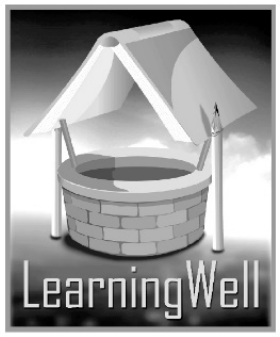

Right Science

4

Teacher's Resource Book

For Order : 0320-5899031

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CONTENTS

Chapter 1: Science

Science and its major fields 1.1

Learning objectives:

- In this lesson we will learn about science and its major fields.
- We will learn about the importance of science.
- We will learn that biology, physics and chemistry are the main branches of science.
- We will learn about work of scientists and scientific method.

Teacher Starters:

Start by asking children how can they imagine a world without science? Tell them the importance of science in our everyday life. Also ask them what they know about the branches of sciences. Tell them that biology, chemistry and physics are the main branches of science.

Teaching:

Get the lesson read in class, emphasizing more on use of science in our everyday life. You can explain to them about how scientifically developed machines like lever and pulley work. Tell them why science is important in creating such machines which help us in various ways. Next, tell them about the branches of science and how biology, chemistry and physics help us. By the end of the chapter they must be clear how studies of biology, chemistry or physics later advance into studies of medicine and engineering. Also tell them about the work done by scientists the use of scientific method. Point to the pictures given in the unit.

Extended Teaching
Resources at www.learningwell.pk

Log on to your personal account at www.learningwell.pk to view electronic print of this lesson and a full-length video lecture or animation pertaining to the lesson. You will also find extended exercises or MCQ-based tests based on the lesson to help your students improve their learning. Additional teaching resources are also available atwww.TeachingWell.pk

Web Resources:

For further information visit these sites and links:

1. www.teach-nology.com
2. www.desktopclass.com

Test Your Knowledge

A. Match each definition in column A with the term in column B and write the correct answer in the spaces given below.

Column A	Column B
1. An intelligent guess or possible answer of the question	A. Experiment (1)
2. Branch of science that deals with matter, its motion and interaction with energy	B. Curiosity (4)
3. A procedure used to validate hypothesis	C. Hypothesis (3)
4. The desire to learn more about something	D. Biologist (5)
5. Studies living organisms	E. Physics (2)

1. Experiment 2. Physics 3. Hypothesis 4. Curiosity 5. Physics

B. Fill in the blanks

1. Science
2. Life
3. Physics
4. Physics
5. Physicists
6. Matte

C. Write true (T) or false (F)

1. True
2. True
3. True
4. True
5. False
6. False
7. False
8. False
9. True
10. True

Think and Write

A. Answers the following questions:

1. What is the scientific method?

- The method scientists use to study various mechanisms and phenomenon is called scientific method.

2. What are the main steps of the scientific method?

- The main steps are making an observation, asking a question, forming a hypothesis, conducting an experiment and drawing a conclusion.

3. What are the three main branches of science?

- The three main branches of science are as follows:
  i) Biology, ii) Chemistry, iii) Physics

4. What does a chemist do?

- A chemist study the properties, structure and the way matter combines, interacts, changes and how it reacts.

5. What is physics? How it helps us?

- Physics is a branch of science that studies the matter and its motion and how matter interacts with energy and forces. Physics helps us to understand gravity, heat, electricity, magnetism, light and much more.

6. How chemistry is important in our daily life?

- Chemistry is important because everything around us is made of chemicals like food we eat, water we drink, toys we play with and oxygen we breathe.

7. Write three everyday uses of biology.

- **Uses of Biology**:
  i) It helps us in protecting our body from harmful things.
  ii) It helps doctors learn how to keep people safe and healthy.
  iii) It helps us to understand which plants are edible and which are not.

Learning New Words:-

Words	**Meanings**
Scientific method	principles and procedures for the systematic pursuit of knowledge
Observation	the activity of paying close attention to someone or something in order to get information
Question	a sentence, phrase or word that asks for information
Experiment	something that is done as a test
Conclusion	a final decision or judgment
Biology	a science that deals with things that is alive (such as plant, animals and human beings)
Chemistry	a science that deals with the structure and properties of substances and with the changes that go through.
Physics	a science that deals with matter and energy and the way they act on each other in heat, light, electricity and sound

Chapter 2: Our Body

The Human Body Science 2.1

Learning objectives:

- In this lesson we will learn about the science of the human body.
- We will learn about the different levels of organization in our body including cells, tissues, organs and system of organs.

Teacher Starters:

Start by asking students about their bodies and their internal parts. They should be able to name certain organs even before reading the chapter, such as heart, lungs, brain and bones. Also ask them to identify or name certain internal body parts. For example muscles and organs which are all made of cells and contain tissues. You can tell them the details about human body organization, with cell being the basic building block of life.

Teaching:
Get the lesson read in class and clearly keep the scope of the chapter to science in the human body. Tell your students about cells, tissues, organs and organ system. Point to the picture of the different units of organization given in the chapter; tell them about important organ system (excretory system, digestive system, muscular system, skeleton system, nervous system) in our body and their functions.

Extended Teaching
Resources at www.learningwell.pk
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Web Resources:
For further information visit these sites and links:
1. www.nat.geokids.com
2. www.ducksters.com

Test Your Knowledge

A. Write organs and function of the following organ systems

Organ System	Organs in the system	Function of the system
Skeletal system	Bones, muscles, cartilage, tendons, ligaments, joints and other connective tissues	Support and protect soft tissues of the body, produces blood cells and stores minerals
Digestive system	Stomach, large and small intestine, anus, liver, pancreas and gall bladder	Digest food and absorb nutrients
Circulatory	Heart and blood vessels	Circulate blood throughout your body
Excretory	Kidneys, large intestine, liver, skin and lungs	Remove waste material from body

Think and Write

A. Answer the following questions:
1. What are the five levels of organization of the human body?
- The five levels of organization of the human body are:
  a) Cells, b) Tissues, c) Organs, d) Organ system, e) Organisms
2. What are tissues? What is the function of muscle tissues?
- Tissues are made of a group of cells having same structure and function. Muscle tissue can contract or relax. By this, it helps our body parts to move.

3. What is the function of digestive system?
- Digestive system helps us in digesting food and absorbing nutrients.

4. What do you know about cells?
- Cells are the building blocks of our body. They are so small that we cannot see them. Our body is made up of different types of cells, such as blood cells, muscles, brain cells etc. Each type of cell plays a specific role.

5. What is an organ? What are the main organs of respiratory system?
- An organ is made from two or more types of tissues. They all work together to perform a particular job. Nose, mouth, trachea, larynx, pharynx and lungs are the main organs of respiratory system.

B. Fill in the blanks.

1. Cells
2. Tissue
3. Heart and blood vessels
4. Microscope
5. Organs
6. Bone
7. Organ
8. Muscular
9. Human body
10. Nervous system

C. Who am I?

Answers:

1. Brain 2. Muscle 3. Cells 4. Heart 5. Digestive

D. Write true (T) or false (F)

1. True
2. False
3. False
4. True
5. True
6. False
7. True
8. False
9. False
10. True

Learning New Words:-

Words	**Meanings**
Cells	the very small parts that together form all living things
Tissues	the material that forms the parts in a plant or animal
Organs	a part of the body (such as heart or liver) that has a particular function
Organ system	a group of organs that work together to perform an important function of the body.
Organism	a system with many parts that depend on each other and work together
Digestive system	the system that helps in digestion
Skeleton system	relating to, forming, attached or resembling a skeleton
Excretory system	relating to or functioning in excretion
Muscular system	relating to or constituting muscles
Nervous system	relating to or composed of neurons

Chapter 2: Our Body
The Musculoskeletal System 2.2

Learning objectives:

- In this lesson we will learn about the musculoskeletal system.
- We will learn that our muscular system consists of muscles and tendons.
- We will learn about the types of muscles, voluntary muscles and involuntary muscles.
- We will also learn about the skeletal system, bones and joints.
- We will learn about how to take care of our skeletal system.

Teacher Starters:

Start by asking students about bones and muscles, the primary components of the muscoskeletel system. Ask them about the type of situations and activities where muscles and bones perform the main function, such as during walking and in playing sports. Tell them about that musculoskeletal system is the main productive system that helps us in moving, sitting and standing, playing games, jumping, etc. etc.. Also discuss the types of muscles which are voluntary and involuntary muscles. Tell them that it is necessary to take care of skeletal system as much of our motion depends on its health.

Teaching:

Get the lesson read in class and emphasize on the role played by the musculoskeletal system. Tell your students about the function of our muscles and skeleton. The students should be clear that we cannot move, sit, or stand without having muscles and the skeleton. Tell them about the two types of muscles: voluntary muscles and involuntary muscles. Point to the pictures given in the unit so that student can understand the topic easily.

