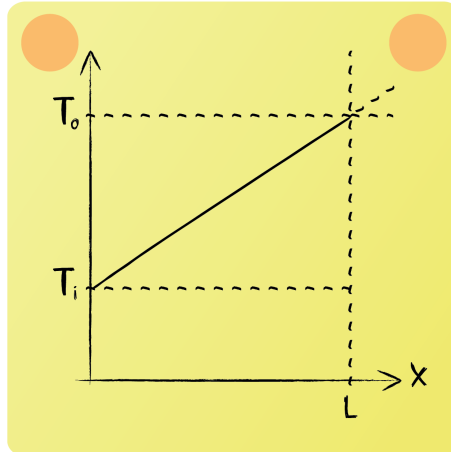


Exam Prep. - Conv. - Forced Internal

03.3

Water flows through a pipe of length L and it is heated from temperature T_i to T_o . Heat transfer is driven by a constant heat flux \dot{q}'' . Sketch the expected water temperature profile along the axis of the pipe.



Water enters at a temperature T_i .

From the entrance, it is being heated with a constant rate \dot{q}'' . As the specific heat capacity is constant, the temperature of the water will increase linearly when along in the direction of the flow.

Eventually, the water leaves the system at a temperature T_o , but the slope is not horizontal due to the fact that still heat is being transferred towards the water at that position.