RADIANT 2026

Physics

Pressure in Fluid and Atmospheric Pressure

Lecture - 01

By - Akash Shravan Sir

Topics *to be covered*

1. Thrust and Pressure
2. Units of Pressure
3. Pressure in Fluids

4) Introduction


AKASH SIR
JOIN MY OFFICAL
TELEGRAM CHANNEL
@AKASHKETAARE
JOIN NOW
hysics Wallah

Thrust and Pressure

Thrust:

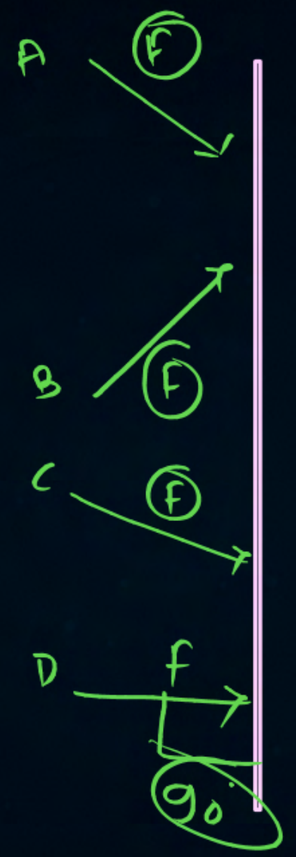
A force can be applied on a surface in any direction. If a force is applied in a direction 1 normal (or perpendicular) to the surface, it is called the thrust. Thus,

Thrust is the force acting normally on a surface.

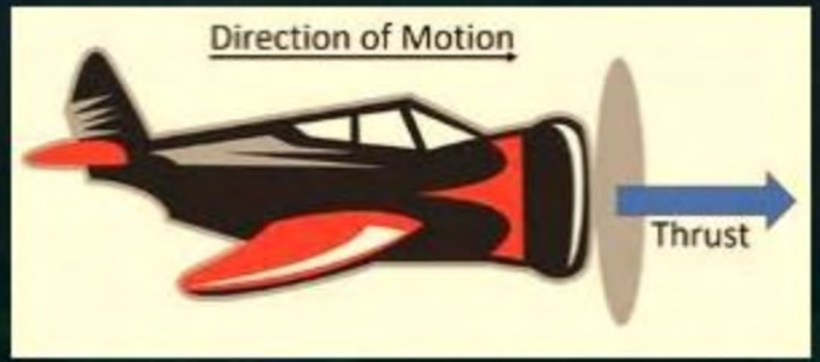
The thrust exerted by a body placed on a surface is equal to its weight. The thrust is same in whatsoever position the body is placed on the surface. Thus,

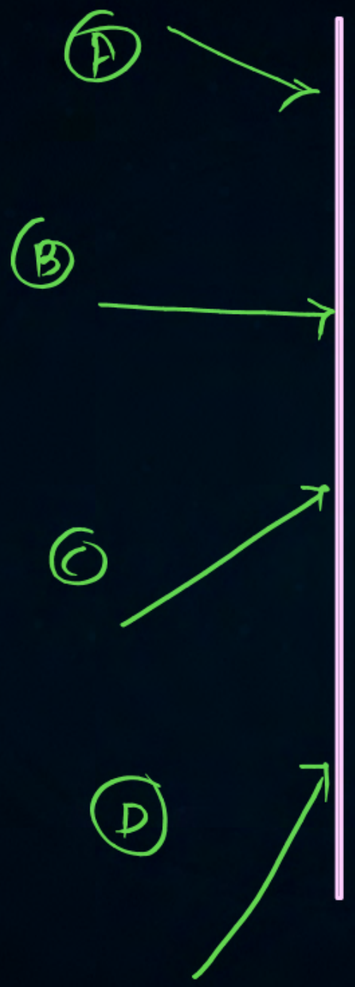
Thrust exerted by a body on a surface = Weight of the body

Thrust is a vector quantity.


