# Mass and Balance

## *Introduction to mass and balance*

Centre of gravity
Mass balance and limits

## *Loading*

Terminology
Aircraft mass check
Procedures for determining aircraft mass and balance
Effect of overloading

## *Centre of gravity*

Basis of CG calculations (load and balance documentation)
Calculation of CG
Securing of load CG
Area load, running load, supporting load

# *Introduction to mass and balance*

## Centre of gravity

The position of the centre of gravity can always be determined by:
A) dividing the total mass by the total moment
**B)** dividing the total moment by the total mass
C) subtracting the total mass from the total moment
D) subtracting the total moment from the total mass

What determines the longitudinal stability of an aeroplane?
**A)** The location of the centre of gravity with respect to the neutral point
B) The effectiveness of the horizontal stabilizer, rudder and rudder trim tab
C) The relationship of thrust and lift to weight and drag
D) The dihedral, angle of sweepback and the keel effect

The stalling speed of an aeroplane will be highest when it is loaded with a:
**A)** high gross mass and forward centre of gravity
B) low gross mass and aft centre of gravity
C) low gross mass and forward centre of gravity
D) high gross mass and aft centre of gravity

During take-off you notice that, for a given elevator input, the aeroplane rotates much more rapidly than expected. This is an indication that:
A) the centre of gravity is too far forward
B) the centre of pressure is aft of the centre of gravity
**C)** the centre of gravity may be towards the aft limit
D) the aeroplane is overloaded

What effect has a centre of gravity close to the forward limit?
**A)** A reduced rate of climb
B) A better rate of climb capability
C) A decreased induced drag
D) A reduction in the specific fuel consumption

If the centre of gravity is near the forward limit the aeroplane will:
A) tend to over rotate during take-off
B) benefit from reduced drag due to the decrease in angle of attack
C) require less power for a given airspeed
**D)** require elevator trim which will result in an increase in fuel consumption

If all the moments are positive when calculating mass (weight) and balance, the position of the datum would be at the:

**A)** nose, or forward of the aircraft
B) trailing edge of the wing
C) main wheels centreline
D) centre line of the nose or tail wheel depending on the aircraft type

The centre of gravity of an aeroplane is that point through which the total mass of the aeroplane is said to act.
The weight acts in a direction:

A) always parallel to the aeroplane's vertical axis
B) at right angles to the flight path
C) governed by the distribution of the mass within the aeroplane
**D)** parallel to the gravity vector

It is intended to fly a certified aircraft with both a full traffic load and a full fuel load.

A) The CG will not be within the limits during the flight
B) The CG might not be in limits any of the time during the flight
C) The CG might be in limits all of the flight
**D)** The CG limits will be in limits all of the flight

The weight of an aeroplane, which is in level non accelerated flight, is said to act:

**A)** vertically through the centre of gravity
B) always along the vertical axis of the aeroplane
C) vertically through the centre of pressure
D) vertically through the datum point

For a large aircraft where the main and nose landing gears retract forward, the effect on the CG on lowering the gear is:

A) to move forward
**B)** to move aft
C) to remain static
D) to move forward then aft

Which of the following statements is correct?

A) The lowest stalling speed is obtained if the actual centre of gravity is located in the middle between the aft and forward limit of centre of gravity
**B)** A tail heavy aeroplane is less stable and stalls at a lower speed than a nose heavy aeroplane
C) If the actual centre of gravity is located behind the aft limit of centre of gravity it is possible that the aeroplane will be unstable, making it necessary to increase elevator forces
D) If the actual centre of gravity is close to the forward limit of the centre of gravity the aeroplane may be unstable, making it necessary to increase elevator forces

An aeroplane is said to be NEUTRALLY STABLE. This is likely to:

A) Cause the CG to move forwards
**B)** Be caused by the CG at the aerodynamic centre of the aircraft
C) Be totally unrelated to the position of the CG
D) Be caused by the CG towards the forward limit

The mass displacement caused by landing gear extension:

A) creates a pitch-up longitudinal moment
B) creates a pitch-down longitudinal moment
**C)** creates a longitudinal moment in the direction (pitch-up or pitch-down) determined by the type of landing gear
D) does not create a longitudinal moment

(For this question use CAP 696 - Figure 4.11)
At the maximum landing mass the range of safe CG positions, as determined from the appropriate graph in the loading manual, is:

A) Forward limit 8.0% MAC aft limit 27.2% MAC
B) Forward limit 8.0% MAC aft limit 26.8% MAC
**C)** Forward limit 7.4% MAC aft limit 27.0% MAC
D) Forward limit 8.6% MAC aft limit 27.0% MAC

With the centre of gravity on the forward limit which of the following is to be expected?

A) A tendency to yaw to the right on take-off
B) A decrease in the landing speed
C) A decrease of the stalling speed
**D)** A decrease in range

An aeroplane is said to be 'neutrally stable'. This is likely to:

A) be totally unrelated to the position of the centre of gravity
B) cause the centre of gravity to move forwards
C) be caused by a centre of gravity which is towards the forward limit
**D)** be caused by a centre of gravity which is towards the rearward limit

If nose wheel moves aft during gear retraction, how will this movement affect the location of the centre of gravity (cg) on the aeroplane?

A) The cg location will change, but the direction cannot be told the information given
B) It will cause the cg to move forward
C) It will not affect the cg location
**D)** It will cause the cg to move aft

(For this question use CAP 696 - Figure 4.11)
The aeroplane has a mass of 61 000 kg in the cruise. The range of safe CG positions, as determined from the appropriate graph in the loading manual, is:

**A)** forward limit 8.3% aft limit 26.3% MAC
B) forward limit 8.0% aft limit 27.2% MAC
C) forward limit 7.7% aft limit 25.2% MAC
D) forward limit 7.6% aft limit 26.9% MAC

When an aeroplane is stationary on the ground, its total weight will act vertically:

A) through its centre of pressure
**B)** through its centre of gravity
C) through a point defined as the datum point
D) through the main wheels of its undercarriage assembly

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21. If the centre of gravity of an aeroplane moves forward during flight the elevator control will:

A) become lighter making the aeroplane more easy to manoeuvre in pitch
B) become lighter making the aeroplane more difficult to manoeuvre in pitch
**C)** become heavier making the aeroplane more difficult to manoeuvre in pitch
D) become heavier making the aeroplane more easy to manoeuvre in pitch

If the CG is aft of the neutral point it results in:

A) Decreased stability with decreased elevator trim
B) Neutral stability
C) Increased stability with increased elevator trim
**D)** Longitudinal instability

The datum of an aeroplane is situated:

A) between the leading edge and the trailing edge of the wing
B) between the leading edge and the trailing edge of the MAC
C) always between the nose and the tail
**D)** not always between the nose and the tail

The centre of gravity of an aircraft:

A) may only be moved if permitted by the regulating authority and endorsed in the aircraft's certificate of airworthiness.
B) is in a fixed position and is unaffected by aircraft loading.
C) must be maintained in a fixed position by careful distribution of the load.
**D)** can be allowed to move between defined limits.

An aeroplane is loaded with its centre of gravity towards the rear limit. This will result in:

A) an increase in longitudinal stability
B) a reduced fuel consumption as a result of reduced drag
**C)** an increased risk of stalling due to a decrease in tailplane moment
D) a reduction in power required for a given speed

(For this question use CAP 696 - Figure 4.11)
The aeroplane has a Take Off Mass of 58 000 kg. At this mass the range of safe CG positions, as determined from the appropriate graph in the loading manual, is:
**A)** Forward limit 8.0% MAC aft limit 26.5% MAC
B) Forward limit 8.2% MAC aft limit 26.2% MAC
C) Forward limit 8.5% MAC aft limit 26.1% MAC
D) Forward limit 9.5% MAC aft limit 26.1% MAC

With respect to the arm _____ (i) of the aircraft datum the arm is _____ (ii) and _____ (iii) of the aircraft datum it is _____ (iv).
A) (i) forward (ii) positive (iii) aft (iv) negative
B) (i) aft (ii) negative (iii) forward (iv) positive
C) (i) forward (ii) negative (iii) aft (iv) negative
**D)** (i) aft (ii) positive (iii) forward (iv) negative

Select the correct statement for the CG safe range:
A) The safe range falls between the front and rear CG limits but only includes the fwd limit
**B)** The safe range falls between the front and rear CG limits and includes both limits
C) The safe range falls between the front and rear CG limits but does not include them
D) The safe range falls between the front and rear CG limits but only includes the aft limit

What effect does the CG on the aft limit have on the fuel flow of an aeroplane?
**A)** Decreases
B) Increases
C) Marginal increase
D) No effect

The undercarriage of an aeroplane moves rearward when it is being retracted. Does this affect the CG?
A) No, the position of the CG would remain the same
**B)** Yes, the CG would move aft
C) Yes, but the CG movement could not be calculated
D) Yes, the CG would move forward

Which of the following is most likely to affect the range of centre of gravity positions on an aeroplane?
A) The need to minimise drag forces and so improve efficiency
**B)** Elevator and tail plane (horizontal stabiliser) effectiveness in all flight conditions
C) Location of the undercarriage
D) The need to maintain a low value of stalling speed

Which of the following statements is correct?
A) If the actual centre of gravity is located behind the aft limit the aeroplane longitudinal stability increases.
B) The centre of gravity is given in percent of MAC calculated from the leading edge of the wing, where MAC always = the wing chord halfway between the centre line of the fuselage and the wing tip
C) The station (STA) is always the location of the centre of gravity in relation to a reference point, normally the leading edge of the wing at MAC
**D)** A tail heavy aeroplane is less stable and stalls at a lower speed than a nose heavy aeroplane

# Mass balance and limits:

Standard masses for baggage can only be used when the aircraft has:

A) less than 30 seats
B) 9 seats or more
C) 30 seats or more
**D)** 20 seats or more

Is it possible to fly a certified aircraft at a Regulated Take-off mass with both a full traffic load and a full fuel load?

A) No, it is not possible
B) All aircraft all the time
C) Only if the performance limited take-off mass is less than the structural limited take-off mass
**D)** Some aircraft in some cases

Considering only structural limitations, on very short legs with minimum take-off fuel, the traffic load is normally limited by:

A) Actual landing mass
B) Maximum take-off mass
**C)** Maximum zero fuel mass
D) Maximum landing mass

For a conventional, nose wheel aircraft configuration, the higher the take-off mass:

1. Stick forces at rotation will increase.
2. Range will decrease but endurance will increase.
3. Gliding range will reduce.
4. Stalling speed will increase.

A) Statement 3 only is correct.
**B)** Statements 1 and 4 only are correct.
C) Statement 4 only is correct.
D) All statements are correct.

The handling and performance problems encountered with a CG too far aft include:

A) No likelihood of a nose up overbalance on a nose wheel aircraft on the ground resulting in tail damage
B) Higher stick forces per G loading with no risk of over-stressing the airframe in manoeuvres
C) Improvement in nose wheel steering
**D)** Degrade or loss of nose wheel steering

An aircraft is flying at 1.3 VS1g in order to provide an adequate margin above the low speed buffet and transonic speeds. If the mass increases from 285,000 kg to 320,000 kg and 1.3 VS1g is 180 kts CAS at 285,000 kg, the new 1.3 VS1g is:

A) 201 kts; drag will remain the same and nm/kg will increase, fuel flow will decrease
B) 191 kts; drag will increase and nm/kg will increase, fuel flow will increase
**C)** 191 kts; drag will increase and nautical mile per kg will decrease, fuel flow will increase
D) 201 kts; drag will increase and nm/kg will decrease, fuel flow will increase

The maximum zero fuel mass is a mass limitation for the:

A) total load of the fuel imposed upon the wing
**B)** strength of the wing root
C) allowable load exerted upon the wing considering a margin for fuel tanking
D) strength of the fuselage

Which combination of weight and CG position will produce the highest stalling speed?

A) Heavy weight and aft CG
B) Low weight and forward CG
C) Low weight and aft CG
**D)** Heavy weight and forward CG

The maximum taxi (ramp) mass is governed by:

A) bearing strength of the taxiway pavement
B) taxi distance to take - off point
**C)** structural considerations
D) tyre speed and temperature limitations

An aeroplane, which is scheduled to fly an oceanic sector, is due to depart from a high altitude airport in the tropics at 1400 local time. The airport has an exceptionally long runway. Which of the following is most likely to be the limiting factor(s) in determining the take - off mass?

**A)** altitude and temperature of the departure airfield
B) maximum zero fuel mass
C) en route obstacle clearance requirements
D) maximum certificated take - off mass

When determining the mass of fuel/oil and the value of the SG is not known, the value to use is:

**A)** determined by the operator
B) determined by the aviation authority
C) set out in JAR OPS - 1 Section 1
D) determined by the pilot

For a particular aeroplane, the structural maximum mass without any fuel on board, other than unusable quantities, is:

**A)** a fixed value which is stated in the Aeroplane Operating Manual
B) a variable value which may limit the payload carried
C) a fixed value which will limit the amount of fuel carried
D) a variable value which is governed by the payload carried

Considering only structural limitations, on long distance flights (at the aeroplane's maximum range), the traffic load is normally limited by:

A) The maximum zero fuel mass plus the take-off mass
B) The maximum landing mass
**C)** The maximum take-off mass
D) The maximum zero fuel mass

When standard mass values are being used, infants occupying separate passenger seats must be considered as:

A) the same if below 2 years of age
B) adults
**C)** children
D) infants after being weighed

In cruise flight, an aft centre of gravity location will:

A) increase longitudinal static stability
**B)** decrease longitudinal static stability
C) does not influence longitudinal static stability
D) not change the static curve of stability into longitudinal

(For this question use CAP 696 - Figure 4.9)
From the loading manual for the transport aeroplane, the aft cargo compartment has a maximum total load of:

**A)** 4187 kg
B) 9232 kg
C) 3062 kg
D) 1568 kg

(Refer to CAP696 figure 2-5)
From the attached data sheet, what is the fwd CG limit for an aircraft with a mass of 3500 lb?

A) + 78.0”
B) + 80.0”
C) + 79.5”
**D)** + 79.0”

Which of the following statements is correct?

**A)** The Maximum Landing Mass of an aeroplane is restricted by structural limitations, performance limitations and the strength of the runway
B) The Basic Empty Mass is equal to the mass of the aeroplane excluding traffic load and useable fuel but including the crew
C) The Maximum Zero Fuel Mass ensures that the centre of gravity remains within limits after the uplift of fuel
D) The Maximum Take-off Mass is equal to the maximum mass when leaving the ramp

The handling and performance problems encountered with a CG too far aft include:

A) Improvement in nose wheel steering
**B)** Difficulty or inability in recovering from a spin
C) Higher stick forces per G loading with no risk of over-stressing the airframe in manoeuvres
D) No likelihood of a nose up overbalance on a nose wheel aircraft on the ground resulting in tail damage

The maximum certificated take - off mass is:

**A)** a structural limit which may not be exceeded for any take - off
B) a take - off limiting mass which is governed by the gradient of climb after reaching V2
C) limited by the runway take off distance available. It is tabulated in the Flight Manual
D) a take - off limiting mass which is affected by the aerodrome altitude and temperature

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21. The maximum certificated taxi (or ramp) mass is that mass to which an aeroplane may be loaded prior to engine start. It is:

A) a value which varies only with airfield altitude. Standard corrections are listed in the Flight Manual
B) a value which is only affected by the outside air temperature. Corrections are calculated from data given in the Flight Manual
**C)** a fixed value which is listed in the Flight Manual
D) a value which varies with airfield temperature and altitude. Corrections are listed in the Flight Manual

Given a runway of unrestricted length, with oceanic views and a high pressure altitude, what, for a heavy aircraft at a constant IAS, are the effects on performance factors?

A) Short runway, a high climb angle and Vmc (IAS) will be reduced
B) Long runway, a high climb angle and Vmc (IAS) will be increased
**C)** Long take-off, a low climb angle but Vmc (IAS) will be reduced
D) Long runway, a low climb angle but Vmc (IAS) will remain unchanged

The maximum aircraft mass excluding all usable fuel is:

A) variable and is set by the payload for the trip.
B) variable and depends on the actual fuel load for the trip
**C)** fixed and listed in the Aircraft Operating Manual
D) fixed by the physical size of the fuselage and cargo holds

The effect of operating an aeroplane with a CG too far forward is to experience:

A) Lower stick forces per G loading
B) Lower stalling speed
C) Inability or difficulty in trimming when flaps are retracted
**D)** Inability or difficulty in flaring on touchdown, resulting in nosewheel landing first

Who establishes the limits of C of G?

A) The CAA
**B)** The manufacturer
C) The insurers
D) The JAA

An aircraft is about to depart on an oceanic sector from a high elevation airfield with an exceptionally long runway in the tropics at 1400 local time. The take off mass is likely to be limited by:

A) Obstacle limited mass
**B)** Climb limited mass
C) Maximum certified Take-off mass
D) MZFM

If an aeroplane lands below its Max Structural Landing Mass but above the Performance Limited Landing Mass for the arrival airfield:

1. It will not suffer physical damage as a result of the extra mass.
2. Tyre temperature limits could be exceeded.
3. It might not have sufficient runway length in which to stop safely.
4. A go-around might not be achievable.
5. It will increase structural fatigue.

