

# Important Drag and Forces Formulas PDF



**Formulas**  
**Examples**  
**with Units**

## List of 11 Important Drag and Forces Formulas

### 1) Area of body for Lift Force in body moving on Fluid Formula

Formula

$$A_p = \frac{F_L'}{C_L \cdot 0.5 \cdot \rho \cdot (v^2)}$$

Example with Units

$$1.8889 \text{ m}^2 = \frac{1100 \text{ N}}{0.94 \cdot 0.5 \cdot 1.21 \text{ kg/m}^3 \cdot (32 \text{ m/s}^2)}$$

Evaluate Formula 

### 2) Coefficient of drag for sphere in Oseen formula when Reynolds number is between 0.2 and 5 Formula

Formula

$$C_D = \left( \frac{24}{Re} \right) \cdot \left( 1 + \left( \frac{3}{16 \cdot Re} \right) \right)$$

Example

$$0.0048 = \left( \frac{24}{5000} \right) \cdot \left( 1 + \left( \frac{3}{16 \cdot 5000} \right) \right)$$

Evaluate Formula 

### 3) Coefficient of drag for sphere in stoke's law when Reynolds number is less than 0.2 Formula

Formula

$$C_D = \frac{24}{Re}$$

Example

$$0.0048 = \frac{24}{5000}$$

Evaluate Formula 

### 4) Drag Force for body moving in Fluid Formula

Formula

$$F_D' = \frac{C_D' \cdot A_p \cdot M_w \cdot (v)^2}{V_w \cdot 2}$$

Example with Units

$$175.3234 \text{ N} = \frac{0.15 \cdot 1.88 \text{ m}^2 \cdot 3.4 \text{ kg} \cdot (32 \text{ m/s})^2}{2.8 \text{ m}^3 \cdot 2}$$

Evaluate Formula 

### 5) Drag Force for body moving in Fluid of Certain Density Formula

Formula

$$F_D' = C_D' \cdot A_p \cdot \rho \cdot \frac{v^2}{2}$$

Example with Units

$$174.7046 \text{ N} = 0.15 \cdot 1.88 \text{ m}^2 \cdot 1.21 \text{ kg/m}^3 \cdot \frac{32 \text{ m/s}^2}{2}$$

Evaluate Formula 



## 6) Force exerted by body on supersonic plane Formula

Formula

$$F = \left( \rho \cdot (\Delta L^2) \cdot (v^2) \right) \cdot \left( \frac{\mu_d}{\rho \cdot v \cdot \Delta L} \right) \cdot \left( \frac{K}{\rho \cdot v^2} \right)$$

Evaluate Formula 

Example with Units

$$1269.499 \text{ N} = \left( 1.21 \text{ kg/m}^3 \cdot (3277 \text{ m}^2) \cdot (32 \text{ m/s}^2) \right) \cdot \left( \frac{0.075 \text{ P}}{1.21 \text{ kg/m}^3 \cdot 32 \text{ m/s} \cdot 3277 \text{ m}} \right) \cdot \left( \frac{2000 \text{ Pa}}{1.21 \text{ kg/m}^3 \cdot 32 \text{ m/s}^2} \right)$$

## 7) Power Required to Keep Flat Plate in Motion Formula

Formula

$$P_w = F_D' \cdot v$$

Example with Units

$$5584 \text{ W} = 174.5 \text{ N} \cdot 32 \text{ m/s}$$

Evaluate Formula 

## 8) Pressure Drag from Total Drag Force on Sphere Formula

Formula

$$F_d = \pi \cdot \mu_d \cdot D \cdot v$$

Example with Units

$$0.0603 \text{ N} = 3.1416 \cdot 0.075 \text{ P} \cdot 0.08 \text{ m} \cdot 32 \text{ m/s}$$