A
F
B
F
C
F
D
f
90°

Thrust and Pressure




A
B
C
D

Thrust and Pressure

Thrust and Pressure

The effect of thrust is expressed in terms of thrust per unit area. This quantity is called pressure. Thus

Pressure is the thrust per unit area of surface.

$P = \frac{F}{A}$

$P \propto F$

$P \propto 1/A$

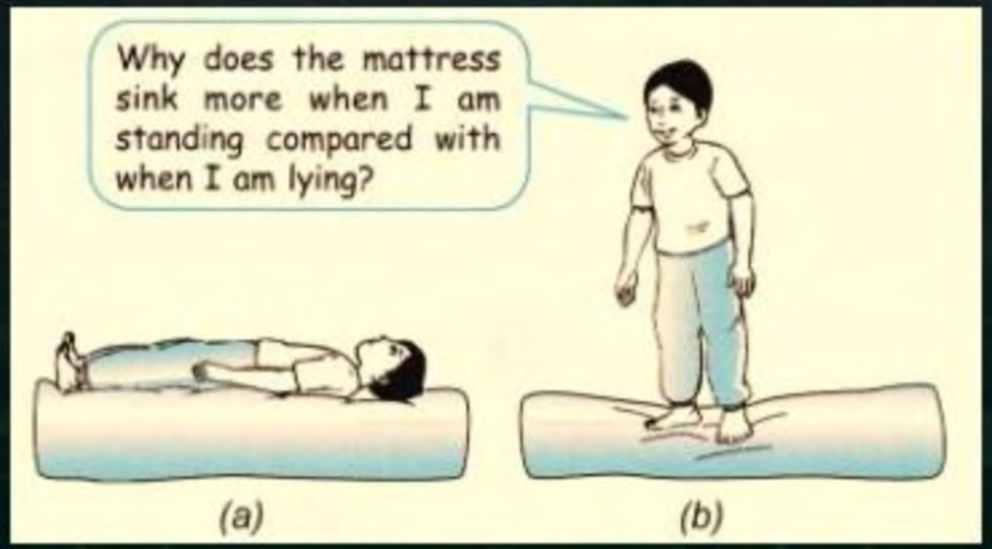
If a thrust Facts on an area A, then

$P = \frac{F}{A}$

$$\textbf{Pressure} = \frac{\textbf{Thrust}}{\textbf{Area}} \text{ or } P = \frac{F}{A}$$

Pressure is a scalar quantity.

