# Easy Science 7
# Textbook Answer Key

# Unit 1: Plant Systems

**Practice page 3**

- Xylem
- Water and minerals, solutions

**Practice page 5**

Transpiration affected by

- Temperature
- Wind
- Humidity
- Time of day

**Practice page 6**

1. False
2. True
3. False

**Practice page 9**

1. Magnesium
2. Nitrogen
3. Photosynthesis
4. Anaerobic respiration

**Exercise**

**1.**

**i.** b

**ii.** a

**iii.** a

**iv.** b

**v.** b

**vi.** b

**2.**

| Column A | Column B |
|---|---|
| Nitrogen | Is important for root development |
| Phosphorous | Is important for protein synthesis |
| Potassium | Regulates enzyme activity |

**3.**

**i.** Root system

Shoot System

**ii.** parts of a shoot system

All the parts above the ground including stem, leaves, flowers, buds, etc.

**iii.** The function of stomata is to allow exit of water vapour.

**iv.** Definitions.

**a. Osmosis**

The process by which water moves from an area of higher concentration of water to an area of lower concentration of water is known as osmosis.

**b. Transpiration**

The process by which the plant releases water into the atmosphere is known as transpiration.

**c. Photosynthesis**

The making of food in plant leaves takes place through a process called as photosynthesis, where carbon dioxide and water combine to form glucose or starch and oxygen is released in the presence of sunlight in chloroplast.

**d. Aerobic respiration**

This is a type of respiration which requires oxygen and a large amount of energy is released. Glucose and oxygen react and carbon dioxide, water and energy is released.

**e. Anaerobic respiration**

This type of respiration takes place in the absence of oxygen and less energy is released. Glucose changes into ethanol, carbon dioxide and energy.

**v.** Transpiration is called necessary evil because on one hand it transports water from roots to leaves in plants and on the other hand an increase in the rate of transpiration results in wilting.

**4.**

**a.**

Carbon Dioxide + Water $\xrightarrow{\text{sunlight absorbed by chlorophyll}}$ Glucose + Oxygen

**b.**

Glucose + Oxygen $\longrightarrow$ Carbon Dioxide + Water + Energy

**5.**

**i** There are two types of root systems: Tap root system and fibrous root system. A tap root is a long thick root that grows straight down, whereas a fibrous root system consists of many roots growing in all directions.

**ii.** Various parts of shoot system and their functions.

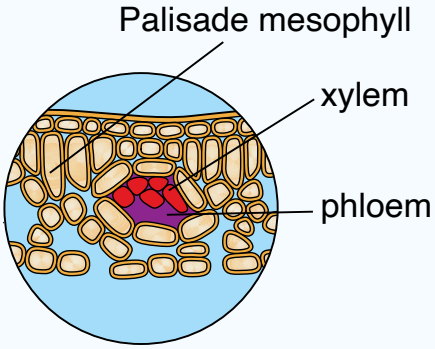
All the parts of the plants which are above the ground are known as shoot system. Some are:

Stem. It is the main support system of the plant above the ground. It holds the leaves where food making occurs. The flowers are also produced on it. The long tubes inside the stem carry, food, water, etc. in the plant. Minerals are also transported/ The leaves have special structure are sites for photosynthesis as well as transpiration.

Flowers are reproductive parts that attract insects in pollination. Sometimes self pollination occurs. Seeds are produced inside the fruits. Buds are where growth starts.

**iii.** Vascular bundles are tiny tubes in stems and roots which carry water and nutrition throughout the plant body. There are two types of vascular bundles which are phloem and xylem. These tubes combine together to form vascular bundles. Xylem carries water and minerals in the form of solutions. Phloem carries food.

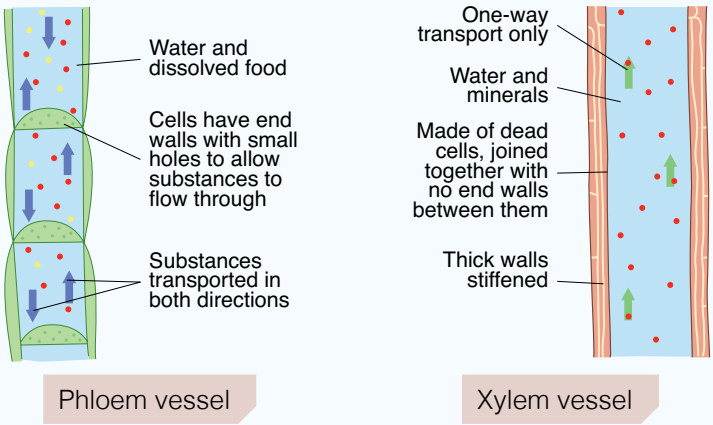
**iv.** The internal structure of leaf



**v.** Comparison between photosynthesis and transpiration

| Photosynthesis | Raspiration |
|---|---|
| Food is produced | $CO_2$ $H_2O$ and energy |
| Food is produced in green leaves in the chloroplast | Water is released through stomata |
| It takes place in the day time only | It takes place in day at a higher rate but continues at a lower rate at night |

**6.**




Both xylem and phloem play their part in transport of substances in plants. These are tiny tubes that move substances up and down in a plant. The xylem transports water and minerals in the plants. The phloem tubes moves sugars and other nutrients in the plant, The movement in xylem in one direction (upward) and in phloem it is in two directions.

# Unit 2: Human Respiratory and Circulatory System

**Practice page 13**

1. Organ
2. Respiration
3. Oxygen, lungs

**Practice page 14**

1. Trachea
2. Lungs
3. Bronchus

**Practice page 15**

1. The Trachea
2. Bronchi

**Practice page 17**

| Column A | Column B |
|---|---|
| Arteries | Transport oxygenated blood |
| Capillaries | Small blood vessels with thin the walls |
| Veins | Transports deoxygenated bloods |
| Heart | Pumps blood |

**Practice page 19**

1. Water
2. Biconcave shape
3. White blood cells
4. The bone marrow of large bones

**Practice page 20**

1. Two types, open and closed
2. Open circulatory system
3. Closed circulatory system in humans

**Exercise**

**1.**

**i.** d

**ii.** c

**iii.** a

**iv.** c

**v.** b

**vi.** b

**2 a.**

- The six organ systems are:
- Circulatory system
- Nervous system
- Respiratory system
- Digestive system
- Skeletal system
- Muscular systems

**b.**

Aerobic respiration

When respiration involves oxygen it is known as respiration

Anaerobic respiration

When respiration takes place without oxygen it is known as anaerobic respiration.

Respiration

It is a chemical process by which the body derives energy in its cells.

