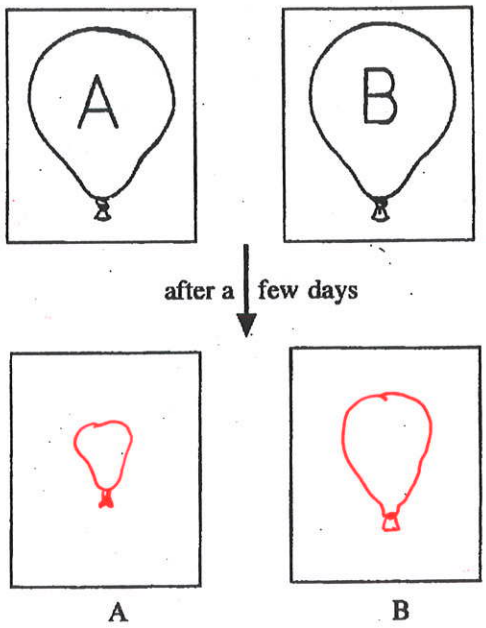
9. Particles in Motion 1

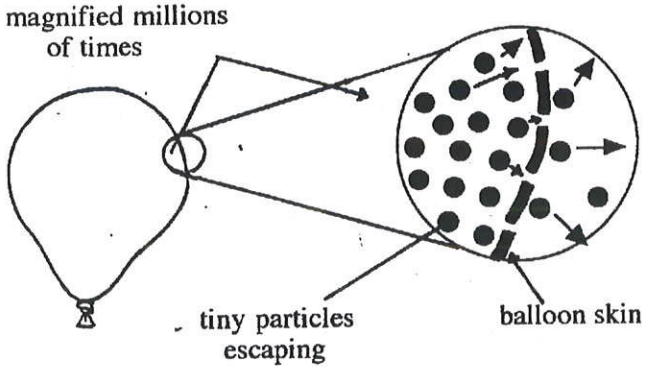
Learning Outcomes:

- Know that particles of a gas are moving
- Know that the skin of a balloon must contain tiny holes
- Know that the particles of a gas will move till the container the gas is in is full of the gas
- Be able to draw and describe the speed of motion of gas particles

Activity: Draw in the balloons after a few days



Activity: Colour in the balloon



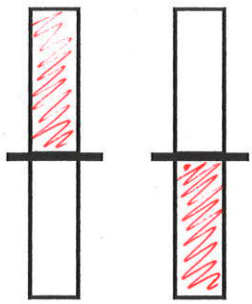
Activity: Complete the paragraph and diagrams below

Gases are made up of very tiny p articles. These very tiny particles are always moving and escape through tiny h oles in the skin of the balloon. The particles in balloon A must be s maller than the particles in balloon B because m ore of them escape.

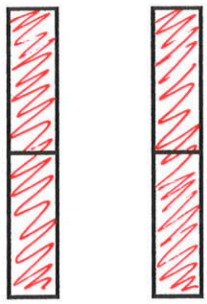
Brown Gas

Colour in the diagram below to show what happens when the lids are removed.

Before



After



Complete the following:

Particles of the b rown gas m ove to fill the container that they are in. This happens whether the gas is at the t op of the container or the b ottom of the container.

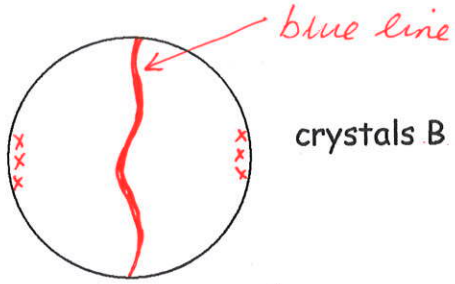
10. Particles in Motion 2

Learning Outcomes:

- Know that the particles of a liquid are always moving
- Be able to draw or recognise a particle picture of a liquid
- Be able to draw or recognise a particle picture of a solid
- Be able to compare the speed of movement of particles in a solid and a liquid

Particles Moving in Liquids

Activity: Colour in and label the diagram below to show the dish after a few minutes.



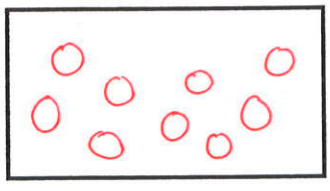
Petri dish with water
crystals A

Activity: Complete the sentences:

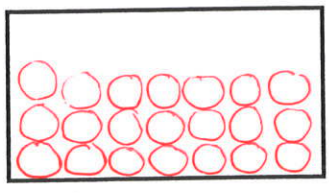
The b lue colour appears where the 2 chemicals meet. The position of this line shows that both chemicals have m oved out from where they have started. This is caused by movement of the p articles.