**A)** 2, 3, 4 and 5 only
B) 3 and 4 only
C) 1, 3, 4 and 5 only
D) 1 and 5 only

(For this question use CAP 696 - Figure 4.9)
Referring to the loading manual for the transport aeroplane, the maximum running load for the aft section of the forward lower deck cargo compartment is:

A) 13.15 kg per inch
B) 14.65 kg per inch
C) 7.18 kg per inch
**D)** 13.12 kg per inch

If the maximum structural landing mass is exceeded:

A) no damage will occur providing the aircraft is within the performance limited landing mass
**B)** the undercarriage could collapse on landing
C) no damage will occur providing the aircraft is within the regulated landing mass
D) the aircraft will be unable to get airborne

The loading limitations shall include:

**A)** all limiting mass, centres of gravity position, mass distributions and floor loadings
B) all limiting mass, centres of gravity position and floor loadings
C) all limiting mass, mass distributions and centres of gravity
D) all limiting mass and centres of gravity

(For this question use CAP 696 - Figure 4.9)
From the loading manual for the jet transport aeroplane, the maximum floor loading intensity for the aft cargo compartment is:

A) 68 kg per square metre
**B)** 68 kg per square foot
C) 150 kg per square foot
D) 68 Lbs per square foot

(For this question use CAP 696 - Figure 4.9)
Referring to the loading manual for the transport aeroplane, the maximum load intensity for the lower forward cargo compartment is:

**A)** 68 kg per square foot
B) 150 kg per square foot
C) 3305 kg in forward compartment and 4187 kg in aft compartment
D) 7288 kg in forward compartment and 9232 kg in aft compartment

(For this question use CAP 696 - Figure 4.9)
From the Loading Manual for the transport aeroplane, the maximum load that can be carried in that section of the aft cargo compartment which has a balance arm centred at:

**A)** 835.5 inches is 3062 kg
B) 421.5 inches is 4541 kg
C) 835.5 inches is 6752 kg
D) 421.5 inches is 2059 Lbs

# *Loading*

# Terminology:

The operating mass of an aircraft is:

A) The empty mass plus crew, crew baggage and catering
B) The empty mass plus the trip fuel mass
**C)** The dry operating mass plus the take-off fuel mass
D) The empty mass plus the take-off fuel mass

For the purposes of mass and balance JAR-OPS 1 defines a child as a person aged:

**A)** Of 2 years but not having reached their twelfth birthday
B) Of 2 years but not having reached 15 years old
C) Of 3 years but not having reached their twelfth birthday
D) Of 3 years but not having reached their fifteenth birthday

With reference to mass and balance calculations (on an aeroplane) a datum point is used. This datum point is:

**A)** a fixed point from which all balance arms are measured. It may be located anywhere on the aeroplane's longitudinal axis or on the extensions to that axis
B) the point through which the sum of the mass values (of the aeroplane and its contents) is assumed to act vertically
C) a point near the centre of the aeroplane. It moves longitudinally as masses are added forward and aft of its location
D) a point from which all balance arms are measured. The location of this point varies with the distribution of loads on the aeroplane

In calculations with respect to the position of the centre of gravity a reference is made to a datum. The datum is:

**A)** a reference plane which is chosen by the aeroplane manufacturer. Its position is given in the aeroplane Flight or Loading Manual
B) an arbitrary reference chosen by the pilot which can be located anywhere on the aeroplane
C) calculated from the data derived from the weighing procedure carried out on the aeroplane after any major modification
D) calculated from the loading manifest

The Maximum Structural Take-off Mass is:

A) the maximum permissible total aeroplane mass for take-off but excluding fuel
**B)** the maximum permissible total aeroplane mass at the start of the take-off run
C) the maximum permissible total aeroplane mass on completion of the refuelling operation
D) the maximum permissible total aeroplane mass for take-off subject to the limiting conditions at the departure airfield

The Arm is the _____ (i) distance of a load as measured from the aircraft _____ (ii).
A) (i) vertical (ii) aft limit
**B)** (i) horizontal (ii) datum
C) (i) horizontal (ii) forward limit
D) (i) lateral (ii) datum

The chemical fluids used to charge the aircraft' s toilets are counted as?
**A)** part of the variable load
B) part of the under load
C) part of the basic empty mass
D) part of the payload

For the purpose of completing the Mass and Balance documentation, the Dry Operating Mass is defined as:
A) The total mass of the aeroplane ready for a specific type of operation excluding all traffic load
B) The total mass of the aeroplane ready for a specific type of operation excluding crew and crew baggage
C) The total mass of the aeroplane ready for a specific type of operation excluding all usable fuel
**D)** The total mass of the aeroplane ready for a specific type of operation excluding all usable fuel and traffic load

Dry Operating Mass is the mass of the aeroplane less:
**A)** usable fuel and traffic load
B) usable fuel, potable water and lavatory chemicals
C) traffic load, potable water and lavatory chemicals
D) usable fuel

The actual 'Zero Fuel Mass' is equal to the:
A) Operating Mass plus all the traffic load
B) Basic Empty Mass plus the fuel loaded
C) Actual Landing Mass plus trip fuel
**D)** Dry Operating Mass plus the traffic load

The Regulated Take-off Mass:
A) the maximum structural take-off mass subject to any last minute mass changes
**B)** is the lower of maximum structural take-off mass and the performance limited take-off mass
C) is the higher of the maximum structural zero fuel mass and the performance limited takeoff mass
D) the maximum performance limited take-off mass subject to any last minute mass changes

Traffic load is the:
A) Dry Operating Mass minus the disposable load
**B)** Zero Fuel Mass minus Dry Operating Mass
C) Dry Operating Mass minus the variable load
D) Take-off Mass minus Zero Fuel Mass

By adding to the basic empty mass the following fixed necessary equipment for a specific flight (catering, safety and rescue equipment, fly away kit, crew), we get:
A) take-off mass
B) landing mass
**C)** Dry operating mass
D) zero fuel mass

What is the zero fuel mass?
A) The mass of the aircraft at the start of the taxi (at departure from the loading gate)
B) The maximum permissible mass of an aeroplane with no useable fuel mass
**C)** D.O.M plus traffic load but excluding fuel
D) The mass of an aeroplane plus standard items such as: unusable fuel and liquids; lubricating oil in engine & other auxiliary units; fire extinguishers; pyrotechnics; emergency oxygen equipment; supplementary equipment

The Basic Empty Mass is the:
A) Take-off mass minus the traffic load and the fuel load
B) MZFM minus both traffic load and the fuel load
C) Landing mass less traffic load
**D)** Operating mass minus the crew and fuel load

While making mass and balance calculation for a particular aeroplane, the term 'Empty Mass' applies to the sum of airframe, engine(s), fixed ballast plus:
A) all the oil and fuel
B) all the consumable fuel and oil, but not including any radio or navigation equipment installed by manufacturer
**C)** unusable fuel and full operating fluids
D) all the oil, fuel, and hydraulic fluid but not including crew and traffic load

The CG envelope is the distance between the point furthest _____ (i) that a CG has been approved to act to the point furthest _____ (ii) that a CG has been approved to act.
**A)** (i) aft (ii) forward
B) (i) right (ii) left
C) (i) port (ii) starboard
D) (i) up (ii) down

In mass and balance calculations the " index" is:
A) an imaginary vertical plane or line from which all measurements are taken
B) the range of moments the centre of gravity (cg) can have without making the aeroplane unsafe to fly
C) a location in the aeroplane identified by a number
**D)** the moment divided by a constant

The Zero Fuel Mass and the Dry Operating Mass:
A) differ by the sum of the mass of usable fuel plus traffic load mass
**B)** differ by the value of the traffic load mass
C) are the same value
D) differ by the mass of usable fuel

Which of the following alternatives corresponds to zero fuel mass?
A) Operating mass plus passengers and cargo
**B)** The mass of an aeroplane with no usable fuel
C) Take-off mass minus fuel to destination and alternate
D) Operating mass plus load of passengers and cargo

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21. The Dry Operating Mass of an aeroplane includes:
**A)** Crew and crew baggage, catering, removable passenger service equipment, potable water and lavatory chemicals
B) Unusable fuel and reserve fuel
C) Fuel and passengers baggage and cargo
D) Passengers baggage and cargo

The Maximum Zero Fuel Mass is a structural limiting mass. It is made up of the aeroplane Dry Operational mass plus:
A) traffic load and crew standard mass
B) traffic load, unusable fuel and crew standard mass
**C)** traffic load and unusable fuel
D) unusable and crew standard mass

The zero fuel mass of an aeroplane is always:
A) The take-off mass minus the fuselage fuel mass
**B)** The take-off mass minus the take-off fuel mass
C) The maximum take-off mass minus the take-off fuel mass
D) The take-off mass minus the wing fuel mass

The centre of gravity is the:
**A)** point where all the aircraft mass is considered to be concentrated
B) neutral point along the longitudinal axis, in relation to a datum line
C) focus along the longitudinal axis, in relation to a datum line
D) centre of thrust along the longitudinal axis, in relation to a datum line

The Traffic Load of an aeroplane is:

A) LM plus Trip Fuel
B) Useful Load minus Operating Mass
C) TOM minus Useful Load
**D)** TOM minus Operating Mass

The Maximum Zero Fuel Mass is the maximum permissible mass of the aeroplane:

**A)** with no useable fuel unless the Aeroplane Flight Manual Limitations explicitly include
B) including the fuel taken up for take-off
C) with no useable fuel
D) including all useable fuel unless the Aeroplane Flight Operations Manual explicitly excludes it

Define the useful load.

A) Dry operating mass plus usable fuel load
B) Traffic load plus dry operating mass
C) That part of the traffic load which generates revenue
**D)** Traffic load plus usable fuel mass

With regards to the Maximum Zero-Fuel Weight (MZFW).

A) It is lower than the Maximum Take-Off Weight by the weight of a payload.
**B)** It is the maximum weight that an aircraft can be loaded to without useable fuel.
C) Is more relevant to aircraft with fuselage fuel tanks.
D) Is important as exceeding the MZFW may mean that there is insufficient lift to get the aircraft airborne.

Take-off mass is described as:

A) DOM fuel but without traffic load
B) The lowest of performance limited & structural limited T.O.M.
**C)** The mass of an aeroplane including everything & everyone contained within it at the start of the take-off run
D) The take-off mass subject to departure airfield limitations

The term 'Maximum Zero Fuel Mass' consist of:

A) The maximum mass for some aeroplanes including the fuel load and the traffic load
B) The maximum mass authorized for a certain aeroplane not including traffic load and fuel load
**C)** The maximum permissible mass of an aeroplane with no usable fuel
D) The maximum mass authorized for a certain aeroplane not including the fuel load and operational items

The Operating Mass:
A) is the lower of the structural mass and the performance limited mass
B) is the higher of the structural mass and the performance limited mass
C) is the actual mass of the aircraft on take-off
**D)** is the dry operating mass and the fuel load

The term USEFUL LOAD as applied to an aeroplane includes:
A) the revenue-earning portion of traffic load plus useable fuel
**B)** traffic load plus useable fuel
C) the revenue-earning portion of traffic load only
D) traffic load only

The useful load is:
A) BEM plus fuel load
B) TOM - fuel mass
**C)** TOM minus the DOM
D) TOM minus the operating mass

The term 'useful load' as applied to an aeroplane includes:
**A)** traffic load plus useable fuel
B) the revenue-earning portion of traffic load plus useable fuel
C) the revenue-earning portion of traffic load only
D) traffic load only

The Traffic Load is defined as:
A) The total mass of crew and passengers excluding any baggage or cargo.
**B)** The total mass of passengers, baggage and cargo, including any non revenue load.
C) The total mass of flight crew, passengers, baggage, cargo and usable fuel.
D) The total mass of passengers, baggage, cargo and usable fuel.

The Basic Empty Mass is the mass of the aeroplane ...
**A)** plus standard items such as unusable fluids, fire extinguishers, emergency oxygen equipment, supplementary electronics etc
B) minus non-standard items such as lubricating oil, fire extinguishers, emergency oxygen equipment etc
C) minus non-standard items such as unusable fluids, fire extinguishers, emergency oxygen and supplementary electronic equipment etc
D) plus non-standard items such as lubricating oil, fire extinguishers, emergency oxygen equipment etc

The distance from the datum to the CG is:
A) the station
B) the index
**C)** the balance arm
D) the moment

The centre of gravity is that _____ (i) on an aircraft through which the total _____ (ii) is considered to act vertically _____ (iii).

A) (i) datum (ii) mass (iii) upwards
**B)** (i) point (ii) mass (iii) downwards
C) (i) point (ii) moment (iii) upwards
D) (i) datum (ii) moment (iii) downwards

On an aeroplane without central fuel tank, the maximum Zero Fuel Mass is related to:

A) Wing loaded trip fuel
B) Maximum Structural Take-Off Mass
**C)** The bending moment at the wing root
D) Variable equipment for the flight

The total mass of the aeroplane including crew, crew baggage; plus catering and removable passenger equipment; plus potable water and lavatory chemicals but excluding usable fuel and traffic load, is referred to as:

**A)** Dry Operating Mass
B) Maximum Zero Fuel Mass
C) Aeroplane Prepared for Service ( APS) Mass
D) Zero Fuel Mass

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41. The DOM of an aeroplane is:

A) Useful Load minus Operating Mass
**B)** TOM minus Useful Load
C) LM plus Trip Fuel
D) TOM minus Operating Mass

The Traffic Load is:

A) The landing Mass minus the sum of the Dry Operating Mass and the mass of the remaining fuel
**B)** all the above
C) The Zero Fuel Mass minus the Dry operating Mass
D) The Take-off Mass minus the sum of the Dry Operating Mass and the total fuel load

Balance Arm (BA) is:

A) The distance from the centre of gravity to the centre of amass
B) The point on which a lever is supported, balanced, or about which it turns
C) The distance from the centre of pressure to the centre of a mass
**D)** The distance from the datum to the centre of gravity of a mass

For the purpose of completing the Mass and Balance documentation, the Traffic Load is considered to be equal to the Take-off Mass:

A) plus the Trip Fuel Mass
B) less the Trip Fuel Mass
**C)** less the Operating Mass
D) plus the Operating Mass

When establishing the mass breakdown of an aeroplane, the empty mass is defined as the sum of the:

**A)** standard empty mass plus specific equipment mass plus trapped fluids plus unusable fuel mass
B) empty mass dry plus variable equipment mass
C) basic mass, plus special equipment mass
D) basic mass plus variable equipment mass

The Maximum Zero Fuel Weight of an aircraft is:

A) the maximum permissible take-off mass of the aircraft.
B) the maximum permissible landing mass.
**C)** the maximum permissible mass of an aircraft with no usable fuel.
D) the maximum permissible mass of an aircraft with zero payload.

The actual 'Take-off Mass' is equivalent to:

A) Dry Operating Mass plus the take-off fuel
B) Actual Landing Mass plus the take-off fuel
**C)** Dry Operating Mass plus take-off fuel and the traffic load
D) Actual Zero Fuel Mass plus the traffic load

For the purpose of completing the Mass and Balance documentation, the Operating Mass is considered to be Dry Operating Mass plus:

**A)** Take-off Fuel Mass
B) Ramp Fuel Mass
C) Ramp Fuel Mass less the fuel for APU and run-up
D) Trip Fuel Mass

The term 'BAGGAGE' means:

A) any freight or cargo not carried on the person
**B)** personal belongings
C) Excess freight
D) Any non-human, non-animal cargo

Choose the correct statement as related to infants travel in aircraft:

A) An infant is a person between the ages of 0 years to 3 years
B) An infant seated on an adults lap increases the pax mass by 35 kg
C) An infant must always be seated in its own seat and accounted for as 35 kg
**D)** An infant is a person between the ages of 0 years to 2 years

The take-off mass of an airplane is 8600 kg which includes a traffic load of 1890 kg and a usable fuel load of 1230 kg. If the standard mass for the crew is 190 kg the dry operating mass is?

A) 5290 kg
B) 8410 kg
C) 6710 kg
**D)** 5480 kg

The maximum zero-fuel mass:

1. is a regulatory limitation
2. is calculated for a maximum load factor of +3.5 g
3. is due to the maximum permissible bending moment at the wing root
4. imposes fuel dumping from the outer wings tank first
5. imposes fuel dumping from the inner wings tank first
6. can be increased by stiffening the wing

The combination of correct statements is:

**A)** 1, 3, 5
B) 2, 5, 6
C) 1, 2, 3
D) 4, 2, 6

In relation to an aeroplane the Dry Operating Mass is the total mass of the aeroplane ready for a specific type of operation but excluding:

A) usable fuel and crew
B) potable water and lavatory chemicals
C) usable fuel, potable water and lavatory chemicals
**D)** usable fuel and traffic load

A person of 13 years of age is defined as:

A) A child
**B)** An adult
C) An adult if female only
D) An adult if male only

In mass and balance calculations which of the following describes the datum?

A) It is the most aft position of the centre of gravity
**B)** It is the point on the aeroplane designated by the manufacturers from which all centre of gravity measurements and calculations are made
C) It is the distance from the centre of gravity to the point through which the weight of the component acts
D) It is the most forward position of the centre of gravity

With respect to aeroplane loading in the planning phase, which of the following statements is always correct?

LM = Landing Mass
TOM = Take-off Mass
MTOM = Maximum Take-off Mass
ZFM = Zero Fuel Mass
MZFM = Maximum Zero Fuel Mass
DOM = Dry Operating Mass

**A)** LM = TOM - Trip Fuel
B) Reserve Fuel = TOM - Trip Fuel
C) MTOM = ZFM + maximum possible fuel mass
D) MZFM = Traffic load + DOM

The datum is a reference from which all moment (balance) arms are measured. Its precise position is given in the control and loading manual and it is located:
A) at or near the focal point of the aeroplane axis system
B) at or near the natural balance point of the empty aeroplane
**C)** at a convenient point which may not physically be on the aeroplane
D) at or near the forward limit of the centre of gravity

The difference between "Traffic Load" and "Useful Load" is:
**A)** usable fuel
B) total mass of passengers and baggage
C) Non-revenue load
D) freight or cargo load

At the flight preparation stage, the following parameters in particular are available for determining the mass of the aircraft:
Dry operating mass
Operating mass
Which statement is correct:
A) The operating mass is the mass of the aeroplane without take-off fuel
**B)** The dry operating mass includes fixed equipment needed to carry out a specific flight
C) The operating includes the traffic load
D) The dry operating mass includes take-off fuel

The aircraft datum is a _____ (i) reference point that is defined on or relative to the aircraft about which the _____ (ii )of any load locations are known.
A) (i) movable (ii) moments
B) (i) forward (ii) arms
C) (i) variable (ii) moments
**D)** (i) fixed (ii) arms

61. Which is true of the aeroplane empty mass?

A) It is dry operating mass minus traffic load
B) It is dry operating mass minus fuel load
C) It is the actual take-off mass, less traffic load
**D)** It is a component of dry operating mass

Select the correct statement for the Datum:
A) Is a point from which all the arm distances are measured
**B)** Is an arbitrary vertical plane from which all the arm distances are measured
C) Is the point through which all the forces of gravity are said to act
D) Is a vertical plane through which all the forces of gravity are said to act

The chemical fluids used to charge the aircraft' s toilets are counted as:
**A)** part of the dry operating mass
B) part of the basic empty mass
C) part of the payload
D) part of the under load

The Operating Mass:
A) is the maximum zero fuel mass less the traffic load
B) is the landing mass minus the traffic load
C) is the take-off mass minus the basic empty mass and crew mass
**D)** is the take-off mass minus the traffic load

Mass refers to:
A) The force exerted on a body by gravity
**B)** The quantify of matter in a body as measured by its inertia
C) None of the above
D) Weight x gravity

What is the zero fuel mass?
A) MTOM minus fuel to destination minus fuel to alternative airfield
**B)** Actual loaded mass of the aircraft with no usable fuel on board
C) Maximum allowable mass of the aircraft with no usable fuel on board
D) Operating mass minus the fuel load

Allowed traffic load is the difference between:
A) allowed take off mass and basic mass
B) allowed take off mass and basic mass plus trip fuel
C) operating mass and basic mass
**D)** allowed take off mass and operating mass

In mass and balance terms, what is an index?
A) A mass divided by a moment
B) A moment divided by a mass
**C)** A moment divided by a constant
D) A cut down version of a force

The maximum mass to which an aeroplane may be loaded, prior to engine start, is:
**A)** maximum certificated taxi (ramp) mass
B) maximum certificated take - off mass
C) maximum regulated take - off mass
D) maximum regulated taxi (ramp) mass

# Aircraft mass check:

If individual masses are used, the mass of an aeroplane must be determined prior to initial entry into service and thereafter:

A) only if major modifications have taken place
**B)** at intervals of 4 years if no modifications have taken place
C) at regular annual intervals
D) at intervals of 9 years

An aircraft that is not within a fleet mass evaluation program must be weighed:

A) Every third year
**B)** Every fourth year
C) Every year
D) Every other year

When weighing an aircraft certain precautions have to be made. Which of the following is not a requirement:

A) Ensure the weighing is accomplished in an enclosed building
B) Check for completeness of aeroplane and equipment
C) Ensure the aeroplane is clean
**D)** Ensure all fuel and oil tanks are full

Select the correct mass tolerance range that a new aircraft' s DOM must fall within if it is to join an existing fleet where the fleet' s DOM is 34300 kg, and the aircraft' s MLM is 54900 kg:

A) Between 32928 to 35672 kg
B) Between 33751 to 34849 kg
C) Between 34163 to 34437 kg
**D)** Between 34025 to 34575 kg

An aeroplane must be re-weighed at certain intervals. Where an operator uses 'fleet masses' and provided that changes have been correctly documented, this interval is:

A) 4 years for each aeroplane
B) whenever a major modification is carried out
**C)** 9 years for each aeroplane
D) whenever the Certificate of Airworthiness is renewed

To measure the mass and CG-position of an aircraft, it should be weighed with a minimum of:

**A)** 3 points of support
B) 4 point of support
C) 1 point of support
D) 2 points of support

Aircraft must be weighed:

A. on initial entry into service
B. if the mass and balance records have not been adjusted for alterations or modifications
C. every four years after initial weigh
D. whenever the cumulative changes to the dry operating mass exceed plus or minus 0.5% of the maximum landing mass
E. if the cumulative change in CG position exceeds 0.5% of the mean aerodynamic chord

A) A and C only
**B)** A, B, C, D and E
C) A, B and C only
D) A, C and E only

When preparing to carry out the weighing procedure on an aeroplane, which of the following is not required?

