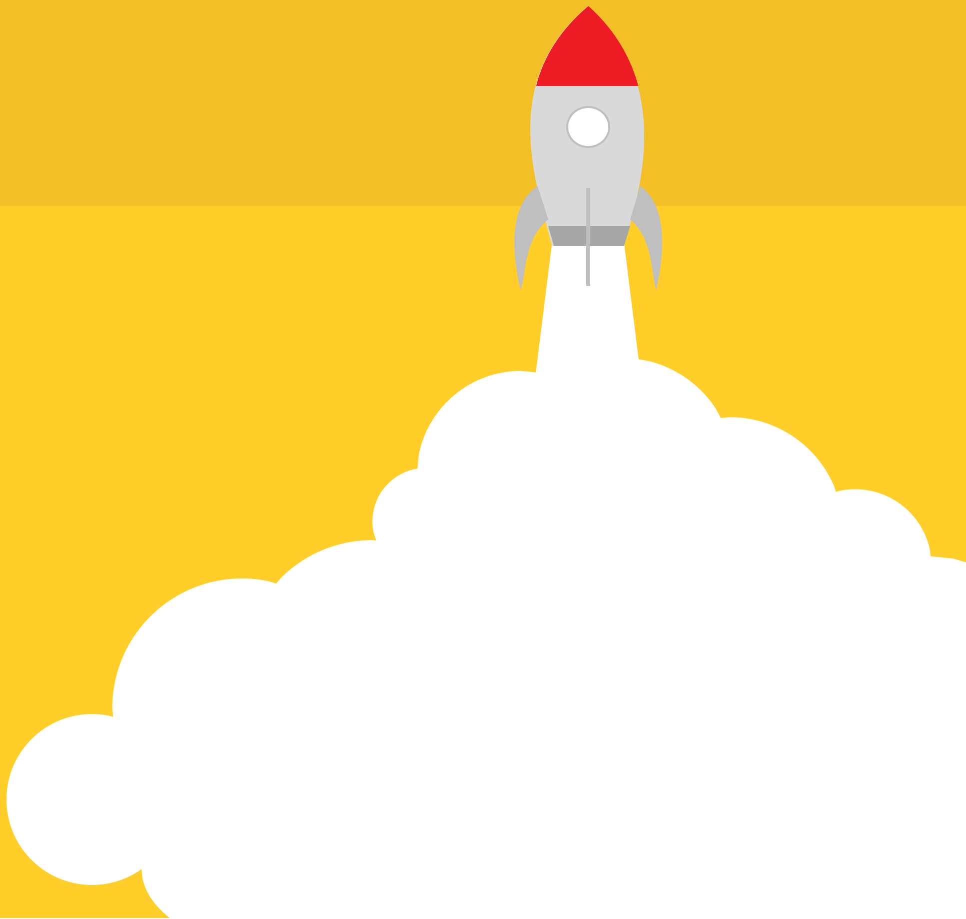
BASICS OF ROCKETRY AND PARACHUTE DEPLOYMENT



BASIC PRINCIPLES

01

NEWTON'S FIRST LAW

At rest: forces are balanced. The force of gravity on the rocket balances with that of the launch pad.
In motion: thrust from the rocket unbalances the forces as a result it travels upward.

02

NEWTON'S SECOND LAW

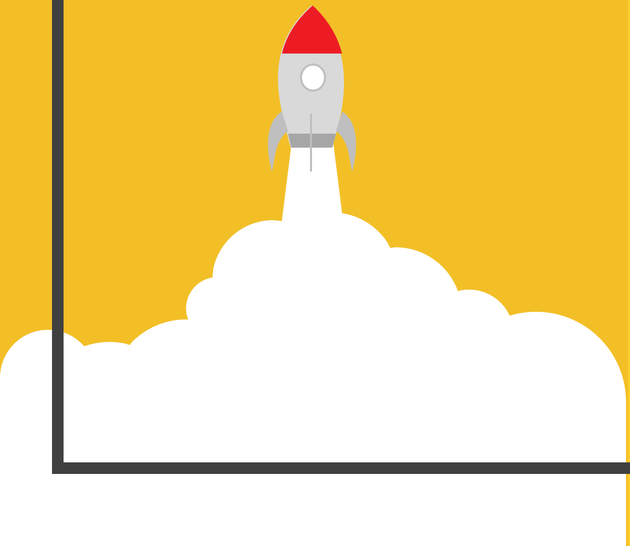
Force equals mass times acceleration: The pressure created inside the rocket acts across the area of the rocket exhaust it produces force. Here mass represents the total mass of rocket including its fuel

