

A) (i) move aft, (ii) move forward
B) (i) not move, (ii) not move
C) (i) move aft, (ii) not move
D) (i) move aft, (ii) move aft

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81. What factors determine the distance travelled over the ground of an aeroplane in a glide?

A) The wind and the aeroplane s mass.
B) The wind and weight together with power loading, which is the ratio of power output to the weight.
C) The wind and CLmax.
D) The wind and the lift/draq ratio, which changes with angle of attack.

Compared with level flight prior to the stall, the lift (1) and drag (2) in the stall change as follows:
A) (1) increases; (2) decreases.
B) (1) decreases; (2) decreases.
C) (1) decreases; (2) increases.
D) (1) increases; (2) increases.

The standard procedure for recovery from a stall in a light single engine aircraft is:
A) idle power; stick neutral, wait for normal nose down tendency.
B) idle power; stick - roll neutral and forward.
C) maximum power; stick - roll neutral and forward, correct for bank with rudder.
D) maximum power; stick - roll neutral and forward, correct for bank with stick.

After the transition point between the laminar and turbulent boundary layer:
A) the mean speed and friction drag increases.
B) the mean speed increases and the friction drag decreases.
C) the boundary layer creates thinner and the speed increases.
D) the boundary layer gets thicker and the speed decreases.

The wing of an aeroplane will never stall at low subsonic speeds as long as:
A) the angle of attack is smaller than the value at which the stall occurs.
B) the CAS exceeds the power-on stall speed.
C) there is a nose-down attitude.
D) the IAS exceeds the power-on stall speed.

The load factor is:
A) the ratio of thrust to weight.
B) the ratio of lift to weight.
C) the ratio of centripetal force to lift.
D) the ratio of lift to drag.

An aircraft whose weight is 237402 N stalls at 132 kt. At a weight of 356103 N it would stall at:
A) 108 kt
B) 162 kt
C) 172 kt
D) 88 kt

The input to a stick shaker comes from:
A) the airspeed, and sometimes the rate of change in airspeed.
B) the angle of attack only.
C) angle of attack, and sometimes the rate of change in angle of attack.
D) the angle of incidence.

Stick pushers must be installed in aeroplanes with dangerous stall characteristics. Dangerous stall characteristics include:

A) pitch down and minor wing drop.
B) excessive wing drop and deep stall.
C) pitch down and yaw.
D) pitch down and increase in speed.

The sensor of a stall warning system can be activated by a change in the location of the:

A) centre of gravity.
B) stagnation point.
C) centre of lift.
D) transition region.

Which type of stall has the largest associated angle of attack?

A) Deep stall.
B) Low speed stall.
C) Shock stall.
D) Accelerated stall.

Which statement is correct about the laminar and turbulent boundary layer:

A) friction drag will be equal in both types of layers.
B) friction drag is lower in the laminar layer
C) separation point will occur earlier in the turbulent layer.
D) friction drag is lower in the turbulent layer.

When a pilot makes a turn in horizontal flight, the stall speed:

A) decreases with increasing bank angle.
B) increases with the square root of load factor.
C) increases with flap extension.
D) increases with the load factor squared.

C_{Lmax} Augmentation:

A slotted flap will increase the CLmax by:
A) increasing only the camber of the aerofoil.
B) increasing the critical angle of attack.
C) increasing the camber of the aerofoil and improving the boundary layer.
D) decreasing the skin friction.

When a trailing edge flap is lowered fully:
A) the C of P moves to the rear and lift/drag ratio is increased.
B) the C of P moves forwards and lift/drag ratio is decreased.
C) the C of P moves to the rear and lift/drag ratio is unaffected.
D) the C of P moves to the rear and lift/drag ratio is decreased.

Which statement is correct?
A) Extension of flaps causes a reduction of the stall speed, the maximum glide distance also reduces.
B) Spoiler extension decreases the stall speed and the minimum rate of descent, but increases the minimum descent angle.
C) Extension of flaps has no influence on the minimum rate of descent, as only the TAS has to be taken into account.
D) Extension of flaps will increase (CL/CD)max, causing the minimum rate of descent to decrease.

When the angle of attack of an aircraft is progressively increased, the wing center of pressure will reach its most forward position:
A) when the aircraft has stalled.
B) at the maximum lift coefficient (Clmax).
C) when the airplane flies at an angle of attack where the lift-to-drag ratio is maximum.
D) at the optimum angle of attack of the wing.

What is the most effective flap system?
A) Single slotted flap.
B) Split flap.
C) Fowler flap.
D) Plain flap.

An aeroplane with swept back wings is equipped with slats and/or leading edge (L.E.) flaps. One possible efficient way to arrange the leading edge devices on the wings is?
A) Wing roots: slats Wing tips: no devices.
B) Wing roots: L.E. flaps Wing tips: slats.
C) Wing roots: slats Wing tips: L.E. flaps.
D) Wing roots: L.E. flaps Wing tips: no devices.

Which of the following statements about the difference between Krueger flaps and slats is correct?

A) Deploying a Krueger flap will increase critical angle of attack, deploying a slat does not.
B) Deploying a Krueger flap will form a slot, deploying a slat does not.
C) Deploying a slat will increase critical angle of attack, deploying a Krueger flap does not.
D) Deploying a slat will form a slot deploying a Krueger flap does not.

The function of the slot between an extended slat and the leading edge of the wing is to:

A) slow the air flow in the slot so that more pressure is created under the wing.
B) reduce the wing loading.
C) allow space for vibration of the slat.
D) cause a venturi effect which energizes the boundary layer.

Vortex generators:

A) take kinetic energy out of the boundary layer to reduce separation.
B) transfer energy from the free airflow into the boundary layer.
C) change the turbulent boundary layer into a laminar boundary layer.
D) reduce the span wise flow on swept wing.

When, in flight, you lower the trailing edge flaps fully down:

A) the wing C of P moves forward and the L/D ratio increases.
B) the stalling angle reduces and the L/D ratio increases.
C) the wing C of P moves aft and the L/D ratio decreases.
D) the stalling angle increases and the L/D ratio reduces.

The trailing edge device shown in the figure is a:

A) split flap.
B) Fowler flap.
C) Krueger flap
D) plain flap.

When vortex generators are fitted they will normally be found:

A) towards the wing trailing edge.
B) on the underside of the wing towards the leading edge.
C) towards the wing root to act as a stall inducer.
D) near the wing leading edge in front of control surfaces.

During the extension of the flaps at a constant angle of attack the aeroplane starts to: (all other factors of importance being constant)

A) climb.
B) yaw.
C) sink suddenly.
D) bank.

Deploying a Fowler flap, the flap will:

A) move aft, then turn down.
B) just move aft.
C) just turn down.
D) turn down, then move aft.

An aeroplane has the following flap settings: 0° , 15° , 30° and 45° . Slats can be selected too. Which of the above selections will produce the greatest negative influence on the CL/CD ratio?

A) The slats.
B) Flaps from 15° to 30° .
C) Flaps from 0° to 15° .
D) Flaps from 30° to 45° .

The effect of Winglets is:

A) elliptical pressure distribution increases.
B) reduction in induced drag.
C) decrease in stall speed.
D) longitudinal static stability increases.

When flaps are extended in a straight and level flight at constant IAS, the lift coefficient will eventually:

A) remain the same.
B) increase.
C) decrease.
D) first increase and then decrease.

When spoilers are used as speed brakes:

A) at same angle of attack, CL remains unaffected.
B) CLmax of the polar curve is not affected.
C) at same angle of attack, CD is increased and CL is decreased.
D) they do not affect wheel braking action during landing.

When a trailing edge flap is lowered during flight from take-off position to fully down position, one will experience:

A) a small increase in lift and a small increase in drag.
B) a small increase in lift and a large increase in drag.
C) a large increase in lift and a small increase in drag.
D) a large increase in lift and a large increase in drag.

What is the purpose of an auto-slat system?

A) Assist the ailerons during rolling.
B) Provide automatically slat IN selection after take-off.
C) Extend automatically when a certain value of angle of attack is exceeded.
D) Ensures that the slats are always extended when the ground/flight system is in the ground position.

21. The type of flap which extends rearward from the trailing edge as it is lowered is:

A) a zap flap.
B) a split flap.
C) a Krueger flap
D) a fowler flap.

Which of the following series of configurations has an increasing critical angle of attack?

A) flaps only extended, clean wing, slats only extended.
B) slats only extended, flaps only extended, clean wing.
C) slats only extended, clean wing, flaps only extended.
D) clean wing, flaps only extended, slats only extended.

Where on the surface of a typical aerofoil will flow separation normally start at high angles of attack?

A) lower side leading edge.
B) lower side trailing edge.
C) upper side leading edge.
D) upper side trailing edge.

When the trailing edge flaps are deflected in level flight, the change in pitch moment will be:

A) zero.
B) dependent on c.g. location.
C) nose up.
D) nose down.

If the flaps are lowered but the airspeed is kept constant, to maintain level flight:

A) the altitude must be held constant.
B) the nose must be pitched up.
C) the nose must be pitched down.
D) spoilers must be deployed.

The effects of leading edge slats:

A) increase boundary layer energy, move suction peak on to slat and increase CLMAX angle of attack.
B) decrease boundary layer energy, move suction peak onto slat, move CLMAX to a lower angle of attack.
C) increase boundary layer energy, increase suction peak on main wing section, move CLMAX to a higher angle of attack.
D) increase camber, increase suction peak on main wing, increase effective angle of attack and move CLMAX to higher angle of attack.

Flaps are used in order to:

A) decrease stalling speed and reduce max angle of attack thereby achieving a more nose down attitude near and at stalling speed.
B) increase max L/D.
C) increase max lift coefficient by increasing max angle of attack.
D) reducing drag.

Deflection of leading edge flaps will:

A) increase critical angle of attack.
B) not affect critical angle of attack.
C) decrease drag.
D) decrease CLmax.

On a wing fitted with a fowler type trailing edge flap, the Full extended position will produce:

A) an unaffected wing area and increase in camber.
B) an unaffected CD, at a given angle of attack.
C) an increase in wing area only.
D) an increase in wing area and camber.

During flap down selection in a continuous straight and level flight at constant IAS and weight:

A) the stall speed increases.
B) the centre of pressure moves aft.
C) the lift coefficient and the drag coefficient increase.
D) the total boundary layer becomes laminar.

Cmax may be increased by the used of:

A) slats.
B) boundary layer control.
C) flaps.
D) A, B and C.

Compared with the flap up configuration the maximum angle of attack for the flaps down configuration is:

A) unchanged.
B) smaller.
C) smaller or larger depending on flap deflection.
D) larger.

How is the pitching moment affected if flaps are deployed in straight and level flight?

A) Pitch up.
B) Pitch down.
C) Depends on CG position.
D) Flap deployment has no effect on aircraft pitching moment.

How is the pitching moment affected if flaps are deployed in straight and level flight?

A) Depends on CG position.
B) Pitch up.
C) Pitch down.
D) Flap deployment has no effect on aircraft pitching moment.

What is the effect of lowering leading edge and trailing edge flaps in flight?

A) Cl increases, Cd increases and the stalling angle of attack increases.
B) Cl remains constant, Cd increases and the stalling angle of attack remains the same.
C) Cl increases, Cd remains the same and the stalling angle of attack increases.
D) Cl decreases, Cd increases and the stalling angle of attack reduces.

Which type of flap is shown in the picture?

A) Single slotted flap.
B) Plain flap.
C) Split flap.
D) Fowler flap.

During the retraction of the flaps at a constant angle of attack the aeroplane starts to (all other factors of importance being constant):

A) bank.
B) yaw.
C) sink suddenly.
D) climb.

What increases the stalling angle of attack? Use of:

A) spoilers.
B) fuselage mounted speed-brakes.
C) flaps.
D) slats

Lowering the inboard flaps causes the wing Centre of Pressure:

A) to move forward.
B) to move inward and forward.
C) to move outboard towards the wing tips.
D) to move inboard towards the wing root

Slats:

A) re-energise the boundary layer thereby decreasing the stalling angle of attack.
B) de-energise the boundary layer thereby increasing the stalling angle of attack.
C) re-energise the boundary layer thereby increasing the stalling angle of attack.
D) de-energise the boundary layer, thereby decreasing the stalling angle of attack.

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41. When deploying the flaps the effective angle of attack:

A) increases.
B) decreases.
C) may increase of decrease depending on the aircraft type.
D) remains the same.

The purpose of a fixed spoiler on the leading edge of a wing at the root is to:

A) prevent the wing from stalling at the root.g
B) re-energise the boundary layer thereby delaying the stall (although at a cost of increased from drag).
C) reduce the landing run.
D) ensure that the root of the wing stalls before the tip.

Vortex generators mounted on the upper wing surface will:

A) decrease the stalling speed by increase of the tangential velocity of the swept wing.
B) increase the effectiveness of the spoiler due to increase in parasite drag.
C) decrease the interference drag of the trailing edge flaps.
D) decrease the shock wave induced separation.

It is possible to reduce the span wise airflow over swept wings, due to adverse pressure gradients, by:

A) wing fences.
B) increased anhedral.
C) trailing edge vortex generators.
D) leading edge stall inducers.

Extension of FOWLER type trailing edge lift augmentation devices, will produce:

A) a nose-down pitching moment.
B) a force which reduces drag.
C) a nose-up pitching moment.
D) no pitching moment.

After take-off the slats (when installed) are always retracted later than the flaps. Why?

A) Because SLATS EXTENDED provides a better view from the cockpit than FLAPS EXTENDED.
B) Because VMCA with SLATS EXTENDED is more favourable compared to the FLAPS EXTENDED situation.
C) Because FLAPS EXTENDED gives a large decrease in stall speed with relatively less drag.
D) Because SLATS EXTENDED gives a large decrease in stall speed with relatively less drag.

In order to maintain straight and level flight at a constant airspeed, whilst the flaps are being retracted, the angle of attack will:

A) decrease.
B) increase.
C) remain constant.
D) increase or decrease depending on type of flap.

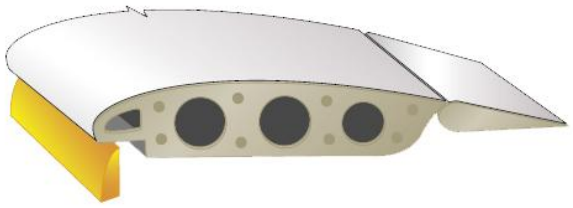
Deploying a Fowler flap, the flap will:

A) move aft, then turn down.
B) turn down, then move aft.
C) just turn down.
D) just move aft.

If flaps are deployed at constant IAS in straight and level flight, the magnitude of tip vortices will eventually: (flap span less than wing span)

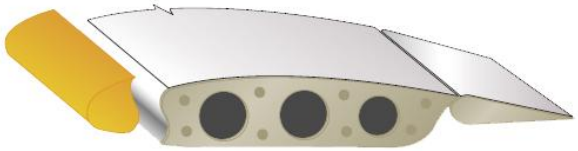
A) remain the same.
B) increase or decrease, depending on the initial angle of attack.
C) decrease.
D) increase.

The high lift device shown in the figure is a:



A) Fowler flap.
B) Slot or slat.
C) Krueger flap.
D) Slotted flap.

The high lift device shown in the figure is a:



A) Slotted flap.
B) Krueger flap.
C) Fowler flap.
D) Leading edge slot

A plain flap will increase CLmax by:

A) centre of lift movement.
B) increasing angle of attack.
C) boundary layer control.
D) increasing the camber of the aerofoil.

If a smaller flap setting is selected for take-off compared to a larger angle of flap selection:

A) stalling speed and V2 both decrease, while VR and VLOF both increase.
B) the stalling speed decreases and V2, VR and VLOF remain the same.
C) stalling speed, V2, VR and VLOF all increase.
D) VR and VLOF decrease and the stalling speed remains the same.

A deployed slat will:

A) increase the boundary layer energy and increase the suction peak on the fixed part of the wing, so that the stall is postponed to higher angles of attack.
B) decrease the boundary layer energy and decrease the suction peak on the slat, so that CLmax is reached at lower angles of attack.
C) increase the camber of the aerofoil and increase the effective angle of attack, so that CLmax is reached at higher angles of attack.
D) increase the boundary layer energy, move the suction peak from the fixed part of the wing to the slat, so that the stall is postponed to higher angles of attack.

When flaps are deployed at constant angle of attack the lift coefficient will:

A) vary as the square of IAS.
B) remain the same.
C) increase.
D) decrease.

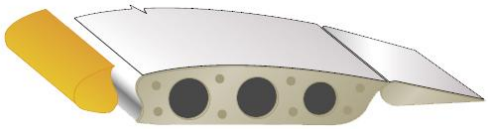
The trailing edge flaps when extended:

A) increase the zero lift angle of attack.
B) significantly lower the drag.
C) significantly increase the angle of attack for maximum lift.
D) worsen the best angle of glide.

Slats:

A) both A and B.
B) neither A or B.
C) decrease the minimum angle of attack.
D) increases Clmax.

What type of high lift device is depicted on the attached picture?



A) Fowler flap.
B) Slotted flap.
C) Krueger flap.
D) Slot

One of the main purposes of using flaps during approach and landing is to:

A) permit a higher reference speed (Vref) for landing.
B) decrease the angle of descent without increasing the airspeed.
C) shift the centre of gravity aft.
D) increase the angle of descent without increasing the airspeed.

The use of a slot in the leading edge of the wing enables the aeroplane to fly at a slower speed because:

A) it changes the camber of the wing.
B) the laminar part of the boundary layer gets thicker.
C) it decelerates the upper surface boundary layer air.
D) it delays the stall to a higher angle of attack.

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61. Following the deployment of leading edge slats:

A) the boundary layer is re-energised and the peak pressure moves forward onto the slat.
B) the boundary layer is re-energised and the peak pressure moves forward towards the wing leading edge.
C) the boundary layer is de-energised and the peak pressure moves forward onto the slat.
D) the boundary layer is de-energised and the peak pressure moves forward towards the wing leading edge.

What is the effect of deploying leading edge flaps?

A) Decrease CLMAX.
B) Not affect the critical angle of attack.
C) Increase the critical angle of attack.
D) Decrease the critical angle of attack.

The lift coefficient C of a wing at a given angle of attack:

A) is reduced when high lift devices are used.
B) is dependent on the surface area of the wing.
C) is constant and not affected by high lift devices.
D) is increased by the use of high lift devices.

Which of the following occurs when trailing edge flaps are extended?

A) The critical angle of attack remains constant and stall speed increases.
B) The critical angle of attack decreases and CLMAX increases.
C) The critical angle of attack is constant, but CLMAX increases.
D) CLMAX increases and the critical angle of attack increases.

Means to decrease CL to C_D ratio, increasing drag:

The maximum lift-to-drag ratio for an aircraft 13,6. Calculate the minimum glide angle and the maximum range measured along the ground covered by the airplane in a power-off glide that starts at an altitude of 10.000ft.

A) Minimum glide angle = 3.2 degrees, maximum range = 15.6 miles.
B) Minimum glide angle = 5.2 degrees, maximum range = 35.6 miles.
C) Minimum glide angle = 4.2 degrees, maximum range = 25.6 miles.
D) Minimum glide angle = 2.2 degrees, maximum range = 25.6 miles.

Which of the following is the most important result/problem caused by ice formation?

A) Blockage of the controls.
B) Increased weight.
C) Reduction in CLMAX.
D) Increased drag.

The optimum angle of attack for a typical airfoil is about..., and the actual angle of attack will be close to this optimum angle during..

A) 16° , a stall.
B) 4° , a stall.
C) 4° , cruise.
D) 16° , cruise.

Upon extension of a spoiler on a wing:

A) only CL is decreased (CD remains unaffected).
B) CD is increased and CL is decreased.
C) both CL and CD are increased.
D) CD is increased, while CL remains unaffected.

An aircraft has trailing edge flap positions of 0, 15, 30 and 45 degrees plus slats can be deployed. What will have the greatest negative influence on CL / CD?

A) Deploying slats.
B) 15 - 30 flaps.
C) 0 - 15 flaps.
D) 30 - 45 flaps.

If the weight of an aircraft is increased, the maximum lift-to-drag ratio will:

A) decrease.
B) not be affected.
C) increase.
D) increases although the corresponding airspeed will be lower.

Spoiler deflection causes:

A) an increase in lift only.
B) an increase in drag and decrease in lift.
C) decrease in lift and drag.
D) an increase in lift and drag.

Speed brakes are a device used on large transport category aircraft:

A) and are an old version of anti block system.
B) used at high speeds for turning when a yaw damper is not installed.
C) for speed reduction after landing.
D) to increase drag in order to maintain a steeper gradient of descent.

