As per the CISCE Curriculum released in November 2016

Connect with Science

SEMESTER I

Class 5

Ruby Koley

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Preface

Science is a way of learning about the natural world. It provides us the means to connect isolated facts to develop a deeper understanding of the world around us.

Connect with Science CISCE Split Edition is a series for classes 3 to 5 designed as per the new curriculum released by the Council for the **Indian School Certificate Examinations** (**CISCE**) in **November 2016**. The books comply fully with the Council's guidelines for Internal Assessment. Through this series, a conscious attempt has been made to engage learners and help them develop a variety of scientific skills, such as observation, classification, sequencing, and referencing.

Key Features

- **Thematic Approach:** As per the **new CISCE curriculum**, each chapter includes all key concepts mentioned in the new syllabus.
- **Questions** after every major topic assess learning progress through objective-type and picture-based questions.
- **Wrap Up** at the end of the chapter provides quick revision notes.
- **Exercises** at the end of each chapter adhere to the Council's guidelines for Internal Assessment and assess learners' remembering, understanding, and applying abilities. These consist of
  - **Section I**, which contains a variety of objective-type questions to assess learners' remembering and recalling abilities
  - **Section II**, which contains a variety of descriptive-type questions to assess learners' understanding abilities
  - **My Learning Corner** at the end of each chapter provides tools for subject integration and to hone life skills.
    - **Think about:** Application-based questions to foster inductive and deductive reasoning and critical thinking skills. In addition, it includes '**Life Skills**' such as decision-making, problem–solving, communication and, cooperation based on recommendations in the new CISCE curriculum
    - **Picture study:** Picture-based exercises to develop visual interpretation skills
    - **Try out:** Hands-on activities and projects to acuminate the skills of observation, analysis, organization, and data collection. In addition, it includes suggestions for **subject-integration** for different themes across various curricular areas based on the new CISCE curriculum
- **Worksheets** at the end of each chapter to help develop key skills such as picture study, observation, and interpretation
- **Model Test Papers** at the end of the book for comprehensive revision
- **Key Words** at the end of the book listing chapter-wise key terms for quick recap

I hope ***Connect with Science CISCE Split Edition*** will help the learner think about science, understand it, and, above all, connect with it. I welcome valuable suggestions, comments, and feedback from users.

Author

Ruby Koley, a postgraduate in Botany, has a teaching experience of more than 10 years. She is actively engaged in writing about science.

Key Features

Thematic Approach as per the new CISCE curriculum Includes all key concepts mentioned in the new syllabus

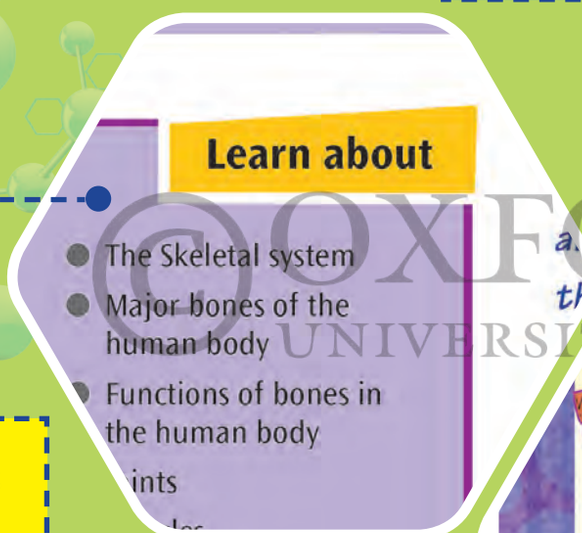
My Learning Corner **at the end of each chapter enables subject integration and hones life skills:**

Think about helps foster critical thinking skills through application-based questions. In addition, it inculcates '**Life Skills**' such as decision-making, problem-solving, communication, and cooperation, based on the recommendations of the new CISCE curriculum.

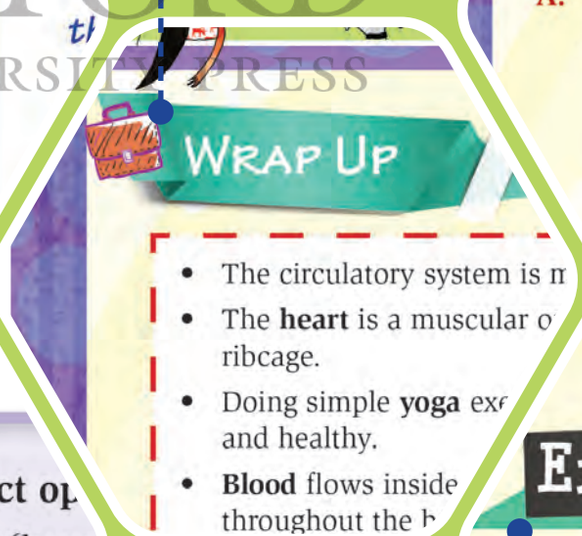
Picture study helps sharpen visual interpretation skills through picture-based exercises.

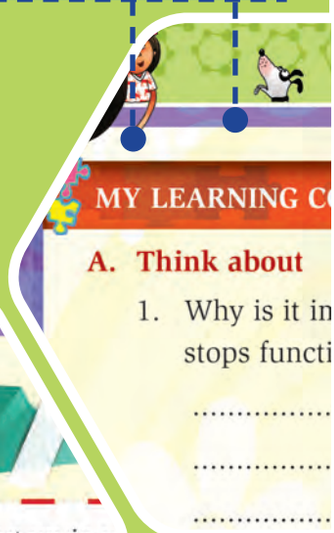
Try out helps develop the skills of observation, analysis, organization, and data collection through hands-on activities and projects. These activities and projects also facilitate subject integration for different themes across various curricular areas based on the new CISCE curriculum.

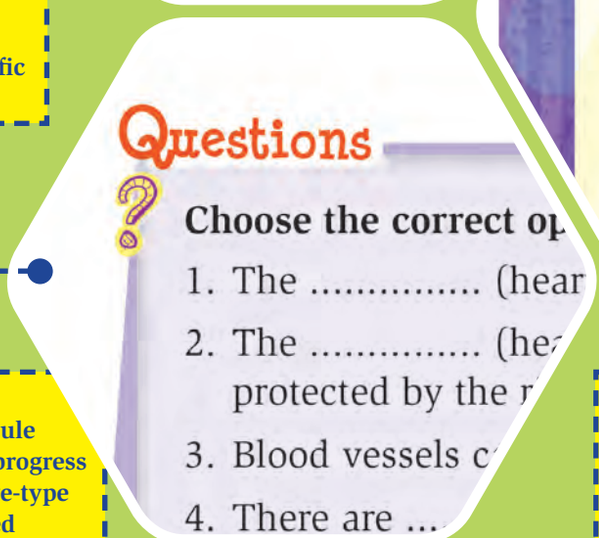
Wrap Up **at the end of the chapter, presented as a graphic organizer with boxes and bullets, provides quick revision notes.**



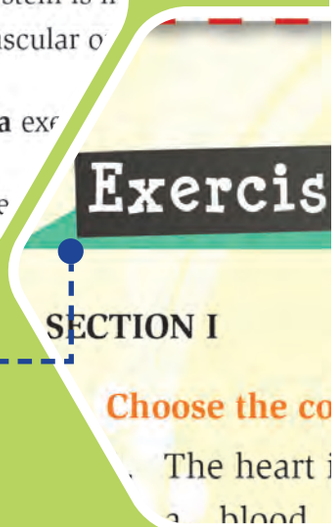
Learn about, **at the beginning of each module, keeps learners motivated by presenting specific learning goals.**







Questions **at the end of each module assess learning progress through objective-type and picture-based questions.**



Exercises, **at the end of each chapter, provide a variety of objective and descriptive type questions for wholesome internal assessment.**

Worksheet **at the end of each chapter to help develop key skills such as picture study, observation, and interpretation**

Teacher's Resources

Each of the coursebooks is supported by a **Teacher's Manual** that provides additional resources and instructional guidance in the form of a lesson plan and the answer key to all textbook questions.

Worksheet

w and solve the crossword puzzle.

1

ORNER

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Model Test Papers

option to fill in the blank.

skeleton are held together

Model Test Papers, **at the end of the book, aid in comprehensive revision.**

Key Words

Chapter 1

Heart A muscular organ that pumps

Heartbeat The rhythmic moveme

Blood Substance that flows thro
oxygen, and carbon dioxide

Blood vessels Thin muscul

es

rrect optio

s protecte

Key Words **at the end of the book listing chapter-wise key terms for quick recap**

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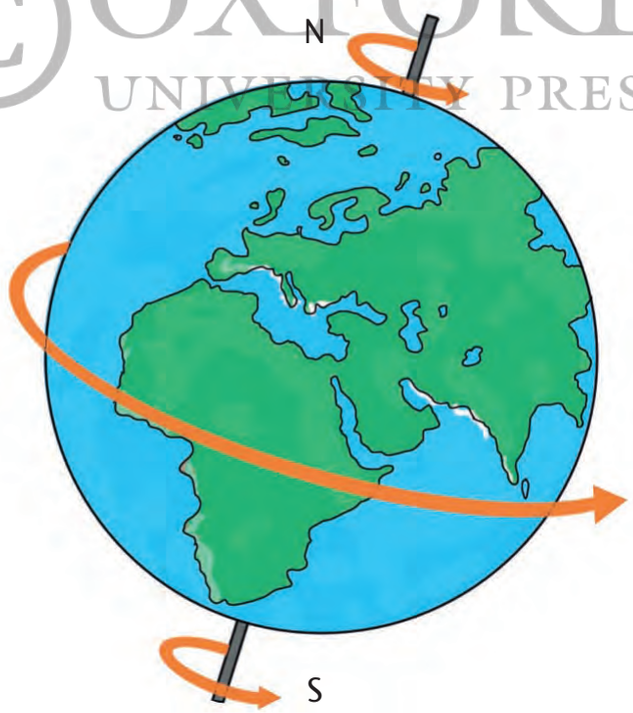


