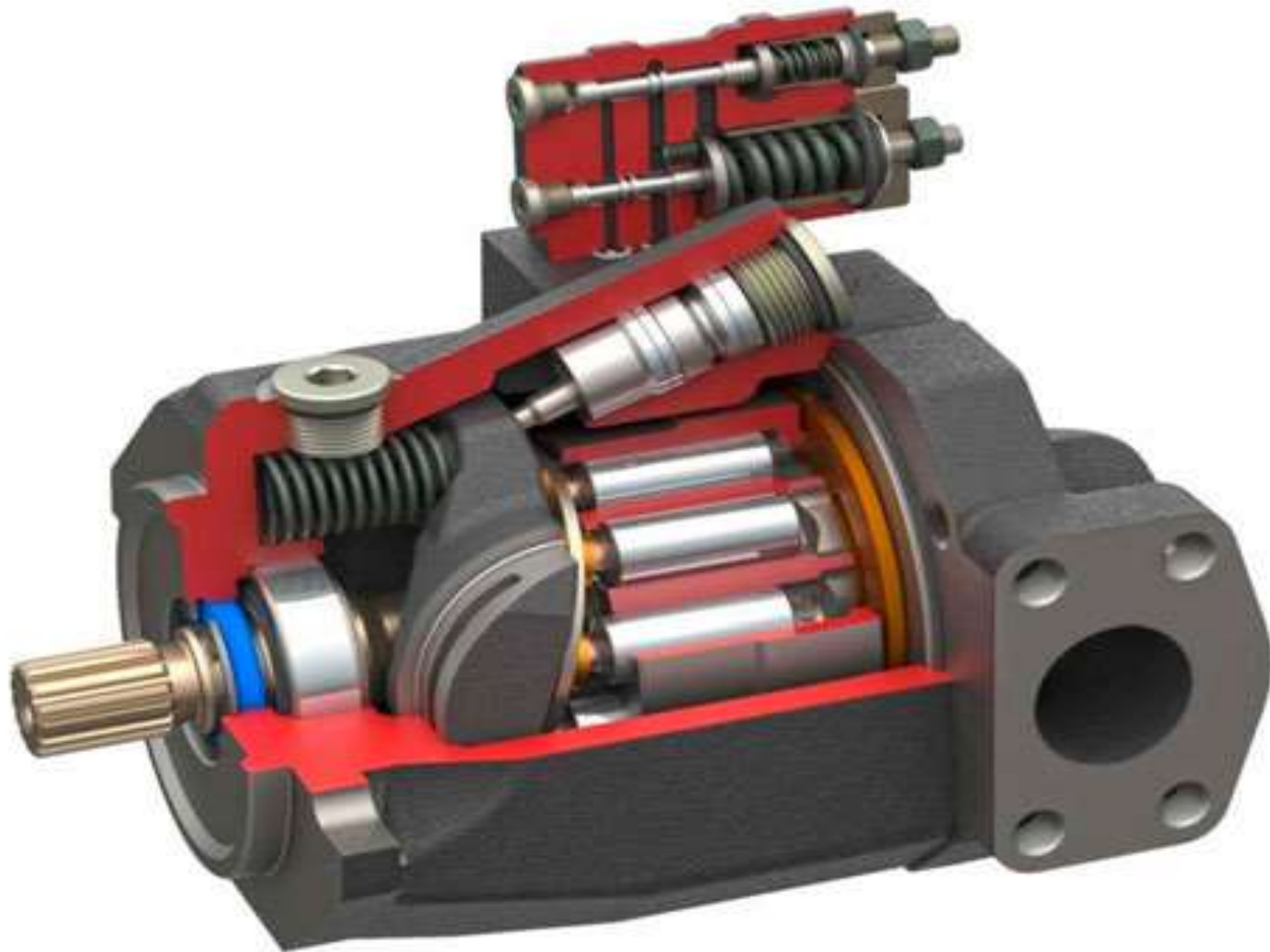


॥ नमस्ते ॥

HYDRAULIC PRESSURE GENERATION



HYDRAULIC PUMPS

- **Function:-**

The pump converts the mechanical energy of its prime-mover to hydraulic energy by delivering a given quantity of hydraulic fluid at high pressure into the system.

TYPES OF HYDRAULIC PRESSURE GENERATION

1. MECHANICAL DRIVEN PUMPS

- primary source of pressure generation on most aircraft.
- mounted on the accessory gearbox of the main engine

2. ELECTRICAL DRIVEN PUMPS

- mounted away from the engine (wheel well or in a hydraulics bay near the root of the wings.)
- Use in emergencies or during ground operation when engines are not running

3. PNEUMATIC-DRIVEN PUMPS

- These pumps are used as demand pumps to supplement the primary pumps and are driven by air from the pneumatic system or by ram air in the case of a ram air turbine (RAT).

Today's Amazing Fact???????

Did You
Know?



The Boeing 777 has three hydraulic systems with two engine driven pumps, four electrical driven pumps, two air driven pumps, and a hydraulic pump motor driven by the RAT.



**TODAY'S AMAZING
FACT???????**



Airbus A380 has two hydraulic systems, eight engine-driven pumps, and three electrical driven pumps.