Thrust and Pressure



P21/A

Thrust and Pressure

HIGH PRESSURE

WEIGHT FROM HEELED SHOES IS SPREAD OVER A **SMALLER** AREA

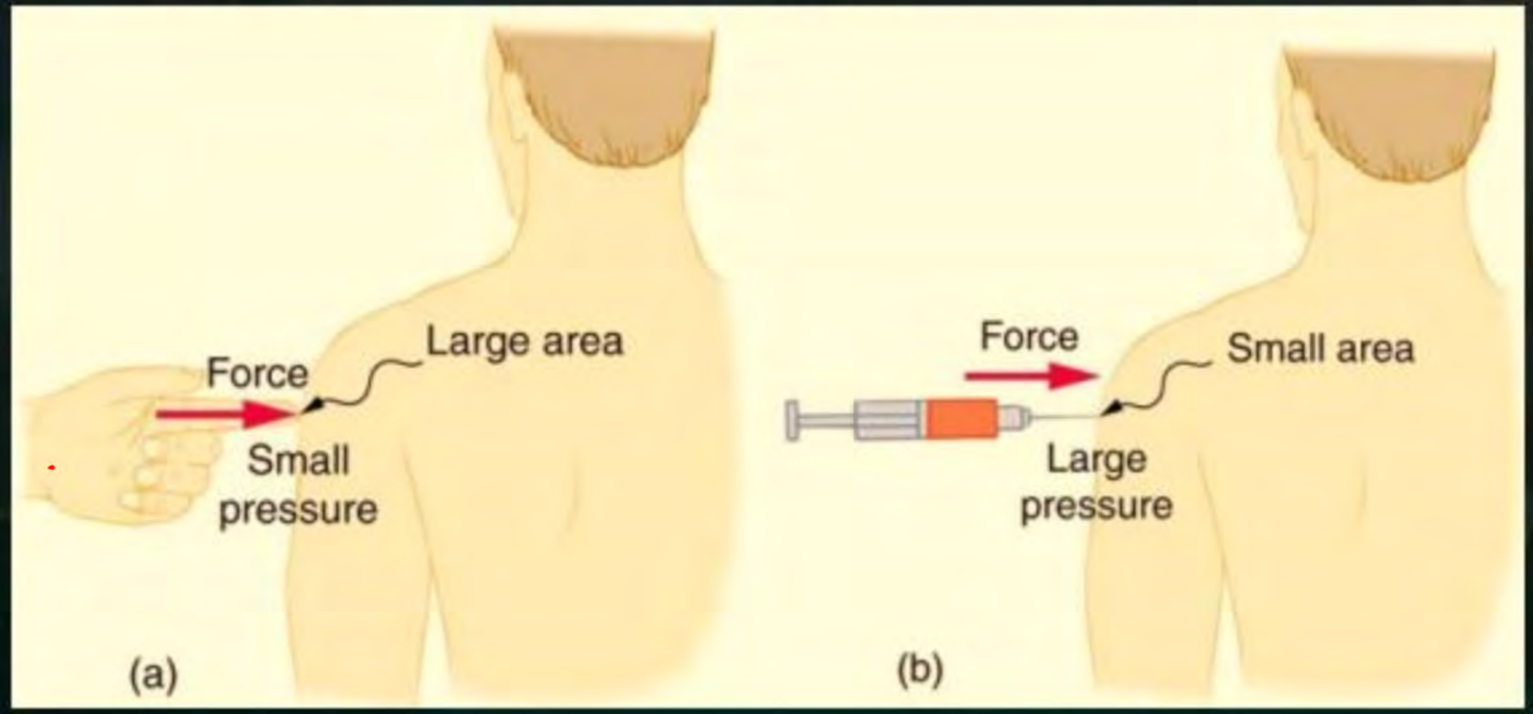
THIS EXERTS A **HIGHER** PRESSURE ON THE GROUND

LOW PRESSURE

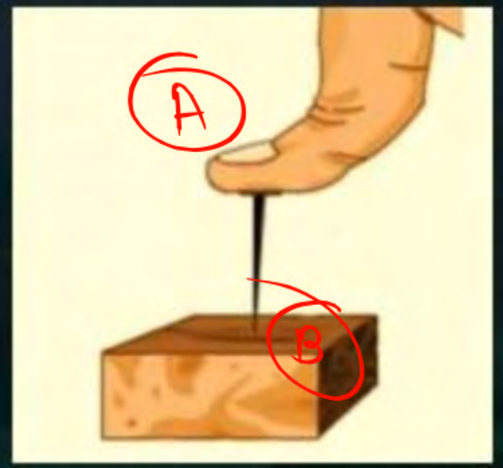
WEIGHT FROM FLAT SHOES IS SPREAD OVER A **LARGER** AREA

THIS EXERTS A **LOWER** PRESSURE ON THE GROUND

Thrust and Pressure



Thrust and Pressure



Thrust and Pressure

↑P A↓

Units of Pressure

From relation (4.2), pressure = $\frac{\text{thrust}}{\text{area}}$

$\therefore$ Unit of pressure = $\frac{\text{Unit of thrust}}{\text{Unit of area}}$

$P = \frac{F}{A}$

$F = 1N \qquad A = 1m^2$

$1\,Pa = \frac{1N}{1m^2}$

S.I. unit: The S.I. unit of thrust is newton and that of area is metre^2, so the S.I. unit of pressure is newton per metre^2 which is abbreviated as N m^{-2}. This unit is named pascal (symbol Pa) after the name of the french scientist Blaise Pascal. i.e.,

1 pascal (or 1 Pa) = $\frac{1 \text{ Newton}}{1 \text{ metre}^2}$ or **1 Pa = 1 N m^{-2}**

Thus

One pascal is the pressure exerted on a surface of area 1 m^2 by a force of 1 N acting normally on it.

