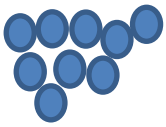
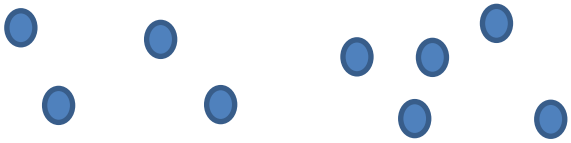
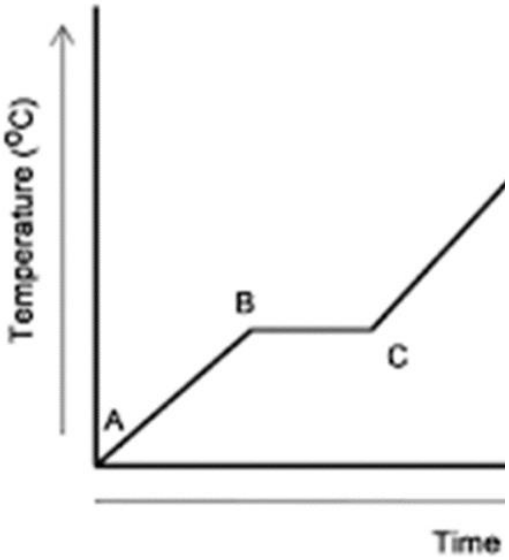
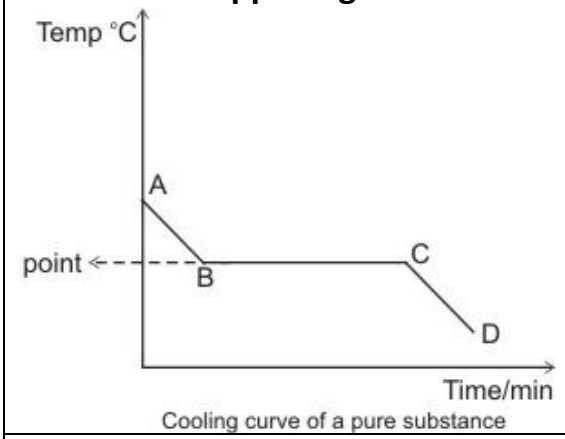
P1 Topic 1 Particle Model FACT SHEET

States of matter	
1. Name the 3 states of matter	**Solid, liquid, gas**
2. Draw 9 particles in solid	
3. Draw 9 particles in a liquid	
4. Draw 9 particles in gas	
5. Which state of matter is usually the most dense? Why?	• **Solid** • **because particles are closer together** • **so there are more particles in a given space**
6. Which state of matter is usually the least dense? Why?	• Gas • because particles are further apart • so there are less particles in a given space
7. Changing from a solid to a liquid is called…	**melting**
8. Changing from a liquid to a gas is called….	**evaporation**
9. Changing from a gas to a liquid is called…	**condensation**
10. Changing from a liquid to a solid is called….	**freezing**
11. Changing from a solid to a gas is called…	sublimation
12. Are changes of state physical or chemical changes? Why?	• Physical • because the change can be reversed (and no bonds are broken/ made)
13. The mass of a substance before a change of state is ….. as the mass of the substance after the change (e.g. when a solid melts, the mass of the solid is ….. as the mass of the liquid)	the same as
14. If 50g of a liquid is heated, state the mass of gas produced	**50g**

Density	
1. How do you calculate density?	***Density = mass ÷ volume***
2. State the units for mass	kg
3. State the units for volume	m^3
4. State the units for density	**kg/m^3**
Heating and cooling curves	
1. The graph below shows a solid being heated. What is happening between B and C? 	**It is melting**
2. The graph below shows a gas being cooled. What is happening between B and C?  Cooling curve of a pure substance	**It is condensing**
3. On a heating/ cooling graph, what is happening when there is a flat, horizontal line?	**A change of state**
4. On a heating/ cooling graph, what is happening when the line goes up?	Temperature is increasing

