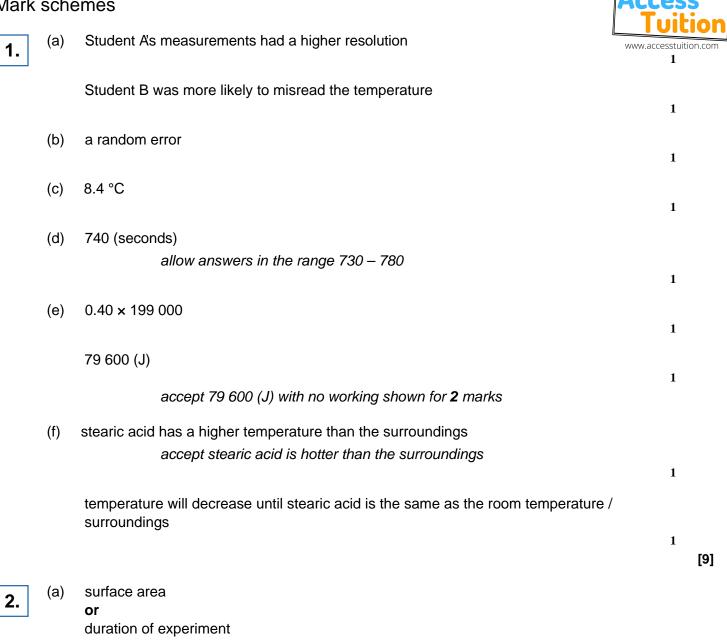


GCSE Physics Change of State and Specific Latent Heat Mark Scheme

Time available: 65 minutes Marks available: 55 marks

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Mark schemes



accept shape of beaker size of beaker is insufficient

1

(b)	any two from:			
	•	takes readings automatically ignore easier or takes readings for you	www.accesstuition	
	•	takes readings more frequently reduces / no instrument reading error ignore human error		
	•	higher resolution allow better resolution		
	•	don't need to remove probe to take reading more accurate	2	
(c)	(i)	0.07 (°C/s)		
		allow 1 mark for obtaining a temperature drop of 7 (°C) allow 1 mark for an answer between 0.068 and 0.069 (°C/s)	2	
	(ii)	rate of temperature change is greater at the start accept rate of evaporation is greater at the start		
		or rate of temperature change decreases allow rate of evaporation decreases allow temperature decreases faster at the start	1	
	(iii)	A reason only scores if A is chosen		
		lower temperature decrease (over 200 seconds) accept lower gradient	1	
	(iv)	no effect (as rate of evaporation is unchanged) allow larger temperature change (per second as mass of liquid is lower)		
(d)	part	1		
		accept particles with higher speeds	1	
	leave the (surface of the) liquid			
	(whi	ch) reduces the average (kinetic) energy (of the remaining particles) allow reference to the total energy of the liquid reducing	1	
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(a) (black) is a good absorber of (infrared) radiation



1

1

1

amount of energy required to change (the state of a substance) from solid to (b) (i) liquid (with no change in temperature)

melt is insufficient

1

unit mass / 1kg

1

(ii) $5.1 \times 10^6 (J)$

accept 5 x 10⁶

allow 1 mark for correct substitution ie $E = 15 \times 3.4 \times 10^5$

2

(c) (i) mass of *ice*

allow volume / weight / amount / quantity of ice

(ii) to distribute the salt throughout the ice

to keep all the ice at the same temperature

1

(iii) melting point decreases as the mass of salt is increased allow concentration for mass accept negative correlation

do not accept inversely proportional

60 000 (J) (d) accept 60 KJ

allow **2** marks for correct substitution ie $E = 500 \times 2.0 \times 60$

allow 2 marks for an answer of 1000 or 60

allow 1 mark for correct substitution ie

 $E = 500 \times 2.0$ or $0.50 \times 2.0 \times 60$

allow 1 mark for an answer of 1

3

(e) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.



0 marks

No relevant content

Level 1 (1-2 marks)

There is an attempt at a description of some advantages or disadvantages.

Level 2 (3-4 marks)

There is a basic description of some advantages **and / or** disadvantages for some of the methods

Level 3 (5-6 marks)

There is a clear description of the advantages and disadvantages of all the methods.

examples of the points made in the response extra information

energy storage

advantages:

- no fuel costs
- no environmental effects

disadvantages:

- expensive to set up and maintain
- need to dig deep under road
- dependent on (summer) weather
- digging up earth and disrupting habitats

salt spreading

advantages:

- easily available
- cheap

disadvantages:

- can damage trees / plants / drinking water / cars
- needs to be cleaned away

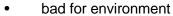
undersoil heating

advantages:

- not dependent on weather
- can be switched on and off

disadvantages:

(ii)





[18]

6

4.	(a)	(i)	any two from:	
••			mass (of block)	
			accept weight for mass	
			starting temperature	
			final / increase in temperature	
			temperature is insufficient	
			voltage / p.d.	
			same power supply insufficient	
			power (supplied to each block)type / thickness of insulation	
			same insulation insufficient	
			Same insulation insulicient	2
		 \		
		(ii)	one of variables is categoric	
			or (type of) material is categoric	
			accept the data is categoric	
			accept the data is categoric accept a description of categoric	
			do not accept temp rise is categoric	
			do not accept temp rise is categoric	1
		/···· \		
		(iii)	concrete	
			reason only scores if concrete chosen	1
				1
			(heater on for) longest / longer time	
			a long time or quoting a time is insufficient	
			do not accept it is the highest bar	
				1
		(iv)	4500 (J)	
			allow 1 mark for correct substitution ie	
			$2 \times 450 \times 5$ provided no subsequent step shown	
				2
	(b)	(i)	point at 10 minutes identified	
	()	(.)	Lanca and the commence of the	

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line through all points except anomalous

line must go from at least first to last point

1

1

(iii) 20 (°C)

if 20°C is given, award the mark.



If an answer other than 20°C is given, look at the graph. If the graph shows a correct extrapolation of the candidate's best-fit line and the intercept value has been correctly stated, allow 1 mark.

1

(iv) 2 (minutes)

1

[11]



Marks awarded for this answer will be determined by the Quality of Written Communication



(QWC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks

No relevant content.

Level 1 (1-2 marks)

Considers either solid or gas and describes at least one aspect of the particles.

or

Considers both solids and gases and describes an aspect of each.

Level 2 (3–4 marks)

Considers both solids and gases and describes aspects of the particles.

or

Considers one state and describes aspects of the particles and explains at least one of the properties.

or

Considers both states and describes an aspect of the particles for both and explains a property for solids or gases.

Level 3 (5-6 marks)

Considers both states of matter and describes the spacing and movement / forces between the particles. Explains a property of both solids and gases.

examples of the points made in the response extra information

Solids

- (particles) close together
- (so) no room for particles to move closer (so hard to compress)
- vibrate about fixed point
- strong forces of attraction (at a distance)
- the forces become repulsive if the particles get closer
- particles strongly held together / not free to move around (shape is fixed)

any explanation of a property must match with the given aspect(s) of the particles.

Gases

- (particles) far apart
- space between particles (so easy to compress)
- move randomly
- negligible / no forces of attraction
- spread out in all directions (to fill the container)