Types of Hydraulic Pumps

1. Positive Displacement Pump

1. Gear Type
2. Gerotor Pump
3. Piston Pumps
4. Bent Axis Piston Pump
5. Inline Piston Pump
6. Vane Pump

2. Non-Positive Displacement Pump

1. Centrifugal Pump
2. Propeller Pump

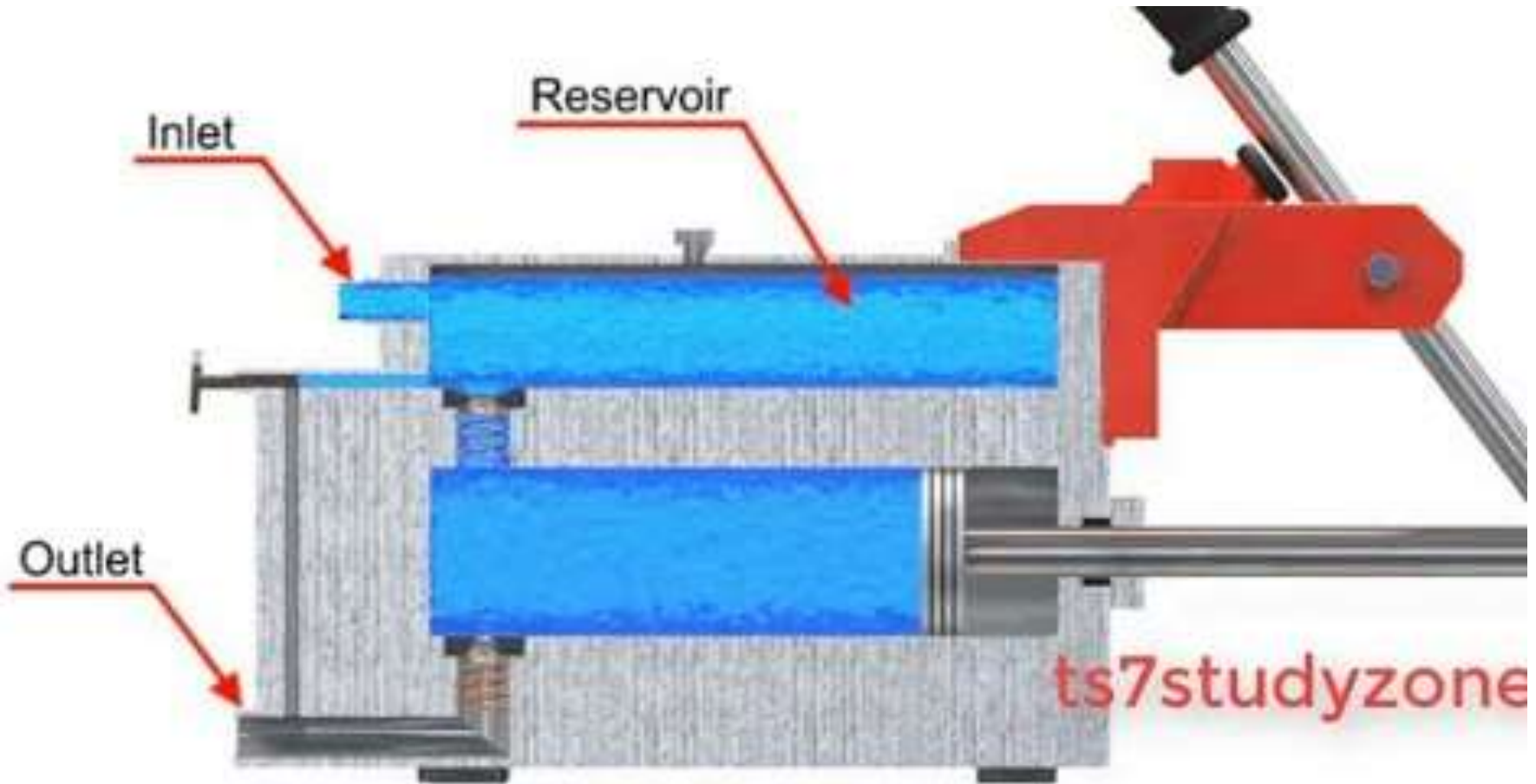
1. Hand Pump



Function

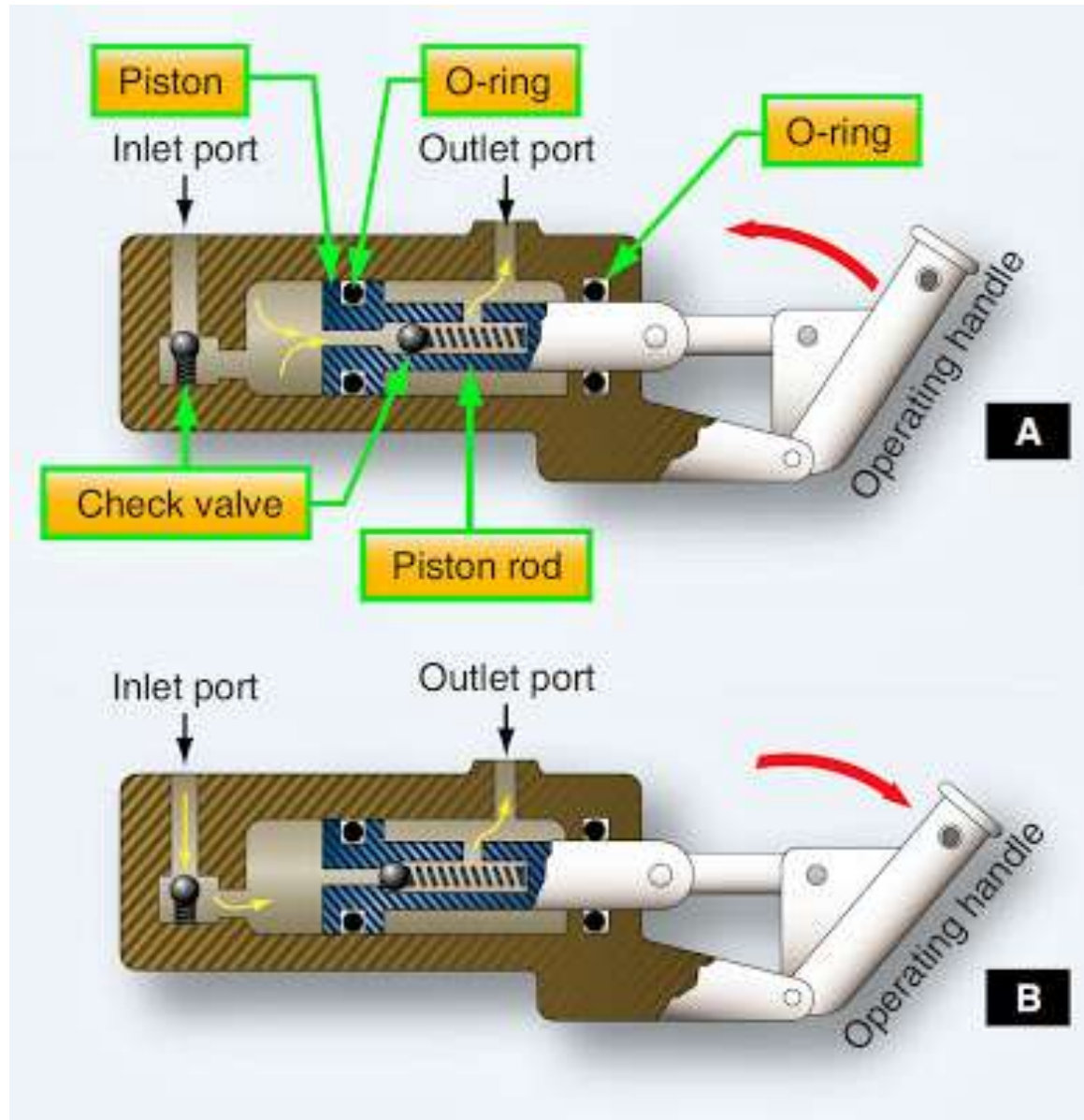
- **Used in Older Aircraft**
- **Modern aircraft it is used as Back Unit or Emergency Unit.**
- **Also used for do the servicing of the Reservoir**
- **Types of Hand Pumps are**
 - 1. Single Action**
 - 2. Double Action**
 - 3. Rotary**

