An equal amount of heat is transferred to two containers containing water at the same temperature. If the second container contains three times as many water molecules as the first, how do the final temperatures compare?

Solution.

Relation between amount of heat and change of temperature of the body is the next:

$$Q = cm\Delta T$$

Where Q is amount of heat is transferred to the body; c is specific heat capacity, this is the property of the body (water in our case); m – mass of the body; ΔT – temperature change of the body.

So we have two bodies, $3*m_1 = m_2$

$$Q_1 = cm_1\Delta T_1$$

$$Q_2 = cm_2\Delta T_2 = 3cm_1\Delta T_2$$

$$Q_1 = Q_2$$

$$cm_1\Delta T_1 = 3cm_1\Delta T_2$$

$$\Delta T_1 = 3\Delta T_2$$

$$T_{1final} = T_{1initial} + \Delta T_1$$

$$T_{2final} = T_{2initial} + \Delta T_2$$

$$T_{1initial} = T_{2initial} = T$$

$$T_{1final} = T + 3\Delta T_2$$

$$T_{2final} = T + \Delta T_2$$

So temperature change of the smaller body is three times bigger than the larger one.

Answer: $T_{1final} > T_{2final}$; $\Delta T_1 = 3\Delta T_2$