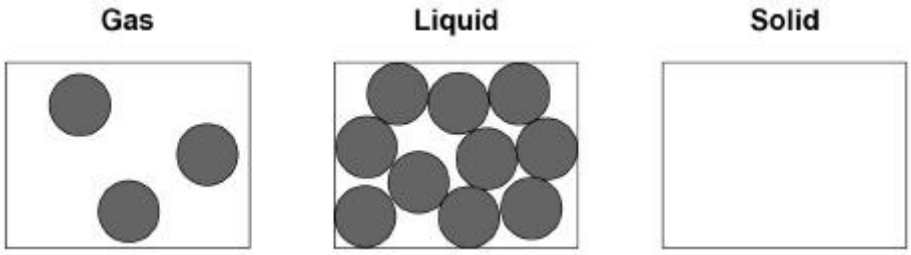
Physics unit 3 homework – Particle model of matter

For each of the questions below: -

Highlight the command word if there is one & annotate what the command word means. - Answer the question!

Q1. The diagram shows a model of the particles in a gas and in a liquid.



(a) Complete the diagram to show the arrangement of particles of the same substance as a solid.

(2)

(c) The substance in the diagram has a:

- melting point of 98 °C
- boiling point of 883 °C

What is the state of the substance at 20 °C?

Tick **one** box.

Gas ☐ Liquid ☐ Solid ☐

(1)

(d) What type of change is a change of state?

Tick **one** box.

Chemical ☐

Kinetic ☐

Permanent ☐

Physical ☐

(1)

(e) Which **two** statements are correct about the particles when a liquid turns into a gas?

Tick **two** boxes.

Particles are bigger ☐

Particles are lighter ☐

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For each of the questions below: -

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Particles have more chemical energy ☐

Particles have more kinetic energy ☐

Particles move faster ☐

(2)

(f) Which **two** quantities are needed to calculate the energy required to turn a liquid into a gas with no change in temperature?

Tick **two** boxes.

Mass of the liquid ☐

Specific heat capacity of the gas ☐

Specific latent heat of vaporisation ☐

Time the liquid is heated ☐

(2)

(g) A mass of 2.0 kg of water is heated.

The temperature increase of the water is 80 °C

The specific heat capacity of water is 4200 J / kg °C

Calculate the change in thermal energy when the water is heated.

Use the equation:

change in thermal energy = mass × specific heat capacity × temperature change

_____

_____

_____

Change in thermal energy = _____ J

(2)

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For each of the questions below: -

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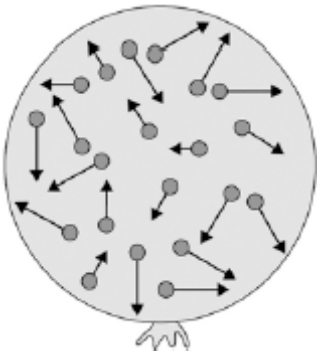
Q2 The figure below shows a balloon filled with helium gas.



(a) Describe the movement of the particles of helium gas inside the balloon.

_____

_____

_____

_____

(2)

(b) What name is given to the total kinetic energy and potential energy of all the particles of helium gas in the balloon?

_____

(1)

(c) Write down the equation which links density, mass and volume.

_____

(1)

(d) The helium in the balloon has a mass of 0.00254 kg.

The balloon has a volume of 0.0141 m^3.

Calculate the density of helium. Choose the correct unit from the box.

m^3 / kg	**kg / m^3**	**kg m^3**

_____

_____

_____

_____

Density = _____ Unit _____

(3)

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Q3 Solid, liquid and gas are three different states of matter.

(a) Describe the difference between the solid and gas states, in terms of the arrangement and movement of their particles.

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_____

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_____

(4)

(b) What is meant by 'specific latent heat of vaporisation'?

_____

_____

_____

_____

(2)

(c) While a kettle boils, 0.018 kg of water changes to steam.

Calculate the amount of energy required for this change.

Specific latent heat of vaporisation of water = 2.3×10^6 J / kg.

_____

_____

_____

Energy required = _____ J

(2)