Extended Teaching
Resources at www.learningwell.pk

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Web Resources:

For further information visit these sites and links:

1. https://en.m.wikipedia.org
2. www.kenhub.com

Test Your Knowledge

A. Complete the following chart. (Answer is given)

Types of muscles	Voluntary or involuntary	Location	Function
Skeletal muscles	voluntary	Attached to bones	They contract or relax to move body parts, hold your bones & give shape to your body
Smooth muscles	Involuntary	In walls of visceral organs except the heart	Smooth muscles determines the flow of blood to maintain blood pressure and move food through the digestive track
Cardiac muscles	Involuntary	In the walls of heart	They contract and relax to pump blood throughout the body.

Think and Write

A. Answer the following questions:

1. What is the function of musculoskeletal system?
   - The function of musculoskeletal system is to provide support and movement for your body. Without musculoskeletal system, we would be unable to run, walk, stand, move or do anything.
2. What are joints? How many types of joints are there?
   - The part in our skeletal system where two bones connect is called a joint. There are about 400 joints in our body.
3. How many types of muscles are there? Describe each type with an example.
   - There are three types of muscles.

   i) Smooth Muscles:
   They are involuntary muscles- They are made of fibrous tissues but look smooth. They are controlled by our brain and internal organs such as stomach, intestine and bladder.

   ii) Skeletal muscles:
   They are voluntary muscles- They are attached to bones with the help of tendons. They hold our bones and shape our body- They contract or relax to move body parts.

   iii) Cardiac muscles:
   They are involuntary muscles- Cardiac muscles are attached together to make our heart. They contract and relax to pump blood throughout the body.
4. What are the major functions of skeletal system?
   - The major functions of skeletal system are:

   a) It helps us to move.
   b) Backbone in our skeleton helps us stand straight.
   c) It protects internal organs of our body.
   d) Some bones in our skeleton help in the production of blood cells.
   e) It stores minerals such as calcium and phosphorus for the body.
5. What are bones made of?
   - Bones are made up of hard living tissues providing structural support to the body.

B. MCQ's.

1. Two
2. Involuntary
3. 400
4. Ball or rocket
5. Bone marrow
6. Skeletal
7. Smooth

C. Differentiate between the following along with an example of each.

Voluntary muscles	**Involuntary muscles**
We can control voluntary muscles of our body.	We cannot control involuntary muscles of our body.
Moveable joints	**Immovable joints**
Movable joints can move, twist and bend different parts of our body.	Immovable joints are bony plates of your skull to protect the brain.

D. Tick the right word.

1. Plates
2. Muscles
3. Hinge
4. Voluntary
5. Fibrous
6. 206
7. Weak
8. Calcium

E. Fill in the blanks.

1. Ball and soket
2. Joint
3. Skull
4. Nerves and blood vessels
5. Skeletal system
6. Fracture
7. Milk / healthy

Learning New Words:-

Words	**Meanings**
Musculoskeletal system	relating to both muscular and skeleton
Muscles	a tissue composed of fibers capable of contracting to effect bodily movement
Voluntary muscles	muscle that is under the control of the will and is generally attached to the skeleton
Involuntary muscles	a muscle that contracts without conscious control and found in walls of internal organs
Smooth muscles	one of the type of muscles tissue in the body along with skeletal and cardiac muscle
Cardiac muscles	the principal involuntary-muscle tissues of the vertebrate heart
Backbone	a series of vertebrae extending from the skull to the pelvis; the spine

Tendons	a strong piece of tissue in the body connecting a muscle to a bone
Spongy	a soft and full of cavities spongy, and absorbent
Bone marrow	the soft, sponge-like tissue in the center of most bones
Blood cells	any of the kinds of cell normally found circulating in the blood
Movable joints	joints that are able to move
Fixed joints	joints that don't allow any movement
Socket Joints	a joint in which the rounded end of one part fits into the cavity of another
Hinge	a flexible ligamentous joint
Joints	a point at which parts of an artificial structure are joint
Fracture	the cracking or breaking of a hard object or material

Chapter 2: Our Body

Our Teeth 2.3

Learning objectives:

- In this lesson we will learn about Teeth and their function.
- We will learn that a tooth is made up of three layers; enamel, dentine and the pulp.
- We will learn about four parts of teeth; incisors, canines, premolars and molars.
- We will learn about plaque, tooth decay, tooth sensitivity and root infection.
- We will learn about how we can take care of our teeth.

Teacher Starters:

Start by asking children that what is a tooth made of? They might say it is more like a bone than a muscle. But you can also remind them that they are connected with gums, or muscles, in their roots. Ask your students about the main functions of teeth, such as grinding or cutting food before they enter our stomach. Ask them to identify differences between different types of teeth? As they answer, tell them that some teeth are more useful in eating certain foods than others. Tell them about plaque, tooth decay, tooth sensitivity, bad breath, and root infection. Discuss how they can take care of their teeth as well.

Teaching:

Get the lesson read in class. The students should be clear about various types of teach in detail and two main parts of a tooth: crown and root. Tell them about layers of tooth; enamel, dentine and the pulp. Discuss the types of teeth; incisors, canines, premolars and molars. Point to the pictures given in the unit. Tell students that they should take care of their teeth to avoid any type of dental problem.

Extended Teaching
Resources at www.learningwell.pk
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Web Resources:
For further information visit these sites and links:
1. https://kidshealth.org
2. www.cyh.com

Test Your Knowledge
A. **Match the columns**
- Answer.
  Tooth used for chewing and crushing food (Molars)
  Outer hard covering of tooth (enamel)
  A person who checks and looks after your teeth (dentist)
  Pointy tooth used for tearing food (Canines)

B. Label the parts of the tooth.
- (Do as directed) see page 22.

C. Which food for healthy teeth?
Healthy teeth: milk, apple, carrot
Unhealthy teeth: cake, lollypops, chocolates

Think and Write

1. Answer the following questions:
1. What are children's first set of teeth called?
   - The first set of teeth is called milk teeth, primary teeth or baby teeth.
2. Why do we have teeth?
   - We have teeth to bite and chew food so that it is small enough to be swallowed. Teeth also help us in forming words and speaking clearly.
3. What are the different types of teeth and their functions?
   - The four different types of teeth are:

   i) Incisors: They are used for biting and cutting.
   ii) Canines: They are used for tearing food.
   iii) Premolars: They are used for chewing and grinding food.
   iv) Molars: They are used for chewing and crushing food.

4. What are teeth made of?
   - Teeth are made up of three layers such as;
     i) The outer hard covering is the **Enamel**.
     ii) The bone like material just below the enamel is **Dentine**.
     iii) The inner softest part of tooth is the **Pulp**.
5. How and why do teeth decay?
   - Teeth decay when the plaque combines with the sugar in our food and attacks enamel. As enamel of a tooth erodes, a cavity develops in it and then bacteria makes way to inside of the tooth damaging it internally.
6. How should you take care of teeth?
   - We should take care of our teeth by;
     i) Brushing our teeth regularly twice a day.
     ii) Visiting our dentist for checkups.
     iii) Avoiding sweets and sugar drinks.
     iv) Drinking milk daily.
     v) Eating fresh fruits and vegetables.
7. Discuss some common dental problems in detail.
   - Some common dental problems are;
     i) Tooth decay: As the tooth enamel erodes, cavity develops and bacteria enters the tooth to damage it internally.
     ii) Tooth sensitivity: It is a feeling of sharp, pinching pain in our teeth from sweets, hot and cold drinks or ice-cream, cold air.
     iii) Bad breath: Gum disease, cavities and bacteria on tongue are some dental problems that can cause bad breath.
     iv) Root infection: This infection damages the nerves and tissues inside the tooth. It occurs when the bottom part of a tooth becomes infected and fills up with bacteria.

2. Fill in the blanks.

1. Premolars
2. Root
3. Plaque
4. Tooth
5. Permanent teeth
6. Incisors
7. Pulp

Learning New Words:-

Words	**Meanings**
Milk teeth	temporary teeth of a young mammal (human)
Permanent teeth	the second set of teeth of a mammal (human)
Crown	the external part of a tooth
Enamel	the hard glossy substance that covers the crown of a tooth
Dentine	a material that composes the mass of a tooth
Pulp	the soft sensitive tissue of a tooth that fills the central cavity
Cementum	a bony layer of connective tissue covering the dentine of the part of a tooth
Incisors	a tooth that has a sharp edge for biting

Canines	a pointed tooth
Premolars	big flat teeth present next to canines
Molars	bigger than premolars present at the back of mouth
Plaque	a thin coating on teeth that contains bacteria
Flossing	use to clean teeth
Tooth decay	to destroy by decomposition
Cavity	a hole formed in a tooth by decay

Chapter 2: Our Body

Balanced Diet 2.4

Learning objectives:

- In this lesson we will learn about balanced diet.
- We will learn about different food groups; grains, fruits and vegetables, meat, dairy, fats, oil and sweets.
- We will learn about the importance of water in our diet.
- We will learn about food pyramid.
- We will learn that exercise is good for health.