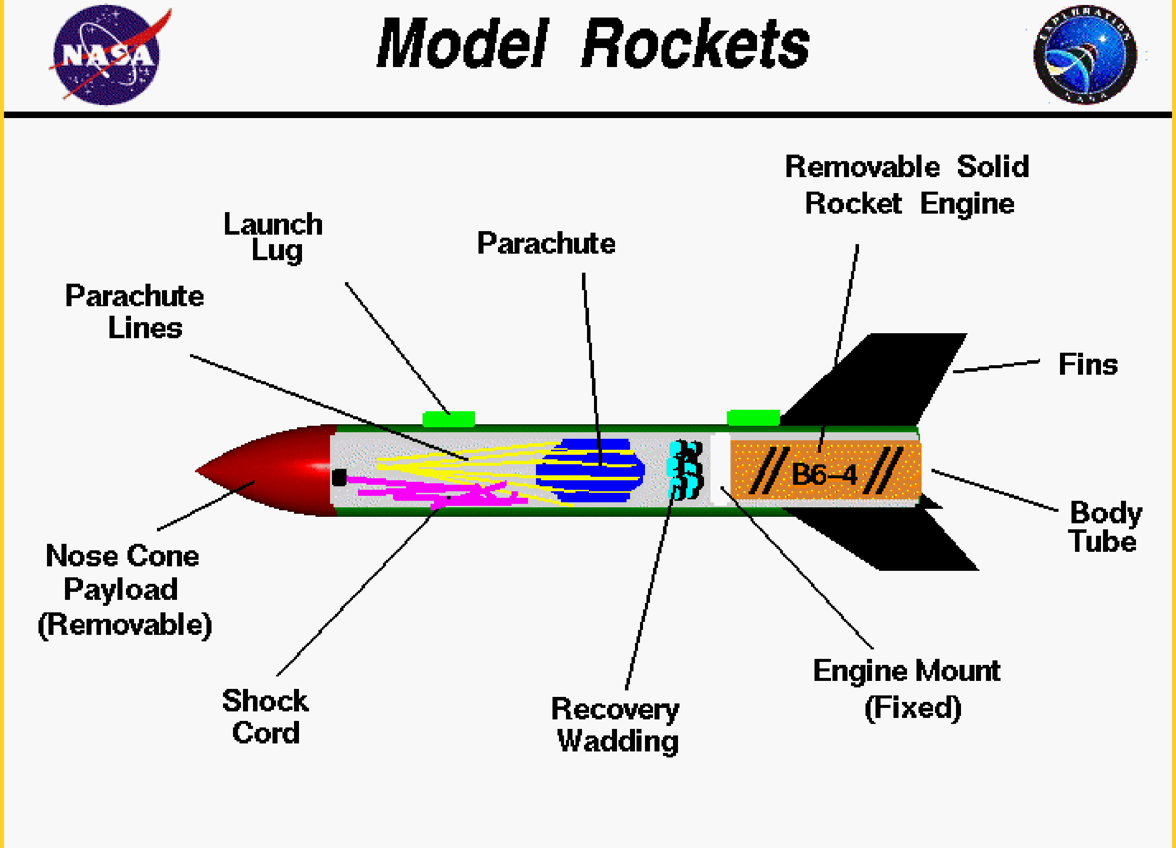
03

NEWTON'S THIRD LAW

Action and reaction: a rocket takes off only when it expels gas
Action: the rocket pushes the gas out of the engine.
Reaction: the gas pushes off the rocket

