Easy Science 8
Textbook Answer Key

UNIT 1: VARIATIONS, HEREDITY AND CELL DIVISION

Practice page 3

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

Practice page 5

1. Heredity
2. Genes
3. Genetics
4. Father, mother
5. Genetics

Practice page 7

Term	Meaning
1 Dominant	A Two identical alleles
2 Recessive	B One dominant and one recessive
3 Homozygous	C A gene that is hidden when paired
4 Heterozygous	D A gene that shows its trait

Practice page 8

1. True
2. False
3. False

Exercise

1

i. c

ii. c

iii. b

iv. c

v. c

vi. a

2.

i. True

ii. True

iii. True

iv. True

v. False

vi. False

3. i

Heredity.

The transfer of characteristics in offspring from their parents is called heredity.

Genes.

The basic unit of heredity are called genes. They determine which characteristics one inherits from their parents.

Nucleotides

A DNA molecule is made up of structures called nucleotides. A molecule is made up of five carbon sugar called deoxyribose. It is joined to a phosphate group and an organic base.

ii. 4 types of organic bases are adenine, thymine, cytosine, guanine

iii. Gregor Mendel

iv. 8 Phases of meiosis:

1. Prophase I
2. Metaphase I
3. Anaphase I
4. Telophase I
5. Prophase ii
6. Metaphase II

7. Anaphase II

8. Telophase II

V. 4 Phases of mitosis are:

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase

4.

i. DNA stands for deoxyribonucleic acid. The structure of DNA:

A DNA molecule made up of structures called nucleotides. A nucleotide is made up of five carbon sugar a called deoxyribose, which is joined to a phosphate group and it is an organic base.

ii. A person who has two identical gene alleles for a characteristic is known as homozygous for that characteristic.

A person with two alleles –one dominant and one recessive is known as being hybrid or heterozygous for that characteristic.

iii. When cell division id not taking place this time period is said to be interphase.

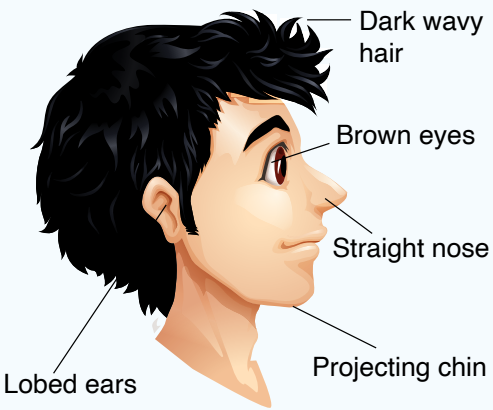
iv. Cell division: A process where a single parent cell divides into two or more daughter cells to create more cells. There are two types of cell division which re mitosis and meiosis.

v. Genes are the basic unit of heredity. They are made up of DNA. The DNA carries instructions for building and maintaining an organism.

Chromosomes carry genetic information .It is a thread-like structure found inside the nucleus of a cell. Made up of proteins and DNA molecules.

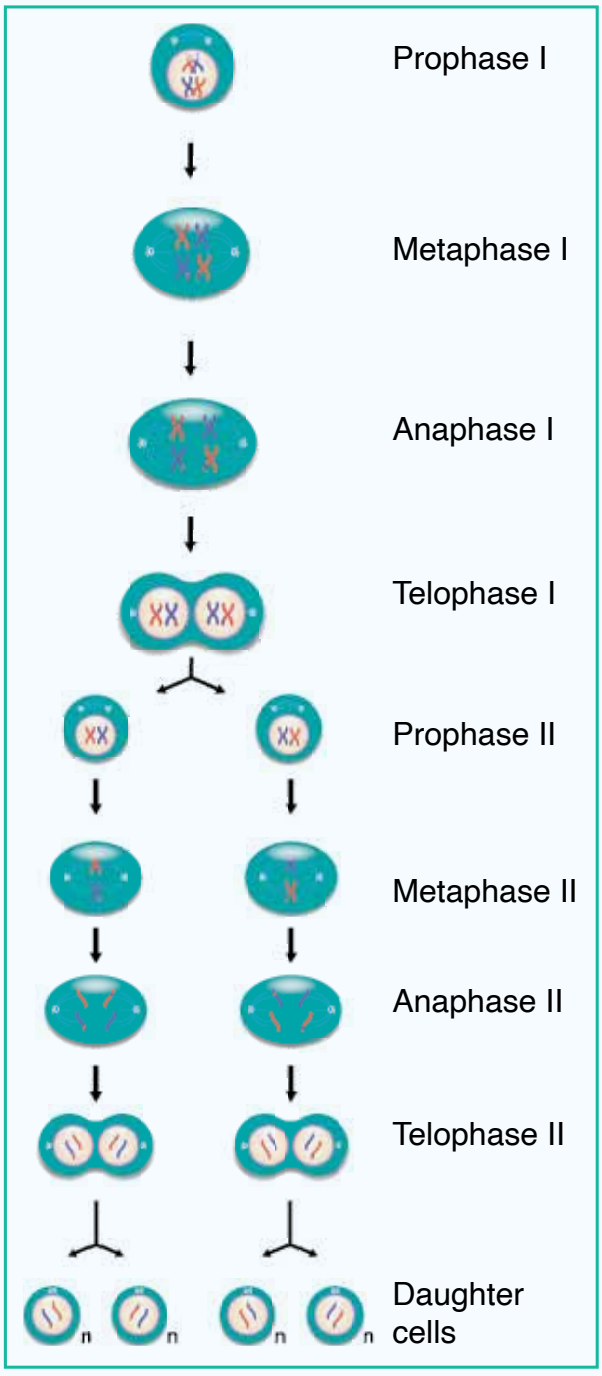
vi. Mutations are permanent changes to the DNA that can occur during cell division or through environmental factors.

5.



Dominant characteristics in humans

6.


Prophase I
Metaphase I
Anaphase I
Telophase I
Prophase II
Metaphase II
Anaphase II
Telophase II
Daughter cells
n
n
n
n

UNIT 2: HUMAN NERVOUS SYSTEM

Practice page 14

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

Practice page 16

1. True
2. False. Both animals and plants respond to environmental stimuli
3. False. Humans may sweat if it is too hot.
4. True
5. True

Practice page 18

Activity	Mark ✓/×
Drinking plenty of water	✓
Playing strategy games	✓
Using calculator for all maths problems	×
Learning to play a musical instrument	✓
Eating junk food	×
Getting fresh air and regular exercise	✓
Sleeping well	✓
Watching tv for long hours without break	×

Exercise

1.

i. b

ii. c

iii. c

iv. c

v. b

vi. c

2.

i. **There are two types of nerve cells which are**

- Sensory nerve cells (sensory neurons)
- Motor neve cells (motor neurons)

ii. Different parts of human brain:

- Forebrain
- Midbrain
- Hindbrain

iii. Muscles in the eyes contract and relax to change the shape of the lens to focus light from near and far objects. In case of flash of light a reflex action occurs which tends to close the eys lens through contraction.

iv. When our body touches something hot, it reacts to the heat. As the heat is transferred to the body or skin particularly a reaction is triggered and body automatically pulls away.

v. When people are in a cold environment without proper warm clothes, their body temperature drops and it may lead to death.

vi. Certain challenging activities help to keep the brain active and healthy.

3.

i. CNS stands for The Central Nervous System. It comprises of grain and the spinal cord., which controls the coscious and unconscious functions of the body. The spinal cord sends signals through millions of nerves to control and coordinate body functions.

ii. When a nerve connection is broken in the body, the ability of brain to communicate with body, like muscles, skin, organs, etc., is interrupted. This results in loss pf control in the human body, in multiple ways.

iii. The three main parts of brain are:

- The forebrain
- The midbrain
- The hindbrain

iv. It is the smallest part of the brain that acts as a bridge between the midbrain and the hindbrain. Midbrain transmits signals related to vision, hearing, temperature, and alertness from hindbrain to forebrain.

v. Hindbrain is the lowest part of the brain, composed of three parts:

- Cerebellum
- Medulla
- Pons

vi. Voluntary action is the type of action that helps planning and thoughts, such as writing answers to home work questions.