The Boundary layer:

Why are vortex generators often fitted on aircraft with straight wings?

A) To delay boundary layer separation.
B) To reduce span wise airflow towards the wing root on the intrados.
C) To reduce span wise airflow towards the wing tips on the extrados.
D) To reduce induced drag.

The boundary layer of a body in a moving airstream is:

A) a layer of air over the surface where the airspeed is changing from free stream velocity to zero velocity.
B) a layer of air which is moving at free stream speed.
C) a thin layer of air over the surface where the air is stationary.
D) a layer of separated flow where the air is turbulent.

The transition point located on the wing is the point where...

A) airflow starts separating from the wing.
B) the airflow changes from subsonic to supersonic flow.
C) the boundary layer changes from laminar flow to turbulent flow.
D) the static pressure reaches its highest value.
Both d and A are correct

The boundary layer is considered to be turbulent?

A) Just in front of the transition point.
B) Between the transition and separation points.
C) Just aft of the separation point.
D) Just in front of the centre of pressure.

The advantage of a turbulent boundary layer over a laminar boundary layer is:

A) increased skin friction.
B) decreases energy.
C) thinner.
D) less tendency to separate.

There are two types of boundary layer: laminar and turbulent. One important advantage the turbulent boundary layer has over the laminar type is that:

A) it is thinner.
B) energy is less.
C) it has less tendency to separate from the surface.
D) skin friction drag is less.

A laminar boundary layer is... and has... drag than a turbulent layer:

A) thin; less
B) thick; more
C) thin; more
D) thick; less

Special Circumstances:

When pulling out of a dive (e.g. looping) the angle of attack:
A) increases.
B) decreases.
C) cannot be increased at all for structural reasons.
D) remains the same.

If ice is present on the leading edge of the wings, it may increase the landing distance due to higher Vth with:
A) 30-40 %
B) 10-20 %
C) 5-10 %
D) 40-50 %

In which phase of the take-off is the aerodynamic effect of ice located on the wing leading edge most critical?
A) All phases of the take-off are equally critical.
B) The take-off run.
C) During climb with all engines operating.
D) The last part of the rotation.

Which is the most critical phase regarding ice on a wing leading edge?
A) During the take off run.
B) Climb with all engines operating.
C) All phases are equally important.
D) The last part of rotation.

Transonic Aerodynamics:
The Mach number Definitions

When accelerating through the region of transonic flight:
A) the centre of pressure will move forward and contribute to a better lift-to-drag ratio.
B) the centre of pressure will move to the rear and cause a nose up trim change.
C) the centre of pressure will move aft and cause an increased stability in pitch.
D) the centre of pressure will move forward and cause a nose up trim change.

Which statement with respect to the speed of sound is correct?
A) Doubles if the temperature increases from 9° to 36° Centigrade.
B) Varies with the square root of the absolute temperature.
C) Increases always if the density of the air decreases.
D) Is independent of altitude.

In the transonic range Clmax will ... and the 1g stalling speed will...
A) increase, decrease.
B) increase, increase.
C) decrease, decrease.
D) decrease, increase.

The Mach trim system will:
A) pump the fuel from tank to tank, depending on the Mach Number.
B) adjust the elevator trim tab, depending on the Mach Number.
C) keep the Mach Number automatically constant.
D) adjust the stabilizer, depending on the Mach Number.

The speed of sound is affected by the:
A) density of the air.
B) temperature of the air.
C) pressure of the air.
D) humidity of the air.

A jet aeroplane is cruising at high altitude with a Mach-number, that provides a buffet margin of 0.3g incremental. In order to increase the buffet margin to 0.4g incremental the pilot must:
A) fly at a larger angle of attack.
B) extend the flaps to the first selection.
C) fly at a lower altitude and the same Mach-number.
D) fly at a higher Mach-number.

The maximum obtainable lift coefficient ... when the Mach-number...
A) increases, decreases.
B) decreases, increases.
C) decreases, decreases.
D) stays the same, increases.

Shock stall is:
A) separation of the flow behind the bow wave.
B) separation of the flow at high angles of attack and at high Mach Numbers.
C) separation of the boundary layer behind the shock wave.
D) separation of the flow at the trailing edge of the wing at high Mach Numbers.

On a typical symmetrical airfoil, as the free stream Mach number approaches M 1.0, the centre of pressure will:
A) move aft to the trailing edge.
B) move forward to about 25% chord.
C) move from 25% chord to the leading edge.
D) move aft to about 45% chord.

The speed of sound is a function of altitude because:
A) temperature varies with altitude.
B) pressure varies with altitude.
C) both pressure and temperature vary decrease when altitude increases.
D) sound waves reflect on the ionosphere.

As an aircraft accelerates through the transonic speed range:
A) The coefficient of drag increases then decreases.
B) The coefficient of drag decreases then increases.
C) The coefficient of drag decreases.
D) The coefficient of drag increases.

A shock stall occurs when laminar flow breaks down:
A) at a high angle of attack and high Mach number.
B) behind the shock wave.
C) behind the leading edge.
D) behind the trailing edge.

Reducing the thickness/chord ratio on a wing will:
A) reduce the transonic variations in lift coefficient.
B) all of the above.
C) reduce the transonic variations in drag coefficient.
D) delay the onset of shockwave formation.

Climbing at a constant Mach Number up to FL 350 the TAS will:
A) first increase, then decrease.
B) increase.
C) remain constant.
D) decrease.

How does temperature influence the speed of sound?
A) Speed of sound decreases with temperature increase.
B) Speed of sound is not influenced by temperature.
C) Speed of sound remains constant.
D) Speed of sound increases with temperature increase.

The two areas of speed instability in transonic aircraft are:
A) below VDmin, above M 1.0
B) above VDmin, above M 0.4
C) below VDmin, M 0.89 to 0.98
D) above VDmin, M 0.75 to 0.81

The flight Mach number is 0.8 and the TAS is 400 kts. The speed of sound is:
A) 480 kts
B) 600 kts
C) 320 kts
D) 500 kts

Which of the following flight phenomena can happen at Mach Numbers below the critical Mach Number?
A) Dutch roll.
B) Mach buffet.
C) Tuck under.
D) Shock stall.

The speed of sound in a perfect gas depends only on the ... of the gas.
A) density
B) pressure
C) free stream velocity
D) temperature

A mach trim system operates:
A) at all Mach numbers.
B) above the critical Mach number.
C) at low Mach numbers.
D) at high Mach number.

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21. On a typical transonic airfoil the transonic rearward shift of the CP occurs at about:
A) M 0.89 to M 0.98
B) M 0.81 to M 1.4
C) M 0.75 to M 0.89
D) M 0.75 to M 0.98

The speed of sound in a more compressible fluid, compared to a less compressible fluid is:
A) lower.
B) the same.
C) higher.
D) lower or higher depending on fluid density.

Compressibility effects are usually insignificant below:
A) 350 knots at sea level.
B) 661 knots at sea level.
C) are always significant.
D) Mach 0.4

In the transonic range the aeroplane characteristics are strongly determined by:
A) the TAS.
B) the Mach Number.
C) the CAS.
D) the IAS.

The Mach cone semi-angle:
A) decreases with increasing speed.
B) decreases up to a certain speed, then increases.
C) remains constant at all speeds above MCRIT.
D) increases with increasing speed.

Should a transport aeroplane fly at a higher Mach number than the buffet-onset Mach number?
A) No, this is not acceptable.
B) Yes, but only during approach.
C) Yes, this causes no problems.
D) Yes, if you want to fly fast at very high altitudes.

An aeroplane is descending at a constant Mach number from FL 350. What is the effect on true airspeed?
A) It decreases as altitude decreases.
B) It decreases as pressure increases.
C) It remains constant.
D) It increases as temperature increases.

The maximum acceptable cruising altitude is limited by a minimum acceptable load factor because exceeding that altitude:
A) a sudden necessary bank angle may exceed the limit load factor.
B) turbulence may exceed the limit load factor.
C) turbulence may induce Mach buffet.
D) Mach buffet will occur immediately.

The Mach number:
A) is the ratio between the IAS of the aeroplane and the local speed of sound.
B) is the ratio between the TAS of the aeroplane and the local speed of sound.
C) increases at a given TAS, when the temperature rises.
D) is the ratio between the TAS of the aeroplane and the speed of sound at sea level.

Define the term Mach number.
A) The ratio between TAS and the speed of sound.
B) The ratio between IAS and the speed of sound.
C) The ratio between GS and the speed of sound
D) The ratio between EAS and the speed of sound

If the altitude is increased and the TAS remains constant in the standard troposphere the Mach Number will:

A) increase or decrease, depends of the type of aeroplane.
B) increase.
C) decrease.
D) not change.

By definition, that free stream Mach number at which sonic flow is first obtained somewhere on the airfoil surface is called the ... of the airfoil.

A) drag-divergence Mach-number
B) free stream Mach number
C) critical Mach number
D) high speed Mach number

What comes about due to an increase of the effectiveness of the spoiler due to increase in parasite drag.

A) Elevator stall.
B) Dutch roll.
C) Speed instability.
D) Mach buffet.

The formula for the Mach Number is: (a = speed of sound) is?

A) M= IAS / a
B) M= TAS / a
C) M= a / TAS
D) M= TAS*a

The free stream Mach-number at which the drag coefficient begins to increase rapidly is defined as the ... Mach- number.

A) critical
B) supersonic
C) drag divergence
D) shock stall

To be able to predict compressibility effects you have to determine the:

A) EAS.
B) Mach Number.
C) TAS.
D) IAS.

Compared to a normal transonic airfoil section a supercritical section has:

A) a more cambered top surface.
B) a flatter bottom surface.
C) a very sharp leading edge.
D) a flatter top surface.

Normal Shockwave:

When the presence of a shock wave causes airflow to separate from a body, this is known as:
A) a shock stall.
B) a transonic effect.
C) a stall.
D) a boundary layer stall.

At what speed does a shock wave move forward over the ground?
A) Flight level airspeed.
B) Aircraft ground speed.
C) Speed of sound at ground level.
D) Aircraft TAS.

Air passes a normal shock wave. Which of the following statements is correct?
A) The pressure decreases.
B) The temperature decreases.
C) The temperature increases.
D) The velocity increases.

The least energy loss through a normal shockwave occurs when the local Mach number is:
A) just above 1.0 M
B) just below 1.0 M
C) well above 1.0 M
D) exactly 1.0 M

At an aircraft weight of 70,000lb your aerodynamic ceiling in 1g level flight will be:
A) FL440
B) FL390
C) FL420
D) FL320

When a fluid element flows through a normal shock wave:
A) the Mach-number increases and static pressure increases.
B) the Mach-number decreases and static pressure decreases.
C) the Mach-number decreases and static pressure increases.
D) the Mach-number increases and static pressure decreases.

The high speed buffet is induced by:
A) expansion waves on the wing upper side.
B) boundary layer separation due to shock waves.
C) a shift of the centre of gravity.
D) boundary layer control.

Which statement is correct about a normal shock wave?

A) The airflow changes direction.
B) The airflow expands when passing the aerofoil.
C) The airflow changes from subsonic to supersonic.
D) The airflow changes from supersonic to subsonic.

Compared with an oblique shock wave at the same Mach number a normal shock wave has a:

A) higher expansion.
B) higher compression.
C) smaller expansion.
D) smaller compression.

Which of the following flight phenomena can only happen at Mach Numbers above the critical Mach Number?

A) Elevator stall.
B) Dutch roll.
C) Speed instability.
D) Mach buffet.

If an aeroplane is flying at transonic speed with increasing Mach number the shock wave on the upper side of the wing:

A) moves into leading edge direction.
B) disappears.
C) moves into trailing edge direction.
D) stays all the time at the same position.

At higher altitudes, the stall speed (IAS):

A) remains the same.
B) decreases.
C) decreases until the tropopause.
D) increases.

Shockwaves at MFS above MDET will be:

A) Normal.
B) Detached.
C) Oblique.
D) Sufficient to slow the local airflow to subsonic values.

Tuck under is caused by which

i. movement of the centre of pressure of the wing, and
ii. change of the downwash angle at the location of the stabilizer.

A) (i) forward (ii) decreasing
B) (i) forward (ii) increasing
C) (i) aft (ii) increasing
D) (i) aft (ii) decreasing

When air has passed through a shock wave the speed of sound is?
A) decreased.
B) increased.
C) decreased and beyond a certain Mach number start increasing again.
D) not affected.

Shock induced separation results in:
A) constant lift.
B) increasing lift.
C) decreasing drag.
D) decreasing lift.

What data may be obtained from the Buffet Onset Boundary chart?
A) The values of MMO at different weights and altitudes.
B) The values of the Mach Number at which low speed and shock-stall occur at different weights and altitudes.
C) The values of Mcrit at different weights and altitudes.
D) The values of the Mach Number at which low speed and Mach Buffet occur at different weights and altitudes.

The loss of total pressure in a shock wave is due to the fact that:
A) the static pressure decrease is comparatively high.
B) the speed reduction is too high.
C) kinetic energy in the flow is changed into heat energy.
D) the friction in the boundary layer is higher.

When air has passed an expansion wave, the static pressure is:
A) decreased.
B) increased.
C) unchanged.
D) decreased or increased, depending on Mach Number.

In the transonic range lift will decrease at the shock stall due to the:
A) attachment of the shock wave on the trailing edge of the wing.
B) separation of the boundary layer at the shock waves.
C) first appearance of a shock wave at the upper side of the wing.
D) appearance of the bow wave.

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21. When an aeroplane is flying through the transonic range with increasing Mach Number the centre of the pressure of the wing will move aft. This requires:
A) a stability augmentation system.
B) much more thrust from the engine.
C) a pitch up input of the stabilizer.
D) a higher IAS to compensate the nose down effect.

The buffet margin:
A) increases during a descent with a constant IAS.
B) is always greatest after a step climb has been executed.
C) is always positive at Mach numbers below MMO.
D) decreases during a descent with a constant Mach number.

The critical speed where the speed is too low and too high at the same time is called:
A) Coffin corner.
B) Supersonic.
C) Mcrit.
D) High speed buffet.

Vortex generators mounted on the upper wing surface will:
A) increase the effectiveness of the spoiler due to increase in parasite drag.
B) decrease the shock wave induced separation.
C) decrease the stalling speed by increase of the tangential velocity of the swept wing.
D) decrease the interference drag of the trailing edge flaps.

For minimum wave drag, an aircraft should be operated at which of the following speeds?
A) High supersonic.
B) Mach 1.0
C) Subsonic.
D) Low supersonic.

Vortex generators on the upper side of the wing surface will:
A) increase the critical Mach Number.
B) decrease the span wise flow at high Mach Numbers.
C) decrease the intensity of shock wave induced air separation.
D) increase the magnitude of the shock wave.

Which kind of flow separation occurs at the smallest angle of attack?
A) low-speed stall.
B) deep stall.
C) shock stall.
D) high-speed stall.

When the air is passing through a shock wave the static temperature will:
A) stay constant.
B) decrease and beyond a certain Mach number start increasing again.
C) decrease.
D) increase.

A normal shock wave:
A) is a discontinuity plane in an airflow, in which the temperature drops suddenly.
B) can occur at different points on the aeroplane in transonic flight.
C) is a discontinuity plane in an airflow, which is always normal to the surface.
D) is a discontinuity plane in an airflow, in which the pressure drops suddenly.

In transonic flight the ailerons will be less effective than in subsonic flight because:
A) aileron deflection only partly affects the pressure distribution around the wing.
B) aileron down deflection moves the shock wave forward.
C) aileron deflection only affects the air in front of the shock wave.
D) behind the shock wave pressure is lower.

When the Mach number is slowly increased in straight and level flight the first shockwaves will occur:
A) on the underside of the wing.
B) somewhere on the horizontal tail.
C) at the wing root segment, upper side.
D) somewhere on the fin.

Compared with an oblique shock wave at the same Mach number a normal shock wave has:
A) higher total temperature.
B) lower static temperature.
C) higher loss in total pressure.
D) higher total pressure.

When the air is passing through a shock wave the density will:
A) stay constant.
B) decrease and beyond a certain Mach number start increasing again.
C) decrease.
D) increase.

When the air has passed through a normal shock wave the Mach number is?
A) Less than 1.
B) Lower than before but still greater than 1.
C) Equal to 1.
D) Higher than before.

The application of the area rule on aeroplane design will decrease the:
A) induced drag.
B) skin friction drag.
C) wave drag.
D) form drag.

Just above the critical Mach number the first evidence of a shock wave will appear at the
A) leading edge of the wing.
B) trailing edge of the wing.
C) lower side of the wing.
D) upper side of the wing.

Tuck under will happen:
A) only at the critical Mach number.
B) only below the critical Mach number.
C) only above the critical Mach number.
D) above or below the critical Mach number depending on the angle of attack.

At what speed does the front of a shock wave move across the earths surface?
A) The speed of sound at flight level.
B) The ground speed of the aeroplane.
C) The speed of sound at ground level.
D) The true air speed of the aeroplane.

Means to avoid the effects of exceeding M_{crit}:

What is the influence of decreasing aeroplane weight on Mcrit at constant IAS?
A) Mcrit decreases as a result of flying at a greater angle of attack.
B) Mcrit increases as a result of compressibility effects.
C) Mcrit decreases.
D) Mcrit increases as a result of flying at a smaller angle of attack.

The principle reason for employing wing sweep on an aircraft is to:
A) decrease the critical Mach-number (Mcrit).
B) increase the critical flight Mach-number (Mcrit).
C) improve wing tip stall at high speeds.
D) improve high and low speed aeroplane handling characteristics.

The consequences of exceeding Mcrit in a swept-wing aeroplane may be: (assume no corrective devices, straight and level flight)
A) engine unbalance and buffeting.
B) buffeting of the aeroplane and a tendency to pitch down.
C) an increase in speed and a tendency to pitch up.
D) buffeting of the aeroplane and a tendency to pitch up.

What is the effect of a decreasing aeroplane weight on Mcrit at n=1, when flying at constant IAS? The value of Mcrit:
A) increases.
B) is independent of the angle of attack.
C) decreases.
D) remains constant.

When comparing a rectangular wing and a swept back wing of the same wing area and wing loading, the swept back wing has the advantage of:
A) Greater strength.
B) Lower stalling speed.
C) Higher critical Mach number.
D) Increased longitudinal stability.

Mcrit is the free stream Mach number at which:
A) he bow shock wave attaches to the wing leading edge.
B) the bottom shock wave reaches the wing trailing edge.
C) the first local Mach number at any point on the aircraft equals M 1.0
D) the centre of pressure is at its most rearward point.

Critical Mach-number is the:
A) highest speed at which the aeroplane is certificated for operation (MMO).
B) highest speed without supersonic flow over any part of the aeroplane.
C) speed at which there is subsonic airflow over all parts of the aircraft(Mach number < 1).
D) speed at which there is supersonic airflow over all parts of the aeroplane.

Which of the following (1) aerofoil and (2) angles of attack will produce the lowest Mcrit values?
A) (1) thin and (2) large.
B) (1) thick and (2) small.
C) (1) thin and (2) small.
D) (1) thick and (2) large.

Two methods to increase the critical Mach Number are:
A) thin aerofoil and dihedral of the wing.
B) thick aerofoil and dihedral of the wing.
C) positive cambering of the aerofoil and sweep back of the wing.
D) thin aerofoil and sweep back of the wing.

The critical Mach Number of an aeroplane can be increased by:
A) control deflection.
B) vortex generators.
C) sweep back of the wings.
D) dihedral of the wings.

Mcrit is the free stream Mach Number at which:
A) shock stall occurs.
B) the critical angle of attack is reached.
C) Mach buffet occurs.
D) somewhere about the airframe Mach 1 is reached locally.

Vortex generators on the upper side of the wing:
A) decrease wave drag.
B) increase wave drag.
C) decrease critical Mach Number.
D) increase critical Mach Number.

Compared to a straight wing of the same airfoil section a wing swept at 30 should theoretically have an Mcrit ... times Mcrit for the straight wing, but will, in practice gain ... that increase:
A) 1.414; twice
B) sine 30; half
C) cosine 30; twice
D) 1.154; half

Compared to straight wings of the same airfoil section swept wings ... the onset of the transonic drag rise and have a ... CD in supersonic flight:
A) delay, higher
B) hasten, higher
C) hasten, lower
D) delay, lower

The critical Mach number for an aerofoil equals the free stream airfoil Mach number at which:
A) the maximum operating temperature is reached.
B) a supersonic bell appears on the upper surface.
C) sonic speed (M=1) is reached at a certain point on the upper side of the aerofoil.
D) a shock-wave appears on the upper surface.