Teacher Starters:

Start by asking students the kind of food they take daily? Ask them to determine the food group that their meals or meal items belongs to? Tell them that food can be divided into five major groups; Grains, fruits/vegetables, meat, fat and dairy. You can tell them some examples so it will be easy to understand the topic for them. Draw a food pyramid on board and discuss it in detail. Also tell students that exercise is critical to keep us in good health.

Teaching:

Get the lesson read in class, emphasizing more on the importance of 'balance' in different types of food we eat. Tell students about the types of food groups; Dairy, grains, meat, fat, fruits and vegetables, and tell them what to choose and how much to choose for their body. Point to the picture of the pyramid given in the unit. Discuss the importance of water intake and exercise also. You may also tell a few disadvantages that take place due to consumption of excessive food or consumption of food containing toxicants.

Extended Teaching

Resources at www.learningwell.pk

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Web Resources:
For further information visit these sites and links:
1. www.mayoclinic.org
2. www.livingandloving.co.za

Test Your Knowledge

A. Write the foods in the correct food group.

Grains	Meat	Dairy	Fruits and vegetables	Fats, oil and sweet
Bread, rice, cereal, beans, Chapatti, noodles, spaghetti	Poultry, egg, fish, mutton	Milk, yogurt	Tomato, carrot, spinach, cabbages cherry, mangoes,	Margarine, ice cream, biscuits, cakes, zinger burger

B. Food groups word search
- (Puzzle can be solve by student easily)

Think and Write
A. Answer the following questions:

1. Why do we need food?
- We need food because it gives us energy to work, grow and develop. It also helps to be healthy, to move and play.

2. What is the purpose of dividing food into groups?
- The purpose of dividing food into groups is to understand what foods do for our body and how much do we need them.

3. How many food groups are there? Explain how each group helps your body.
- There are five major food groups.
  i) Grains: Grains help our body to break down carbohydrates into simple form of sugar, which is the major source of quick energy.
  ii) Fruits & vegetables: They give our body strength to fight against diseases and be fit.
  iii) Meat: It gives proteins to our body, the building blocks of our muscles and body organs. It helps us to build, repair and maintain our body tissues.
  iv) Dairy: It is the main source of calcium. It helps in the growth and development of strong bones and teeth of our body.
  v) Fats, oil and sweets: It helps to keep our body warm and give us energy.

4. Which food group is the source of protein?
- Meat food group is the main source of protein. Poultry, beef, mutton, eggs, fish and beans are some foods included in this group.

5. What is a food pyramid?
- A food pyramid is pictorial guide which shows what and how much a person should eat from different food groups each day to stay healthy and strong.

6. What do we mean by a balanced diet?
- A diet that contains all the nutrients our body needs to function properly is called a balanced diet.

7. What do vitamins and minerals do for our body?
- Vitamins and Minerals give our body strength to fight against diseases and be fit.

8. How does calcium help the body? Name three foods which contain calcium.
- Calcium helps the body in the growth and development of strong bones and teeth. Milk, cheese, and yogurt contain calcium.

9. Which food group should form the largest portion of your diet?
- Fruits and Vegetables food group should form the largest portion of our diet.

10. Which food group should form the smallest portion of your diet and why?
- We need small amount of fats, oil and sweets food group because it contains cookies, cakes, butter, ice-cream, fried items etc. Eating too much of these foods can make us fat.

B. MCQ's

1. Fish
2. Carbohydrates
3. Protein
4. Nutrients
5. Protein

C. Write true (T) or false (F)

1. True
2. False
3. True
4. False
5. True
6. False
7. False
8. True
9. True
10. False

Learning New Words:-

Words	Meanings
Balanced diet	a diet with all nutrients in right proportion
Nutrients	a substance that plants, animals and people need to live and grow
Minerals	a substance that is naturally formed under the ground (such as coal and salt etc.)
Carbohydrates	made of carbon, hydrogen and oxygen that provide heat and energy to our body.
Vitamins	a natural substance usually found in foods
Proteins	a substance found in food (such as meat, eggs, milk and beans)
Iron	an essential mineral which makes us strong
Tissues	the material that forms the parts in a plant or animal
Calcium	a substance found in most plants and animals that is important in people for strong healthy bones.
Fat	having a lot of body fat
Waste	something unnecessary and unwanted

Materials	anything made of matter
Sweating	to produce a clear liquid from your skin
Urination	to send urine out of the body
Food pyramid	recommend daily servings for different food groups (such as vegetables, meat, dairy products)

Chapter 3: Animals

Classifying Animals 3.1

Learning objectives:

- In this lesson we will learn about the classification of animals.
- We will learn that living organisms are divided into two kingdoms; animal kingdom and the plant kingdom.
- We will learn that animal kingdom is divided into two big groups, called vertebrates and invertebrates.
- We will learn about classification of vertebrates and invertebrates.
- We will learn about warm-blooded and cold-blooded animals.

Teacher Starters:

Start by asking students how we can classify animals. Also ask them what they know about vertebrates and invertebrates animals. They should be clear about the difference of 'backbone' between the two types. As they answer, tell them that all living organisms are divided into two big kingdoms: animal kingdom and plant kingdom. Tell students about warm-blooded and cold blooded animals.

Teaching:

Get the lesson read in class. Emphasize on the topic 'classification of animals or groups of animals'. Tell students about animal kingdom and plant kingdom. Tell them about vertebrates and invertebrates. Discuss the main characteristics of vertebrates and invertebrates. Point to the pictures given in the unit so that students get the idea to name and identity a few animals as vertebrates and invertebrates.

Extended Teaching

Resources at www.learningwell.pk

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Web Resources:
For further information visit these sites and links:
1. www.mensaforkids.org
2. www.pinterest.com

Test Your Knowledge

A. Match the definition in column A with the terms in column B.

Answer:
A hard external covering: **exoskeleton**
A group of organisms that are similar to each other and can breed with each other: **specie**
Animals with backbone: **vertebrates**
Bony plates protecting the skin of organizing: **scales**
Animals without backbones: **invertebrates**

Think and Write

A. Answer the following questions:

1. What do we mean by classification? Why we classify things?

- The process of sorting through all species and organizing them by similar properties is called classification. We classify things because understanding behaviour, structure, function and evolution of so many species was very difficult.

2. Define the following terms with examples of each:

- **a) Warm-blooded animals**: Animals that are capable of maintaining their body temperature are called warm-blooded animals.eg mammals and birds.
  b) Cold-blooded animals: Animals that are unable to maintain their body temperature are called cold-blooded animals. E.g. reptiles, amphibians and fish.

3. Differentiate between vertebrates and invertebrates.

- **Vertebrates**: They have a backbone or spinal column- E.g. fish, rabbits, lions and human etc.
  Invertebrates: They do not have a backbone or spinal column-E.g. insects, snails and worms.

B. MCQ's

1. Earth worm,
2. Dog,
3. Bee,
4. Spider,
5. Lion,
6. Lungs,
7. Crocodile,
8. Jelly fish,
9. Rat,
10. Octopus

C. Fill in the blanks.

1. Invertebrate
2. Cold-blooded
3. Hair
4. Tentacles
5. Lungs

Learning New Words:-

Words	Meanings
Breed	to produce young animals, birds etc.
Species	a group of animals or plants that are similar and can produce young animals or plants
Classification	the process of putting people or things into groups based on ways that they are alike
Animal kingdom	a basic group of natural objects that includes all living and extinct animals
Plant kingdom	a basic group of natural objects that includes all living and extinct plants
Phyla	a large group of related animals or plants
Vertebrates	an animal that has a backbone
Invertebrates	an animal without a backbone
Mammals	a type of animal that feeds milk to its young
Amphibians	an animal that can live both on land and in water
Reptiles	an animal (such as snake, lizard, turtle) that has cold blooded, that lays eggs, their body covered with scales or hard parts
Birds	a warm-blooded egg-laying vertebrate animal distinguished by feathers, wing and a beak
Fish	a cold-blooded animal that live in water
Echinoderms	any of a phylum of marine animals
Cnidaria	a phylum of aquatic invertebrate animals that comprises the coelenterates
Molluscs	a large group of animals (such as snails, calms) that have a soft body without a backbone that usually live in a shell
Annelids	any of a phylum of usually segmented invertebrates (such as earthworms)
Arthropods	invertebrate animals that have a segmented body and jointed appendages
Nematodes	free living in soil or water
Warm-blooded animals	having blood that always remain warm animals
Cold-blooded animals	having cold blood

Chapter 3: Animals

Habitats and Adaptations 3.2

Learning objectives:

- In this lesson we will learn about habitats.
- We will learn about types of habitat; land habitats and water habitats.
- We will learn that food, water, space, shelter are four main components of a habitat.
- We will learn about adaptation. Adaptation can be behavioral or physical.
- Some physical adaptations are: webbed feet, sharp teeth, sharp claws, scales, striped fur.