A) drain all chemical toilet fluid tanks
B) drain all useable fuel
**C)** drain all engine tank oil
D) removable passenger services equipment to be off-loaded

The interval between 2 fleet mass evaluations must not exceed:

A) 36 months
**B)** 48 months
C) 12 months
D) 24 months

An operator has a fleet of 43 aircraft, how many aircraft must be weighed at the same time to maintain the fleet value?

A) 8
B) 7
C) 6
**D)** 9

Individual aircraft should be weighed in an air-conditioned hangar:

A) when the effects of modifications or repairs are not known
B) on entry into service and subsequently every 4 years
**C)** all the above
D) with the hangar doors closed and the air conditioning off

An aeroplane is weighed prior to entry into service. Who is responsible for deriving the Dry Operational Mass from the weighed mass by the addition of the 'operational items'?

A) The aeroplane manufacturer or supplier
**B)** The Operator
C) The commander of the aeroplane
D) The appropriate Aviation Authority

An average dry operating mass and CG position may be used for a fleet or group of aeroplanes:

A. if they are of the same model and configuration
B. providing the individual masses and CG positions meet specific tolerances specified in JAR OPS section J
C. providing the dry operating mass of any aeroplane does not vary by more than 0.5% of the maximum structural landing mass of the fleet
D. providing that the CG position varies by more than 0.5% of the mean aerodynamic chord of the fleet
E. providing appropriate corrections to mass and CG position are applied to aircraft within the fleet which have a physical, accurately accountable difference

**A)** A, B, C and E only
B) B, C and D only
C) A, B, C, D and E
D) A, D and E only

For an aircraft that is part of a fleet mass, what is the maximum time allowed between each weighing?
A) 6 yrs
B) 3 yrs
**C)** 9 yrs
D) 12 yrs

An aeroplane may be weighed:
**A)** in an enclosed, non-air conditioned, hangar
B) in an area of the airfield set aside for maintenance
C) at a specified 'weighing location' on the airfield
D) in a quiet parking area clear of the normal manoeuvring area

An operator has 19 aircraft of the same type and wants to use fleet mass values. Select the number of aircraft that will have to be weighted on the initial weighing and the subsequent weightings:
A) Initially 10 thereafter 14
**B)** Initially 19 thereafter 7
C) Initially 10 thereafter 7
D) Initially 19 thereafter 14

# Procedures for determining aircraft mass and balance:

**When computing the mass of passengers and baggage for an aircraft with 20 seats or more:**

A. **Standard masses of male and female in Table 1 are applicable**
B. **If there are thirty seats or more, the 'All Adult' mass values in Table 1 may be used as an alternative**
C. **Holiday Charter masses apply to Table 1 and Table 3 if the charter is solely intended as an element of a holiday travel package**
D. **Holiday flights and holiday charters attract the same mass values**

**A)** A and B only
B) All the above
C) C and D only
D) A, C and D only

**An aeroplane is to depart from an airfield where the performance limited take-off mass is 89200 kg. Certificated maximum masses are as follows:**
**Ramp (taxi) mass 89930 kg**
**Maximum Take-off mass 89430 kg**
**Maximum Landing mass 71520 kg**
**Actual Zero fuel mass 62050 kg**
**Fuel on board at ramp:**
**Taxi fuel 600 kg**
**Trip fuel 17830 kg**
**Contingency, final reserve and alternate 9030 kg**
**If the Dry Operating Mass is 40970 kg the traffic load that can be carried on this flight is:**

A) 21220 kg
B) 21500 kg
**C)** 21080 kg
D) 20870 kg

**When computing the mass of passengers and baggage:**

A. **Personal belongings and hand baggage must be included**
B. **Infants must be classified as children it they occupy a seat**
C. **Standard masses include infants being carried by an adult**
D. **Table 1, Table 2 and Table 3 must be used as appropriate if using standard masses for passengers and freight**
E. **Weighing must be carried out immediately prior to boarding and at an adjacent location**

A) A, B and E only
B) B and D only
**C)** All the above
D) A, B, C and E only

**(For this question use CAP 696 - Figure 4.14)**
**A revenue flight is planned for the transport aeroplane. Take-off mass is not airfield limited. The following data applies:**
**Dry Operating Mass 34930 kg**
**Performance limited landing mass 55000 kg**
**Fuel on board at ramp:**
**Taxi fuel 350 kg**
**Trip fuel 9730 kg**
**Contingency and final reserve fuel 1200 kg**
**Alternate fuel 1600 kg**
**Passengers on board 130**
**Standard mass for each passenger 84 kg**
**Baggage per passenger 14 kg**
**Traffic load Maximum possible**
**Use the loading manual provided and the above data. Determine the maximum cargo load that may be carried without exceeding the limiting aeroplane landing mass.**

A) 3185 kg
**B)** 4530 kg
C) 5400 kg
D) 6350 kg

**(For this question use CAP 696 - Figure 4.14)**
**The medium range twin jet transport is scheduled to operate from a departure airfield where conditions limit the take-off mass to 65050 kg. The destination airfield has a performance limited landing mass of 54500 kg. The Dry Operating Mass is 34900 kg. Loading data is as follows:**
**Taxi fuel 350 kg**
**Trip fuel 9250 kg**
**Contingency and final reserve fuel 1100 kg**
**Alternate fuel 1000 kg**
**Traffic load 18600 kg**
**Check the load and ensure that the flight may be operated without exceeding any of the aeroplane limits. Choose, from those given below, the most appropriate answer.**

**A)** The flight is 'landing mass' limited and the traffic load must be reduced to 17500 kg
B) The flight may be safely operated with an additional 200 kg of traffic load
C) The flight may be safely operated with the stated traffic and fuel load
D) The flight is 'zero fuel mass' limited and the traffic load must be reduced to 14170 kg

**(For this question use CAP 696 - Figure 4.8)**
**Maximum allowed take-off mass limit: 37 200kg**
**Dry operating mass: 21 600 kg**
**Take-off fuel: 8 500 kg**
**Passengers on board: male 33, female 32, children 5**
**Baggage: 880 kg**

**The company uses the standard passenger mass systems allowed by regulations. The flight is not a holiday charter. In these conditions, the maximum cargo that may be loaded is:**

A) 1 098 kg
B) 901 kg
C) 1 105 kg
**D)** 585 kg

**If standard mass tables are being used for checked baggage and a number of passengers check in baggage that is expected to exceed the standard baggage mass, the operator:**

A) determine the actual masses of such baggage
B) need may no alterations if the Take-off mass is not likely to be exceeded
C) must determine the actual mass of such baggage by weighing or by deducting an adequate mass increment
**D)** must determine the actual mass of such baggage by weighing or adding an adequate mass increment

**Prior to departure an MRJT is loaded with maximum fuel of 20,100 lt. at an SG of 0.78. Calculate the maximum allowable traffic load that can be carried given the following data:**

**Performance Limited TOM 67200 kg**
**Performance Limited LM 54200 kg**
**DOM 34930 kg**
**Taxi fuel 250 kg**
**Trip fuel 9250 kg**
**Contingency and holding fuel 850 kg**
**Alternate fuel 700 kg**

A) 12442 kg
B) 16842 kg
C) 16370 kg
**D)** 13092 kg

**(For this question use CAP 696 - Figure 4.14)**
**Aeroplane Dry Operating mass 85000 kg**
**Performance limited take-off mass 127000 kg**
**Performance limited landing mass 98500 kg**
**Maximum zero fuel mass 89800 kg**
**Fuel requirements for flight:**
**Trip fuel 29300 kg**
**Contingency and final reserve fuel 3600 kg**
**Alternate fuel 2800 kg**
**The maximum traffic load that can be carried on this flight is:**

A) 6300 kg
**B)** 4800 kg
C) 7100 kg
D) 12700 kg

**Mass for individual passengers (to be carried on an aeroplane) may be determined from a verbal statement by or on behalf of the passengers if the number of:**

A) passengers carried is less than 20
**B)** passenger seats available is less than 10
C) passenger seats available is less than 6
D) passengers carried is less than 6

**On any flight identified as carrying a significant number of passengers whose masses, including hand baggage, are expected to exceed the standard passenger mass the operator:**

A) must add an adequate mass increment to each of such passengers
B) must determine the actual mass of such passengers
C) need only determine the actual masses or apply an increment if the Take-off mass is likely to be exceeded
**D)** must determine the actual masses of such passengers or add an adequate increment to each of such passengers

**The crew of a transport aeroplane prepares a flight using the following data:**
**Block fuel: 40 000 kg**
**Trip fuel: 29 000 kg**
**Taxi fuel: 800 kg**
**Maximum take-off mass: 170 000 kg**
**Maximum landing mass: 148 500 kg**
**Maximum zero fuel mass: 112 500 kg**
**Dry operating mass: 80 400 kg**
**The maximum traffic load for this flight is:**

A) 40 400 kg
**B)** 32 100 kg
C) 32 900 kg
D) 18 900 kg

**A flight has been made from London to Valencia carrying minimum fuel and maximum traffic load. On the return flight the fuel tanks in the aeroplane are to be filled to capacity with a total fuel load of 20100 litres at a fuel density of 0.79 kg/l.**
**The following are the aeroplane's structural limits:**
**Maximum Ramp Mass: 69 900 kg**
**Maximum Take Off Mass: 69 300 kg**
**Maximum Landing Mass: 58 900 kg**
**Maximum Zero Fuel Mass: 52 740 kg**
**The performance limited take off mass at Valencia is 67 330 kg**
**The landing mass at London is not performance limited.**
**Dry Operating Mass: 34 930 kg**
**Trip Fuel (Valencia to London): 5 990 kg**
**Taxi fuel: 250 kg**
**The maximum traffic load that can be carried from Valencia will be:**
A) 16 770 kg
B) 9 830 kg
**C)** 14 331 kg
D) 13 240 kg

**Who determines what items to include in the dry operating weight?**
A) The Commander
B) The operator
C) The manufacturer
**D)** The JAA

**To calculate a usable take-off mass, the factors to be taken into account include:**
A) Maximum take-off mass decreased by the fuel burn
B) Maximum zero fuel mass augmented by the fuel burn
**C)** Maximum landing mass augmented by the fuel burn
D) Maximum landing mass augmented by fuel on board at take-off

**Based on actual conditions, an aeroplane has the following performance take-off mass limitations:**
**Flaps: 0° / 10° / 15°**
**Runway: 4100 / 4400 / 4600 (Masses are in kg)**
**Climb: 4700 / 4500 / 4200 (Masses are in kg)**
**Structural limits:**
**Take-off / landing / zero fuel: 4 300 kg**
**The maximum take-off mass is:**
A) 4 100 kg
**B)** 4 300 kg
C) 4 200 kg
D) 4 700 kg

**An aeroplane takes off as normal on a scheduled flight however, shortly after take-off the aeroplane is diverted to another airfield.**
**Max Structural TOM 14000 kg**
**Performance Limited TOM 12690 kg**
**Max Structural LM 9600kg**
**Trip Fuel to original destination 6000 kg**
**Contingency fuel 200kg**
**Alternate fuel 200 kg**
**Final reserve fuel 750kg**
**Expected landing mass at original destination 4600kg**
**Actual flight duration 2 hour**
**Fuel consumption 1,500 kg per hour**
**Performance Limited LM at diversion airfield 9000 kg**

A) The aeroplane can land safely as it is below its MSLM
B) The aeroplane cannot land safely because its mass is beyond the limit for the runway limitations and also it is above its MSLM
C) The aeroplane cannot land safely because it is above its MSLM
**D)** The aeroplane can land safely because it is below its PLLM

**In relation to an aeroplane, the term ' Basic Empty Mass' includes the mass of the aeroplane structure complete with its power plants, systems, furnishings and other items of equipment considered to be an integral part of the particular aeroplane configuration. Its value is:**

A) found in the flight manual and is inclusive of unusable fuel plus fluids contained in closed systems
**B)** found in the latest version of the weighing schedule as corrected to allow for modifications
C) inclusive of an allowance for crew, crew baggage and other operating items. It is entered in the loading manifest
D) printed in the loading manual and includes unusable fuel

**An aeroplane's weighing schedule indicates that the empty mass is 57320 kg. The nominal Dry Operating Mass is 60120 kg and the Maximum Zero Fuel Mass is given as 72100 kg. Which of the following is a correct statement in relation to this aeroplane?**

A) operational items have a mass of 2800 kg and the maximum useful load is 11980 kg
B) operational items have a mass of 2800 kg and the maximum useful load is 14780 kg
**C)** operational items have a mass of 2800 kg and the maximum traffic load for this aeroplane is 11980 kg
D) operational items have a mass of 2800 kg and the maximum traffic load for this aeroplane is 14780 kg

**JAR Mass and Balance regulations can be found in:**

A) JAR OPS-1 subpart K
**B)** JAR OPS- 1 subpart J
C) JAR OPS-1 subpart D
D) JAR OPS-1 subpart A

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**21. Determine the Zero Fuel Mass for the following single engine aeroplane. Given:**

**Standard Empty Mass: 1764 lbs**
**Optional Equipment: 35 lbs**
**Pilot + Front seat passenger: 300 lbs**
**Cargo Mass: 350 lbs**
**Ramp Fuel = Block Fuel: 60 Gal.**
**Trip Fuel: 35 Gal.**
**Fuel density: 6 lbs/Gal.**

A) 2589 lbs
**B)** 2449 lbs
C) 2659 lbs
D) 2414 lbs

**Once the mass and balance documentation has been signed prior to flight:**

**A)** acceptable last minute changes to the load must be documented
B) the documentation is not signed prior to flight
C) documented last minute changes to the load may be incorporated
D) no load alterations are allowed

**On an aeroplane with a seating capacity of more than 30, it is decided to use standard mass values for computing the total mass of passengers. If the flight is not a holiday charter, the mass value which may be used for an adult is:**

**A)** 84 kg
B) 84 kg (male) 76 kg (female)
C) 88 kg (male) 74 kg (female)
D) 76 kg

**A box has a mass (weight, actually) of 122 lbs, what is the mass in kg ?**

A) 57.547 kg
B) 33.558 kg
C) 55.454 kg
**D)** 55.338 kg

**(For this question use CAP 696 - Figure 4.4)**
**The medium range jet transport aeroplane is to operate a flight carrying the maximum possible fuel load. Using the following data as appropriate, determine the mass of fuel on board at start of take off.**

**Departure airfield performance limited take-off mass: 60 400 kg**
**Landing airfield: not performance limited.**
**Dry Operating Mass: 34930 kg**
**Fuel required for flight:**
**Taxi fuel: 715 kg**
**Trip fuel: 8600 kg**
**Contingency and final reserve fuel: 1700 kg**
**Alternate fuel 1500 kg**
**Additional reserve 400 kg**
**Traffic load for flight 11000 kg**
A) 15 815 kg
B) 16 080 kg
**C)** 14 470 kg
D) 13 655 kg

**The take-off mass of an aeroplane is 117 000 kg, comprising a traffic load of 18 000 kg and fuel of 46 000 kg.**
**What is the dry operating mass?**
A) 99 000 kg
B) 71 000 kg
**C)** 53 000 kg
D) 64 000 kg

**Determine the maximum take-off mass given:**

**MSTOM 43,000 kg**
**MSLM 35,000kg**
**PLLM 33,000kg**
**MZFM 31,000 kg**
**DOM 19,000 kg**
**Total Fuel capacity 12,500 kg**
**Trip Fuel 9,000 kg**
**Contingency fuel 1000 kg**
**Alternate fuel 500 kg**
**Final reserve fuel 400 kg**
**Traffic load 9000 kg**
A) 40,000 kg
B) 43,000 kg
C) 41,000 kg
**D)** 42,000 kg

**Given an aeroplane with:**
**Maximum Structural Landing Mass: 125000 kg**
**Maximum Zero Fuel Mass: 108500 kg**
**Maximum Structural Take-off Mass: 155000 kg**
**Dry Operating Mass: 82000 kg**
**Scheduled trip fuel is 17000 kg and the reserve fuel is 5000 kg**
**Assuming performance limitations are not restricting, the maximum permitted take-off mass and maximum traffic load are respectively:**

**A)** 130500 kg and 26500 kg
B) 125500 kg and 21500 kg
C) 125500 kg and 26500 kg
D) 130500 kg and 31500 kg

**The mass and centre of gravity of an aircraft must be established by actual weighing:**

A) by the engineers before commencing service
**B)** by the operator prior to initial entry of aircraft into service
C) by the pilot on entry of aircraft into service
D) by the owner operator before the first flight of the day

**The Maximum Zero Fuel Mass is the mass of the aeroplane with no usable fuel on board. It is a limitation which is:**

A) governed by the traffic load to be carried. It also provides protection from excessive 'wing bending'
B) governed by the requirements of the centre of gravity limits and the structural limits of the aeroplane
**C)** listed in the Flight Manual as a fixed value. It is a structural limit
D) tabulated in the Flight Manual against arguments of airfield elevation and temperature

**2588 USG of fuel has been loaded into an aircraft, what is the volume in litres ?**

A) 979.664 L
B) 9979.66 L
C) 9785.58 L
**D)** 9796.65 L

**The empty mass of an aeroplane, as given in the weighing schedule, is 61300 kg. The operational items' (including crew) is given as a mass of 2300 kg. If the take-off mass is 132000 kg (including a useable fuel quantity of 43800 kg) the useful load is:**

A) 29600 kg
B) 26900 kg
**C)** 68400 kg
D) 70700 kg

**Given:**

**Maximum structural take-off mass= 146 900 kg**
**Maximum structural landing mass= 93 800 kg**
**Maximum zero fuel mass= 86 400 kg**
**Trip fuel= 27 500 kg**
**Block fuel= 35 500 kg**
**Engine starting and taxi fuel = 1 000 kg**

**The maximum take-off mass is equal to:**

**A)** 120 900 kg
B) 120 300 kg
C) 113 900 kg
D) 121 300 kg

**'Standard Mass' as used in the computation of passenger load establish the mass of a child as:**

A) 35 kg irrespective of age provided they occupy a seat
B) 35 kg for children over 2 years occupying a seat and 10 kg for infants (less than 2 years) not occupying a seat
**C)** 35 kg only if they are over 2 years old and occupy a seat
D) 35 kg for children over 2 years occupying a seat and 10 kg for infants (less than 2 years) occupying a seat

**An aircraft basic empty mass is 3000 kg. The maximum take-off, landing, and zero-fuel mass are identical, at 5200 kg. Ramp fuel is 650 kg, the taxi fuel is 50 kg. The payload available is:**

**A)** 1 600 kg
B) 2 200 kg
C) 2 150 kg
D) 1 550 kg

**When computing the mass of passengers and baggage for an aircraft with 19 seats or less:**

**A. The standard masses in Table 2 apply**
**B. If hand baggage is accounted for separately, 6 kg may be deducted from the mass of each male and female**
**C. Table 2 masses vary with both the gender (male or female) of the seat occupant and the number of seats on the aircraft**
**D. Standard masses are not available for baggage**
**E. Standard masses are not available for freight**