Syllabus

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
Human Body: The Circulatory System	• Revisit learning of Class IV on human body. • Circulatory System. • Organs/Parts of the • circulatory system, their structure, functions (heart, arteries, veins), functions of blood. • Process of circulation through pictures, visuals in simple terms (no technical knowledge to be given).	Identify organs of the circulatory system in a picture/model; Locate position of each organ on the human body (Cut outs); Draw pictures of various organs of the circulatory system and label them; Describe functions of each organ and explain the process of circulation using scientific terms/words; Differentiate between arteries and veins and name the major arteries and veins; Explain functions of blood; Discuss various ways (yoga exercises) to keep the heart healthy and strong; Do simple yogic exercises to keep the body strong and healthy under the guidance of expert /teacher (deep breathing).	• Providing opportunities to children to observe various organs related to the circulatory system (using models, pictures). • Organizing group discussion to observe chart showing various organs & process of circulation. • Providing opportunities to children to develop working model on circulatory system. • Performing simple *Asanas* to show deep breathing pranayama and asking the children to follow and practice doing the same • Drawing and labelling circulatory system individually in the class. • Showing slides of blood and discussing blood reports. • Demonstrating inhaling and exhaling process	• Pictures / diagrams of internal organs. • Diagram of the circulatory system, model of heart. • Working model of the circulatory system. • Cut outs of the human body showing the circulatory system. • Material on process of circulation • Diagram made by children of the circulatory system and organs. • Microscope to observe blood slides • Video.		
Human Body: The Skeletal System	• Skeleton system-bones. • Importance of bones, • muscles and joints for the body. • Functions of bones, major bones of the body - arms, legs, chest bone, skull, jawbone, backbone.	Identify major bones of the human body and name them; Draw diagrams of major bones and name them; Describe functions of major bones of the human body; Locate major joints of the human body and discuss their functions;	• Providing opportunities to children to share and discuss information related with this theme. • Providing opportunities to observe visuals and pictures of actual bones, in the skeleton system to develop clarity on this theme. • Making drawings of bones/muscles and labelling them.	• Skeleton of whole human body. Bones, Joints of knee, shoulder, elbow. • Charts showing different bones, joints, jaws, etc. • Children's drawing of major bones and joints.		

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
	• Care of bones and joints, food items to make the bones strong. • Importance of good posture and exercise.	Draw diagrams of the shoulder and knee joints and their location in the body; Give examples of other kinds of joints in the human body; Identify food items that are calcium rich; Following simple exercises (under guidance) to make bone and muscles strong; Demonstrate correct posture to keep body healthy and strong both in sitting /standing position.	• Giving opportunities to children to observe different kinds of joints and demonstrating how they work. • Demonstrating simple physical exercises to improve body posture. • Initiating discussions related to improving body health. • Demonstration of correct posture for standing and sitting positions. • Yoga exercises for muscles and joints	• Food items rich in calcium and minerals.		
Food and Health	• Revisit previous learning. • Components of a balanced diet, importance of eating a balanced diet. • Junk food: meaning and examples; adverse effects of eating junk food. • Ways to make diet more healthy (e.g. sprouting, fermentation). • Diseases related to food habits, life style (obesity, anaemia, diabetes, blood pressure); and symptoms of the diseases in simple terms. • Prevention of these diseases in non-technical terms.	Discuss various components of food required for healthy living; Give reasons of the need for a balanced diet; Enlist healthy and junk ood items and differentiate between them; Suggest/find out some ways to make diet healthier; Give reasons for some deficiency diseases and find out ways to prevent/reduce them; Develop awareness regarding adulteration in food items; Find out diseases related to life style, including those related to food habits; State symptoms of some lifestyle diseases such as obesity, anaemia, diabetes, blood pressure;	• Building on previous learning. • Providing opportunities to children to discuss components of food & their effects on health. • Organizing simple activities to classify junk and healthy food. • Undertaking project work and evolving ways to avoid junk food and writing slogans and exploring various other practical solutions. • Conducting small group activities with children for them to find out the kind of • food adulterants, and their effects (support material). • Providing opportunities to see films on lifestyle-related diseases and discussion on for their prevention. • Organizing talks and interaction with a doctor to learn more about healthy food habits, deficiency diseases and ways to prevent them. • Conducting survey in the children's surroundings/local neighbourhood. • Discussing diseases related to life style and ways to avoid them.	• Children's experiences related to daily life. • Various kind of food items rich in carbohydrates, protein, fats, vitamins and minerals. • Various food items shown as junk food. • Examples of various kinds of food items as rich in carbohydrates, proteins, fat, minerals vitamins, roughage and water. • Material on various kinds of diseases (other than textbook) • List of healthy food items (examples). • Materials/pictures on various deficiency diseases. • Narratives on deficiencies / life style related.		Languages

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
	• Deficiency diseases – some common deficiency diseases (Kwashiorkor, marasmus, night blindness, anaemia, rickets, scurvy, beriberi, goitre); and ways to prevent them. • Meaning of food adulteration; examples of some common adulterants (awareness level only).	Suggest some ways to avoid these diseases; Infer why sprout food and fermented food is good for health; Appreciate the use of various components of food for our body.	• Discussing diseases related to deficiency of food components.			
Pollination	• Revise parts of a flower. • Androecium and gynoecium. • Pollination. • Bisexual and monosexual flowers. • Process of pollination. • Some ways of pollination (self and cross pollination).	Identify various parts of flower and label each part; Draw diagrams of each part of a flower (after observation); Locate parts of a flower involved in the process of pollination; Explain/discuss process of pollination by using technical terms; Differentiate between self and cross pollination and cite examples of each kind (showing pictures); recognise and relate the need of the pollination for plants	• Revisiting previous concepts and learning. • Building on previous learning. • Showing pollen grains in flowers, and their transfer. • Creating opportunities for group discussion, asking questions and sharing experiences by children. • Conducting simple experiments/ activities to locate different parts of the reproductive organs in a flower. • Asking children to draw pictures of a flower, parts of reproductive organs and to label them. • Making worksheets on the concepts related with this theme.	• Different flowers with reproductive parts (male and female) • Bisexual and mono –sexual flower diagrams made by children of the flower and reproductive parts. • Charts/ diagrams of different kind of flowers. • Charts/ pictures/ e-content depicting pollination/process. • Examples of self and cross pollination in flower. • Worksheets.		
Plant Reproduction	• Process of sexual reproduction in plants: fertilization and formation of seed.	Draw and label the male and female reproductive parts of a flower;	• Conducting simple activities (small group/ individually) to observe, draw, compare and clarify different parts of reproductive organ in plants.	• Children's drawings, visuals/charts of the reproductive organs.		Social Studies

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
	• Dispersal of seeds (air, water, animals). • Other ways of reproduction in plants: Vegetative reproduction: meaning; vegetative-reproduction from stem cuttings (potatoes, onion, ginger) root (carrot), leaf (Bryophyllum).	Discuss the need for the process of fertilization in plants; Explain the process of fertilization in plants; Identify the different kinds of reproduction in plants (by observing pictures); Cite examples of different kinds of reproduction in plants; Identify various parts through which vegetation reproduction takes place and give examples. Give examples of each kind of seed dispersal; Discuss the need and significance of seed dispersal.	• Arranging visits to a nursery for children to observe vegetative reproduction in some plants. • Worksheets on new concepts practiced by children. • Collecting different seeds and their classification based on dispersal methods. • Project work by children in groups or individually on growing plants through • Vegetative propagation in potato. • Demonstrating experiments on process & conditions for seed germination.	• Flowers with androecium, gynoecium. • Chart/e-program showing the fertilization process. • Plants having vegetative reproduction (i.e. potato, carrot, ginger). • Nursery/ School garden. • E-content-on plant reproduction. • Children's project work. • Collection of different kinds of seeds. • Examples of various kind of dispersal of seeds.		
Solids, Liquids, and Gases	• Revision of Class III learning • Solids: Properties of solids: definite shape, geometry. Give examples of sugar crystals. • Liquids: Properties of liquids: occupy space, flow from high level to low level, take the shape of the container. • Separation of liquids from solids. • Gases: Properties of gases: no definite shape and volume.	Identify different forms of matter and cite examples of each based on observable properties; State simple properties of solids and demonstrate the same through simple activities; State simple properties of liquids and demonstrate the same through simple activities; State simple properties of gases and demonstrate the same through simple activities;	• Revisiting concepts. • Building on previous learning. • Showing some crystals of sugar, copper sulphate, potash alum to children. • Conducting experiments to demonstrate how to make solutions by using various solvents. • Conducting activities/experiments demonstrating various ways of separating impurities. Take a liquid milk, water, some juice etc. Take different containers like test tubes, beakers, glasses of different sizes. Transfer a definite volume of liquid from one container to the other. Show that the liquid changes its shape and takes the shape of the container.	• Some crystals of sugar, copper sulphate and potash alum. • Soluble and insoluble substances; examples of soluble and insoluble substances. • Apparatus for conducting simple experiments to describe properties of solids, liquids and gases. • Different sizes of containers and liquids. • Sand, water, sieve and filter paper.		