PARTS OF ROCKET

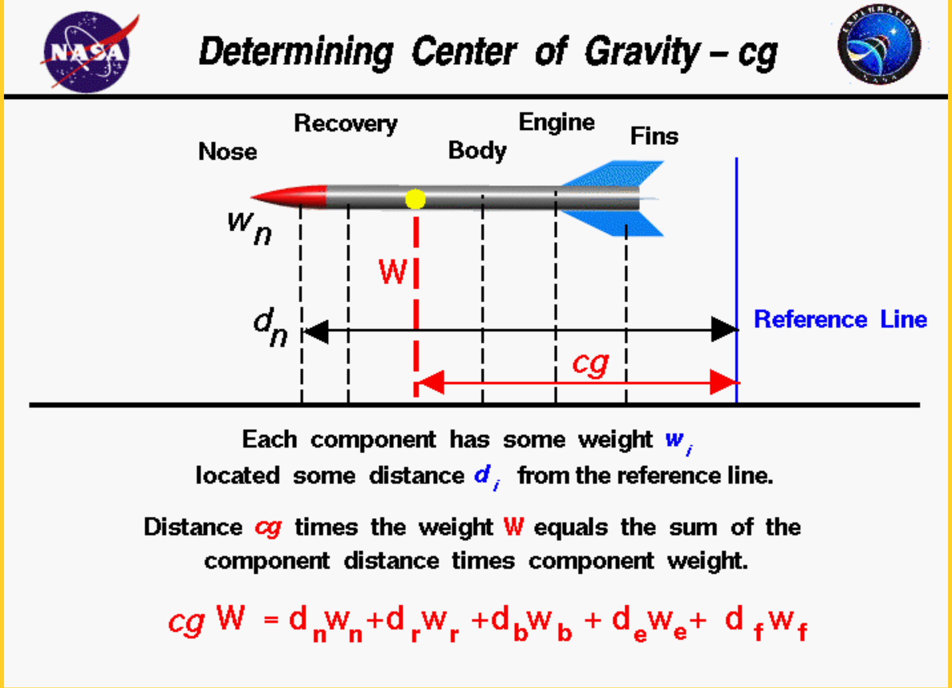




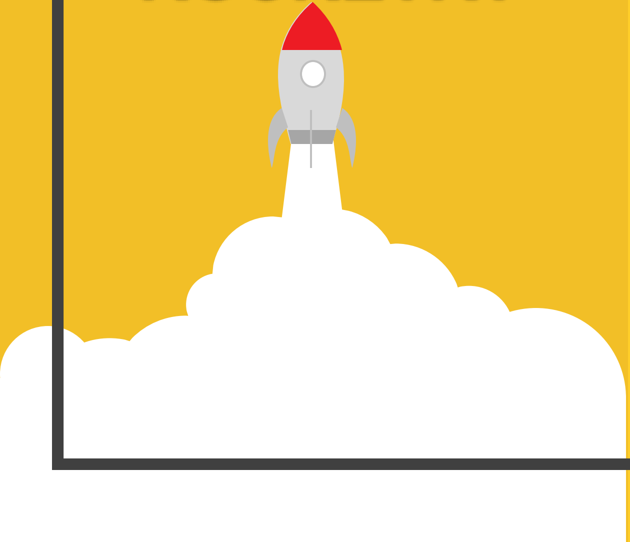
BASIC TERMS RELATED TO ROCKETRY

CENTER OF GRAVITY:

It is the point where the weight of all the rocket components seem to be concentrated.

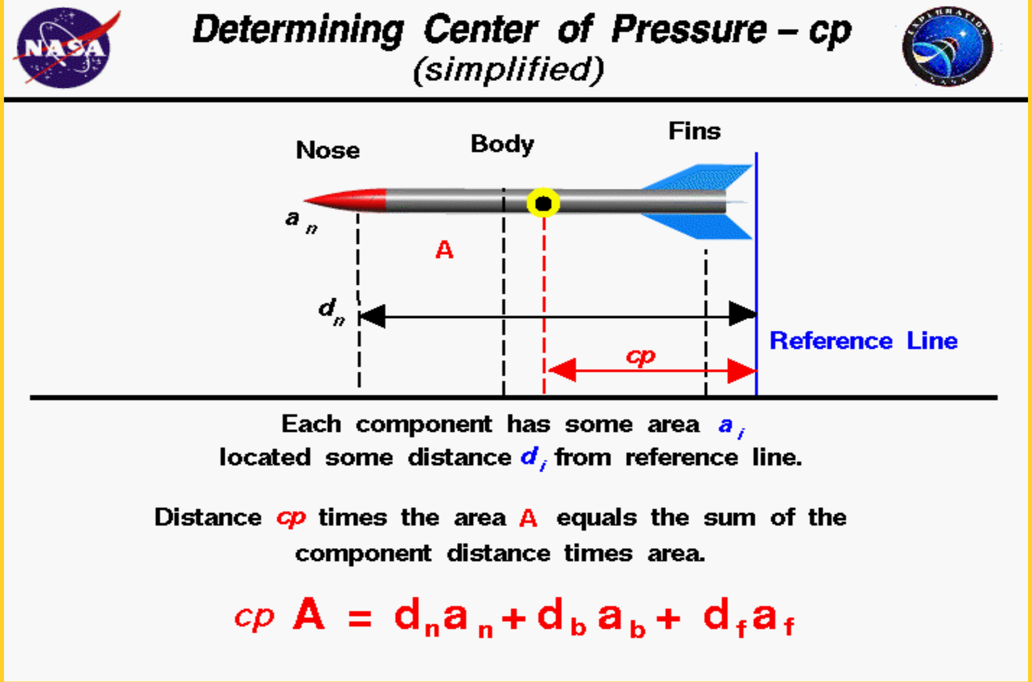


BASIC TERMS RELATED TO ROCKETRY

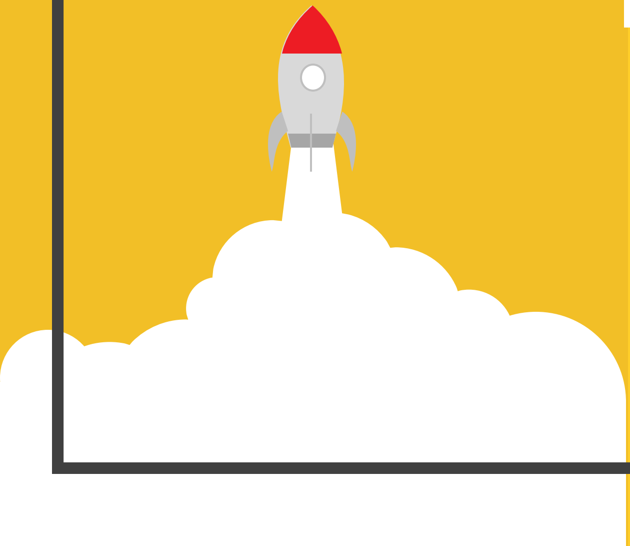


CENTER OF PRESSURE:

It is the point where where the aerod -ynamic forces seem to be concentrated.