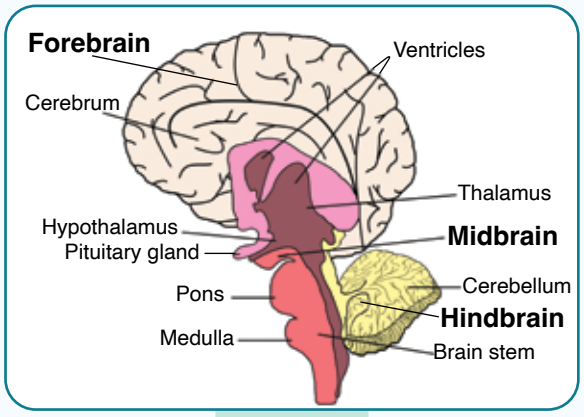
Involuntary actions happen without thinking. These are also called as reflex action. They are very fast and save our bodies from injury. For example, when we suddenly touch a hot plate.

4.

List

- Learning a language
- Learning to play a musical instrument.
- Memorizing a poem or the words to a song.
- Playing games and doing puzzles even on the computer. Games that require strategy are more challenging for the brain.
- Using mental arithmetic rather than a calculator during math and science classes.
- Avoid dangerous chemicals and illegal drugs, as these contain neurotoxins that can kill nerve cells.

5.



The Brain

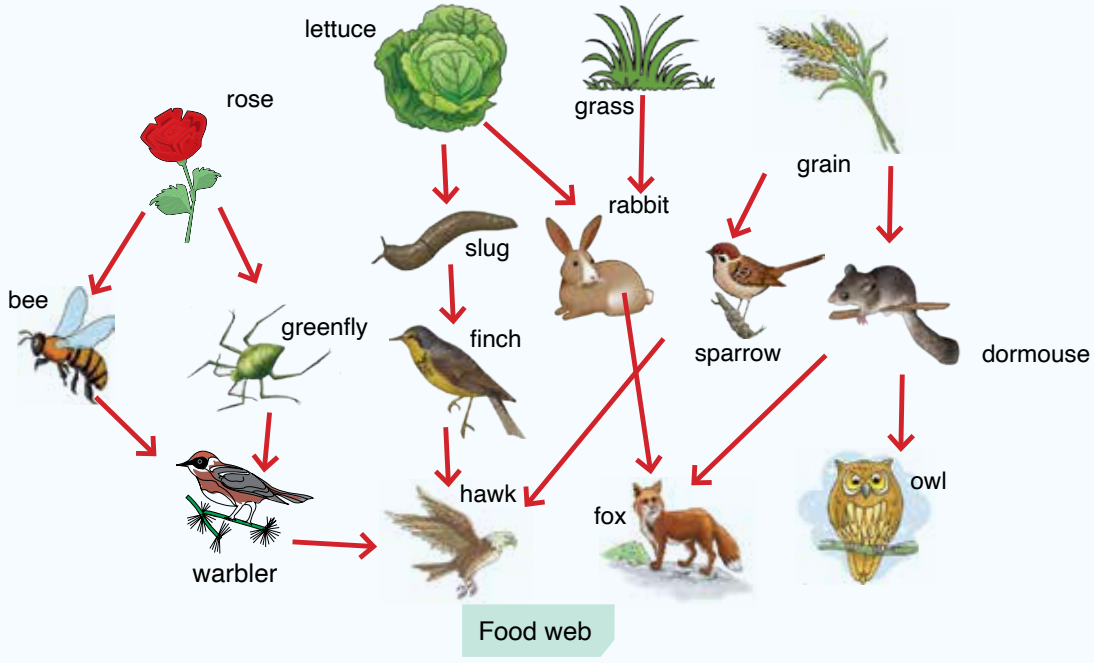
UNIT 3: ECOLOGY

Practice page 21

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

Practice page 26

Food web with three food chains



Food web

Practice page 28

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

Exercise

1.

i. c

ii. d

iii. c

iv. b

v. c

vi. c

2.

i. In ecosystems, carbon is continuously exchanged between living organisms(biotic). This is known as carbon cycle.

ii. When oxygen is exchanged between biotic and abiotic components , this process is known as oxygen cycle.

iii. Human activities in the last 200 years have had harmful effects on the delicate balance, leading to environmental problems, such as global warming and climate change. Increase in human population, emission of carbon dioxide from burning of fossil fuels and deforestation have adversely effected ecosystem on earth.

iv. Symbiosis means living together. It is the close interaction between two different organisms in an ecosystem. For example, Remora fish feed off scraps of food that escape from the shark's mouth.

v. The parasitic relationships are harmful for the host. The parasite benefits and harms the host. It takes nutrients and energy from the host.

vi. Commensalism is different from the symbiosis and parasitism as one organism gets the benefit but the other is neither helped or harmed. E.g., Remora fish feeds off scraps of food that escape from the shark's mouth.

3.

i. During the process of photosynthesis plants take in carbon dioxide from the air and prepare glucose in the presence of sunlight (energy). Oxygen and water are released.

ii. Using energy from the sunlight, green plants make their own food through the process of photosynthesis. Animals eat other living things (plants as well as animals).

iii. The energy moves from sunlight to plants and to animals.

iv. Producers:

A living thing that makes its own food.

Consumers:

They are animals that eat other living things ,i.e., plants as well as animals.

Decomposers:

Organisms in the ecosystem that break down dead plants and animals.

Producers, consumers and decomposers help each other in the cycles running in the ecosystem of of energy and nutrients.

v. Animals and plants compete for food, water and space to stay alive. In an ecosystem there are always more living things born than can survive. Plants require maximum amount of light in order to photosynthesize. They also require minerals and water.

Animals need food and water. The more food and water they are able to get the better are their chances for survival. They also need to hide from predators or seek shelter from bad weather in order to survive longer.

4.

i. Name of the process: Respiration

Glucose+ oxygen → **carbon dioxide** + water

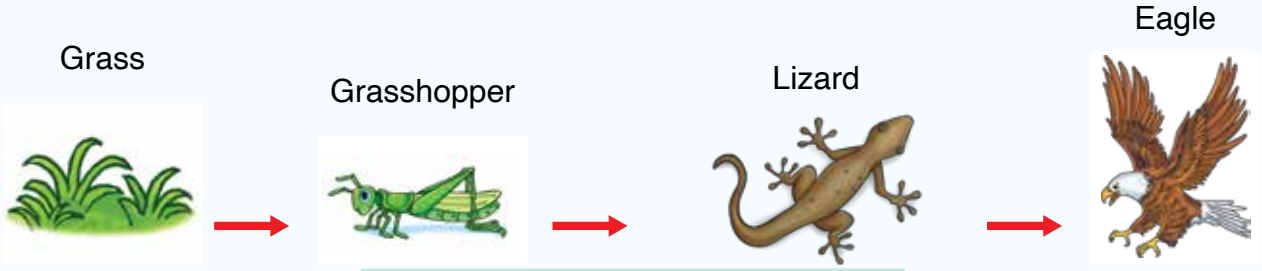
ii. Name of the process: Photosynthesis

Carbon dioxide+ water → glucose + **oxygen**

iii. Name of the process: Combustion

Carbon + oxygen → **carbon dioxide**

5 Diagram 4 linked food chain



A food chain with more than three links

UNIT 4: BIOTECHNOLOGY

Practice page 35

Yoghurt and cheese are the result of fermentation of milk. by Lactobacillus and streptococcus bacteria. In our homes we make yoghurt. For this purpose, milk is first pasteurized by heating it 20 seconds on 71.7° C., and then cooling it quickly to 3°C. This milk is then fermented by bacteria starter culture., which feeds on the milk sugar (lactose) and produces lactic acid It is this lactic acid that coagulates the milk protein (casein) to produce thick creamy yoghurt. The fermentation process works best at 48°C.