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
	• Composition of gases in air; with experiment- land and sea breezes, monsoon breezes. • Role of ventilators in houses/halls, closed spaces- warm air lighter than fresh air.	Describe composition of air and depict it diagrammatically; Cite examples of warm and fresh air in different situations in daily life; Differentiate between wind, breezes, storms and give examples; Explain why ventilators and windows are needed in houses, buildings and halls; Relate the use of fans, air conditioners and coolers in different seasons	• Conducting simple experiments showing soluble and insoluble substances in solvents. • Citing examples of various solutions used in day-to-day life. • Organizing demonstration to show the processes of separation, sedimentation, decantation, filtration, and their examples. • Asking children to blow air into a balloon. Showing them that air occupies different volumes in balloons and that balloons can expand. • Giving examples of filling air in tyres of bicycle, cars, trucks, etc. • Giving examples of coolers and exhaust fans. Showing children how smoke is thrown out by exhausts and chimneys.	• Gas chimneys, exhaust fan in kitchens and laboratories.		
Interdependence in Living Beings- Plants and Animals	• Plants as producers, living things as consumers, their examples. • Simple food chains, scavengers and decomposers. • Causes of imbalance in nature (some example: hunting, forest fire).	Differentiate between plants and animals based on some features (plants as producer while animals as consumers); Infer why plants can make their own food; Cite examples of producers and consumers; Classify living beings as producers and consumers; Explain the food chain by taking examples as seen in daily life; Identify decomposers, scavengers and cite their examples;	• Creating opportunities for group discussion, asking questions and sharing experiences by children. • Organising group activities to identify producers and consumers. • Providing material on producers/ consumers and making e-material available. • Developing/creating worksheets for new concepts. • Providing learning opportunities to children to make a model of the food chain. • Initiating a class discussion on what would happen if one of the producers or consumers in the food chain disappeared. • Organising project work on field visit experiences.	• Pictures/ materials on producers and consumers. • Examples of various producers and consumers. • Examples and visuals of the food chain. • Visuals and examples of decomposers. • Visual and examples of scavengers. • Children's experiences.		Social Studies, Languages

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
		Discuss and explain causes of imbalance in nature; Generalize/ infer the effect of hunting, forest fires in the environment.				
Sound and Noise	• Sounds made by common objects (clock, whistle, tea kettle, cooker, piano, call bell, flute, etc.). • Sound made by living beings – plants, animals, human beings. • Sound made by trees and fallen leaves. • Pleasant and unpleasant sounds. • Warning sounds (fire alarm, ambulance siren). • Harmful effect of loud noise (vehicle, loud speaker, fire cracker). • Ways to reduce noise pollution.	Identify objects that produce pleasant sounds and objects that produce unpleasant sounds; Recognise sounds produced by some common objects; Identify sounds produced by some animals and mimic them; Identify sounds produced by trees and fallen leaves; Appreciate the importance of sound as a warning signal to save life; Enlist causes of noise pollution; Suggest some ways to reduce noise in the surroundings; Discuss how loud sound affects health.	• Providing opportunities to children to share personal experiences related to sounds that are pleasant /unpleasant. • Citing examples of pleasant and unpleasant sounds. • Organising group activity to identify sounds of some objects (by using audios tape or mobiles. • Discussing various causes of noise pollution (based on personal experiences) and suggesting ways to overcome them. • Discussing uses of warning sounds (doing mock exercises). • Organising quizzes/riddles on issues related to noise pollution.	• Personal experiences of children. • Mimic of various sounds. • Documentary film on sounds of various vehicles, warning sounds. • Sounds, made by various vehicles/ objects /instruments.		Social Studies, Languages
Work and Energy	• Meaning of work, examples of work done/not done. • Definition of energy; energy is need for work. • Renewable and non-renewable sources of energy, examples of each kind.	Indicate various food items that give more energy than other food items; Discuss the meaning of work by taking examples from daily life; Cite examples and explain the situations where work is done/ work is not done;	• Initiating discussion on personal experiences of children and sharing with peers. • Introducing new concept (work, energy) by giving various examples. • Conducting simple activities with children that help to demonstrate when work is done in different situations. • Demonstrating different forms of energy through various forms of energy activities.	• Personal experiences of children. • Narratives to save energy. • Examples of different kinds of work done/ not done. • Demonstration/ activities depicting meaning of work done.		Social Studies

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
	• Various kinds/forms of energy - light, heat electricity, sound.	Demonstrate through activity, work done/ work not done, in different situations; Explain why energy is needed for work; Differentiate between work and energy with examples; Give examples from daily life of the amount of energy required for different kinds of work; Enlist different forms of energy (light, electricity, heat, sound) and give examples of each kind; Appreciate the importance of energy (light) in daily life.		• Examples of different forms of energy with and without pictures.		
Light and Shadows	• Revisit previous learning: Objects as transparent, translucent, opaque; features of each type of objects. • Formation of shadows: in day, night, dim light; • Condition for formation of shadows; • Day and night formation; some idea of solar and lunar eclipses	Conduct simple activities by using various objects and classify them; Record observations of each object (as kind of material); Conduct simple experiment/ activity to form the shadow (with the support of elders); Infer why a shadow is formed and what conditions are required for its formation; Enlist changes seen in sun in the morning, afternoon, evening and night (advise not to see sun With naked eyes); Infer why day/night are formed; Differentiate between different motions of earth (revolution of earth);	• Providing opportunities to children to share their personal experiences, discussion with teacher and peer group. • Conducting simple activities/experiment to observe simple properties of light. • Providing opportunities to observe and classify objects as transparent, translucent and opaque. • Conducting simple activities by children to demonstrate shadow formation with the support of teacher. • Creating opportunities to enlist uses of light in daily life. • Conducting simple experiment to demonstrate how day and night are formed (simple idea – to be dealt with in greater detail in Social Studies/ Geography). • Depicting activities on movement or revolution and rotation of earth • Demonstrating through simple experiment how solar and lunar eclipses are formed.	• Live experiences of children related to this theme. • Luminous and nonluminous objects. • Material used to show objects as transparent, translucent and opaque. • Examples of transparent, translucent and opaque objects • Experiment/activities explaining how shadow is formed. • Picture depicting how day /night is formed		

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
		Explain the phenomenon of solar eclipse in simple language.	• Filling up of work sheets by children on learnt concepts.	• Activities/ demonstration depicting movement or revolution and rotation of earth • Picture/ demonstration to show solar and lunar eclipses.		
Simple Machines	• Need for machines. • Types of simple machines used in day-to-day life (lever, screw, pulley). • Need for levers, types of levers, I, II, III order, examples related to daily life.	Appreciate the discovery and use of simple tools/ machines in daily life; Enlist tools/ simple machines used in day to-day life; Classify simple machines based on their working principles (levers I, II, III); Give examples of each kind of simple machines; Discuss the need for levers to form different kinds of machines; Draw picture of each kind of machine and label major parts; Conduct simple experiments/activities to demonstrate how simple machines function.	• Creating various situations to listen children's experiences related with the use of machines in daily life. • Relating the theme to body parts joints, acting as levers (e.g. elbow joint, knee joint). • Showing simple machines, which are used in kitchen, at home and in school. • Explaining principles on which different machines function. • Conducting activities to identify different kind of machines and classifying them into 3 categories (Lever I, II, III). • Drawing of different kinds of machines in the class. • Giving hands-on experiences to make models of machines. • Demonstrating and conducting activities on how simple machines work.	• Children's experiences related to simple machines. • Various kind of simple machines used in daily life. • Activities conducted to classify machines having levers as I, II, III. • Pictures of different kinds of machines. • Children's drawings.		
Cleanliness and Hygiene	• Revisit learning of Class III particularly for inculcation of healthy habits. • Cleanliness of body, body parts, their care, cleanliness of clothes, food, water, healthy habits.	Demonstrate when and how to wash their hands for healthy living; Identify causes of source disease which occur due to unclean surroundings, personal hygiene; Develop awareness and sensitivity towards keeping public places clean;	• Building on children's previous learning. • Providing opportunities to children to discuss, interact, ask questions, and share personal experiences during T-L process. • Demonstration of some hands–on activities for habit formation (hand washing). • Providing opportunities to children as part of group work to discuss issues related to cleanliness.	• Materials used for cleanliness (*House). • Personal cleanliness material (Body). • Demonstration on proper washing hands (by elders). • Hand wash material.		Languages, Health and Physical Education

Theme	Key Concepts	Learning Outcomes	Suggested Transactional Processes	Suggested Learning Resources	Life Skill	Integration
	• Diseases due to lack of personal hygiene and unclean surroundings. • Degradable and non-degradable garbage with examples. • How to reduce non-degradable garbage in the surroundings.	Share cleanliness issues with family members so that healthy habits can be developed among Family members as well; Identify degradable and non-degradable garbage in the surroundings and give examples of each; Discuss how to reduce non-degradable garbage to keep the surroundings clean; Create slogans and demonstrate how to dispose-off garbage in the surroundings	• Preparing work sheets for practice. • Arranging and conducting quizzes/ question answer sessions. • Conducting awareness campaigns on cleanliness personal hygiene. • Assigning project work on various issues (e.g. slogan for awareness on cleanliness. • Showing children degradable and non-degradable materials in the environment and encouraging them to segregate at source. • Giving projects to children to identify ways in which they can reduce non-biodegradable garbage in their own homes/ schools. • Asking children to prepare slogans on awareness generation on garbage disposal. • Asking children to make two dust bins – for degradable and non-degradable garbage in the class.	• Posters on communicable diseases • Matching cards (Names of diseases & their symptoms). • Examples of degradable materials. • Examples (material) of non-degradable material. • Slogans on awareness • generation on garbage disposal. • Worksheets, quizzes and riddles on the theme. Note: Hand washing and cleanliness messages need to be reinforced regularly in all grades so as to make this as habit.		

1 Human Body: The Circulatory System

Learn about

- The circulatory system
- Heart
- Blood
- Blood vessels
- Process of circulation

We know that a group of organs[1] working together to perform a particular function is called an organ system. For example, the digestive system helps us to break down the food we eat into simpler forms that can be used by our body. The mouth, food pipe, stomach, small intestine, large intestine, and anus together form the digestive system. Similarly, the excretory system removes wastes, such as urine and sweat, from the body. Kidneys, skin, and lungs form the excretory system.

We will learn about the organ system called the circulatory system in this chapter.

THE CIRCULATORY SYSTEM

The circulatory system is an organ system that helps in transporting substances such as nutrients, water, and oxygen inside our body, and also removes waste gases, such as carbon dioxide, from the body through blood.

Parts of the circulatory system

The circulatory system is made up of the following three main parts:

i. Heart

ii. Blood

iii. Blood vessels

HEART

The heart is a muscular organ that pumps blood to all parts of our body. It is located between the lungs, slightly to the left of the middle of the chest. It is protected by the ribcage.