Teacher Starters:
Start by asking students questions pertaining to basic environmental features of different animals. Like fish in in the habitat of water, camel in dessert etc. Also ask them about how many types of habitat are? Ensure that the students understand that certain animals need certain environmental features or habitat to live. Discuss the various types of habitat, components of habitat, and adaptations in class.

Teaching:
Get the lesson read in class, emphasizing more on habitats and adaptations. Tell students about habitat, its types, and its components. Point to the pictures given in the unit. Discuss adaptation features: webbed feet, sharp teeth, sharp claws, scales, striped fur.

Extended Teaching
Resources at www.learningwell.pk
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Web Resources:
For further information visit these sites and links:
1. www.panda.org
2. www.kidcyber.com.au
3. http://kids.nationalgeographic.com

Test Your Knowledge
A. Read the adaptations given below carefully and guess the name of the animal.

Adaptation	Animals
I am tall with a neck so long; I can eat tall tree's leaves nobody else can reach.	Giraffe
I have large flat feet to walk with ease, My hump stores food, some people call me ship of the desert	Camel
I live in Australia, I carry my baby in my bag, I have strong legs for jumping	Kangaroo
My tusks help me dig to underground water, which is especially nice when the weather's hotter.	Crocodile
I look like a horse, I have black and white stripes on my body to blend in and confuse predator	Zebra
I am a black and white bird that doesn't fly. I love cold weather. My thick skin keeps me warm	Penguin

B. Match the animals in column A with their habitats in column B.

- Answers: (according to picture sequence)
  Bird---- nest
  Bee ---- hive
  Penguin--- snow
  Frog---- pond
  Fish----sea or ocean
  Camel---- desert
  Spider---- web

Think and Write

A. Answer the following questions:

1. What is meant by habitat?
- The place where an animal lives is called its habitat.
2. What are the main components of a habitat?
- The main components of a habitat are:
  i) food, ii) water, iii) space, iv) shelter

4. How many types of habitat are there?
- There are two main types of habitats:
  i) Land habitats, ii) Water habitats

5. What do we mean by physical adaptations? Describe at least five physical adaptations in animals.
- A physical adaptation is a kind of structural change made to a body part to survive. Five physical adaptation in animals are as follow:
  a) Webbed feet: They help the animal swim faster to catch the prey or escape a predator.
  b) Sharp teeth: They help to tear and chew meat easily, hunt and survive.
  c) Sharp claws: They help in digging roots and herbs or burrowing for shelter.
  d) Scales: They protect animals from the environment and reduce the loss of water from animal's body.
  e) Striped fur: They help animals to blend with their environment.

5. What is camouflage and how it helps animals?
- An application of special adaptation is called camouflage. It helps animals to blend in with their surroundings to avoid detection by prey and predators.
6. Make a list of animals that are adapted to survive in a desert habitat.
- A list of animals that is adapted to survive in a desert habitat. Camel, chuckwalla, squirrel, radiators, Gila monster, sand grouse, blink skink, scorpions, kangaroos, antelope
7. Define behavioral adaptation.
- A behavioral adaptation is something an animal does, like how it reacts to external stimuli.

B. Fill in the blanks.

1. Habitat	2. Four	3. Swim	4. Striped
5. Adaptation	6. Non-living	7. Physical	8. Sharp / meat

Learning New Words:-

Words	Meanings
Habitats	the place where a plant or animal naturally or normally lives or grows
Adaptations	a change in a plant or animal that makes it better able to live in particular place or situation
Aquatic	animals and plants that live in or near water
Animals	a living thing that is not a human being or plant
Earthworm	a long worm that lives in damp soil
Land habitats	the land where a plant or animal naturally or normally lives or grows
Water habitats	the water where a plant or animal naturally or normally lives or grows
Webbed feet	an area of skin that is between the fingers and toes of an animal or bird
Sharp teeth	thin edge of teeth that is able to cut things
Sharp claws	a sharp curved part on the toe of an animal (such as a cat or bird)
Scales	a small thin plate, suggesting a fish scale
Striped fur	the hairy coat of an animal with band of colour

Chapter 4: Plants

Classifying Plants 4.1

Learning objectives:

- In this lesson we will learn about classification of plants.
- We will learn that plants are divided into two different groups; vascular plants and non-vascular plants.
- We will learn that vascular plants have special transportation system. Non-vascular plants do not have special transportation system.

Teacher Starters:

Start by asking students about how do we classify plants? Also ask them why we need plants? Then tell them the importance of plant. Tell that plants are divided into two different groups; vascular plants and non-vascular plants. Give them some related examples of each type.

Teaching:

Get the lesson read in class, emphasizing more on the topic 'Classifying plants'. Discuss the importance of plants. Tell students about groups of plants in detail. Give them examples of vascular plants and non- vascular plants. Point to the pictures given in the unit.

Extended Teaching
Resources at www.learningwell.pk
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Web Resources:
For further information visit these sites and links:
1. www.factmosnter.com
2. www.pinterest.com

Test Your Knowledge

A. Make a list of things you use daily that come from plants.

- Oxygen, Paper, Clothes, Wood, Medicines, Fruits, Vegetables

B. Make a poster showing how plants are useful for us.

- Answer: Do as directed

Think and Write

A. Answer the following questions:

1. Why plants are important for all living organisms?
- All living organisms directly or indirectly depend on plants for their food. Plants are procedures and they convert sun's energy into food.
2. How are the plants classified?
- Plants are classified according to the way they transport nutrients and fluids.
3. List at least three ways in which plants are useful for us.
- Plants are useful for us in many ways:
  i) Plants release oxygen gas as they prepare their food. We use this oxygen gas to breathe.
  ii) Medicines we use are made of from plants.
  iii) Paper, clothes and wood are obtained from plants.
4. List any two characteristics of plants that are different from animals.
- I) Plants take in carbon dioxide and give off oxygen.
  ii) Plants convert Sun's energy into food.
5. Define the following terms:
- **a) Vascular system**: Plants that have special transportation system is called vascular system. It is used for transporting water and nutrients from the ground to all parts of the plants.
  b) Photosynthesis: All plants can manufacture their own food by this process. In photosynthesis plants convert Sun's energy, water and carbon dioxide gas into food and oxygen.
  c) Cones: Conifers have needle like leaves which produce seeds; but their seeds are not enclosed in a fruit or flower, instead their seeds are naked. These seeds are called cones.

d) Rhizoids: The tiny root like structure of mosses are called rhizoids, they attach themselves to the ground. Their whole body absorbs water from surroundings like a sponge.

6. Differentiate between the following

Vascular plants	Non-vascular plants
Plants that have special transportation system inside them are called vascular plants. They have true roots, stem, fruits, flower and leaves	Plants that do not have special transportation system inside them are called non-vascular plants. They do not have true roots, stem and leaves
Ferns	**Conifers**
They are flowerless, seedless vascular plants. They use spores to reproduce. They are non-seed plants in the phylum	They are flowerless vascular plants. They reproduce by their seeds. They are gymnosperms or naked seed plants in the phylum

7. Explain how algae are similar to ferns and how these two groups are different from each other.

- Algae are similar to ferns as they both are plants and can grow on land and near the stream, lake or ponds.
  Algae do not have root, stem, fruits, flower, or leaves in them while ferns have roots, stems and special leaves.

8. What do you know about mosses? How do they keep themselves fix in the ground?

- Mosses are tiny plants. They are non- vascular plant so they lack true roots, stem and leaves- Mosses can survive in different habitats but they mostly grow in moist, damp and shady places. They grow close together and form a thick green carpet on the land.

B. MCQ's

1. Oxygen
2. Chlorophyll
3. Non- vascular
4. Cones
5. Fronds
6. Non- vascular
7. Mosses
8. Angiosperms
9. Carbon dioxide
10. Spores

C. Write true (T) or false (F)

1. True
2. False
3. True
4. True
5. False
6. False
7. False
8. False
9. True
10. False

Learning New Words:-

Words	Meanings
Chlorophyll	the green substance in plant that makes food for them
Vascular plant	a plant having special transportation system
Non-vascular plants	a plant do not have special transportation system
Algae	a plant organism of several phyla, division or classes of chiefly aquatic
Mosses	a type of green plant with small leaves and no flowers
Ferns	a type of plant with large delicate leaves and no flowers
Conifers	a bush or tree that produces cones and usually have green leaves all year
Fronds	a large, long leaf
Flowering plants	their vascular system transport water and nutrients from the ground to all parts of the plant
Rhizoids	a root like structure

Chapter 4: Plants

Pollination and fertilization 4.2

Learning objectives:

- In this lesson we will learn about pollination and fertilization.
- We will learn that flowers are composed of four main parts; sepals, petals, stamen and pistil.
- We will learn about the two ways for pollination; self-pollination and cross-pollination.
- We will learn about pollinating agents: water, wind, animals and insects.
- We will learn that fertilization can occur when pollens join with the ovules.