The critical Mach Number of an aeroplane is the free stream Mach Number, which produces the first evidence of:

A) buffet.
B) local sonic flow.
C) supersonic flow.
D) shock wave.

The critical Mach number can be increased by:

A) a T-tail.
B) an increase in wing aspect ratio.
C) sweepback of the wings.
D) positive dihedral of the wings.

The regime of flight from the critical Mach number up to M = 1.3 is called:

A) hypersonic range.
B) subsonic range.
C) transonic range.
D) supersonic range.

Supersonic Aerodynamics:
Oblique Shockwave

When a supersonic airflow passes through an expansion wave speed will... and temperature wil...
A) decrease; rise.
B) increase; fall.
C) increase; rise.
D) decrease; fall.

Which statement is correct about an expansion wave in supersonic flow?
1. The temperature in front of an expansion wave is higher than the temperature behind it
2. The speed in front of an expansion wave is higher than the speed behind it.

A) 1 and 2 are correct.
B) 1 and 2 are incorrect.
C) 1 is correct and 2 is incorrect.
D) 1 is incorrect and 2 is correct.

When a supersonic airflow passes through an oblique shockwave static pressure will ... and temperature will...
A) rise; rise.
B) rise; fall.
C) fall; fall.
D) fall; rise.

How will the density and temperature change in a supersonic flow from a position in front of a shock wave to behind it?
A) Density will decrease, temperature will decrease.
B) Density will increase, temperature will decrease.
C) Density will increase, temperature will increase.
D) Density will decrease, temperature will increase.

In case of supersonic flow retarded by a normal shock wave a high efficiency (low loss in total pressure) can be obtained if the Mach number in front of the shock is:
A) small but still supersonic.
B) exactly 1.
C) high (supersonic).
D) lower than 1.

If an aeroplane is accelerated from subsonic to supersonic speeds, the centre of pressure will move:
A) to the mid chord position.
B) to a position near the trailing edge.
C) to a position near the leading edge.
D) forward.

In supersonic flight, all disturbances produced by an aeroplane are:
A) in between a conical area, depending on the Mach Number.
B) outside the conical area depending on the Mach Number.
C) very weak and negligible.
D) in front of the aeroplane.

When the air is passing through an expansion wave the local speed of sound will:
A) decrease and beyond a certain Mach number start increasing again.
B) increase.
C) stay constant.
D) decrease.

The aft movement of the centre of pressure during the acceleration through the transonic flight regime will:
A) increase the static longitudinal stability.
B) decrease the static lateral stability.
C) increase the static lateral stability.
D) decrease the longitudinal stability.

Tuck under is a phenomenon which occur:
A) when deploying flaps.
B) on a/c at supersonic speeds.
C) on a/c in transonic flight.
D) only on small airplanes during landing.

When the air is passing through an expansion wave the static temperature will?
A) stay constant.
B) decrease and beyond a certain Mach number start increasing again.
C) decrease.
D) increase.

On a non swept wing, when the aerofoil is accelerated from subsonic to supersonic speeds, the aerodynamic centre:
A) remains unchanged.
B) slightly shifts forward.
C) shifts aft by about 10%.
D) shifts from 25% to about 50% of the aerofoil chord.

In order to expand a gas to supersonic speeds, starting with a stagnant gas in a reservoir, a... duct must be used.
A) constant area
B) divergent
C) convergent
D) convergent-divergent

Mcrit is the speed at which:
A) the aircraft is not controllable.
B) the centre of pressure is moving aft.
C) the a/c is passing the sound barrier.
D) sonic flow is first achieved above the surface of the airfoil.

As an aircraft goes from subsonic to supersonic flight the CP:
A) moves forward.
B) moves aft.
C) moves aft and then forward.
D) remains in the same position.

In supersonic flight aerofoil pressure distribution is:
A) the same as in subsonic flight.
B) triangular.
C) rectangular.
D) irregular.

The phugoid motion is a long term oscillation around the:
A) vertical axis.
B) normal axis.
C) longitudinal axis
D) lateral axis.

Which statement is correct about an expansion wave in a supersonic flow?
1. The density in front of an expansion wave is higher than behind.
2. The pressure in front of an expansion wave is higher than behind.

A) 1 and 2 are correct.
B) 1 is correct and 2 is incorrect.
C) 1 and 2 are incorrect.
D) 1 is incorrect and 2 is correct.

Consider insentropic flow in a stream tube. If the flow is supersonic (M>1), for the velocity to increase:
A) the area of the stream tube must decrease.
B) the area of the stream tube must first increase and then decrease.
C) the area of the stream tube must increase.
D) the area of the nozzle must first decrease and then increase.

When a fluid element flows through an oblique shock wave:
A) Total temperature decreases, Mach-number decreases and static temperature decreases.
B) Total temperature stays the same, Mach-number decreases and static temperature increases.
C) Total temperature increases, Mach-number increases and static temperature increases.
D) Total temperature stays the same, Mach-number decreases and static temperature stays the same.

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21. The additional increase of drag at Mach Numbers above the critical Mach Number is due to:
A) increased skin friction.
B) increased angle of attack.
C) increased interference drag.
D) wave drag.

When an aircraft is flying at speeds above Mach 1, pressure disturbances from the aircraft will be felt only:
A) in front of the oblique shock wave.
B) within the Mach cone.
C) in front of the normal shock wave.
D) in front of the Mach cone.

The shock wave angle of a supersonic aircraft at increasing Mach number:
A) increases.
B) decreases.
C) remain the same.
D) decreases, then increases above certain Mach number.

If a symmetrical aerofoil is accelerated from subsonic to supersonic speed the centre of lift will move:
A) aft to the trailing edge.
B) aft to the mid chord.
C) forward to the leading edge.
D) forward to the mid chord.
When the air is passing through an expansion wave the Mach number will:
A) stay constant.
B) decrease and beyond a certain Mach number start increasing again.
C) increase.
D) decrease.

The bow wave will appear first at:
A) M= 0.6
B) M= 1.0
C) M= Mcrit
D) M= 1.3

One way to increase Mcrit is to:
A) increase the chamber of the airfoil.
B) move the section with maximum thickness well aft.
C) install vortex generators.
D) sweep the wings.

If the Mach number of an aeroplane in supersonic flight is increased, the shock wave angles will:
A) stay constant.
B) decrease.
C) increase.
D) decrease and beyond a certain Mach number start increasing again.

When airflow over a wing becomes supersonic, the pressure pattern on the top surface will become:
A) triangular.
B) rectangular.
C) irregular.
D) the same as subsonic.

Superstall is a condition:
A) Where the a/c is in a spin.
B) Which is easily to recover from.
C) Which is a stable stall with almost a constant pitch attitude.
D) Where the wings have stalled at high speed.

Stability:
Condition of equilibrium in stable horizontal flight

If the total sum of moments about one of its axis is not zero, an aeroplane:
A) would not be affected because the situation is normal.
B) would fly a path with a constant curvature.
C) would be difficult to control.
D) would experience an angular acceleration about that axis.

At constant EAS, what is the effect on aerodynamic damping as height increases?
A) Damping in all axes is reduced.
B) Damping in roll is increased.
C) Damping in pitch manoeuvres only is reduced.
D) Damping in all axes is increased.

If an aircraft is disturbed (e.g. vertical gust) and initially returns to its original position:
A) it is neutrally stable.
B) it is statically stable and may be dynamically stable.
C) it is dynamically unstable.
D) it is neutrally unstable.

An aircraft is placed in a level balanced turn and the controls released. It is spirally unstable if:
A) the pitch attitude increases.
B) the bank steadily increases.
C) the bank remains the same.
D) the bank reduces.

A statically unstable aeroplane is:
A) always dynamically stable.
B) sometimes dynamically stable.
C) sometimes dynamically unstable.
D) never dynamically stable.

If the total moments about an axis are not zero, what will be the result around that axis?
A) Angular acceleration.
B) Constant angular displacement.
C) Constant angular velocity.
D) Equilibrium.

An aeroplane, with a C.G. location behind the centre of pressure of the wing can only maintain a straight and level flight when the horizontal tail loading is:
A) zero.
B) upwards or downwards depending on elevator deflection.
C) upwards.
D) downwards.

As the centre of gravity moves, recovery from a stall:
A) in unaffected by centre of gravity position, only by all up weight (AUW).
B) is more difficult with the centre of gravity moving aft.
C) is more difficult with the centre of gravity moving forward.
D) is less difficult when the centre of gravity moves aft.

If the sum of moments in flight is not zero, the aeroplane will rotate about:
A) the centre of pressure of the wing.
B) the aerodynamic centre of the wing.
C) the centre of gravity.
D) the neutral point of the aeroplane.

If an aircraft has its CG ahead of its CP, in straight and level flight:
A) there will normally be no load on the tailplane.
B) there will normally be an upload on the tailplane.
C) there will normally be a download on the tailplane.
D) the tailplane will have a negative angle of attack.

The effect of a ventral fin on the static stability of an aeroplane is as follows: (1=longitudinal, 2=lateral, 3=directional)
A) 1: positive, 2: negative, 3: negative
B) 1: negative, 2: positive, 3: positive
C) 1: no effect, 2: positive, 3: negative
D) 1: no effect, 2: negative, 3: positive

In which situation would the wing lift of an aeroplane in straight and level flight have the highest value? (The engines are mounted below the wing)?
A) Forward centre of gravity and take-off thrust.
B) Forward centre of gravity and idle thrust.
C) Aft centre of gravity and take-off thrust.
D) Aft centre of gravity and idle thrust.

If the aircraft is properly loaded the CG, the neutral point and the manoeuvre point will be in the order given, forward to aft: lllllll
A) manoeuvre point, CG, neutral point.
B) manoeuvre point, neutral point, CG.
C) CG, manoeuvre point, neutral point.
D) CG, neutral point, manoeuvre point.

Stability on an aircraft means:
A) the ability to roll around an axis.
B) divergence from the original trimmed position when disturbed.
C) the ability to return to the original trimmed position when disturbed.
D) the ability to continue flight in the disturbed position.

Method of achieving balance:

Loading an airplane to the aft centre of gravity limit will cause the airplane to be:

A) more stable for all airspeeds.
B) less stable for all airspeeds.
C) less stable at slow speed, but more stable at high speed.
D) less stable at high speed, but more stable at low speed.

The distance between the CG Datum and the CG Neutral Point in straight and level flight is called the:

A) CG static margin.
B) CG manoeuvre margin
C) CG aft limit.
D) CG forward limit.

For a normal stable aeroplane, the centre of gravity is located:

A) at the neutral point of the aeroplane.
B) with a sufficient minimum margin ahead of the neutral point of the aeroplane.
C) between the aft limit and the neutral point of the aeroplane.
D) aft of the neutral point of the aeroplane.

In a twin-engined jet powered aeroplane (engines mounted below the low wings) the thrust is suddenly increased. Which elevator deflection will be required to maintain the pitching moment zero?

A) No elevator movement will required because the thrust line of the engines remains unchanged.
B) Down.
C) Up.
D) It depends on the position of the centre of gravity.

Longitudinal Stability:

The effects of CG position on longitudinal static stability and control response will be:

A) forward movement of the CG will reduce stability and increase control response.
B) rearward movement of the CG will increase stability and reduce control response.
C) rearward movement of the CG will reduce stability and control response.
D) forward movement of the CG will reduce control response and increase stability.

Which statement about stick force per g is correct?

A) The stick force per g can only be corrected by means of electronic devices (stability augmentation) in case of an unacceptable value.
B) The stick force per g must have both an upper and lower limit in order to assure acceptable control characteristics.
C) If the slope of the Fe-n line becomes negative, generally speaking this is not a problem for control of an aeroplane.
D) The stick force per g increases, when centre of gravity is moved aft.

Tuck under may happen at:

A) high Mach numbers.
B) only at low altitudes.
C) all Mach numbers.
D) low Mach numbers.

Deflecting the elevator up, when the trim tab is in neutral, will cause the tab to:

A) move up relative to the elevator chord line.
B) remain in line with the tailplane.
C) move down relative to the elevator chord line.
D) remain in line with the elevator.

What is the effect of an aft shift of the centre of gravity on

1. static longitudinal stability and
2. the required control deflection for a given pitch change?

A) (1) increases (2) reduces
B) (1) reduces (2) increases
C) (1) increases (2) increases
D) (1) reduces (2) reduces

What is the purpose of the mach trim?

A) to prevent wing tip stall on swept wings.
B) to compensate for the centre of gravity shift in the transonic speed range.
C) to compensate for variations in lateral stability at high mach numbers.
D) to counteract the tuck-under effect.

Dynamic longitudinal stability requires:

A) a variable incidence (trimming) tailplane.
B) positive static longitudinal stability.
C) a small CG range.
D) an effective elevator.

The Mach trim system will prevent:
A) tuck under.
B) Dutch roll.
C) buffeting.
D) shock stall.

A Machtrimmer:
A) has no effect on the shape of the elevator position versus speed (IAS) curve for a fully hydraulic controlled aeroplane.
B) is necessary for compensation of the autopilot at high Mach Numbers.
C) increases the stick force per g at high Mach Numbers.
D) corrects insufficient stick force stability at high Mach Numbers.

The aerodynamic centre of the wing is the point, where:
A) aerodynamic forces are constant.
B) the aeroplanes lateral axis intersects with the centre of gravity.
C) pitching moment coefficient does not vary with angle of attack.
D) change of lift due to variation of angle of attack is constant.

In what way is the longitudinal stability affected by the degree of positive camber of the aerofoil?
A) Positive, because the centre of pressure shifts rearward at increasing angle of attack.
B) Positive, because the lift vector rotates backward at increasing angle of attack.
C) No effect, because camber of the aerofoil produces a constant pitch down moment coefficient, independent of angle of attack.
D) Negative, because the lift vector rotates forward at increasing angle of attack.

The (1) stick force stability and the (2) manoeuvre stability are positively affected by:
A) (1) forward C.G. position (2) forward CG. position.
B) (1) aft C.G. position (2) aft CG. position.
C) (1) forward C.G. position (2) aeroplane nose up trim.
D) (1) aeroplane nose up trim (2) aeroplane nose up trim.

The Mach-trim function is installed on most commercial jets in order to minimize the adverse effects of:
A) compressibility effects on the stabilizer
B) changes in the position of centre of pressure
C) uncontrolled changes in stabilizer setting
D) increased drag due to shock wave formation

Which of the following components is most important in determining longitudinal static stability?
A) Engines
B) Wings.
C) Fuselage.
D) Horizontal tailplane.

When an aeroplane with the centre of gravity forward of the centre of pressure of the combined wing / fuselage is in straight and level flight, the vertical load on the tailplane will be:

A) upwards.
B) downwards because it is always negative regardless of the position of the centre of gravity.
C) zero because in steady flight all loads are in equilibrium.
D) downwards.

If an airplane has poor longitudinal stability in flight, what can be done to increase the stability?

A) Install a yaw damper.
B) Increase elevator range of movement.
C) Increase stabiliser surface area.
D) Reduce in keel surface area.

The longitudinal stability of an airplane is mainly dependent on the size and/or position of:

A) the fuselage.
B) the rudder.
C) the centre of gravity position.
D) the Krueger flaps.

The value of the manoeuvre stability of an aeroplane is 150 N/g. The load factor in straight and level flight is 1.
The increase of stick force necessary to achieve the load factor of 2.5 is:

A) 225 N.
B) 450 N.
C) 375 N.
D) 150 N.

The effect of Mach trim on stick forces for power operated controls:

A) is to decrease the stick force gradient to ensure the pilot can manoeuvre the aircraft adequately when flying at high transonic Mach number.
B) a Mach trim system is not required if an aircraft has power operated controls.
C) is to decrease the stick force gradient to prevent the possibility of high speed stall.
D) is to maintain the required stick force gradient.

One of the requirements for dynamic stability is:

A) a large deflection range of the stabilizer trim.
B) positive static stability.
C) effective elevator.
D) a small C.G. range.

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21. Moving the C of G of an aircraft aft in flight will:

A) reduce longitudinal stability.
B) increase the angle of attack.
C) have no effect on longitudinal stability.
D) increase longitudinal stability.

If the centre of gravity is aft of the limits:

A) longitudinal stability is improved.
B) lateral stability is improved.
C) longitudinal stability is unaffected.
D) the aircraft becomes unstable.

What determines the longitudinal stability of an airplane?

A) The location of the CG with respect to the neutral point of the airplane.
B) The weight of an aircraft.
C) The effectiveness of the horizontal stabilizer, rudder and rudder trim tab.
D) The relationship between lift and drag.

Why do some wings have dihedral?

A) To increase longitudinal stability.
B) To reduce directional stability.
C) To increase lateral stability.
D) To increase directional stability.

If the radius of a turn, flown at constant IAS is increased, the angle of bank will:

A) change proportional to the change of the radius.
B) remain the same.
C) increase.
D) decrease.

During landing of a low-winged jet aeroplane, the maximum elevator up deflection is normally required when the flaps are:

A) up and the C.G. is fully aft.
B) up and the C.G. is fully forward.
C) fully down and the C.G. is fully forward.
D) fully down and the C.G. is fully aft.

Which of the following best describes the function of the Mach trim system?

A) It adjusts the stabiliser trim position.
B) It adjusts the longitudinal trim of the aircraft.
C) It adjusts the elevator trim tab.
D) It adjusts the fore and aft fuel balance.

The effect of a highly cambered airfoil on longitudinal stability will be?

A) Positive effect because the lift vector is inclined rearwards as angle of attack increases.
B) Positive effect as CP moves backwards as angle of attack increases.
C) Negative effect because the lift vector is inclined forwards as angle of attack increases.
D) No effect.

Which part of an aeroplane provides the greatest positive contribution to the static longitudinal stability?

A) The fuselage.
B) The horizontal tailplane.
C) The engine.
D) The wing.

When the CG is close to the forward limit:

A) very high stick forces are required in pitch because the aircraft is very stable.
B) longitudinal stability is reduced.
C) the stalling speed is reduced.
D) very small forces are required on the control column to produce pitch.

If an aircraft has static longitudinal instability, it:

A) will be dynamically stable only at low speed.
B) may or may not be dynamically stable, depending on momentum and damping factors.
C) will be dynamically unstable.
D) will be dynamically stable.

When the aircraft CG is on the aft limit, it is:

A) above the neutral point.
B) in front of the neutral point.
C) behind the neutral point.
D) on the neutral point.

Which of the following statements about a Mach trimmer is correct?

A) A Mach trimmer corrects the change in stick force stability of a swept wing aeroplane above a certain Mach number.
B) A straight wing aeroplane always needs a Mach trimmer for flying at Mach numbers close to MMO.
C) A Mach trimmer reduces the stick force stability of a straight wing aeroplane to zero at high Mach numbers.
D) The Mach trimmer corrects the natural tendency of a swept wing aeroplane to pitch-up.

If an aircraft continues to oscillate with a constant amplitude after having encountered a vertical gust. This kind of stability is called:

A) lateral instability.
B) longitudinal neutral static stability.
C) longitudinal dynamic instability.
D) longitudinal neutral dynamic stability.

Longitudinal stability will be greatest: llllll

A) when the centre of gravity is coincident with the centre of pressure.
B) with the centre of gravity on the forward limit.
C) when the centre of gravity is most forward.
D) with the centre of gravity on the aft limit.

If an aircraft has neutral static stability, what will happen if it is disturbed (e.g. vertical gust):

A) will return to the trimmed position.
B) will oscillate with a fixed amplitude around the trimmed position.
C) will remain in the disturbed attitude forever.
D) will continue to diverge away from the neutral position.

In case the Mach trimmer fails:
A) try to relocate the centre-of-gravity aft.
B) the speed must be kept constant.
C) the Mach number must be limited.
D) the aeroplane weight must be limited.
-Since relocating is one of the option right answer would be limiting mach number since it includes other options along with relocating CG

Longitudinal static stability is created by the fact that the:
A) centre of gravity is located in front of the leading edge of the wing.
B) centre of gravity is located in front of the neutral point of the aeroplane.
C) aeroplane possesses a large trim speed range.
D) wing surface is greater than the horizontal tail surface.

The short-period mode of longitudinal dynamic stability is:
A) a rapid oscillation about the normal axis.
B) a rapid oscillation about the lateral axis.
C) always induced by the pilot.
D) a rapid oscillation about the longitudinal axis.

The max aft position of the centre of gravity is amongst others limited by the:
A) too small effect of the controls on the aeroplane.
B) maximum elevator deflection.
C) minimum value of the stick force per g.
D) maximum longitudinal stability of the aeroplane.

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41. A C.G location beyond the aft limit leads to:
A) an unacceptable low value of the manoeuvre stability (stick force per g, Fe/g).
B) an increasing static longitudinal stability.
C) a better recovery performance in the spin.
D) a too high pulling stick force during rotation in the take off.