[1]organ: a part of the body that carries out a specific function

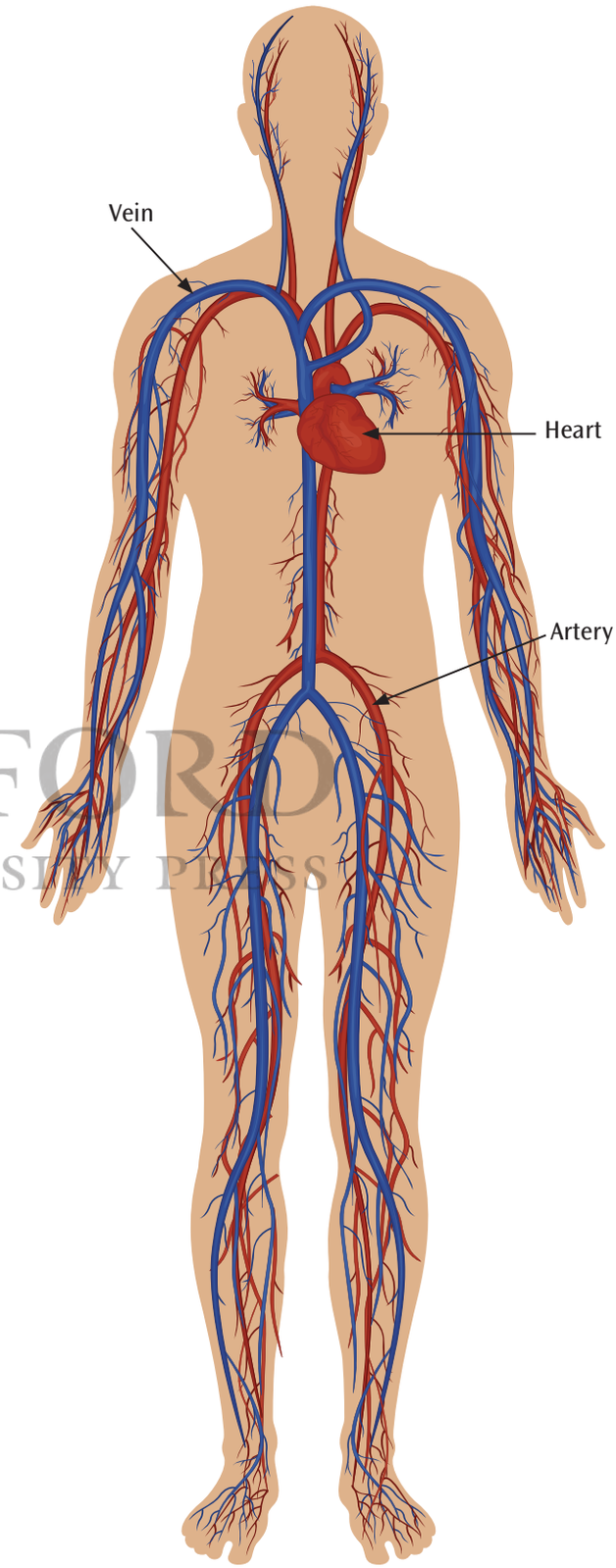
Structure and function of the heart

The human heart is a muscular organ consisting of four chambers – two upper chambers and two lower chambers. The upper chambers are called **atria** or **auricles**. They receive blood coming from the rest of the body. The lower chambers are called **ventricles**. They pump blood out of the heart. The adult human heart is about the size of our fist.

The main function of the heart is to pump blood containing oxygen and nutrients to all cells in the body. It also receives blood containing carbon dioxide from all the parts of the body and pumps it to the lungs for purification.

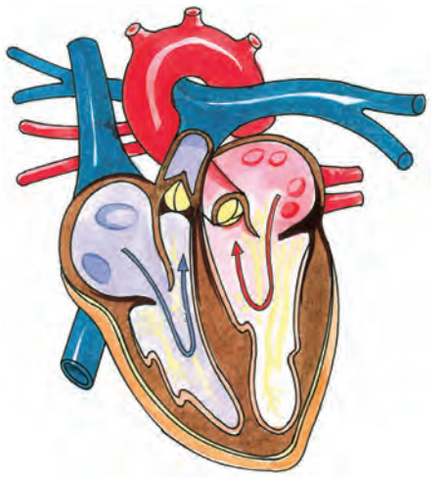
The rhythmic movement that the heart makes while pumping blood is called the **heartbeat**. We can feel this movement at different places on our body, such as the wrist or the neck.

To feel the pumping movement of the heart on your wrist, turn your left hand so that the palm faces upwards. Then, place the first three fingers of your right hand on the left wrist, about 1 inch away from the base of your left thumb. You will feel a light pumping movement, this is called a **pulse**. This method of checking the pulse is called **trisection**. For an adult human being, the pulse rate can vary from 60 to 100 beats per minute.



Circulatory system

How to keep your heart healthy



Human heart

For our body to function properly, it is important to keep our heart healthy. The best way to do this is to adopt a healthy and active lifestyle. We should do the following regularly:

i. Walk daily for at least 3 to 4 km, ideally in the morning.

ii. Exercise for at least 30 minutes every day. Try to exercise in the morning.

iii. Ask your parents not to use a vehicle to drop you to your school, if it is a short distance away. You should walk or cycle, instead.

iv. Avoid sitting for too long. Try to get up at regular intervals, walk around for some time, and then continue the sitting position.

v. Actively participate in outdoor sports such as football, cricket, hockey, and badminton.

vi. Always eat a balanced diet.

vii. Try to eat less of junk and fried food. Such food items are bad for the heart. Try to achieve an ideal body weight.

viii. Stay away from polluted surroundings. Avoid being close to people smoking cigarettes.

ix. Stay happy and avoid stress.

Yoga exercises for a healthy heart

Yoga is a good form of exercise to keep the heart healthy and to improve the circulation of blood. Regular practice of simple yoga exercises improves the overall fitness of the body. There are several benefits of practicing yoga.

- It increases muscle strength and improves the function of lungs.
- It helps in decreasing stress and anxiety and gives a feeling of well-being.
- It boosts energy, improves memory, and increases concentration and attention.

- It helps in reducing weight and also prevents high blood pressure and high blood sugar level.
- It is helpful in relieving joint pain in elderly persons.

Some yoga exercises that may help in improving the health of the heart are *tadasana* (mountain pose), *vrikshasana* (tree pose), *trikonasana* (triangle pose), and *dhanurasana* (bow pose). Yoga may also be combined with meditation. Meditation helps to clear the mind of all negative thoughts, and thus reduces stress. Deep breathing exercises also help in improving the function of lungs and circulation of blood. Yoga exercises should always be done under the guidance of an expert or a trained yoga teacher.

BLOOD

Blood is a substance that flows inside the human body through muscular tubes called **blood vessels**. Blood is pumped by the heart to different parts of the body. Blood is primarily responsible for the transportation of nutrients (from the digested food), water, oxygen, and carbon dioxide within our body.

Functions of blood

i. Blood helps in transporting oxygen and carbon dioxide throughout the body. The red blood cells (RBCs) present in the blood take the oxygen from the lungs to all the cells in the body. They also collect carbon dioxide from these cells and take it back to the lungs.

ii. Blood carries the nutrients generated during digestion from different parts of the digestive system to all cells of the body.

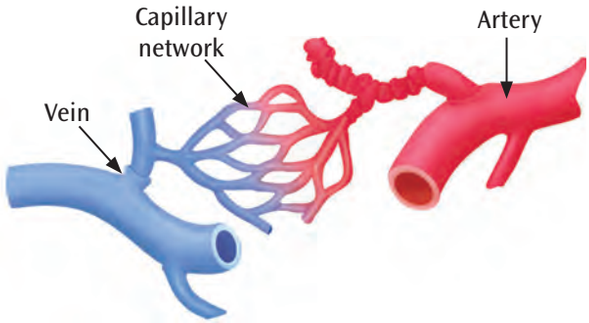
iii. Blood helps in carrying the waste generated by the cells of the body to the kidneys for filtering.

iv. Blood helps in maintaining the temperature of the body, that is, it prevents the body from becoming too hot or too cold.

v. The white blood cells (WBCs) present in the blood protect the body from infections and disease-causing organisms.

BLOOD VESSELS

Blood vessels are thin muscular tubes that carry blood throughout our body. They form a network within the body so that blood can be transported to all parts of the body. Blood vessels are of three types: arteries, veins, and capillaries.



Blood vessels

Structure and functions of blood vessels

Let us study about the different blood vessels in our body.

Arteries

Arteries are the largest of the three blood vessels. They carry blood containing oxygen from the heart to different parts of the body. Each artery gets divided into smaller **arterioles** to form a network throughout the body.

The largest artery in our body is called **aorta**. It is the main artery coming out of the heart. Another important artery is the **carotid artery** that carries blood from the heart to the brain.

Veins

Veins are thinner than the arteries. They carry blood from different parts of the body back to the heart. Veins can carry more blood than the arteries. They contain special structures called **valves** that prevent blood that is going towards the heart from flowing back to the body parts. Veins get divided into smaller **venules** to form a network throughout the body.

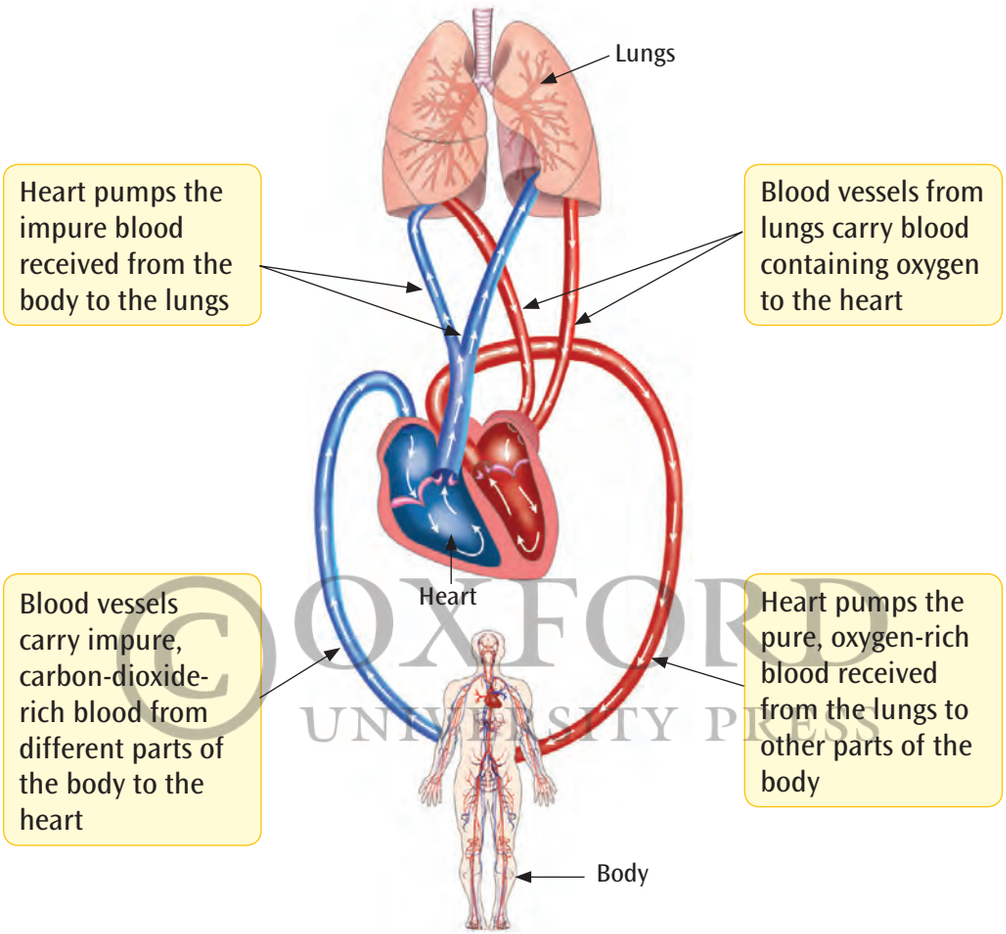
Important veins of the human body include the **superior vena cava** (responsible for bringing blood from the upper portion of the body to the heart) and the **inferior vena cava** (responsible for bringing blood from the lower portion of the body to the heart).

