Ex 12.6
p 384

$$Av = A\frac{dx}{dt} = \frac{d(Ax)}{dt} = \frac{dV}{dt} = \text{Volume flow rate}$$

a/ Through pipe of area, A, Volume flow rate = 9.5 L s

$$1\ L = 10^{-3}\ m^3$$

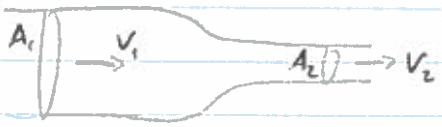
Use $Av = \frac{dV}{dt}$

$$v = \frac{1}{A}\frac{dV}{dt} = \frac{4}{\pi d^2}\frac{dV}{dt}$$

$$= \frac{4}{\pi (8.0\times10^{-2}\ m)^2}\ 9.5\ L s^{-1}\ (10^{-3}\ m^3\ L^{-1})$$

$$\underline{v = 1.9\ m s^{-1}}$$

b/



$$A_1 v_1 = A_2 v_2 \qquad v_2 = \frac{A_1 v_1}{A_2}$$

$$v_2 = \frac{4}{\pi (4.0\times10^{-2}\ m)^2} \cdot \frac{\pi}{4}(8.0\times10^{-2})^2\ (1.9\ m s^{-1})$$

$$v_2 = 7.6\ m s^{-1} \quad = 4 v_1$$