The manoeuvrability of an aeroplane is best when the:
A) flaps are down.
B) C.G. position is on the forward C.G. limit.
C) speed is low.
D) C.G. is on the aft C.G. limit.

Which of the following statements is correct?
A) Static stability means that the aeroplane is also dynamically stable about the relevant axis.
B) Dynamic stability means that after being displaced from original equilibrium condition, the aeroplane will return to that condition without oscillation.
C) A dynamically stable aeroplane would be almost impossible to fly manually.
D) Dynamic stability is possible only when the aeroplane is statically stable about the relevant axis.

Tuck under is:

A) the tendency to nose down when speed is increased into the transonic flight regime.
B) shaking of the control column at high Mach Number.
C) the tendency to nose down when the control column is pulled back.
D) the tendency to nose up when speed is increased into the transonic flight regime.

If the centre of gravity of an aircraft moves aft during flight, ...

A) an increase in longitudinal stability will result.
B) an increase in lateral stability will result.
C) stability will not be affected.
D) a reduction in longitudinal stability will result.

The centre of gravity of an aircraft is on its most forward limit in straight and level flight. What effect will this have on longitudinal stability?

A) Longitudinal stability will be reduced with an increased download existing on the tailplane.
B) An increased download will exist on the tailplane with an associated increase in longitudinal stability.
C) A reduction in longitudinal stability will exist with no change in loading on the tailplane.
D) A reduced download will exist on the tailplane with an associated reduction in longitudinal stability.

The C.G. position of an aeroplane is forward of the neutral point in a fixed location. Speed changes cause a departure from the trimmed position. Which of the following statements about the stick force stability is correct?

A) Increase of speed generates pull forces.
B) Increasing 10 kt trimmed at low speed has more effect on the stick force than increasing 10 kt trimmed at high speed.
C) Stick force stability is not affected by trim.
D) Aeroplane nose up trim decreases the stick force stability.

The effect of a swept wing is to give:

A) positive dihedral effect.
B) decreased roll-with-yaw effect.
C) negative dihedral effect.
D) adverse yaw effect.

Dutch roll occurs when:

A) lateral stability is too great compared to directional stability.
B) directional and lateral stability is equal.
C) directional stability is compensated by ailerons.
D) directional stability is too great compared to lateral stability.

One function of the Mach trim is to:

A) adjust for aileron reversal.
B) maintain the required stick force gradient.
C) trim the aircraft nose down.
D) adjust the stick force per g gradient.

Static directional Stability:

An aeroplane has static directional stability; in a side-slip to the right, initially the:
A) nose of the aeroplane tends to move to the right.
B) nose of the aeroplane will remain in the same direction.
C) right wing tends to go down.
D) nose of the aeroplane tends to move to the left.

The primary function of the fin is to give:
A) directional stability - about the normal axis.
B) lateral stability - about the longitudinal axis.
C) directional stability - about the longitudinal axis.
D) directional stability - about the lateral axis.

Ventral fin has its greatest effect at:
A) low speed, high angle of attack.
B) speeds above Mcrit.
C) high wing loading.
D) transonic speed.

Positive static stability of an aeroplane means that once it has been displaced the:
A) initial tendency to move is away from its equilibrium position.
B) tendency will be to move with an oscillating motion of increasing amplitude.
C) tendency will be to move with an oscillating motion of decreasing amplitude.
D) initial tendency to move is towards its equilibrium position.

If the forces and moments on a body caused by a disturbance tend initially to return the body toward its equilibrium position, the body is ... stable. The body has ... stability.
A) dynamically; positive static stability
B) statically; positive static stability.
C) statically; negative static stability
D) dynamically; negative static stability

Compared to straight wings, swept back wings have:
A) better longitudinal stability.
B) less directional stability.
C) better directional stability.
D) less longitudinal stability

The effect of a positive wing sweep on static directional stability is as follows:
A) destabilizing dihedral effect.
B) stabilizing effect.
C) negative dihedral effect.
D) no effect.

Directional static stability is determined by:
A) elevator angle for trim.
B) tail volume.
C) fin volume.
D) aircraft weight.

An aeroplane that has positive static stability:
A) is always dynamically unstable.
B) is never dynamically stable.
C) can be dynamically stable, neutral or unstable.
D) is always dynamically stable.

Which of the following gives an unstable contribution in sideslip?
A) Flap extension.
B) High wing.
C) Dihedral.
D) Wing sweep.

When considering the relationship between lateral static stability and directional stability:
A) dominant lateral static stability gives an increased tendency for dutch roll.
B) dominant lateral static stability gives an increased tendency for spiral instability.
C) dominant directional static stability gives an increased tendency for dutch roll.
D) they are mutually independent and have no effect on each other.

A swept wing will for a given angle of attack and wing area:
A) be more laterally stable and produce less lift.
B) produce more lift and be more laterally stable.
C) advance Mcrit.
D) increase lateral stability with reduced tip stall tendency.

When an aircraft is in a sideslip:
A) wing dihedral will cause a yawing moment to reduce the sideslip.
B) wing dihedral will cause a rolling moment which reduces the sideslip.
C) wing anhedral will cause a rolling moment which reduces the sideslip.
D) the fin will cause the rolling moment which increases the sideslip.

Static lateral Stability:

What will increase the sensitivity to Dutch Roll?
A) An increased anhedral.
B) A forward movement of the centre of gravity.
C) An increased static lateral stability.
D) An increased static directional stability.

Directional stability is the stability around the:
A) Longitudinal axis.
B) Lateral axis.
C) Pitch axis.
D) Normal axis.

Which of the following lists aeroplane features that each increase static lateral stability?
A) Sweep back, under wing mounted engines, winglets.
B) Fuselage mounted engines, dihedral, T-tail.
C) High wing, sweep back, large and high vertical fin.
D) Low wing, dihedral, elliptical wing planform.

With a swept wing aircraft, with an increase in altitude, which of the following statements about lateral stability is correct?
A) Static lateral stability decreases, dynamic lateral stability increases.
B) Static lateral stability remains the same, dynamic lateral stability decreases.
C) Static lateral stability increases, dynamic lateral stability increases.
D) Static lateral stability increases, dynamic lateral stability decreases.

After a disturbance about the lateral axis, an aeroplane oscillates about the lateral axis at a constant amplitude.
The aeroplane is:
A) Statically unstable - Dynamically neutral
B) Statically stable - Dynamically neutral
C) Statically unstable - Dynamically stable
D) Statically stable - Dynamically unstable

Dihedral of the wing:
A) increases the static lateral stability.
B) is the only way to increase the static lateral stability.
C) decreases the static lateral stability.
D) is only positive for aeroplanes with high mounted wings.

The short period mode is an:
A) unstable movement of the aeroplane, induced by the pilot.
B) oscillation about the lateral axis.
C) oscillation about the longitudinal axis.
D) oscillation about the vertical axis.

Lateral stability can be increased using:
A) wing anhedral.
B) frise ailerons.
C) wing dihedral.
D) spoilers.

Which statement is correct for a side slip condition at constant speed and side slip angle, where the geometric dihedral of an aeroplane is increased?
A) the stick force per g decreases.
B) the required lateral control force decreases.
C) the required lateral control force increases.
D) the required lateral control force does not change.

The dihedral construction of an aircraft wing provides:
A) lateral stability about the longitudinal axis.
B) lateral stability about the normal axis.
C) longitudinal stability about the lateral axis.
D) directional stability about the lateral axis.

The effect of a high wing with zero dihedral is as follows:
A) Zero dihedral effect.
B) Its only purpose is to ease aeroplane loading.
C) Positive dihedral effect.
D) Negative dihedral effect.

Considering the lateral stability of a swept wing aircraft, at high level the static lateral stability will be ... and the dynamic lateral stability will be...
A) less; greater.
B) the same; less.
C) greater; greater.
D) the same; greater.

Lateral static stability is determined by:
A) wingspan.
B) aspect ratio.
C) aircraft response to sideslip.
D) cg position.

Which type of wing arrangement decreases the static lateral stability of an aeroplane?
A) Anhedral.
B) Increased wing span.
C) Dihedral.
D) High wing.

What happens to lateral stability when flaps are extended?

A) Lateral stability is increased as lift is increased.
B) Lateral stability is unaffected, as the wings are symmetrical.
C) Lateral stability is increased as the centre of pressure moves inboard.
D) Lateral stability is decreased.

Which of the following statements about dihedral is correct?

A) The effective dihedral of an aeroplane component means the contribution of that component to the static lateral stability.
B) Effective dihedral is the angle between the 1/4-chord line and the lateral axis of the aeroplane.
C) Dihedral contributes to dynamic but not to static lateral stability.
D) Dihedral is necessary for the execution of slip-free turns.

The pendulum effect on a high wing aeroplane:

A) improves lateral stability.
B) reduces longitudinal stability.
C) has no effect on lateral stability.
D) reduces lateral stability.

What is the effect on the lateral stability of an aircraft, when a high wing is employed?

A) Lateral stability will be reduced because the airflow at the wing root is disturbed.
B) Lateral stability will be the same as for a low wing aircraft.
C) Lateral stability will be improved.
D) Lateral stability will be reduced because of the lower centre of gravity position.

Dynamic lateral Stability:

Which of the following will reduce lateral stability?

A) Wing root fairing.
B) Tip tanks.
C) Anhedral.
D) Dihedral.

Which of the following statements about static lateral and directional stability is correct?

A) An aeroplane with an excessive static directional stability in relation to its static lateral stability, will be prone to Dutch roll.
B) Static directional stability can be increased by installing more powerful engines.
C) The effects of static lateral and static directional stability are completely independent of each other because they take place about different axis.
D) An aeroplane with an excessive static directional stability in relation to its static lateral stability, will be prone to spiral dive. (spiral instability).

Longitudinal dynamic oscillation takes two forms. One of these, long period oscillation, involves slow changes in:

A) pitch and load factor.
B) height and load factor.
C) height and speed.
D) speed and load factor.

The max aft position of the centre of gravity is amongst others limited by the:

A) Roll spoilers.
B) Rudder limiter.
C) Spoiler mixer.
D) Yaw damper.

When pulling out of a dive the angle of attack:

A) remains the same.
B) decreases.
C) cannot be increased at all due to structural considerations.
D) increases.

Which one of the following statements about the dynamic stability of a conventional aeroplane about the lateral axis is correct?

A) Period time of the phugoid is normally 5 sec.
B) Damping of the phugoid is normally very weak.
C) An aft C.G. position shortens the period time of the phugoid.
D) Speed remains constant during one period of the phugoid.

Which aeroplane behaviour will be corrected by a yaw damper?

A) Spiral dive.
B) Dutch roll.
C) Buffeting.
D) Tuck under.

Which one of the following systems suppresses the tendency to Dutch roll?

A) Rudder limiter.
B) Yaw damper.
C) Spoiler mixer.
D) Roll spoilers.

Sensitivity for spiral dive will occur when:

A) the Dutch roll tendency is too strongly suppressed by the yaw damper.
B) the static directional stability is positive and the static lateral stability is relatively weak.
C) the static directional stability is negative and the static lateral stability is positive.
D) the static lateral and directional stability are both negative.

With increasing altitude and constant IAS the static lateral stability (1) and the dynamic lateral/directional stability (2) of an aeroplane with swept-back wing will:

A) (1) increase (2) increase.
B) (1) increase (2) decrease.
C) (1) decrease (2) increase.
D) (1) decrease (2) decrease

Control
General

When are outboard ailerons (if present) de-activated?
A) Flaps (and slats) retracted or speed above a certain value.
B) Flaps (and/or slats) extended or speed below a certain value.
C) Landing gear retracted.
D) Landing gear extended.

When spinning to the left, which wing(s) are stalled?
A) Neither wing is stalled.
B) Only the right wing is stalled.
C) Both wings are stalled.
D) Only the left wing is stalled.

The flaperon is a control that operates simultaneously as:
A) flaps and elevators.
B) elevators and ailerons.
C) flaps and speed brakes.
D) flaps and ailerons.

What is the advantage of a variable incidence tailplane over a fixed incidence tailplane with elevator and trim tab?
A) Less trim drag and maximum elevator authority retained.
B) Linkages and mechanism less complicated.
C) Increased flight stability and less weight.
D) Elevator movement is restricted at high speed.

Rotation about the lateral axis is called:
A) slipping.
B) pitching.
C) rolling.
D) yawing.

Which statement is true for an aircraft in a fully developed spin?
A) The outer wing only is fully stalled.
B) Full elevator deflection up is required at once, in order to restore straight and level flight.
C) The aircraft will automatically stabilise after a few turns.
D) The inner wing only is fully stalled.

The range of control surface movements is limited by:
A) high tension in the control cables.
B) normal tension in the control cables.
C) mechanical control stops.
D) defined limits in the operations manual.

Which of the following statements is correct?

I. When the critical engine fails during take-off the speed VMCL can be limiting.
II. The speed VMCL is always limited by maximum rudder deflection.

A) I is correct, II is incorrect.
B) I is correct, II is correct.
C) I is incorrect, II is incorrect.
D) I is incorrect, II is correct.

Which of the following is the reason for putting the horizontal stabiliser on top of the fin, known as a T-tail?
A) to decrease the tendency for super stall.
B) to improve the aerodynamic efficiency of the vertical tail.
C) to improve the wing efficiency.
D) to improve ground clearance during take-off and landing on a contaminated runway.

Rudder controls:
A) Yaw.
B) Pitch.
C) Turn.
D) Roll.

The type of flap which extends rearward from the trailing edge of the wing as it is lowered is called:
A) a zap flap.
B) a split flap.
C) a fowler flap.
D) a Krueger flap.

Manoeuvrability is best at:
A) high flap settings.
B) low speed.
C) aft CG position.
D) forward CG position.

The sweepback on a wing will:
A) cause the stall to occur at lower angles of attack.
B) reduce the possibility for the wing tip to stall.
C) increase the possibility of a wing tip stall.
D) have no effect on the stall characteristics.

During initiation of a turn with speedbrakes extended, the roll spoiler function induces a spoiler deflection:
A) on the up going wing only.
B) upward on the up going wing and downward on the down going wing.
C) on the down going wing only.
D) downward on the up going wing and upward on the down going wing.

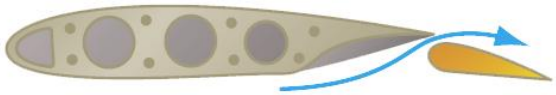
The range of control surface movements is limited by:
A) defined limits is the operations manual.
B) providing control stops.
C) leaving control cables a little stack.
D) tensioning control cables correctly.

Rolling is the rotation of the aeroplane about the:
A) vertical axis.
B) wing axis.
C) lateral axis.
D) longitudinal axis.

The axes of an aircraft by definition must all pass through the:
A) aircraft datum.
B) center of pressure.
C) center of gravity.
D) flight desk.

When ice is present on the stabilizer, deflection of flaps may cause:
A) the stabilizer to stall and a pitch up situation.
B) both wings and stabilizer to stall.
C) a roll movement due to directional instable.
D) the stabilizer to stall and a vertical dive.

The trailing edge device shown in the figure is a:



A) Fowler flap.
B) split flap.
C) plain flap.
D) slot flap.

A control surface has its limitations in movement by:
A) primary stops at the surface.
B) primary stops at the control column.
C) control cable tension.
D) secondary stops at the control column.

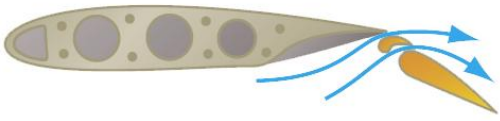
---

21. Over tensioned cables is a flying control system could result in:
A) insufficient friction in the system.
B) restricted movement of control surfaces.
C) excessive friction in the system.
D) no appreciable difference.

What type of trailing edge device is shown in this figure?

A) Slotted Flap
B) Krueger Flap
C) Split Flap
D) Plain Flap

What type of trailing edge device is shown in this figure?



A) Split Flaperon
B) Krueger Flap
C) Slotted Fowler Flap
D) Split Flap

Pitch Control:

A primary stop is mounted on an elevator control system in order to:
A) restrict the range of movement of the elevator.
B) maintain constant control cable tension.
C) prevent overloading of control cables.
D) restrict the range of movement of the control column.

Which of the following devices is used to counter adverse yaw on rolling into or out of a turn?
A) A yaw damper.
B) Vortex generators.
C) Differential ailerons.
D) A dorsal fin.

Rotation about the lateral axis is called:
A) pitching.
B) rolling.
C) slipping.
D) yawing.

An aeroplane has a servo-tab controlled elevator. What will happen when only the elevator jams during flight?
A) Pitch control reverses direction.
B) Pitch control has been lost.
C) The pitch control forces double.
D) The servo-tab now works as a negative trim-tab.
Why reverse?

An aircraft is approaching to land with its CG at the forward limit. It will be ... to flare and VREF will be ... than normal.
A) easy; lower
B) easy; higher
C) difficult; higher
D) difficult; lower

When the control column is moved forward and to the right:
A) the elevator goes down, the starboard aileron moves up and the port aileron moves down.
B) the elevator goes up, the starboard aileron moves down and the port aileron moves up.
C) the elevator goes up, the starboard aileron moves up and the port aileron moves down.
D) the elevator goes down, the starboard aileron moves down and the port aileron moves up.

The centre of gravity moving aft will:
A) increase the elevator up effectiveness.
B) decrease the elevator up effectiveness.
C) increase or decrease the elevator up effectiveness, depending on wing location.
D) not affect the elevator up or down effectiveness.

Which statement about a jet transport aeroplane is correct during take-off with the cg at the forward limit and the trimmable horizontal stabiliser (THS) positioned at the maximum allowable aeroplane nose down position?

A) Rotation will be normal.
B) Early nose wheel raising will take place.
C) The rotation will require extra stick force.
D) If the THS position is just within the limits of the green band, the take off warning system will be activated.

An aircraft is fitted with an elevator with a servo tab mechanism in the pitch control system. If the elevator becomes jammed, what is the effect on pitch control?

A) The servo tab will become a negative trim tab.
B) The servo tab will become an anti-balance tab.
C) Pitch control will be lost.
D) Some pitch control will be retained, working in the reverse sense.

When the C.G. position is moved forward, the elevator deflection for a manoeuvre with a load factor greater than 1 will be:

A) smaller.
B) larger.
C) unchanged.
D) dependent on trim position.

The purpose of the horizontal stabilizer is to:

A) give the aeroplane sufficient directional stability.
B) give the aeroplane enough weight in the tail.
C) give the aeroplane sufficient longitudinal stability.
D) give the aeroplane sufficient lateral stability.

In a mechanically controlled aeroplane, the most forward allowable position of the centre of gravity could be limited by the:

A) wing surface, stabilizer surface.
B) trim system, trim tab surface.
C) elevator capability, elevator control forces.
D) engine thrust, engine location.

What is the effect on the aeroplanes static longitudinal stability of a shift of the centre of gravity to a more aft location and on the required control deflection for a certain pitch up or down?

A) The static longitudinal stability is smaller and the required control deflection is smaller.
B) The static longitudinal stability is larger and the required control deflection is smaller.
C) The static longitudinal stability is smaller and the required control deflection is larger.
D) The static longitudinal stability is larger and the required control deflection is larger.

Pitch is movement around the:

A) lateral axis.
B) longitudinal axis.
C) vertical axis.
D) yaw axis.

Yaw Control:

A yaw damper is a system which:
A) increase directional stability
B) increase lateral stability.
C) decrease lateral stability.
D) reduce the stall speed

The pilot use the rudder to provide control around the:
A) Normal axis.
B) Turn axis.
C) Longitudinal axis.
D) Lateral axis.

What is the purpose of the rudder on an airplane?
A) To control the aircraft about the yaw-axis.
B) To control roll.
C) To control over banking tendency.
D) To increase lateral stability.

An aircraft is maintaining height and heading with the left engine inoperative and 5deg of bank toward the live engine. Which of the following indications will be displayed?
A) Turn indicator neutral, ball to the right.
B) Turn indicator right, ball to the right.
C) Turn indicator neutral, ball to the left.
D) Turn indicator left, ball to the left.

An aeroplane performs a right turn, the slip indicator is left of neutral. One way to co-ordinate the turn is to apply:
A) less right bank.
B) more right rudder.
C) a higher turn-rate.
D) more right bank.

When inner and outer ailerons are mounted, outer ailerons are used:
A) at low speeds.
B) at high speeds.
C) during take off only.
D) when flaps are in landing configuration only.

