6. Water A

$m_A = 2.00 \times 10^2$ g

$C = 4180 \frac{J}{kg \cdot °C}$

$T_{iA} = 80.0°C$

$T_f = ?$

Water B

$m_B = 2.00 \times 10^2 \text{ g} = m_A$

$C = 4180 \frac{J}{kg \cdot °C}$

$T_{iB} = 10.0°C$

$T_f = ?$

$Q_A = -Q_B$

$m_A C (T_f - T_{iA}) = -m_B C (T_f - T_{iB})$

since $m_A = m_B$

$T_f - T_{iA} = -T_f + T_{iB}$

$T_f + T_f = T_{iB} + T_{iA}$

$2T_f = T_{iB} + T_{iA}$

$T_f = \frac{(T_{iB} + T_{iA})}{2} = 45.0°C$

7.

$Q_A = -Q_B$

$m_A C_A (T_f - T_{iA}) = -m_B C_B (T_f - T_{iB})$

$m_A C_A T_f - m_A C_A T_{iA} = -m_B C_B T_f + m_B C_B T_{iB}$

$m_A C_A T_f + m_B C_B T_f = m_B C_B T_{iB} + m_A C_A T_{iA}$

$T_f (m_A C_A + m_B C_B) = m_B C_B T_{iB} + m_A C_A T_{iA}$

$T_f = \frac{(m_B C_B T_{iB} + m_A C_A T_{iA})}{(m_A C_A + m_B C_B)}$

$= 59.5°C$

8. F -> fishing weight W -> water

$C_F = ?$

$$Q_F = -Q_W$$

$$\frac{\cancel{m_F} C_F (T_f - T_{iF})}{\cancel{m_F} (T_f - T_{iF})} = \frac{-m_W C_W (T_f - T_{iW})}{m_F (T_f - T_{iF})} = 253 \frac{J}{kg\,^\circ C}$$

9. A -> aluminum W -> water

$C_A = ?$

see above $C_A = \frac{-m_W C_W (T_f - T_{iW})}{m_A (T_f - T_{iA})} = 836 \frac{J}{kg\,^\circ C}$