Hot and Cold Mixing Problems

Heat energy always flows from the higher temperature to the lower temperature until they reach the same temperature.

The higher temperature material releases heat energy = exo

The lower temperature material absorbs heat energy = endo

$Q = mc\Delta T$ where Q represents heat energy $\Delta T = T_f - T_i$

$-Q = mc\Delta T$ = exothermic $+Q = mc\Delta T$ endothermic

	HOT	(loses Ht)	COLD	
i)	Hands	and	Hands	Activity
ii)	Water	and	Water	Activity
iii)	Water	and	Ice	Lab

In each case the hot and the cold eventually reach the same temperature!

HOT WATER | COLD WATER

$-Q = +Q$

$$-m_H C_H \Delta T_H = m_C C_C \Delta T_C$$

m_H C_H T_H → m_C C_C T_C → T_f

$$-m_H c_H \Delta T_H = m_c c_c \Delta T_c$$

(3+4)

Therefore there are 2 formulae to use depending on the question asked!

i) $-Q = +Q$ or $-m_H c_H \Delta T_H = m_c c_c \Delta T_c$

ii) $$T_f = \frac{m_H c_H T_H + m_c c_c T_c}{m_H c_H + m_c c_c}$$

Be careful with mass! Only water has a density of 1g/1 mL.

Mass volume!

Mass (amount of matter) Volume (the space the matter occupies)

1 g mass of water occupies 1 mL of volume

But! 1 g 1 mL

30 mL Hot
80 mL cold

What would be the final temperature if 75.0 mL of water at 80.0 °C were to be mixed with 30.0 mL of 20.0 °C water?