Capillaries

Capillaries are the thinnest of the three blood vessels. They connect the arteries to the veins.

PROCESS OF CIRCULATION

The continuous movement of important nutrients, oxygen, and carbon dioxide between the heart and the rest of the body by blood through the blood vessels is called **circulation**.



Circulation of blood

Questions

Choose the correct option to fill in the blank.

1. The ..... (heart/kidney) is a muscular organ that pumps blood.
2. The ..... (heart/stomach) is located between the lungs and is protected by the ribcage.
3. Blood vessels carry ..... (saliva/blood) throughout our body.
4. There are ..... (two/three) types of blood vessels.
5. ..... (Capillaries/Veins) are the thinnest blood vessels.

Wrap Up

- The circulatory system is made up of the heart, blood, and blood vessels.
- The **heart** is a muscular organ that pumps blood to all parts of our body. It is protected by the ribcage.
- Doing simple **yoga** exercises under the guidance of an expert or a trained yoga teacher can keep our heart strong and healthy.
- **Blood** flows inside the blood vessels and transports nutrients, water, oxygen, and carbon dioxide throughout the body.
- **Blood vessels** are thin tubes that carry blood throughout our body. They are of three types.
- **Arteries** carry blood from the heart to different parts of the body.
- **Veins** carry blood from the different parts of the body back to the heart.
- **Capillaries** connect arteries to veins. They are the thinnest of the blood vessels.
- The continuous movement of important nutrients, oxygen, and carbon dioxide between the heart and the rest of the body by blood through the blood vessels is called **circulation**.

Exercises

SECTION I

A. Choose the correct option.

1. The heart is protected by the ..... .
   a. blood b. blood vessels c. ribcage d. kidneys
2. It flows inside the blood vessels and transports nutrients, water, oxygen, and carbon dioxide within our body.
   a. Urine b. Blood c. Heart d. Blood vessels
3. These blood vessels carry blood from the heart to different parts of the body.
   a. Veins b. Capillaries c. Arteries d. All of them
4. To keep the heart healthy and strong, we should
   a. Eat a balanced diet b. Never exercise
   c. Sleep as less as possible d. None of these
5. These cells present in the blood protect the body from infections and disease-causing organisms.
   a. RBCs b. WBCs c. Both a and b d. None of these

B. Choose the correct option to fill in the blank.

1. The ..... (excretory/circulatory) system helps in transporting substances within our body through blood.
2. The rhythmic movement that the heart makes while pumping blood is called the ..... (heartbeat/breathing).
3. ..... (Arteries/Veins) are the largest of the three blood vessels.
4. ..... (Aorta/Carotid) is the main artery coming out of the heart.
5. The ..... (aorta/carotid) artery carries blood from the heart to the brain.

C. Name the following.

1. The thin tubes that carry blood throughout our body .....
2. The blood vessels that carry blood from the heart to the different parts of the body .....
3. The blood vessels that carry blood from the different parts of the body to the heart .....
4. The blood vessels that connect arteries to veins .....

SECTION II

D. Short answer questions.

1. How does the circulatory system help us?
2. Name the parts of the circulatory system.
3. Write a short note on arteries.
4. List any two ways in which you can keep your heart healthy.

E. Long answer questions.

1. Describe the various parts of the circulatory system.
2. List the functions of blood.
3. Write the differences between arteries and veins.
4. Write any three benefits of yoga.

MY LEARNING CORNER

A. Think about

1. Why is it important to keep the heart healthy? What would happen if the heart stops functioning?

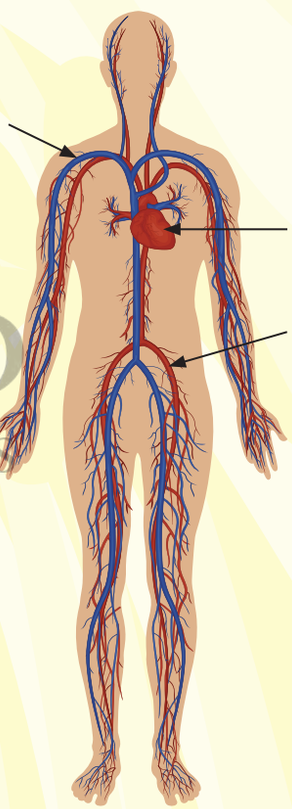
.....

.....

.....

B. Picture study

Look at the picture and answer the questions that follow.



1. Name the organ system shown in the picture.

.....

2. Label the parts shown by the arrows.
3. What is the role of each of these parts?

.....

.....

.....

4. Which of these parts is protected by the ribcage?

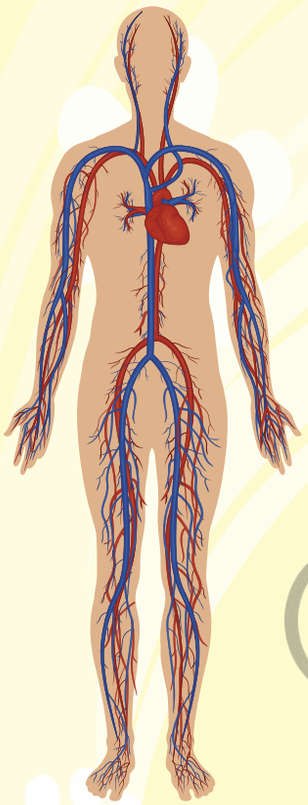
.....

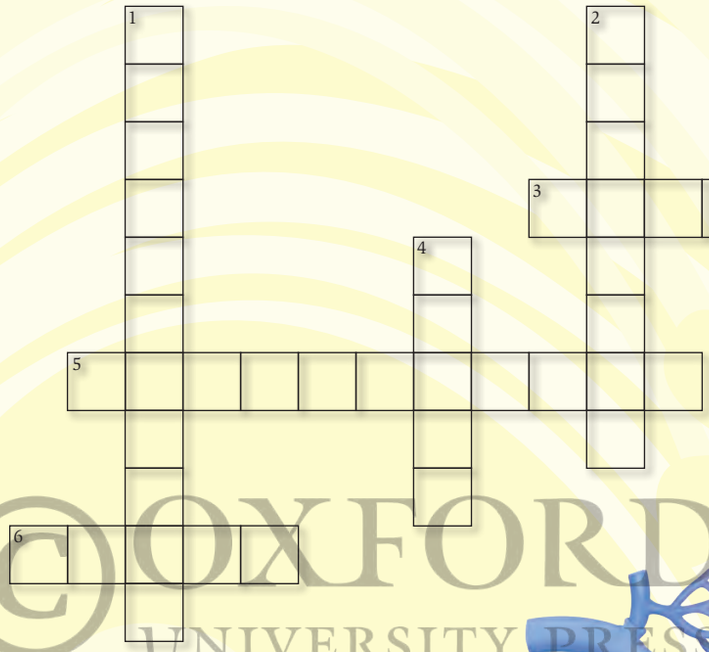
C. Try Out

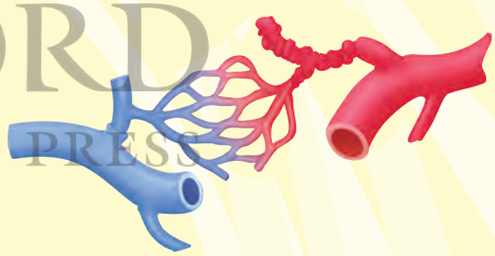
Using modelling clay, create a model of the circulatory system and paste it on a cardboard. Label its parts.

Worksheet

Use the clues given below and solve the crossword puzzle.







Across

3. Blood vessels that carry blood from different parts of the body to the heart
5. Blood vessels that connect arteries to veins
6. Substance that flows inside the body and transports nutrients, oxygen, and carbon dioxide

Down

1. Movement of nutrients, oxygen, and carbon dioxide between the heart and the rest of the body by blood through blood vessels
2. Blood vessels that carry blood from the heart to different parts of the body
4. The muscular organ that pumps blood to all parts of the body

2 Human Body: The Skeletal System

Learn about

- The skeletal system
- Major bones of the human body
- Functions of bones in the human body
- Joints
- Muscles
- Importance of the skeletal system
- Care of bones and joints

We know that a group of organs working together to perform a particular function is called an organ system. We will learn about another organ system known as the skeletal system in this chapter.

THE SKELETAL SYSTEM

The skeletal system consists of all the bones present in the body. These bones form a framework that supports the body and gives it a definite shape. This framework of bones is called a **skeleton**.

Types of bones

There are 206 bones in an adult human skeleton. Bones are mainly made up of minerals such as calcium and phosphorus. Calcium makes the bones strong. The bones are connected to each other at the joints. Joints allow the movement of the various parts of our body.

The human body has different types of bones. Bones of the limbs, including those of the fingers and toes, are long. Bones of the wrist and ankle are short. Most of the bones of the skull and the breastbone are flat in shape. The bones of the spine, hips, and some of the bones of the skull are irregular in shape.

