PLUMBER IP FORMULAS

1 sq. ft. EDR = 240 BTUh

1.414 = Travel Offset of a 45° Elbow

12 000 BTU of cooling = 1 ton

Area = L × W

Area of Circle = πr^2

Circumference of Circle = πd

Cubic Volume = L × W × H

Expansion = Length × ΔT × Coefficient of Expansion

$$\text{GPM} = \frac{\text{BTU}}{\text{lb./gal.} \times \Delta\text{T}}$$

$$\text{GPM} = \frac{\text{Total BTUh}}{\Delta\text{T} \times \text{Mass} \times \text{Minutes} \times \text{Spc.Ht.Cap.}}$$

Litres = Area × Rainfall Intensity

Pressure Head Conversion Unit = 0.433 psi/ft.

PLUMBER IP FORMULAS (continued)

Perimeters/Circumference

= 2(L + W)

= a + b + c

= πd

Area

= L × W

= $\frac{1}{2}$bh

= πr²

= 2(L x W) + 2(W x H) + 2(L x H) (Totally Enclosed)

= (L x W) + 2(W x H) + 2(L x H) (Open Top)

= 2πr² + πdh (Totally Enclosed)

= πr² + πdh (Open Top)

= πd² or 4πr²

= π × L × Dia

Volume

= L × W × H

= πr²h

= $\frac{4}{3}$πr³

PLUMBER IP FORMULAS (continued)

Boyle's Law: $\frac{V_1}{V_2} = \frac{P_2}{P_1}$

Charles' Law: $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

Ohm's Law: Current = $\frac{\text{Voltage}}{\text{Resistance}}$

Grade = $\frac{\text{Drop or Rise}}{\text{Run}}$

Pressure = Height × Density

Force = Pressure × Area

Coefficients

Material	Coefficient of Linear Expansion per 1 °F	Coefficient of Linear Expansion per 1 °C
ABS	0.000055	0.0000990
Brass	0.0000105	0.0000189
Cast Iron	0.0000059	0.0000108
Copper	0.0000095	0.0000171
PVC	0.000033	0.0000594
Steel	0.0000067	0.0000120

PLUMBER IP FORMULAS (continued)

Electrical

$$\text{rpm} = \frac{\text{Hz} \times 120}{\#\ \text{poles}}$$

Hydronic Thermal Formulas

$$\Delta T = \frac{\text{BTUh}}{500 \times \text{GPM}}$$

$$\text{GPM} = \frac{\text{BTUh}}{500 \times \Delta T\ (\text{Water})}$$

$$\text{BTUh} = \text{GPM} \times 500 \times \Delta T$$

Conversion Factors

To Convert	To	Multiply by
°C	°F	1.8 and add 32
kg	lb.	2.205
kg/m³	lb./ft.³	0.06243
kN	lb.	224.81
kN/m	lbf/ft.	68.52
kN/m³	lbf/ft.³	6.360
kPa	lbf/in.² (psi)	0.1450
kPa	lbf/ft.²	20.88
L	gal. (imp.)	0.2200
L/s	gal./min. (gpm)	13.20
m	ft.	3.281
m²	ft.²	10.76
mm	in.	0.03937
m/s²	ft./s²	3.281