Hydronic Formulas

Pump Law #1

$$\left(\frac{GPM_{new}}{GPM_{old}}\right) = \left(\frac{RPM_{new}}{RPM_{old}}\right)$$

Formulas for problem solving
RPM is interchangeable for GPM
Note: *new* is the same as **1** and *old* is the same as **2**

GPM new = GPM old X $\left(\dfrac{RPM_{new}}{RPM_{old}}\right)$ **RPM new =** RPM old X $\left(\dfrac{GPM_{new}}{GPM_{old}}\right)$

Pump Law #2

$$\left(\frac{GPM_{new}}{GPM_{old}}\right)^2 = \frac{P_{new}}{P_{old}} \ \text{or} \ \left(\frac{GPM_{new}}{GPM_{old}}\right) = \sqrt{\frac{P_{new}}{P_{old}}}$$

Formulas for problem solving

GPM new = GPM old X $\sqrt{\dfrac{SP_{new}}{SP_{old}}}$ **SP new =** $\left(\dfrac{GPM_{new}}{GPM_{old}}\right)^2$

Pump Law #3
RPM is interchangeable for GPM

$$\left(\frac{GPM_{new}}{GPM_{old}}\right)^3 = \frac{BHP_{new}}{BHP_{old}} \ \text{or} \ \frac{GPM_{new}}{GPM_{old}} = \sqrt[3]{\frac{BHP_{new}}{BHP_{old}}}$$

Formulas for problem solving

GPM new = GPM old X $\sqrt[3]{\dfrac{BHP_{new}}{BHP_{old}}}$ **BHP new =** BHP old x $\left(\dfrac{GPM_{new}}{GPM_{old}}\right)^3$

Hydronic Thermal Calculation:

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

$$\Delta T = \frac{BTUH}{500 \times GPM}$$

$$BTUH = GPM \times 500 \times \Delta T$$

$$new\Delta P(psi) = old\Delta P(psi)x\left(\frac{GPMnew}{GPMold}\right)^2$$

GPM = Cv x $\sqrt{\Delta P(psi)}$ **Cv** = $\dfrac{GPM}{\sqrt{\Delta P(psi)}}$ $\Delta P = \left(\dfrac{GPM}{Cv}\right)^2$

Water: sp.ht. = 1.0
0.12 gal. = 1lb.
8.33 lbs. = 1 gal.
8.33 lbs. x 60 min. = 500 lbs per hour
500 x 1.0 = 500   (1.0 is the specific heat of water)