Breathing

It is the process when carbon dioxide leaves the body and oxygen enters through lungs.

**c. Blood vessels in the human body are:**

- Arteries
- Veins
- Capillaries

**d. The type of blood cells are:**

- Red blood cells
- White blood cells
- Platelets

**e. Key organs of respiratory system:**

- Trachea
- Lungs
- Bronchus
- Nasal cavity
- Nostrils

**3**

**i.** The two phases of breathing are :

- Inhalation (breathing in)
- Exhalation (breathing out)

The parts involved and their function:

Diaphragm is a muscle that pulls down and creates space.

Muscles of rib cage also help in the same.

Lungs – Exchange of gases takes place in the lungs during the process.

Trachea or wind pipe is the passage for air to lungs from nasal cavity.

Bronchi – The trachea splits into two tubes known as bronchi entering the lungs they further divide into smaller tubes called as bronchioles. Thy continue to branch out into tiny tubes called as alveoli.

**ii.** The closed circulatory system in human body keeps the blood inside blood vessels, keeping it more efficient. It comprises of Blood vessels, arteries, Veins, capillaries and heart.

**iii.** The blood vessels supply blood to various parts of human body. The blood flows through arteries, veins and capillaries.

Arteries carry oxygenated blood from the heart to the body.

Veins bring deoxygenated blood back to the heart.

Capillaries are tiny vessels where oxygen, carbon dioxide and nutrients are exchanged.

**iv.**

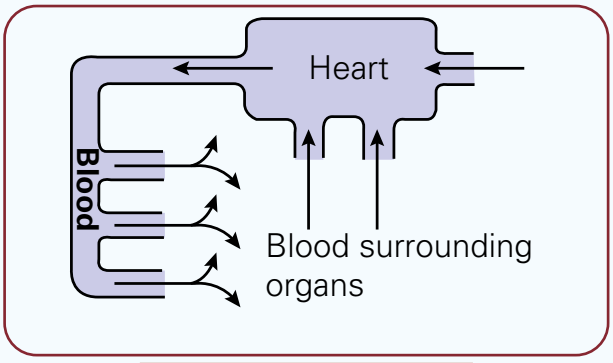
**a.** Respiration is a chemical reaction that takes place in human body and energy is released in body cells.

During the process of respiration the energy holding the glucose molecules together is released in cells. Carbon dioxide and water is produced during this process as waste products which are expelled out of the body.

**b.**

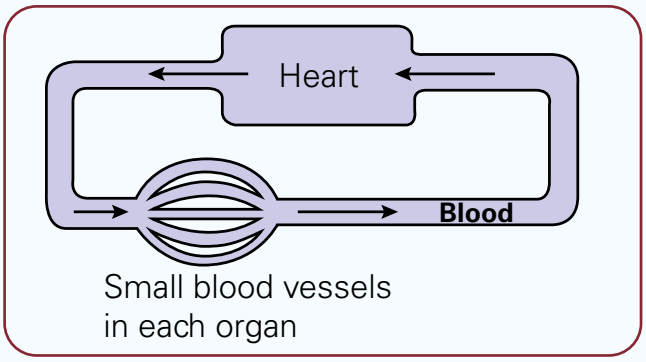
Glucose + Oxygen ⟶ Carbon Dioxide + Water + Energy

**v.**




Open circulatory system

**4.**




Closed circulatory system

# Unit 3: Immunity and Diseases

**Practice page 25**

1. True
2. True
3. False. Viruses are much simpler than bacteria. They are very small and only contain genetic material surrounded by protein coating.
4. True
5. False. Viruses have protein coat

**Practice page 29**

1. Liver
2. Mosquitoes that carry the dengue virus
3. Respiratory system

**Practice page 30**

1. False
2. True
3. True
4. False

**Practice page 33**

1. Dengue
2. Mosquitoes
3. Malarial parasite
4. Red Blood Cells

**Exercise**

**1.**

**i.** c

**ii.** c

**iii.** b

**iv.** b

**v.** a

**vi.** b

**2** Inflammation of the liver is widespread nowadays , as it spreads easily by **contaminated** food or drink. Its symptoms are **high temperature, muscle** and **joint** pain and **dark urine** and **pale faeces**.

**3.**

**Unhealthy**

**Healthy**

**Unhealthy**

**Healthy**

**4.**

**i.** Microorganisms are very tiny living things that can only be seen through a microscope.

**ii.** We cannot see some microorganisms with the naked eye as they are too tiny.

**iii.** Pathogens are microorganisms that cause diseases.

**iv.** Role of vaccines in communities is vital. It helps in not only prevention but also in control of diseases. This helps in better health of people in communities.

**v.** We can avoid getting ill by taking following measures.

- Cooking food thoroughly to kill germs.
- Take a bath regularly to remove dust and sweat.
- Wash our hands properly.
- Use a hand sanitizer when soap is unavailable
- Wear mask where required.

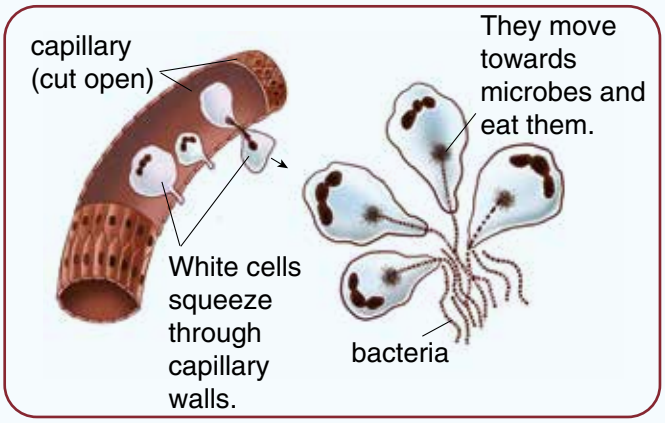
**5.**

**i.** There are various types of pathogens including bacteria, viruses, parasites and fungi.

**ii.** The human systems has two types of immunity systems. The innate immunity and the adaptive immunity.

In innate immunity we have mucus in the nasal passage which trap dust. Cilia lmove the mucus up the throat. The skin is an efficient barrier. The stomach produces hydrochloric acid. However if some pathogens enter our bodies they are killed by white blood cells. The adaptive immunity is the second line of defense.