Left rudder input will cause:
A) left yaw about the vertical axis and left roll about the longitudinal axis.
B) right yaw about the vertical axis and left roll about the longitudinal axis.
C) right yaw about the vertical axis and right roll about the longitudinal axis.
D) left yaw about the vertical axis and right roll about the longitudinal axis.

What happens during an engine failure with two similar aeroplanes with wing mounted engines, one of them with jet engines, the other one with co-rotating propellers:

A) the same roll tendency for both aeroplanes.
B) more roll tendency for the propeller aeroplane.
C) less roll tendency for the propeller aeroplane.
D) the same yaw tendency for both aeroplanes regardless of left or right engine failure.

An advantage of locating the engines at the rear of the fuselage, in comparison to a location beneath the wing, is:

A) less influence on longitudinal control of thrust changes.
B) a wing which is less sensitive to flutter.
C) lighter wing construction.
D) easier maintenance of the engines.

Roll Control:

Rolling is a rotation about:
A) the normal axis.
B) any or all of the axes depending on the altitude of the aeroplane time.
C) the longitudinal axis.
D) the lateral axis.

An example of differential aileron deflection during initiation of left turn is:
A) left aileron: 2° up Right aileron: 5° down.
B) left aileron: 2° down Right aileron: 5° up.
C) left aileron: 5° down Right aileron: 2° up.
D) left aileron: 5° up Right aileron: 2° down.

In a roll manoeuvre, the down going wing:
A) has an increase in wash out.
B) provides a damping force.
C) provides a force to increase the rate of roll.
D) has a reduced angle of attack.

One method to compensate adverse yaw is a:
A) balance panel.
B) balance tab.
C) differential aileron.
D) antibalance tab.

The effect of differential ailerons in a turn will be:
A) reduced drag on the inner wing.
B) increased profile drag on the inner wing.
C) produced equal form drag on the inner and outer wings.
D) reduced induced drag on the inner and outer wings.

In order to reduce adverse aileron yaw, aircraft are fitted with:
A) frize ailerons.
B) offset rudder.
C) differential elevators.
D) horn balanced ailerons.

Which phenomenon is counteracted with differential aileron deflection?
A) Aileron reversal.
B) Turn co-ordination.
C) Adverse yaw.
D) Sensitivity for spiral dive.

How is adverse yaw compensated for during entry into and roll out from a turn?
A) Horn-balanced controls.
B) Differential aileron deflection.
C) Servo tabs.
D) Anti-balanced rudder control.

When an airplane is rotating about the longitudinal axis (roll), the down going wing:
A) generates a higher lift compared to the up going wing.
B) creates a force to increase the roll rate.
C) has a reduced angle of attack.
D) creates a damping moments, which resists the rolling motion.

Rolling means rotating about the:
A) normal axis.
B) longitudinal axis.
C) airplane axis.
D) lateral axis.

What is the purpose of the ailerons?
A) To give lateral control about the lateral axis.
B) To provide longitudinal control about the lateral axis.
C) To provide directional control about the normal or vertical axis.
D) To give lateral control about the longitudinal axis.

Differential aileron deflection:
A) equals the drag of the right and left aileron.
B) is required to keep the total lift constant when ailerons are deflected.
C) is required to achieve the required roll-rate.
D) increases the CLmax.

Flaperons are controls which are used simultaneously as:
A) flaps and elevator.
B) ailerons and flaps.
C) flaps and speed brakes.
D) ailerons and elevator.

When ailerons are deployed:
A) induced drag increases on both wings.
B) induced drag does not increase on either wing.
C) induced drag increases on the down going wing.
D) induced drag increases on the up going wing.

Which motion occurs about the longitudinal axis?
A) Sideslip.
B) Pitching.
C) Rolling.
D) Yawing.

If a turbulent gust causes an aeroplane to roll:
A) the angle of attack depends on whether the aeroplane changes speed.
B) the down going wing has no angle of attack.
C) the down going wing experiences an increases in angle of attack.
D) the down going wing experiences a decreases in angle of attack.

An aircraft rolls about the:
A) vertical axis.
B) lateral and longitudinal axis.
C) longitudinal axis.
D) lateral axis.

The ailerons on the wing of an aircraft are used for:
A) lateral control about the longitudinal axis.
B) lateral control about the lateral axis.
C) longitudinal control about the lateral axis.
D) longitudinal control about the normal axis.

Adverse aileron yaw can be countered by:
A) aileron reversal.
B) differential ailerons.
C) nothing (it is all a desirable flight characteristic).
D) aileron snatch.

A modern jet aeroplane equipped with inboard and outboard ailerons plus roll control spoilers is cruising at its normal cruise Mach number:
A) the inboard and outboard ailerons are active, the spoilers may be active.
B) only the inboard ailerons are active, the spoilers may be active.
C) only the spoilers will be active, not the ailerons.
D) only the outboard ailerons are active, the spoilers may be active.

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21. In an aircraft fitted with spoilers for lateral control, and not deployed as speed brakes, a roll to the right is initiated by:
A) right spoiler extended, left spoiler retracted.
B) left spoiler extended, right spoiler retracted.
C) both spoilers extended.
D) right spoiler extended, but left spoiler extended more.

When an aileron is deflected downward, it causes:
A) an increase in induced drag only.
B) an increase in both induced drag and profile drag.
C) an increase in lift on that wing area without any drag penalty.
D) an increase in profile drag only.

Rolling is the rotation of the aeroplane about the:
A) lateral axis.
B) vertical axis.
C) wing axis.
D) longitudinal axis.

Which of the following statements concerning control is correct?
A) Hydraulically powered control surfaces do not need mass balancing.
B) In a differential aileron control system the control surfaces have a larger upward than downward maximum deflection.
C) In general the maximum downward elevator deflection is larger than upward.
D) On some aeroplanes, the servo tab also serves as a trim tab.

Roll is:
A) rotation about the normal axis.
B) due to aileron deflection and is motion about the lateral axis.
C) rotation about the longitudinal axis.
D) rotation about the longitudinal axis due to speed brake selection.

Interaction in different planes (yaw/roll):

Which moments or motions interact in a Dutch roll?
A) Pitching and yawing.
B) Pitching and rolling.
C) Rolling and yawing.
D) Pitching and adverse yaw.

When an aircraft is rolled to port, adverse yaw will be reduced by:
A) Frise ailerons producing increased profile leading edge drag on both surfaces.
B) the leading edge of the down going aileron protruding into the airflow.
C) a Frise aileron being effective on the port wing.
D) the down going aileron producing a greater angle of deflection than the up going aileron.

Dutch roll will occur when the dihedral effect is ... when compared to ... directional...
A) large, static, stability.
B) small, dynamic, stability.
C) large, dynamic, stability.
D) small, static, stability.

Dutch roll is:
A) a combined rolling and yawing motion.
B) a type of slow roll.
C) a type of static instability.
D) primarily a pitching instability.

When a jet aircraft enters a turn or straightens-up from a turn, what device ensures correct response?
A) Dorsal fin.
B) Yaw damper.
C) Aileron - rudder coupling.
D) Vortex generators.

A secondary effect of using left rudder in level flight would be:
A) roll to the right.
B) yaw to the left.
C) roll to the left.
D) yaw to the right.

An aircrafts tendency to Dutch roll may be reduced by:
A) giving the aircraft longitudinal dihedral.
B) giving the wings an angle of anhedral.
C) sweeping the wings.
D) reducing the size of the fin.

A spring tab is used:

A) to reduce the effort required in moving the controls at high airspeed.
B) to reduce a possible tendency of control surface flutter at high speeds.
C) to provide a constant spring tension in a trim control system.
D) to provide feel (feed back) in a control system.

Adverse aileron yaw may be reduced by the employment of differential ailerons. What is the principle of differential aileron operation?

A) The down going aileron on the down going wing moves through a greater angle of deflection than the up going aileron on the up going wing.
B) Both the up and down going ailerons move through the same a angle of deflection, however the up going aileron produces greater profile drag than the down going aileron.
C) The down going aileron on the up going wing moves through a greater angle of deflection than the up going aileron.
D) The up going aileron on the down going wing moves through a greater angle of deflection than the down going aileron.

Means to reduce control force:

Stick forces, provided by an elevator feel system, depend on:
A) elevator deflection, dynamic pressure.
B) elevator deflection, static pressure.
C) stabilizer position, total pressure.
D) stabilizer position, static pressure.

It is possible to have an aileron control aerodynamically balanced by:
A) the surface C of G acting through the hinge line.
B) attaching weights which act forward of the hinge line.
C) causing the surface to move through a greater angle in up deflection than down deflection.
D) setting the hinge back into the control surface.

An anti balance tab:
A) is a form of mass balance tab.
B) improves the feel of the controls.
C) protects against control reversal.
D) increases control surface vibration.

A horn balance in a control system has the following purpose:
A) to prevent flutter.
B) to decrease the effective longitudinal dihedral of the aeroplane.
C) to decrease stick forces.
D) to obtain mass balancing.

A horn balance is an example of a:
A) mass balance.
B) trim tab.
C) aerodynamic balancing panel.
D) convergent-divergent nozzle.

Some airplanes have spring tabs mounted into the control system: This is to provide:
A) reduced control surface loads at all speeds.
B) a reduction in the pilots effort to move the controls against high airloads.
C) constant spring tension to a trim system.
D) feel feedback in a control system.

Examples of aerodynamic balancing of control surfaces are:
A) mass in the nose of the control surface, horn balance and mass balance.
B) balance tab, horn balance, and mass balance.
C) servo tab, spring tab, seal between the wing trailing edge and the leading edge of control surface.
D) spring tab, servo tab, and power assisted control.

To hold a given sideslip angle and airspeed, increased geometric dihedral would:
A) increase the stick force.
B) decrease the stick force.
C) have no effect on stick force.
D) reduce the stick force to zero.

The following is true concerning a balance tab. It is:
A) used to increase feel.
B) only operating at high speed.
C) a form of mass balance.
D) a form of aerodynamic balance.

A balance tab is a form of aerodynamic balance and is designed to:
A) be operated direct by the control column, which aerodynamically then moves the control surface.
B) move in the same direction as the control surface.
C) move in the opposite direction to the elevator when it is deflected up, but remain approximately parallel to the tailplane chord line.
D) operate in conjunction with hydraulic servo units.

On take-off with the CG at the forward limit:
A) elevator stick force to rotate the aircraft at VR will be unchanged, because the aircraft on the ground rotates about the main wheels.
B) elevator stick forces will be higher at VR.
C) elevator stick force is less because of the increased tailplane arm.
D) VMCG is lower due to the increased fin arm.

Aerodynamic balance can be obtained by:
A) an internal balance (the leading edge of the aileron is housed within a box inside the wing trailing edge, vented to atmosphere, with a seal from the wing to the leading edge of the aileron).
B) a weight mounted forward of the control surface hinge line.
C) the down going aileron moving through a smaller angle than the up going aileron.
D) an external balance, provided by a seal from the wing to the trailing edge of the aileron.

Possible solutions to reduce the control column forces required to deflect large control surfaces in flight are:
A) moving the hinge line further forward towards the control surface leading edge.
B) mass balancing.
C) aerodynamic balancing.
D) static balancing.

Which statement about a primary control surface controlled by a servo tab, is correct?
A) The servo tab can also be used as a trimtab.
B) The position is undetermined during taxiing, in particular with tailwind.
C) Due to the effectiveness of the servo tab the control surface area can be smaller.
D) The control effectiveness of the primary surface is increased by servo tab deflection.

Control surface aerodynamic balancing:
A) will alleviate control surface flutter tendencies.
B) will increase surface feel therefore increasing control effectiveness.
C) is achieved using a vertical and horizontal tail.
D) will decrease surface hinge moments and pilot effort.

The inputs to the Q unit are from:
A) pitot and altitude.
B) static and temperature.
C) altitude and pitot.
D) pitot and static.

The inputs to the Q feel unit are from:
A) pitot and static pressures.
B) altitude and pitot pressure.
C) pitot pressure and total head pressure.
D) static pressure and temperature.

A device designed to assist the pilot in moving the controls against the force of the air flow is known as a:
A) mass balance.
B) trim tab.
C) elevon.
D) aerodynamic balancing surface.

An anti-balance tab moves in the:
A) same sense as its associated control surface to reduce aerodynamic loading.
B) opposite sense as its associated control surface to increase aerodynamic loading.
C) opposite sense as its associated control surface to reduce aerodynamic loading.
D) same sense as its associated control surface, to increase aerodynamic loading.

Control surface overbalancing may be the result of:
A) applying excessive force to the controls.
B) the control surface centre of pressure being located in front of the surface hinge line.
C) a sudden movement of the centre of pressure aft of the surface hinge line.
D) bad pilot skills.

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21. Which kind of tab is commonly used in case of manual reversion of fully powered flight controls?
A) Anti-balance tab.
B) Spring tab.
C) Balance tab.
D) Servo tab.

When flutter damping of control surfaces is obtained by mass balancing, these weights will be located with respect to the hinge of the control surface:
A) above the hinge.
B) behind the hinge.
C) below the hinge
D) in front of the hinge.

When power assisted controls are used for pitch control, this:
A) makes aerodynamic balancing of the control surfaces meaningless.
B) can only function in combination with an elevator trim tab.
C) makes trimming superfluous.
D) ensures that a part of the aerodynamic forces is still felt on the column.

A tab which remains in line with the control surface when that surface is deflected, when the aircraft is on the ground is a:
A) spring tab.
B) anti-balance tab.
C) servo tab.
D) balance tab.

If an aircraft is fitted with powered flying controls, which of the following would be used in the case of manual reversion?
A) Anti-balance tab.
B) Balance tab.
C) Spring tab.
D) Servo tab.

Mass balance:

Mass balance to reduce control flutter is not required on:
A) aircraft with short rigid wings.
B) aircraft with a fully powered irreversible control system with no manual emergency system.
C) aircraft with a fully powered irreversible control system.
D) aircraft limited to speeds below 200kt.

When a large modern aircraft employs a variable incidence tailplane, trim changes are made by:
A) adjusting the trim tab on the trailing edge of the elevator.
B) changing the angle of the entire tailplane.
C) varying the spring bias trimming system.
D) adjusting the Q feel unit.

The location of mass balance weights is:
A) on the hinge line if the control surface has an inset hinge.
B) in front of the hinge line.
C) on the hinge line if the control surface does not have an inset hinge.
D) always on the hinge line, irrespective of the type of aerodynamic balance.

What is the reason for mass balancing a control surface?
A) To make it easy for the pilot to move the control surface.
B) To move the centre of gravity of the control surface aft of the hinge line, thereby preventing flutter.
C) To move the centre of gravity forward thereby preventing flutter.
D) Both a and b are correct.

Trimming:

In general transport aeroplanes with power assisted flight controls are fitted with an adjustable stabilizer instead of trim tabs on the elevator. This is because:
A) effectiveness of trim tabs is insufficient for those aeroplanes.
B) trim tab deflection increases Mcrit.
C) the pilot does not feel the stick forces at all.
D) mechanical adjustment of trim tabs creates too many problems.

Which of the following is an advantage of engines mounted on the rear fuselage over those mounted in wing pods?
A) The wing is less likely to suffer from flutter.
B) Longitudinal trim is less affected by changes in thrust.
C) Wings can have a lighter form of construction.
D) Easier maintenance access.

A balance tab is installed to provide:
A) balancing of the loads on the control surface.
B) reduced control column movement resistance,
C) movement of the control surface.
D) movement of the surface C of G to the hinge line.

How would the exterior appearance of an aeroplane change, when trimming for speed increase?
A) The elevator is deflected further downward by means of a movable horizontal stabiliser.
B) Elevator deflection is increased further downward by an upward deflected trim tab.
C) The exterior appearance of the aeroplane will not change.
D) The elevator is deflected further up by a downward deflected trim tab.

What should be usually done to perform a landing with the stabilizer jammed in the cruise flight position?
A) If possible, relocate as many passengers as possible to the front of the cabin.
B) Choose a higher landing speed than normal and/or use a lower flap setting for landing.
C) Use the Mach trimmer until after landing.
D) Choose a lower landing speed than normal.

Which statement about a jet transport aeroplane is correct, during take-off at the maximum allowable forward centre of gravity limit, while the THS (Trimmable Horizontal Stabilizer) has been positioned at the maximum allowable AND (Aeroplane Nose Down) position.
A) If the THS position is just within the limits of the green band, the take off warning system will be activated.
B) The rotation will require extra stick force.
C) Nothing special will happen.
D) Early nose wheel raising will take place.

How does the exterior view of an aeroplane change, when the trim is used during a speed decrease?
A) The elevator is deflected further downwards by means of an upwards deflected trim tab.
B) The elevator is deflected further downwards by mean's of a trimmable horizontal stabiliser.
C) Nothing changes in the exterior view.
D) The elevator is deflected further upwards by means of a downwards deflected trim tab.

One advantage of a movable-stabilizer system compared with a fixed stabilizer system is that:
A) it is a more powerful means of trimming.
B) the systems complexity is reduced.
C) it leads to greater stability in flight.
D) the structure weighs less.

Which statement about the trim position is true related to centre of gravity and adjustable stabiliser position?
A) Because characteristic speeds at take off do not vary with centre of gravity location, the need for stabiliser adjustment is dependent on flap position only.
B) At the forward limit for centre of gravity, stabiliser trim is adjusted maximum Nose Down to obtain maximum elevator authority at take off rotation.
C) A nose heavy aeroplane requires that the stabiliser leading edge is lower than compared with a tail heavy aeroplane.
D) A nose heavy aeroplane requires that the stabiliser leading edge is higher than compared with a tail heavy aeroplane.

An aircraft is equipped with an all flying tailplane which has a combined antibalance and trimming tab. The top of the trim wheel is moved forward. Which of the following statements is most correct?

A) The tab moves down, so that less effort is requires when the pilot attempts to move the control column to the rear.
B) The tab moves up, so that less effort is required when the pilot attempts to move the control column to the rear.
C) The tab moves up, so that more effect is required when the pilot attempts to move the control column to the rear.
D) The tab moves down, so that more effort is required when the pilot attempts to move the control column to the rear.

If an elevator trim tab is in its neutral position and the elevator is moved up:

A) the tab will move up relative to the elevator.
B) the tab will remain in line with the elevator.
C) the tab will remain parallel to the chord line of the tailplane.
D) the tab will move down relative to the elevator applying the trim input has been made.

What is the position of the elevator in relation to the trimmable horizontal stabilizer of a power assisted aeroplane, which is in trim?

A) The elevator is always deflected slightly downwards in order to have sufficient remaining flare capability.
B) At a forward CG the elevator is deflected upward and at an aft CG the elevator is deflected downward.
C) The position depends on speed, the position of slats and flaps and the position of the centre of gravity.
D) The elevator deflection (compared to the stabilizer position) is always zero.

If an elevator gets jammed in the neutral position during flight, moving the elevator trim tab down will cause:

A) a pitch-up moment.
B) no effect at all.
C) the airplane to maintain its attitude.
D) a pitch-down moment.

If the elevator trim tab is deflected up, the cockpit trim indicator presents:

A) nose-up.
B) nose-left.
C) nose-down.
D) neutral.

Power assisted flying control systems have trim controls primarily in order to:

A) relieve stresses on the hydraulic actuators.
B) bring the control forces to zero in steady flight.
C) relieve stresses on the trim tab.
D) allow the pilot to maintain control in case of hydraulic failure.

The reason for having a trim system on powered assisted flying controls is:

A) enables the pilot to maintain control in case of hydraulic failure.
B) enables the stick force to be reduced to zero.
C) relieve stresses on the hydraulic actuators.
D) relieve stresses on the trim tab.

Limitations:
Operating limitations

VMO:
A) is equal to the design speed for maximum gust intensity.
B) should be not greater than VC.
C) should be chosen in between VC and VD.
D) is the calibrated airspeed at which MMO is reached at 35.000 ft.

In flight the flutter of a control surface is normally reduced by:
A) weights acting forward of the hinge line.
B) weights acting on the hinge line.
C) use of balance tabs.
D) weights acting aft of the hinge line.

Which speed represents maximum landing gear extended speed?
A) Vfe
B) Vle
C) Vs0
D) Vlo

A jet transport aeroplane is in a straight climb at a constant IAS and constant weight. The operational limit that could be exceeded is:
A) MMO
B) VA
C) VMO
D) MD

For an aeroplane with one fixed value of VA the following applies. VA is:
A) the speed at which unrestricted application of elevator control can be used, without exceeding the maximum manoeuvring limit load factor.
B) the maximum speed in smooth air.
C) just another symbol for the rough air speed.
D) the speed at which the aeroplane stalls at the manoeuvring limit load factor at MTOW.