BARROWMAN EQUATIONS



Conical Transition Terms

$$(C_N)_T = 2\left[\left(\frac{d_R}{d}\right)^2 - \left(\frac{d_F}{d}\right)^2\right]$$

$$X_T = X_P + \frac{L_T}{3}\left[1 + \frac{1 - \frac{d_F}{d_R}}{1 - \left(\frac{d_F}{d_R}\right)^2}\right]$$

Fin Terms

$$(C_N)_F = \left[1 + \frac{R}{S+R}\right]\left[\frac{4N\left(\frac{S}{d}\right)^2}{1 + \sqrt{1 + \left(\frac{2L_F}{C_R + C_T}\right)^2}}\right]$$

$$X_F = X_B + \frac{X_R}{3}\frac{(C_R + 2C_T)}{(C_R + C_T)} + \frac{1}{6}\left[(C_R + C_T) - \frac{(C_R C_T)}{(C_R + C_T)}\right]$$

Finding the Center of Pressure

Sum up coefficients: $(C_N)_R = (C_N)_N + (C_N)_T + (C_N)_F$

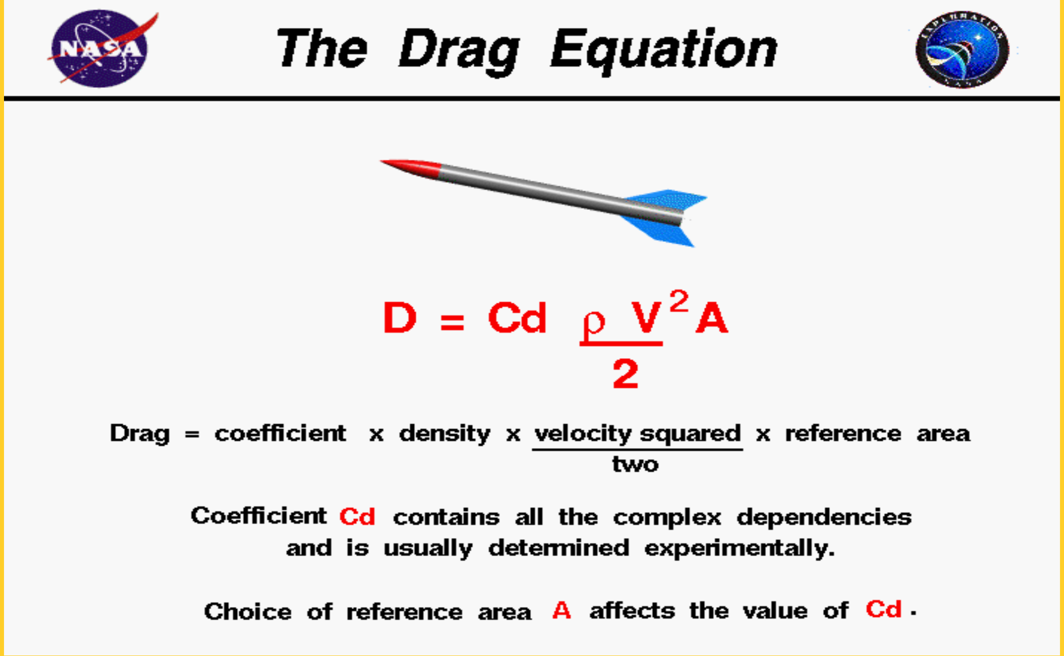
Find CP Distance from Nose Tip:

