

Mark schemes – Physics unit 1 homework

Q1.

- (a) 80 °C 1
- $\Delta E = 0.5 \times 3400 \times 80$ 1
- $\Delta E = 136\,000$ (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

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Q2.

- (a) kinetic energy = $0.5 \times \text{mass} \times (\text{speed})^2$
allow $E = \frac{1}{2}mv^2$ 1
- (b) $0.5 \times 9000 \times 30^2$ 1
- 4 050 000 1
- 4050 (kJ)
*an answer of 4050 (kJ) scores 3 marks
an answer of 4 050 000 scores 2 marks*

(c) efficiency =

$$\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

1

(d) $0.80 = \frac{\text{useful output energy transfer}}{4050}$

allow ecf from (b)

1

(useful output energy transfer =) $0.80 \times 4\,050$

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
<p>Indicative content</p> <p>advantages of both methods:</p> <ul style="list-style-type: none"> • both renewable sources of energy • both have no fuel (cost) • no carbon dioxide produced <p>advantages of wind</p> <ul style="list-style-type: none"> • higher average power output <p>advantages of hydroelectric</p> <ul style="list-style-type: none"> • constant / reliable power (output) • lower (installation) cost <p>disadvantages of wind</p> <ul style="list-style-type: none"> • higher (installation) cost • variable / unreliable power output <p>disadvantages of hydroelectric</p> <ul style="list-style-type: none"> • lower power output 	

disadvantages of both methods	
<ul style="list-style-type: none"> • (may be) noisy • visual pollution 	

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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

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