The relationship between the stall speed VS and VA (EAS) for a large transport aeroplane can be expressed in the following formula: (SQRT= square root)
A) VA = VS SQRT(2.5)
B) VS = VA SQRT(2.5)
C) Va = VA SQRT(3.75)
D) VS = VA SQRT(3.75)

What can happen to the aeroplane structure flying at a speed just exceeding VA?
A) It will collapse if a turn is made.
B) It may break if the elevator is fully deflected upwards.
C) It may suffer permanent deformation if the elevator is fully deflected upwards.
D) It may suffer permanent deformation because the flight is performed at too large dynamic pressure.

In a high speed descent at MMO you will reach VMO at:
A) M0.8
B) 350kts
C) FL270
D) FL250

Aileron reversal can be caused by:
A) neither A nor B.
B) both A and B.
C) fries type ailerons at low angles of attack.
D) twisting of the wing above reversal speed.

What is the relationship of VMO and MMO, in a climb and descent?
A) If climbing at VMO, it is possible to exceed MMO.
B) If descending at MMO, VMO cannot be exceeded.
C) If climbing at VMO, Mach number is decreasing.
D) If climbing at MMO, Indicated Airspeed is increasing.

VA is:
A) the maximum speed at which rolls are allowed.
B) the speed at which a heavy transport aeroplane should fly in turbulence.
C) the speed that should not be exceeded in the climb.
D) the maximum speed at which maximum elevator deflection up is allowed.

Which speed represents the maximum flap extended speed?
A) Vlof
B) Vfc
C) Vs1
D) Vfe

What is the danger when recovering from an emergency descent?
A) The landing gear may collapse.
B) Engine stall.
C) Directional stability.
D) Structural damage.

The maximum load factor that can be imposed on an airplane depends mainly on:
A) The operators decision.
B) The speed of the airplane.
C) The position of the centre of gravity.
D) All of the above.

In transonic flight the ailerons will be less effective than in subsonic flight because:
A) aileron deflection only affects the air in front of the shock wave.
B) aileron deflection only partly affects the pressure distribution around the wing.
C) aileron down deflection moves the shock wave forward.
D) behind the shock wave pressure is lower.

When flying at speeds above VA:
A) the aircraft may self-destruct in a turn.
B) an overspeed warning will be activated.
C) full elevator deflection may result in damage to the airframe or structural failure.
D) the aircraft cannot be stalled.

Flutter can be eliminated using:
A) a T-tail.
B) mass balancing.
C) a canard in front of the main wing.
D) powered flying controls.

An aircraft has a mass of 60,000kg and a limiting positive load factor of 2,5. VA is calculated as the EAS at which full positive elevator deflection will give the limiting load factor at the stall, and is 237kts. If the aircraft mass is reduced to 40,000kg by fuel burn, what will be the new VA?
A) 375 kts
B) 194 kts
C) 150 kts
D) 237 kts

Formula $V_{A2} = V_{A1} \times \sqrt{\frac{VA2}{VA1}} = 237 \times \sqrt{\frac{40000}{60000}}$

Which speed represents the manoeuvring speed?
A) Va
B) Vne
C) Vso
D) Vlo

By what percentage does VA (EAS) alter when the aeroplanes weight decreases by 19%?
A) 4.36% lower.
B) 10% lower.
C) 19% lower.
D) No change.

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21. A commercial jet aeroplane is performing a straight descent at a constant Mach Number with constant weight.
The operational limit that may be exceeded is:
A) MMO
B) VNE
C) VMO
D) VD

Which wind condition would be most critical during taxi with a tricycle landing gear airplane?
A) Quartering headwind.
B) Quartering tailwind.
C) Direct crosswind.
D) Full crosswind.
Why head wind and not tailwind?

Flutter may be caused by:
A) distortion by bending and torsion of the structure causing increasing vibration in the resonance frequency.
B) high airspeed aerodynamic wing stall.
C) low airspeed aerodynamic wing stall.
D) roll control reversal.

Aileron flutter is most likely to occur:
A) at high airspeed when the wing is rigid.
B) at high airspeed when the wing is flexible.
C) at low airspeed when the wing is flexible.
D) at low airspeed when the wing is rigid.

Control surface vibration at high airspeed is known as:
A) snatch.
B) flutter.
C) reversal.
D) vibration.

Which of the following statements is true?
A) Limiting factors in severe turbulence are the possibility of a stall and the margin to the structural limitations.
B) Through extension of the flaps in severe turbulence it is possible to reduce the speed and increase the margins to the structural limits.
C) Through extension of the flaps in severe turbulence the centre of pressure will move aft which will increase the margins to the structural limits.
D) By increasing the flap setting in severe turbulence the stall speed will be reduced and the risk for exceeding the structural limits will be decreased.

On FAR 23 airplane, the limit load factor in normal category is:
A) 4,4 G
B) +3,8 G
C) +3,2 G
D) +6,0 G

An aircraft is flown at 20% below its normal weight. Because of this, VA will be:
A) 10% higher
B) 20% higher
C) 10% lower
D) 20% lower

Maneuvering Envelope:

An A310 aeroplane weighing 100 tons is turning at FL 350 at constant altitude with a bank of 50 degrees. Its flight Mach range between low-speed buffering and high-speed buffering goes from:
A) M = 0.74 to M = 0.84
B) M = 0.72 to M higher than 0.84
C) M = 0.69 to M higher than. 0.84
D) M = 0.65 to M higher than 0.84

The positive manoeuvring limit load factor for a light aeroplane in the utility category in the clean configuration is:
A) 2.5
B) 3.8
C) 6.0
D) 4.4

For airplanes which have a high wing loading (W/S):
A) Total drag is mainly profile drag.
B) Vertical gusts have more influence on the load factor.
C) Total drag is mainly induced drag.
D) Vertical gusts have less influence on the load factor.

Which has the effect of increasing load factor? (all other relevant factors being constant).
A) Rearward CG location.
B) Increased air density.
C) Increased aeroplane mass.
D) Vertical gusts.

Load Factor is defined as:
A) a multiplying factor which converts a force into a moment of a force.
B) thrust divided by weight.
C) the inverse of the secant bank angle.
D) lift divided by weight.

What is the limit load factor of a large transport aeroplane in the manoeuvring diagram?
A) 1.5
B) 2.5
C) 6
D) 3.75

The lift coefficient (CL) of an aeroplane in steady horizontal flight is 0.35. Increase in angle of attack of 1 degree will increase CL by 0.079. A vertical up gust instantly changes the angle of attack by 2 degrees. The load factor will be:
A) 1.45
B) 0.45
C) 1.9
D) 0.9

An aircraft in straight and level flight has a CL of 0.35, and a 1s increase in angle of attack would increase the CL by 0.079. If a vertical gust increased angle of attack from the 1g value by 2s, what load factor would result?
A) 0.45
B) 5.08
C) 1.45
D) 4.43

The distribution of ... and ... in a structure determine natural frequencies and modes of vibration.
A) stringers, longerons
B) mass, stiffness
C) flaps, slats
D) passengers, payload

The positive manoeuvring limit load factor for a large jet transport aeroplane with flaps extended is:
A) 3.75
B) 2.5
C) 2.0
D) 1.5
Manoeuvring limit factor

Which load factor determines VA?
A) manoeuvring limit load factor
B) gust load factor at 66 ft/sec gust.
C) manoeuvring flap limit load factor.
D) manoeuvring ultimate load factor.

What is the positive limit load factor for large jet transport aircraft?
A) n = 3.75
B) n = 1.5
C) n = 1.0
D) n = 2.5

The lift coefficient (CL) of an aeroplane in steady horizontal flight is 0.42, increase in angle of attack of 1 degree increases CL by is 0.1. A vertical up gust instantly changes the angle of attack by 3 degrees. The load factor will be:
A) 2.49
B) 1.71
C) 0.74
D) 1.49

Load factor is:
A) Wing loading
B) Weight/Lift
C) 1/Bank angle
D) Lift/Weight

The lift coefficient (CL) of an aeroplane in steady horizontal flight is 0.4. Increase of angle of attack of 1 degree will increase CL by 0.09. A vertical up gust instantly changes the angle of attack by 5 degrees. The load factor will be:
A) 1.09
B) 2.0
C) 3.18
D) 2.13

An aircraft is in straight, level flight has a CL of 0.42, and a 1° increase in angle of attack would increase the CL by 0.1. Following a gust that increases the angle of attack by 3° , what load factor would the aircraft be subject to?
A) n = 1.4
B) n = 1.7
C) n = 0.7
D) n = 1.0

Gust envelope:

The shape of the gust load diagram is also determined by the following three vertical speed in ft/s (clean configuration):

A) 25, 50, 66
B) 25, 55, 75
C) 35, 55, 66
D) 15, 56, 65

The extreme right limitation for both V-n (gust and manoeuvre) diagrams is created by the speed:

A) VMO
B) VD
C) Vflutter
D) VC

Which combination of speeds is applicable for structural strength in gust (clean configuration)?

A) 50 ft/sec and VC.
B) 66 ft/sec and VD.
C) 55 ft/sec and VB.
D) 65 ft/sec at all speeds.

Which of the following is a correct statement of gust factors applied in certification under JAR 25?

A) 25fps at VB
B) 66fps at VD
C) 55fps at VC
D) 50fps at VC

What wing shape or wing characteristic is the least sensitive to turbulence:

A) winglets.
B) swept wings.
C) straight wings.
D) wing dihedral.

A high aspect ratio wing:

A) increases induced drag.
B) is structurally stiffer than a low aspect ratio.
C) decreases induced drag.
D) has a higher stall angle than a low aspect ratio.

What effect will gusts and turbulence have on the load factor of an airplane when it changes its airspeed?

A) Load factor decreases as airspeed increases.
B) Load factor increases as airspeed increases.
C) The load factor can increase or decrease, depending on the weight of the aircraft.
D) Airspeed has no influence on the load factor.

Which statement regarding the gust load factor on an aeroplane is correct (all other factors of importance being constant)?

1. Increasing the aspect-ratio of the wing will increase the gust load factor.
2. Increasing the speed will increase the gust load factor.

A) 1 is correct and 2 is incorrect.
B) 1 and 2 are correct.
C) 1 is incorrect and 2 is correct.
D) 1 and 2 are incorrect.

Which statement is correct about the gust load on an aeroplane (IAS and all other factors of importance remaining constant:

1. the gust load increases, when the weight decreases.
2. the gust load increases, when the altitude increases.

A) 1 and 2 are incorrect.
B) 1 and 2 are correct.
C) 1 is correct and 2 is incorrect.
D) 1 is incorrect and 2 is correct.

An aircraft flying at a given EAS is subject to a positive gust of 50kt EAS. Which of the following correctly describes the increase in positive g felt by the aircraft?

A) More at high aircraft weight.
B) More with a swept wing.
C) Less at altitude.
D) More with a high aspect ratio straight wing.

Which of the following statements is correct?

A) Extending flaps in turbulence reduces the stall speed but will reduce the margin to structural limitations.
B) By extending flaps during extreme turbulence, the CP moves aft which will increase the margin to structural limitations.
C) The use of flaps during severe turbulence reduces the stall speed and the risk of exceeding structural limitations decreases.
D) By extending flaps during severe turbulence it is possible to reduce speed and increase the margins to structural limitations.

Propellers

Conversion of Engine torque to thrust:

On an aircraft fitted with a variable pitch propeller, if engine RPM is to remain constant when engine power is increased, it requires:

A) an increase in blade angle.
B) a decrease in blade angle of attack.
C) a constant blade angle of attack to be maintained.
D) a decrease in blade angle.

The angle of attack for a propeller blade is the angle between blade chord line and:

A) Principal direction of propeller blade.
B) Direction of propeller axis.
C) Local air speed vector.
D) Aeroplane heading.

Running an engine fitted with a fixed pitch propeller at full throttle with the aircraft stationary and nose into a strong headwind will result in a:

A) higher RPM than in still air.
B) variable RPM depending on the CSU.
C) lower RPM than in still air.
D) the same RPM as in still air.

The output of a turboprop engine is usually indicated by?

A) Engine RPM as a percentage.
B) Torque.
C) SHP
D) Propeller RPM.

The booster pump fitted to the CSU of a constant speed propeller:

A) provides emergency oil pressure for feathering.
B) increases the engine lubricating oil pressure for propeller operation.
C) is driven by the propeller to provide oil pressure to unfeather single acting propellers.
D) is electrically operated, which is used to feather double acting propellers.

If you push forward the RPM lever of a constant speed propeller during a glide with idle power and constant speed, the propeller pitch will:

A) increase and the rate of descent will decrease.
B) decrease and the rate of descent will increase.
C) increase and the rate of descent will increase.
D) decrease and the rate of descent will decrease.

Which of these definitions of propeller parameters is correct?

A) Critical tip velocity = propeller speed at which risk of flow separation at some parts of propeller blade occurs.
B) Propeller angle of attack = angle between blade chord line and propeller vertical plane.
C) Blade angle = angle between blade chord line and propeller axis.
D) Geometric propeller pitch = the theoretical distance a propeller blade element is travelling in forward direction in one propeller revolution.

In cruise, the propellers ATM is:

A) equal to the CTM (Centrifugal Twisting Moment).
B) greater than the CTM.
C) less than the CTM.
D) equal to the DTM (Dynamic Turning Moment).

The centrifugal turning or twisting moment on a propeller will:

A) cause the blades to move to a coarser pitch when rotating.
B) cause the blades to move to a finer pitch when rotating.
C) cause the blades to pitch lock in neutral when rotating.
D) cause the blades to the feathering position when oil supply pressure fails.

The propeller CTM will:

A) Move the blades about their longitudinal axis.
B) Act in reverse when propeller braking is applied.
C) Tend to move the blades to a coarse pitch.
D) Cause the propeller CSU to pitch lock.

When there is no oil flow to or from the actuator of the CSU, the propeller is:

A) overspeeding.
B) pitch-locked.
C) on speed.
D) under speeding.

Constant-speed propellers provide a better performance than fixed-pitch propellers because they:

A) produce a greater maximum thrust than a fixed-pitch propeller.
B) have a higher maximum efficiency than a fixed-pitch propeller.
C) have more blade surface area than a fixed-pitch propeller.
D) produce an almost maximum efficiency over a wider speed range.

For an aircraft with a right hand propeller, the slipstream rotation will cause:

A) yaw to the left.
B) roll to the right.
C) yaw to the right.
D) roll to the left.

When an aircraft fitted with a constant speed propeller is in level flight, and a climb is initiated:
A) the blades will move to coarse pitch and RPM will reduce.
B) the RPM will remain constant as the blades move to a finer pitch.
C) the RPM will increase as the blades will move to fine pitch.
D) the RPM will increase as the blades move to a coarser pitch.

The de-icing of a propeller by fluid is achieved through:
A) slinger rings.
B) de-icing paste.
C) ground application of fluid only.
D) spray mats.

The twisting of a propeller blade from root to tip has been made to:
A) to prevent excessive stress at the blade tip at high RPM.
B) provide a constant angle of attack from root to tip.
C) to ensure its optimum thrust is always achieved at take off.
D) to provide its greatest thrust toward the blade root.

Thrust forces acting on a propeller blade in flight will tend to:
A) bend the blades back opposite to the direction of flight.
B) bend the blades forward in the direction of flight.
C) bend the blades in the direction of rotation.
D) bend the blades opposite to the direction of rotation.

Does the pitch-angle of a constant-speed propeller alter in medium horizontal turbulence?
A) Yes, but only if the pitch is full-fine.
B) Yes strongly.
C) Yes slightly.
D) No.

The first action in event of propeller runaway (overspeed condition), should be to:
A) feather the propeller.
B) push the RPM. lever fully forward.
C) close the throttle.
D) reduce the RPM. lever setting.

A double acting propeller is one which the blades are:
A) moved to coarse by oil pressure and to fine by spring pressure.
B) moved to coarse and fine by oil pressure with spring operation provided for emergency use.
C) moved to coarse and fine by spring pressure.
D) moved to coarse and fine by oil pressure.

21. A reversible propeller is one that:

A) can deliver negative thrust.
B) can be operated clockwise or counter clockwise.
C) is a PUSHER rather than a TRACTOR.
D) is mounted behind the main wing.

A right-hand propeller:

A) rotates clockwise viewed from the front.
B) is an engine fitted to the starboard side.
C) rotates clockwise viewed from the rear.
D) is always contra-rotating.

During normal operation of a constant speed propeller, what might be the reason for no oil flow within the C.S.U.?

A) The propeller is on speed.
B) Propeller RPM is too low.
C) The propeller is in overspeed.
D) The propeller is moving to the feathered position.

Reverse pitch propellers are used:

A) to slow up aircraft when making an approach to land.
B) to provide aerodynamic braking on the ground.
C) only for ground checking the pitch change mechanism.
D) to provide differential thrust during cross-wind landings.

In a single acting constant speed propeller, the actuator spring:

A) moves the propeller out of the feathered position when selected.
B) opposes the CSU weights.
C) moves the propeller through coarse to feather.
D) moves the propeller through coarse to a fine pitch.

A propeller which rotates clockwise when viewed from the front and is mounted on the starboard engine is termed:

A) an anti-clockwise propeller.
B) a left handed propeller.
C) a right handed propeller.
D) a clockwise propeller.

When the flyweights of the propeller CSU, during operation, move outwards overcoming the spring force:

A) the propeller is on speed.
B) the propeller is locked in pitch.
C) the propeller is in overspeed.
D) the propeller is in underspeed.

If you pull back the RPM lever of a constant speed propeller during a glide with idle power and constant speed, the propeller pitch will:

A) decrease and the rate of descent will increase.
B) increase and the rate of descent will decrease.
C) decrease and the rate of descent will decrease.
D) increase and the rate of descent will increase.

If you decrease the propeller pitch during a glide with idle-power at constant IAS the lift to drag ratio will.

A) decrease and the rate of descent will increase.
B) increase and the rate of descent will decrease.
C) decrease and the rate of descent will decrease.
D) increase and the rate of descent will increase.

A propeller is said to be double acting when it:

A) produces thrust on both its front and flat faces of its blades.
B) employs an electrically driven booster pump to move the blades in both directions.
C) employs a spring to move the propeller blade toward fine.
D) uses oil pressure to move the blade toward fine and coarse.

A fixed pitch propeller is usually:

A) at its optimum angle on take off
B) at too fine and angle of take off.
C) at too coarse an angle in the cruise.
D) at too course an angle of take off.

Propeller efficiency may be defined as the ratio between:

A) usable (power available) power of the propeller and shaft power.
B) the thrust and the maximum thrust.
C) the thermal power of fuel-flow and shaft power.
D) the usable (power available) power and the maximum power.

Mechanically driven pump, contained within a propeller constant speed unit, is used to:

A) feather the propeller, and is called the feathering pump.
B) feather the propeller and is called the emergency pump.
C) boost the feathering pump oil pressure, and is called the booster pump.
D) increase engine oil pressure for propeller operation and is called the booster pump.

With a fixed pitch propeller increasing speed will ... propeller alpha and increasing power and therefore propeller RPM will l ... propeller alpha.

A) decrease, increase
B) increase, decrease
C) decrease, decrease
D) increase, increase

The angle of attack of a fixed pitch propeller can be increased by:
A) reducing power and increasing TAS.
B) increasing power and increasing TAS.
C) increasing power and reducing TAS.
D) reducing power and reducing TAS.

For a variable propeller, which way does the blade twist from root to tip?
A) To finer pitch angle.
B) To coarser pitch angle.
C) Depend on the variable pitch setting.
D) Depends if it a left handed or right handed propeller.

The Beta Range of a propeller is used...
A) for takeoff at high temperatures.
B) to bring the propeller out of the feathering position.
C) for ground manoeuvring.
D) to move the propeller blades to the feathering position in an emergency.

The blade angle of a fixed pitch propeller remains the same in flight. The angle of attack of the blade:
A) is always directly proportional to aircraft speed.
B) increases when airspeed decreases and vice versa.
C) is controlled by the CSU.
D) also remains the same.

The greatest drag produced by the variable pitch propeller on a piston engine will occur when the propeller is:
A) stopped in fine pitch.
B) used during a powered glide.
C) stopped in coarse pitch.
D) windmilling.

A propeller blade is twisted to:
A) increase the effective solidity of the blade.
B) ensure equal thrust is generated along the length of the blade.
C) balance stress forces generated on the blade.
D) maintain a constant angle of attack along the length of the blade.

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41. Running an engine fitted with a fixed pitch propeller at full throttle with the aircraft stationary and nose into strong wind will result in:
A) higher rpm than in still air.
B) lower rpm than in still air.
C) the same rpm as in still air.
D) a variable rpm depending on the CSU.

A propeller mounted forward of the engine is termed:
A) a pusher propeller.
B) a paddle propeller.
C) a tractor propeller.
D) a hydropneumatic propeller.