**A)** All the above
B) A, B and D only
C) C and E only
D) A only

**(Reference to CAP 696 - Figure 4.9)**
**What is the balance arm, the maximum compartment load and the running load for the most aft compartment of the fwd cargo hold?**

A) 1046.5 inches; 711 kg; 7.18 kg per kg
B) 1046.5 m; 711 kg; 7.18 kg per in
C) 421.5 cm; 3305 kg; 13.12 kg per inch
**D)** 421.5 inches; 2059 kg; 13.12 kg per inch

**The maximum quantity of fuel that can be loaded into an aeroplane's tanks is given as 3800 US Gallons. If the fuel density (specific gravity) is given as 0.79 the mass of fuel which may be loaded is:**

**A)** 11364 kg
B) 13647 kg
C) 18206 kg
D) 14383 kg

**A twin-engine aeroplane is certified for a Max Structural TOM and a Max LM of 58000 kg and 55000 kg respectively. Given the information below, what is the limiting take-off mass for the aeroplane?**

**Performance Limiting TOM 61000 kg**
**Performance limiting LM 54000 kg**
**MZFM 36000 kg**
**Operating mass 55000 kg**
**Trip fuel 3000 kg**
**Contingency fuel 5% of trip fuel**
**Alternate fuel 500 kg**
**Final reserve 500 kg**
**Flight duration 3 hours**
**Fuel consumption 500 kg per hour per engine**

A) 61000 kg
B) 58000 kg
C) 56545 kg
**D)** 57000 kg

**An aeroplane develops a serious technical problem shortly after take-off and has to return to its departure airfield. In order to land safely the aircraft must dump fuel. How much fuel must be dumped?**

A) The fuel system automatically stops the jettison at the Regulated Landing Mass
B) Sufficient to reduce the mass to the zero fuel mass
C) As much as the pilot feels is just insufficient to land safely
**D)** The pilot calculates the amount of fuel to jettison to reduce the mass to a safe level at, or below the Regulated Landing Mass

**41. The crew of a transport aeroplane prepares a flight using the following data:**

**Dry operating mass: 90 000 kg**
**Block fuel: 30 000 kg**
**Taxi fuel: 800 kg**
**Maximum take-off mass: 145 000 kg**

**The traffic load available for this flight is:**

A) 55 800 kg
B) 25 000 kg
C) 55 000 kg
**D)** 25 800 kg

**The following data is extracted from an aeroplane's loading manifest:**

**Performance limited take-off mass 93500 kg**
**Expected landing mass at destination 81700 kg**
**Maximum certificated landing mass 86300 kg**
**Fuel on board 16500 kg**

**During the flight a diversion is made to an en-route alternate which is not 'performance limited' for landing. Fuel remaining at landing is 10300 kg. The landing mass:**

A) is 87300 kg which is acceptable in this case because this is a diversion and not a normal scheduled landing
**B)** is 87300 kg and excess structural stress could result
C) must be reduced to 81700 kg in order to avoid a high speed approach
D) is 83200 kg which is in excess of the regulated landing mass and could result in overrunning the runway

**The empty mass of an aeroplane is recorded in:**

A) the loading manifest. It differs from Dry Operating Mass by the value of the " useful load"
B) the loading manifest. It differs from the zero fuel mass by the value of the " traffic load"
**C)** the weighing schedule and is amended to take account of changes due to modifications of the aeroplane
D) the weighing schedule. If changes occur, due to modifications, the aeroplane must be re-weighed always

**Given an aeroplane with:**

**Maximum Structural Landing Mass: 68000 kg**
**Maximum Zero Fuel Mass: 70200 kg**
**Maximum Structural Take-off Mass: 78200 kg**
**Dry Operating Mass: 48000 kg**
**Scheduled trip fuel is 7000 kg and the reserve fuel is 2800 kg**

**Assuming performance limitations are not restricting, the maximum permitted take-off mass and maximum traffic load are respectively:**

A) 77200 kg and 19400 kg
B) 75000 kg and 20000 kg
C) 77200 kg and 22200 kg
**D)** 75000 kg and 17200 kg

**The empty mass of an aeroplane is given as 44800 kg. Operational items (including crew standard mass of 1060 kg) are 2300 kg. If the maximum zero fuel mass is given as 65500 kg, the maximum traffic load which could be carried is:**

A) 20700 kg
B) 19460 kg
**C)** 18400 kg
D) 23000 kg

**Given are:**

**Maximum structural take-off mass: 72 000 kg**
**Maximum structural landing mass: 56 000 kg**
**Maximum zero fuel mass: 48 000 kg**
**Taxi fuel: 800 kg**
**Trip fuel: 18 000 kg**
**Contingency fuel: 900 kg**
**Alternate fuel: 700 kg**
**Final reserve fuel: 2 000 kg**

**Determine the actual take-off mass:**

A) 72 000 kg
**B)** 69 600 kg
C) 70 400 kg
D) 74 000 kg

**When computing the mass of checked baggage for an aircraft with twenty seats or more:**

A. **Table 1 applies**
B. **Table 2 applies**
C. **Table 3 applies**
D. **Mass is categorised by destination**
E. **Mass is categorised by gender**

A) A, C and D only
B) All the above
C) B, C and E only
**D)** C and D only

**Give the JAR OPS standard mass for a 13 yr old female travelling without hand luggage on a commercial flight in a five passenger seat aircraft:**

**A)** 86 kg
B) 80 kg
C) 76 kg
D) 70 kg

**Given:**

**Dry Operating Mass= 29 800 kg**
**Maximum Take-Off Mass= 52 400 kg**
**Maximum Zero-Fuel Mass= 43 100 kg**
**Maximum Landing Mass= 46 700 kg**
**Trip fuel= 4 000 kg**
**Fuel quantity at brakes release= 8 000 kg**
**The maximum traffic load is:**

A) 9 300 kg
B) 14 600 kg
**C)** 12 900 kg
D) 13 300 kg

**The take-off mass of an aeroplane is 141000 kg. Total fuel on board is 63000 kg including 14000 kg reserve fuel and 1000 kg of unusable fuel. The traffic load is 12800 kg. The zero fuel mass is:**

**A)** 79000 kg
B) 78000 kg
C) 65200 kg
D) 93000 kg

**An aeroplane has a maximum structural take-off mass of 64800 kg and a maximum structural landing mass of 56000 kg. Calculate the maximum traffic load for a flight of three hours duration if each of the four engines consumes 1500 litres of fuel per hour**
**Performance Limited TOM 62800 kg**
**MZFM 51300 kg**
**DOM 27372 kg**
**Maximum Ramp Fuel 35805 ltr**
**Ramp Fuel 35802.8 ltr**
**Start/taxi Fuel per engine 350 kg**
**A)** 11050kg
B) 23928 kg
C) 17210kg
D) 12450kg

**The mass of the fuel load must be determined:**
**A)** by the operator using actual density or by density calculation specified in the Operations Manual
B) by the pilot using actual density or by density calculation specified in the Operations Manual
C) by the owner using actual density or by density calculation specified in JAR OPS-1
D) by the fuel bowser operator using actual density or by density calculation specified in the Fuelling Manual

**A revenue flight is to be made by a jet transport. The following are the aeroplane's structural limits:**
**Maximum Ramp Mass: 69 900 kg**
**Maximum Take Off Mass: 69 300 kg**
**Maximum Landing Mass: 58 900 kg**
**Maximum Zero Fuel Mass: 52 740 kg**
**The performance limited take off mass is 67 450kg**
**Performance limited landing mass is 55 470 kg**
**Dry Operating Mass: 34 900 kg**
**Trip Fuel: 6 200 kg**
**Taxi Fuel: 250 kg**
**Contingency & final reserve fuel: 1 300 kg**
**Alternate Fuel: 1 100 kg**
**The maximum traffic load that can be carried is:**
A) 18 170 kg
B) 25 800 kg
C) 13 950 kg
**D)** 17 840 kg

**Conversion of fuel volume to mass:**

A) must be done using fuel density values of 0.79 for JP 1 and 0.76 for JP 4 as specified in JAR - OPS, IEM - OPS 1.605E
B) may be done by using standard fuel density values as specified in JAR - OPS 1
**C)** may be done by using standard fuel density values as specified in the Operations Manual, if the actual fuel density is not known
D) must be done by using actual measured fuel density values

**Given that:**
**Maximum structural take-off mass: 146 000 kg**
**Maximum structural landing mass: 93 900 kg**
**Actual zero fuel mass: 86 300 kg**
**Trip fuel: 27 000 kg**
**Taxi fuel: 1 000 kg**
**Contingency fuel: 1350 kg**
**Alternate fuel: 2650 kg**
**Final reserve fuel: 3000 kg**

**Determine the actual take-off mass:**

A) 121 300 kg
**B)** 120 300 kg
C) 146 000 kg
D) 120 900 kg

**Given the following:**
**Maximum structural take-off mass 48 000 kg**
**Maximum structural landing mass: 44 000 kg**
**Maximum zero fuel mass: 36 000 kg**
**Taxi fuel: 600 kg**
**Contingency fuel: 900 kg**
**Alternate fuel: 800 kg**
**Final reserve fuel: 1 100 kg**
**Trip fuel: 9 000 kg**

**Determine the actual take-off mass:**

A) 53 000 kg
B) 48 000 kg
**C)** 47 800 kg
D) 48 400 kg

**Standard masses may be used for the computation of mass values for baggage if the aeroplane:**

A) has 6 or more seats
B) has 30 or more seats
**C)** has 20 or more seats
D) is carrying 30 or more passengers

**The basic empty mass of an aircraft is 30 000 kg. The masses of the following items are:**
**Catering: 300 kg**
**Safety and rescue material: nil**
**Fly away kit: nil**
**Crew (inclusive crew baggage): 365 kg**
**Fuel at take-off: 3 000 kg**
**Unusable fuel: 120 kg**
**Passengers, baggage, cargo: 8 000 kg**

**The Dry Operating Mass is:**

**A)** 30 665 kg
B) 30 785 kg
C) 30 300 kg
D) 38 300 kg

**The operator of an aircraft equipped with 50 seats uses standard masses for passengers and baggage. During the preparation of a scheduled flight a group of passengers present themselves at the check-in desk, it is apparent that even the lightest of these exceeds the value of the declared standard mass.**

**A)** the operator should use the individual masses of the passengers or alter the standard mass
B) the operator is obliged to use the actual masses of each passenger
C) the operator may use the standard masses for the load and balance calculation without correction
D) the operator may use the standard masses for the balance but must correct these for the load calculation

**The standard mass for a child is:**

A) 30 kg for holiday charters and 35 kg for all other flights
**B)** 35 kg for all flights
C) 38 kg for all flights
D) 35 kg for holiday charters and 38 kg for all other flights

**61. The Dry Operating Mass of an aircraft is 2 000 kg. The maximum take-off mass, landing and zero fuel mass are identical at 3500 kg. The block fuel mass is 550kg, and the taxi fuel mass is 50 kg. The available mass of payload is:**

A) 1 500 kg
B) 1 000 kg
**C)** 950 kg
D) 1 450 kg

**(For this question use CAP 696 - Figure 3.4)**
**With respect to a multi-engine piston powered aeroplane, determine the total moment (lbs.In) at landing in the following conditions:**
**Basic empty mass: 3 210 lbs**
**One pilot: 160 lbs**
**Front seat passenger: 200 lbs**
**Centre seat passengers: 290 lbs (total)**
**One passenger rear seat: 110 lbs**
**Baggage in zone 1: 100 lbs**
**Baggage in zone 4: 50 lbs**
**Block fuel: 100 US Gal**
**Trip fuel: 55 US Gal**
**Fuel for start up and taxi (included in block fuel): 3 US Gal**
**Fuel density: 6 lbs./US Gal**
**Total moment at take-off: 432226 lbs.In**

**A)** 401 338
B) 432 221
C) 377 746
D) 433 906

**On an aeroplane with 20 or more seats engaged on an inter-continental flight, the 'standard mass' which may be used for passenger baggage is:**

**A)** 15 kg per passenger
B) 11 kg per passenger
C) 14 kg per passenger
D) 13 kg per passenger

**(For this question use CAP 696 - Figures 4.5 and 4.6)**
**For the medium range transport aeroplane, from the loading manual, determine the maximum total volume of fuel which can be loaded into the main wing tanks. (Fuel density value 0.78)**

**A)** 11646 litres
B) 5674 litres
C) 8850 litres
D) 11349 litres

**Standard passenger masses used for a holiday charter flight are:**

**A)** Male 83 Kg, Female 69 Kg, or an average mass of Adult person 76 Kg
B) Average mass of adult person 84 Kg
C) Child up to the age of 12 years 30 Kg
D) Male 80 Kg, Female 70 Kg

**The flight preparation of a turbojet aeroplane provides the following data:**

**Take-off runway limitation: 185 000 kg**
**Landing runway limitation: 180 000 kg**
**Planned fuel consumption: 11 500 kg**
**Fuel already loaded on board the aircraft: 20 000 kg**

**Knowing that:**
**Maximum take-off mass (MTOM): 212 000 kg**
**Maximum landing mass (MLM): 174 000 kg**
**Maximum zero fuel mass (MZFM): 164 000 kg**
**Dry operating mass (DOM): 110 000 kg**

**The maximum cargo load that the captain may decide to load on board is:**

A) 55 000 kg
B) 61 500 kg
**C)** 54 000 kg
D) 55 500 kg

**A revenue flight is to be made by a jet transport. The following are the aeroplane's structural limits:**

**Maximum Ramp Mass: 69 900 kg**
**Maximum Take Off Mass: 69 300 kg**
**Maximum Landing Mass: 58 900 kg**
**Maximum Zero Fuel Mass: 52 740 kg**
**Take Off and Landing mass are not performance limited**
**Dry Operating Mass: 34 900 kg**
**Trip Fuel: 11 800 kg**
**Taxi Fuel: 500 kg**
**Contingency & final reserve fuel: 1 600 kg**
**Alternate Fuel: 1 900 kg**

**The maximum traffic load that can be carried is:**

**A)** 17 840 kg
B) 19 200 kg
C) 19 500 kg
D) 19 100 kg

**In determining the Dry Operating Mass of an aeroplane it is common practice to use 'standard mass' values for crew. These values are**

A) flight crew (male) 88 kg. (female) 75 kg., cabin crew 75 kg. each. These do not include an allowance for hand baggage
B) flight crew (male) 88 kg. (female) 75 kg., cabin crew 75 kg. each. These include an allowance for hand baggage
C) flight crew 85 kg., cabin crew 75 kg. each. These do not include a hand baggage allowance
**D)** flight crew 85 kg., cabin crew 75 kg. each. These are inclusive of a hand baggage allowance

**The operator must establish the mass of the Traffic Load:**

**A)** by actual weighing or determine the mass of the traffic load in accordance with standard masses as specified in JAR-OPS sub part J
B) by using an appropriate method of calculation as specified in the JAR Ops subpart J
C) prior to initial entry into service
D) prior to embarking on the aircraft

**Basic empty mass:**

A) Is usually the mass of the basic aeroplane without any operating fluids
B) Is the mass of an aeroplane as produced by the manufacturer including operating fluids, toilet and galley water plus all required equipment plus unusable fuel
C) Is the mass of an aeroplane including operating fluids, toilet and galley water and fuel
**D)** Is usually determined by the aircraft manufacturer during weighing at the manufacturing plant and does not include any additional equipment

**(For this Question use CAP 696 - Figure 4.9)**
**The centroid of the forward hold is:**

A) 367.9 inches from the nose of the aeroplane
B) halfway between stations 228 and station 500
C) 314.5 inches forward of the aft cargo bay centroid
**D)** 367.9 inches from the datum

**n aeroplane is to depart from an airfield at a take-off mass of 302550 kg. Fuel on board at take-off (including contingency and alternate of 19450 kg) is 121450 kg. The Dry Operating Mass is 161450 kg. The useful load will be:**

A) 39105 kg
**B)** 141100 kg
C) 19650 kg
D) 121450 kg

**A jet transport has the following structural limits:**

**Maximum Ramp Mass: 63 060 kg**
**Maximum Take Off Mass: 62 800 kg**
**Maximum Landing Mass: 54 900 kg**
**Maximum Zero Fuel Mass: 51 300 kg**

**The aeroplane's fuel is loaded accordance with the following requirements:**
**Taxi fuel: 400 kg**
**Trip fuel: 8400 kg**
**Contingency & final reserve fuel: 1800 kg**
**Alternate fuel: 1100 kg**

**If the Dry Operating Mass is 34930 kg, determine the maximum traffic load that can be carried on the flight if departure and landing airfields are not performance limited.**
A) 16 570 kg
B) 17 070 kg
**C)** 16 370 kg
D) 16 430 kg

**A revenue flight is to be made by a jet transport. The following are the aeroplane's structural limits:**

**Maximum Ramp Mass: 69 900 kg**
**Maximum Take Off Mass: 69 300 kg**
**Maximum Landing Mass: 58 900 kg**
**Maximum Zero Fuel Mass: 52 740 kg**
**Take Off and Landing mass are not performance limited**
**Dry Operating Mass: 34 930 kg**
**Trip Fuel: 11 500 kg**
**Taxi Fuel: 250 kg**
**Contingency & final reserve fuel: 1 450 kg**
**Alternate Fuel: 1 350 kg**

**The maximum traffic load that can be carried is:**
A) 21 170 kg
B) 21 070 kg
C) 20 420 kg
**D)** 17 810 kg

**Prior to departure the medium range twin jet aeroplane is loaded with maximum fuel of 20100 litres at a fuel density (specific gravity) of 0.78. Using the following data:**
**Performance limited take-off mass 67200 kg**
**Performance limited landing mass 54200 kg**
**Dry Operating Mass 34930 kg**
**Taxi fuel 250 kg**
**Trip fuel 9250 kg**
**Contingency and holding fuel 850 kg**
**Alternate fuel 700 kg**
**The maximum permissible traffic load is:**

**A)** 13090 kg
B) 16470 kg
C) 12840 kg
D) 18040 kg

**Mass and balance documentation:**

A. **must be established prior to each flight**
B. **must enable the commander to determine that the load and its distribution is such that the mass and balance limits of the aircraft are not exceeded**
C. **must include the name of the person preparing the document**
D. **must be signed by the person supervising the loading to the effect that the load and its**
E. **distribution is in accordance with the data on the document**
F. **must include the aircraft commander signature to signify acceptance of the document**

**A)** All of the above
B) A, D and E only
C) A and C only
D) B, D and E only

**The Take-off Mass of an aeroplane is 66700 kg which includes a traffic load of 14200 kg and a usable fuel load of 10500 kg. If the standard mass for the crew is 545 kg the Dry Operating Mass is:**

A) 42545 kg
B) 56200 kg
C) 41455 kg
**D)** 42000 kg

**A flight benefits from a strong tail wind which was not forecast. On arrival at destination a straight in approach and immediate landing clearance is given. The landing mass will be higher than planned and:**

**A)** the landing distance required will be longer
B) the landing distance will be unaffected
C) the approach path will be steeper
D) the approach path will be steeper and threshold speed higher

**The following data applies to a planned flight:**
**Dry Operating Mass 34900 kg**
**Performance limited Take-Off Mass 66300 kg**
**Performance limited Landing Mass 55200 kg**
**Maximum Zero Fuel Mass 53070 kg**
**Fuel required at ramp:**
**Taxi fuel 400 kg**
**Trip fuel 8600 kg**
**Contingency fuel 430 kg**
**Alternate fuel 970 kg**
**Holding fuel 900 kg**
**Traffic load 16600 kg**
**Fuel costs at the departure airfield are such that it is decided to load the maximum fuel quantity possible. The total fuel which may be safely loaded prior to departure is:**
**A)** 12700 kg
B) 15200 kg
C) 13230 kg
D) 10730 kg

**The following data applies to an aeroplane which is about to take off:**
**Certified maximum take-off mass 141500 kg**
**Performance limited take-off mass 137300 kg**
**Dry Operating Mass 58400 kg**
**Crew and crew hand baggage mass 640 kg**
**Crew baggage in hold 110 kg**
**Fuel on board 60700 kg**
**From this data calculate the mass of the useful load.**
**A)** 78900 kg
B) 17450 kg
C) 78150 kg
D) 18200 kg

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**81. An aeroplane is performance limited to a landing mass of 54230 kg. The Dry Operating Mass is 35000 kg and the zero fuel mass is 52080 kg. If the take-off mass is 64280 kg the useful load is:**
A) 12200 kg
B) 17080 kg
**C)** 29280 kg
D) 10080 kg

**Given:**

**Dry operating mass = 38 000 kg**
**Maximum structural take-off mass = 72 000 kg**
**Maximum landing mass = 65 000 kg**
**Maximum zero fuel mass = 61 000 kg**
**Fuel burn = 8 000 kg**
**Take-off Fuel = 10 300 kg**

**The maximum allowed take-off mass and payload are respectively:**

A) 73 000 kg and 27 000 kg
B) 71 300 kg and 25 300 kg
C) 73 000 kg and 24 700 kg
**D)** 71 300 kg and 23 000 kg

# Effect of overloading:

Due to a mistake in the load sheet the aeroplane is 100 kg heavier than you believe it to be. As a consequence:

A) V1, VMU, VR will all occur earlier
B) VR will be higher
**C)** VMU will be higher
D) V1 will be higher

The handling and performance problems encountered when an aircraft is overloaded include:

**A)** The stall speed is increased
B) The stall speed is decreased
C) No possibility of overstressing the airframe if the mass is above the maximum authorised weights
D) The take-off and landing runs are decreased

When considering the effects of increased mass on an aeroplane, which of the following is true?