Teacher Starters:

Start by asking students about the various stages of plant growth, focusing more on flowers and change of flowers into fruits with seeds. As they answer, present them details of pollination and fertilization. Also ask them what they know about structure of a flower. Tell them about parts of a plant: sepals, petals, stamen, and pistil. Tell students about the types of pollination: Self – pollination and Cross pollination.

Teaching:

Get the lesson read in class, emphasizing more on the topic 'Pollination and fertilization'. Discuss the structure of a flower, pollination, types of pollination, and fertilization and give students some related examples. Point to the pictures given in the unit. Draw a diagram of parts of flower on board and label it, and define each part.

Extended Teaching
Resources at www.learningwell.pk
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Web Resources:
For further information visit these sites and links:
1. https://easyscineceforkids.com
2. www.sciencelearn.org.nz

Test Your Knowledge

A. Match the definition in column A with the terms in column B.

Column A	Column B
1. The female part of the flower	Stamen (4)
2. Sources that carry pollen from anther to stigma	Pollination (3)
3. The falling of pollen of one flower onto the stigma of the same flower	Nectar (7)
4. The male part of the flower	Cross-pollination (6)
5. Transfer of pollen grains from anther to stigma	Pollinators (2)
6. The falling of pollen of one flower onto the stigma of another flower	Self-pollination
7. A sweet juice produced by some flowers to attract insects and birds	Pistil (1)

B. Construct a table, like below in your note book and illustrate the function of each part of a flower with a labeled diagram that you have studied in this chapter.

Part of flower	Function	Diagram
Anther	It produces the male gametophyte	Draw a labeled diagram of flower with the help of book
Petal	It attract pollinators	
Sepal	It protect the developing flower	
Style	Without it embryo will not be formed	
Ovary	When fertilized it will develop into a seed	
Filament	It supports the anther	

C. Label the flower diagram given below.

- Do as directed with the help of book

D. Complete the word fill exercise given below.

1. Stamen 2. Anther 3. Filament, 4. Pistil,
5. Sigma 6. Style, 7. Ovary 8. Pollen grains,
9. Pollination, 10. Pollen, 11. Ovules, 12. Male cells,
13. Female cells, 14. Fertilization

Think and Write

A. Answer the following questions:

1. What makes flower an important part of a plant?

- Flowers are important part of plant because they go through the processes of pollination and fertilization to become fruits which give us seeds to grow new plants.

2. Describe the structure of a flower with a neatly labeled diagram.

- Flowers are composed of four main parts; Sepals, Petals, Stamen, Pistil.
  Sepals: are the tiny leaves like structures present at the bottom of the flower.
  Petals: are bright coloured modified leaves of the flower. Petals are the most beautiful part of the flower.
  Stamen: is the male part of the flower. It is made of two parts: anther and filament.
  Pistil: is the female part of the flower. It is composed of three parts: stigma, styles and ovary.
  Note:(Draw a diagram with the help of book) Pg 53

3. What is pollination?

- The process of transferring pollen grains from anther to sigma is called pollination.

4. Define the following terms:

- a) calyx, b) pollen grains, c) corolla, d) ovules
  a) Calyx: All the sepals together are called calyx.
  b) Pollen grains: Anther contains tiny dust like particles are called pollen grains.
  c) Corolla: All the petals together are called corolla.
  d) Ovules: Ovary contains the female reproductive cells are called ovules.

5. What are pollinators? Name three common pollinators.

- Sources that help flowers in pollination are called pollinating agents or pollinators. The three common pollinators are water, wind and animals or insects.

6. How butterflies help in pollination?

- When butterflies sit on flower some pollen get stuck to their legs and wings. When they sit on some other flower, these pollen grains fall onto the stigma of the flower.

7. How do plants that do not have brightly coloured petals or beautiful scent attract pollinators?

- Some flowers are pollinated by the wind, as the wind blows, the pollen from stamen of these flowers transfer to the stigma of another flower.

8. What is fertilization?

- The joining of male cells that is pollens with the female cells that is ovules is called fertilization.

9. How a plant is fertilized? Explain each step with diagram.

- i) The pollen grain lands on stigma
  ii) The pollen tube starts to grow downward
  iii) The pollen grain reaches the ovules
  iv) The pollen grain combines with the ovules
  Note: (Diagram is given on page no. 55)

10. Define the following processes with a neat and labeled diagram:

- **a) Self-pollination**
  When pollen grains of a flower fall onto the stigma of the same flower, it is called self-pollination. (Diagram is on page no. 54)
  b) Cross-pollination
  When pollen grains of a flower fall onto the stigma of another flower, it is called cross-pollination. (Diagram is on page no. 54)

B. Tick the correct word.

1. Sepals
2. Fertilization
3. Two
4. Wind
5. Pistil
6. Ovules
7. Anther
8. Calyx
9. Pollination
10. Female

Learning New Words:-

Words	**Meanings**
Pollination	the transfer of pollen from an anther to the stigma
Fertilization	an act or process of making
Sepals	one of the modified leaves comprising a calyx
Petals	the soft, colourful part of a flower
Stamen	the part of a flower that produces pollen
Pistil	the long central part of a flower that extends from an ovary
Pollen grains	the granular microspores that occur in pollen
Ovules	an outgrowth of the ovary of a seed plant
Fruits	the part of a plant that has the seeds in it.
Self-pollination	the transfer of pollen from an anther of a flower to the stigma of the same flower
Cross-pollination	the transfer of pollen from an anther of a flower to the stigma of another flower
Nectar	a sweet liquid produced by plants and used by bees in making honey

Chapter 5: Materials

Mixtures and Solution 5.1

Learning objectives:

- In this lesson we will learn about mixtures and types of mixtures; heterogeneous mixture and homogeneous mixture.
- We will learn about the kinds of material in which we can dissolve liquids.
- We will learn the terms: soluble, insoluble, solute and solvent.

Teacher Starters:
Start by asking question about various types of mixtures and solutions that the children already consume, for example saline water etc. Also ask them how they are produced. As an example, you can create a mixture of salt and water in glass to show to your students. Discuss the types of mixture i.e. homogenous mixtures and heterogeneous mixtures.

Teaching:
Get the lesson read in class and focus on simple mixtures and solutions such as sugar water, syrups used in medicines etc. Tell students that mixture is anything that your get after mixing two or more substances. Point to the pictures given in the unit to improve student's understanding. Discuss the types of mixtures and give them examples of homogenous and heterogeneous mixtures. Tell them about soluble, insoluble, solute and solvent.

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Web Resources:
For further information visit these sites and links:
1. https://study.com
2. www.pinterest.com
3. www.wikipedia.com

Test Your Knowledge
A. Identify if the given elements are a mixture or not.

1. Not a mixture
2. Mixture
3. Mixture
4. Mixture
5. Not a mixture
6. Not a mixture
7. Mixture
8. Mixture

B. Find the following words in the grid below
- (Do as directed)

Think and Write

A. Answer the following questions:

1. What are mixtures? How many types of mixture are there? Give one example of each.

- When two or more types of matter are put together they form a mixture. There are two types of mixture.
  1) Homogeneous: when you mix salt in water, the salt seems to disappear in water. In reality salt does not disappear, it dissolves in water.
  2) Heterogeneous: When you mix sand in water, sand settles down at the bottom and you get a heterogeneous mixture.

2. What do you know about solution?

- A solution is a mixture in which one or more substances are dissolved into another. A solution consists of two types of substances: i) Solute ii) Solvent

3. Define the terms given below.

- **a)Solute**: A substance that is dissolved is called the solute.
  b) Solvent: A substance in which solute is dissolved is called the solvent.
  c) Soluble: If a substance dissolves in another substance, it is called soluble.
  d) Insoluble: If a substance does not dissolve in another substance it is called insoluble.

4. Is solvent always in liquid form? Support your answer with an example from your daily life.

- No, solvent can be liquids, solids or gases.
  E.g. Tang and water is a solution, where tang is the solute and water is the solvent.

