

Year 11 Physics Test  
Heat

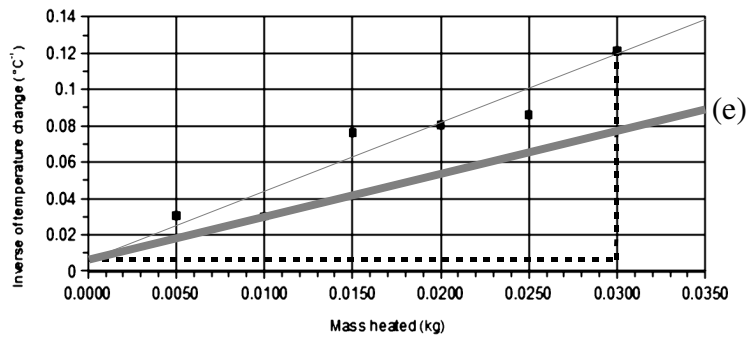
**SOLUTIONS**

1.
  - (a)  $Q = mc\Delta T$  so increased mass means more energy.
  - (b) They do not have the same specific heat capacity.
  - (c) Zero in kelvin is absolute zero.
  
2.
  - (a) Transfer of energy from hotter to colder object.
  - (b)  $25^{\circ}\text{C}$ . Heat transfers from hot to cold until same temperature i.e. thermal equilibrium.  
*(can argue for different temperatures as long as the argument is logical)*
  - (c) The metal block would warm up faster, because it transfers heat more quickly.
  
3.
  - (a) The vibrating charged particles emit radiation (electromagnetic waves).
  - (b) Convection. Air heated by the flames travels from the fire up to our hands.
  
4.
  - (a) Energy transferred during change of state.
  - (b)  $Q = mL$   
 $L$  is constant  
 $\therefore Q \propto m$   
 $\therefore \frac{Q_2}{Q_1} = \frac{m_2}{m_1}$   
 $\therefore Q_2 = \frac{m_2}{m_1} \times Q_1$   
 $= \frac{1}{2} \times 22.7 \times 10^3$   
 $= 11.4 \times 10^3 \text{ J}$
  - (c) First calculate the energy to get to  $100^{\circ}\text{C}$  :  
 $Q = mc\Delta T$   
 $= 0.050 \times 4.18 \times 10^3 \times 50$   
 $= 10450 \text{ J}$   
The leftover energy is  $15000 - 10450 = 4550 \text{ J}$   
 $Q = mL$   
 $\therefore m = \frac{Q}{L} = \frac{4550}{2.272 \times 10^6} = 0.0020 \text{ kg}$
  
5.
  - Boiling happens at or above the boiling temperature (evaporation can be colder).
  - Boiling happens wherever the heat is, evaporation is on the surface.

6.

(a) The temperature change of an object is inversely proportional to its mass.

(b) Inverse of Temperature Change against Mass Heated



(c) 
$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{0.115}{0.0300} = 3.83 \text{ } ^\circ\text{C}^{-1}\text{kg}^{-1}$$

(d) 
$$Q = mc\Delta T$$

$$\therefore c = \frac{Q}{m\Delta T}$$

Now the slope is  $\frac{\frac{1}{\Delta T}}{m} = \frac{1}{m\Delta T}$

$$\therefore c = Q \times \text{slope}$$

$$= 500 \times 4$$

$$= 2000 \text{ J kg}^{-1}\text{K}^{-1}$$