**Mark schemes – Physics unit 1 homework**

**Q1.**

(a)     80 °C

**1**

ΔE = 0.5 × 3400 × 80

**1**

ΔE = 136 000 (J)

*an answer of 136 000 (J) scores* ***3*** *marks*

**1**

(b)     energy is dissipated into the surroundings

*allow any correct description of wasted energy*

**1**

(c)     put a lid on the pan

*allow any sensible practical suggestion*

*eg add salt to the water*

**1**

(d)     efficiency = 300/500

**1**

efficiency = 0.6

*an answer of 0.6 or 60% scores* ***2*** *marks*

*allow efficiency = 60%*

*an answer of 0.6 with a unit scores* ***1*** *mark*

*an answer of 60 without a unit scores* ***1*** *mark*

**1**

(e)     lower rate of energy transfer

**1**

(so) potato soup will remain at a higher temperature

**1**

**[9]**

**Q2.**

(a)     kinetic energy = 0.5 × mass × (speed)2

*allow*



**1**

(b)     0.5 × 9000 × 302

**1**

4 050 000

**1**

4050 (kJ)

*an answer of 4050 (kJ) scores* ***3*** *marks*

*an answer of 4 050 000 scores* ***2*** *marks*

**1**

(c)     efficiency =



**1**

(d)



*allow ecf from (b)*

**1**

(useful output energy transfer =) 0.80 × 4 050

**1**

= 3240 (kJ)

*an answer of 3240 (kJ) scores* ***3*** *marks*

**1**

(e)

|  |  |
| --- | --- |
| **Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar/different is made clear and (where appropriate) the magnitude of the similarity/difference is noted. | 3-4 |
| **Level 1:** Relevant features are identified and differences noted. | 1-2 |
| No relevant content | 0 |
| **Indicative content**  **advantages of both methods:**  •   both renewable sources of energy  •   both have no fuel (cost)  •   no carbon dioxide produced  **advantages of wind**  •   higher average power output  **advantages of hydroelectric**  •   constant / reliable power (output)  •   lower (installation) cost  **disadvantages of wind**  •   higher (installation) cost  •   variable / unreliable power output  **disadvantages of hydroelectric**  •   lower power output  **disadvantages of both methods**  •   (may be) noisy  •   visual pollution |  |

**4**

**[12]**

Q3

(a)     **Level 3 (5–6 marks):**

A full, detailed and coherent plan covering all the major steps is provided, which outlines what needs to be measured to calculate specific heat capacity. The steps are set out  
in a logical manner that could be followed by another person to calculate the specific  
heat capacity.

**Level 2 (3–4 marks):**

The substantive content of a plan is present but may be missing some steps. The plan  
may not be in a completely logical sequence but leads towards the calculation of the  
specific heat capacity.

**Level 1 (1–2 marks):**

Simple statements relating to relevant apparatus or steps are made but they may not be  
in a logical order. The plan would not allow another person to calculate specific heat capacity.

**0 marks:**

No relevant content.

**Indicative content**

•        measure the mass of metal

•        correct use of balance

•        description of how work is done or energy transferred to metal

*eg electrical work, mechanical work (eg dropping lead shot)*

•        how energy transfer or work done is measured

*eg electrical using joulemeter, mechanical decrease in potential energy store of falling lead shot*

•        equate work done / energy transferred = increase in thermal energy store of the  
metal

•        calculate specific heat capacity

**6**