**iii.** The white blood cells fight the germs that enter the human body and kill them.



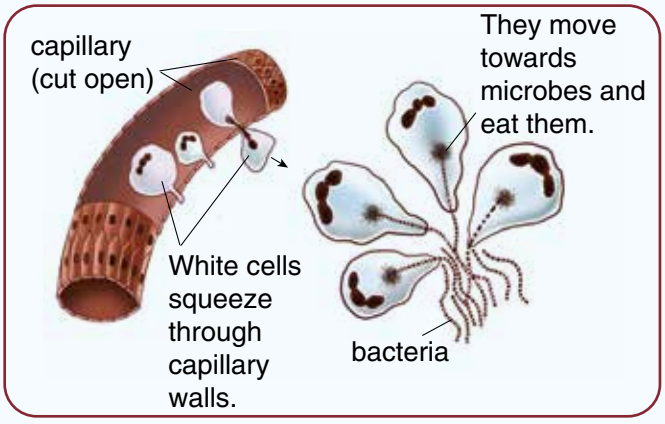

**iv.**

- regularly exercise
- eat a healthy and balaned diet
- get plenty of sleep

**v.** The role of communities that can help stop spread of diseases.

- Promote the importance of staying home during illness to prevent spreading germs in schools, workplaces, or public areas.
- Advocate for safe water sources, well-maintained toilets, and waste disposal, especially in less privileged areas.

**6.**



# Unit 4: Structure of an Atom

**Practice page 38**

**1.**

1. 12
2. Atomic number
3. 12

**Practice page 39**

1. 12
2. 8
3. 14

**Practice page 43**

1. Li Be B N
2. Group I
3. Alkaline Earth metals are called as Lanthanides
4. Nitrogen Family

**Exercise**

**1.**

**i.** b

**ii.** c

**iii.** d

**iv.** b

**v.** d

**vi.** d

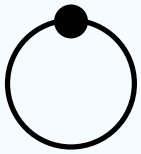
**2**

| Elements | Number of Protons | Number of Neutrons | Atomic Number | Atomic Mass |
|---|---|---|---|---|
| Hydrogen | 1 | 0 | 1 | 1 |
| Helium | 2 | 2 | 2 | 4 |
| Lithium | 3 | 4 | 3 | 7 |

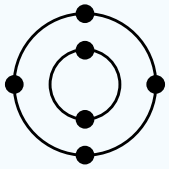
| | | | | |
|---|---|---|---|---|
| Beryllium | 4 | 5 | 4 | 9 |
| Boron | 5 | 6 | 5 | 11 |
| Carbon | 6 | 6 | 6 | 12 |
| Nitrogen | 7 | 7 | 7 | 14 |
| Oxygen | 8 | 8 | 8 | 16 |

**3.** Arrangement of electrons in K and L shells:

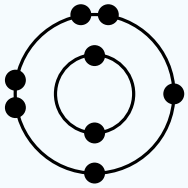
**Hydrogen**



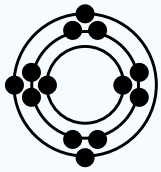
**Carbon**



**Oxygen**



**Aluminium**



**4.**

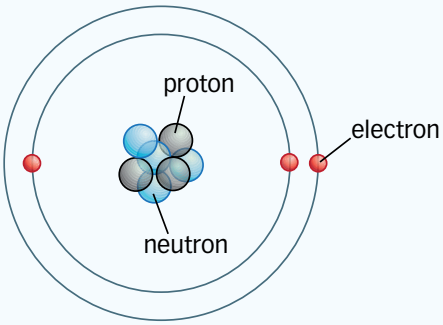
| | |
|---|---|
| Protons and neutrons | Found in nucleus |
| Atom | Smallest unit of a chemical element |
| Mass number | Depends on the number of protons and neutrons in an atom |
| Bohr and Rutherford | Proposed the theoretical model of an atom |

**5.**

**i.** The structure of an atom

An atom consists of a dense nucleus surrounded by a cloud of negatively charged electrons. The nucleus contains positively charged electrons and nutral neutrons. The number of electrons in an atom is same number of protons in an atom. Therefore overall electrons are electrically neutral.

**ii.** Lithium




Structure of an atom

**iii.** The gas used to fill the ballons is Helium because it is lighter than air.

**iv.** Hydrogen is outside the periodic table because of its unique properties. It has one electron in the outermost shell.

**v.** Important properties of the alkali metals:

They are soft and can be cut with a knife. They react violently in water.

**5.**

**i.** An atom is electrically neutral because because the number of electrons is always the same as number of protons so atoms are overall electrically neutral.

**ii.** Definition:

Atomic number

The number of protons in an atom is known as atomic number.

Mass number

The number of neutrons and number of protons is called as mass number

Difference

The mass number is the total number of protons and neutrons in the nuleus of an atom, while the atomic number is only the number of protons.

**iii.** Periodic table helps to organise elements systemetically. The elements are placed in the periodic table horizontically in periods and in columns (vertically) which helps in dividing them based on their physical and chemical properties.

**iv.** Lanthinides

They are a group of 15 soft, silvery white metals found in the periodic table. They are located at the bottom of periodic table in a special row and are also called as rare earth metals.

Actinides

They are a group of 15 of metallic elements found at the bottom of the periodic table, right below lanthanides. These are radioactive elements.

Some properties of group IV, V and VI elements.

Group IV is known as carbon family. All the elements have 4 electrons in their outermost shell.

Group V is known as the nitrogen family. All elements in this group have 5 electrons in their outermost shell.

Group VI has oxygen and sulphur as their main elements. All elements of this group have 6 electrons in their outermost shells.

# Unit 5: Physical and Chemical changes

**Practice page 47**

1. Physical change, chemical change
2. Physical
3. Released
4. Chemical

**Practice page 48**

1. False
2. False
3. True
4. True

**Practice page 51**

1. False. Fossil fuels are made up of carbon and hydrogen atoms only.
2. True
3. False. Acid rain forms when rain water reacts with various oxides.
4. True
5. False. The levels of carbon dioxide have increased due to pollution.
6. True
7. True
8. True

**Exercise**

**1.**

**i.** b

**ii.** c

**iii.** a

**iv.** c

**v.** a

**vi.** b

**2.**

| | |
|---|---|
| Physical change | Burning of natural gas in stove |
| | Mixing of sugar in water |
| Chemical change | Formation of an oxide |
| | Altered molecular structure |

**3**

| Physical Change | Chemical Change |
|---|---|
| No new substances are formed | One or more new substances are formed |
| Energy changes are not always there | Energy is always given out or taken in |
| Reversible | It is usually very difficult to reverse |

**4.**

**i.** A physical change is when the chemical structure of a substance does not change but there is change in the physical properties like shape, state, or colour. No new substances are formed.

