Pump Formulas

Pressure
(PSI)
$$= \frac{\text{Head (Feet) x Specific Gravity}}{2.31}$$

Head
(Feet)
$$= \frac{\text{Pressure (PSI) x 2.3}}{\text{Specific Gravity}}$$

Vacuum
(Inches of Mercury)
$$= \text{Dynamic Suction Lift (Feet) x .883 x Specific Gravity}$$

Horsepower
(Water)
$$= \frac{\text{GPM x Head (Feet) x Specific Gravity}}{3960 \text{ x Pump Efficiency}}$$

Efficiency
(Pump)
$$= \frac{\text{Horsepower (Water) x 100\%}}{\text{Horsepower (Brake)}}$$

NPSH
(Available)
$$= \text{Positive Factors – Negative Factors}$$

Affinity Laws: Effect of change of speed or impeller diameter on centrifugal pumps.

	GPM Capacity	Ft. Head	BHP
Impeller Diameter Change	$Q_2 = \dfrac{D_2}{D_1} Q_1$	$H_2 = \left(\dfrac{D_2}{D_1}\right)^2 H_1$	$P_2 = \left(\dfrac{D_2}{D_1}\right)^3 P_1$
Speed Change	$Q_2 = \dfrac{RPM_2}{RPM_1} Q_1$	$H_2 = \left(\dfrac{RPM_2}{RPM_1}\right)^2 H_1$	$P_2 = \left(\dfrac{RPM_2}{RPM_1}\right)^3 P_1$

Where Q = GPM, H = Head, P = BHP, D = Impeller Dia., RPM = Pump Speed