

MARK SCHEME

GCSE

PHYSICS

AQA - TRIPLE SCIENCE

P3 - TEST 4

PARTICLE MODEL OF MATTER

Intermediate

Mark schemes

1.	(a) range of speeds	1
	moving in different directions <i>accept random motion</i>	1
	(b) internal energy	1
	(c) density = mass / volume	1
	(d) 0.00254 / 0.0141	1
	0.18	1
	<i>accept 0.18 with no working shown for the 2 calculation marks</i>	
	kg / m ³	1
		[7]

2.

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)

[6]

3.

(a) **B**

*no mark for **B** - marks are for the explanation
first two mark points can score even if **A** is chosen*

draught increases (the rate of) evaporation

accept more evaporation happens

accept draught removes (evaporated) particles faster

*do **not** accept answers in terms of particles gaining energy from the fan / draught*

1

evaporation has a cooling effect

accept (average) kinetic energy of (remaining) particles decreases

1

so temperature will fall faster / further

1

(b) larger surface area

1

increasing the (rate of) evaporation

accept more / faster evaporation

accept easier for particles to evaporate

or

for water to evaporate from

accept more particles can evaporate

*accept water / particles which have evaporated are trapped
(in the bag)*

answers in terms of exposure to the Sun are insufficient

1

[5]

4.

(a) (matt) black is a good emitter of infrared / radiation

accept heat for infrared / radiation

ignore reference to good absorber

attracts heat negates this marking point

1

to give maximum (rate of) energy transfer (to surroundings)

accept temperature (of coolant) falls fast(er)

accept black emits more radiation for 1 mark

*black emits most radiation / black is the best emitter of radiation for
2 marks*

1

(b) the fins increase the surface area
accept heat for energy 1

so increasing the (rate of) energy transfer
or
so more fins greater (rate of) energy transfer 1

(c) 114 000
allow 1 mark for correct temperature change, ie 15 (°C)
or
allow 2 marks for correct substitution, ie $2 \times 3\,800 \times 15$
*answers of 851 200 **or** 737 200 gain 2 marks*
or
*substitution $2 \times 3800 \times 112$ **or** $2 \times 3800 \times 97$ gains 1 mark*
an answer of 114 kJ gains 3 marks 3

(d) increases the efficiency 1

less (input) energy is wasted
accept some of the energy that would have been wasted is
(usefully) used

or
more (input) energy is usefully used
accept heat for energy 1

[9]

5.

(a) radiates
absorbs / conducts
reflects
for 1 mark each 3

(b) C make sure the lamp is the same distance from both tubes
B switch on the lamp
A switch off the lamp
E wait for the temperature to stop rising
D read the thermometers
for 1 mark each 5

[8]

6.

(a) any **two** from:

- black is a good emitter of (infrared radiation)
accept heat for radiation
ignore reference to absorbing radiation
- large surface (area)
- matt surfaces are better emitters (than shiny surfaces)
accept matt surfaces are good emitters
ignore reference to good conductor

2

(b) 90% or 0.9(0)

$$\text{efficiency} = \frac{\text{useful energy out} (\times 100\%)}{\text{total energy in}}$$

allow 1 mark for correct substitution, ie $\frac{13.5}{15}$

provided no subsequent step shown

an answer of 90 scores 1 mark

an answer of 90 / 0.90 with a unit scores 1 mark

2

(c) (producing) light

allow (producing) sound

1

(d) any **two** from:

- wood is renewable
accept wood grows again / quickly
accept wood can be replanted
- (using wood) conserves fossil fuels
accept doesn't use fossil fuels
- wood is carbon neutral
accept a description
cheaper / saves money is insufficient

2

(e) $E = m \times c \times \theta$

2 550 000

allow 1 mark for correct substitution

ie $100 \times 510 \times 50$

provided no subsequent step shown

answers of 1 020 000, 3 570 000 gain 1 mark

2

joules /J

accept kJ / MJ

*do **not** accept j*

for full credit the unit and numerical answer must be consistent

1

[10]