

**CWEA
Mechanical Technology**

**EQUIVALENTS AND FORMULAS
All grades**

1 cubic foot = 1,728 cubic inches	1 horsepower = 42.45 BTU/minute
1 cubic foot of water weighs 62.43 pounds	1 BTU = 778 foot-pounds
1 day = 1,440 minutes	Coefficients of thermal expansion = 0.00000633/°F for steel, 0.00001/°F for brass
1 cubic foot/second = 449 gallons/minute	
1 horsepower = 33,000 foot-pounds/minute	
1 kilowatt = 1000 watts	
1 cubic foot = 7.48 gallons	1 MGD = 1.55 cubic feet/second
1 gallon of water weighs 8.34 pounds	1 watt = 3.412 BTU/hour
1 MGD = 694 gallons/minute	1 therm = 100,000 BTU
1 psi = 2.31 feet of water	$\pi = 3.14159$
1 horsepower = 746 watts	

Perimeter_{rectangle} = 2 x (length + width)

Circumference_{circle} = π x diameter

Area_{rectangle} = base x height

Area_{triangle} = 1/2 (base x height)

Area_{circle} = π x radius²

Area_{circle} = .7854 x diameter²

Volume_{rectangular solid} = length x width x height

Volume_{triangular solid} = 1/2 (base x height x length)

Volume_{cylinder} = π x radius² x height

Volume_{cylinder} = .7854 x diameter² x height

Big = Fast

Little = Slow

Water horsepower =

$$\frac{\text{flow x total head x specific gravity}}{3960}$$

Brake horsepower =

$$\frac{\text{Flow x head x specific gravity}}{3960 \text{ x efficiency}}$$

Hydrostatic force =
column area x column height x fluid
density

Thermal expansion =
coeff of thermal expansion x length x DT

Energy = power x time

Efficiency = $\frac{\text{work output}}{\text{work input}}$

Flowing quantity = Area x velocity

Power costs =

$$\frac{(\text{Quantity x watts x hours}) \text{ x } (\text{cost})}{(1000 \text{ watts/kilowatt}) \text{ (kilowatt)}} \text{ x time}$$