5. Make a list of mixture and solution that you use in your daily life.

Mixtures	Solutions
Sugar and water	Tea
Milk and chocolate	Juice
Honey and Tea	Soup
Coffee and sugar	Bleach
Oil and water	Salt water

B. Fill in the blanks.

1. Mixture
2. Solute
3. Solvent
4. Soluble
5. Insoluble

B. MCQ's

1. Oil
2. Solute
3. Solution
4. Solution
5. Insoluble

Learning New Words:-

Words	Meanings
Mixture	two or more things together
Substances	a material of a particular kind
Homogenous mixtures	
Heterogeneous mixtures	
Soluble	capable of being dissolved in a liquid
Insoluble	not able to be dissolved in a liquid
Solute	a dissolved substance
Solvent	a liquid substance that is used to dissolve another substance
Brass	a yellow metal that is made by combining copper and zinc
Zinc	a bluish-white metal which is especially used to make a brass
Copper	a reddish metallic element is the best conductors of heat and electricity
Universal solvent	a liquid substance that is used to dissolve another substance in all times or in all places

Chapter 5: Materials

Separating Mixtures 5.2

Learning objectives:

- In this lesson we will learn the ways of separating mixtures.
- We will learn that hand sorting; winnowing, sieving, sedimentation, decantation; filtration and evaporation are some methods to separate components of mixture.
- We will learn about the magnetic method of separation.

Teacher Starters:

Start by asking students about how we can separate different mixtures, a very simple example of use of sieve for separating tea leaves from the tea. Also ask those ways of separating mixtures other than this. You can tell them some examples like, hand sorting, winnowing, sieving, sedimentation / decantation, filtration, evaporation and etc.

Teaching:

Get the lesson read in class. Put more emphasis on the topic of mixtures of used in everyday life i.e. tea, tang, jelly etc. Point to the pictures given in the unit. Discuss the ways of separating mixtures: hand sorting, winnowing, sieving, sedimentation/ decantation, filtration, evaporation and magnetic method of separation in a class. If possible, demonstrate some of these ways in class as well.

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Web Resources:
For further information visit these sites and links:
1. www.factmoster.com
2. www.wikipedia.com

Test Your Knowledge

A. Match the definitions in column A with the terms in Column B.

Column A	Column B
1. Method used for separating lighter components of a mixture	Sediment (3)
2. The clean water collected after filtration	Magnetic method (5)
3. Heavy particles that settle down during sedimentation	Evaporation (7)
4. The solid retained on the filter paper	Decant (6)
5. Method used for separating magnetic components of a mixture	Winnowing (1)
6. Clear liquid obtained during decantation	Filtrate (2)
7. Method used for separation dissolved solid from a mixture	Residue (4)

B. Match mixture of substances with the method to separate them.

Mixtures	Separating methods
1. Sugar + Water	evaporation
2. Iron nails + Pieces of plastic	magnetic method of separation
3. Flour + Water	sedimentation
4. Peas + Gram + Beans	hand sorting
5. Fine sand + Salt	sieving

Think and Write

A. Answer the following questions:
1. What type of mixture can be separated using the sieving method?
- Components of a dry mixture containing particles of different sizes can be separated by sieving method.

2. How would you separate the components of mixture containing salt, water and sand?
- To separate salt and water you can first add water to your mixture of salt and sand, when salt gets dissolved in water. Let The mixture relax for an hour when The sand settles down separate water and sand then evaporate water.. You have salt and sand separated.

3. Give an example of mixture you can separate using winnowing method.
- Mixture of sand and husk can be separated by using the method of winnowing.

4. Where do we use evaporation method of separation? Give an example from your daily life.
- We use evaporation method of separation to separate dissolved solids from a liquid. E.g. To get salt back from the salt water, the solution is heated to boiling point. As it boils, the water evaporates leaving a layer of salt at the bottom.

5. What do you know about sedimentation and decantation method of separation?

- i) **Sedimentation method of separation**:
  In the process, mixture is kept undisturbed, so that heavier components of the mixture settle down at the bottom of the container.
  ii) Decantation method of separation:
  In this process the upper clear liquid of mixture is then poured off into another container by tilting the container very slowly without disturbing the sediment.

6. Which method will you use to separate a mixture of rice and lentil beans and why?
- We use hand sorting method to separate a mixture of rice and lentil beans. This method can be used when the components of mixture are large enough to be seen clearly. It is used to separate solid-solid mixture.

B. MCQ's

1. Magnetic
2. Filtrate
3. Magnet
4. Sieving
5. Metal

C. Write true (T) or false (F)

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

Learning New Words:-

Words	**Meanings**
Winnowing	it is a method to separate lighter component of a mixture from heavier components.
Sieving	a method in which components of dry mixture containing particles of different sizes can be separated
Sedimentation	the natural process in which material is carried to the bottom of a body of water and forms a solid layer
Decantation	to pour a liquid from one container into another

Sediment	material that sinks to the bottom of a liquid
Decant	to pour out, transfer or unload
Filtration	removing something unwanted from a liquid, gas etc.
Filtrate	fluid that has passed through a filter
Residue	remaining small amount of something, after a process has been completed
Evaporation	to change from a liquid to gas

Chapter 6: Earth and the Atmosphere

Investigating Atmosphere 6.1

Learning objectives:

In this lesson we will learn about atmosphere.

- We will learn that earth's atmosphere is a mixture of various gases.
- We will learn atmosphere is divided into five major layers: Troposphere, Stratosphere, Mesosphere, Thermosphere, and Exosphere.
- We will learn that some pollutants pollute our atmosphere.

Teacher Starters:

Start by asking children about earth, planet and our solar system. Also ask them what makes earth so perfect for life? What is atmosphere? And why do we need it. Tell them that a layer of gases surrounds the surface of earth and it is called the atmosphere.

Teaching:

Get the lesson read in class, emphasizing more on the topic 'investigating atmosphere'. Point to the pictures of various atmospheric effects given in the unit. Discuss composition of atmosphere, layers of the atmosphere: troposphere, stratosphere, mesosphere, thermosphere, and exosphere. Also discuss the ways in which human beings and their things tend to pollute the atmosphere, such as use of gases and fuels, burning in factories etc.

Extended Teaching

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Web Resources:

For further information visit these sites and links:

1. http://kidsgeo.com
2. https://youtu.be/W5teyd8srp8

Test Your Knowledge

A. Earth's atmosphere word search

- Do as directed

Think and Write

A. Answer the following questions:

1. What makes Earth so perfect for life?

- Earth has air, water, food and right temperature for living things to survive, develop and grow.

2. What is atmosphere? Why do we need it?

- A layer of gases that surrounds the surface of Earth is called the atmosphere. We need it because this layer of gases acts like a shield against harmful objects coming from space.

3. What is global warming?

- Global warming is increasing the level of trace gases in the atmosphere is making our planet hot. These gases trap the heat in the atmosphere and prevent it from going back into the space.

4. What makes up Earth's atmosphere?

- Earth's atmosphere is a mixture of various gases. These gases work together to make Earth livable.

5. Define following terms

- **a) Pollutants**: Releasing harmful chemicals and particles into the atmosphere can damage the troposphere are called pollutants.
  b) Tropopause: Troposphere's boundary is called Tropopause. It separates troposphere from the atmospheric layer.
  c) Ozone: Ozone exists in large amount which absorbs harmful ultraviolet radiations from the sun.

6. Name at least five pollutants that are changing Earth's atmosphere.

- Five pollutants that are changing Earth's atmosphere are;
  1) Sulphur dioxide 2) Carbon dioxide 5) Ammonia
  3.) Carbon dioxide 4) Nitrogen oxide

7. How chlorofluoro carbons (CFCs) pollute our environment?

- Chlorofluoro carbons (CFCs) pollute our environment by breaking down the ozone layer, allowing a great amount of harmful ultraviolet rays to reach the surface of the Earth.

8. How Earth's atmosphere protects us from UV radiations?

- Earth's atmosphere is about 480 km thick. There are five major layers of atmosphere. Each layer has distinct temperature and characteristic which protect us from UV radiations.

9. What is the most abundant gas in Earth's atmosphere?

- The most abundant gas in Earth's atmosphere is nitrogen with oxygen gas.

10. List at least two uses of the following gasses

- Uses of the **gasses:**

a) Nitrogen:

1) It can be used to replace air.
2) It reduces oxidation of materials.

b) Oxygen:

1) It is used to breathe.
2) It is used for welding and cutting of metals.

c) Carbon dioxide:

1) It is used for solid or liquid refrigeration and cooling.
2) It is used in the manufacture of casting molds to enhance their hardness.

d) Hydrogen:

1) It is used for welding.
2) It is used for reduction of metallic ores.

e) Helium:

1) It is used to keep satellite instrument cool.
2) It is used to cool the liquid, oxygen and hydrogen.