Practice page 37

1. GMO (Genetically modified organism)
2. Edward Jenner, small pox
3. Antibodies
4. Sugar
5. Genetic, precision

Exercise

1.

i. a

ii. b

iii. b

iv. b

v. b

2.

i. Presence of carbon dioxide in lime water during the fermentation process can be proven through an experiment. The yeast uses enzymes to break down glucose in the solution into alcohol, carbon dioxide, and water. During this process , energy and carbon dioxide are released, The presence of carbon dioxide can be identified when calcium hydroxide solution (limewater) turns milky.

ii. Products:

Yoghurt, sour cream

iii. Genetic engineering:

It involves taking genes from one type of cii and transferring them to another cell to produce desired results.

iv. Transgenic:

The organism that is modified by a process where desired gene or genes are identified and inserted in DNA of another species are called as transgenic.

v. Fermentation:

Fermentation is a process where bacteria and yeast break down carbohydrates into simpler substances. Formation of yoghurt and cheese is a good example, people have been fermenting milk and other substances since centuries. Bakers use yeast in making of bread and pizza. The dough rises due to fermentation.

3.

i. Process of pasteurization.

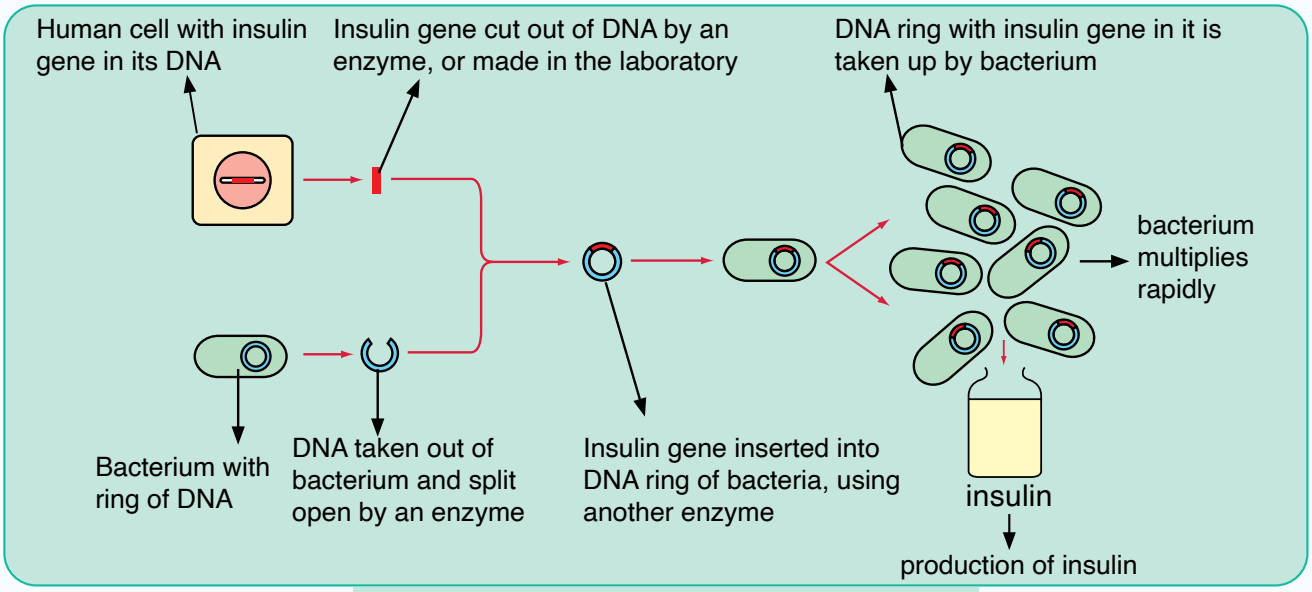
The process of pasteurization helps sterilize for example milk by killing germs and bacteria. Milk is pasteurized by heating at 17.7°C for 29 seconds and then it is cooled down to 3°C.

ii. Biotechnology is the use of living cells and organisms in products and processes that improve the quality of human lives. Biotechnology brings knowledge of biology and skills in technology together to provide food, medicines and new materials for industry.

iii. The two ways biotechnology can be used are processes for making foods like yoghurt, cheeses, sour cream.

iv. The genetic modifications have also raised ethical issues, like possible health risks of eating GMO foods Another issue is the fear that undesired genes might spread to other species by mistake.

v. Process of making insulin through genetic engineering



Production of Insulin through Genetic Engineering

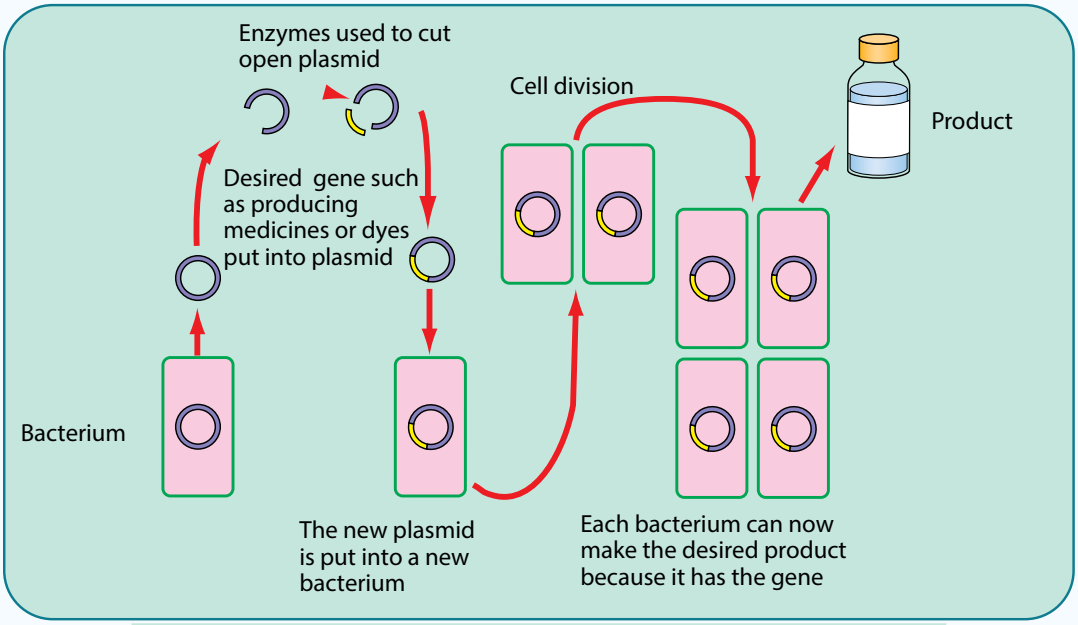
4. Match

A	B
Insulin resistance	Results in diabetes
Genetic engineering	Involves transfer of genes from one cell to a different cell
Vats	Containers for bacterial growth
Vaccines	A liquid containing weakened or killed disease causing agent
Surface antigens	A protein coat around the virus

5.

Steps of Genetic Engineering:

1. Scientists first identify a gene that can be used to produce a desirable trait, such as resistance to disease or the ability to produce a specific protein.
2. The selected gene is carefully isolated from the DNA of the original organism using special enzymes.
3. The isolated gene is inserted into a carrier, often a plasmid (a small circular piece of DNA found in bacteria), which acts as a vector. The vector acts as a carrier to deliver the gene into another organism.
4. The vector carrying the gene is introduced into the host cells commonly bacteria, plants, or animals.
5. Cells that successfully receive the gene are selected and cloned to make many identical copies.
6. The inserted gene instructs the host cells to produce new proteins or enzymes that they would not naturally make.



Steps involved in genetic engineering for modification of bacteria

UNIT 5: PERIODIC TABLE

Practice page 44

Symbol	Element	Atomic Number	Number of electrons	First Shell K	Second Shell L	Third Shell M
H	Hydrogen	1	1	1	-	-
He	Helium	2	2	2	-	-
C	Carbon	6	6	2	4	
Na	Sodium	11	11	2	8	1

Practice page 45

Metals	Non-metals
Shiny, Good conductor of heat, high melting point, malleable	Brittle, poor conductor of heat, sonorous, dull appearance

Practice page 46

Uses of metals and non-metals in our surroundings

Uses of non-metals: Oxygen is used in hospitals, manufacturing steel, for breathing. Chlorine is used in purification of water and carbon in fossil fuels is used to produce energy like heat. We generate electricity which is used in industries.

