

PHYS1120

Summer 2025

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1. A pond in LaBonte Park has frozen over. On a day when the air temperature is  $-5.2\text{ }^{\circ}\text{C}$ , you notice fish swimming under the frozen surface. You drill a hole in the ice and measure the water's temperature to be  $4\text{ }^{\circ}\text{C}$ . Suppose you know that the total depth of the pond is  $1.4\text{ m}$ . Given the thermal conductivity of ice and water are  $1.67$  and  $0.502\text{ W m}^{-1}\text{ K}^{-1}$  respectively, what must the thickness of the ice be to maintain this steady state of heat transfer?