1. Single Action



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2. Double Action



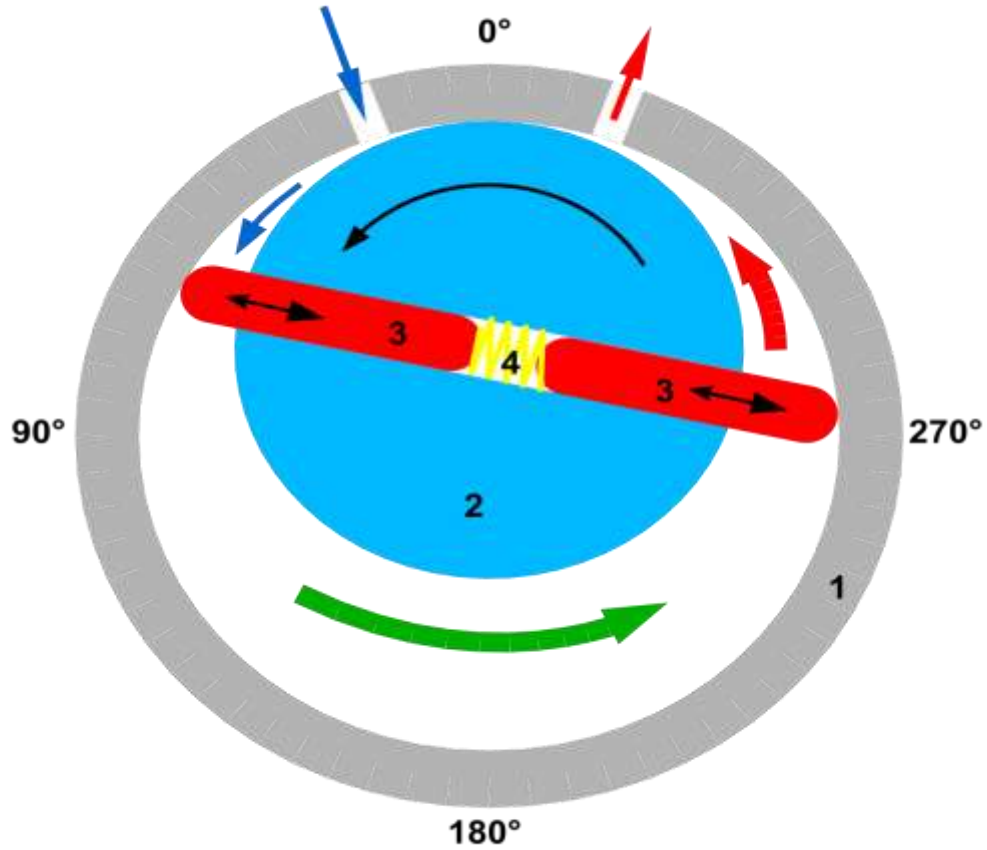
- The double action hand pump consists essentially of a housing that has a cylinder bore and two ports, a piston, two spring-loaded check valves, and an operating handle.
- An O-ring on the piston seals against leakage between the two chambers of the piston cylinder bore
- Animation