Uses of metals: Gold is used in making of jewellery, copper is used for making of coins, iron is used in making of bridges because it is strong. Aluminium is used in making of cooking utensils. Tungsten is used in making of light bulbs' filaments.

Exercise

1.

i. b

ii. b

iii. d

iv. d

v. a

vi. c

2.

i. Periodic table and how it is useful

In order to study properties of elements, they are arranged according to their structure in the form of a table. It is called Periodic Table. It is a way of classifying elements in groups and periods.

ii. Daily life uses of metals:

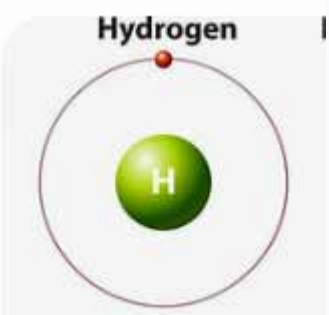
- Use of copper utensils in our kitchens for cooking
- Aluminium is used in making of windows

iii. Metalloids

They are substances that share some properties with metals and some with non-metals. For example,

Silicon (Si), Boron (B)

iv. Atomic number of Hydrogen is 1



v. Relationship of periods and number of shells of elements and examples.

The periods are arrangement of elements horizontally. The elements in a period have same number of electron shells. For example, H and He in Period I have only one shell.

3.

i. The compounds that are affecting the ozone layer are chlorofluorocarbons or CFCs.

ii. The periods in a periodic table are elements arranged horizontally according to number of shells of the elements. There are 7 periods.

iii. Characteristic features of noble gases

Group VIII comprises of noble gases. As their outermost shell is complete the noble gases are non-reactive.

iv. Sonorous, malleable, ductile

- Sonorous means when the substance are hit they produce ringing sounds.
- Malleable means the substance can be given any particular shape by hammering.
- Ductile means the substances can be pulled into wires.

v. Gold is a precious metal because of its rarity and physical properties. It is malleable, resistant to corrosion and it is used in making of jewellery as it does not tarnish.

4.

i. non-shiny, matte

ii. gases

iii. malleable or sonorous

iv. poor

v. used

5

Symbol	Element	Atomic Number	Number of Electrons	First Shell K	Second \ shell L	Third Shell M
H	Hydrogen	1	1	1	0	0
He	Helium	2	2	2	0	0
Li	Lithium	3	3	2	1	0
Be	Beryllium	4	4	2	2	0
C	Carbon	6	6	2	4	0
Ar	Argon	18	18	2	8	8
Si	Silicon	14	14	2	8	4
S	Sulphur	16	16	2	8	6

UNIT 6: CHEMICAL REACTIONS

Practice page 51

1. $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$
2. $SiCl_2 + H_2O \rightarrow H_4SiO_4 + HCl$

   $SiCl_2 + 4H_2O \rightarrow 4H_4SiO_4 + 4HCl$
3. $Al + HCl \rightarrow AlCl_3 + H_2$

   $2Al + 6\ HCl \rightarrow 2\ AlCl_3 + 3H_2$

Practice page 52

Endothermic	Exothermic
Melting of Ice, photosynthesis, cooking an egg	Burning of Wood, freezing water, rusting iron

Practice page 55

1. Synthesis
2. Decomposition
3. Displaces
4. Exchange
5. Combustion

Exercise

1.

i. c

ii. b

iii. b

iv. a

v. a

vi. a

2.

i. Chemical reaction is said to occur when new substances are formed with the absorption or release of energy. This change is hard reverse. The new substances formed are different from the substances that reacted.

ii. $2Cu(s) + O_2(g) \rightarrow 2CuO$

iii. Two types of chemical reactions that involve heat are endothermic and exothermic reactions.

Endothermic are certain chemical reactions that take in energy from their surroundings. That energy is usually heat.

Exothermic reactions are certain chemical reactions that need to give out energy to their surrounding. This released energy is in the form of light or heat.

iv. $Zn(s) + \_\_\_\_\_ \rightarrow ZnSO_4(aq) + H_2(g)$

$Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

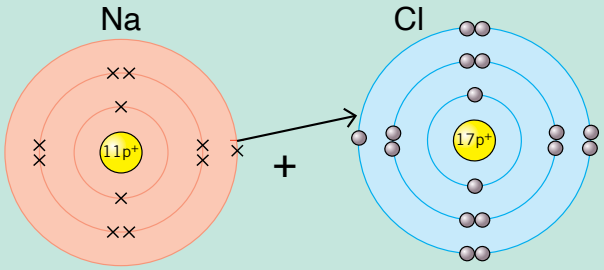
e. Cation= They are positively charged ions formed by loss of electrons in ionic bonds.

Anion= They are negatively charged ions formed by gain of electrons in ionic bonds.

3.

i

Sodium chloride is a very common ionic compound, known as the table salt. It is formed when sodium and chlorine react with each other, and the electrons lost by sodium atoms are gained by chlorine atoms. As a result of the reaction white crystals of sodium chloride are formed.



ii. Law of conservation of mass with examples

The law of conservation of mass states that total mass of atoms before and after the reaction remains the same.

For example, if 10 g of salt is added to 240 g of hot water and stirred thoroughly the mass of the solution is 250 g. Although the salt appears to disappear in the solution , all of the salt particles still present along with the water particles.

iii. Decomposition reaction with examples.

A decomposition reaction results in the break down of a single compound into two or more simpler products. Since this process involves breaking down of chemical bonds, energy is required in such reactions.

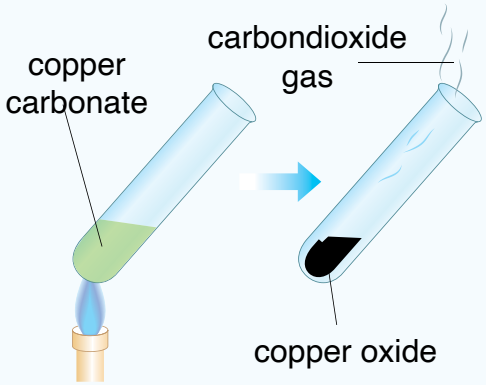
For example: When copper carbonate is heated copper oxide and carbon dioxide is formed and the solid remains while the gas escapes.

iv. Magnesium chloride reacts with baririum sulphate ohysical and chemical changes take place during the process. It is **a double displacement reaction**. For example when a solution of barium chloride is a solution of msgnesium sulphate, a white solid barium sulphate is produced. The other product of the reaction is magnesium chloride which remains in solution form. The barium sulphate produced is insoluble and forms a precipitate.

v. Ionic bond forms between two atoms, a metal and anon-metal. Metal loses one(or more) electron(s), while the non-metal gains one(or more) electrons, forming ions. The formation of ionic bonds, is helped by electrostatic attraction between the ions.

vi. Most covalent compounds are non-conductors of electricity, due to the absence of electrically charged particles.

4



Heating copper carbonate

Thermal decomposition occurs when copper carbonate is heated. It changes from a green powder to a black powder indicating that the green copper carbonate is broken down into black coper oxide and carbon dioxide is released.

UNIT 7: ACIDS, BASES, AND SALTS

Practice page 63

Match

Alkali	Common use
Sodium hydroxide	In household bleach
Calcium hydroxide	To test for CO_2
Ammonium hydroxide	In soap making

Practice page 65

1. Acid
2. Base
3. Neutral
4. Base/alkali
5. Acids

Practice page 66

1. $HCl + NaOH \rightarrow NaCl + H_2O$

   Acid Alkali salt water

2. $H_2SO_4 + KOH \rightarrow K_2SO_4 + H_2O$

   Acid Alkali salt water

3. $HNO_3 + NH_4OH \rightarrow NH_4NO_3 + H_2O$

   Acid alkali salt water

Practice page 68

Acid Used	Alkali Used	Salt Formed	Use of Salt
Hydrochloric acid	Sodium hydroxide	Sodium chloride	Table salt
Nitric acid	Ammonia	Ammonium nitrate	Fertilizer
Sulphuric acid	Potassium hydroxide	Potassium sulphate	Fertilizer

Exercise

1.

i. c

ii. b

iii. b

iv. c

v. c

vi. b

2.

i. The substances for which H_2SO_4 is used as raw material are phosphate- based fertilizers.

ii. Nitric acid is the main ingredient of fertilizers and explosives.

iii. The other name for bases is alkalis. Some properties of bases are:

- Soapy to touch
- Bitter taste
- Usually, no smell
- Turns red litmus blue
- pH is of more than 7
- Reacts with acids to form salt and water
- Vinegar is an acid known as acetic acid. Its pH value is between 2 and 3.

iv. an acid. pH range 2-3

v. Salts are called ionic compounds as they conduct electricity in their molten form as well as their aqueous state.

vi. Some uses of acids are:

Some strong acids in laboratories have industrial uses. Sulphuric acid is as raw material in the production of plastics, paints, and fertilizers. It is also used in the car batteries.