B. MCQ's

1. Five
2. Ozone
3. Global warming
4. Troposphere
5. Spheres
6. Mesopause
7. Exosphere
8. Thermosphere
9. Oxygen
10. Atmosphere

C. Write true (T) or false (F)

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

Learning New Words:-

Words	**Meanings**
Atmosphere	a mass of gasses that surrounds the earth
Radiations	a type of dangerous and powerful energy that is produced by radioactive substances and nuclear reactions
Space debris	an area specify used for the pieces that are left after something has been destroyed
Meteoroids	a meteor in orbit around the sun
Asteroids	any one of / thousands of small planets that circle around the sun
Nitrogen	a chemical with no colour and smell that makes up a large part of the atmosphere
Oxygen	a chemical that is found in the air with no colour, taste or smell
Carbon dioxide	a gas produced when people and animals breathe out

Neon	a type of gas that is used in brightly coloured electric signs and lights
Argon	a chemical element that is a coloured gas used in various products (such as lasers, electric light bulbs)
Helium	a chemical element that is a colourless gas which is lighter than air
Hydrogen	a chemical element that has no colour or smell
Krypton	a chemical element that is a colourless gas especially used in electric lights
Methane	a colourless gas with no smell that can be burned for fuel Spheres a round object
Spheres	layers of atmosphere
Pauses	a temporary stop
Troposphere	the lowest densest part of the earth's atmosphere in which most weather changes occur
Stratosphere	the part of the earth's atmosphere which extend from the top of the troposphere
Mesosphere	the part of the earth's atmosphere between the stratosphere and the thermosphere
Thermosphere	the part of the earth's atmosphere that begins at about 50 miles
Exosphere	the outer fringe region of the atmosphere of the earth
Molecules	the smallest amount of a particular substance
Pollutants	a substance that makes land, water, air etc dirty and not safe or suitable to use
Sulphur dioxide	a gas with a strong smell, used in many industries that contributes to air pollution
Carbon monoxide	a poisonous gas is formed when carbon is not completely burned
Ammonia	a colourless gas or liquid with a strong smell and taste used ecially in cleaning products
Global warming	the recent increase of certain gases in the world's temperature
Chlorofluorocarbons	a gas that cause damage to the ozone layer in the Earth's atmosphere

Chapter 7: Machines and Force

Friction 7.1

Learning objectives:

- In this lesson we will learn that friction is a force that stops the movement of a sliding object.
- We will learn that friction produces heat.
- We will learn that air resistance and water resistance are the main types of friction.
- We will about the demerits of friction.

Teacher Starters:
Start by asking students that why do our hands become warm when rubbed against each other? And why we slip on a polished floor. You can tell them some examples of friction, such as screeching of brakes in a bicycle/car etc. Discuss the one or more types of frictions in detail.
Teaching:
Get the lesson read in class, emphasizing more on the friction. Point to the pictures given in the unit. Cover the topic with more or less friction, friction produces heat, air resistance, water resistance and the merits and demerits of friction.

Extended Teaching
Resources at www.learningwell.pk
Log on to your personal account at www.learningwell.pk to view electronic print of this lesson and a full-length video lecture or animation pertaining to the lesson. You will also find extended exercises or MCQ-based tests based on the lesson to help your students improve their learning. Additional teaching resources are also available atwww.TeachingWell.pk

Web Resources:
For further information visit these sites and links:
1. https://en.m.wikipedia.org
2. www.britannica.com

Test Your Knowledge

A. What does Abdullah need to win the race?
- Abdullah need flat track to win the race. The surface smoothness can help him to ride a bicycle fast. Flat surface decrease the friction due to the reduction of interlock.

B. Draw an arrow to show the direction of friction force in each picture.
- Do as directed in book.

C. Look at the figures. Which box will be easier to move? Explain why?
- A box on flat surface easier to move because the surface is smooth so it will be easy to push that box easily.

Think and Write

A. Answer the following questions:
1. What do you know about friction force?
- Friction is a force that stops the movement of a sliding object. When two objects move against each other they experience friction force. Friction force makes it harder for things to move. It slows down the movement of objects.
2. How friction helps us?
- Friction helps us in walking around; stop us from slipping, writing and holding things in our hands.

3. What is meant by water resistance?
- The friction between water and any other object moving through it is called water resistance. We experience this when we swim or when we place our hand in flowing water.

4. Write at least two advantages and disadvantages of friction.
- **Advantages of Friction**:
  1) Friction stops the movement of a sliding object.
  2) Friction produces heat.
  Disadvantages of Friction:
  1) Friction causes wear and tear in machine parts.
  2) Friction between moving parts of a machine causes lots of energy loss.

5. Why is it more difficult to walk on ice than on a concrete road?
- It is difficult to walk on ice because it has very low friction so it doesn't apply much force on you. Ice is soft and spongy where as concrete is hard.

B. Write true (T) or false (F)

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

Learning New Words:-

Words	**Meanings**
Friction	the force that causes a moving object to slow down when it is touching another object
Sliding object	an object that slip and fall
Direction	the course or path on which something is moving or pointing
Roughness	having a surface that is not even
Smoothness	having a flat, even surface
Surface	an outside part or layer of something
Air resistance	effort made to stop or to fight against air
Water resistance	effort made to stop or to fight against water
Reduce	to make something smaller in size, amount, number etc.

Machines and Force

Understanding Machines 7.2

Learning objectives:
- In this lesson we will learn about machines and their types.
- We will learn that simple machines have six types: Lever, Pulley, Inclined plane, Wedge, Screw, Wheel and axle.
- We will learn that when two or more simple machines are combined together they form a complex machine.

Teacher Starters:
Start by asking question about machines and their various homes that we have in our homes, such as fan, door locks, etc. Also ask them that why do we need machines? That is, how machines make complex tasks easier for us. You can tell students some examples of machines with their uses. Tell student about the types of machines: simple machines, complex machines.

Teaching:
Get the lesson read in class; focusing more on machines that are used by almost everyone, such as fan or cutter or screw driver, pulley, lever etc. Point to the pictures given in the unit. Discuss the types of machines: Simple machines and complex machines. Simple machines have different types: for example. Lever, Pulley, inclined plane, Wedge, Screw, Wheel and axle. Also tell students that when two or more simple machines are combined together they from a complex machine.

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Web Resources:
For further information visit these sites and links:
1. https://en.m.wikipedia.org
2. https://youtu.be/fvOmaf2GfCY

Test Your Knowledge
A. Match definition in column A with the right term in column B

Column A	Column B
1. Ability to do work	Force (3)
2. To move something forward	Wedge (4)
3. A push or a pull	Machine (5)
4. Two inclined planes joined back to back	Lever (6)
5. A device that makes work easier	Energy (1)
6. A long bar resting on a fixed point	Push (2)

B. Read the following situations and decide which simple machines should be used to solve the problem.

- a) Pulley, because pulley is commonly used for moving heavy objects up and down or back and forth.
  b) Lever.

Think and Write

A. Answer the following questions:

1. What are machines? Why do we need them?

- A machine is a device that uses energy to do work. We need them to do a task that requires more force, energy, time and power than we alone can exert.

2. Differentiate between a simple and a complex machine.

Simple Machines	Complex Machines
It is the simplest form of using one thing to do a job faster and better.	They formed when two or more simple machines are combined together.
They require energy.	They require electrical energy.
Lever, Pulley, Inclined plane, Wedge, Screw, Wheel and Axle is the examples of simple machines.	Scissors and Wheel barrow are the examples of complex machines.

3. Define and draw a pulley.

- A pulley is a simple machine consisting of a grooved wheel and a rope or a string. They are commonly used for moving heavy objects up and down or back and forth.
Diagram is given on page no. 85.

4. How a lever makes work easier?

- A lever makes work easier by reducing the force needed to move an object. In order to reduce the force needed, the distance over which the force is applied must be increased.

5. Make a list of at least five simple and complex machines that you use in your daily life.

Simple Machine	Complex Machine
Lever	Scissor
Pulley	Wheel barrow
Screw	Stapler
Wedge	Bicycle
Wheel and axle	Can opener

6. How screw works?

- Through rotation screw allows movement from lower position to a higher position. They are mostly used to hold two objects together.

7. What makes scissors a complex machine?

- The edges of blades are wedges, acting in opposite direction. These blades are combined with a lever to make the blades come together to cut and make a scissors a complex machine.