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3. Rotary Pump



Diagram

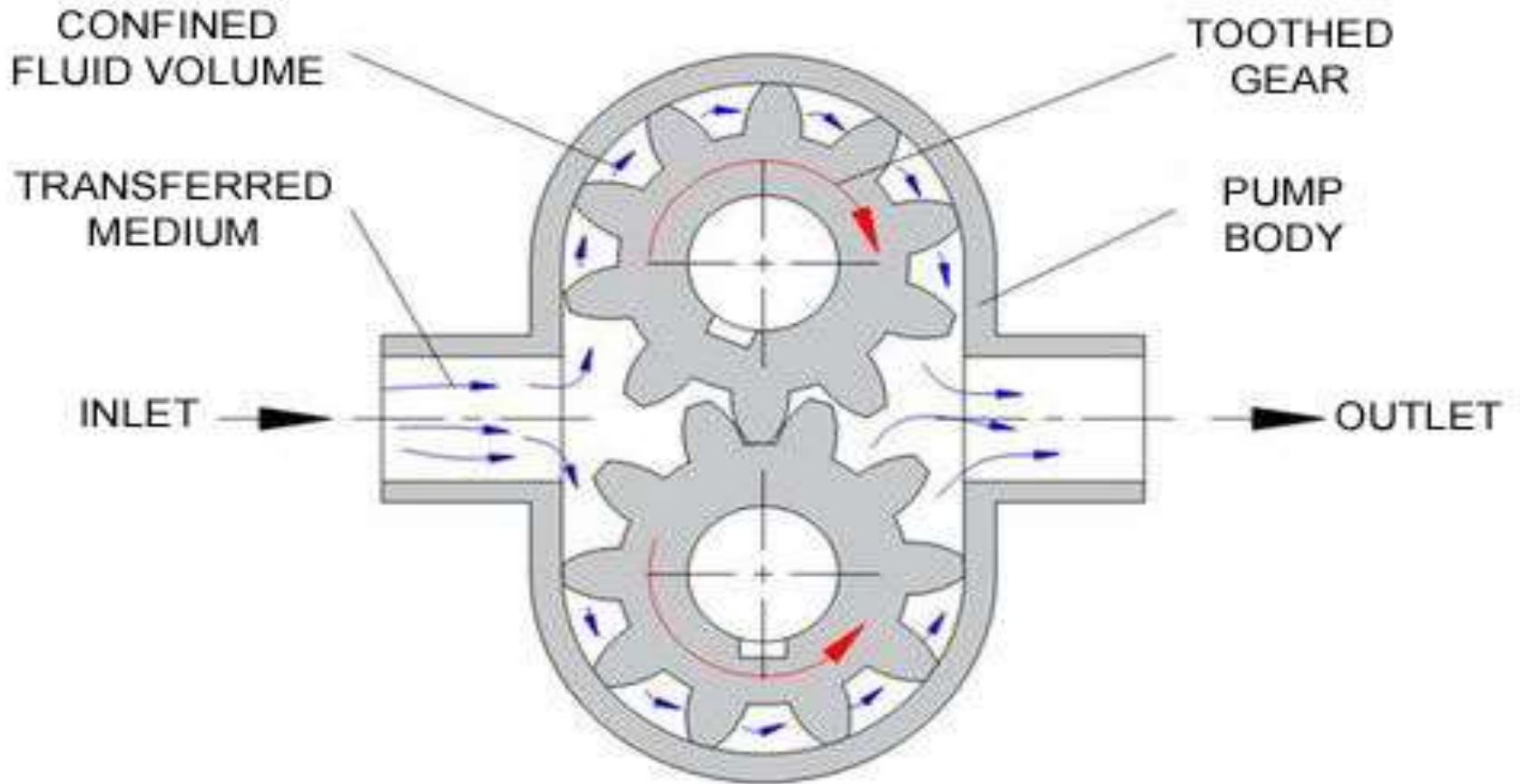


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3. GEAR PUMP

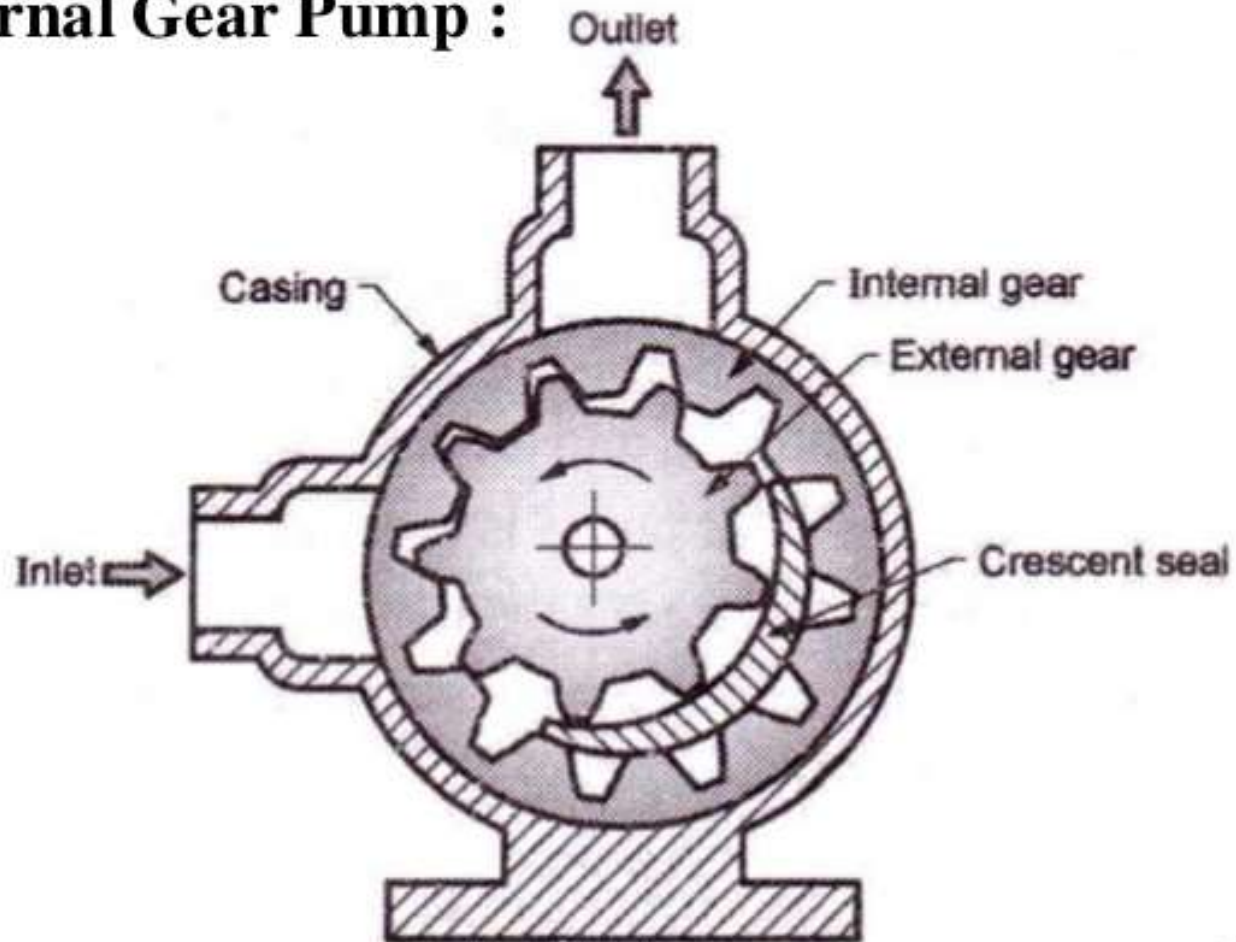
- A gear type power pump is a constant displacement pump. It consists of two meshed gears that revolve in a housing.
- ***The driving gear is driven by*** the aircraft engine or some other power unit.
- The driven gear meshes with, and is driven by, the driving gear.
- Clearance between the teeth as they mesh and between the teeth and the housing is very small.
- The inlet port of the pump is connected to the reservoir, and the outlet port is connected to the pressure line.
- When the driving gear turns, ***it turns the driven*** gear. Fluid is captured by the teeth as they pass the inlet, and it travels around the housing and exits at the outlet.

