

Physics 151 Class Exercise: Calorimetry

1. Each of the following situations involves the mixing of substances at different temperatures in an insulated calorimeter with negligible capacity. You should first estimate the correct answer before beginning any calculations and then write out the $Q_{\text{lost}} + Q_{\text{gained}} = 0$ equation for each and calculate the final temperature.

(a) 50g of water at 10 °C is mixed with 50g of water at 50 °C

Estimated Answer:	
Exact Answer:	

(b) 10g of water at 10 °C is mixed with 50g of water at 50 °C

Estimated Answer:	
Exact Answer:	

(c) 10g of Aluminum at 80 °C is mixed with 10g of water at 10 °C

Estimated Answer:	
Exact Answer:	

(d) 50.0g of Lead at at 10.0 °C is mixed with 10.0g of water at 80.0 °C

Estimated Answer:	
Exact Answer:	

2. Consider a double-paned window consisting of two panes of glass, each with a thickness of 0.500 cm and an area of 0.725 m^2 , separated by a layer of air with a thickness of 1.75 cm. The temperature on one side of the window is $0.00 \text{ }^\circ\text{C}$; the temperature on the other side is $20.0 \text{ }^\circ\text{C}$. In addition, note that the thermal conductivity of glass is roughly 36 times greater than that of air. **(a)** Approximate the heat transfer through this window by ignoring the glass. That is, calculate the heat flow per second through 1.75 cm of air with a temperature difference of $20.0 \text{ }^\circ\text{C}$. **(b)** Use the approximate heat flow found in part (a) to find an approximate temperature difference across each pane of glass.

Answer:	
Answer:	