3.

i. Soap can be prepared domestically by the use of a strong alkali called sodium hydroxide or caustic soda with some other ingredients, like olive oil or coconut oil or castor oil. Distilled water, essential oils, and oatmeal is also needed. A dye can also be used to colour the soap.

ii. Sulphur dioxide is produced when coal and oil are burned in industries in order to power industries and motor engines. Sulphur dioxide released from industries dissolves in rain water to form sulphuric acid. Sulphuric acid is a strong acid which makes the rain acidic.

iii. The acid rain harms the plants and animals' life on land and in water. It also destroys man-made environment including building and other structures made of limestone. The forests are completely destroyed by acid rain in areas with this hazard exists.

iv. The scale which is used to measure strength of acidic and alkaline solutions is known as pH scale.

The pH of an acid is less than 7 and a substance with pH 7 is neutral. A substance with pH above 7 is known as an alkali.

v. When an acid is mixed with a base, they neutralize (cancel out) each other and a salt is formed. Water is also a product of this reaction.

Example: Neutralization reaction

HCL + NaOH→ NaCl+ water

vi. **1.** HCL + NaOH→ NaCl+ water

2. H_2SO_4 + KOH → K_2SO_4 + H_2O

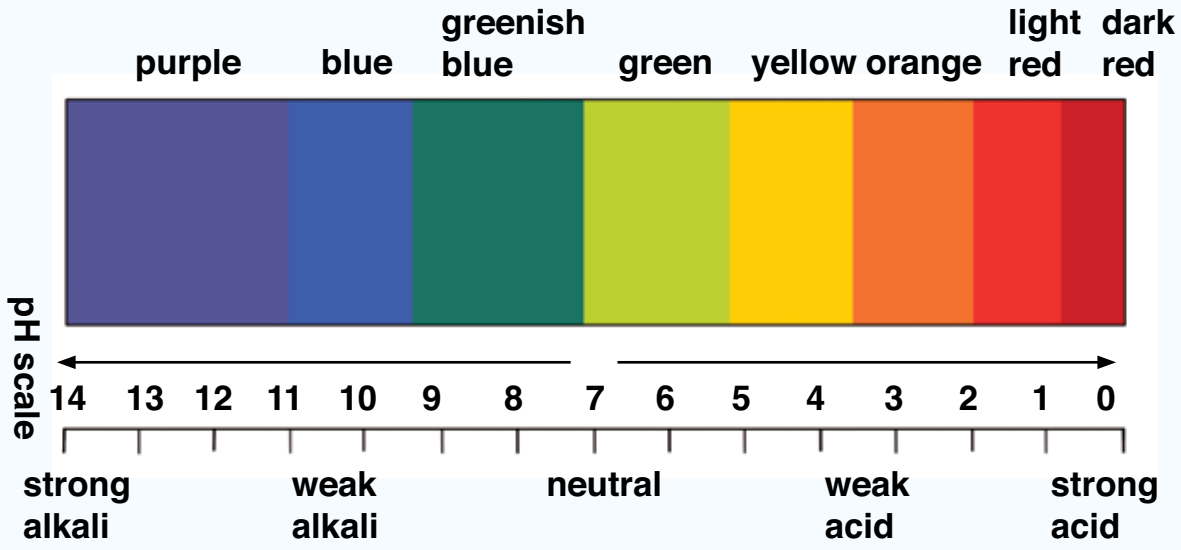
3. HNO_3 + NH_4OH → NH_4NO_3 + H_2O

vii. **Acid** + alkali→ **Salt + water**

4.

Acids	Alkalis
Sticky to touch	**Soapy to touch**
Sour in taste	Bitter in taste
Strong smell	Usually, no smell
Turn blue litmus red	Turn red litmus paper blue
pH less than 7	**pH more than 7**
Reacts with alkalis to form salt	Reacts with acids to to form salt

5



Colour chart of Universal indicator.

UNIT 8: REFLECTION AND REFRACTION OF LIGHT

Practice page 75

1. Straight line in wave form
2. Longer
3. Electromagnetic
4. Many different
5. Red

Practice page 77

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

Practice page 79

1. Convex mirror
2. Convex mirror
3. Concave mirror

Exercise

1.

i. c

ii. d

iii. a

iv. c

v. c

vi. d

2.

i. When white light shines onto an object from the sun or a light bulb, shines onto an object, we can see colour of the object. As a result of this, only colours of the reflected light are seen.

ii. Incident ray:

It is a ray of light that strikes a surface.

Normal:

In the reflection of light, it is an imaginary line, which is drawn perpendicularly to the surface at the exact point where an incident ray of light hits it.

iii.

1. Violet
2. Indigo
3. Blue
4. green
5. Yellow
6. Orange
7. Red

iv. The spherical mirrors have reflecting mirrors, which are curved.

Based on the fact that the reflecting mirrors are curved inwards or outwards, there are two types of spherical mirrors. These are concave mirrors and concave mirrors.

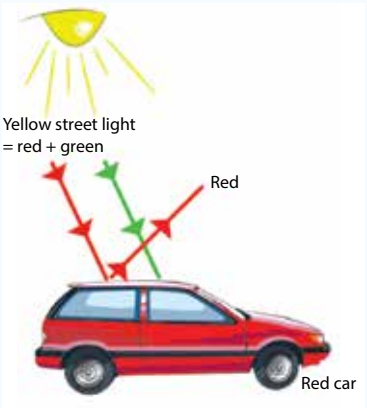
v. he optical instrument are devices which use the reflecting and refracting properties of plane mirrors, spherical mirrors, lenses, and prism.

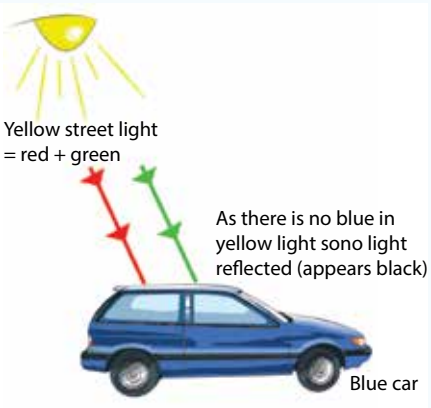
The two optical instruments used in the scientific laboratories are microscope and telescope.

3.i. The two laws of reflection are:

1. The angle of incidence is equal to the angle of reflection.
2. The incident ray, the reflected ray and the normal , all lie in the same plane.

3.ii. Shining different coloured lights or objects can make them appear to have different colours. For example how different cars appear under street light.





iii. A rainbow is a naturally occuring example of dispersion. It occurs when sunlight from behind the observer is refracted through the raindrop in front. Sometimes the same effect can be observed when looking at a garden hose spray, or from a waterfall in bright sunlight.

iv. Refraction of light

Light travels at the speed of 300,000 km/ sec. in air, but slows down as it enters a different medium, such as water or glass.

When a ray of light meets the new medium at an angle, it bends further. This bending is known as refraction.

v. Difference between concave mirrors and convex mirrors

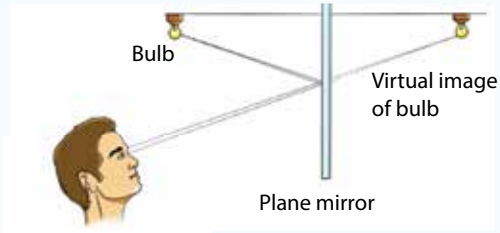
Convex mirrors

These spherical mirrors have a reflecting surface whichcurves outwards. When light falls onto a convex lmirror, the reflected ray spread out or diverge , that is convex mirrors are also known as diverging mirrors.