External gear Pump



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Internal Gear Pump :



Ajaypalsinh Barad

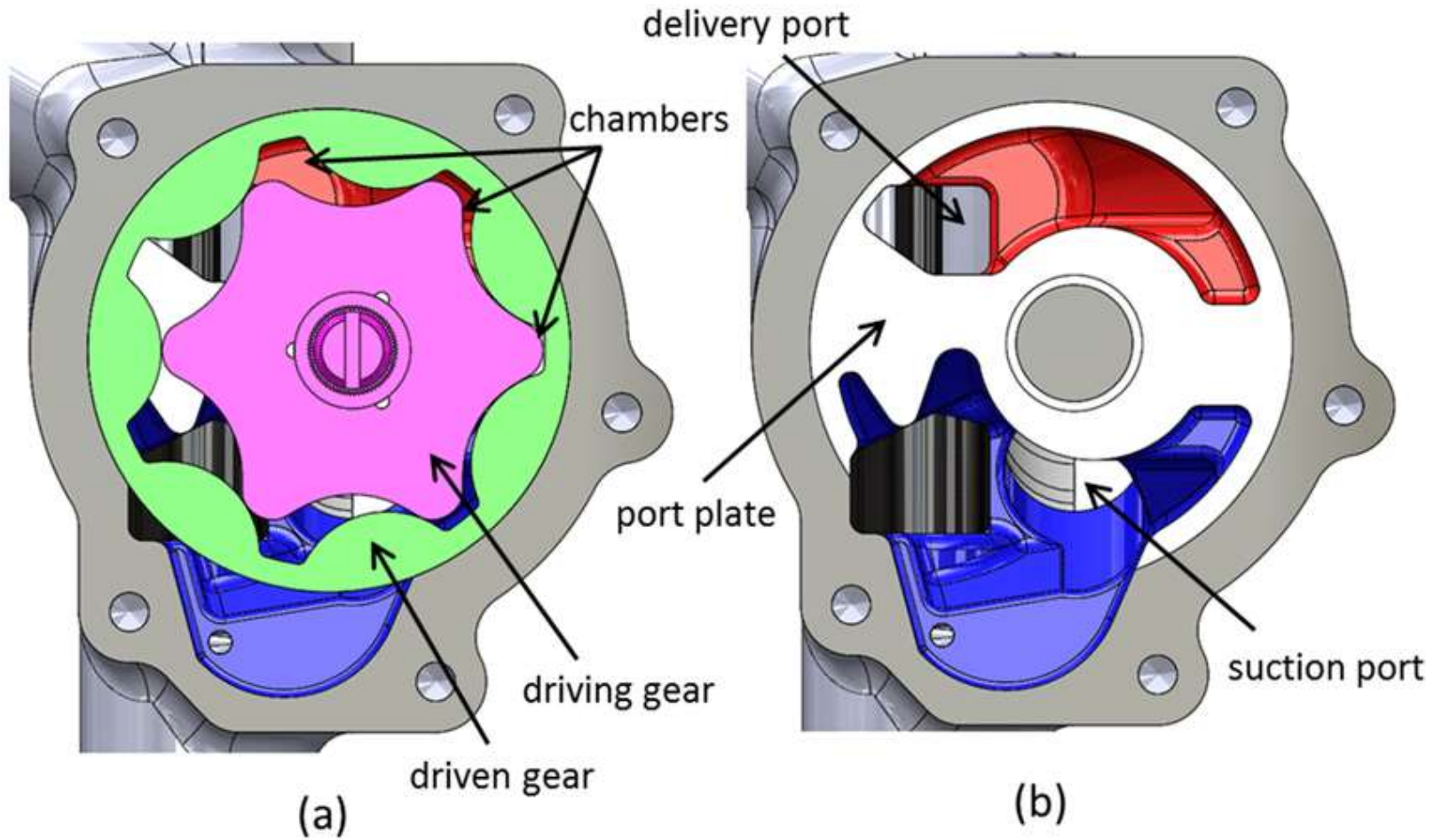
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3. Gerotor Pump