Evaluate Formula 

## 9) Skin Friction Drag from Total Drag Force on Sphere Formula

Formula

$$F_{\text{dragforce}} = 2 \cdot \pi \cdot \mu_d \cdot D \cdot v$$

Example with Units

$$0.1206 \text{ N} = 2 \cdot 3.1416 \cdot 0.075 \text{ P} \cdot 0.08 \text{ m} \cdot 32 \text{ m/s}$$

Evaluate Formula 

## 10) Total Drag force on Sphere Formula

Formula

$$F_D = 3 \cdot \pi \cdot \mu_d \cdot D \cdot v$$

Example with Units

$$0.181 \text{ N} = 3 \cdot 3.1416 \cdot 0.075 \text{ P} \cdot 0.08 \text{ m} \cdot 32 \text{ m/s}$$

Evaluate Formula 

## 11) Total force exerted by fluid on body Formula

Formula

$$F = \left( C_D' \cdot A_p \cdot \rho \cdot \frac{v^2}{2} \right) + \left( C_L \cdot A_p \cdot \rho \cdot \frac{v^2}{2} \right)$$

Evaluate Formula 

Example with Units











$$1269.5204 \text{ N} = \left( 0.15 \cdot 1.88 \text{ m}^2 \cdot 1.21 \text{ kg/m}^3 \cdot \frac{32 \text{ m/s}^2}{2} \right) + \left( 0.94 \cdot 1.88 \text{ m}^2 \cdot 1.21 \text{ kg/m}^3 \cdot \frac{32 \text{ m/s}^2}{2} \right)$$



## Variables used in list of Drag and Forces Formulas above

- $A_p$  Projected Area of Body (Square Meter)
- $C_D$  Coefficient of Drag for Sphere
- $C_D'$  Coefficient of Drag for Body in Fluid
- $C_L$  Lift Coefficient for Body in Fluid
- $D$  Diameter of Sphere in Fluid (Meter)
- $F$  Force (Newton)
- $F_D$  Total Drag Force on Sphere (Newton)
- $F_D'$  Drag Force on Body in Fluid (Newton)
- $F_{\text{dragforce}}$  Skin Friction Drag on Sphere (Newton)
- $F_L'$  Lift Force on Body in Fluid (Newton)
- $K$  Bulk Modulus (Pascal)
- $M_w$  Mass of Flowing Fluid (Kilogram)
- $P_d$  Pressure Drag Force on Sphere (Newton)
- $P_w$  Power to Keep Plate in Motion (Watt)
- $Re$  Reynolds Number
- $v$  Velocity of Body or Fluid (Meter per Second)
- $V_w$  Volume of Flowing Fluid (Cubic Meter)
- $\Delta L$  Length of Aeroplane (Meter)
- $\mu_d$  Dynamic Viscosity of Fluid (Poise)
- $\rho$  Density of Fluid Circulating (Kilogram per Cubic Meter)

## Constants, Functions, Measurements used in list of Drag and Forces Formulas above

- **constant(s):**  $\pi$ ,  
3.14159265358979323846264338327950288  
*Archimedes' constant*
- **Measurement: Length** in Meter (m)  
*Length Unit Conversion* 
- **Measurement: Weight** in Kilogram (kg)  
*Weight Unit Conversion* 
- **Measurement: Volume** in Cubic Meter (m<sup>3</sup>)  
*Volume Unit Conversion* 
- **Measurement: Area** in Square Meter (m<sup>2</sup>)  
*Area Unit Conversion* 
- **Measurement: Pressure** in Pascal (Pa)  
*Pressure Unit Conversion* 
- **Measurement: Speed** in Meter per Second (m/s)  
*Speed Unit Conversion* 
- **Measurement: Power** in Watt (W)  
*Power Unit Conversion* 
- **Measurement: Force** in Newton (N)  
*Force Unit Conversion* 
- **Measurement: Dynamic Viscosity** in Poise (P)  
*Dynamic Viscosity Unit Conversion* 
- **Measurement: Density** in Kilogram per Cubic Meter (kg/m<sup>3</sup>)  
*Density Unit Conversion* 



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