B. MCQ's

1. Knife
2. Inclined plane
3. Complex machine
4. (Do as directed)
5. Effort
6. Inclined plane
7. Fulcrum
8. Wedge
9. Wheel and axle
10. Pulley

C. Tick the right word

1. Easier
2. Simple
3. Apart
4. Two or more simple
5. Effort
6. Pulley
7. Simple
8. Can
9.

Learning New Words:-

Words	Meanings
Force	a push or a pull that can change the direction of an object
Machine	a piece of equipment with moving parts which work from ectricity, gasoline etc.
Simple machine	a thing to do a job faster and better
Complex machine	having parts that connect or go together in complicated ways
Lever	a strong bar that is used to lift and move something heavy
Pulley	it is used to lift or lower heavy object with a rope
Inclined plane	a plane surface that makes an oblique angle with the plane of the horizon
Wedge	a piece of wood, metal etc with one pointed end and one thicker end to separate two things stuck together
Screw	a spirally grooved a solid cylinder and a grooved hollow cylinder into which it fits
Wheel and axle	a grooved wheel turned by a cord or a chain with a rigidly attached axle

Machines and Force

Electricity and Circuits 7.3

Learning objectives:

- In this lesson we will learn that electricity is a form of energy.
- We will learn about open and close circuit.
- We will learn about types of circuit: Series circuit, and parallel circuit.
- We will learn about insulators and conductors.

Teacher Starters:

Start by asking children about electricity, current and circuits. As a reminder from previous lesson, you can ask students about machines which are run from electricity. This will create a brainstorming session in them for our use of electricity. You can tell them that electricity is a form of energy. Give them some related examples in home at school. Draw a circuit diagram on board, that will help them to understand.

Teaching:
The students here must be clear that use of electricity for machines is only possible through formation of an electric circuit. Point to the pictures of circuits and switches given in the unit so that students get a better grip on the topic. Discuss: open and closed circuit, switches, and types of circuit: Series circuit and Parallel circuit, insulator and conductors. Also tell students they ways to be careful with electricity.

Extended Teaching
Resources at www.learningwell.pk
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Web Resources:
For further information visit these sites and links:
1. www.physicsclass.room.com
2. www.elprocus.com

Test Your Knowledge

A. Draw and label the following circuits with a battery, wire, a switch and three light bulbs.
- Do as directed in book)

B. Draw the following circuits with a battery, a wire and a bulb.
- (Do as directed in book)

Think and Write

A. Answer the following questions:
1. Define the following terms:
- **a) Current:** Electricity flows through an electrical wire. This moving electricity is called current.
  b) Circuit: The path through which electricity flows is called a circuit.
  c) Load: It is an electrical device that uses a power source such as battery or generator which provides electricity.
2. Compare the following:

a) Insulators	**Conductors**
i) Insulators do not allow electricity to pass through.	Conductors are materials which allow electricity to pass through.
ii) We use insulators to protect ourselves from electric shocks.	Wires we use to make circuits are made of conducting materials.

b) Open Circuit	Closed Circuit
If there is a break or gap anywhere in the path or circuit, then the electricity will not flow through it and you have an incomplete or open circuit.	The current has to end up back where it started flowing, that is the power source. This circuit is known as complete or closed circuit.

3. How many types of circuit are there?
- There are two types of circuit that we can make:
  i) Series Circuit ii) Parallel Circuit
4. Why do we use switches in an electric circuit?
- We use switches to control the flow of electricity. Switch is like a gate in circuit that we can open or close whenever we want.
5. Make a list of at least five electrical appliances that are mains-powered.
- A list of 5 electrical appliances:
  i) Television ii) Computer, iii) A.C, iv) Fan, v) Radio
6. What components are required to make a circuit?
- Components are required to make a circuit are an energy source, a conductor (wire), an electrical load (device) and a controller (Switch).
7. Make a list of at least five insulators and conductors you see in your daily life.
- A list of five insulators and conductors are:

Insulators	Conductors
Wood	Silver
Rubber	Gold
Tiles	Copper
Glass	Iron
Paper	Aluminum

B. MCQ's

1. Current
2. Insulators
3. Iron
4. Series
5. Switches
6. Plastic

C. Fill in the blanks.

1. Switch
2. Parallel
3. Parallel
4. Circuit
5. Insulators
6. Copper
7. Energy
8. Conductors
9. Electronic device
10. Parallel

D. Write true (T) or false (F)

1. False
2. False
3. True
4. False
5. True
6. True
7. True
8. False
9. True
10. False

Learning New Words:-

Words	Meanings
Electricity	a form of energy that is carried through wires
Current	a flow of electricity
Closed circuit	the current has to end up back where it started flowing
Open circuit	due to a break or gap the electricity will not flow through the path
Switches	a small device that starts or stops the flow of electricity
Series circuit	a circuit with no branches
Parallel circuit	a circuit with branches
Insulators	a material which does not allow electricity to pass through
Conductors	a material which allows electricity to pass through
Unplug	to disconnect from an electrical source or another device by removing its plug

Chapter 8: Sound and Light

Light 8.1

Learning objectives:

- In this lesson we will learn about light and the process in which light travels.
- We will learn about the speed of light.
- We will learn about luminous objects and non-luminous objects.
- We will learn about eclipses and its types: Lunar eclipse and Solar eclipse.

Teacher Starters:

Start by asking students about light and their various forms, natural and man-made including light from the sun and the stars. Ask them to given their ideas about light travel? Why does eclipses takes place? As they answer, tell them about light by giving them some examples. Cover the topic in detail.

Teaching:

Get the lesson read in class, emphasizing more on Light and its uses for us. Point to the pictures given in the unit. Discuss the process in which light travels and its speed. Tell students about luminous and non-luminous objects with examples, including one in their homes and in schools. Also discuss reflection of light, eclipses and its kinds.

Extended Teaching
Resources at www.learningwell.pk
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Web Resources:
For further information visit these sites and links:
1. www.theschoolrun.com
2. www.explainthatstuff.com

Test Your Knowledge
A. Match the definition in column A with the term in column B.

Column A	Column B
1. Straight lines of light	Reflection (3)
2. Object which produces its own light	Eclipse (4)
3. Bouncing back of light	Rays (1)
4. When a space object blocks another space object from view	Luminous (2)

B. Construct a table in your notebook like the one given below.
- **Luminous:** candle, tube light, sun, lamp, cell phones, glow-worm, mars, Jupiter, comets
  Non-luminous: tree, wall, book, table, earth, tissue paper, bag, chair, fan, turtle

Think and Write

A. Answer the following questions:
1. What is reflection of light?
- When light hits a surface it bounces back or changes direction and then reflected light enters our eyes so we can see, this is called reflection of light.
2. What are the two types of eclipses? How do these occur? Draw a labeled diagram of both eclipses.
- The two types of eclipses are;
  i) Lunar Eclipse:
  It occurs when the earth comes in between the sun and the moon. Earth blocks the light from the sun to the moon and the moon is completely covered by the shadow of earth. (Diagram is given on page no. 98)
  ii) Solar Eclipse:
  It occurs when the moon comes in between the earth and the sun. Moon blocks the light from the sun to the earth and casts a shadow onto the earth. (Diagram is given on page no. 99)

3. When was the last total solar eclipse in Pakistan?
- The last total solar eclipse in Pakistan was on 11th August 2018
4. What do we call the Earth's movement around the Sun?
- The earth's movement around the sun is called Rotation.
5. Define the following terms
- Definitions:

a. Luminous:
Some objects produce or give out light on their own are called luminous objects. E.g. the sun and stars.

b) Non- Luminous:
Objects that do not give out light on their own are called non-luminous object. We see non-luminous objects because light is reflected from them into our eyes. E.g. the moon, a tree.

c) Translucent:
Some objects let some but not all the light pass through them are called translucent. E.g. tissue paper, butter paper.

d) Rays:
Light travels in perfectly straight lines. These straight lines of light are called Rays.

e) Opaque:
Some objects completely reflect light. This type of matter is called opaque. E.g. a book, a wall.

f) Transparent:
Sometime light passes through an object. This type of matter is called transparent. E.g. glass, water.

B. MCQ's

1. Current
2. Moon
3. Beam
4. Lunar
5. Smooth
6. Non-luminous
7. Reflected
8. Star
9. The moon's shadow falls on the earth
10. Sunglasses
11. Your text book

C. Tick the right word

1. Opaque
2. Absorbs light of the sun
3. Sun
4. Blocks
5. Two
6. Several
7. Same
8. Luminous
9. Faster
10. 8 minutes

Learning New Words:-

Words	**Meanings**
Electromagnetic	relating to produced by electromagnetism
Light	something that makes vision possible
Rays	straight lines through which light travels
Beam	a line of light from a source
Luminous	producing or seeming to produce light
Non-luminous	objects that do not give out light on their own
Transparent	able to be seen through
Opaque	not letting light through
Translucent	not completely clear but clear enough to allow light to pass through
Reflection	something that shows the effect, existence or character of something else
Eclipses	a dark circle formed when the moon is between the sun and the earth
Lunar eclipse	an eclipse in which the full moon passes partially or wholly through the umbra of the earth's shadow
Solar eclipse	an eclipse of the sun by the moon