**ii.** The melting ice absorbs heat, as it changes its state from solid to liquid. It is a physical change/

**iii.** Chemical change can be defined as a change where chemical structure of a substance changes. One or more new substances are formed and energy is either given out or absorbed. This change is usually difficult to reverse.

**iv.**

Fuel + Oxygen $\longrightarrow$ Carbon Dioxide + Water + Heat

**v.** The acid rain:

When oxides of carbon, nitrogen and sulphur combine with rain water it is called as acid rain. Acids are formed.

**5.**

**i.** Difference between physical change and chemical change.

| Physical Change | Chemical Change |
|---|---|
| No new substances are formed | One or more new substances are formed |
| Energy changes are not always there | Energy is always given out or taken in |
| Reversible | It is usually very difficult to reverse |

**ii.** Oxidation with examples:

Oxidation is a chemical process in which a substance reacts with oxygen to form an oxide. For example tarnishing of silver, rusting of iron, combustion.

**iii** Iron nails change colour to reddish brown in moist environment, this process is called as rusting.

It can be prevented by:

- Keeping iron in a dry place to avoid moisture.
- Use paint, oil and grease to create a barrier between iron and the air.
- Clean and inspect metal items regularly to remove any signs of rust early.

**iv.** Effects of combustion reactions on the environment.

When fossil fuels are burned they release carbon, nitrogen and sulphur oxides into the atmosphere. These oxides react with rain water to form rain.

**v.** The Greenhouse effect is a phenomenon that occurs due to high amount of carbon dioxide present in the air. It increases temperature of atmosphere. The rise in the levels of carbon dioxide is about 25% over the last two centuries.

The carbon dioxide functions as a glass of a greenhouse, capturing sun's heat and leading to an increase in Earth's temperature.

**6**

**Physical Change**

**Physical Change**

**Chemical Change**

**Chemical Change.**

# Unit 6: Chemical Bonds

**Practice page 55**

1. Atoms
2. Covalent bond
3. Chemical bonds
4. Chemical formula

**Practice page 56**

1. True
2. True
3. False

**Practice page 59**

Ammonia

- Nitrogen valency=3 (needs 3 electrons)
- Hydrogen valency+ 1(needs 1 electrons)
- 1 Nitrogen atom bonds with 3 hydrogen atoms
- Formula: $NH_3$

**Exercise**

**1.**

**i.** a

**ii.** d

**iii.** a

**iv.** b, c

**v.** c

**2**

| Atom | Molecule |
|---|---|
| H | $H_2$ |
| O | $O_2$ |
| N | $N_2$ |
| Cl | $Cl_2$ |

**3**

**i.** Chemical bonds are like glue that holds atoms together to form molecules or compounds creating the substances we see around us.

**ii.** Molecules act like one substance as they are essentially identical and posses the same unique set of physical and chemical properties.

**iii.** A chemical formula shows us the types of elements that make up molecules or compounds.

**iv.** Water

- Hydrogen valency=1 (needs 1 electron)
- Oxygen valency= 2 (needs 3 electrons)
- 2 Hydrogen atoms bond with I oxygen atom
- Formula: $H_2O$

Carbon dioxide

- Carbon valency + 4 (needs 4 electrons)
- Oxygen valency = 2 (needs 2 electrons)
- Carbon atom bonds with 2 oxygen atoms
- Formula = $CO_2$

**v.** The anions are negatively charged electrons as they gain electrons while cations are positively charged electrons as they lose electrons when a chemical bond is formed.

**4**

**i.** Valency is the combining capacity of an atom based on the number of electrons it can lose, gain or share from its outermost shell during a chemical reaction to form a stable compound.

Formation of ions

For example: Mg has a valency of 2 because it can lose two electrons from its outermost shells to become stable. So an ion is formed which has positive charge or valency 2.

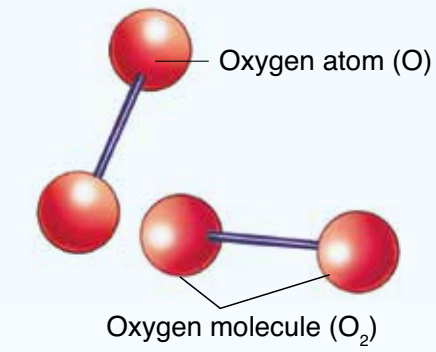
**ii.**

| **Group number in the periodic table** | **Number of electrons in the outermost shell** |
|---|---|
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |

| | |
|---|---|
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |

**iii.** An atom is the smallest particle of an element while an atom joins together to another atom or atoms to form more stable molecules.

**For example $O+O=O_2$**




**iv.** Sodium posses a single electron in its outermost shell. Which tends to lose in order to achieve a stable electronic configuration.

**v.** Bonding in chlorine

- Chlorine one extra electron in its outermost shell to become stable.
- Sodium gives its electron to chlorine.
- This makes sodium a positively charged ion (cation) because it loses an electron.
- Chlorine becomes a negatively charged ion (anion) because it gains that electron. These opposite charges pull sodium and chlorine ions together strongly forming an ionic bond.

Bonding in Nitrogen: A nitrogen atom has five outermost shell electrons so it needs to share 3 electrons. Nitrogen molecule has triple covalent bond between its two atoms--$N_2$.

Bonding in chlorine molecule: A chlorine atom has seven outer shells electrons, so it needs to share one electron to complete its outermost shell. So, two chlorine atoms share one electron each, giving molecules the formula $Cl_2$. There is a single covalent bond between the two atoms.

**5. Chemical Formula:**

**i.** Magnesium chloride

(Magnesium = 2, chlorine = 1)

Magnesium valency is 2 (needs 2 electrons)

Chlorine valency is 1 (gives 2 electrons) Formula = $MgCl_{2)}$

**ii.** Sodium oxide

(Sodium=1, Oxygen = 2)

Sodium valency=1 ( needs 1 electrons)

Oxygen valency is =2 (needs 2 electrons)

2 atoms of Na bind together with 1 atom of oxygen

Formula = $Na_2O$

**iii.** Aluminium oxide

(Aluminium= 3, oxygen=2)

Aluminium valency= 3 ( needs 3 electrons)

Oxygen valency= 2 ( needs 2 electrons)

2 atoms of Aluminium and 3 atoms of oxygen bind together

Formula = $Al_2O_3$

**iv.** Hydrogen chloride

(Hydrogen =1, chlorine = 1)

Hydrogen valency= 1 (needs 1 electron)

Chlorine valency = 1 (needs 1 electron)

1 atom of hydrogen combines with 1 atom of chlorine.