Bones of the limbs are long.

The breastbone is flat.

The bone of the wrist is short.

The bone of the spine is irregular in shape.

Skull: It covers and protects the brain.

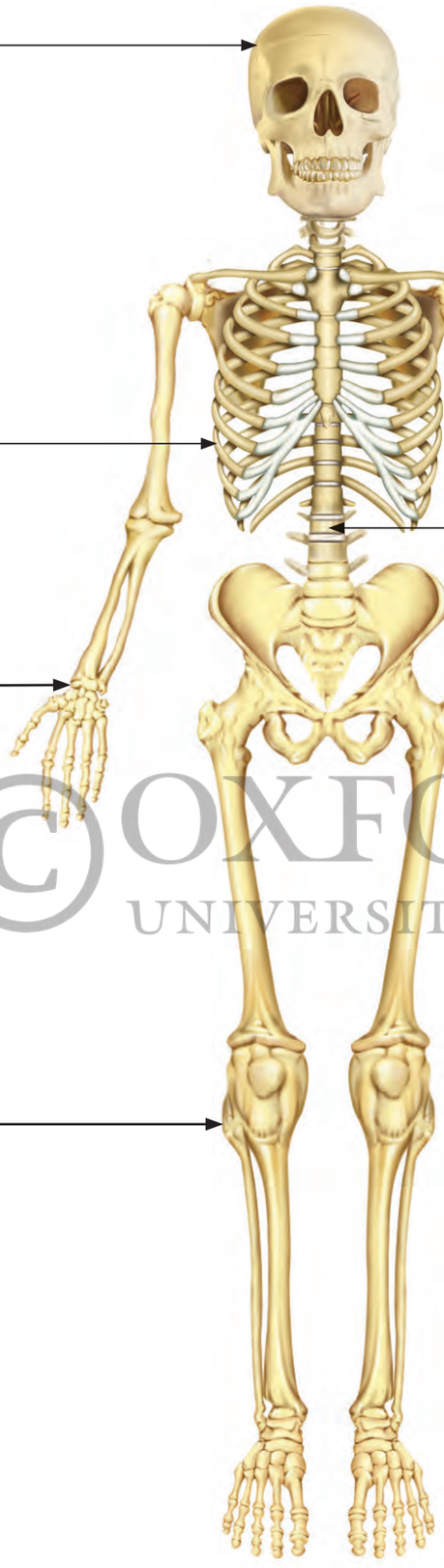
Ribcage: It protects our two delicate organs: the heart and lungs.

Backbone: It encloses and protects the delicate spinal cord.

Limbs:

Upper limbs help us to eat, write, and hold things.

Lower limbs help us to walk and run.



Skeletal system

MAJOR BONES OF THE HUMAN BODY

The skeleton consists of the skull, backbone, ribcage, limbs, jawbone, and girdle bones.

Skull

Skull

The skull is a hollow, round structure present in the head. It is made up of 22 bones, of which eight bones form the part of the skull that protects the brain and the remaining 14 bones form the face. In addition, there are six small bones in our ears: three in each ear. The skull covers and protects the brain. It also gives shape to the face. All the bones of the skull are fixed and immovable, except the lower jaw. The lower jaw is joined to the upper jaw. The upper and lower jaws have teeth.

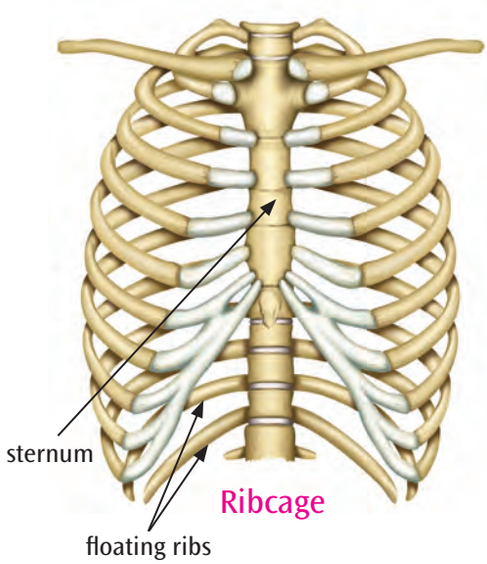
Backbone

Backbone

The backbone, also known as the vertebral column or spine, is a long bony structure. It is made up of 33 small bones. The individual small bones are called vertebra. The backbone encloses and protects the delicate spinal cord.

Ribcage

The ribcage is a bony structure present in the chest region. It is made up of 12 pairs of thin, curved bones called ribs. A long, flat bone, called the sternum, is present at the centre of the chest and holds these ribs together in the front. At the back, the ribs are held together by the spine or backbone. However, the last two pairs of ribs are not attached to the sternum.



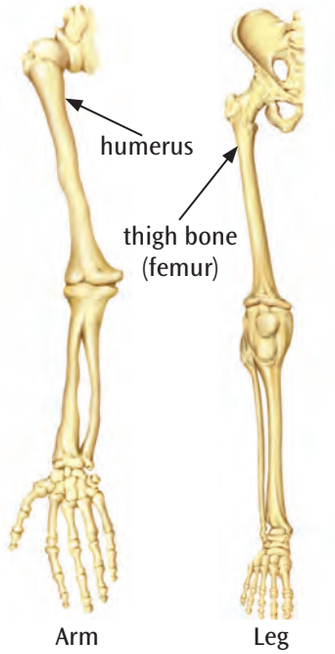
Ribcage

These two pairs of ribs are called the floating ribs. The ribcage protects the delicate organs such as the heart and lungs.

Limbs

Human beings have four limbs: a pair of upper limbs (arms) and a pair of lower limbs (legs).

Upper limbs Upper limbs have two parts: the upper arm and the lower arm. The bone present in the upper arm, called humerus, is joined to the two bones of the lower arm at the elbow.



Limbs

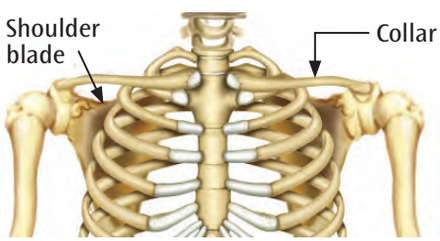
Lower limbs Lower limbs have two parts: the upper leg and the lower leg. The upper leg has the longest bone in the body, called the femur. The femur is also known as the thigh bone. It is joined to the two bones of the lower legs at the knees.

Jawbone

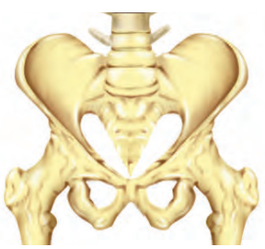
The jawbone is the U-shaped bone of the lower jaw. It is the largest and strongest bone in the face. It holds the lower teeth. It is the only bone on the face that can move. It helps us to move our mouth so that we can chew food.

Girdles

A girdle is a bony, ring-like structure. There are two girdles present in the body: the shoulder girdle and the hip girdle. The shoulder girdle is made up of the shoulder blade and the collar bone. The hip girdle is made up of three bones fused to form a single bone.



Shoulder girdle


Hip girdle

FUNCTIONS OF BONES IN THE HUMAN BODY

The main functions of the bones that form the skeleton are listed as follows.

Shape and support: It gives shape and support to the body.

Protection: It protects the delicate internal organs such as the brain, spinal cord, heart, and lungs.

Movement: It allows the movement of the various parts of the body.

Production and storage: Bone marrow present inside the bones produces the red blood cells. The bones of the skeleton also store the mineral calcium.

Questions

Write T for True and F for False.

1. The skull covers and protects the brain. .....
2. The backbone is made up of 33 small bones. .....
3. The long, flat bone present at the centre of the chest is called humerus. .....
4. The longest bone in the body is called the ribcage. .....
5. The jawbone is the largest and strongest bone in the face. .....

JOINTS

A joint is a place in the skeleton where two or more bones connect. Bones are held together at the joints with the help of the ligament. At the joints, the surfaces of the bones are covered with cartilage.

Cartilage is a strong, elastic, yellowish or white-coloured substance present around the joints. Cartilage can bend. Organs such as our nose and ears also have cartilage.

The cartilage protects the bones from getting damaged as a result of the constant[1] movements that take place at the joints.

Joints are of two types: movable and immovable. All the joints except those in the skull are movable joints.

[1]constant: continuous

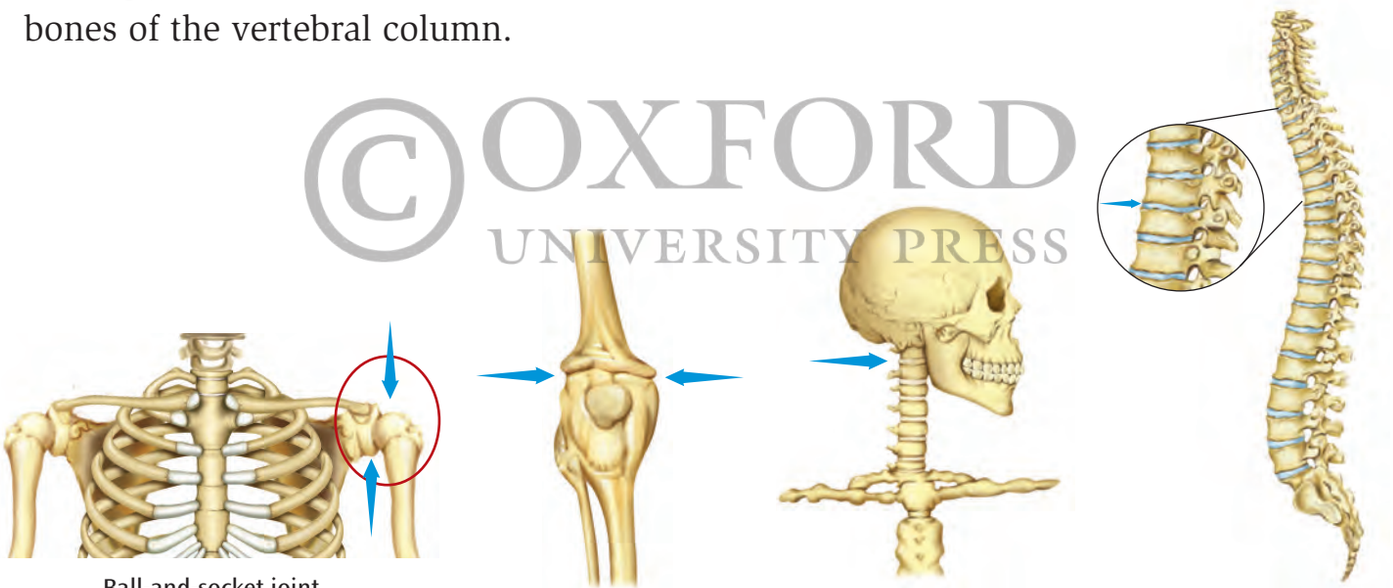
Types of movable joints

Ball-and-socket joint In this type of joint, the ball-shaped end of one bone fits into the cup-shaped socket of another bone. This type of joint allows movement in all directions. The shoulder and the hip joints are examples of a ball-and-socket joint.