These spherical mirrors have a reflecting surface which curves inwards.

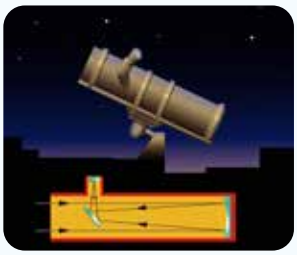
When light falls onto a concave mirror, the reflected rays bend inwards or converge to a point called the focus. This is why the concave mirrors are sometimes called as converging mirrors.

4.



The rays of light from the object (bulb) are reflected. The observer sees the image behind the mirror.

5.

Instruments	Name	Function
	refracting telescope	a refracting telescope works by having two lenses to focus light rays. this allows the distant objects to appear brighter with cleared details
	reflecting telescopes	reflecting telescope – uses concave mirrors instead of lenses to focus light rays together. This allows distant objects to appear with greatly magnified detail.
	microscope	an optical instrument with two convex lenses. improves visibility and image clarity.

UNIT 9: ELECTRICITY AND MAGNETISM

Practice page 83

1. Ampere
2. Charged (electrons)
3. Volt (V)
4. Thickness
5. Greater

Practice page 85

Solution.1. Power (W) = Voltage(v) x Current (A)

Power=230x8=

=1,840 W

2. Current= Power/Voltage = 90/18= 5 A

Practice page 87

Match

Term	Description
Electromagnet	Region around a wire with moving electric current
Solenoid	A tightly wound coil of wire
Magnetic Field	Uses 'make and break' circuit to produce sound repeatedly
Speaker	Can be turned on and off with electric current
Electric bell	Uses electromagnets to to move a coil and vibrate a cone
Iron core	Increase strength of magnetic field inside a solenoid

Exercise

1.

i. c

ii. b

iii. c

iv. b

v. c

vi. c

2.

i. Electric current

The flow of charge is known a electric current

Unit = ohm (Ω)

ii. voltage is the measure of difference in electrical energy between two difference parts of a circuit

iii. potential difference

iv. resistance is the property of materials which slows down the flow of electric current through them, as it makes it harder for electrons to freely move. For example, electric current is able to pass easily through a copper wire but not through a nichrome wire of the same length because the current flows more easily through a thicker copper wire.

3.

i. Resistance (Ω)= Voltage (V)/Current (A)

Current

When electricity flows through a wire, it means negatively charged electrons are moving through a wire. This flow of charge is electric current Its SI unit is Ampere (A).

Current = Voltage/Resistance

Ω=V/C

Power

The rate of usage of electrical energy in a circuit is known as electric power. Its unit is Watts (W)

Formula

Power (W)= Voltage V x Current (A)

Voltage

It is the measure of difference in electric in electric energy between two different parts.

Unit = Volt(V)

Voltage + Power/ Current

ii. Earth wire

It is a safety wire in case of a live wire comes in contact with a metal part of an appliance . The earth wire prevents electrical fires from occurring by providing an extra path for current to ground through metal plate.

iii. Fuse and its working

A fuse is a safety wire made up of a thin piece of resistance wire which can quickly melt if the current gets too high. The fuse must always be connected to live wire and have a current rating +(resistance) just big enough to let the appliance's circuit work properly. If the resistance is too high there could be an overload of current which can damage the appliance.

iv. Solenoid. When a current flows through a single wire, the magnetic field around it is not that strong. In order to make the electronic field stronger the wire can be wound into a coil resulting in a stronger magnetic field. A long, tightly wound coil is known as solenoid.

v. Function of a residual circuit.

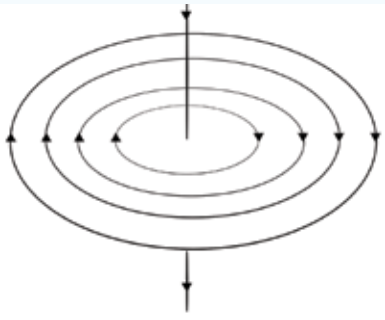
A residual circuit breaker (r.c.c.b) is used to protect against situations where a fault occurs in which the outer covering of a properly earthed covering becomes live.

It contains an electromagnetic switch that can quickly turn the power of if the difference of current between earth and live wire becomes greater than 0.03.

4.

Electrical Appliance	**Electricity Consumption (in Watts)**
TV	80
Lamp	60
Iron	110
Drill machine	400
Electric Kettle	2400

5.



The current in the wire produces a circular magnetic field.

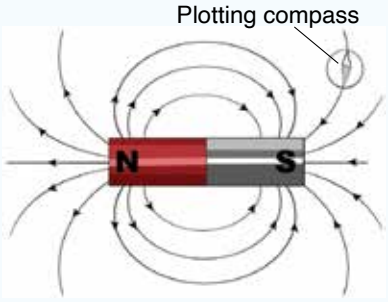
6 a.

Overloaded plug sockets can damage the household electricity supply and cause a fire.

b.

The picture shows the safety cap being used to cover the plug. This measure is used to safe young children from harm.

7.



It is a bar magnet. As the diagram shows the magnetic field is stronger near poles.

UNIT 10: FORCE AND PRESSURE

Practice page 94

1. Density = Mas/Volume
2. Sink
3. Archimedes discovered that amount of upward push or upthrust is equal to the weight of the water that has been displaced by an object.
4. 1

Practice page 97

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

Exercise

1.

i. a

ii. b

iii. c

iv. c

v. c

vi. b

vii. b

viii. b

2.

i. True

ii. False

iii. True

iv. False

v. True

4.

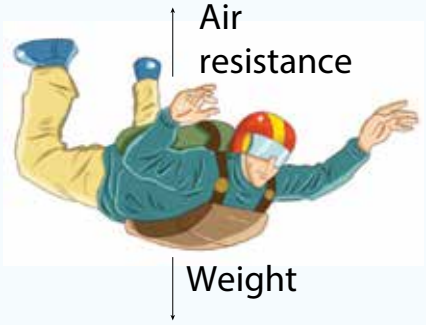
i. Newton's First law of motion states that

In absence of an unbalanced external force against acting on it, an object will:

- If stationary: then remain stationary.
- If moving: then keep moving at a steady speed in a straight line.

ii. If the weight of the box is 40 N and the force from the table is 40 N, the forces are balanced and the lamp remains stationary on the table

iii.



If a sky driver is falling at a steady speed, the forces acting on him are balanced. How His downward force (weight) is balanced by the upaward force of the air resistance.

iv. What happens to pressure of aliquid when its density changes?

When the density increases the pressure of aliquid will also increase. Similarly, when the density decreases the pressure of liquid will also decrease.

v. Density can be defined as the measure of how much space an object or substance takes (volume)

in relation to its matter (mass) in per unit volume.

Density = Mass/Volume

5. Detailed answers.

i. The upward force of the water pushing on the ship, is equal to or greater than the weight of the ship, which is the downward force, the ship floats.

ii. Unbalanced forces. If there are dfifferent forces acting on an object and they do not cancel the effect of each other, these forces are said to be unbalanced. The combined effect of unbalanced forces is known as resultant force.

iii. Pressure and its units: Pressure is the result of force exerted on a surface per unit area. Its unit is pascal (Pa)

Pressure in liquids: Pressure in liquids is related to the weight of the liquid pressing down on an area. This means that when a liquid is poured into a container, pressure is created by the weight of the liquid pushing down on the base.

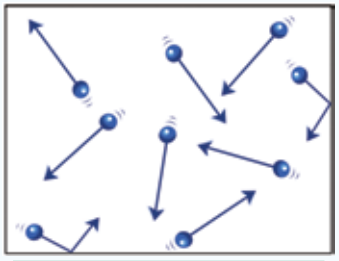
iv. Atmospheric presure:

The air around us has weight and it surrounds everything on the planet. It also presses down against everything it touches. This pressure is known as air pressure or atmospheric pressure. It is the force exerted on the earth by the surface above.

v. Spiked shoes or studs are used by football players because it stops from skidding. They reduce the eurface area so that the force is more concentrated. This makes the sole of the boot cut more deeply into the water.

vi. The haydraulic breaks work as hydaulic machines use liquids under pressure to transmit forces, through hydraulic pressure. In hydraulic brakes pedal is pressed, a piston puts pressure on the liquid inside the attached cylinder. The pressure gets transferred to a piston in another cylinder, which pushes the attached brake pad causing the car to slow down.