A) Flight endurance will be increased
B) Gradient of climb for a given power setting will be higher
C) Stalling speeds will be lower
**D)** Stalling speeds will be higher

The handling and performance problems encountered when an aircraft is overloaded include:

A) The take-off and landing runs are decreased
**B)** A reduced rate of climb and a reduced climb gradient
C) Little possibility of overstressing the airframe if the mass is above the maximum authorised weights
D) The stall speed is decreased

An additional baggage container is loaded into the aft cargo compartment but is not entered into the load and trim sheet. The aeroplane will be heavier than expected and calculated take-off safety speeds:

**A)** will give reduced safety margins
B) will not be achieved
C) are unaffected but V1 will be increased
D) will be greater than required

If an aeroplane is at a higher mass than anticipated, for a given airspeed the angle of attack will:

A) be decreased, drag will decrease and endurance will increase
**B)** be greater, drag will increase and endurance will decrease
C) remain constant, drag will increase and endurance will increase
D) remain constant, drag will decrease and endurance will decrease

During a violent avoidance manoeuvre, a light twin aircraft, certified to FAR 23 requirements was subjected to an instantaneous load factor of 4.2. The Flight Manual specifies that the aircraft is certified in the normal category for a load factor of -1.9 to +3.8. Considering the certification requirements and taking into account that the manufacturer of the twin did not include, during its conception, a supplementary margin in the flight envelope, it might be possible to observe:

A) rupture of one or more structural components
B) no distortion, permanent or temporary of the structure
C) an elastic deformation whilst the load was applied, but no permanent distortion
**D)** a permanent deformation of the structure

Just prior to take-off, a baggage handler put a large extra bag into the forward hold without recording it in the LMC's. What are the effects of this action?

1. VMC will increase if the extra load is forward of the datum.
2. Stick forces in flight will decrease if the extra load is behind the datum.
3. Stick forces at VR will increase.
4. VMU will occur later
5. The safe stopping distance will increase.

A) 2, 3 and 4 only
B) all of the above
C) 1 and 5 only
**D)** 3, 4 and 5 only

Prior to departure an aeroplane is loaded with 16500 litres of fuel at a fuel density of 780 kg/$m^3$. This is entered into the load sheet as 16500 kg and calculations are carried out accordingly. As a result of this error, the aeroplane is:

**A)** lighter than anticipated and the calculated safety speeds will be too high
B) heavier than anticipated and the calculated safety speeds will be too low
C) heavier than anticipated and the calculated safety speeds will be too high
D) lighter than anticipated and the calculated safety speeds will be too low

In order to provide an adequate " buffet boundary" at the commencement of the cruise a speed of 1.3Vs is used.
At a mass of 120000 kg this is a CAS of 180 knots. If the mass of the aeroplane is increased to 135000 kg the value of 1.3Vs will be:

A) increased to 191 knots, drag will decrease and air distance per kg of fuel will increase
B) increased to 202 knots but, since the same angle of attack is used, drag and range will remain the same
C) unaffected as Vs always occurs at the same angle of attack
**D)** increased to 191 knots, drag will increase and air distance per kg of fuel will decrease

If an extra load is loaded into an aircraft the stall speed is likely to:

A) Change depending on whether the load was placed FWD or AFT of the C of G
**B)** Increase
C) Stay the same
D) Decrease

Fuel loaded onto an aeroplane is 15400 kg but is erroneously entered into the load and trim sheet as 14500 kg.
This error is not detected by the flight crew but they will notice that:

A) the aeroplane will rotate much earlier than expected
B) V1 will be reached sooner than expected
C) V1 will be increased
**D)** speed at un-stick will be higher than expected

At maximum certificated take-off mass an aeroplane departs from an airfield which is not limiting for either take- off or landing masses. During initial climb the number one engine suffers a contained disintegration. An emergency is declared and the aeroplane returns to departure airfield for an immediate landing. The most likely result of this action will be:

A) a high threshold speed and a shorter stop distance
**B)** a high threshold speed and possible undercarriage or other structural failure
C) a landing further along the runway than normal
D) a landing short resultant from the increased angle of approach due to the very high aeroplane mass

# *Centre of gravity*

## Basis of CG calculations (load and balance documentation)

(Refer to CAP696 figure 2-1)
What are the CG limits?
A) fwd limit = 74 inches to 80.4 inches
B) fwd limit = 74 inches, aft limit = 87.7 inches
**C)** fwd limit = 74 inches to 80.4 inches, and aft limit = 87.7 inches
D) fwd limit = 74 inches, aft limit = 80.4 inches

You require 63,000 kg of fuel for your flight, the aircraft currently has 12,000 kg indicated on the gauges. How many US gallons of fuel do you request if the density is 0.81?
A) 62,960 US gallons
**B)** 16,660 US gallons
C) 10, 910 US gallons
D) 41, 310 US gallons

(Refer to CAP696 figure 2-1)
What is the distance of the main undercarriage from the firewall?
A) 39 inches
B) 97 inches
C) 87.7 inches
**D)** 58 inches

(Refer to CAP696 figures 3-1 & 3-3)
The main wheel is:
**A)** 27.8 inches behind the fwd CG limit at a take-off mass of 3400 lbs
B) 19 inches forward of the fwd CG limit at the maximum take-off mass
C) 15.2 inches forward of the rear CG limit at the maximum take-off mass
D) all the above

(Refer to CAP696 figures 4-1 & 4-4)
How far is the leading edge of the mean aerodynamic chord from the datum?
**A)** 625.6 inches aft of the datum
B) 540 inches forward of the datum
C) 627.5 inches aft of the datum
D) 589.5 inches forward of the datum

(Refer to CAP696 figure 2-1)
How far is the main wheel from the aft CG limit?
**A)** 9.3 inches aft of the rear datum
B) 0.7 inches forward of the rear datum
C) 6.6 inches forward of the rear datum
D) 0.7 inches behind the rear datum

5600 USG is equivalent to how many Imperial gallons?
A) 4366 imp
B) 6338 imp
**C)** 4663 imp
D) 4848 imp

(Refer to CAP696 figures 3-1 & 3-2)
If the pilot has a mass of 200 lb, what is the maximum traffic load?
A) 6001 lb
B) 1600 lb
C) 1006 lb
**D)** 1060 lb

The determination of the centre of gravity in relation to the mean aerodynamic chord:
**A)** consists of defining the centre of gravity longitudinally in relation to the length of the mean aerodynamic chord and the leading edge
B) consists of defining the centre of gravity longitudinally in relation to the position of the aerodynamic centre of pressure
C) consists of defining the centre of gravity longitudinally in relation to the position of the aerodynamic convergence point
D) consists of defining the centre of gravity longitudinally in relation to the length of the mean aerodynamic chord and the trailing edge

(For this Question use CAP 696 - Figures 3.4)
With respect to multi-engine piston powered aeroplane, determine the ramp mass (lbs) in the following conditions:

Basic empty mass: 3 210 lbs
Basic arm: 88.5 Inches
One pilot: 160 lbs
Front seat passenger: 200 lbs
Centre seat passengers: 290 lbs
One passenger rear seat: 110 lbs
Baggage in zone 1: 100 lbs
Baggage in zone 4: 50 lbs
Block fuel: 100 US Gal.
Trip fuel: 55 US Gal.
Fuel for start up and taxi (included in block fuel): 3 US Gal.
Fuel density: 6 lbs/US Gal.
**A)** 4 720
B) 4 390
C) 4 120
D) 4 372

(Refer to CAP696 figure 3-1)
Where is the reference datum?
A) 25.3 inches forward of the nose wheel
**B)** all the above
C) 109.8 inches forward of the main wheel
D) 78.4 inches forward of the wing leading edge at the inboard edge of the inboard fuel tank

125 USG of Avgas in Litres is?
A) 37 L
B) 358 L
C) 460 L
**D)** 473 L

The weighing machine used for passenger weighing shall have a capacity of at least _____ and shall be displayed at minimum graduations of _____ .
A) 200 kgs; 500 g
B) 250 kgs; 1 kg
C) 100 kgs; 1 kg
**D)** 150 kgs; 500 g

The mass of 16 858 kg in Lbs is?
A) 36 330 lbs
B) 7 645 lbs
**C)** 37 166 lbs
D) 7 822 lbs

The CG position is:
A) set by the manufacturer
**B)** able to exist within a range
C) fixed
D) set by the pilot

(Refer to CAP696 figures 2-1 & 2-2)
From the data in the loading manual for a single engine aircraft in performance class B, what is the maximum traffic load allowed when the aircraft is fully fuelled and is flown by a pilot with a mass of 195 lb?
A) 372 lbs
**B)** 596 lbs
C) 781 lbs
D) 611 lbs

(Refer to CAP696 figure 2-1)
If the landing mass is 3155 lb and the trip fuel was 40 gallons, what was the ZFM if the fuel tanks held 60 gallons of fuel prior to take-off?

A) 3098 lb
B) 3001 lb
**C)** 3035 lb
D) 3111 lb

(Refer to CAP696 figures 3-1 & 3-3)
The nose wheel is:

A) all the above
B) 69.3 inches aft of the rear CG limit at maximum take-off mass
**C)** 56.7 inches forward of the fwd CG limit at maximum take-off mass
D) 65.5 inches forward of the fwd CG limit at maximum take-off mass

(Refer to CAP696 figure 4-8)
How many seats are there in zone B?

**A)** 18
B) 21
C) 24
D) 15

The aircraft basic mass and CG position is found in:

A) The loading manifest and is DOM - traffic load
B) In the loading manifest and is ZFM - useful load
C) The weighing schedule in the Aircraft Flight Manual and the aeroplane must be re-weighed if equipment change causes a change in mass or balance
**D)** The weighing schedule in the Aircraft Flight Manual and is adjusted to take account of any mass changes

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21. (Refer to CAP696 figure 4-8)
The balance arm for each of the seat zones is measured from the datum to:

A) the front border line of the next zone in sequence
B) the rear border line of the zone
C) the front border line of the zone
**D)** the centre line of the zone

(Refer to CAP696 figure 2-1)
What is the CG at the BEM?

A) 77.7 cm
**B)** 77.7 inches
C) 77 inches
D) 87 inches

A scheduled flight of three hours an estimated duration within Europe is to be conducted. Using the data given within the loading manual for a medium range twinjet aircraft, calculate the maximum mass of freight that may be loaded in the following circumstances:

Performance limited take-off mass = 67 900 kg
Performance limited landing mass = 56 200 kg
Dry operating mass = 34 960 kg
Fuel on board at ramp = 15 800 kg
Taxi fuel = 450 kg
Trip fuel = 10 200 kg

Passengers:
(adults/each 84 kg) = 115
(children/ each 35 kg) = 6
Standard baggage for each passenger = 13kg

Flight crew (each 85kg) = 2
Cabin crew (each 75 kg) = 5

**A)** 4647 kg
B) 857 kg
C) 4897 kg
D) 6147 kg

(Refer to CAP696 figure 4-11)
Between 44,000 kg and 63,000 kg the rear CG limit as a percentage of the MAC:

A) increases from 28% to 29.5%
**B)** decreases from 28% to 26%
C) decreases from 28% to 9%
D) is constant at 28%

(Refer to CAP696 figure 2-1)
What is the maximum ramp mass?

A) 3780 lbs
B) 3870 lbs
**C)** 3663 lbs
D) 3650 lbs

The mass of 729 US Gallons of fuel at SG 0.78 is:

A) 3095 Kg
B) 568 kg
**C)** 2153 Kg
D) 2579 Kg

(Refer to CAP696 figures 4-5 & 4-6)
What is the maximum usable fuel mass?
A) 16,092 kg
**B)** 16,040 kg
C) 16,064 kg
D) 16,078 kg

Which of the following would not affect the CG?
A) Fuel usage
**B)** Stabiliser trim setting
C) Cabin crewmembers performing their normal duties
D) Mass added or removed at the neutral point

The refueller has metered 4596 Imperial Gallons, your fuel gauges indicated 5,600 lbs before refuelling, what should they indicate now? The density is 0.79.
A) 63,908 lb
B) 36,389 lb
**C)** 41,908 lb
D) 35,901 lb

From the following select the standard baggage mass for a domestic flight on a 300 passenger seat aircraft:
A) 15 kg
B) 6 kg
C) 13 kg
**D)** 11 kg

From the list, select the correct baggage standard masses (Kg) for 180-seat aircraft on a domestic (i), intercontinental (ii) and charter (iii) flights:
A) (i) 13, (ii) 15, (iii) 15
B) (i) 13, (ii) 15, (iii) 11
**C)** (i) 11, (ii) 15, (iii) 13
D) (i) 11, (ii) 13, (iii) 15

How would you convert US Gallons to Litres (L)?
A) US Gall x 1.205
B) US Gall x 0.264
C) US Gall x 4.546
**D)** US Gall x 3.785

(Refer to CAP696 figure 3-2)
From data sheet attached select the volume of the fuel allowance for start, run up and taxi as per the worked example.
A) 3.8 litres
B) 3.8 US pints
C) 3.8 Imp gallons
**D)** 3.8 US gallons

(For this Question use CAP 696 - Figure 4.12)
The actual underload for the aircraft after the traffic load and fuel load have been accounted for is:
A) 720 kg
**B)** 630 kg
C) 960 kg
D) zero

(Refer to CAP696 figures 4-1 & 4-4)
What is the length of the mean aerodynamic chord?
A) 104.5 inches
**B)** 134.5 inches
C) 114.5 inches
D) 124.5 inches

The responsibility for determination of the mass of OPERATING MASSES and CREW MEMBERS included within the Dry Operating Mass lies with:
A) the commander
B) the authority of the state of registration
C) the person compiling the weighing schedule
**D)** the operator

(For this Question use CAP 696 - Figures 4.1 & 4.2)
For the medium range twin jet the datum point is located:
A) at the leading edge of the Mean Aerodynamic Chord (MAC)
B) on the nose of the aeroplane
**C)** 540 inches forward of the front spar
D) 540 cm forward of the front spar

(For this Question use CAP 696 - Figure 4.12)
The actual take-off mass is:
A) 62,800 kg less 8,500 kg trip fuel
B) 53,670 kg less 14,500 kg take-off fuel
C) 51,300 kg ZFM plus 14,500 kg take-off fuel
**D)** 47,670 kg ZFM plus 14,500 kg take-off fuel mass

A scheduled flight of three hours estimated flight time, within Europe, is being planned. Calculate the maximum mass of freight that may be loaded in the following circumstances:

Structural limited take-off mass: 62,800 kg
Structural limited landing mass: 54,900 kg
MZFM : 51,300 kg
Dry Operating Mass: 34,960 kg
Fuel on board at ramp: 15,800 kg
Taxi fuel: 450 kg
Trip fuel: 10,200 kg
Passengers (adults each 84 kg): 115
Passengers (children each 35 kg): 6
Standard baggage for each passenger: 13 kg
Flight crew (each 85 kg): 2
Cabin crew (each 75 kg): 3

A) 5,545 kg
**B)** 1,047 kg
C) 4,102 kg
D) 4,647 kg

A scheduled flight of three hours estimated time, within Europe, is to be conducted. Using the data given calculate the maximum mass of freight that may be loaded in the following circumstances:

Performance limited take-off mass: 67,900 kg
Performance limited landing mass: 56,200 kg
MZFM: 51,300 kg
DOM: 34,960 kg
Fuel on board at ramp: 15,800 kg
Taxi fuel: 450 kg
Trip fuel: 10,200 kg
Passengers: 115 adults + 6 children
Flight crew (each 85 kg): 2
Cabin crew (each 75 kg): 5

Allow standard baggage for each passenger (13 kg).

A) 4764 kg
**B)** 4647 kg
C) 6147 kg
D) 1047 kg

---

41. How would you convert Kilograms (KG) to Pounds (LB)?

**A)** KG x 2.20462262 LB
B) KG x 0.45359237 LB
C) KG / 2.20462262 LB
D) None of the above

(Refer to CAP696 figure 4-6)
From the data sheet for a medium range twinjet determine the amount of unusable fuel in the aircraft:
**A)** 17.1 US gallons at 52 kg
B) 17.1 US gallons at 50 kg
C) 17.0 US gallons at 50 kg
D) 17.0 US gallons at 52 kg

(Refer to CAP696 figure 4-1)
What is the total length of the fuselage?
A) 1395 inches
B) 1375 inches
C) 1365 inches
**D)** 1387 inches

(Refer to CAP696 figure 2-2)
Where is the centroid of baggage zone B?
**A)** 150 inches from the datum
B) 108 inches from the datum
C) 180 inches from the datum
D) 120 inches from the datum

(For this Question use CAP 696 - Figure 4.9 or 4.10)
For the transport aeroplane the moment (balance) arm (B.A.) for the forward hold centroid is:
A) 421.5 inches
B) 257 inches
**C)** 367.9 inches
D) 314.5 inches

The centre of gravity location of the aeroplane is normally computed along the:
**A)** longitudinal axis
B) horizontal axis
C) vertical axis
D) lateral axis

Which of the following is unlikely to have any effect on the position of the centre of gravity on an aeroplane in flight?
A) Normal consumption of fuel for a swept wing aeroplane
B) Lowering the landing gear
C) Movement of cabin attendants going about their normal duties
**D)** Changing the tailplane (horizontal stabiliser) incidence angle

Determine the Landing Mass for the following single engine aeroplane. Given:
Standard Empty Mass: 1764 lbs
Optional Equipment: 35 lbs
Pilot + Front seat passenger: 300 lbs
Cargo Mass: 350 lbs
Ramp Fuel = Block Fuel: 60 Gal.
Trip Fuel: 35 Gal.
Fuel density: 6 lbs/Gal.