Formula = HCl

**v.** Calcium oxide

(Calcium =2, oxygen =2)

Calcium valency= 2 (needs 2 electrons)

Oxygen valency = 2 (needs 2 electrons)

1 atom of calcium binds with 1 atom of oxygen

Formula= CaO

**vi.** Nitrogen trihydride

(nitrogen=3, hydrogen=10

Nitrogen valency= 3 ( needs 3 electrons)

Hydrogen valency = 1 ( gives 1 electron )

1 atom of Nitrogen binds 3 atoms of hydrogen to form ammonia

Formula= $NH_3$

# Unit 7: Solutions

**Practice page 62**

1. Solutions
2. Suspension
3. Solvent
4. Solute

**Practice page 64**

1. False
2. True
3. True
4. False

**Practice page 66**

1. Nature of the solvent and solute
2. Temperature
3. Pressure
4. Particle size
5. Stirring or agitation

**Exercise**

**1.**

**i**. a

**ii**. d

**iii**. c

**iv**. b

**v**. c

**vi**. a

**2**

| | |
|---|---|
| Concentration of a solution | One or more new substances are formed |
| Dilute solution | How closely solution particles are packed |
| Concentrated | Is more reactive |
| Concentrated acid | When concentration of a solution is very high |

The amount of solute dissolved is more than the saturation point of the solution.

**i.** An unsaturated solution is the one in which the amount of solute dissolved is less than the saturation point of the solvent.

**ii.** Smaller particles dissolve faster than the smaller ones because they have a large surface area, exposed to the solvent. Therefore it takes longer for sugar cubes to dissolve in comparison to crushed sugar. The crushed sugar grains will dissolve faster.

**iii.** Water is known as the universal solvent because so many substances dissolve in it.

**iv.** **a.** In a dilute solution, the amount of solute is small in comparison to the amount of solvent. When a large quantity is dissolved in a solvent, the solution is known as concentrated.

**b.** In a saturated solution the amount of solute dissolved is more than the saturation point of the solvent.

In an unsaturated solution, the amount of solute dissolved is less than the saturation point of the solvent.

**c.** Suspension and solution

If we add a solid in a liquid and it does not dissolve the solid will remain visible in a liquid, this is called as suspension.

When a solid dissolves in a liquid a solution is formed.

**4.**

**i.** A solution is formed when solute like sugar or salt mixed in a solvent like water .i.e.,

when a spoon of sugar is added and stirred. In due time, it gets dissolved in water. The sugar crystals occupy spaces in between water molecules and are properly mixed together.

**ii.** A solution forms by addition of a solute in a solvent.

A solvent is a substance that dissolves another substance to form a mixture called a solution.

A solute gets dissolved in a solvent to form a solution.

**iii.** A saturated solution is a mixture of solute and solvent where no solute will be dissolved. While an unsaturated solution is the one in which the amount of solute dissolved is less than the saturation point.

**iv.**

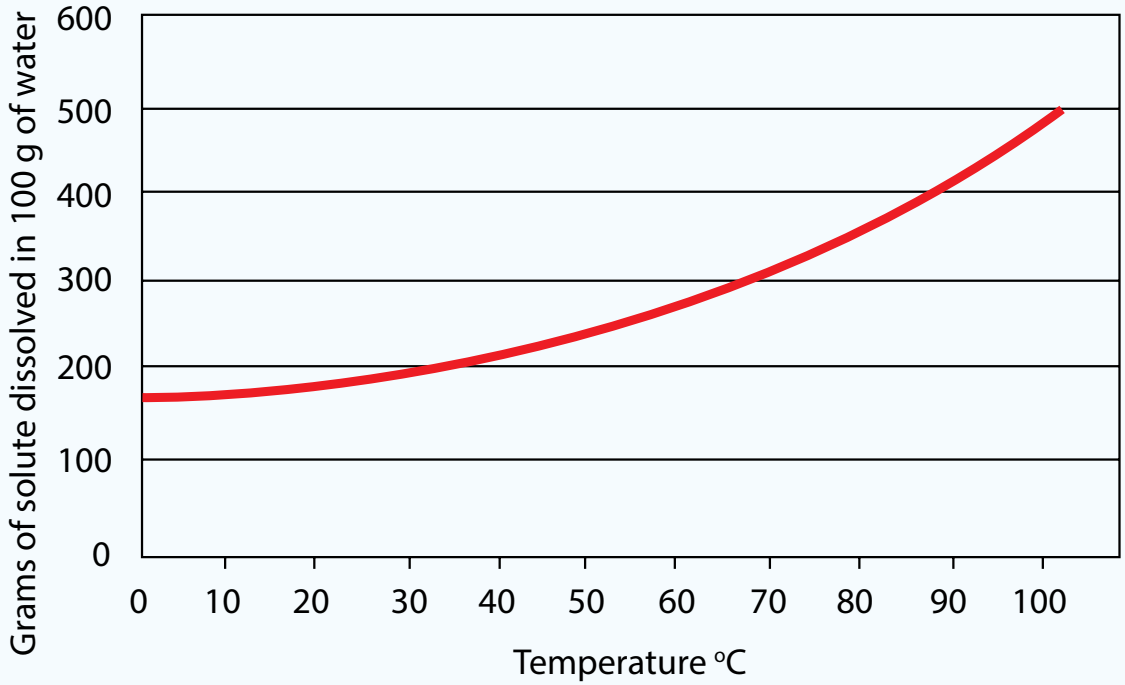
**a.** There are many factors that affect the solubility of a substance. Some are:

Nature of solute and solvent: Ionic compounds usually dissolve in polar solvents like water while covalent compounds, however do not typically dissolve in water, unless polar such as oils and waxes.

**b.** In our homes the factors affecting solubility of a substance help with cleaning water works well for salt stains, but oil stains soap or another solvent. In industries this is used to choose the right chemicals for paints, medicines, or cleaning agents.

**5**

The differences in temperature effect the solubility of a solute in a solution. For most solid solutes, increasing the temperature typically increases solubility. Higher temperatures provide more energy to break down the solid particles and mix them with a solvent.




The solubility of a solute increases as the temperature rises

# Unit 8: Force and Motion

**Practice page 73**

**1.** **i.** contact forces

**ii.** Friction is a contact force, resistance of air

**iii.** tension contact force

**2.** The contact force acts on an object only when it is in direct physical contact with another object. Whereas the non-contact forces act between two objects that are not in physical contact with each other.

**3.** -Frictional Force

This is the force that opposes the motion of one object sliding or attempting to slide over the surface of another.

For example: When we try to push a box, and the ground resist the motion.

-Tension

This is the force transmitted through a string, rope, or cable when it is pulled tightly by forces acting on both.