Hinge joint This type of joint allows only back and forth movements. Hinge joints are found in the knees, elbows, fingers, and toes.

Pivot joint This type of joint allows us to move our head sideways. Pivot joints are found between the first and the second vertebrae of the neck region of the backbone.

Gliding joint This type of joint allows the bones to glide[2] against each other. Gliding joints are found in the bones of the wrist and ankle, and between the bones of the vertebral column.



Types of joints

MUSCLES

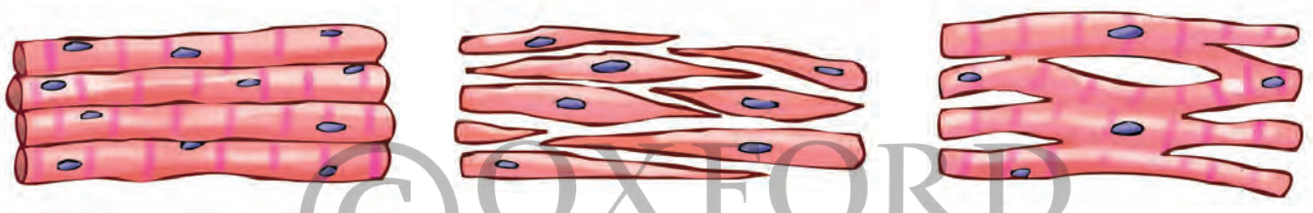
There are over 600 different muscles in our body. They remain attached to the bones through tendons. Based on their function, muscles can be of the following two types.

[2]glide: to move smoothly

Voluntary muscles Voluntary muscles are those muscles whose movements can be controlled by us. The skeletal muscles present in the arms, legs, hands, and feet are examples of voluntary muscles.

Involuntary muscles Involuntary muscles work on their own and their movements cannot be controlled by us. The following are two types of involuntary muscles present in the human body.

- *Smooth muscles* The involuntary muscles present inside internal organs, such as the stomach and intestines, are smooth muscles.
- *Cardiac muscles* The involuntary muscles present inside the wall of the heart are called cardiac muscles. These muscles work all the time, pumping blood to different parts of the body, whether we are asleep or awake.



Voluntary muscles Smooth muscles Cardiac muscles

Types of muscles

Questions

Name the following.

1. The type of joint found in the shoulder and hip .....
2. The type of joint found in knees .....
3. The type of joint that allows us to move our head sideways .....
4. The type of joint found between the bones of the vertebral column .....
5. The type of muscles whose movements can be controlled by us .....

IMPORTANCE OF THE SKELETAL SYSTEM

The skeletal system includes all the bones, joints, and muscles present in the body. Let us discuss the importance of each of these parts of the skeletal system.

Importance of bones

We have already learnt about the functions of the bones in the human body.

i. They provide shape and support to the body.

ii. They protect the delicate internal organs of the body.

iii. They allow movement of various parts of the body.

iv. The bone marrow present inside the bones produces the red blood cells.

v. Bones also store the mineral calcium.

Importance of joints

i. The bones present in the human body are rigid and cannot bend. The joints make our body flexible by allowing movement in different directions.

ii. There are many different types of joints. Each of these types allows movement in a certain manner.

Importance of muscles

i. Muscles provide support to the bones.

ii. They assist the skeleton in moving the limbs and other parts of the body.

iii. Muscles inside the internal organs help them in carrying out important functions. For example, the cardiac muscles help the heart in pumping blood to different parts of the body.

CARE OF BONES AND JOINTS

For our body to be able to move and function properly, we need to take good care of the bones and joints present in it. To make our bones and joints strong and healthy, we should do the following:

i. Eat food items that are rich in **proteins**. Milk, egg, cheese, fish, meat, beans, and pulses are good sources of proteins.

ii. Eat food items that are rich in **calcium**. Some examples of calcium-rich foods are milk, curd, almond, and cheese.

iii. Eat food items that are rich in **vitamin D**. Fatty fish, cheese, and egg yolks are some sources of vitamin D.

iv. Eat food items rich in **vitamin C**. Examples of food that are rich in vitamin C include all citrus fruits, dark green leafy vegetables, and tomatoes.

v. **Exercise** regularly. Some physical activities that are good for bones and joints include walking, running, and playing sports such as football, basketball, and tennis. Some simple yoga exercises that involve balance and stretching are also good for the bones, joints, and muscles.

Food items that make bones and muscles strong

To make bones, joints, and muscles strong, we need to include food items that are rich in proteins, vitamins, and minerals in our diet.

Proteins

Proteins help in the growth and repair of the body. They also help in building muscles. Food items that are rich in proteins are also called body-building foods. Young children need a more protein-rich diet than adults to help in their growth and development.

Some food items that contain protiens

Sources: Milk, egg, cheese, fish, meat, beans, and pulses are some food items that are rich in proteins.

Vitamins and minerals

Vitamins and minerals protect our body from diseases and help in making bones, joints and muscles strong and healthy. Food items that are rich in vitamins and minerals are also called protective foods.

Some important vitamins that our body needs to maintain strong bones, joints, and muscles are vitamins C and D. Vitamin C helps in repairing the cartilages in joints,

while vitamin D helps the body to absorb the calcium present in food. Calcium is the most important mineral needed by bones and joints. It helps in the formation of bones and teeth.

Some food items that contain vitamins and minerals

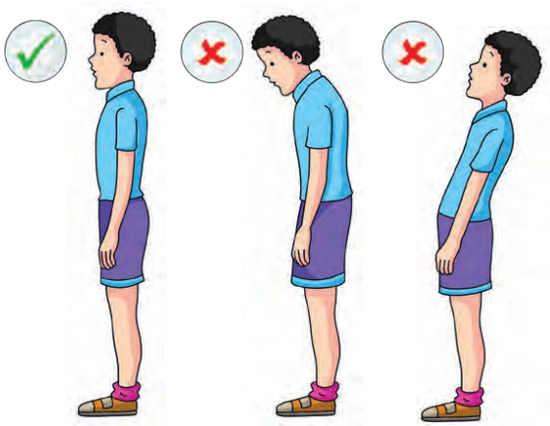
Sources: Examples of food that are rich in vitamin C include all citrus fruits, dark green leafy vegetables, and tomatoes. Fatty fish, cheese, and egg yolks are some sources of vitamin D. Milk, curd, almond, and cheese are rich in calcium. Fresh fruits and vegetables, milk, eggs, and peanuts are rich sources of vitamins and minerals.

Importance of rest, good posture, and exercise

To help our body to function properly, we must make sure that it gets enough **rest**. The body needs 6 to 8 hours of sleep every day. Lack of proper sleep can lead to illness. Therefore, we must not stay awake for too long at night.

Posture is the way in which we keep our body while standing or sitting. It is important to keep our backs straight while sitting or standing. It is incorrect to sit or stand with our back bent. A bent back puts burden on the backbone and joints. This may lead to joint and muscle pain later.

Correct posture while sitting



Correct posture while standing

Regular exercise keeps the bones, joints, and muscles strong and healthy. Some physical activities that are good for bones and joints include walking, running, and playing outdoor sports such as football, basketball, and tennis. Some simple yoga exercises that involve balance and stretching also help in keeping our body fit and healthy.

Regular exercise

Questions

Choose the correct option to fill in the blank.

1. ..... (Regular exercise/Watching television) keeps the bones, joints, and muscles strong and healthy.
2. ..... (Proteins/Fats) help in the growth and repair of the body.
3. Vitamin ..... (C/D) helps the body to absorb the calcium present in food.
4. Keeping the back straight while sitting or standing is the ..... (correct/incorrect) posture.

Wrap Up

- Bones form a framework called skeleton that gives shape to the body.
- There are 206 bones in an adult human skeleton.
- Bones are made of calcium and phosphorus.
- Bones are held together at the joints with the help of ligament. The surfaces of the bones at the joints have cartilage. The cartilage protects the bones from getting damaged.
- Some major bones of the human body are the skull, backbone, ribcage, limbs, jawbone, and girdle bones.

- The major functions of bones include providing shape, support, and protection, allowing movement, production of red blood cells, and storage of calcium.
- A joint is a place in the skeleton where two or more bones connect. Joints are of two types – movable and immovable.
- There are 600 different muscles in our body. Muscles are of two types – voluntary and involuntary.
- Bones, joints, and muscles are important to us because bones provide shape and support, joints allow movement of bones in different directions, and muscles provide support to the bones.
- For our body to be able to move and function properly, we must take good care of the bones and joints by eating food items that make them strong, and by regular exercise.
- To make bones, joints, and muscles strong, we need to include food items that are rich in proteins, vitamins, and minerals to our diet.
- Posture is the way in which we keep our body while standing or sitting.
- Regular exercise keeps the bones, joints, and muscles strong and healthy.