6. Model of a gas



Particle model of a gas

The particle model of a gas shows its particles are not arranged in any particular way and are not arranged in any particular way and are far apart from each other. As a result these particles are not strogly held together and particles are free to move in all directions.

UNIT 11: THE UNIVERSE

Pracrice page 102

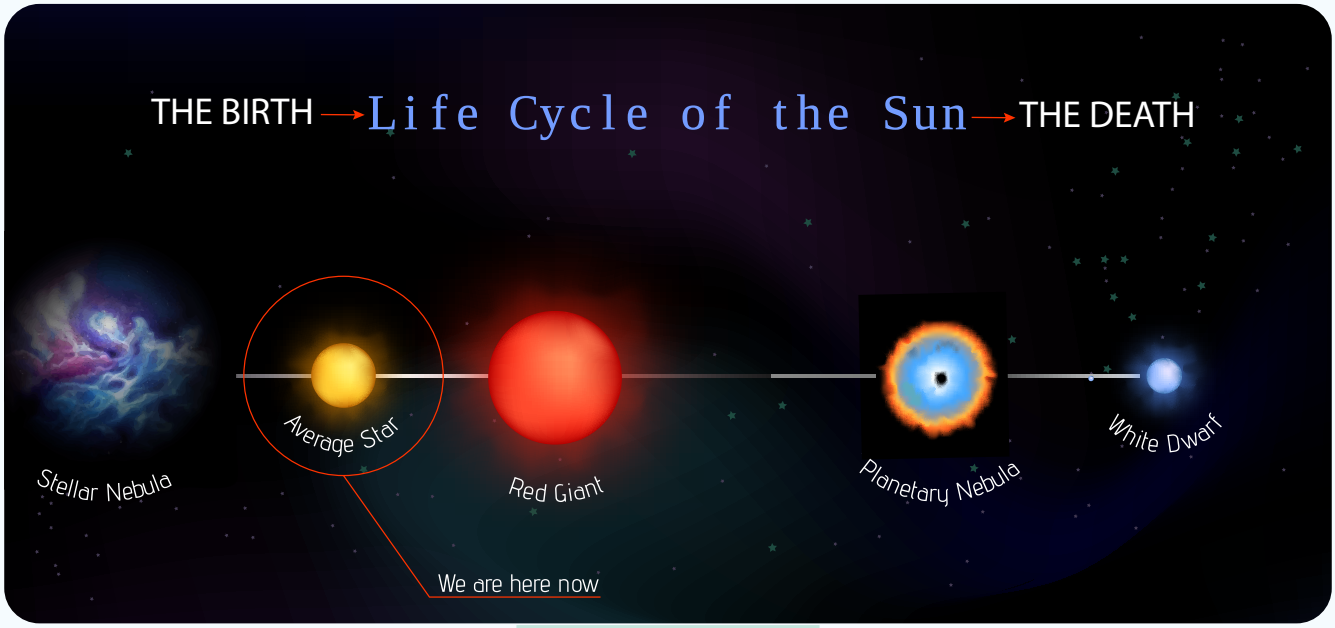
1. Universe
2. Astronomers
3. Milky Way
4. Sagittarius A*

Practice page 104

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

practice page 105

Life cycle of the Sun



Life Cycle of the Sun

Exercise

1.

i. c

ii. b

iii. c

iv. c

v. c

vi. b

3. **i** There are three types of galaxies which are:

1. Spiral galaxies
2. Elliptical galaxies
3. Irregular galaxies

ii. Our solar system is part of Milky Way galaxy.It is a spiral galaxy with 400 billion stars.that orbit a huge black hole known as Sagittarius A*. Planet Earth is located in a tiny Part of the milky way.

iii. The Universe

The word universe is used to indicate the entire phyxical world, which means it containseverything that physically exists. The scientists that study space and universe have not able to determine the sixe of the universe or the limit of its size. However it is estimated that universe contains trillions of galaxies.

iv. The new stars are formed in nebula.

v. Main Sequence Star

When very large number of helium atomsare formed per second along with production of intense heat, a new star is formed, known as main sequence stars.

Protostar

As gravity becomes stronger, temperature also rises turning the nebula into a protostar.

4.

i. Cluster

Galaxies in the universe are not found on their own, rather they tend to be grouped together in clusters. The Milky Way and Andromeda are both present in a small cluster of only around 40 galaxies. It is possible clusters to join together in a formation called super cluster, which are largest known structures in the universe.

ii. Life cycle of the Sun.

The astronomers calculate that the Sun was from a nebula from about 4.6 billion years ago. This means that the Sun is in the main sequence stage of its life cycle.

In another 6 billion years the Sun will finally run out of Hydrogen and become a red giant. At this stage it will be big enough to swallow uo the planets of Mercury and Venus, and burn up Earth.

A few billion years after this event, the Sun will begin to die. However as our Sun is not big enough , it will not die in a huge explosive supernova. Instead the large amount of helium will fuse causing the Sun to shrink and become more luminous.

Over the next 5 billion years the Sunwill loose mass as it throws out massive masses of material known as planetary nebula out in the space. This will be the result of powerful bursts of radiation, which will result in the loss of about half of the Sun's mass.

The left over mass of the Sun, will further cool down to become a white dwarf star, which will glow for billions of years, before fading away into darkness.

iii. The galaxy closest to the milky way is Andromeda which is 2.5 million years away.

iv. Following are the types of telescopes used to collect information from space.

Hubble telescope: It is a reflecting telescope. . It orbits the Erath every 96 minutes and is controlled by ground station. Its cameras are digital and send back sognals to Earth. Hubble is not affected by the dust and other pollution in the air.

The James Webb Space Telescope is the latgest most powerful telescope ever built. It is able to stake photographs of some of the first galaxies ever formed and look inside dust clouds, to see where new stars are forming.

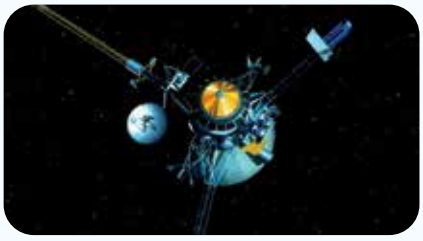
Radio telescope.detect radio waves from space. They have large dusc-shaped reflectors that collect and focus these waves into a detector. The detector turns the waves into signals that scientist study to learn about stars, alaxies, and space objects.

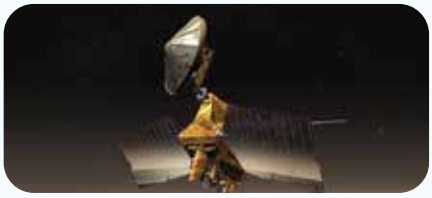
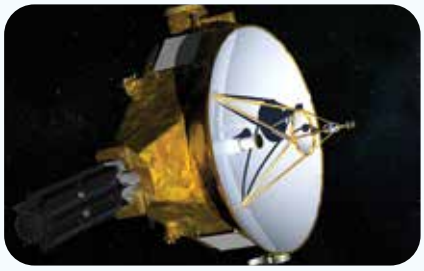
v. The space exploration began in 1957 with the launch of the first artificial satellite. Since then many advancements have occurred, such as the humans' visit to the moon, information gathering from distant galaxies using space telescope to finally robots exploring other planets. Scientists continue to develop new technologies, in order to discover more about the universe. These advancements in science and technology also benefit our lives on Earth in many ways. For example, many development have been possible due to this research, in the field of medicine, power generation, energy storagesystems, engineering, computing, robotics, and communication systems.

vi. Space probes are used to provide more indepth information about palnets in our solar system.

A space probe is an unmanned rocket, full of very expensive scientific equipment. The space probes are of two types. They either gather information as they orbit a planet (an orbiter) or they send smaller probes to the land on the planet's surface. (a rover).

