

# Formula/Conversion Table

## Plant Maintenance Exams

$$\text{Amps} = \frac{\text{Volts}}{\text{Ohms}}$$

$$\text{Area of Circle} = (0.785) (\text{Diameter}^2) \text{ or } (\Pi) (\text{Radius}^2)$$

$$\text{Area of Cone (lateral area)} = (\Pi) (\text{Radius}) \sqrt{\text{Radius}^2 + \text{Height}^2}$$

$$\text{Area of Cone (total surface area)} = (\Pi) (\text{Radius}) (\text{Radius} + \sqrt{\text{Radius}^2 + \text{Height}^2})$$

$$\text{Area of Cylinder (total outside surface area)} = [\text{Surface Area of End \#1}] + [\text{Surface Area of End \#2}] + [(\Pi) (\text{Diameter}) (\text{Height or Depth})]$$

$$\text{Area of Rectangle} = (\text{Length}) (\text{Width})$$

$$\text{Area of a Right Triangle} = \frac{(\text{Base}) (\text{Height})}{2}$$

$$\text{Average (arithmetic mean)} = \frac{\text{Sum of All Terms}}{\text{Number of Terms}}$$

$$\text{Circumference of Circle} = (\Pi) (\text{Diameter})$$

$$\text{Degrees Celsius} = (\text{Degrees Fahrenheit} - 32) (\frac{5}{9}) \text{ or } \frac{(^{\circ}\text{F} - 32)}{1.8}$$

$$\text{Degrees Fahrenheit} = [(\text{Degrees Celsius}) (\frac{9}{5}) + 32] \text{ or } [(\text{Degrees Celsius}) (1.8) + 32]$$

$$\text{Electromotive Force (E.M.F), volts} = (\text{Current, amps}) (\text{Resistance, ohms}) \text{ or } E = IR$$

$$\text{Filter Backwash Rate, gpm/sq ft} = \frac{\text{Flow, gpm}}{\text{Filter Area, sq ft}}$$

$$\text{Flow Rate, cfs} = (\text{Area, sq ft}) (\text{Velocity, ft/sec}) \text{ or } Q = AV \text{ where: } Q = \text{flow rate, } A = \text{area, } V = \text{velocity}$$

$$\text{Force, pounds} = (\text{Pressure, psi}) (\text{Area, sq in})$$

$$\text{Horsepower, Brake (bhp)} = \frac{(\text{Flow, gpm}) (\text{Head, ft})}{(3,960) (\text{Decimal Pump Efficiency})}$$

$$\text{Horsepower, Motor (mhp)} = \frac{(\text{Flow, gpm}) (\text{Head, ft})}{(3,960) (\text{Decimal Pump Efficiency}) (\text{Decimal Motor Efficiency})}$$

$$\text{Horsepower, Water (whp)} = \frac{(\text{Flow, gpm}) (\text{Head, ft})}{3,960}$$

$$\text{Leakage, gpd} = \frac{\text{Volume, gallons}}{\text{Time, days}}$$

$$\text{Reduction in Flow, \%} = \frac{(\text{Original Flow} - \text{Reduced Flow}) (100\%)}{\text{Original Flow}}$$

$$\text{Slope, \%} = \frac{\text{Drop or Rise}}{\text{Distance}} \times 100$$

$$\text{Specific Gravity} = \frac{\text{Specific Weight of Substance, lbs/gal}}{\text{Specific Weight of Water, lbs/gal}}$$

$$\text{Velocity, ft/sec} = \frac{\text{Flow Rate, cu ft / sec}}{\text{Area, sq ft}} \text{ or } \frac{\text{Distance, ft}}{\text{Time, sec}}$$

$$\text{Volume of Cone} = (1/3) (0.785) (\text{Diameter}^2) (\text{Height})$$

$$\text{Volume of Cylinder} = (0.785) (\text{Diameter}^2) (\text{Height})$$

$$\text{Volume of Rectangular Tank} = (\text{Length}) (\text{Width}) (\text{Height})$$

$$\text{Watts (DC circuit)} = (\text{Volts}) (\text{Amps})$$

$$\text{Watts (AC circuit)} = (\text{Volts}) (\text{Amps}) (\text{Power Factor})$$

$$\text{Wire-to-Water Efficiency, \%} = \frac{\text{Water Horsepower, HP}}{\text{Power Input, HP or Motor HP}} \times 100$$

$$\text{Wire-to-Water Efficiency, \%} = \frac{(\text{Flow, gpm}) (\text{Total Dynamic Head, ft}) (0.746 \text{ kw/hp}) (100)}{(3,960) (\text{Electrical Demand, kilowatts})}$$

### Conversion Factors:

1 acre = 43,560 square feet	1 horsepower = 0.746 kW or 746 watts or 33,000 ft. lbs./min.
1 acre foot = 326,000 gallons	1 million gallons per day = 694 gallons per minute
1 cubic foot = 7.48 gallons	1 million gallons per day = 1.55 cubic feet per second
1 cubic foot = 62.4 pounds	1 mile = 5,280 feet
1 cubic foot per second = 0.646 MGD	1 pound = 0.454 kilograms
1 foot = 0.305 meters	1 pound per square inch = 2.31 feet of water
1 foot of water = 0.433 psi	1 ton = 2,000 pounds
1 gallon = 3.79 liters	1% = 10,000 mg/L
1 gallon = 8.34 pounds	Π or pi = 3.14
1 grain per gallon = 17.1 mg/L	

### Abbreviations:

cfs	cubic feet per second
ft	feet
g	grams
gpd	gallons per day
gpg	grains per gallon
gpm	gallons per minute
in	inches
kW	kilowatt
lbs	pounds
mg/L	milligrams per liter
MGD	million gallons per day
mL	milliliter
psi	pounds per square inch
Q	flow