Internal energy	
1. Define internal energy	Energy stored by particles in a system
2. When do particles have kinetic energy?	**When they are moving**
3. Internal energy = _____ + _____	Kinetic energy + stored energy of particles
4. What does heating do to particles?	**Increases their energy**
5. State 2 ways a material/ system can change when it is heated	• **Increase in temperature** • **Change state**
Specific heat capacity	
1. Define specific heat capacity	• Amount of energy required • For 1 kg of a substance • To get hotter by 1°C
2. State the units for specific heat capacity	J/ kg °C
3. If a material has a high specific heat capacity, **a lot/ not much**, energy is needed to heat it up by 1°C	A lot
Specific latent heat	
1. Define specific latent heat	• Amount of energy required • For 1 kg of a substance • To change state (e.g. melt, freeze)
2. When a change of state occurs, what happens to the temperature of the substance?	**Stays the same**
3. State the units for latent heat	J/kg
4. Define specific latent heat of fusion	1kg changing from solid to liquid
5. Define specific latent heat of vaporisation	1kg changing from liquid to gas (vapour)
Gas pressure	
1. Describe the movement of gas particles	• **Constant (they don't stop)** • **random (go in any direction)**
2. If the volume of gas stays the same: as the temperature increases, the movement of the gas particles…..	increases
3. If the volume of gas stays the same: as the temperature increases, the pressure….	**increases**
4. If the volume of gas stays the same: increasing the movement of the gas particles will …. the pressure of the gas	increase

Skills section

You will be given these formulae:

- **$\Delta E = m \times c \times \Delta\theta$ (ΔE = energy, m = mass, c = specific heat capacity, $\Delta\theta$= temperature change)**
- **$E = m L$ (E = energy, m = mass, L = specific latent heat)**

4marks per question:

- **Equation written down**
- **Substitution of numbers into the equation**
- **Number answer**
- **Units on the answer**

1. An object has a mass of 12 kg and a volume of 4m^3. Calculate the density of the object	**p= m ÷ V** **12 ÷ 4** **3 kg/m^3**
2. An object with a mass of 5kg is made of a material with a specific heat capacity of 10J/ kg °C. It increases in temperature by 10°. Calculate the energy transferred	$\Delta E = m \times c \times \Delta\theta$ 5 x 10 x 10 500 J
3. An object with a mass of 3kg is made of a material with a specific heat capacity of 2000J/ kg °C. It increases in temperature by 40°. Calculate the energy transferred	$\Delta E = m \times c \times \Delta\theta$ 3 x 2000 x 40 240,000 J
4. An object with a mass of 9kg is made of a material with a specific heat capacity of 250J/ kg °C. It is heated from 20°C to 40°C. Calculate the energy transferred	$\Delta E = m \times c \times \Delta\theta$ Temperature change = 40-20 = 20°C E = 9 x 250 x 20 = 45000J
5. 4kg of a liquid is heated and it turns into a gas. The specific latent heat of the substance is 600J. Calculate the energy	E = m L 4 x 600 2,400J
6. 8kg of a solid is heated and it turns into a liquid. The specific latent heat of the substance is 1000J. Calculate the energy	E = m L 8 x 1000 8,000J

TRIPLE ONLY	
Gas pressure	
1. Define pressure	Net force of particles at right angles to the wall of the gas container/ surface
2. If temperature is kept constant: increasing the volume of a gas will ….. the pressure	decrease
3. Explain why increasing the volume of a gas will decrease the pressure (if temperature is kept constant)	Particles are more spread out Net force of particles will be reduced
4. State the units for pressure	Pascals (Pa)
5. Define work	Transfer of energy by a force
6. What does doing work on a gas do to the internal energy of the gas?	Increases it
7. What does doing work on a gas do to the temperature of the gas?	Increases it
8. Explain how a bicycle pump increase the temperature of the gas	• It decreases the volume • Which increases the pressure • Which increases the temperature