$$\bar{X} = \frac{(C_N)_N X_N + (C_N)_T X_T + (C_N)_F X_F}{(C_N)_R}$$

BASIC TERMS RELATED TO ROCKETRY

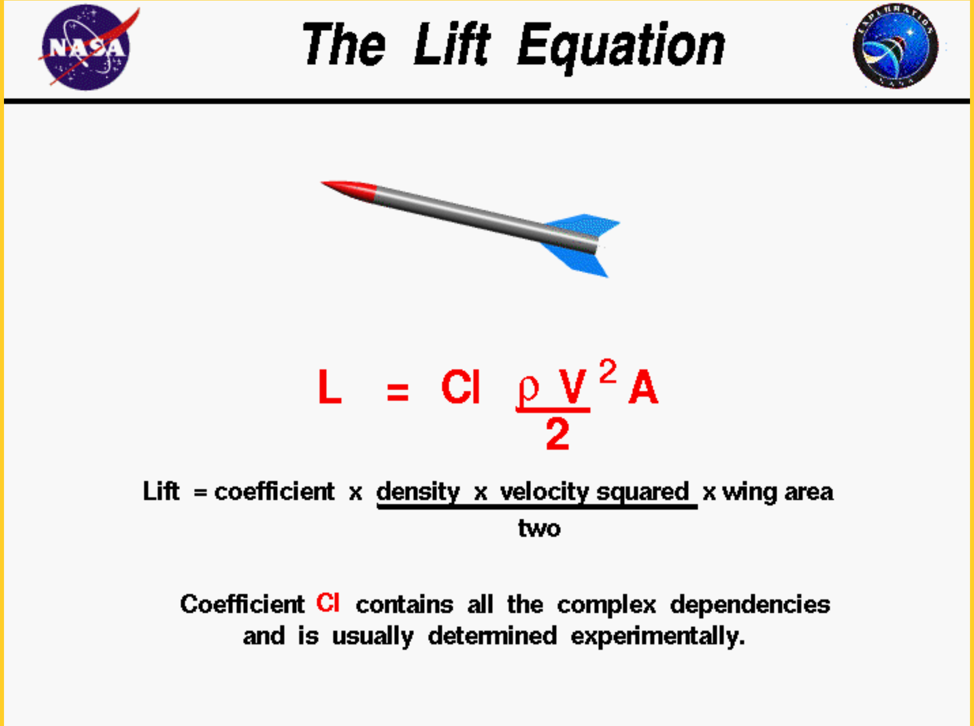
DRAG:

Drag is defined as the aerodynamic resistance to motion of the rocket through air. Drag directly depends on the shape and size of rocket.



BASIC TERMS RELATED TO ROCKETRY

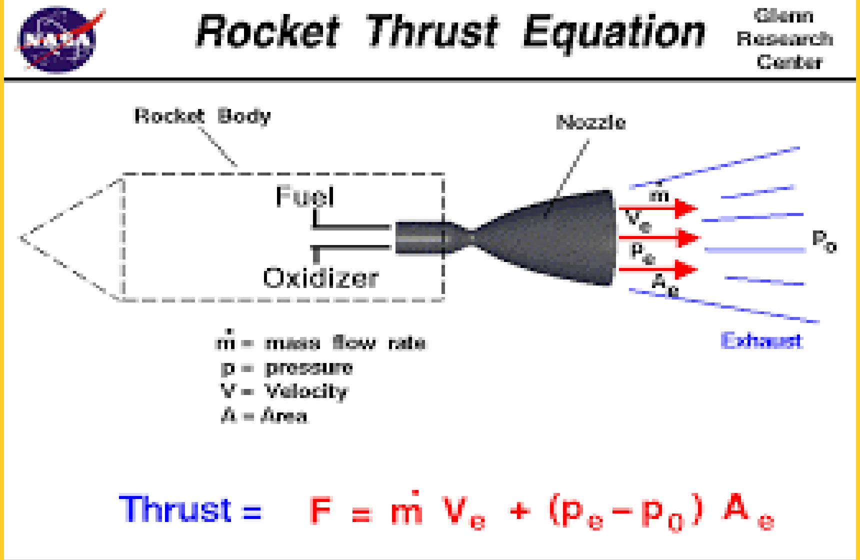
LIFT: Lift of a rocket is a side force used to stabilize a nd control the direction of flight.



