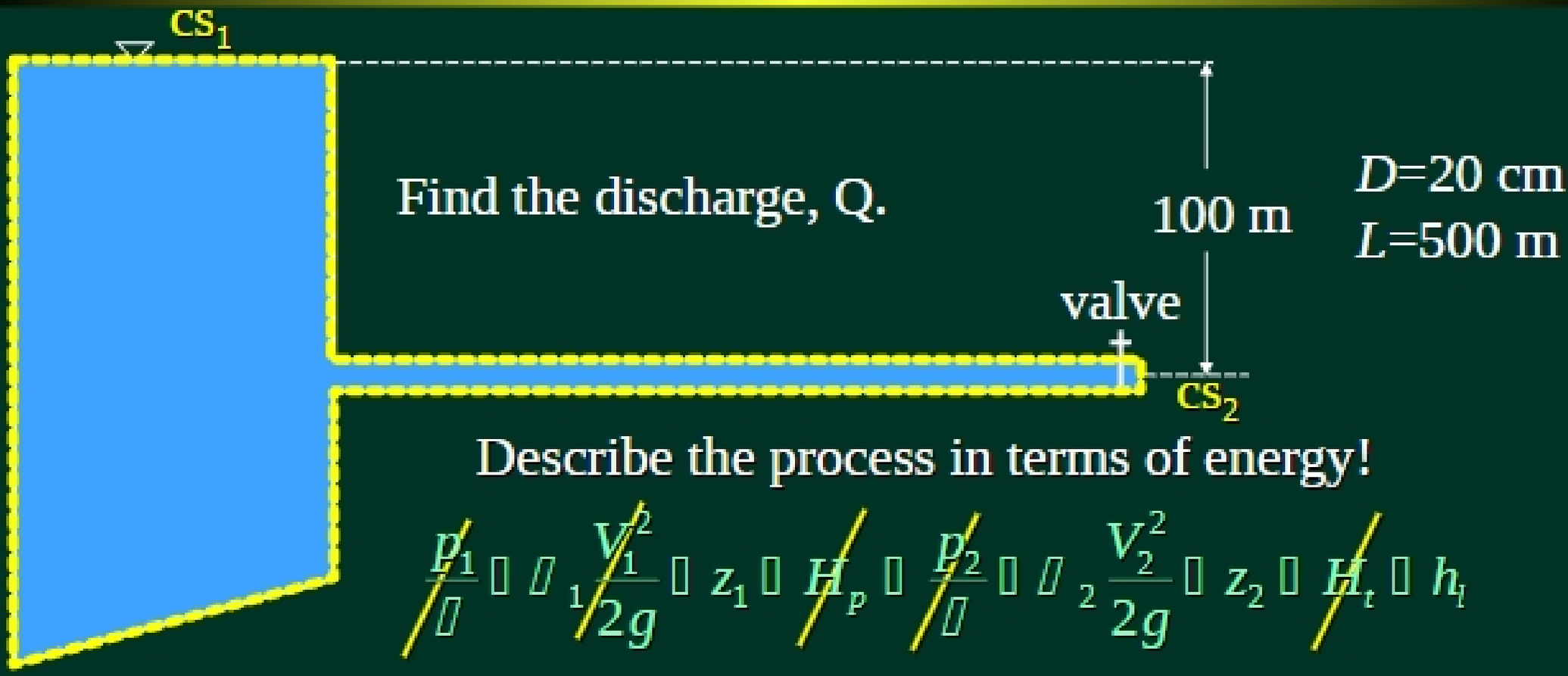
Viscous Flow in Pipes

Types of Engineering Problems

- How big does the pipe have to be to carry a flow of x m^3/s?
- What will the pressure in the water distribution system be when a fire hydrant is open?

Example Pipe Flow Problem



Describe the process in terms of energy!

$$\frac{p_1}{\gamma} + \alpha_1 \frac{V_1^2}{2g} + z_1 + H_p = \frac{p_2}{\gamma} + \alpha_2 \frac{V_2^2}{2g} + z_2 + H_t + h_l$$

$$z_1 = \frac{V_2^2}{2g} + z_2 + h_l \qquad V_2 = \sqrt{2g(z_1 - z_2 - h_l)}$$