The normal tendency of a propeller blade when it rotates is:
A) to go into high pitch if not equipped with counterweights.
B) to go into low pitch if not equipped with counterweights.
C) to remain in current pitch if equipped with counterweights.
D) to go into low pitch if equipped with counterweights.

Fixed pitch propellers are usually designed for maximum efficiency at:
A) best climb speed.
B) take off.
C) maximum RPM.
D) normal cruising speed.

Which of the following statements about a constant speed propeller is correct?
A) The RPM decreases with increasing aeroplane speed.
B) The blade angle increases with increasing speed.
C) The selected RPM is kept constant by the manifold pressure.
D) The propeller system keeps the aeroplane speed constant.

When forward speed ..., the ... of the propeller blades (fixed pitch)...
A) increases, angle of attack, decreases.
B) increases, angle of attack, increases.
C) increases, blade angle, decreases.
D) increases, blade angle, increases.

The propeller blade angle of attack on a fixed pitch propeller is increased when:
A) forward velocity increases and RPM decreasing.
B) RPM increases and forward velocity decreases.
C) velocity and RPM increase.
D) velocity and RPM decrease.

When maximum RPM is selected at take-off, what happens with the propeller blades if a CSU is installed?
A) The blades move to coarse pitch to enable the propeller to absorb the high power which is developed by the engine.
B) The propeller blades move to a finer pitch to allow the engine to develop maximum power.
C) The blades move to fine pitch to prevent propeller overspeeding.
D) The propeller blades move to a coarser pitch in order to generate the maximum thrust.

The geometric pith of a propeller is:
A) the distance the propeller actually moves forward in one revolution.
B) the angle the blade makes with the plane of rotation.
C) the distance it would go forward in one revolution at the blade angle.
D) the difference between A and C.

With a constant speed propeller, which of the following statements is true?
A) Pitch angle decreases with increasing TAS.
B) Pitch angle increases with increasing TAS.
C) RPM decreases with increasing TAS.
D) RPM increases with increasing TAS.

The purpose of the CSU oil booster pump of a variable pitch propeller is to:
A) increase the engine oil pressure for propeller operation.
B) increase engine oil pressure for propeller feathering.
C) lubricate the constant speed unit.
D) unfeather the propeller.

A typical fixed pitch propeller (C-172) is designed to achieve its optimum angle of attack at:
A) cruise speed.
B) low forward speeds, such as during take off.
C) rest to case engine starting.
D) maximum speed for high performance.

A variable pitch propeller during take-off will move towards:
A) coarse pitch to ensure the best angle of attack is achieved.
B) fine pitch to ensure minimum aerodynamic drag is generated.
C) coarse pitch to achieve the highest possible thrust.
D) fine pitch to ensure that the engine can develop its maximum power.

If you increase the propeller pitch during a glide with idle-power at constant IAS the lift to drag ratio will:
A) increase and the rate of descent will increase.
B) decrease and the rate of descent will decrease.
C) increase and the rate of descent will decrease.
D) decrease and the rate of descent will increase.

Engine failure or engine stop:

Given two identical aeroplanes with wing mounted engines, one fitted with jet engines and the other with counter rotating propellers, what happens following an engine failure?

A) The same yaw tendency for both aeroplanes regardless of left or right engine failure.
B) The same roll tendency for both aeroplanes.
C) More roll tendency for the propeller aeroplane.
D) Less roll tendency for the propeller aeroplane.

An engine failure can result in a windmilling (1) propeller and a non rotating (2) propeller. Which statement about propeller drag is correct?

A) (2) is larger than (1).
B) impossible to say which one is largest.
C) (1) is larger than (2).
D) (1) is equal to (2).

A twin-engine aircraft is available in both jet and propeller variants. The engines are mounted on the wings in the same position in both types. In the case of failure of one engine how would the resultant roll effect show itself?

A) Jet: roll away from the live engine; Propeller: roll away from the live engine more rapidly.
B) Jet: roll toward the live engine; Propeller: roll toward the dead engine.
C) Jet: roll toward the dead engine; Propeller roll toward the live engine.
D) Jet: no change but; Propeller roll opposite to direction of rotation of the live engine.

The purpose of the feathering stop on a variable pitch propeller is to:

A) prevent the propeller from feathering above a set RPM.
B) allow the blades to be feathered on engine shut down.
C) allow the blades to be feathered when ground running.
D) prevent the propeller blades from moving beyond the feather position.

A twin-engine aircraft is available in both jet and propeller variants. The engines are mounted on the wings in the same position in both types. In the case of failure of one engine how would the engine torque effect show itself?

A) Jet: roll toward the dead engine; Propeller: roll toward the dead engine.
B) Jet: no change but; Propeller: roll away from the live engine.
C) Jet: no change; Propeller: roll in the direction of rotation of the dead engine.
D) Jet: roll toward the live engine; Propeller: roll toward the dead engine.

A windmilling propeller produces:

A) thrust, and rotates in the opposite direction.
B) thrust, and rotates in the same direction.
C) drag, and rotates in the same direction.
D) drag, and rotates in the opposite direction.

In an aircraft with a two-lever power control system, in a descent with the throttle closed, what would be the effect if the pitch control were pulled fully back to the flight stop?

A) Rate of descent would increase and RPM would increase.
B) Rate of descent would remain the same and RPM would increase.
C) Rate of descent would decrease and RPM would decrease.
D) Rate of descent would remain the same and RPM would decrease.

With a propeller feathered:

A) the engine will turn over just fast enough to lubricate it.
B) there will be minimum drag on the propeller.
C) the best windmilling speed is achieved.
D) there will be minimum lift to drag ratio.

With the propeller windmilling after an engine failure, the:

A) CTM will rapidly increase.
B) ATM will rapidly increase.
C) ATM and CTM will act in the same direction.
D) ATM and CTM will immediately reduce to zero.

The windmilling of a propeller will cause:

A) the external weights to move the propeller to fine pitch.
B) drag to be produced instead of thrust.
C) the CTM tend to cause the propeller to move to coarse pitch.
D) some thrust to be produced.

When the blades of a propeller are in the feathered position:

A) the RPM is then just sufficient to lubricate the engine.
B) the drag of the propeller is then minimal.
C) the windmilling RPM is the maximum.
D) the propeller produces an optimal windmilling RPM.

After feathering an engine in flight, how is the propeller of a single acting type being unfeathered?

A) By use of oil pressure stored in a hydraulic accumulator.
B) With oil pressure from the CSU booster pump.
C) With oil pressure generated by an electrically driven pump, with its own oil supply.
D) By the action of the spring in the propeller actuator.

Propeller blades are said to be feathered when:

A) the blades leading edges face forward in the direction of the flight.
B) the propeller is windmilling.
C) the blades are at fully fine pitch.
D) the blades are at coarse pitch.

Design feature for power absorption:

A propeller blade is twisted in order to:
A) keep the local angle of attack constant along the blade.
B) decrease tangential speed from propeller blade root to propeller blade tip.
C) avoid local transonic flow to develop on the propeller blades.
D) allow higher mechanical stresses.

Why does the blade angle of a propeller change from root to tip?
A) To compensate for the increased velocity of the blade tip.
B) To compensate for the change in geometric cross section.
C) To provide increased thrust at root.
D) Cross-sectional segment increases from tip to root.

The number of blades in a propeller would be increased:
A) to enable a longer undercarriage to be fitted.
B) to increase the efficiency of the variable pitch mechanism.
C) to reduce noise.
D) to increase power absorption capability.

In the alpha and beta ranges respectively the governed elements of turboprop propeller controls are as follows:
A) engine RPM and fuel flow.
B) reverse thrust and blade angle.
C) propeller RPM and engine RPM.
D) fuel flow and pitch.

Increasing the number of propeller blades will:
A) decrease the torque in the propeller shaft at maximum power.
B) increase the maximum absorption of power.
C) increase the propeller efficiency.
D) increase the noise level at maximum power.

One a variable pitch propeller, were can you find the largest blade angle?
A) at the blade tip.
B) at the blade root.
C) depends on the rotation direction of the propeller.
D) depends on the pitch setting of the propeller.

The more blades a propeller has, the more power it is able to absorb. The limitation on blade number from an aerodynamic standpoint is:
A) the loss of efficiency of one blade if it follows to the path of the preceding blade to closely.
B) engine speed if the engine is not geared.
C) the loss of efficiency as the propeller tip approaches sonic speed.
D) the blade diameter as compared to the maximum width.

Which is one of the disadvantages of increasing the number of propeller blades?

A) Higher tip-speed.
B) Less power can be absorbed by the propeller.
C) Decrease propeller efficiency.
D) Increased noise.

Why is a propeller blade twisted from root to tip?

A) To ensure that the root produces most thrust.
B) Because the local angle of attack of a blade segment is dependent on the ratio of that segments speed in the plane of rotation and the true airspeed of the aeroplane.
C) To ensure that the tip produces most thrust.
D) Because the local angle of attack of a blade segment is dependent on the ratio of that segments speed in the plane of rotation and the angular velocity of the propellers.

The geometric pitch of a propeller is:

A) equal to the blade angle.
B) the mean chord of the propeller blade.
C) the distance between the propeller blades.
D) the distance the propeller would travel per revolution if it were retarded in a solid medium.

Increasing the camber on propeller blades will, if all else is the same:

A) increase the propeller efficiency.
B) increase the power absorption capability.
C) give the aircraft greater range.
D) increase the propeller solidity.

A reversible propeller is on that:

A) is mounted behind the main wing.
B) can be operated in either direction of rotation.
C) will deliver negative thrust.
D) is a pusher rather than a tractor.

The propeller noise can be minimised by:

A) Reduce the RPM of the engine.
B) Reduce the propeller area.
C) Increase number of blades.
D) Decrease the angle of attack of the propeller

The thickness of a propeller blade ... from root to tip.

A) remains constant
B) increases
C) decreases
D) increases or decreases depending on the propeller pitch angle

For a fixed-pitch propeller designed for cruise, the angle of attack of each blade, measured at the reference section:

A) is lower in ground run than in flight (with identical engine RPM).
B) is always positive during idling descent.
C) decreases when the aircraft speed decreases (with identical engine RPM).
D) is optimum when the aircraft is in a stabilized cruising flight.

Moments and couples due to propeller operation:

In a single engine a/c with clockwise rotating propeller, a left yaw is generated due to:

A) higher lift on the right wing.
B) the torque effect.
C) higher helix angle.
D) the slipstream, striking the fin on the left side.

Propeller torque is caused by:

A) the propeller trying to reduce the pitch angle owing to the centrifugal turning moment.
B) the gyroscopic effect of the rotating propeller.
C) the forward thrust on the propeller.
D) the aerodynamic forces on the propeller blades.

A propeller rotating anti-clockwise when viewed from the front, during the take-off ground roll will:

A) produce an increased load on the left wheel due to gyroscopic effect.
B) produce an increased load on the right wheel due to gyroscopic effect.
C) produce an increased load on the left wheel due to torque reaction.
D) produce an increased load on the right wheel due to torque reaction.

A propeller is turning to the right, seen from behind. The asymmetric thrust effect in the climb will:

A) yaw the aeroplane to the left.
B) yaw the aeroplane to the right.
C) roll the aeroplane to the left.
D) roll the aeroplane to the right.

To counteract the effect of slipstream on a single engined aircraft:

A) the fin should be placed as far as possible from the propeller.
B) frise ailerons should be used.
C) the horizontal stabilizer should be reduced in size.
D) higher power settings should be used.

A propeller rotating clockwise as seen from the rear tends to rotate the aircraft to the:

A) right around the vertical axis, and to the left around the longitudinal axis.
B) left around the vertical axis, and to the right around the longitudinal axis.
C) right around the vertical axis, and to the right around the longitudinal axis.
D) left around the vertical axis, and to the left around the longitudinal axis.

Propeller torque is caused by:

A) the forces caused by the airflow on the propeller.
B) the sideways thrust of the propeller.
C) the propeller trying to reduce the pitch angle owing to the centrifugal turning moment.
D) the forward thrust on the propeller.

For a tail wheel aircraft with a right handed propeller, at the start of the take off run, asymmetric blade effect causes:

A) no effect.
B) nose down pitch (tail up).
C) yaw to right.
D) yaw to left.

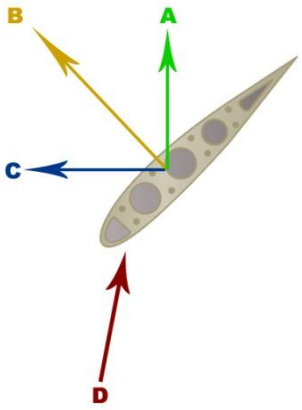
The torque reaction of a clockwise turning propeller will cause:

A) nose down pitch.
B) roll to the right.
C) nose up pitch.
D) roll to the left.

A propeller turns to the right, seen from behind. The torque effect in the take-off will:

A) pitch the aeroplane nose up.
B) roll the aeroplane to the right.
C) pitch the aeroplane nose down.
D) roll the aeroplane to the left.

Using the diagram below of the forces affecting a propeller in flight, which arrow represents the torque moment?



A) D
B) C
C) A
D) B

Propeller efficiency is best described as:

A) thermal HP to shaft HP.
B) thrust HP to shaft HP.
C) brake HP to maximum power.
D) thrust HP to overall power.

During the take-off roll, what affect does torque have on an aircraft with a clockwise rotating propeller?

A) Weight on left wheel decreased, weight on right wheel increased.
B) Weight on right wheel increased, weight on left wheel decreased.
C) Weight on left wheel increased, weight on right wheel remains constant.
D) Weight on left wheel increased, weight on right wheel decreased.

On a single engined aircraft with a right hand propeller the gyroscopic effect causes:

A) roll to the right during turns to the left.
B) the nose to fall during turns to the left.
C) roll to the left during turns to the right.
D) the nose to rise during turn to the left.

Which of the following would change the magnitude of the gyroscopic precession effect of the propeller?

A) Propeller blade angle.
B) Rate of roll.
C) TAS
D) Propeller RPM.

The tendency for propeller-driven aircraft to swing to one side on take-off is causes by:

A) a damaged propeller.
B) asymmetric blade effect, torque reaction, slipstream effect and gyroscopic effect.
C) the aft position of the centre of gravity.
D) poor pilot control.

Which of the following definitions of propeller parameters is correct?

A) Blade angle of attack is the angle between chord line and propeller vertical axis.
B) Blade angle is the angle between chord line and propeller axis.
C) Critical tip speed is the propeller speed at which there is a risk of the flow separating at some part of the propeller.
D) Geometric propeller pitch is the theoretical distance travelled forward by the propeller in one rotation.

A propeller is turning to the right, seen from behind. The asymmetric thrust effect is mainly induced by:

A) high angles of attack.
B) high speed.
C) large angles of yaw.
D) large angles of climb.

The CTM of a propeller is:

A) the distance a blade moves forward in one revolution.
B) a force which directly opposes the torque force.
C) a force which turns the blades towards fine pitch.
D) a force which turns the blades towards coarse pitch.

Gyroscopic precession of the propeller is induced by:

A) increasing RPM and rolling.
B) pitching and rolling.
C) pitching and yawing.
D) increasing RPM and yawing.

21. On a single engined aircraft with a right hand propeller the gyroscopic effect causes:

A) roll to the left in right turns.
B) the nose to fall in left turns.
C) the nose to rise in left turns.
D) roll to the right in left turns.

For an aircraft with a right hand propeller, the slipstream rotation will cause:

A) yaw to the right.
B) yaw to the left.
C) roll to the right.
D) roll to the left.

The torque reaction of a right-hand propeller will cause:

A) roll to the right.
B) nose up pitch.
C) nose down pitch.
D) roll to the left.

Counter-rotating propellers have the effect of:

A) decreasing the torque but increasing the gyroscopic effect.
B) cancelling out the torque and gyroscopic effects.
C) increasing the torque and gyroscopic effects.
D) increasing the torque but decreasing the gyroscopic effect.

The left turning tendency of an airplane caused by P-factor is the result of:

A) the propeller turning the airplane counter-clockwise.
B) an unbalanced propeller.
C) the propeller blade descending on the right hand side, producing more thrust than the ascending blade on the left.
D) gyroscopic forces applied to the rotating propeller blades acting 90° in advance of the point the force was applied.

An aerodynamic force on a propeller blade, which tends to turn the blade to coarse pitch during operation, is called:

A) ATM.
B) a slip force.
C) Beta range.
D) CTM (Centrifugal Twisting Moment.

For a tail wheel aircraft with a clockwise turning propeller, the asymmetric blade effect at the start of the take off run causes:

A) yaw to left.
B) no significant effects.
C) nose down pitching moment (tail up).
D) yaw to right.

Counter rotating propellers have the effect of:

A) cancelling out the torque and gyroscopic effects.
B) increasing the torque and gyroscopic effects.
C) decreasing the torque but increasing the gyroscopic effect.
D) increasing the torque but decreasing the gyroscopic effect.

Asymmetric propeller blade effect is mainly induced by:

A) large angles of yaw.
B) the inclination of the propeller axis to the relative airflow.
C) large angles of climb.
D) high speed.

To counteract the effect of slipstream on a single engined aircraft:

A) the fin may be offset.
B) the fin may be reduced in size.
C) frise ailerons may be used.
D) the fin may be inverted.

Flight mechanics

Forces acting on an airplane:

What are the two forces into which the lift force may be resolved when an aircraft is executing a turn?

A) centripetal force and a force equal and opposite to weight.
B) a force opposite to weight and a force equal and opposite to thrust.
C) a force equal and opposite to drag and the centripetal force.
D) a force equal and opposite to thrust and the centrifugal force.

What is the relationship between lift and weight when an airplane is in an accelerated climbing flight?

A) Lift equals weight.
B) Lift is less than weight.
C) Lift exceeds weight.
D) Depends mainly on the thrust setting.

To obtain both a small turn radius and a large turn rate, we want:

A) the highest possible load factor and the lowest possible velocity.
B) the highest possible load factor and the highest possible velocity.
C) the lowest possible load factor and the lowest possible velocity.
D) the lowest possible load factor and the highest possible velocity.

In a coordinated and level turn:

A) an aeroplane cannot stall.
B) the stall speed remains the same.
C) the stall speed increases.
D) the stall speed decreases.

During a power-off glide, the forces acting on an aircraft are:

A) drag, thrust and weight.
B) lift, drag and weight.
C) thrust, lift and drag.
D) lift, weight and inertia forces.

Weight acts:

A) perpendicular to the relative airflow.
B) parallel to the gravitational force.
C) perpendicular to the longitudinal axis.
D) perpendicular to the chord line.

The theoretical best range speed for a jet aircraft at low level is:

A) the same as for a propeller aircraft.
B) the minimum drag speed.
C) approximately 1.32 times the minimum drag speed.
D) the minimum power speed.

Flying for maximum range in a jet aircraft, will you get a higher specific air range by increasing altitude if:

A) you are above the tropopause, at MCDR and at VIMD.
B) you are below or above the tropopause, at MCDR and above VIMD.
C) you are above the tropopause, at MCDR and above VIMD.
D) you are below the tropopause, at MCDR and above VIMD.

In a steady unaccellerated glide:

A) the resultant aerodynamic force is equal to weight.
B) the resultant aerodynamic force is equal to drag.
C) none of these statements is true.
D) the resultant aerodynamic force is equal to lift.

In a level banked turn, the stalling speed will:

A) remain the same.
B) vary inversely with wing loading.
C) increase.
D) decrease.

How many feet will a sailplane sink in 15 nautical miles if its lift/drag ratio is 22:1?

A) 2,700 feet
B) 3,600 feet
C) 5,200 feet
D) 4,100 feet

Which of the following statements is true for a glider aircraft?

A) Weight affects endurance and not range.
B) Wind affects range and not endurance.
C) Wind has no influence on range and endurance.
D) Weight affects range and not endurance.

The turn indicator shows a right turn. The slip indicator is left of neutral. To coordinate the turn:

A) a higher turn rate is required.
B) more right bank is required.
C) less right bank is required.
D) more right rudder is required.

An aeroplane is in a steady turn, at a constant TAS of 300 kt, and a bank angle of 45° . Its turning radius is equal to:

A) 9.000 metres.
B) 4.743 metres.
C) 3.354 metres.
D) 2.381 metres.

When an aircraft is descending with the engines running at idle RPM:

A) lift is equal to weight.
B) thrust is less than drag.
C) only profile drag is produced.
D) thrust equals weight.

In order to achieve the maximum rate of climb, aircraft should be flown at the indicated airspeed which:

A) gives the best lift/drag ratio.
B) gives the best speed/drag ratio.
C) gives maximum excess power.
D) gives the best thrust/drag ratio.