Units of Pressure

However, if thrust is measured in kgf and area in m^2, the unit of pressure is kgf m^{-2}.

C.G.S. unit: The C.G.S. unit of pressure is dyne cm^{-2}

where

1 dyne cm^{-2} = 0.1 N m^{-2} or 1 N m^{-2} = 10 dyne cm^{-2}.

Other Units

Other units of pressure are bar and millibar, where

1 bar = 10^5 N m^{-2} and 1 millibar = 10^{-3} bar = 10^2 N m^{-2}.

The atmospheric pressure is generally expressed in terms of the height of mercury column in the barometre. At normal temperature and pressure, the barometric height is 0.76 m of Hg (or 76 cm of Hg or 760 mm of Hg) at sea level which is taken as one atmosphere. Thus atmospheric pressure is also expressed in a unit atmosphere (symbol atm) where

1 atmosphere (atm) = 0-76 m of Hg = 1-013 × 10^5 Pa

Sometimes we use torr as unit of atmospheric pressure after the name of the scientist Torricelli where

1 torr = 1 mm of Hg

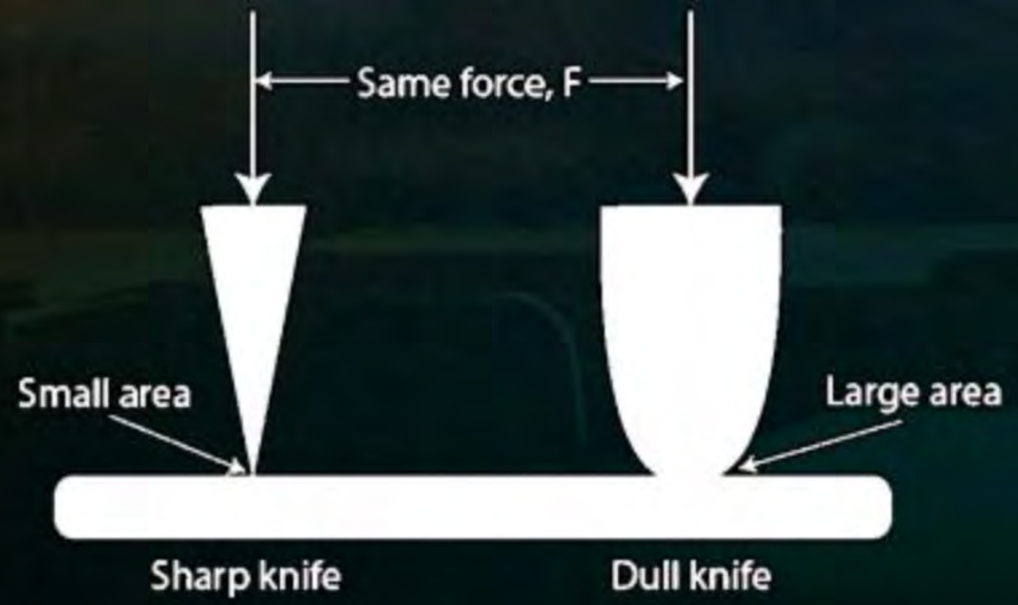
and 1 atm 760 torr.

Factors Affecting the Pressure

The pressure exerted on a surface depends on two factors:

(i) the area on which the thrust is applied, and

(ii) the thrust.



Pressure in Fluids

Examples of Liquids

A liquid is a state of matter with a definite volume, but no fixed shape.

Pressure in Fluids

- A substance which can flow is called a fluid.
- All liquids and gases are, thus, fluids.

Pressure in Fluids


Thank you