Activity: Copy the diagrams on page 26-7 of work book

Particles in a Liquid



Particles in a Solid



11. Diffusion

Learning Outcomes:

- Know that there are spaces between the particles of a solid
- Know what diffusion is in solids liquids and gases

Activity: **Fill** in the missing word.

When particles of one substance move through the particles of another substance we call this d iffusion .

Diffusion in Solids

Activity: Draw 4 test tubes below and colour to show the blue crystals before and after.

Before **After**

Complete:

Particles of the blue s olid have diffused through the particles of the g el . This happens whether the s olid is going up the way or d own the way.

Diffusion in Gases (from lesson 9)

Activity: Complete the sentences:

The scent from the c andle moved from the front to the b ack of the room. The room already contained a ir and so there must have been s paces between the air particles so the s cent particles could move through it. This process is called d iffusion .

Diffusion in liquids (from Lesson 10)'

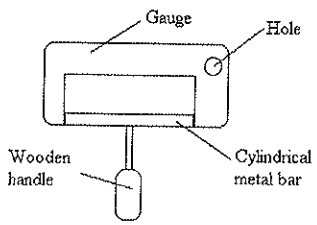
When the pale green solid and the orange solid were put at opposite sides of a container of water, their p<u>articles</u> diffused through the water until they met in the middle, where they reacted to form a b<u>lue</u> solution.

12. Expansion and contraction

Learning Outcomes:

- Be able to define 'expand' and 'contract'
- Be able to describe what effect heating and cooling will have on the volume of an object
- Be able to explain expansion and contraction in terms of particles and spaces

Heating solids



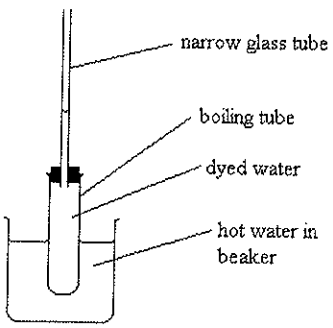
Activity: Complete the sentences:

When the gauge is heated it gets bigger.

When something gets bigger we say it expands.

When something gets smaller we say it contracts.

Heating Liquids



Activity: Complete the sentence:

When the liquid in the tube is put in hot water it expands.

Activity: Complete the sentences:

When substances are heated, their particles move f aster and spread out more. The substance expands.

When substances are cooled, their particles move s lower and move closer together. The substance contracts.

Activity: Decide whether or not you think the following statements are true or false?
Write 'True' or 'False' after each statement

1. Gases can expand roughly 3000 times more than solids. FALSE

2. The Forth railway bridge is 2.5 km long in the winter time, but in the summer time it is half a meter longer. TRUE

3. It would be a sensible idea to have power cables hanging tightly just before the start of winter months. FALSE

13. One Substance 3 States

Learning Outcomes:

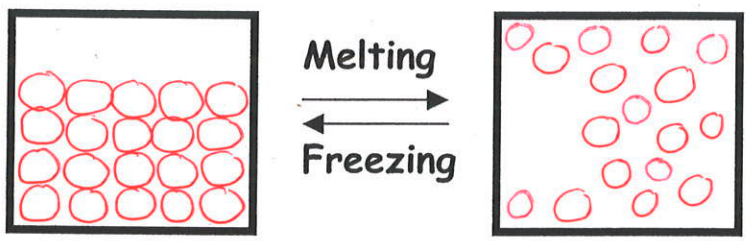
- Know the correct words for the changes of state between **a solid, a liquid and a gas**
- Be able to draw the particle pictures for these changes of state
- Know what effect the changes of state have on the speed of motion of the particles and how tightly held together they are

Solid and Liquid

Activity: Draw a beaker of ice with a thermometer in it.

Complete the following using the particle pictures from lesson 9:

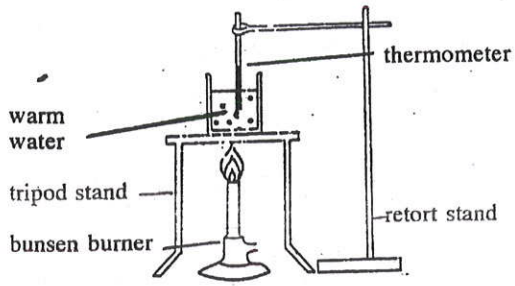
Ice **Water**



Heat from the room is needed to change ice into w**ater**.
The particles are now held together less strongly and are moving f**reely**.