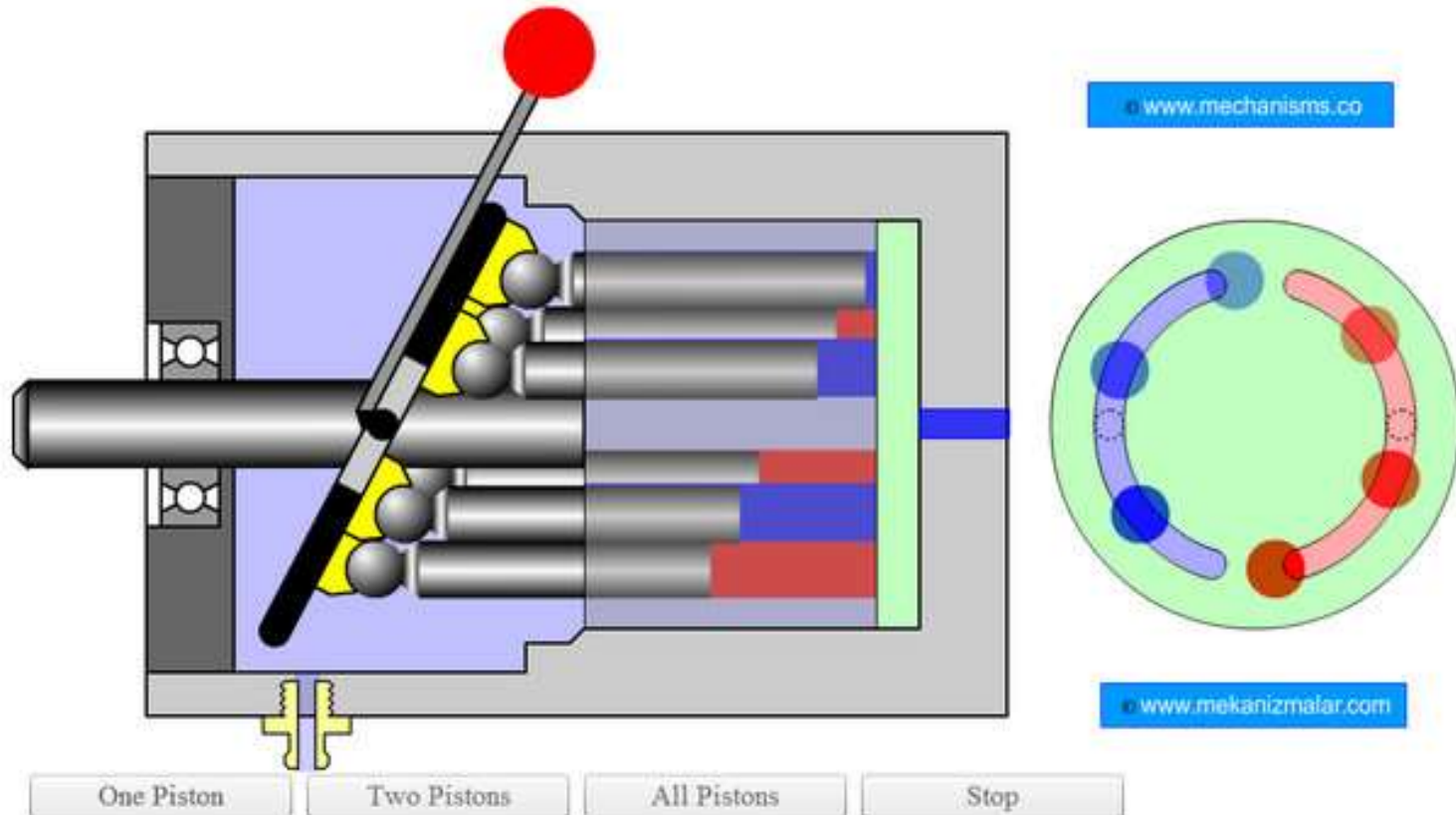
- A Gerotor type power pump consists essentially of a housing containing an eccentric-shaped stationary liner, an internal gear rotor having seven wide teeth of short height, a spur driving gear having six narrow teeth, and a pump cover that contains two crescent shaped openings.

- One opening extends into an inlet port and the other extends into an outlet port.
- During the operation of the pump, the gears turn clockwise together.
- As the pockets between the gears on the left side of the pump move from a lowermost position toward a topmost position, the pockets increase in size, resulting in the production of a partial vacuum within these pockets.
- Since the pockets enlarge while over the inlet port crescent, fluid is drawn into them.
- As these same pockets (now full of fluid) rotate over to the right side of the pump, moving from the topmost position toward the lowermost position, they decrease in size.
- This results in the fluid being expelled from the pockets through the outlet port crescent.