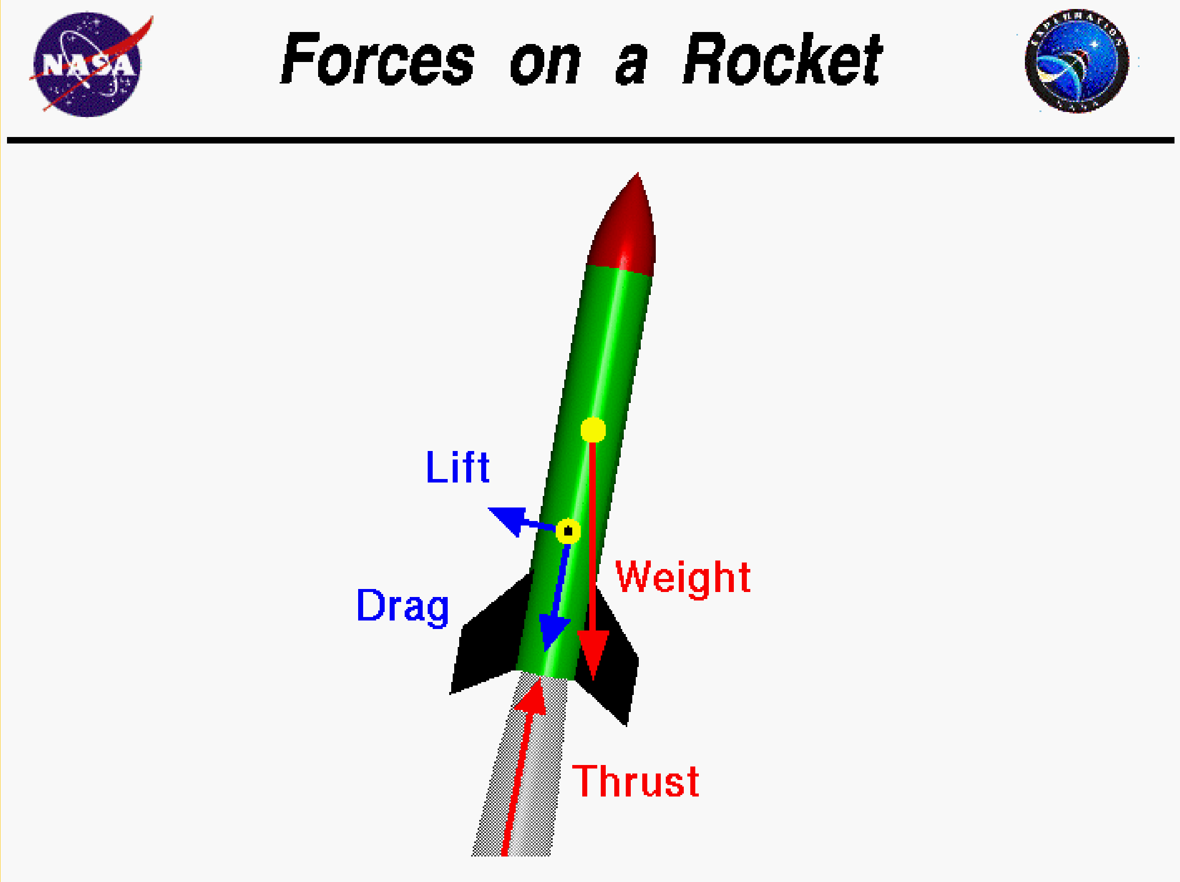
BASIC TERMS RELATED TO ROCKETRY

THRUST :

Thrust is the force which moves the rocket through the air, and through space.Thrust is generated by the p -ropulsion system of the rocket through the application of Newton's third law of motion