A) 2659 lbs
**B)** 2599 lbs
C) 2449 lbs
D) 2799 lbs

Given:
DOM = 3 415 lbs
Trip fuel = 400 lbs
Passenger Mass = 600 lbs
Freight/baggage = 1 050 lbs
Maximum structural TOM = 5 850 lbs
Performance TOM = 5 200 lbs
The traffic load is to be reduced to bring the TOM into the regulated TOM limits by:

A) 600 lbs
B) 400 lbs
**C)** 265 lbs
D) 200 lbs

Given the following:
APS (aircraft prepared for service) mass = 3 400 lb
Fuel for sector = 500 lb
Passengers = 400 lb
Freight/baggage = 200 lb
Maximum take-off mass (structural) = 4 750 lb
Regulated take-off mass (performance) = 4 300 lb
How much will the Traffic Load have to be reduced by in order to bring the take-off mass into the regulated take- off mass limits?

A) No reduction required
B) 200 kg
**C)** 200 lbs
D) 250 lbs

(Refer to CAP696 figure 2-1)
How far is the firewall from the fuel tank centroid?

A) 39 inches
B) 38 inches
**C)** 36 inches
D) 37 inches

The weight of 1292 Litres of fuel (SG 0.812) is:
A) 2846 lbs
B) 3805 lbs
**C)** 2313 lbs
D) 3508 lbs

(Refer to CAP696 figure 2-1)
For the single engine piston/propeller aeroplane the FWD C of G limits are:
A) 74.00"
**B)** 74.00" - 80.4"
C) 80.4"
D) 37.7"

(Refer to CAP696 figure 3-1)
The reference point for the MEP 1 aircraft is:
A) 25.3 inches aft of the datum
**B)** 78.4 inches aft of the datum
C) 85.5 inches aft of the datum
D) 108.8 inches aft of the datum

Which one of the following is correct?
A) Arm = Force X Moment
**B)** Arm = Moment / Force
C) Moment = Force / Arm
D) Arm = Force / Moment

(Refer to CAP696 figure 4-4)
What stabiliser trim setting is required for take-off when the CG is 19% MAC for 5 degrees of take-off flap?
**A)** 3.75
B) 4.75
C) 2.75
D) 5.75

(Refer to CAP696 figure 4-4)
Assuming the MZFM, what is the maximum allowable fuel mass for take-off?
A) 10,150 kg
**B)** 11,500 kg
C) 15,000 kg
D) 10,015 kg

(Refer to CAP696 figures 3-1 & 3-2)
What is the maximum fuel tank capacity?
A) TOM minus ZFM
B) not given
**C)** 123 US gallons
D) 46.6 US gallons

Moment (balance) arms are measured from a specific point to the body station at which the mass is located.
That point is known as:
**A)** the datum
B) the centre of gravity of the aeroplane
C) the focal point
D) the axis

A location in the aeroplane which is identified by a number designating its distance from the datum is known as:
A) Index
B) Moment
**C)** Station
D) MAC

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61. For an aircraft having 16 passenger seats, if no hand luggage is carried, how much weight may be deducted from the standard passenger weights for passengers over 12 years old?
A) 0 kg
B) 10 kg
**C)** 6 kg
D) 12 kg

An aeroplane has its centre of gravity located 7 metres from the datum line and it has a mass of 49000 N. The moment about the datum is:
A) 34 300 Nm
**B)** 343 000 Nm
C) 1.43 Nm
D) 7000 Nm

(For this Question use CAP 696 - Figure 4.12)
The landing mass is:
**A)** 62,170 kg take-off mass less 8,500 kg trip fuel
B) 62,800 kg take-off mass plus 8,500 kg trip fuel
C) 62,800 kg take-off mass less 8,500 kg trip fuel
D) 62,170 kg take-off mass plus 8,500 kg trip fuel

(Refer to CAP696 figure 4-3)
From the data sheet for a medium range twinjet determine the moment effect of raising the flaps from 40° to 15° .
A) +1000 kg force inches
**B)** -2000 kg force inches
C) +2000 kg force inches
D) -1000 kg force inches

An aeroplane has 40 passenger seats and is on a holiday charter flight. The passenger breakdown is 10 male 20 female 5 children (occupying separate seats). The standard mass values are to be used to the best advantage of the operator. The total weight entered in the load sheet is:

A) 2 105 kgs
B) 2 210 kgs
**C)** 2 455 kgs
D) 2 385 kgs

(Refer to CAP696 figures 4-7 & 4-9)
The front compartment of the front cargo hold is situated below:

A) passenger zone C
**B)** passenger zone A
C) passenger zone B
D) passenger zone D

(For this Question use CAP 696 - Figure 4.12)
The Traffic Load is:

**A)** 13,370 kg obtained from 10,920 kg pax mass, 1,820 baggage mass and 630 kg cargo mass
B) obtained from the sum of pax mass plus baggage mass plus total cargo compartment mass
C) 13,370 kg obtained from 10,920 kg pax mass plus 2,450 kg baggage mass plus 630 kg cargo mass
D) 39,800 kg obtained from ZFM 51,300 kg less fuel mass 11,500 kg

(Refer to CAP696 figures 3-1 & 3-4)
Assuming floor loading limits are acceptable, how much freight and fuel load can be carried for MTOM if the pilot mass was 200 lb?

**A)** A full load in each zone plus 380 lb of fuel
B) A full freight load in each zone plus 280 lb of fuel
C) 350 lbs load in zone 4 but full loads in all the other zones, plus 280 lbs of fuel
D) 50 lb in zones 1 or 4 but full loads in each of the other zones, plus 280 lbs of fuel

(Refer to CAP696 figure 2-1)
What is the structural load limit for the floor at baggage zone C?

A) 100 kg per square inch
B) 50 lb per square foot
**C)** 100 Ib per square foot
D) 100 lb per cubic foot

(Refer to CAP696 figure 4-4)
What is the maximum structural take-off mass?

**A)** 62,800 kg
B) 51,300 kg
C) 54,900 kg
D) 63,060 kg

(For this Question use CAP 696 - Figure 4.12)
In order to determine the underload the pilot starts by selecting the lowest mass from the three key masses given.
The key masses are:
A) Dry Operating Mass, Maximum Zero Fuel Mass and Landing Mass
B) Dry Operating Mass, Maximum Zero Fuel Mass and Take Off Mass
**C)** Maximum Zero Fuel Mass, Take Off Mass and Landing Mass
D) Traffic Load, Take-off Mass and Landing Mass

(Refer to CAP696 figure 2-1)
Where is the reference datum?
A) 74 inches aft of the fwd CG position
B) 80.4 inches aft of the rear CG position
**C)** 39 inches forward of the firewall
D) 87.7 inches aft of the rear CG position

(For this Question use CAP 696 - Figure 4.12)
From the figures given, if the actual take-off fuel mass (14,500 kg) was added to the Maximum Zero Fuel Mass the aircraft would be:
**A)** Over the maximum Take-off mass by 3,000 kg
B) Below the maximum Take-off mass by 350 kg
C) Below the maximum Take-off mass by 630 kg
D) Over the maximum Take-off mass by 530 kg

(Refer to CAP696 figure 3-1)
What is the minimum fuel mass that must be consumed if the aircraft, having become airborne at maximum weight, decides to abort the flight?
**A)** 237 lb
B) 1260 lb
C) 202 lb
D) 280 lb

If 567 Kgs of fuel at SG 0.812 are on board an aircraft, the amount of fuel in US gallons is:
**A)** 184 USG
B) 161 USG
C) 168 USG
D) 201 USG

The bowser delivers 10,000 litres of fuel and this is incorrectly entered on the aircraft load sheet as 10,000 kgs.
Given that the SG of the fuel is 0.75, determine if the aircraft is heavier or lighter than appears and by how much:
A) Heavier by 3330 kg
B) Lighter by 3330 kg
C) Heavier by 2500 kg
**D)** Lighter by 2500 kg

Given:
DOM(APS) = 3 500 lb
Trip fuel = 500 lb
Passengers = 400 lb
Freight/Baggage = 1 250 lb
Maximum Structural TOM = 5 850 lb
Performance Regulated TOM = 5 200 lb
The traffic load is to be reduced to bring the TOM into the Regulated TOM limits by:
**A)** 450 lb
B) 200 lb
C) 650 lb
D) 250 lb

(Refer to CAP696 figures 3-1 & 3-2)
Assuming the maximum zero fuel mass and maximum take-off mass, what fuel load can be carried?
A) 176.8 litres
B) 46.6 US gallons
**C)** any one of the above
D) 38.9 Imperial gallons

The distance from the datum to the Centre of Gravity of a mass is known as:
A) the index
B) the moment
C) the lever
**D)** the moment arm or balance arm

(Refer to CAP696 figures 4-1 & 4-2)
From the medium range twinjet data sheet give the distance of body station 727F from the front spar:
A) + 287 inches
B) + 187 inches
C) + 540 inches
**D)** + 313 inches

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81. The datum used for balance calculations is:
A) chosen on the longitudinal axis of the aeroplane, and necessarily situated between the nose and the tail of the aircraft
B) chosen on the longitudinal axis of the aircraft, and always at the fire-wall level
C) chosen on the longitudinal axis of the aircraft and necessarily situated between the leading edge and trailing edge of the wing
**D)** chosen on the longitudinal axis of the aeroplane, but not necessarily between the nose and the tail of the aircraft

What is the allowed traffic load for a medium range jet aircraft where the DOM is 35058 kg, where the limitations are MZFM 52790 kg, RTOM 61875 kg, RLM 53871 kg. The TOF is 13358 kg of which 8900 kg is trip fuel.

A) 17 732 kg
B) 10 376 kg
**C)** 13 459 kg
D) 14 355 kg

If the mass of 6000 US gallons of fuel is 16780 kg, what is its S.G. given that 1 Imperial gallon of fuel equals 4.546 litres?

**A)** 0.74
B) 0.76
C) 0.78
D) 0.80

(Refer to CAP696 figures 3-1 & 3-2)
If the aircraft is at MTOM with full fuel tanks and a pilot of mass 200 lb, what traffic load can be carried?

A) 579 lbs providing at least 20.5 gallons of fuel are consumed in start, taxi and flight
B) nil
**C)** 625 lbs providing at least 43.3 gallons of fuel are consumed in start, taxi and flight
D) 759 lbs providing at least 59.5 gallons of fuel are consumed in start, taxi and flight

Select the correct mass allowed for cabin crew in a 19 seat aircraft used on a holiday charter:

**A)** 75 kg
B) 76 kg
C) 85 kg
D) 84 kg

(Refer to CAP696 figures 4-5 & 4-6)
What is the maximum usable fuel quantity?

**A)** 5,294 US gallons
B) 5,311 US gallons
C) 5,032 US gallons
D) 5,123 US gallons

125 988 kg is how many pounds?

A) 58 458 lbs
B) 271 525 lbs
**C)** 277 756 lbs
D) 314 970 lbs

The centre of gravity of an aeroplane is at 25% of the Mean Aerodynamic Chord. This means that the centre of gravity of the aeroplane is situated at 25% of the length of:

**A)** the mean aerodynamic chord in relation to the leading edge
B) the mean aerodynamic chord in relation to the trailing edge
C) the mean aerodynamic chord in relation to the datum
D) the aeroplane in relation to the leading edge

To convert 1 US gallon of AVGAS to lbs:

**A)** 1 USG = 6 lbs
B) 1 USG = 3.8 lbs
C) 1 USG = 6.8 lbs
D) 1 USG = 4 lbs

The datum for determining the CG has to be along the longitudinal axis:

A) between the nose and the tail
B) between the leading and trailing edge of the MAC
**C)** but does not have to be between the nose and the tail
D) at the fire wall

If a load moved in flight:

A) A change of the moment of the load would be unlikely to cause the aircraft C of G to change
B) The aircraft would become tail heavy
C) The aircraft would become nose heavy
**D)** A change of the moment of the load would cause the aircraft C of G to change

The weight of 867 US Gallons of fuel (SG 0.78) is:

A) 2560 Lbs
**B)** 5653 Lbs
C) 8122 Lbs
D) 5361 Lbs

(Refer to CAP696 figure 3-1)
For the light twin engine piston propeller aeroplane the datum is located:

A) On the nose of the aeroplane
B) At the leading edge of the MAC
C) 78.4 cm FWD of the wing leading edge at the inboard edge of the inboard fuel tank
**D)** 78.4" FWD of the wing leading edge at the inboard edge of the inboard fuel tank

(For this Question use CAP 696 - Figures 4.1 & 4.2)
What is the station number at the nose of the aircraft?

A) Station -22
**B)** Station 130
C) Station 152
D) Station 348

An aircraft has an average fuel consumption of 7500 kg per hour at 480 kts. Calculate its maximum range and endurance for a bulk fuel load of 80 000 litres at SG 0.8, the start, run up + taxi allowance is 1200 kg and a minimum reserve fuel of 10 000 kg.

A) Range 3360 nm & Endurance 7.04 hr
B) Range 3379.2 nm & Endurance 7.0 hr
**C)** Range 3379.2 nm & Endurance 7.04 hr
D) Range 3360 nm & Endurance 7.0 hr

(For this Question use CAP 696 - Figure 4.12)
The cargo distribution in section 4 is:

A) 1220 kg
B) 1820 kg plus 630 kg
**C)** 630 kg
D) 1850 kg

If 1250 Lbs of fuel at SG 0.812 are on board an aircraft, the amount of fuel in US Gallons is:

A) 153 UG Gallons
B) 128 US Gallons
C) 122 US Gallons
**D)** 185 US Gallons

(For this Question use CAP 696 - Figures 4.1 & 4.2)
What is the distance of station 727C from the datum?

A) 895 inches
B) 60 inches
C) 727 inches
**D)** 787 inches

(Refer to CAP696 figure 4-1)
What is the distance between the two main access doors?

**A)** 947 inches
B) 984 inches
C) 974 inches
D) 940 inches

# Calculation of CG:

(Refer to CAP696 figures 4-1 & 4-4)
The CG is found to be 652.5 inches aft of the datum. What percentage is the CG to the MAC?
A) 15%
**B)** 20%
C) 25%
D) 10%

The mass and balance information gives:
Basic mass: 1 200 kg
Basic balance arm: 3.00 m

Under these conditions the Basic centre of gravity is at 25% of the mean aerodynamic chord (MAC). The length of MAC is 2m. In the mass and balance section of the flight manual the following information is given:
Position Arm front seats: 2.5 m
Position Arm rear seats: 3.5 m
Position Arm rear hold: 4.5 m
Position Arm fuel tanks: 3.0 m

The pilot and one passenger embark; each weighs 80 kg. Fuel tanks contain 140 litres of petrol with a density of 0.714. The rear seats are not occupied. Taxi fuel is negligible.

The position of the centre of gravity at take-off (as % MAC) is:
**A)** 22 %
B) 17 %
C) 34 %
D) 29 %

Give the following CG location as a percentage of MAC.
Where the CG located at 79.9” aft of the datum, the LEMAC is located at – 9.5” and the MAC is 131.3”
**A)** 68.09 %
B) 53.61 %
C) 53.62 %
D) 68.08 %

(For this Question use CAP 696 - Figure 4.12)
What is the Take-off CG as a percentage of the MAC?
A) 19.3%
**B)** 18.3%
C) 25.5%
D) 21.5%

The planned take-off mass of a turbojet aeroplane is 190 000 kg, with its centre of gravity located at 29 % MAC (Mean Aerodynamic Cord). Shortly prior to engine start, the local staff informs the flight crew that 4 000 kg must be unloaded from cargo 4 (23.89 m aft of the reference point).

Given:
Distance from reference point to leading edge: 14 m
Length of MAC = 4.6 m.

After the handling operation, the new centre of gravity location in % MAC will be:
A) 33 %
**B)** 25 %
C) 31 %
D) 27 %

(Refer to CAP696 figures 2-1, 2-3, 2-4 & 2-5)
The aircraft has six seats. Assuming no other cargo or baggage, what is the maximum fuel that can be carried if all six seats are occupied and the mass of each occupant is 180 lb?
A) 50 lbs and the CG would be in limits
B) 50 lbs but the CG would be dangerously out of limits
C) 155 lbs and the CG would be within limits
**D)** 155 lbs but the CG would be dangerously out of limits

The aft CG limit of an aircraft is 80 in aft of the datum. The loaded CG is found to be at 80.5 in aft of the datum.
The mass is 6400 lb. How much mass must be removed from a hold situated 150 in aft of the datum to bring the CG onto the aft limit?
A) 195.9 lb
B) 122.3 lb
C) 34.1 lb
**D)** 45.7 lb

(Refer to CAP696 figure 4.12)
Assuming the fuel index moves minus 5.7 from the ZFM index, what is the take-off CG as a percentage, of the MAC?
A) 19.1%
**B)** 20.1%
C) 18.2%
D) 23.0%

If an aircraft weight = 2000 kg and 400 kg of freight is added to a hold 2m aft of the present CG position, the movement of the CG is:
A) 0.4m forward
**B)** 0.33 aft
C) 0.4m aft
D) 0.33 forward

The MAC is 58 inches. The C.G. limits are from 26% to 43% MAC. If the C.G. is found to be at 45.5% MAC, how many inches is it out of limits?

A) 26.39 inches
**B)** 1.45 inches
C) 24.94 inches
D) 15.08 inches

(Refer to CAP696 figure 4-11)
What is the CG range for maximum zero fuel mass?

A) 8.5% MAC to 26% MAC
B) 7.5% MAC to 27.5% MAC
C) 12%MAC to 20% MAC
**D)** 8% MAC to 27% MAC

(Refer to CAP696 figure 4-3)
What moment change occurs when the flaps are fully retracted from the 15 degree position?

A) an increase of 14000 kg in
B) a reduction of 14 kg in
C) an increase of 14 kg in
**D)** a reduction of 14000 kg in

A jet aeroplane has a take-off weight (W) of 460 000 N and a centre of gravity located at 15.40 m from the zero reference point. Distance from reference point to leading edge = 14 m. Length of MAC = 4.6 m.
At the last moment the station manager has 12 000 N of freight added in the forward compartment at 10 m from the zero reference point. The final location of the centre of gravity, calculated in percentage of mean aerodynamic chord is equal to:

A) 30.4 %
**B)** 27.5 %
C) 35.5 %
D) 16.9 %

The loaded mass of the aircraft is found to be 1850 lb and the CG moment 154 000 lb in. How much mass must be moved from the forward hold 40 inches aft of the datum, to the rear hold, 158 inches aft of the datum, to bring the CG on to the forward limit? CG limits are 86 inches fwd and 90 inches aft.

A) 50.9 lb
**B)** 43.2 lb
C) 66.0 lb
D) 23.1 lb

The loaded mass of an aircraft is 108,560 lbs and the CG position is 86.3 ft aft of the datum. The aft CG limit is 85.6 ft. How much ballast must be placed in a hold which is located at 42 ft aft of the datum to bring the CG onto the aft limit?

A) 2240.21 lbs
B) 980.50 lbs
C) 1667.44 lbs
**D)** 1742.91 lbs

(For this Question use CAP 696 - Figure 4.12)
What is the Dry Operating Index?

**A)** 45
B) 54
C) 10
D) 12

(Refer to CAP696 figure 3-3)
If the CG is 86 inches and the TOM is 4,100 lb the aircraft is :

**A)** just on the forward CG limit
B) just inside the aft CG limit
C) just outside the forward CG limit
D) within the two forward limits

A turbojet aeroplane has a planned take-off mass of 190 000 kg. Following cargo loading, the crew is informed that the centre of gravity at take-off is located at 38 % MAC (Mean Aerodynamic Cord) which is beyond limits.
The captain decides then to redistribute part of the cargo load between cargo 1 (3.5 m from reference point) and cargo 4 (20.39 m from reference point) in order to obtain a new centre of gravity location at 31 % MAC.