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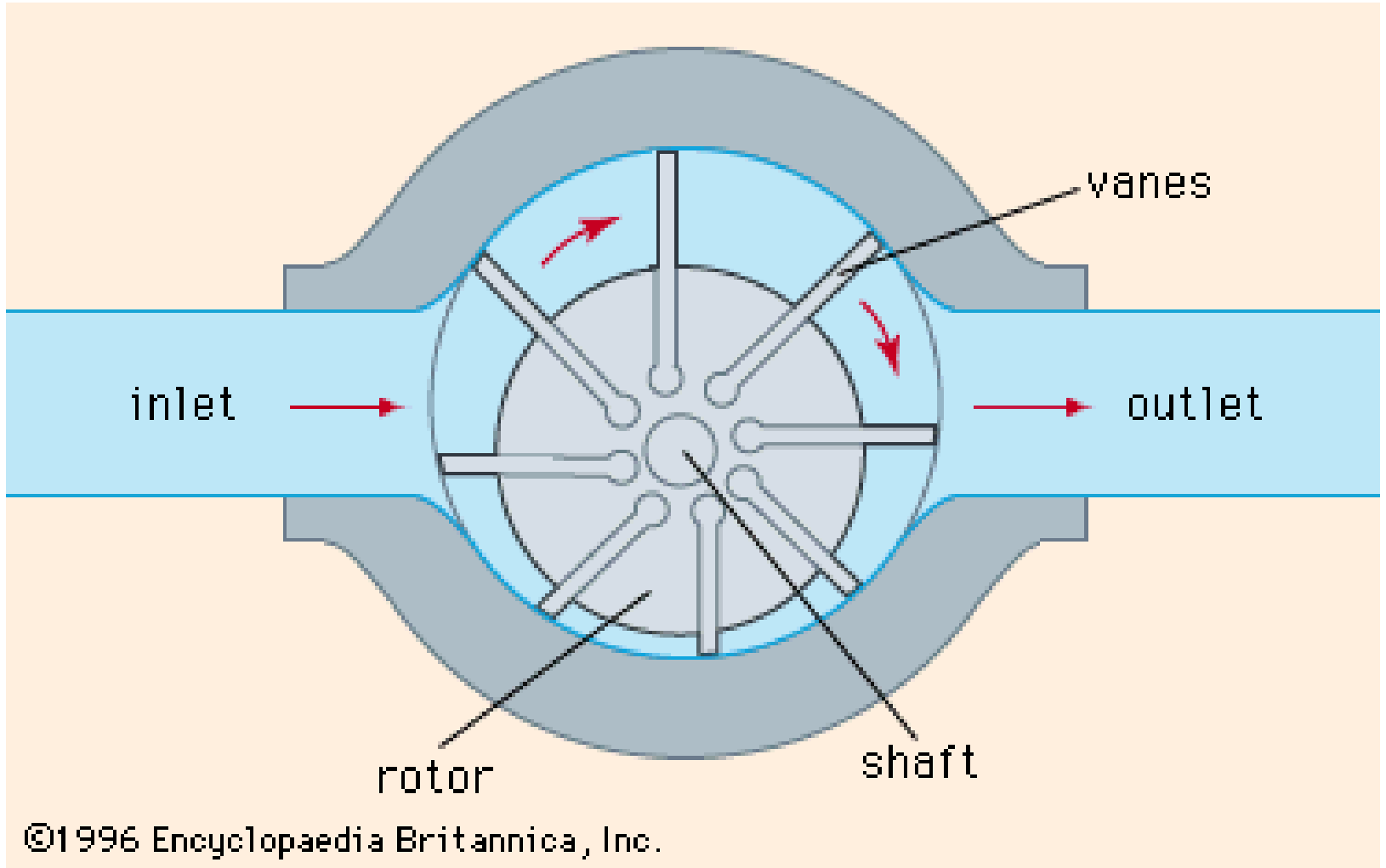
4. Axial Piston Pumps



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- Piston pumps can be constant-displacement or variable displacement pumps.
- The common features of design and operation that are applicable to all piston type hydraulic pumps are described in the following paragraphs.
- Piston type power-driven pumps have flanged mounting bases for the purpose of mounting the pumps on the accessory drive cases of aircraft engines.
- A pump drive shaft, which turns the mechanism, extends through the pump housing slightly beyond the mounting base.
- Torque from the driving unit is transmitted to the pump drive shaft by a drive coupling. The drive coupling is a short shaft with a set of male splines on both ends.

5. *Vane Pump*



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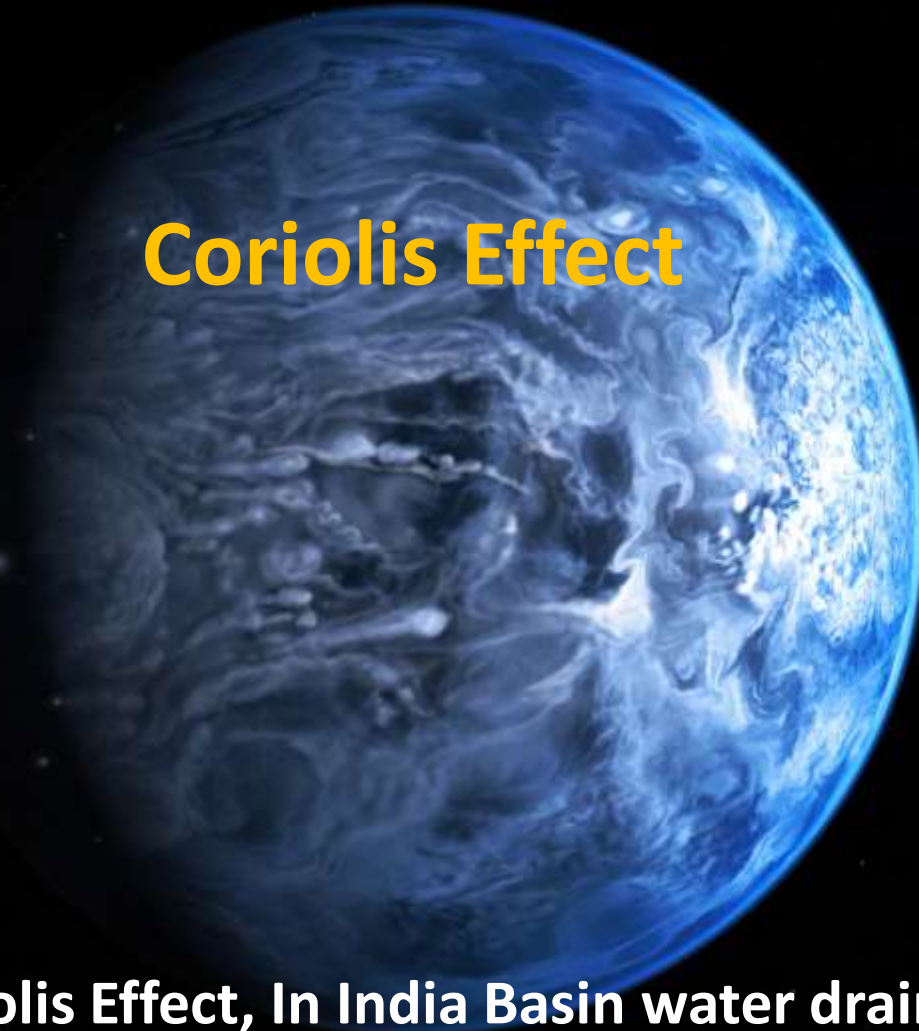
- The vane type power pump is also a constant displacement pump. It consists of a housing containing four vanes (blades), a hollow steel rotor with slots for the vanes, and a coupling to turn the rotor.
- ***The rotor is positioned off center within the sleeve.***
- The vanes, which are mounted in the slots in the rotor, together with the rotor, divide the bore of the sleeve into four sections.
- As the rotor turns, each section passes one point where its volume is at a minimum and another point where its volume is at a maximum