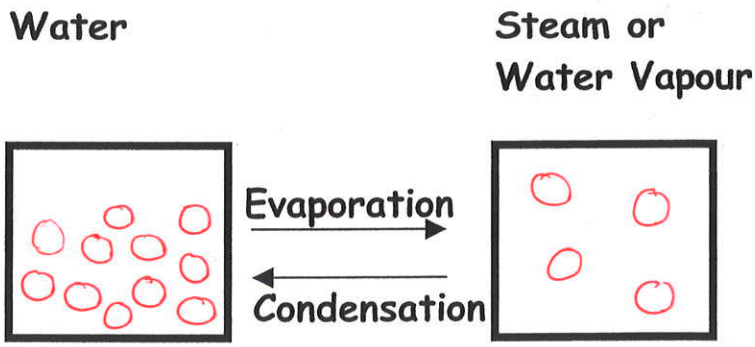
Liquid and Gas

Water and Steam



The change of state from liquid to gas is called **evaporation** and the reverse change of state is called **condensation**.

Activity: Complete the **Particle Diagram**



Activity: Complete the sentences:

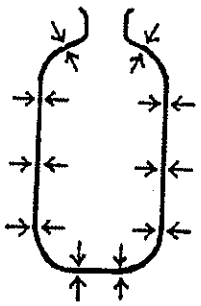
The Bunsen b urner provides heat to change the liquid, w ater into the g as, steam. The particles of water in steam are now held together l ess tightly than before and they are moving faster.

14. Pressure

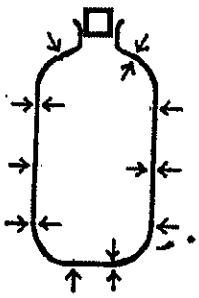
Learning Outcomes:

- Understand what causes pressure in a container
- Be able to state what effect changing the temperature has on pressure
- Be able to explain why changing the temperature changes the pressure
- Be able to state two other ways of changing pressure

Activity: Your teacher will demonstrate the effect of reducing the pressure inside a container.



Bottle with equal pressure inside and out



Bottle with some of the air removed from inside
Greater pressure outside than in

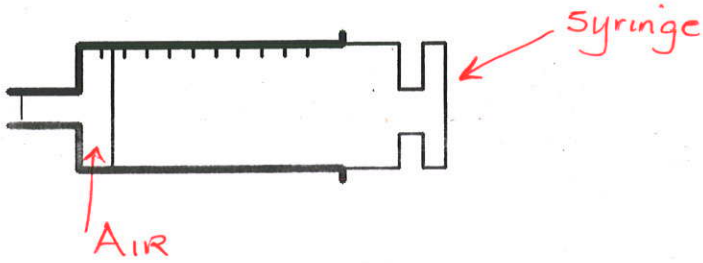
Activity: Complete the statement:

When enough a<u>ir</u> is removed or the p<u>ressure</u> is reduced inside the bottle the bottle will collapse.

Temperature and Pressure

Activity: Complete the diagram and table below:

Apparatus



Table

	At start	In tap water	In hot water	In cold water
Volume of air (cm^3)	5 cm^3	SMALL Difference	INCREASE	DECREASE

Activity:
Some of the statements below are true and some are false. Use the statements which you think are true to write an explanation for what happened in your experiments.

For any false statements, you should be able to change one or two of the words to make them true.

- ✓ The syringe contained a gas
- When the gas was heated, it took up ~~less~~ more space
- ✓ Heating a substance makes the particles move faster
- Heating a substance makes the particles get ~~bigger~~ hotter
- ✓ Heating a substance makes the particles spread out more
- Heating a substance means that the spaces between the particles get ~~smaller~~ bigger

Explanation of observations in experiment:
Use your corrected statements above to complete these statements

The syringe contained a gas.
When the gas was heated, it took up more space.
Heating a substance makes the particles move faster.
Heating a substance makes the particles get hotter.
Heating a substance makes the particles spread out more.
Heating a substance means that the spaces between the particles get bigger.

Complete the following:

Three ways to change the pressure inside a container are:

1. increase the temperature
2. put more gas in
3. decrease the size of the container.