MARK SCHEME

GCSE

PHYSICS

AQA - COMBINED SCIENCE

P3 - TEST 5

PARTICLE MODEL OF MATTER

Advanced

Mark schemes

1.

(a) density = mass / volume

1

(b) any **two** from:

- no forces shown between spheres
- atoms / molecules / ions are not solid spheres
- not all the same size.

2

(c) at higher temperatures particles have more kinetic energy

1

(so) the (average) speed of the particles increases

1

(so there are) more frequent collisions with the wall of the container

1

which apply a greater force on wall of container (so pressure rises)

1

[7]

2.

(a) energy transferred from athlete / skin / body to water / sweat

allow water / sweat heated by athlete

1

(so) more energetic (water / sweat) particles escape (from the liquid)

accept particles with higher speeds escape (from the liquid)

1

water / sweat <u>evaporates</u>

accept particles escape from the (surface of the) liquid

1

(which) lowers the <u>average</u> energy of (remaining) water / sweat particles

allow reference to the total energy of the liquid reducing

allow lowers the athlete's <u>temperature</u>

ignore cool down

1

(b) any **three** from:

accept IR / radiation / heat / infrared / energy throughout

- the blanket traps air
- air is an insulator

  accept for 2 marks trapped air reduces conduction / convection
- space blanket reflects infrared radiation (back to the body)

  ignore incident solar radiation

  ignore reflects light

  ignore bounces off
- space blanket is a poor emitter / radiator of infrared radiation

  *do **not** accept does not emit infrared radiation*

3

[7]

3. (a) random

accept in all directions

1

description must be of random motion

(b) heating increases the temperature of the gas

1

temperature is proportional to kinetic energy

1

if kinetic energy increases speed increases

1

(c) energy is needed to change the state of the water

1

to break the bonds

1

(d) $1000 = m / 2.5 \times 10^{-5}$

1

$m = 2.5 \times 10^{-5} \times 1000$

1

$m = 0.025$ (kg)

1

$E = 0.025 \times 2\ 260\ 000$

1

$E = 56\ 500$ (J)

1

*allow 56 500 (J) without working shown for **5** marks*

***0** marks awarded for E = m × L*

(e) any **four** from:

- because the water is preheated) the change in temperature of the water is less
- so less energy is used to heat the water (E=mcΔθ)
- therefore they (condensing boilers) are more efficient
- so less energy is wasted
- less gas is burned to heat the same amount of water
- less waste gas (CO_2) is produced by the boiler **or** (because less gas is used) they are cheaper to run / save money

4

[15]