- The volume gradually increases from minimum to maximum during the first half of a revolution and gradually decreases from maximum to minimum during the second half of the revolution.
- As the volume of a given section increases, that section is connected to the pump inlet port through a slot in the sleeve.
- Since a partial vacuum is produced by the increase in volume of the section, fluid is drawn into the section through the pump inlet port and the slot in the sleeve.
- As the rotor turns through the second half of the revolution and the volume of the given section is decreasing, fluid is displaced out of the section, through the slot in the sleeve aligned with the outlet port, and out of the pump.

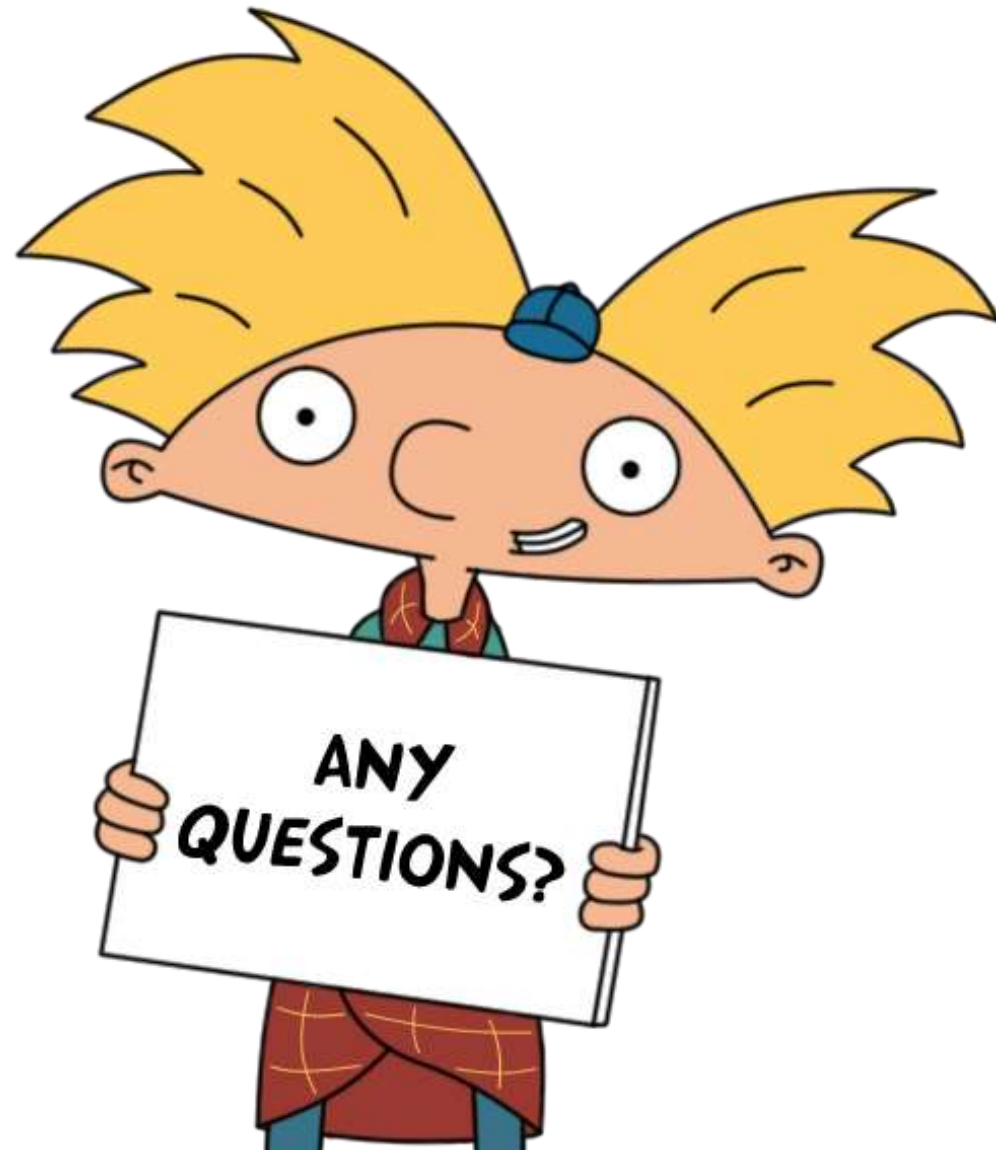
TODAY'S AMAZING FACT???????



Coriolis Effect



Due to the Coriolis Effect, In India Basin water drains in Anti Clockwise Direction & In Australia Basin water drains in Close wise direction



धन्यवाद

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