Given:
Distance from reference point to leading edge: 14 m
Length of MAC = 4.6 m.

He asks for a transfer of:

A) 1 000 kg from cargo 4 to cargo 1
B) 2 000 kg from cargo 4 to cargo 1
C) It is not possible to obtain the required centre of gravity
**D)** 3 000 kg from cargo 4 to cargo 1

(Refer to CAP696 figure 4-4)
For a medium range twin jet aircraft with a CG located at 18% MAC at 62 000 kg gross mass, determine the stabilator units required for a take-off flap setting of 15° .

A) 3.25
**B)** 3.0
C) 2.75
D) 2.5

(Refer to CAP696 figures 4-1 & 4-4)
The leading edge of the MAC is given as 625.6 inches aft of the datum. What is the distance of the CG from the datum if it is found to be 16% of the MAC?

**A)** 647 inches
B) 747 inches
C) 674 inches
D) 547 inches

21. (For this Question use CAP 696 - Figures 2.1 - 2.4)
With respect to a single-engine piston powered aeroplane, determine the zero fuel moment (lbs.In./100) in the following conditions:

Basic Empty Mass: 2415 lbs
Arm at Basic Empty Mass: 77,9 In Cargo Zone A: 350 lbs
Baggage Zone B: 35 lbs
Pilot and front seat passenger: 300 lbs (total)

A) 2311,8
B) 2496,3
C) 6675
**D)** 2548,8

(Refer to CAP696 figures 4-13 & 4-14)
For an aircraft with a DOI of 50, a DOM of 34 100 Kg and a bulk fuel load of 11 900 kg, choose the correct statement for its mass and CG as a % MAC.

**A)** 46 000 kg at 15.3% MAC
B) 46 000 kg at 16.5% MAC
C) 46 000 kg at 14.75% MAC
D) 46 000 kg at 17.75% MAC

If the BEM is 1500 kg and the CG is at 25 % of a 1 m long MAC, what must be done to move the CG to 40 % MAC?

A) Move a mass of 225 kg forwards 1m
B) Add a mass of 450 kg at a distance of 0.5 m aft of the datum
C) Remove a mass of 300 kg from a distance 4 m fwd of the datum
**D)** Move a mass of 25 kg rearwards by 9m

(Refer to CAP696 figure 2-5)
An aircraft has a Mass of 3460 lbs and a CG of 86.2 inches aft of the datum. Immediately prior to take-off you are asked to carry an additional package weighing 60 Ibs to your destination aerodrome. The only available space is in baggage zone C which has a balance arm of 180 inches.
Can you fulfil the request and remain within the CG limits shown in CAP 696 Data Sheet Aircraft - SEP 1 figure 2- 5?

**A)** No, it is 0.1 inches outside the aft limit
B) Yes, it is 0.1 inches inside the aft limit
C) No, it is outside limits by 0.2 inches
D) Yes, but it is right on the aft limit

A loaded aircraft weighs 4200 Ib with a C of G 9 inches AFT of the datum. An extra 200 Ib is loaded into the aircraft 40 inches FWD of the datum. The new C of G position is:

A) 3.0 inches AFT
**B)** 6.8 inches AFT
C) 3.0 inches FWD
D) 6.8 inches FWD

The C.G. limits are from 5 inches forward to 7 inches aft of the datum. If the MAC is 41 inches and its leading edge is 15 inches forward of the datum, what are the C.G. limits as % MAC?

**A)** Fwd limit 24.3%, Aft limit 53.6%
B) Fwd limit 36.6%, Aft limit 53.6%
C) Fwd limit 29.3%, Aft limit 36.6%
D) Fwd limit 12.2%, Aft limit 29.3%

The total mass of an aeroplane is 9000 kg. The centre of gravity (cg) position is at 2.0 m from the datum line.
The aft limit for cg is at 2.1 m from the datum line. What mass of cargo must be shifted from the front cargo hold (at 0.8 m from the datum) to the aft hold (at 3.8 m), to move the cg to the aft limit?

A) 196 kg
B) 30.0 kg
C) 900 kg
**D)** 300 kg

Given:
Length of the mean aerodynamic chord = 1m
Moment arm of the FWD cargo = -0.5 m
Moment arm of the AFT cargo = +2.5m
Aircraft mass = 2200 kg
C of G = 25% MAC
To move the C of G to 40% MAC, how much cargo must be transferred from the FWD to the AFT cargo hold?

A) 104 kg
B) 165 kg
C) 183 kg
**D)** 110 Kg

Length of the mean aerodynamic chord = 1 m
Moment arm of the forward cargo: -0,50 m
Moment arm of the aft cargo: + 2,50 m
The aircraft mass is 2 200 kg and its centre of gravity is at 25% MAC
To move the centre of gravity to 40%, which mass has to be transferred from the forward to the aft cargo hold?

A) 104 kg
**B)** 110 kg
C) 183 kg
D) 165 kg

An aircraft has a mass of 7900 kg and the CG is located at 81.2 in aft of the datum. If a package of mass 250 kg was loaded in a hold situated 32 in aft of the datum, what would the new CG position be?

**A)** 79.7 inches
B) 89.3 inches
C) 74.4 inches
D) 88.1 inches

Given:
Aeroplane mass = 36 000 kg
Centre of gravity (cg) is located at station 17 m

What is the effect on cg location if you move 20 passengers (total mass = 1 600 kg) from station 16 to station 23?

A) It moves aft by 3.22 m
B) It moves forward by 0.157 m
**C)** It moves aft by 0.31
D) It moves aft by 0.157 m

(For this Question use CAP 696 - Figures 3.1 - 3.5)
With respect to multi-engine piston powered aeroplane, determine the block fuel moment (lbs.In.) in the following conditions:

Basic empty mass: 3 210 lbs
Basic arm 88.5 Inch
One pilot: 160 lbs
Front seat passenger: 200 lbs
Centre seat passengers: 290 lbs (total)
One passenger rear seat: 110 lbs
Baggage in zone 1: 100 lbs
Baggage in zone 4: 50 lbs
Block fuel: 100 US Gal.
Trip fuel: 55 US Gal.
Fuel for start up and taxi (included in block fuel): 3 US Gal.
Fuel density: 6 lbs./US Gal.

**A)** 56 160
B) 9 360
C) 30 888
D) 433 906

A mass of 16 kg is added at an arm of +3 ft from the CG of an object that has a mass of 97 kg. What effect will this have on the original CG?

**A)** Relocate the CG by +0.42 ft from the original location
B) Relocate the CG by -0.48 inches from the original location
C) Relocate the CG by +0.48 inches from the original location
D) Relocate the CG by -0.42 ft from the original location

(For this Question use CAP 696 - Figure 4.12)
Using the load and trim sheet, which of the following is the correct value for the index at a Dry Operating Mass (DOM) of 35000 kg with a CG at 14% MAC?

A) 35.5
B) 41.5
**C)** 40.0
D) 33.0

Given:
C of G is located at STN 15
Aeroplane mass is 3650 Ibs
What is the effect on the C of G if you move baggage (total mass 64 Ib) from STN 14 to STN 20?

A) It moves FWD by 0.13 units
B) It moves AFT by 0.31 units
**C)** It moves AFT by 0.1 units
D) It moves AFT by 0.3 units

An aeroplane with a two wheel nose gear and four main wheels rests on the ground with a single nose wheel load of 500 kg and a single main wheel load of 6000 kg. The distance between the nose wheels and the main wheels is 10 meter. How far is the centre of gravity in front of the main wheels?

**A)** 40 cm
B) 41.6 cm
C) 25 cm
D) 4 meter

Give the distance of the CG from the datum for an aircraft where the CG is 23% MAC. The MAC is 90” and LEMAC is located 321" aft of the datum.

A) + 300”
B) -300”
**C)** + 341”
D) -341”

(Refer to CAP696 figure 4-3)
What change in moment occurs when the flaps are retracted from 40 degrees to 5 degrees?

A) a negative moment of 5 kg in
B) a negative moment of 11 kg in
**C)** a negative moment of 5000 kg in
D) a negative moment of 16 kg in

(Refer to CAP696 figures 4-7 & 4-8)
From the data sheet for a medium range twinjet determine the moment effect of 20 female passengers without hand baggage located in zone E:

**A)** 1 212 120 kg force inches
B) 1 305 360 kg force inches
C) 108 780 kg force inches
D) 1 181 040 kg force inches

An aircraft has three holds situated 10 in 100 in and 250 in aft of the datum, identified as holds A, B and C respectively. The total aircraft mass is 3500 kg and the CG is 70 in aft of the datum. The CG limits are from 40 in to 70 in aft of the datum. How much load must be removed from hold C to ensure that the CG is positioned on the forward limit?

A) 250 kg
**B)** 500 kg
C) 400 kg
D) 350 kg

41. An aircraft has a mass of 5000 lb and the CG is located at 80 in aft of the datum. The aft CG limit is at 80.5 in aft of the datum. What is the maximum mass that can be loaded into a hold situated 150 in aft of the datum without exceeding the limit?

**A)** 35.97 lbs
B) 39.50 lbs
C) 58.15 lbs
D) 23.15 lbs

What is the CG as a percentage MAC of the fully loaded aircraft below?

BEM 12000 kg
Arm 3m
CG 25 % MAC
MAC 2m

Item Balance arm:
Front seats 2.5 m
Rear seats 3 m
Fuel SG 0.74
Fuel 410 litres
Fuel arm 2.5 m

Rear seats Empty
Pilot 80 kg
Passenger 80 kg
A) 21 %
B) 16 %
**C)** 24 %
D) 19 %

Aircraft AUW = 240 000 kg. An extra 10 000 kg of freight is added to hold, arm + 24 m. This moves the CG 2m aft. The original arm of the CG was:
A) + 28 m
**B)** -26 m
C) + 26 m
D) -24 m

The CG limits of an aircraft are from 83 inches to 93 inches aft of the datum. The CG as loaded is bound to be at 81 inches aft of the datum. The loaded mass is 3240 lb. How much mass must be moved from the forward hold, 25 inches aft of the datum, to the aft hold, 142 inches aft of the datum, to bring the CG onto the forward limit?
A) 82.09 lb
B) 22.49 lb
**C)** 55.38 lb
D) 74.96 lb

(Refer to CAP696 figure 3-2)
Block fuel = 100 gal
Trip fuel = 55 gal
Fuel density = 6 lbs/gal
Determine block fuel moment:
A) 9 360
**B)** 56 160
C) 30 888
D) 430 546

An aircraft with a BEM of 135 000 Kg acting at an arm of +15 m from datum is loaded with:
Freight of 50 000 Kg centred 12m aft of datum
Fuel of 80 000 litres @ SG 0.8 centred 18m aft of datum
Calculate the new CG for this aircraft:
**A)** 15.17m aft
B) 14. 9m aft
C) 14.84m aft
D) 15.10m aft

An aeroplane has a planned take-off mass of 200 000 kg, with its centre of gravity (C.G.) located at 15.38 m rearward of the reference point, representing a C.G. location at 30 % MAC (Mean Aerodynamic Cord). For performance purposes, the captain decides to reset the value of the centre of gravity location to 35 % MAC.
Distance from reference point to leading edge = 14 m. Length of MAC = 4.6 m. The front and rear cargo compartments are located at a distance of 15 m and 25 m from the reference point respectively, the cargo load mass which needs to be transferred from the front to the rear cargo compartment is:
A) 5 600 kg
B) It is not possible to establish the required centre of gravity location
C) 3 600 kg
**D)** 4 600 kg

Given the data below calculate the C of G at TOM as a percentage of the mean aerodynamic chord:

Basic Empty Mass 1095 kg
C of G at BEM 1.98 m (25 % MAC)
Pilot and front seat occupant 80 kg each
Front seat arm 2.5 m
Rear seat arm 3.2 m
Fuel load 139 litres (SG 0.72)
Fuel arm 1.9 m
MAC 2 m
A) 30 %
**B)** 28 %
C) 32 %
D) 31 %

Given:

Total mass: 7500 kg
Centre of gravity (cg) location station: 80.5
Aft cg limit station: 79.5

How much cargo must be shifted from the aft cargo compartment at station 150 to the forward cargo compartment at station 30 in order to move the cg location to the aft limit?

A) 73.5 kg
B) 68.9 kg
C) 65.8 kg
**D)** 62.5 kg

(For this Question use CAP 696 - Figures 3.1 - 3.5)
With respect to a multi-engine piston powered aeroplane, determine the CG location at take off in the following conditions:

Basic empty mass: 3 210 lbs
Basic arm 88.5 In One pilot: 160 lbs
Front seat passenger: 200 lbs
Centre seat passengers: 290 lbs (total)
One passenger rear seat: 110 lbs
Baggage in zone 1: 100 lbs
Baggage in zone 4: 50 lbs
Zero Fuel Mass: 4120 lbs
Moment at Zero Fuel Mass: 377 751 lbs.In
Block fuel: 100 US Gal
Trip fuel: 55 US Gal
Fuel for start up and taxi (included in block fuel): 3 US Gal
Fuel density: 6 lbs/US Gal

A) 91.84 inches aft of datum
B) 93.60 inches aft of datum
C) 91.69 inches aft of datum
**D)** 91.92 inches aft of datum

The planned take-off mass of an aeroplane is 190 000 kg, with its centre of gravity located at 29 % MAC (Mean Aerodynamic Cord). Distance from reference point to leading edge = 14 m. Length of MAC = 4.6 m.
Shortly prior to engine start, the local staff informs the flight crew that an additional load of 4 000 kg must be loaded in cargo 4 (located at 24.26 m aft of the reference point). After loading this cargo, the new centre of gravity location will be:

A) 25 %
B) 31 %
C) 27 %
**D)** 33 %

A mass of 500 kg is loaded at a station which is located 10 metres behind the present Centre of Gravity and 16 metres behind the datum. The moment for that mass used in the loading manifest is (Assume: g=10 $m/s^2$):
A) 30000 Nm
B) 50000 Nm
**C)** 80000 Nm
D) 130000 Nm

An aeroplane with a two wheeled nose gear and four main wheels rests on the ground with a single nose wheel load of 725 kg and a single main wheel load of 6000 kg. The distance between the nose wheels and the main wheels is 10 meters. How far is the centre of gravity in front of the main wheels?
A) 25 cm
B) 63 cm
C) 40 cm
**D)** 57 cm

The CG limits of an aircraft are from 72 inches to 77 inches aft of the datum. If the mass is 3700 kg and the CG position is 76.5 inches aft of the datum, what will the change to the CG position be if 60 kgs is removed from the fwd hold located at 147 in fwd of the datum?
**A)** 3.68 inches
B) 2.12 inches
C) 3.31 inches
D) 4.66 inches

An aeroplane has a mean aerodynamic chord (MAC) of 134.5 inches. The leading edge of this chord is at a distance of 625.6 inches aft of the datum. Give the location of the centre of gravity of the aeroplane in terms of percentage MAC if the mass of the aeroplane is acting vertically through a balance arm located 650 inches aft of the datum.
A) 75,6%
B) 10,5%
**C)** 18,14%
D) 85,5%

A twin-engine aeroplane of mass 2500 kg is in balanced level flight. The CG limits are 82 in to 95 in aft of the datum of the aeroplane and the CG is approximately mid range. A passenger of mass 85-kg moves from the front seat, 85.5 inches aft of the datum to the rear seat, 157.6 inches aft of the datum. What is the new CG position approximately?
**A)** 91 inches
B) 92.5 inches
C) 2.5 inches
D) 87.5 inches

(For this Question use CAP 696 - Figure 4.12)
Prior to take-off there is a change in destination and so the pilot decides to take 2,000 kg of fuel less. Using the Load and Trim Sheet, calculate the new Take-off mass and CG position.
A) 60,800 kg Take-off mass and CG 17.5% MAC
B) 60,170 kg Take-off mass and CG 18.8% MAC
**C)** 60,170 kg Take-off mass and CG 19.3% MAC
D) Can't be calculated because the landing mass will be too high

An aircraft has a MAC of 82 inches. The leading edge of the MAC is 103 inches aft of the datum. If the C.G. position is 14.7% MAC, what is the C.G. distance from the datum?
A) 12.05 inches
B) 15.14 inches
**C)** 115.05 inches
D) 118.14 inches

(Refer to CAP696 figure 3-3)
The CG when the TOM is 4,300 lb and the corresponding moment is 408,500 lb in is :
**A)** 0.4 inches rear of the aft limit
B) 59 inches
C) 95 inches
D) 0.4 inches tail heavy

Consider an aircraft with a CG located 15m aft of the reference datum. An item with a mass of 1000 kg is loaded at a point 10m aft of this CG. What is the moment of this item?
**A)** 25,000 m kg
B) 15,000 m kg
C) 5,000 m kg
D) 10,000 m kg

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61. Calculate the centre of gravity in % MAC (mean aerodynamic chord) with following data:

Distance datum - centre of gravity: 12.53 m
Distance datum - leading edge: 9.63 m
Length of MAC: 8 m
A) 23.1 % MAC
**B)** 36.3 % MAC
C) 63.4 % MAC
D) 47.0 % MAC

An aeroplane is loaded as follows:
Mass ' A' of 200 lbs at an Arm of 14 in. aft of the nose datum.
Mass ' B' of 160 lbs at an Arm of 80 in. aft of the nose datum.
Mass ' C' of 125 lbs at an Arm of 175 in. aft of the nose datum.

Using the above information the CG would be located at:
**A)** 77.3 in. aft of the datum
B) 13.8 in. aft of the datum
C) 89.6 in. aft of the datum
D) 55.6 in. aft of the datum

The planned take-off mass of an aeroplane is 180 000 kg, with its centre of gravity located at 31 % MAC (Mean Aerodynamic Cord). Distance from reference point to leading edge = 14 m. Length of MAC = 4.6 m.
Shortly prior to engine start, the local staff informs the crew that an additional load of 4 000 kg must be loaded in cargo 1 (located at 2.73 m aft of the reference point). After loading this cargo, the new centre of gravity location will be:
A) 34 %
B) 37 %
C) 28 %
**D)** 25 %

(Refer to CAP696 figure 4-7)
If a passenger moves from a seat position corresponding to the balance arm at zone D to a position corresponding to the balance arm at zone F, what distance will the passenger have travelled and how many seat rows will he have passed?
**A)** 255 inches and 8 seat rows
B) 270 inches and 5 seat rows
C) 265 inches and 6 seat rows
D) 260 inches and 7 seat rows

The mass of an aeroplane is 1950 kg. If 450 kg is added to a cargo hold 1.75 metres from the loaded centre of gravity (cg). The loaded cg will move:
A) 30 cm
B) 33 cm
C) 34 cm
**D)** 40 cm

(Refer to CAP696 figure 4-4)
With reference to the attached chart, the distance of the leading edge of the MAC from the datum is:
A) 525.6 m
B) Undefined
C) 525.6 in
**D)** 625.6 in

The planned take-off mass of a turbojet aeroplane is 180 000 kg, with its centre of gravity located at 26 % MAC (Mean Aerodynamic Cord). Shortly prior to engine start, the local staff informs the flight crew that 4 000 kg must be unloaded from cargo 4 (23.69 m aft of reference point).

Given:
Distance from reference point to leading edge: 14 m
Length of MAC = 4.6 m.
After the handling operation, the new centre of gravity location in % MAC will be?
A) 30.2 %
B) 20.0 %
C) 23.0 %
**D)** 21.8 %

An aircraft has a mass of 19 700 kg with the CG located at + 300 inches. A mass of 287 kg is added at an arm of - 98.3 inches.