For example, when we pull a rope during a game of tug of warthe rope experiences tension.

-Air resistance (air friction)

This is the force that acts against the motion of an object.as it moves through the air.

**4.**

Magnetism is a non-contact force as it acts between the two objects that are not in a physical contact with each other.

**Practice page 74**

| | |
|---|---|
| A person pushes shopping cart | Balloon moves forward |
| A balloon releases air | Water pushes fish forward |
| A hammer hits a nail | Cart pushes back on person |
| A fish swims forward | Nail pushes back on hammer |

**Practice page 75**

Speed= distance/time

Speed= 70/7= 10 m/sec

**Practice page 76**

Total= distance covered 5+10x2= 100km

Total time taken 20+30 + 45 = 95 min= 1 hour 35 min

The average speed is calculated using the formula given above.

Speed= total distance/total time=

100/95= 1.05 km/min

(Km/min)

The boy is travelling at an average speed of 1.05 km/sec

**Exercise**

**1.**

**i.** a

**ii.** c

**iii.** b

**iv.** b

**v.** b

**vi.** b

**2**

| Force | Description |
|---|---|
| Air resistance | Force transmitted through rope or string |
| Tension | Acts against the motion in the air |
| Applied force | Force exerted by a compressed /stretched spring upon any attached object |
| Spring force | Used when pushing an object |

**3**

distance -time

time

distance

**4**

| Contact Forces | Example |
|---|---|
| Frictional Force | To push a box |
| Tension Force | Tug of war |
| Applied Force | To push a trolley |
| Resistance | Flight of an air craft |
| Spring Force | Spring rider |

**5**

**i.** A force is a push or pull exerted on an object in a particular direction

**ii.** Contact forces

Non-contact forces

**iii.** Speed can be calculated by the distance travelled in metres (m) and the time in seconds by using the following formula:

Speed= distance/time

**iv.** Some forces only act when two objects are in contact with each other. These are called contact forces. Whereas the non-contact forces act between the two objects that are not in physical contact with each other.

**v.** Sir Isaac Newton recognized that forces always come in pairs. The Newton's third law of motion states that:

**i.** 'For every action there is an equal and opposite reaction.'

**6**

**i.** As defined, force is a push or pull that changes an object an object's motion by altering its speed.

Which means it can increase speed or slow down an object and can affect direction of motion.

**ii.** Forces between the two objects always appear in pairs- one force acts in one direction, and the other equal force acts in the opposite direction. These pair forces are called as action and reaction forces, as shown below:

- The bullet moves forward the gun moves backward.

**iii.** A force is a push or a pull exerted on an object in a particular direction. Some forces only act when two objects are in contact with each other. These are called contact forces. Some forces act at a distance, they are called as non-contact forces.

**Examples:**

- A racing car: A force can make a racing car move and also change its speed.
- A force can stop a moving objectand can even change its direction, its shape as in an a car accident.

**iv. a.** Speed= 5 km/sec

Time= 3 hours

Distance travelled = Speed x time=

=5x3= 15

=15 km/hour

**b.** Average speed= Total distance/ Total time taken

Total distance travelled= 40+40= 80 km

Total time taken= 2+4= 6 hours

= 80/6= 13.3 km/hour

**c.** Speed = 120 km/hour

Time taken = 2 hour

Distance travelled = speed x time=

120x 2= 240 km

# Unit 9: Waves and Energy

**Practice page 83**

1. Mechanical waves
2. Electromagnetic waves
3. Mechanical waves
4. Mechanical waves
5. Electromagnetic waves
6. Mechanical waves (transverse waves)

**Practice page 84**

**1.**

**i.** Electromagnetic waves

**ii.** Water

**iii.** Electromagnetic

**iv.** Light

**2.**

**i.** False

**ii.** False

**iii.** True

**iv.** True

**Practice 85**

1 True

2. False
3. True
4. True
5. True

**Practice page 86**

a. Time period=?

F= I/T=

T= I/50= 0.02 sec.

b. Frequency=?

T= 0.01 sec.

F= 1/ T=

= 1/o.01= 100 Hz

c. Time=?

T= 1/f=

=1/25= 0.04 sec.

**Exercise**

**1.**

**i.** b

**ii.** a

**iii.** b

**iv.** b

**v.** a

**vi.** b

**2.**

| Mechanical waves | Electromagnetic waves |
|---|---|
| Water waves | Light waves |
| Seismic waves | X-rays |
| Sound waves | Microwaves |

**3**

| Wave Term | Description |
|---|---|
| Mean position | The resting position when particles of the wave medium naturally sits with no wave passes |
| Crest | The highest point of a transverse wave |
| Trough | The lowest point of a transverse wave |

| | |
|---|---|
| Amplitude | Distance between a peak and a the resting(mean) position |
| Wavelength | Distance between the two adjacent crests or consecutive troughs of a wave or distance between successive compressions and rarefactions |
| Frequency | The number of waves per second measured in Hertz |

**4.**

**i.** A wave is a disturbance in a medium that carries energy without transporting the particles of the medium. Waves carry energy from one place to another without matter being transferred.

**ii.** a. Wavelength.

Distance between two adjacent crests or consecutive troughs of a wave or distance between two successive compressions or rarefactions.

Frequency

The number of  waves per second measured in Hertz(Hz). Hertx is one wwave/sec

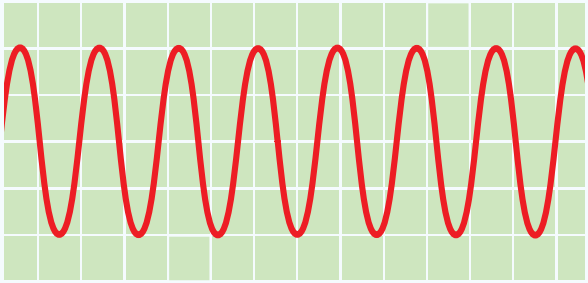
Time period of wave

The time period between one wave and the next. For example-if 4 waves pass in one second, the time period is ¼ or 0.25 seconds.

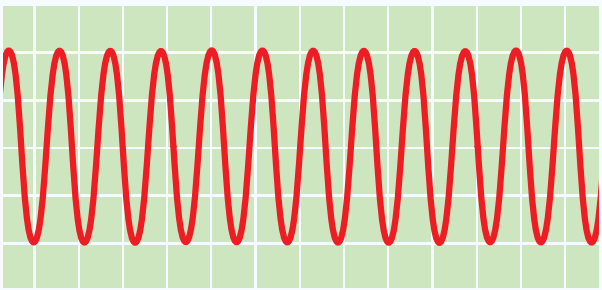
**iii.** Electromagnetic waves do not require a medium to travel through, they travel through vaccum.

