

# Energy Changes in Systems

## Mark Scheme

<b>Level</b>	GCSE (9-1)
<b>Subject</b>	Combined Science: Trilogy - Physics
<b>Exam Board</b>	AQA
<b>Topic</b>	6.1 Energy
<b>Sub-Topic</b>	Energy Changes in Systems
<b>Difficulty Level</b>	Bronze Level
<b>Booklet</b>	Mark Scheme

**Time Allowed:** 31 minutes

**Score:** /29

**Percentage:** /100

**Grade Boundaries:**

M1.(a)	thermometer	1
	stopclock / stopwatch <i>accept measuring cylinder</i> <i>accept top pan balance</i>	1
(b)	independent: type of oil	1
	dependent: temperature rise in °C	1
(c)	wear safety goggles	1
	oil not heated directly <i>accept any reasonable comment about not handling hot apparatus.</i>	1
(d)	repeat the experiment	1
	and calculate the mean temperature rise	
	<b>OR</b>	
	heat the oil for a longer period of time (1)	
	to get a wider range of temperatures (1)	1

(e)  $(17 + 17 + 18) / 3 (= 17.33)$

1

temperature rise = 17 (°C)

1

*accept 17 (°C) with no working shown for 2 marks*

*allow 17.33 with no working shown for 1 mark*

(f)  $E = 0.025 \times 1800 \times 20$  (J)

1

$E = 900$  (J)

1

*allow 900 without working shown for the 2 calculation marks*

Joule

1

[13]

**M2.(a) Level 3 (5–6 marks):**

A clear, logical explanation containing accurate ideas presented in the correct order with links between ideas.

**Level 2 (3–4 marks):**

Key ideas presented with some linked together to form a partial explanation.

**Level 1 (1–2 marks):**

Fragmented ideas, some may be relevant, insufficient links to form an explanation.

**0 marks:**

No relevant content.

**Indicative content**

- current in the wire causes heating
- increases temperature of the metal wires / ice

**Solid**

- arrangement of particles is regular

- particles vibrate about a fixed position

## Melting

- internal energy of the ice increases, increasing the temperature to melting point
- so (as the temperature increases) particles vibrate faster
- eventually particles vibrate fast enough to break free from the (strong) bonds
- therefore the arrangement of particles becomes irregular

## Liquid

- arrangement of particles is irregular
- particles movement (translational) is random

6

- (b) The current in the heating element

1

The mass of ice

1

- (c) latent heat of fusion

1

$$45 / 120 = 0.375$$

1

0.38

*allow 0.38 with no working shown for 2 marks*

*allow 0.375 with no working shown for 1 mark*

1

[11]

**M3.** (a)



*accept 'the humpback bridge' symbol*  
*accept circle with cross but no lines*  
*if more than one symbol drawn, no mark unless lamp is labelled*

1

(b) (i) 24

*allow 1 mark for correct substitution ie  $\frac{2800}{120}$*   
*allow 1 mark for an answer 1440*  
*ignore any unit*

2

(ii) watt

1

(c) larger than

*accept correct indication inside the box*  
*accept an answer meaning larger than ie greater than*

1

[5]