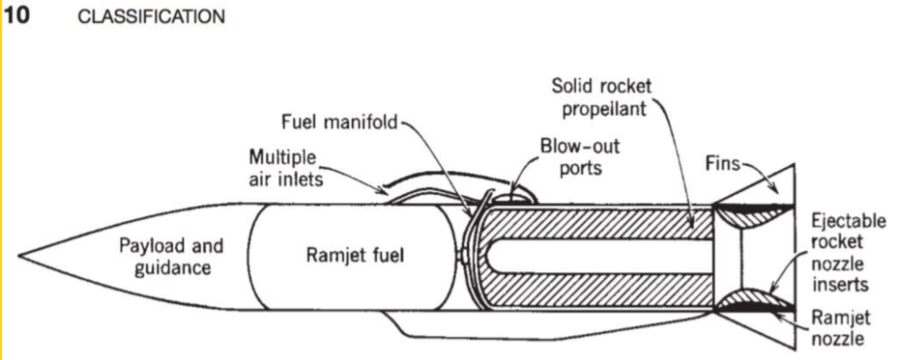


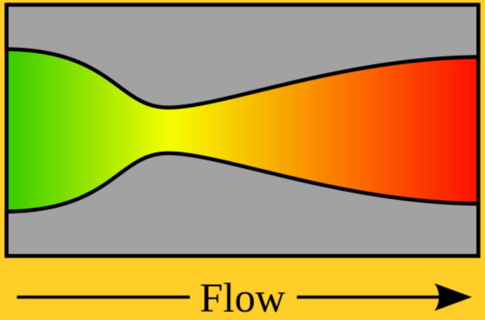
FORCES ACTING ON ROCKET

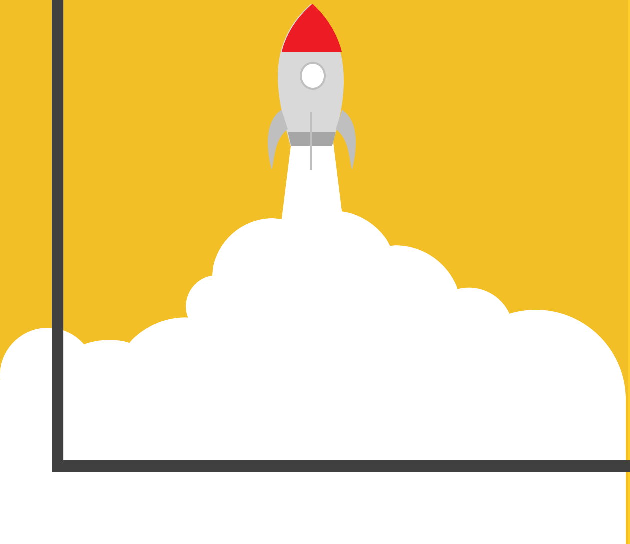


PROPULSION

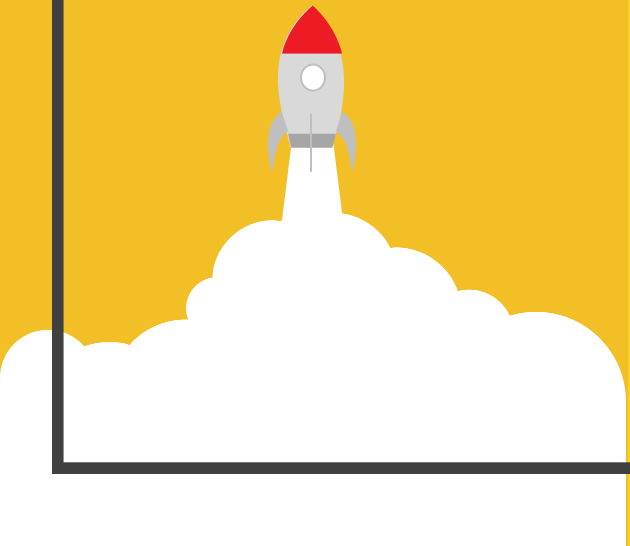
Rocket **propulsion** is the process that uses force to move a rocket off the ground and into the atmosphere.