They are magnetic waves and electric waves moving together. They are produced when charged particles vibrate when they are given extra energy.

**iv.**



Low pitch



High pitch

**5.**

i. Water waves and sound waves are called mechanical waves  beause they require a material medium to travel.

ii. pitch depends on the frequency of the sound wave, while loudnes depends on the amplitude of the wave.

iii. Frequency is inversely proportional to time perod.

iv. Light travels much faster than sound. thunder is heard later beause sound takes more time to reach as.

v. Light is an electromagnetic wase that does not require a medium and can travel thought a vaccum. it travels in a straight line, has a very high speed, shows reflection and refraction

**6.**

The image shows refraction of sound waves, where sound changes direction as it passes from one medium to another. The speed of sound changes in different media.

# Unit 10: Heat and Temperature

**Practice page 93**

1. Hotness
2. Sun
3. Sun
4. Joules

**Practice page 94**

Temperature conversion, in oF

30°C = (°C) (9/5)+ 32 F=

= (30x9/5)+ 32=

= 86 F

**Practice page 98**

1. Heat
2. Silver lining of the wall, stopper and vacuum inside the flask
3. Sir James Dewar

**Exercise**

**1.**

**i.** d

**ii.** a

**iii.** a

**iv.** d

**v.** c

**vi.** b

**2.**

| | **°C** | **°F** |
|---|---|---|
| Water boiling temperature | 100 | 212 |
| Human body temperature | 37 | 9.8 |
| Freezing Point | 0 | 32 |

**3**

**i.** Temperature is a measure of how hot or cold something is. It is ,measured in degree celcius (°C), degree Fahrenheit (°F). Temperature is measured by a thermometer.

**ii.** Heat is the transfer of energy from a higher temperature object to a lower temperature object. Heat and temperature are not the same.as temperature is a measure of how hot or cold an object is.

**iii.** Three scales for temperature measurement:

- Celcius—°C
- Fahrenheit—°F
- Kelvin—K

**iv.** As a solid cools, heat energy is removed. The particles will move slower and slower until they stop moving altogether, the temperature at which the particles stop moving is called absolute zero,0 K at Kelvin scale is however impossible.

**v.** Temperature in Kelvin= (F-32)x 5/9+ 273=

**vii.** As per kinetic molecular theory, the loss or gain of heat can change state of matter.

**4.** In cooking mostly wooden spoons are used because these are made up of insulating materials. In case of metal spoons, they quickly get hot from hot cooking pot and we are unable to hold these spoons.

**ii.** Solids, liquids and gases all expand, i.e., get bigger, when they are heated. Opposite happens when they are cooled down,i.e., they contract (get smaller) as the space between the particles decreases. Gases contract more than liquids.

**iii.** Solids expand due to heating and contract due to cooling. The expansion is less than gases and liquids.

Liquids expand and contract due to gain or loss of heat, but less than gases.

Gases expand and contract more than liquids expand and contract more than solids.

**iv.** The three ways of heat transfer are:

- Conduction
- Convection
- Radiation
- In conduction, according to particle theory in a bar of metal, the particles vibrate more quickly when heated. Some of the energy is passed on to the neighbouring particles, which pass it on to their neighbours and so on.

- Convection. Heat is transferred in liquids as convection. In liquids and gases through particles which are free to move around..e.g., In water when sunlight heat water, convection currents move and more currents occur.
- Radiation
- In radiation heat is transferred through electromagnetic waves, as they do not require any medium. Therefore, particles are not involved in heating process.

**v.** Due to heat gain substances expand, melting, boiling will take place depending on the state of matter. In case of heat loss, the substances contract, the freezing and condensation occurs. The substances will get smaller.

**5**

Insulation of a house is required especially in cooler parts of the world. It is important not to waste fuel in heating homes. When energy used for heating escapes it is lost in the atmosphere, and can never be captured or used again. This is a waste of energy and money.

Heat loss can be reduced by insulating the roof and the walls of a building.

There are different methods for insulation;

For example:

- Loft insulation
- Cavity wall insulation
- Double glazing

# Unit 11: Earth and Space

**Practice page 104**

1. Gravity
2. Gravity
3. Gravity
4. solar

**Practice page 106**

Mass= ?

