Class Today

• Print notes and examples
• Fluid Pressure
  – Defined
  – Resultant force on flat surface
  – Resultant force on curved surface
• Example Problems
• Group Work Time
Fluid Pressure Defined

- **Pressure** – Force distributed over an area. Measured in $lb/ft^2$ or $kN/m^2$

- **Fluid pressure**
  - Creates a pressure that is the same in all directions.
  - Varies linearly with depth.
  - Acts perpendicular to a surface.
Fluid Pressure Defined

Pressure at a depth is calculated by:

\[ p = \gamma z = \rho g z \]

Where

- \( \gamma \) = specific weight
- \( \rho \) = mass density
- \( g \) = acceleration due to gravity
- \( z \) = depth from the liquid surface
Resultant Force on Flat Surface

Solve directly for the perpendicular resultant force:

\[ F_{\text{perp}} = \gamma \bar{z} A \]

Where

\( \bar{z} \) = dist. below liquid surface to centroid of flat plate

\( A \) = Surface area of flat plate
Resultant Force on Flat Surface

Solve directly for the perpendicular resultant force:

\[ F_{\text{perp}} = (w_1 + w_2)(1/2)(L) \]

Where

\( w = bp \) (pressure reduced to a linear distributed load)

\( b = \) width of flat plate measured into page

\( L = \) Length of flat surface affected by distributed load
Resultant Force on Curved Surface

Solve for vertical and horizontal components of resultant force and THEN find resultant, if necessary.

\[ F_v = \gamma V \]

Where

\( V = \) volume of liquid directly above curved surface

\[ F_h = F_{perp} \]