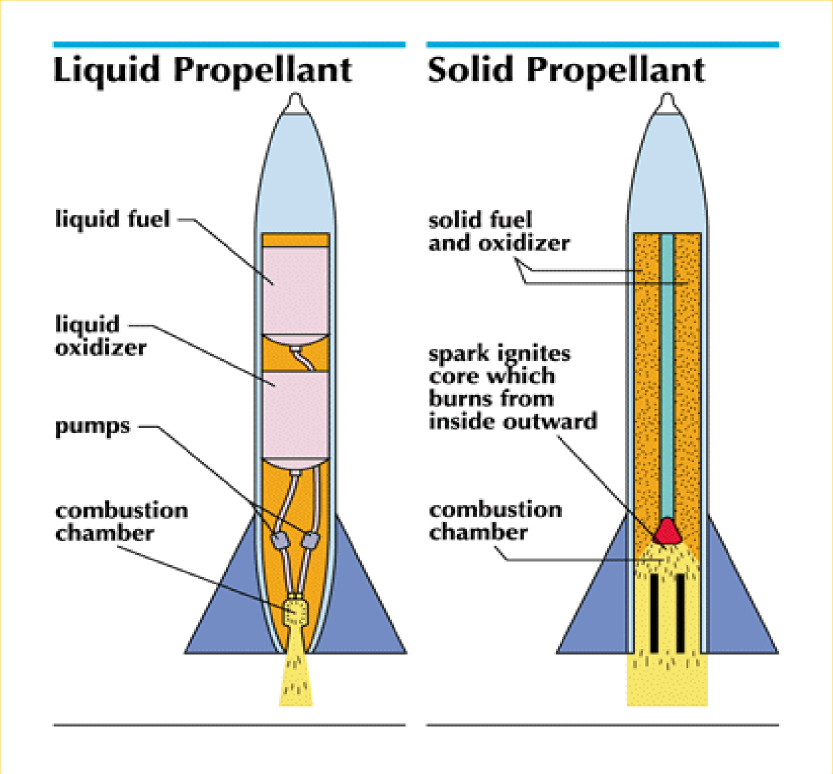




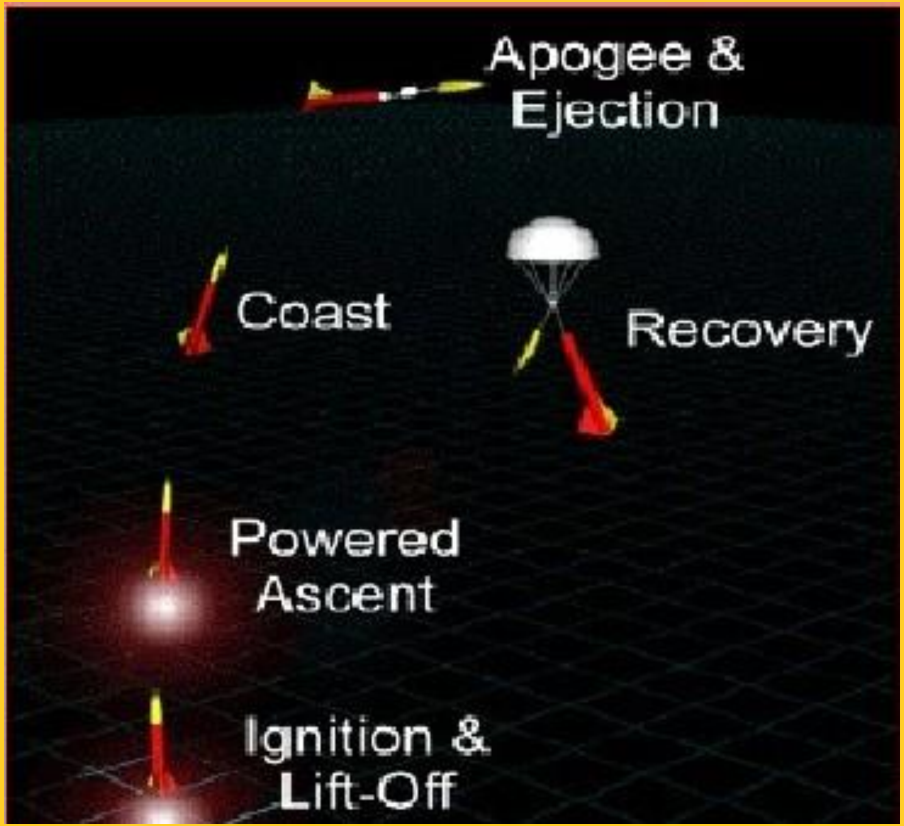
PROPULSION



TYPES OF PROPULSION

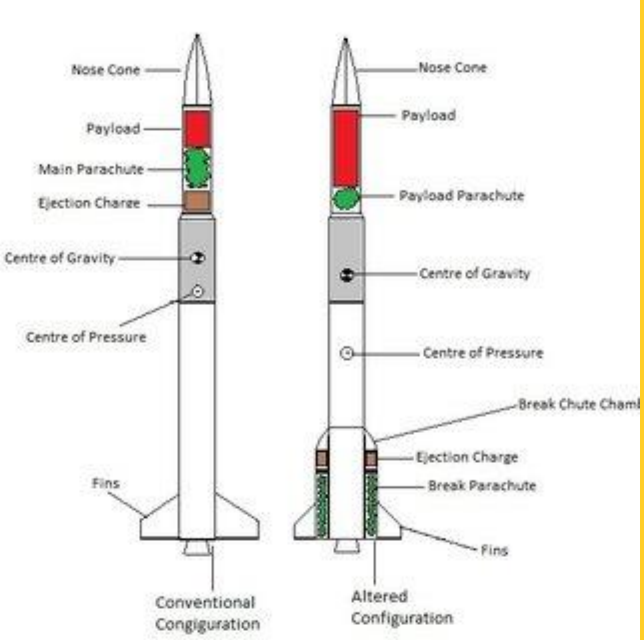


STAGES OF ROCKET FLIGHT

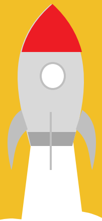


PARACHUTE DEPLOYMENT

Parachutes have been conventionally used for recovery of rockets. Although it was done to recover flight data but now full rocket recovery is also possible. To recover the rocket it is important to deploy parachutes in a controlled manner.

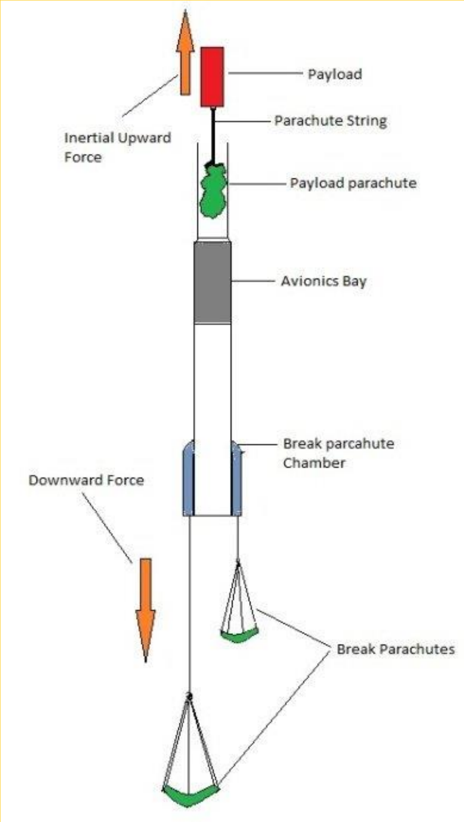


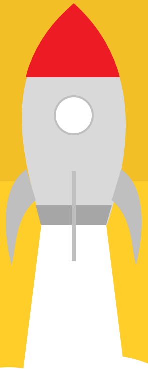
PARACHUTE DEPLOYMENT



OPERATING PRINCIPLE:

The new design and system uses inertial force for the deployment of payload parachute and relies on break parachutes for the recovery of the rocket body





Thank you