An aircraft has a basic stalling speed (level flight) of 200 kts. In a 75 degrees coordinated and level turn the stall speed is:

A) 393 kts
B) 197 kts
C) 102 kts
D) 203 kts

At a true airspeed of 300kt and in a 45° bank level turn, the radius of turn would be... (assume a value of 10m/sec/sec for g).

A) 2387m
B) 8000m
C) 23780m
D) 2765m

The stalling speed of an aircraft in a turn is equal to:

A) the basic stalling speed x the cos(angle of bank).
B) the basic stalling speed x the square root of the load factor.
C) the inverse of the load factor.
D) the basic stalling speed.

The speed for minimum sink rate in a glide, compared to the speed for maximum distance VIMD is:

A) equal to VIMD.
B) slower than VIMD.
C) faster than VIMD.
D) not related to VIMD.

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21. During cruise, the weight of an aircraft reduces by 19%. Therefore the manoeuvring speed will:

A) decrease by 10%.
B) increase by 10%.
C) decrease by 19%.
D) increase by 19%.

The lift of an aeroplane of weight W in a constant linear climb with a climb angle (gamma) is approximately:

A) W(1-tan.gamma).
B) Wcos.gamma.
C) W/cos.gamma.
D) W(1-sin.gamma).

By what percentage does the lift increase in a steady level turn at 45° angle of bank, compared to straight and level flight?

A) 52%
B) 41%
C) 31%
D) 19%

In a climbing turn:

A) the angle of attack on the inner wing will be greater than the angle of attack on the outer wing.
B) the outer wing aileron must be deflected through a greater angle than the aileron on the inner wing.
C) the angle of attack on the outer wing will be greater than the angle of attack on the inner wing.
D) the angle of attack on each wing will be the same.

When an aircraft is in a climb at a constant indicated airspeed:

A) the aerodynamic drag component is less than the thrust.
B) thrust is exactly equal to the aerodynamic drag component.
C) thrust is equal to the component of weight acting along the flight path.
D) thrust is less than the aerodynamic drag.

Which forces produce the necessary normal acceleration to make an aircraft turn?

A) The vertical component of lift.
B) Centrifugal force.
C) The horizontal component of weight.
D) The horizontal component of lift.

An aeroplane performs a steady horizontal turn with 20 degrees bank and 150 kt TAS. The same aeroplane with the same bank angle and the same speed, but at a lower mass will:

A) turn with the same turn radius.
B) turn with a higher turn rate.
C) turn with a larger turn radius.
D) turn with a smaller turn radius.

To cover the greatest distance when gliding, the gliding speed must be:

A) the one which gives the highest lift/drag ratio.
B) as high as possible within V limits.
C) near to the stalling speed.
D) the one that gives the lowest drag.

A sailplane has lost 2.000 feet in 9 nautical miles. The best glide ratio for this sailplane is approximately:

A) 27:1
B) 24:1
C) 30:1
D) 18:1

An aircraft in flight is affected by loads. These may be classified as:

A) compressive, tensile, shear and torsional.
B) tensile, shear, twisting and stretching.
C) compressive, bending, shear and torsional.
D) thrust, drag, lift and weight.

The load factor is defined as:

A) thrust divided by weight.
B) lift divided by weight.
C) centripetal force divided by lift.
D) lift divided by drag.

Which statement is correct at the speed for minimum drag (subsonic)?

A) Propeller aeroplanes fly at that speed at max. endurance.
B) Induced drag is greater than the parasite drag.
C) The CL/CD ratio is minimum.
D) The gliding angle is minimum.

The four forces of lift, weight, thrust and drag in level flight act through:

A) the C of P.
B) the Aft Limit.
C) the Aerodynamic Centre.
D) the C of G.

hat is the percentage increase in stall speed in a 45° bank turn?

A) 41%
B) 10%
C) 19%
D) 45%

Load factor is defined as the actual lift produced by the wings...

A) divided by cos(bank angle).
B) divided by the total weight of the aircraft.
C) divided by the surface area of the wing.
D) divided by the aircrafts empty weight.

For a jet aircraft, the best rate of climb is achieved:

A) at the optimum lift to drag ratio.
B) when excess power available is maximum.
C) at the optimum angle of attack.
D) when excess thrust available is maximum.

When making a level turn...
A) less power is required than in straight and level flight.
B) the load factor will decrease.
C) more power is required than in straight and level flight.
D) the same power is required as in straight and level flight.

A particular SID requires a minimum climb gradient of 210 feet per NM to 8,000 feet. If you climb with a groundspeed of 140 knots, what is the rate of climb required in feet per minute?
A) 210
B) 490
C) 304
D) 450

The margin between the power available and the power required:
A) increases when the aircraft climbs.
B) remains the same.
C) decreases when the aircraft descends.
D) decreases when the aircraft climbs.

When an aircraft is in a steady climb (constant IAS), how will be the wing stalling angle be affected?
A) The wing stalling angle will increase with increasing altitude.
B) The wing stalling angle will remain the same, regardless of altitude.
C) The stalling angle of the wing is only affected by true airspeed which remains constant during climb.
D) The stalling angle of the wing will decrease with increasing altitude.

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41. The bank angle in a rate-one turn depends on:
A) wind.
B) weight.
C) load factor.
D) TAS.

Which of the following is the correct formula to calculate the lift component in a steady climb (μ is the angle of climb)?
A) W x cos(μ)
B) W x (1-sin(μ))
C) W x (1-tan(μ))
D) W / cos(μ)

For a steady unaccelerated climb:
A) lift is equal to weight.
B) lift is equal to drag.
C) lift is less than weight.
D) lift is greater than weight.

When an aircraft is in a gliding flight:

A) lift is greater than weight and drag.
B) thrust is replaced by a component of lift and weight to maintain airspeed.
C) thrust equals drag.
D) thrust is replaced by a component of weight to maintain airspeed.

In a level turn:

A) lift equals the weight.
B) the component of the lift in the vertical direction equals the weight.
C) the component of the lift in the horizontal direction equals the weight.
D) the load factor decreases.

Which of the following forces enables an aircraft to make a level turn?

A) Engine thrust.
B) Weight.
C) Lift.
D) Aeroplane drag.

An aeroplane performs a continuous descent with 160 kts IAS and 1.000 feet/min vertical speed. In this condition:

A) weight is greater than lift.
B) lift is less than drag.
C) drag is less than the combined forces that move the aeroplane forward.
D) lift is equal to weight.

For a glider to obtain a maximum gliding distance, the airspeed to be flown is:

A) the minimum power speed.
B) the minimum control speed.
C) the airspeed which corresponds to the best lift-to-drag ratio.
D) the minimum sink speed.

The four basic forces acting on an airplane in unaccelerated flight are:

A) lift, weight, thrust and drag.
B) pressure forces, centrifugal forces, centripetal forces and inertia forces.
C) lift, weight, gravity and thrust.
D) lift, gravity, power, and friction.

A jet aeroplane is rolled into a turn, while maintaining airspeed and holding altitude. In such a case, the pilot has to:

A) increase thrust and angle of attack.
B) increase thrust and keep angle of attack unchanged.
C) increase angle of attack and keep thrust unchanged.
D) increase thrust and decrease angle of attack.

For an aircraft in straight and level flight, which forces are in equilibrium?

A) Compressive, tensile, shear and torsional loads.
B) Thrust, drag, lift and weight.
C) Tensile, shear, twisting and stretching forces.
D) Compressive, bending, shear and torsional forces.

A sailplane has a best glide ratio of 30:1. How many nautical miles will the glider travel while losing 2,000 feet?

A) 21 nautical miles.
B) 10 nautical miles.
C) 15 nautical miles.
D) 6000 nautical miles.

During straight descent, lift is equal to:

A) weight.
B) thrust.
C) W x sin(climb angle).
D) W x cos(climb angle).

The glide range of an aircraft is affected by:

A) drag only.
B) the wingspan only.
C) aircraft all up weight.
D) the lift/drag ratio.

Which of the following statements is correct?

I. VMCL is the minimum control speed in the landing configuration.
II. The speed VMCL can be limited by the available maximum roll rate

A) I is correct, II is incorrect.
B) I is correct, II is correct.
C) I is incorrect, II is incorrect.
D) I is incorrect, II is correct.

What action must the pilot take to maintain altitude and airspeed when turning in a jet aircraft?

A) Decrease the turn radius.
B) Increase angle of attack and thrust.
C) Increase thrust
D) Increase angle of attack.

A pitch up could be caused by:

A) a reduction in varying loads due to G.
B) forward movement of the center of gravity.
C) forward movement of the center of pressure.
D) lateral movement of the center of gravity.

If in level flight an aircraft has a stalling speed of 90 kts IAS, what will be its stalling speed in a 60° level and balanced turn?

A) 112 kts
B) 90 kts
C) 99 kts
D) 127 kts

What is the approximate value of the lift of an aeroplane at a gross weight of 50 000 N, in a horizontal coordinated 45 degrees banked turn?

A) 60 000 N
B) 70 000 N
C) 80 000 N
D) 50 000 N

When are the four forces that act on an airplane in equilibrium during flight?

A) In a vertical dive.
B) In an unaccelerated turn.
C) In an unaccelerated horizontal flight.
D) In an accelerated climb and/or descent.

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61. In a steady banked turn the lift will:

A) equal the resultant of weight and centrifugal force.
B) equal the centrifugal force minus the weight.
C) equal the weight.
D) equal the centrifugal force.

From the polar diagram of the entire aeroplane one can read:

A) the maximum CL/CD ratio and maximum lift coefficient.
B) the minimum CL/CD ratio and the minimum drag.
C) the minimum drag coefficient and the maximum lift.
D) the minimum drag and the maximum lift.

From the polar diagram of the entire aeroplane one can read:

A) the maximum CL/CD ratio and maximum lift coefficient.
B) the minimum CL/CD ratio and the minimum drag.
C) the minimum drag coefficient and the maximum lift.
D) the minimum drag and the maximum lift.

As fuel is consumed during a level flight cruise at high level:

A) the angle of attack must be increased.
B) the centre of pressure will move forward.
C) induced drag will decrease.
D) the stalling speed will increase.

The angle of climb of an aircraft is proportional to ... and ... as weight increases:

A) excess power; increases
B) excess thrust; increases
C) excess power; decreases
D) excess thrust; decreases

When an aircraft is in a non-accelerated level flight, what are the relationships between lift, weight, thrust and drag?

A) Lift is equal to weight and thrust exceeds drag.
B) Lift is equal to weight and thrust is equal to drag.
C) Lift is greater than weight and thrust is equal to drag.
D) Lift is greater than weight and thrust exceeds drag.

If the temperature decreases it will cause a:

A) increase in take-off distance required and an increased maximum rate of climb.
B) decrease in take-off distance required and a reduced maximum rate of climb.
C) increase in take-off distance required and a reduced maximum rate of climb.
D) decrease in take-off distance required and an increase the maximum rate of climb.

Thrust available ... and power available ... as altitude decreases.

A) decreases; decreases
B) increases; decreases
C) decreases; increases
D) increases; increases

If VS1G is 100kt, the stalling speed in a 45° bank level turn will be:

A) 100 kts
B) 141 kts
C) 80 kts
D) 119 kts

When the load factor increases...

A) an aircraft will have a tendency to roll and yaw.
B) an aircraft will stall at a higher speed.
C) an aircraft will have a tendency to spin.
D) an aircraft will suffer immediate structural failure.

For an aircraft in level flight, if the wing centre of pressure is aft of the centre of gravity and there is no thrust- drag couple, the tailplane load must be:

A) directed upwards.
B) zero at all times.
C) directed downwards.
D) up or down depending on the position of the flight spoilers.

Which of the following statements is correct?

A) Lift acts at right angles to the top surface of the wing and drag acts at right angles to lift.
B) Drag acts in the same direction as the relative wind and lift perpendicular to it.
C) Lift acts perpendicular to the horizontal and drag parallel in a rearwards direction.
D) Drag acts parallel to the chord and opposite to the direction of motion of the aircraft and lift acts perpendicular to the chord.

Propeller aircraft flown at medium altitude at the recommended EAS will have a better specific air range (SAR) than at sea level because:

A) engine efficiency is greater.
B) drag is the same.
C) the thrust required is less.
D) the power required to maintain level flight is less.

The difference between power available and power required...

A) is independent of altitude.
B) increases when the aircraft climbs.
C) decreases when the aircraft descends.
D) decreases when the aircraft climbs.

In a steady climb:

A) if the angle of climb is 20 deg, lift equals weight times sin(20 deg).
B) thrust equals drag plus the weight component perpendicular to the flight path and lift equals the weight component along the flight path.
C) thrust equals drag plus the weight component along the flight path and lift equals the weight component perpendicular to the flight path.
D) thrust equals the weight component along the flight path and lift equals the sum of the components of drag and weight along the flight path.

An aeroplane performs a continuous descent with 160 kts IAS and 1000 feet/min vertical speed. In this condition:

A) drag is less than the combined forces that move the aeroplane forward.
B) lift is equal to weight.
C) lift is less than drag.
D) weight is greater than lift.

In a turn, the load factor n and the stalling speed VS will be:

A) n smaller than 1, VS lower than in straight and level flight.
B) n greater than 1, VS higher than in straight and level flight.
C) n greater than 1, VS lower than in straight and level flight.
D) n smaller than 1, VS higher than in straight and level flight.

For an aircraft in a steady climb, what is the relationship between lift, weight, thrust and drag?

A) The lift force is exactly equal to the weight.
B) Weight is greater than the lift force.
C) The lift force is greater than weight.
D) Weight plus drag is equal to lift (W + D = L).

A sailplane has a best glide ratio of 23:1. How many feet will the glider lose in 8 nautical miles?

A) 1,840 feet.
B) 330 feet.
C) 2,750 feet.
D) 2,100 feet.

Flying horizontally in a turn:

A) more of less power may be require depending on which side of the drag curve the aeroplane is sitting.
B) less power is required than in level flight.
C) the more power is required than in level flight.
D) the same power is required.

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81. Which of the following will give an increase of ground range when gliding at VDmin?

A) A headwind.
B) Increased weight.
C) A tailwind.
D) Decreased weight.

In a steady turn at constant height:

A) the radius of turn depends only upon load factor.
B) the rate of turn depends upon the weight, TAS and angle of bank.
C) the rate of turn depends upon the TAS and angle of bank.
D) the radius of turn depends upon the weight and load factor.

For a jet aircraft the best rate of climb is achieved:

A) at the optimum angle of attack, nominally 4& #351;.
B) when excess power available is at a maximum.
C) at the optimum lift to drag ratio.
D) when excess thrust available is at a maximum.

A light twin is in a turn at 20 degrees bank and 150 kt TAS. A more heavy aeroplane at the same bank and the same speed will:

A) turn at a bigger turn radius.
B) turn at a smaller turn radius.
C) turn at the same turn radius.
D) turn at a higher turn rate.

The value of the induced drag of an aeroplane in straight and level flight at constant weight varies linearly with:

A) v2
B) 1/V
C) 1/V2
D) V

During a correctly balanced turn:

A) the centrifugal force directly balances the weight of the aircraft.
B) the lift force provides a centripetal force and a force that opposes the weight of the aircraft.
C) the lift force balances the aircraft weight.
D) the thrust is a component of the centrifugal force.

In a steady unaccelerated descent:

A) thrust is equal to drag, lift equal to weight.
B) lift is greater than weight, thrust less than drag.
C) thrust is less than drag, lift less than weight.
D) thrust is greater than drag, lift is less than weight.

The greatest gliding range would be obtained from a wing at:

A) a high angle of attack at maximum lift/drag ratio.
B) a small angle of attack at minimum lift/drag ratio.
C) a high angle of attack at minimum lift/drag ratio.
D) a small angle of attack at maximum lift/drag ratio.

During the glide, the forces acting on an aircraft are:

A) drag, thrust and weight.
B) lift, weight and thrust.
C) thrust, lift and drag.
D) lift, drag and weight.

Emergency descent:

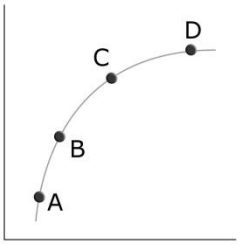
A twin-engine aeroplane loses both engines. How many feet will it sink in 10 nautical miles if its lift-to-drag ratio is 23:1?

A) 2,600 feet.
B) 4,300 feet.
C) 2,400 feet.
D) 2,300 feet.

The maximum glide range of an aircraft will depend on wind and:

A) speed for minimum power required.
B) minimum Lift / Drag ratio.
C) CL MAX.
D) the ratio to lift to drag which varies according to angle of attack.

Which point on the whole aeroplane polar diagram will give minimum sink rate?



A) B
B) D
C) A
D) C

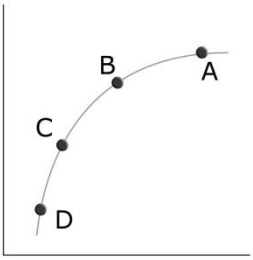
If an aircraft dumps fuel after an engine failure, and the aircraft is flown for maximum glide range:

A) the range will be increased mainly due to less induced drag.
B) the stalling speed will increase.
C) the approach speed will be lower.
D) the optimum gliding angle will be shallower.

In order to optimise gliding distance, the gliding speed must be:

A) equal to the speed which gives the highest lift-to-drag ratio.
B) as high as possible but lower than the never exceeding speed.
C) equal to the minimum power speed.
D) as low as possible.

Which point in the diagram gives the lowest speed in horizontal flight?

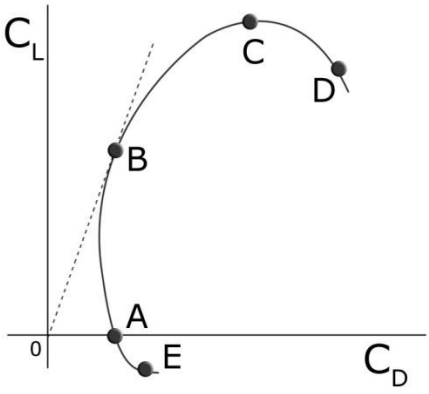


A) Point B.
B) Point A.
C) Point C.
D) Point D.

The effect of a headwind is to ... the climb gradient and to ... the rate of climb.

A) not affect; increase
B) increase; decrease
C) increase; not affect
D) decrease; increase

In the diagram below, an aircraft polar diagram of CL against CD, point B is:

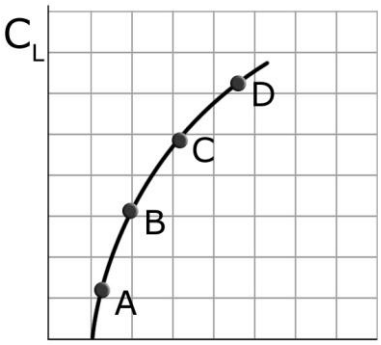


A) minimum drag point.
B) angle of attack for minimum power required in level flight.
C) best lift/drag ratio angle of attack.
D) zero lift angle of attack.

With a L/D ratio of 9:1 and flying at 12000 ft the glide range in still air would be:

A) 18 nm
B) 15 nm
C) 20 nm
D) 14 nm

Which point in the diagram gives the best glide condition?



A) Point B.
B) Point D.
C) Point C.
D) Point A.

On the polar diagram, point C corresponds to:

A) zero lift angle of attack.
B) best lift/drag ratio angle of attack.
C) the critical angle of attack.
D) minimum drag.

The polar curve of an aerofoil is a graphic relation between:

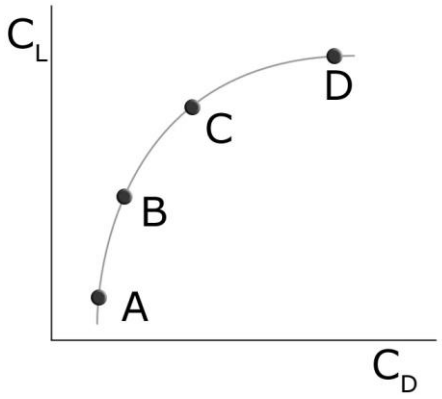
A) angle of attack and CL.
B) TAC and stall speed.
C) CD and angle of attack.
D) CL and CD.

A glider reduces weight by dumping water ballast. A ten per cent reduction in weight would give:

A) a ten per cent increase in best glide angle.
B) a five per cent reduction in best glide angle.
C) a decrease in best rate of descent.
D) no change in best rate of descent.

Which point gives minimum speed in level flight on the whole aeroplane polar curve?

A) B
B) A
C) C
D) D



What flight condition would be represented at point A?

A) VMO.
B) Best rate of climb speed.
C) Minimum power required for level flight.
D) Maximum gliding range.