

MARK SCHEME

GCSE

PHYSICS

AQA - COMBINED SCIENCE

P3 - TEST 1

PARTICLE MODEL OF MATTER

Beginner

Mark schemes

1.

- (a) (i) random distribution of circles in the box with at least 50 % of circles touching 1
random distribution of circles occupies more than 50 % of the space
judged by eye 1
- (ii) (large) gaps between particles
accept particles do not touch
accept particles are spread out 1
- (so) easy to push particles closer (together)
or
forces between particles are negligible / none
an answer in terms of number of particles is insufficient 1
- (b) (i) (both are) random
*accept a correct description of random eg unpredictable or move
around freely or in all directions*
they take up all the space is insufficient
they are spread out is insufficient
they move in straight lines is insufficient 1
- (ii) (speed also) increases 1

[6]

2.	(a) dependent	1
	(b) (probe) C	
	<i>allow 103.2</i>	1
	largest difference between reading and actual temperature	
	<i>reason only scores if C chosen</i>	
	<i>accept larger</i>	
	<i>it is 3.2 greater is insufficient</i>	
	<i>comparing C with only one other probe is insufficient</i>	1
	(c) (i) 12(°C)	
	<i>accept a value between 12.0 and 12.2 inclusive</i>	1
	(ii) 140 (seconds)	
	<i>accept an answer between 130 and 150 inclusive</i>	1
	<u>temperature</u> starts to rise	
	<i>only scores if time mark awarded</i>	
	<i>accept the <u>temperature</u> was lowest (at this time)</i>	1
	(iii) increase	
	<i>accept faster (rate)</i>	1
		[7]
3.	(a) (approximate same size particles as each other and as liquid and gas) touching	
	<i>do not accept particles that overlap</i>	1
	regular arrangement (filling the square)	1
	(b) condensing	1
	(c) solid	1
	(d) physical	1
	(e) particles have more kinetic energy	1
	particles move faster	1

- (f) mass of the liquid 1
- specific latent heat of vaporisation 1
- (g) $2 \times 4\,200 \times 80$ 1
- 672 000 (J) 1
- an answer of 672 000 (J) scores 2 marks*

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4.

- (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

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- (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]