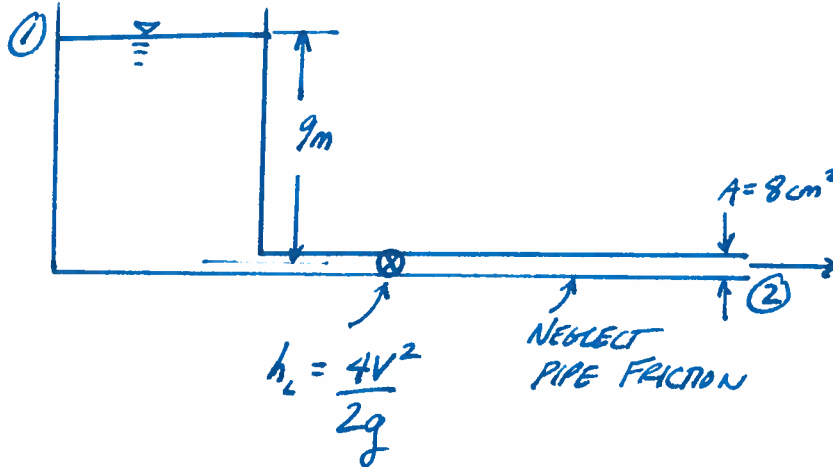




7.34 FIND Q . $K=1.0$ EVERYWHERE. NEGLECT PIPE FRICTION,
BUT INCLUDE VALVE LOSS



EQUATIONS

ENERGY, CONTINUITY.

SOLUTION

ENERGY FROM ① TO ②

$$\underbrace{\frac{p_1}{\rho} + \frac{V_1^2}{2g}}_{\substack{\text{0 gage} \\ \approx 0}} + \underbrace{z_1}_{\substack{\text{0} \\ \text{0-DATUM}}} + \underbrace{h_p}_{\substack{\text{0} \\ \text{0-DATUM}}} = \underbrace{\frac{p_2}{\rho} + \frac{V_2^2}{2g}}_{\substack{\text{0 gage} \\ \text{0-DATUM}}} + \underbrace{z_2}_{\substack{\text{0} \\ \text{0-DATUM}}} + \underbrace{h_L}_{\substack{\text{0} \\ \text{0-DATUM}}} + \underbrace{h_T}_{\substack{\text{0} \\ \text{0-DATUM}}}$$

$$z_1 = \frac{V_2^2}{2g} + h_L = \frac{V_2^2}{2g} + \frac{4V_2^2}{2g} = \frac{5V_2^2}{2g}$$

SOLVE FOR V_2

$$\sqrt{\frac{2g z_1}{5}} = V_2$$

$$\therefore \sqrt{\frac{2(9.8 \text{ m/s}^2)(9 \text{ m})}{5}} = 5.94 \text{ m/s}$$

CONTINUITY TO RECOVER Q

ES-17



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ASCE STUDENT CHAPTER

NAME SOLUTION DATE 27 MAR 14COURSE CE3305 SHEET 4 OF 8

7.34 (CONTINUED)

$$Q = V \cdot A$$

$$= (5.94 \text{ m/s}) (8 \text{ cm}^2) \left(\frac{1 \text{ m}}{100 \text{ cm}} \right) \left(\frac{1 \text{ m}}{100 \text{ cm}} \right)$$

$$= \underline{\underline{0.00475 \text{ m}^3/\text{s}}} \quad \leftarrow Q$$