Calculate the new CG location:
A) -2971.1 inches
**B)** + 294.28 inches
C) + 2971.1 inches
D) -294.28 inches

What mass must be relocated to move the CG into limits for the following aircraft?
Fwd hold = +1 ft
CG located = +5 ft
Fwd CG limit = +7 ft
Safe range = 6 ft
Aft hold = +14 ft
Gross mass = 6 000 kg
A) 92.3 kg
B) 9230 kg
**C)** 923 kg
D) 9.23 kg

An aircraft of mass 62,500 kg has the leading and trailing edges of the MAC at body stations +16 and +19.5 respectively (stations are measured in metres). What is the arm of the CG if the CG is at 30% MAC?
A) 18.45 m
**B)** 17.05 m
C) 11.66 m
D) 5.85 m

At a given mass the CG position is at 15% MAC. If the leading edge of MAC is at a position 625.6 inches aft of the datum and the MAC is given as 134.5 inches determine the position of the CG in relation to to the datum:
**A)** 645.78 inches aft of datum
B) 605.43 inches aft of datum
C) 228.34 inches aft of datum
D) 20.18 inches aft of datum
If 390 lbs of cargo are moved from compartment B (aft) to compartment A (forward), what is the station number of the new centre of gravity (CG)?

Given:
Gross mass: 116 500 lbs
Present CG station: 435.0
Compartment A station: 285.5
Compartment B station: 792.5
**A)** 433.3
B) 436.7
C) 463.7
D) 506.3

An aeroplane has a planned take-off mass of 200 000 kg, with its centre of gravity (C.G.) located at 15.38 m rearward of the reference point, representing a C.G. location at 30 % MAC (Mean Aerodynamic Cord). Distance from reference point to leading edge = 14 m. Length of MAC = 4.6 m. The current cargo load distribution is:
FRONT cargo: 6 500 kg
REAR cargo: 4 000 kg
For performance purposes, the captain decides to reset the value of the centre of gravity location to 33 % MAC.
The front and rear cargo compartments are located at a distance of 15 m and 25 m from the reference point respectively. After the transfer operation, the new cargo load distribution is:

A) front cargo: 6 760 kg; rear cargo: 3 740 kg
B) front cargo: 4 550 kg; rear cargo: 5 950 kg
C) front cargo: 9 260 kg; rear cargo: 1 240 kg
**D)** front cargo: 3 740 kg; rear cargo: 6 760 kg

If the CG position is 30m aft of the datum after 3 000 kg was added to a hold 50m aft of the datum and the original weight was 24 000 kg, the original CG arm was:

A) 34.2m
**B)** 27.5m
C) 41.4m
D) 50.0m

A turbojet aeroplane has a planned take-off mass of 190 000 kg. The cargo load is distributed as follows:
cargo 1: 3 000 kg ( 3.50 m from reference point) cargo 4: 7 000 kg (20.39 m from reference point)
Distance from reference point to leading edge: 14 m
Length of MAC = 4.6 m.
Once the cargo loading is completed, the crew is informed that the centre of gravity at take-off is located at 38 % MAC (Mean Aerodynamic Cord) which is beyond the limits. The captain decides then to redistribute part of the cargo load between cargo 1 and cargo 4 in order to obtain a new centre of gravity location at 31 % MAC.
Following the transfer operation, the new load distribution is:

**A)** cargo 1: 6 000 kg; cargo 4: 4 000 kg
B) cargo 1: 4 000 kg; cargo 4: 5 000 kg
C) cargo 1: 5 000 kg; cargo 4: 4 000 kg
D) cargo 1: 4 000 kg; cargo 4: 6 000 kg

(Refer to CAP696 figure 4-9)
The total mass of an aeroplane is 145 000 kg and the centre of gravity limits are between 4.7 m and 6.9 m aft of the datum. The loaded centre of gravity position is 4.4 m aft. How much mass must be transferred from the front to the rear hold in order to bring the out of limit centre of gravity position to the foremost limit? (note that this value may exceed the permissible loading of the compartment).

A) 35 000 kg
B) 3 500 kg
**C)** 7 500 kg
D) 62 500 kg

(Refer to CAP696 figure 4-4)
With reference to the attached chart, What is the CG as a percentage of the MAC if the CG is 650 inches from the datum?
A) 17.03%
B) 20.36%
C) 16.25%
**D)** 18.14%

Given that the total mass of an aeroplane is 112 000 kg with a centre of gravity position at 22.62m aft of the datum. The centre of gravity limits are between 18m and 22m. How much mass must be removed from the rear hold (30 m aft of the datum) to move the centre of gravity to the middle of the limits:
A) 8 680 kg
B) 16 529 kg
C) 43 120 kg
**D)** 29 344 kg

Given:
Total mass: 2900 kg
Centre of gravity (cg) location station: 115.0
Aft cg limit station: 116.0
The maximum mass that can be added at station 130.0 is:
A) 14 kg
**B)** 207 kg
C) 140 kg
D) 317 kg

(Refer to CAP696 figure 4-7 & 4-8)
Without the crew, the mass and longitudinal CG position of the aircraft are 6 000 kg and 4,70m.
the mass of the pilot is 90 kg the mass of the co-pilot is 100 kg the mass of the flight engineer is 80 kg
With the crew, the mass and longitudinal CG position of the aircraft are:
A) 6 270 kg and 4.796 m
**B)** 6 270 kg and 4.594 m
C) 6 270 kg and 4.61 m
D) 6 270 kg and 5.012 m

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81. (Refer to CAP696 figure 4-7 & 4-8)
Without the crew, the weight and the CG position of the aircraft are 7 000 kg and 4,70m.
the mass of the pilot is 90 kg the mass of the co-pilot is 75 kg the mass of the flight engineer is 90 kg
With this crew on board, the CG position of the aircraft will be:
A) 4,455 m
B) 0,217 m
**C)** 4,615 m
D) 4,783 m

Assume:
Aeroplane gross mass: 4750 kg
Centre of gravity at station: 115.8

What will be the new position of the centre of gravity if 100 kg is moved from the station 30 to station 120?

A) Station 120.22
B) Station 118.33
C) Station 118.25
**D)** Station 117.69

The loaded centre of gravity (cg) of an aeroplane is 713 mm aft of datum. The mean aerodynamic chord lies between station 524 mm aft and 1706 mm aft. The cg expressed as % MAC (mean aerodynamic chord) is:

**A)** 16 %
B) 10 %
C) 41 %
D) 60 %

The C of G of an aircraft is 196 inches aft of datum at an all up mass on 12 500 lbs. If 200 lbs of baggage is moved from FS 325 to FS 120, the new C of G will be:

A) 193.58”
**B)** 192.72”
C) 195.38”
D) 191.67”

Determine the position of the CG as a percentage of the MAC given that the balance arm of the CG is 724 inches and the MAC extends from a balance arm of 517 in to 1706in.

A) 16.3%
B) 14.2%
**C)** 17.4%
D) 15.3%

(Refer to CAP696 figure 2-5)
The CG is on the lower of the fwd CG limits:

A) at a moment of 192,000 lb in and a mass of 2,600 lb
B) at a mass of 2,500 lb and moment of 185,000 lb in
C) at a moment of 175,000 lb in and a mass of 2,350 lb
**D)** all the above

(Refer to CAP696 figure 4-14)
From the Load & Trim sheet attached - for an aircraft with a BEM of 34 100 kg and CG at 15% MAC, select the correct statement after 2000 kg of cargo is loaded into the rear hold.

A) The aircraft’ s gross mass is 34 100 kg and the CG is within limits
B) The aircraft’ s gross mass is 36 100 kg and the CG is within limits
**C)** The aircraft’ s gross mass is 36 100 kg and the CG is behind the rear limit
D) The aircraft’ s gross mass is 34 100 kg and the CG is behind the rear limit

An aircraft of mass 17,400 kg, has its CG at station 122.2. The CG limits are 118 to 122. How much cargo must be moved from the rear hold at station 162 to the forward hold at station -100 (forward of the datum) to bring the CG to the mid position of its range?

**A)** 146.1 kg
B) 119.9 kg
C) 99.9 kg
D) 55.3 kg

What freight must be removed from a hold 30m aft of the datum to move the CG from 22.62m aft of the datum to 20m aft of the datum, aeroplane mass before removal = 112 000 lbs:

A) 35 016 lbs
**B)** 29 344 lbs
C) 2 934.4 lbs
D) 3 501.6 lbs

The CG of an aircraft is 980 inches aft of datum at an all up mass of 170 500 Lbs. If 800 Lbs of baggage is moved from FS 1130 to FS 430 the new C of G will be:

A) 977.62”
B) 975.99”
C) 979.75”
**D)** 976.72”

The loaded mass of an aircraft is 12,400 kg. The aft CG limit is 102 inches aft of the datum. If the CG as loaded is 104.5 inches aft of the datum, how many rows forward must two passengers move from the rear seat row (224 inches aft) to bring the CG on to the aft limit, if the seat pitch is 33 inches? Assume a passenger mass of 75 kg each.

A) 6 rows
B) 8 rows
C) 5 rows
**D)** 7 rows

An aircraft has a loaded mass of 5,500 lbs. The CG is 22 inches aft of the datum. A passenger, mass 150 lbs, moves aft from row 1 to row 3 a distance of 70 inches. What will be the new position of the CG (assuming all dimensions aft of the datum) ?

A) 26.3 inches
B) 22.9 inches
C) 21.1 inches
**D)** 23.9 inches

(For this Question use CAP 696 - Figure 4.12)
When adjusting the CG index for the fuel load, why is the line moved to the left as a minus index?

A) Because the graph would run out of range
B) Because the fuel will be consumed in flight
**C)** Because the fuel is given a minus index in the fuel index correction table
D) Because the centroid of the tanks is behind the CG position

During the weighing of an aeroplane, the following figures are noted:

- Front wheel: 4250 lbs (distance 129.0 cm forward of datum)
- Main wheels: 2290 lbs each (distance of 68.48 cm aft of datum)

Determine the location of the centre of gravity (CG):

A) 32.29 cm forward of datum
B) 26.57 cm aft of datum
**C)** 28.64 cm forward of datum
D) 32.29 cm aft of datum

If the C.G. position is 21% MAC, the MAC is 73 inches, and the C.G. datum is 26 inches aft of the leading edge of the MAC, what is the C.G. position relative to the datum?

A) 41.33 inches aft of datum
B) 10.67 inches aft of datum
C) 41.33 inches fwd of datum
**D)** 10.67 inches fwd of datum

# Securing of load CG:

Who is responsible for specifying the principle and method of loading?

**A)** the operator
B) the loading supervisor
C) the Commander
D) the CAA

Loads must be adequately secured in order to:

A) allow steep turns
B) avoid any centre of gravity (cg) movement during flight
**C)** avoid unplanned centre of gravity (cg) movement and aircraft damage
D) prevent excessive 'g'-loading during the landing flare

# Area load, running load, supporting load:

(Refer to CAP696 figure 3-1)
A box of mass 100 lb is to be transported. The box dimensions are 9 x 9 x 12 inches. Which zones can it be carried in?

A) no zones, both the mass and structural loading would be exceeded
**B)** no zones, the structural loading would be exceeded
C) zones 2 and 3 only
D) all zones, both the mass and structural loading are within limits

The maximum intensity floor loading for an aeroplane is given in the Flight Manual as 650 kg per square metre.
What is the maximum mass of a package which can be safely supported on a pallet with dimensions of 80 cm by 80 cm?

**A)** 416.0 kg
B) 41.6 kg
C) 1015.6 kg
D) 101.6 kg

(Refer to CAP696 figure 2-1)
Assuming the weight and access is not a problem, where can a cubic box of mass 500 lb be positioned if the dimensions are 3.15 ft?

A) in zone 'C' only
**B)** in zone 'B' or 'C' only
C) in zone 'A' only
D) in any of the baggage zones

(Refer to CAP696 figure 4-9)
What is the maximum and minimum distribution load intensity for a box of mass 500 kg and dimensions of 1 m x 1.2m x 1.2m?

A) 45.1 kg/sq ft and 35.8 kg/sq ft
B) 50.5 kg/sq ft and 40.6 kg/sq ft
C) 47.3 kg/sq ft and 37.7 kg/sq ft
**D)** 38.7 kg/sq ft and 32.3 kg/sq ft

If a compartment takes a maximum load of 500 kg, with a running load of 350 kg/m and a distribution load of 300 kg/m2 max. Which of the following 500 kg. boxes can be carried?
100 cm x 110 cm x 145 cm
125 cm x 135 cm x 142 cm
120 cm x 140 cm x 143 cm
125 cm x 135 cm x 144 cm

A) any one of the boxes if loaded with due care as to its positioning
**B)** either of boxes 3 and 4 with their longest length parallel to the aircraft longitudinal axis
C) any of boxes 2, 3 and 4 in any configuration
D) box 2 with its longest length perpendicular to the floor cross beam or box 3 in any configuration

(Refer to CAP696 figure 2-1)
From the manual for the single engine piston/propeller aeroplane, the maximum floor loading is:

**A)** 50 lbs per sq foot between front and rear spars (Includes baggage zone A) and 100 Ibs per sq foot elsewhere (baggage zones B & C)
B) 50 lbs per sq foot and 100 lbs per sq foot
C) 50 lbs per sq foot
D) 100 lbs per sq foot

The floor limit of an aircraft cargo hold is 5 000 N/m2. It is planned to load-up a cubic container measuring 0,4 m of side. It's maximum gross mass must not exceed: (assume g=10m/s2):

A) 800 kg
B) 320 kg
**C)** 80 kg
D) 32 kg

Calculate the running load for an item with a mass of 2681 kg placed on pallet 200 inches long with a 109 kg tare including load securing equipment.

A) 13.4 kg per inch
B) 13.90 kg per inch
**C)** 13.95 kg per inch
D) 14.0 kg per inch

The maximum floor loading on a baggage compartment floor is 120 lb per square foot. If the surface area in contact with the floor is 4 ft x 2 ft 6 inches and the mass of the total load is 1220 lb, the actual floor loading on this aircraft is:

A) 11 lb per square foot
**B)** 122 lb per square foot
C) 120 lb per square foot
D) 10 lb per square foot

(Refer to CAP696 figure 4-9)
All other parameters being acceptable, a box with a maximum and minimum running load of 12 kg/in and 7 kg/in and a mass of 800 kg can be fitted into:

A) the rear section of the forward cargo compartment or the rear section of the aft cargo compartment
B) the centre section of forward cargo compartment only
C) any compartment of either the forward or aft cargo compartment
**D)** the front section of the aft cargo compartment or the rear section of the forward cargo compartment

Aeroplane loading:

A. must be performed under the supervision of qualified personnel
B. must be consistent with the data used for calculating the mass and balance
C. must comply with compartment dimension limitations
D. must comply with the maximum load per running metre
E. must comply with the maximum mass per cargo compartment

A) A, B, D and E only
B) C, D and E only
C) A and B only
**D)** A, B, C, D and E

(Refer to CAP696 figure 4-9)
What is the maximum and minimum running load of a box of mass 500 kg and dimensions of 1 m x 1.2m x 1.2m?

A) 10 kg/in and 12.4 kg/in
B) 15 kg/in and 13.1 kg/in
C) 11 kg/in and 9.5 kg/in
**D)** 12.7 kg/in and 10.6 kg/in

The maximum load per running metre of an aeroplane is 350 kg/m. The width of the floor area is 2 metres. The floor strength limitation is 300 kg per square metre. Which one of the following crates (length x width x height) can be loaded directly on the floor?

**A)** A load of 400 kg in a crate with dimensions 1.2 m x 1.2 m x 1.2 m
B) A load of 400 kg in a crate with dimensions 1.4 m x 0.8 m x 0.8 m
C) A load of 700 kg in a crate with dimensions 1.8 m x 1.4 m x 0.8 m
D) A load of 500 kg in a crate with dimensions 1.5 m x 1 m x 1 m

The maximum floor loading for a cargo compartment in an aeroplane is given as 750 kg per square metre. A package with a mass of 600 kg is to be loaded. Assuming the pallet base is entirely in contact with the floor, which of the following is the minimum size pallet that can be used?

A) 30 cm by 200 cm
**B)** 40 cm by 200 cm
C) 30 cm by 300 cm
D) 40 cm by 300 cm

The maximum floor loading on a baggage compartment floor is 120 lb per square foot. If the surface area in contact with the floor is 4 ft x 3 ft and the mass of the total load is 1320 lb, the actual floor loading on this aircraft is:

A) 11 lb per square foot
**B)** 110 Ib per square foot
C) 10 lb per square foot
D) 120 lb per square foot

(For this question use CAP 696 - Figure 4.9)
A pallet having a freight platform which measures 200 cm x 250 cm has a total mass of 300 kg. The pallet is carried on two ground supports each measuring 20 cm x 200 cm.
Using the loading manual for the transport aeroplane, calculate how much mass may be added to, or must be off loaded from, the pallet in order for the load intensity to match the maximum permitted distribution load intensity for lower deck forward cargo compartment.

**A)** 285.5 kg may be added
B) 158.3 kg must be off loaded
C) 28.5 kg may be added
D) 28.5 kg must be off loaded

A box having dimensions of 1 metre by 1.2 metres by.8 metres, weighing 600 kgs is loaded and secured onto a 4 ft square pallet weighing 30 kg. Using the information on CAP 696 - Figure 4.9, where could the pallet be positioned?

**A)** In the forward position of the forward cargo compartment
B) In the aft position of the aft cargo compartment
C) In the aft position of the forward cargo compartment
D) In the mid position of the aft cargo compartment

Max floor loading = 750 Kg per m2. A package of 600 kg is to be loaded. What is the minimum pallet size?

**A)** 40 cm x 200 cm
B) 30 cm x 300 cm
C) 40 cm x 300 cm
D) 30 cm x 200 cm

(Refer to CAP696 figure 2-1)
Assuming the weight and access is not a problem where can a box of mass 500 lb be positioned if the dimensions are 0.75 ft x 1.5 ft x 5 ft?

A) in zone 'C' only if placed on its middle area
**B)** in zones 'B' or 'C' if placed on its largest area
C) in zone 'A' only if placed on its largest area
D) in any of the baggage zones if placed on its smallest area

(Refer to CAP696 figure 4-9)
Assuming all other parameters are acceptable, a box with a mass of 500 kg and with equal sides of 8.5 ft would fit into:

A) the forward cargo compartment only
**B)** the aft cargo compartment only
C) either the front or rear cargo compartment
D) neither cargo compartment

21. (Refer to CAP696 figure 3-1)
A box of mass 360 lb is to be transported. The dimensions of the box are 1.7 ft x 1.7 ft x 1.8 ft. Which zones can it be carried in?

A) zones 2 and 3only but placed on the 1.7 x 1.7 face
**B)** zones 2 and 3 only but placed on the 1.7 x 1.8 face
C) no zones, the structural loading would be exceeded
D) no zones, both the mass and structural loading would be exceeded

The floor of the main cargo hold is limited to 4 000 N/m2. It is planned to load a cubic container each side of which measures 0.5m. Its maximum gross mass must not exceed: (assume g=10m/s2):

**A)** 100 kg
B) 5 000 kg
C) 500 kg
D) 1 000 kg

Given:
Maximum Floor Strength = 300 kg/m2
Maximum Running Load = 350 kg/m
Which of the following loads is legally permissible?

A) 700 kgs - Dimensions 1.8m x 1.4m x 0.8m
B) 400 kgs - Dimensions 1.4m x 0.8m x 0.8m
**C)** 400 kgs - Dimensions 1.2m x 1.2m x 1.2m
D) 500 kgs - Dimensions 1.5m x 1m x 1m