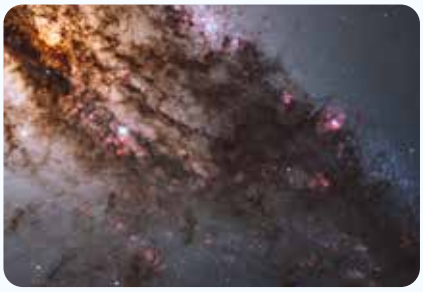
The information collected is shown in the following table

Mission	Photograph	Launched/ arrived	Information collected
Voyager 2 to Jupiter, Saturn, Uranus, and Neptune		August 1977/ Sept 1979 (J) August 1981 (S) January 1986 (U) August 1989 (N)	Uranus and Neptune investigated for the first time. Data on atmospheres, magnetic fields, moons, and rings Found new moons around Neptune.
Magellan to Venus		May 1989/ August 1990	Made detailed maps. Discovered most of the planet is covered with volcanoes/lava.
Galileo to Jupiter		October 1989/ August 1993	**Orbiter**: Studied magnetic field, atmosphere, and moons. **Probe**: Measured pressure, winds, temperature, and clouds in atmosphere.
Cassini to Saturn		October 1997/ July 2004 Huygens probe landed on Titan (one of Saturn's moons) January 2005.	**Orbiter**: Measured atmosphere, molten core and mysterious ring, magnetic field, radio waves, and cosmic dust. **Huygens probe**: found conditions similar to Earth before life evolved. Scientists hope to detect processes that lead to life on Earth.

Mission	Photograph	Launched/ arrived	Information collected
Odyssey to Mars		April 2001/ October 2001	**Orbiter**: Discovered vast supplies of frozen water, mapped surface textures and minerals all over Mars. **Rovers**: searched for health hazards to possible future human exploration of Mars.
Mars Reconnaissance Orbiter		March 2006	Provided more scientific data than all previous Mars missions combined. Strong evidence that Mars had water and, therefore, could have supported life.
New Horizons to Pluto and the outer edge of the solar system Reconnaissance Orbiter		Launched in January 2006 it flew past Pluto in July 2015. Scheduled arrival outer edge 2019 .	First spacecraft to study Pluto close up. Now destined for the outer edge of the solar system beyond the planets where there are lots of remnants from the formation of the solar system.
Perseverance Rover on Mars		July 2020/ February 2021	Provided more scientific data about Mars and searching for signs of past microbial life.

5

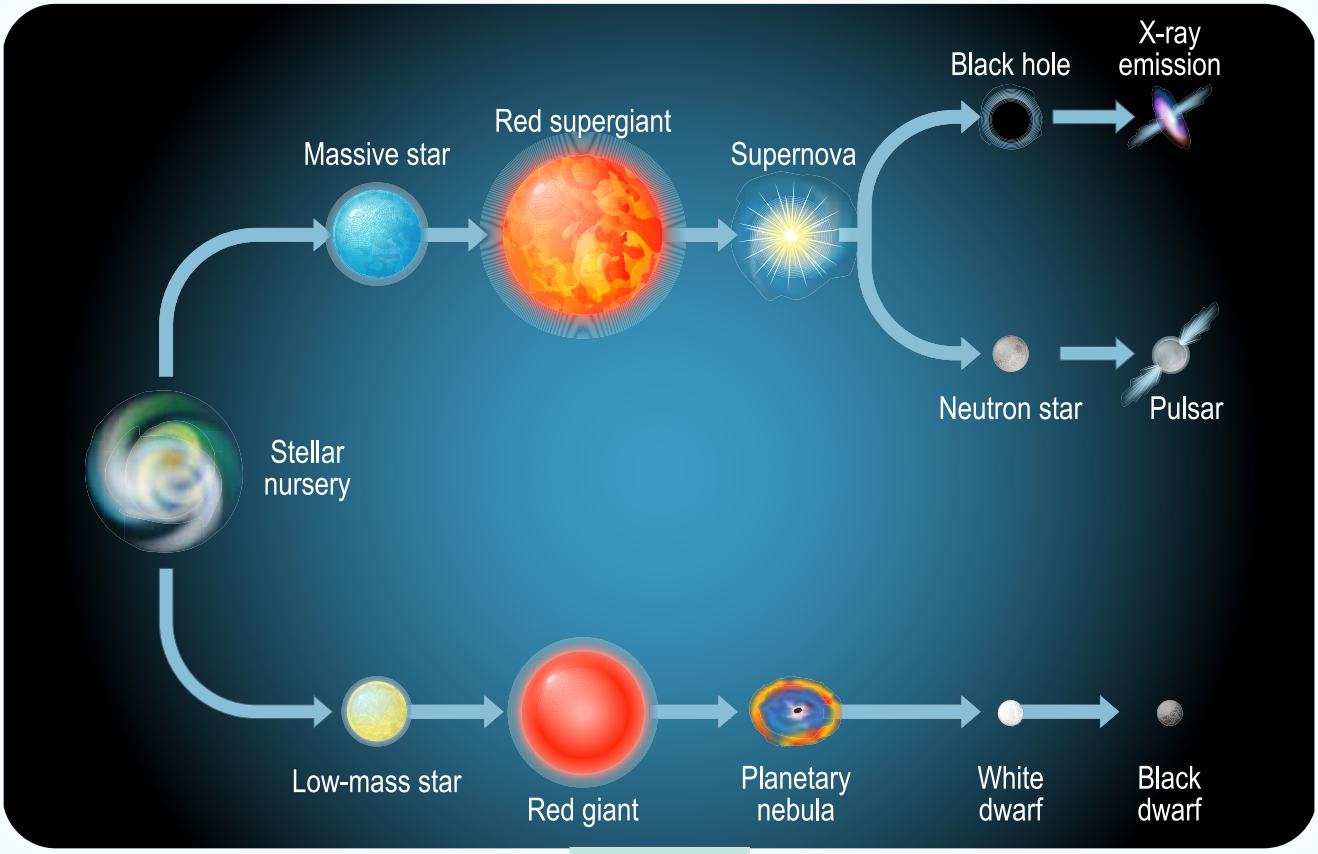
Spiral Galaxy



Elliptical Galaxy

Irregular Galaxy

6



Life of a star

UNIT 12: TECHNOLOGY IN EVERYDAY LIFE

Practice page 112

1. Fluoride
2. Xylite
3. Sodium Hydroxide and coconut oil mixture

Practice page 114

Precautions for handling sodium hydroxide.

1. Wear safety goggles and rubber gloves
2. Wear clothing with rubber sleeves

Practice page 119

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

Exercise

1.

i. c

ii. c

iii. b

iv. c

v. c

vi. b

vii. b

2.

i. It is important to wear safety goggles and gloves when making soap in the laboratory. It is a precautionary safety measure as sodium hydroxide is corrosive and can cause severe burns.

Answer Key

ii. A mixture of baking soda (an abrasive agent) and coconut oil or water (binder) gives toothpaste a creamy texture.

iii. It is important to stir the milk and vinegar while heating in the water bath, this helps milk to coagulate (form lumps).

3.

i. The casein molecule (milk protein) are quite small and can join together to make larger molecules. The acetic acid in the vinegar makes the casein coagulate. The molecules link together to form long chains or polymers which function a stretched plastic.

This chemical reaction is known as saponification.

ii. The thick piece of casein plastic will take longer to dry out, because of hardening of the outer surface. The moisture diffusion takes longer.

iii.

	Bioplastics	Soap
Materials used	Milk, white vinegar, bowl, sieve, spoon, absorbent paper, measuring cylinder, water bath, thermometer	Sodium hydroxide granules, coconut oil, common salt, 1x500 ml beaker, 3x250 ml beaker , glass stirrer, measuring cylinder, Bunsen burner, tripod, gauze ,spoon, mold, absorbent paper tissue.
Chemical reactions	casein molecule are quite small and can join together to make larger molecules. The acetic acid in vinegar makes the casein molecules link together to form long chains or polymers which function as the stretchy plastic	Soap is made through a chemical reaction known as saponification. In this reaction animal fats or plant oils are combined together with an alkali.
Safety precautions	Protection equipment	- gloves and goggles are used - long sleeves dress is recommended

Answer Key

4. Flow Chart