Weight= 370 N

Strength of gravity on Earth= 9.8 N/kg

Weight on Earth= mass x gravity=

Mass =weight on Earth/gravity=

=370/9.8= 37.75 kg

**2.**

1. True
2. True
3 True
4. True

**Exercise**

**1.**

**i.** b

**ii.** a

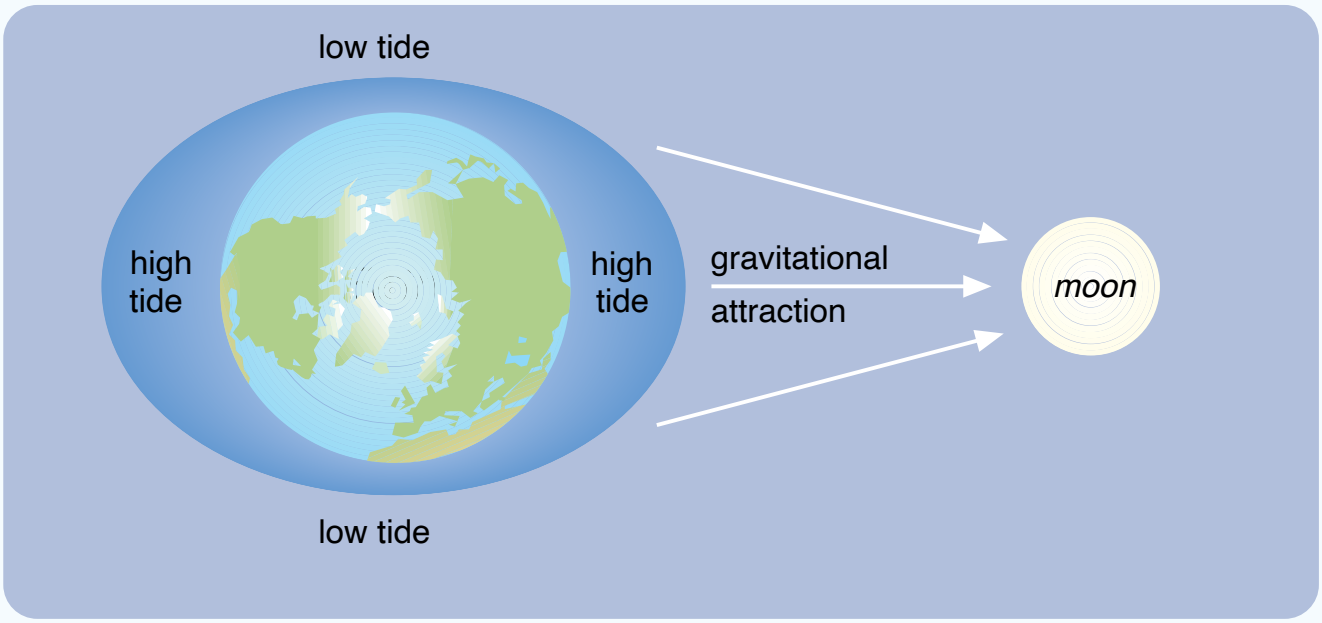
**iii.** b

**iv.** c

**v.** b

**vi.** b

**2.**




The gravitational pull of the moon

**3.**

**i.** Gravity is a force that attracts objects to one another.

**ii.** Force of gravity is responsible for leeping the planets in orbits around the Sun, and also for keeping the Moon orbiting the Earth.

**iii.** Mass is the amount of matter in an object, no matter where object is in the universe.

**iv.** The spin of the Earth called rotation causes day and night. It takes Earth one full day to spin all the way around.

**v.** Tides:

Tides are the regular rise and fall of the sea levels.

Tidal waves:

The tides are mainly caused by the gravitational pull of the Moon. This pull is called the tidal force.

**vi.** Pakistan experiences summer when the Northern hemisphere is tilted towards Sun. Rays from the hit the Earth at right angles and the Sun is seen high in the sky. The Sun's rays are concentrated over a smaller area. Producing warmer temperatures.

**4.**

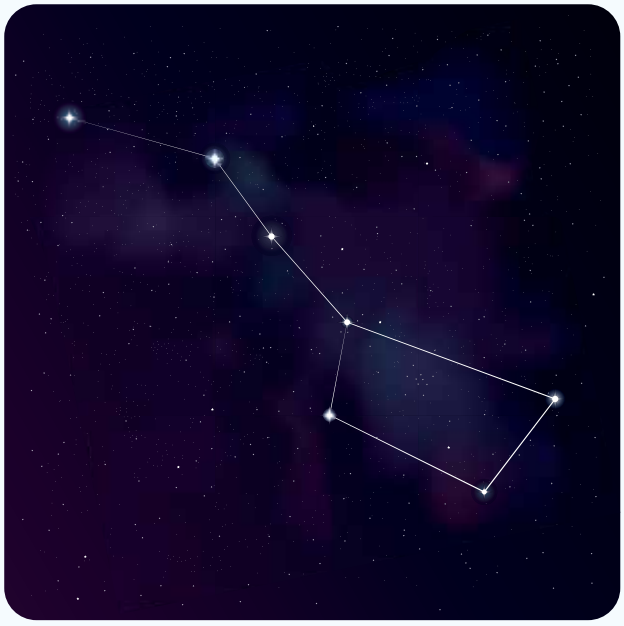
**i.** **a.** Mass and weight are different. Mass is the amount of matter in an object, where ever it is. Whereas, the weight is force of gravity that acts on mass of an object by which Earth pulls the object .

**b.** Astronauts who visit the Moon feel light because the Moon's gravity is weaker, only 1/6th of the Earth's gravity. If an astronaut has a weight of 70 kg, their mass stays the same (70 kg) on the Moon same as on Earth. However, the weight changes. On the Moon, it will be 116 N, while it was 700 N on the Earth. Therefore, they experience lightness on the Moon.

**ii.** As Earth moves around the Sun, different parts get more sunlight at different times. This is why we have summer, winter, spring and autumn. When one half of the Earth is tilted towards the Sun, it gets more sunlight and becomes warmer(summer). While the other half gets less sunlight and gets cooler(winter).

**iii.** The Earth's tilted axis also affects how constellations and other heavenly bodies appear to move across the night sky that is why at sometimes of the year stars and planets appear directly overhead while at other times, they seem to barely rise above the horizon.

**5**



Big Dipper

Orion

# Unit 12: Technology in Everyday Life

**Practice page 115**

Some ways are the use of the following irrigation systems

**a.** A simple drip irrigation system

**b.** Sprinkler irrigation system

**Practice page 116**

The drip irrigation system gives out water slowly and directly to plant root area. However, the sprinkler irrigation system waters like rainfall. The simple irrigation system is suitable for specific plants.

The sprinklers are the best for larger, open areas like lawns.

**Practice page 117**

**a.** Turmeric

It helps prevent bacteria in the pickles.

**b.** Mustard powder

It slows down the spoilage, keeping the pickle fresh for longer.

**Practice page 118**

Making of fruit jam(apricot)

**Materials**

Small plate, 1 kg of apricot, 500 g of sugar, juice from ½ lemon, knife, chopping board, saucepan, wooden spoon, measuring jug, sterilized jars with lids.

**Procedure**

1. Put a small plate into a freezer.
2. Peel and chop the apricots into pieces and put them into a saucepan along with sugar.
3. Add 350 ml of water to the mixture in the sauce pan.
4. Heat the saucepan and stir the apricots and sugar together.
5. As the mixture starts to boil. Turn down the heat, and let the mixture simmer for about 30 minutes until the apricots have softened.
6. Stir in the lemon juice and simmer the mixture for another 2 to 3 minutes., until the mixture is thick and glossy in appearance.

7. Put the sterile jars and lids into a warm but not hot oven.
8. Remove the plate from the freezer and drop a little of mixture on it and leave for few seconds.
9. The jam should be firm. If it is still runny put the plate back in the freezer and put the saucepan back on the heat and again simmer for another 10 to 15 minutes.
10. Test the jam again. It should now be firm.
11. Remove the warm jars and lids from the oven and carefully fill the each one with the hot jam.
12. Put the lids on the jars firmly and lids to cool.

    The apricot jam keep for several months  but once opened it must be used within one month.

**Practice page 119**

1. Using hand sanitisers
2. Using antibacterial soap
3. Stay home when sick

**Exercise**

**1.**

**i.** d

**ii.** a

**iii.** b

**iv.** b system

**2**

**i. a.** A simple drip irrigation

**b.** Sprinkler irrigation system

**ii.** Ingredients of pickle are 240 ml of water, 20ml of white balsamic vinegar, 50 g of sugar, two teaspoons, salt, three raw mangoes.

**iii.** A stethoscope is used to listen to the sounds produced inside the body mostly, mostly heat and lungs.

**iv.** Food preservatives help preserve food and keep it safe for a longer time.