Exercises

SECTION I

A. Choose the correct option.

1. The framework of bones that gives support to our body is called the
   a. cartilage b. marrow c. muscles d. skeleton
2. The ..... protects the heart.
   a. skull b. ribcage c. backbone d. limbs
3. Which of the following holds the ribs together in the front?
   a. Backbone b. Sternum c. Limbs d. Marrow
4. This joint allows only back and forth movement.
   a. Hinge joint b. Gliding joint
   c. Pivot joint d. Ball-and-socket joint
5. It is the only bone on the face that can move
   a. Backbone b. Jawbone c. Ribcage d. Humerus

B. Choose the correct option to fill in the blank.

1. There are ..... (206/306) bones in an adult human skeleton.

2. The backbone protects the delicate ..... (spinal cord/brain).
3. The ribcage is made up of ..... (12/13) pairs of ribs.
4. Bone ..... (marrow/water) present inside the bones produces the red blood cells.
5. The pivot joint allows the movement of the ..... (head/leg).
6. Milk, egg, cheese, and fish are good sources of ..... (proteins/carbohydrates).

C. Write T for True and F for False. Correct the False statements.

1. The backbone is a hollow, round structure present in the head.
2. Human beings have six limbs.
3. The skull protects the brain.
4. The knee joint is a ball-and-socket joint.
5. The involuntary muscles present in the stomach and intestines are smooth muscles.
6. Calcium helps in the formation of bones and teeth.

D. Name the following.

1. A framework of bones present in the body .....
2. A series of small bones that make up the backbone .....
3. A long, flat bone present at the centre of chest .....
4. The longest bone in the body .....
5. The bone in the upper arm .....
6. The muscles whose movement can be controlled by us .....
7. The muscles whose movement cannot be controlled by us .....
8. The muscles present in the stomach and intestines .....
9. The muscles present inside the wall of the heart .....

E. Write the name of the joint present in the following parts of the body.

1. Ankles .....
2. Knees .....
3. Shoulders .....
4. Elbows .....
5. Hip .....

SECTION II

F. Short answer questions.

1. What does the human skeletal system consist of?
2. Write a few lines about ribcage.
3. What is sternum?
4. Name the two girdles present in our body.
5. What is the type of joint found between the first and the second vertebrae of the neck region of the backbone?
6. What are voluntary muscles? Give two examples.
7. What are involuntary muscles? Give two examples.
8. Write any two reasons why bones are important.
9. Why is it important to maintain the correct posture while sitting or standing?

G. Long answer questions.

1. Discuss the different types of bones present in the human body.
2. Describe the structure of the skull.
3. Describe the structure of the upper and lower limbs.
4. What are the functions of the skeletal system?
5. What is a joint? Name the various types of joints and give examples.
6. Describe the different types of muscles present in our body.
7. Explain how including foods rich in proteins, vitamins, and minerals in our diet keeps our bones, joints, and muscles healthy. Mention any two sources of each of these nutrients.

MY LEARNING CORNER

A. Think about

1. Anil was studying the skeletal system and was surprised to know that the backbone has 33 vertebrae. He asked his teacher what would happen if there were only one bone instead of so many. The teacher explained to him the need for so many bones. Can you think of what would happen if we had only one bone in the backbone? (*Hint:* What is the function of a joint?)

   .....

.....

.....

2. Yusuf was wondering why he could move his arm in all directions but could not move his knee in all directions. Do you know why? (Hint: What are the various types of joints?)

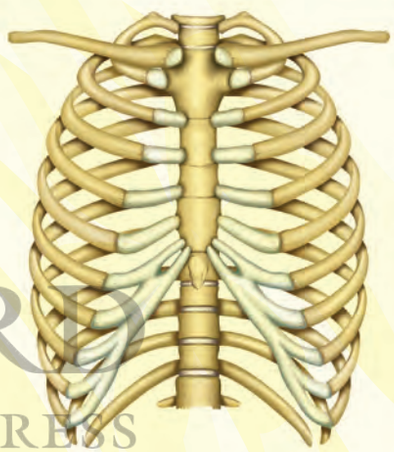
.....

.....

.....

B. Picture study

Look at the picture and answer the questions that follow.



1. Which part of the human skeletal system is shown in the picture? .....
2. How many pairs of thin, curved bones are there in this part? .....
3. What are these bones called?
   .....
4. Name two organs that this structure protects.
   .....
5. Name the bones that hold the ribs together in the front. Label it in the picture.

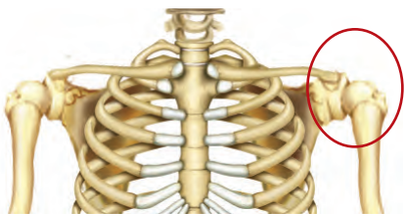
C. Try out

Collect or draw pictures of the following and write their functions.

Skull	**Vertebral column**	**Ribcage**
Function:	Function:	Function: .....
.....	.....	.....

Worksheet

Name the body parts that are shown below. Locate them in your body. In how many directions can you move them? Write your observations under each picture.



Body part: .....

Movement: .....

Type of joint: .....

Body part: .....

Movement: .....

Type of joint: .....

Body part: .....

Movement: .....

Type of joint: .....

Body part: .....

Movement: .....

Type of joint: .....

3 Food and Health

Learn about

- Components of food
- Balanced diet
- Junk food
- Ways to make diet healthier
- Diseases caused by incorrect food habits and unhealthy lifestyle
- Prevention of lifestyle diseases
- Deficiency diseases
- Food adulteration

We need food to stay alive. It is essential to eat a balanced diet for the proper growth and development of our body. We will learn about the importance of eating healthy and the harmful effects of junk food in this chapter.

COMPONENTS OF FOOD

There are five main components of food: carbohydrates, fats, proteins, vitamins, and minerals. These components are also known as **nutrients**. The table given below lists the functions and sources of these components of food.

Components of food	Function	Sources
Carbohydrates	Provide energy to the body.	Cereals (e.g., rice, wheat, and corn), fruits, sugar, potato
Fats	Provide energy to the body.	Oil, milk, butter, cheese, *ghee*, cream, dry fruits
Proteins	Essential for growth and repair of the body and muscle-building.	Eggs, meat, fish, milk, cheese, soya bean, pulses
Vitamins	Needed in small amounts for the normal functioning of the body and to prevent diseases.	Fruits, green leafy vegetables, fish, eggs
Minerals (iron, calcium, iodine, and phosphorus)	Needed in small amounts for keeping the body healthy.	Vegetables, fruits, milk, eggs

In addition to these five components, water and roughage are also essential to our diet.

Water We need adequate amount of water so that our body stays healthy.

Roughage It is the undigested portion of the plant food, which includes mostly fibres. It is mostly present in whole grains and in various fruits and vegetables. It helps in the easy passage of food through our digestive system.

BALANCED DIET

We need all the components of food in adequate amounts to remain healthy.

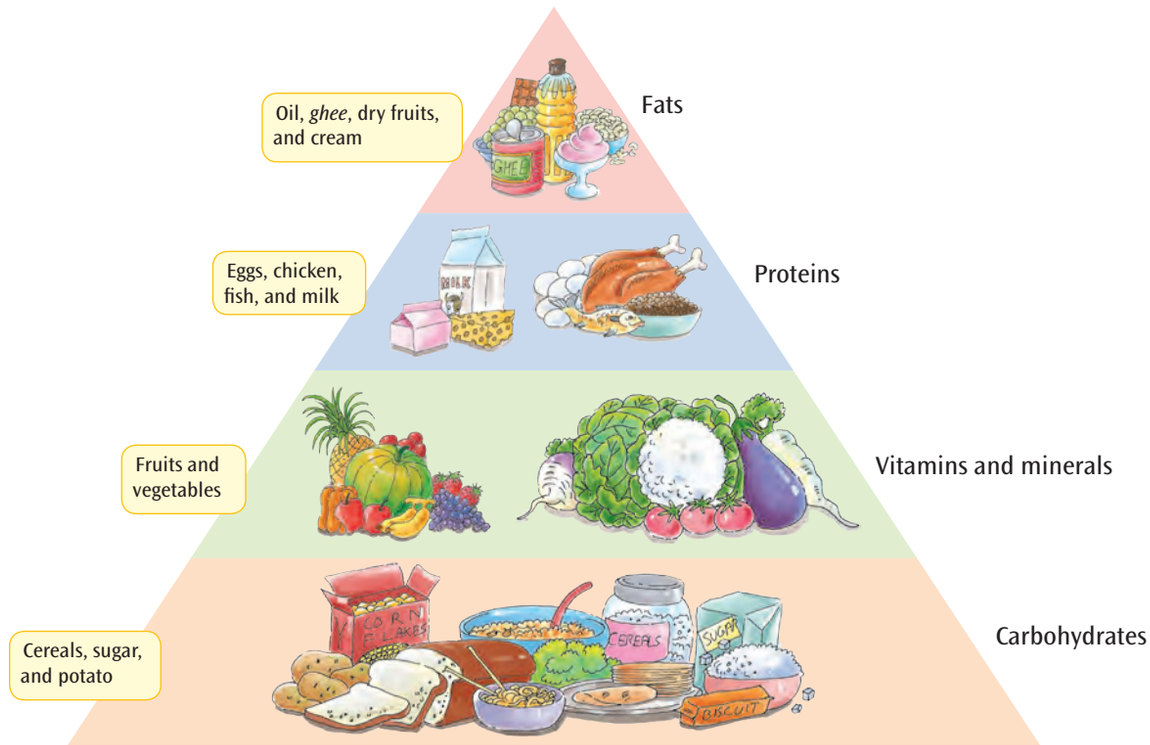
A diet that contains all the components of food in the right proportions for the healthy functioning of our body is called a ***balanced diet****.*

Components of a balanced diet

Eating a balanced diet provides the required nourishment to the body and keeps it healthy. The different components that need to be a part of a balanced diet are carbohydrates, proteins, fats and sugars, milk and dairy products, and fruits and vegetables. The amount of each of these components depends on the **age** and the **amount of physical activity** of a person.

Look at the following examples:

- A person who does more physical labour (such as an athlete or a labourer) needs a diet that is richer in carbohydrates than a person who works in an office.
- Growing children need to have a protein-rich diet to help in the overall development of their bodies and minds.
- Adults who have jobs that require them to sit and work during the day need a diet that has less carbohydrates and fats to prevent them from gaining weight.
- Elderly persons usually need a low-fat, high-fibre diet along with moderate exercise. They should have plenty of milk and milk products, fresh fruits, and vegetables to meet their vitamin and mineral needs.



A balanced diet contains different components of food in adequate amounts.

Importance of eating a balanced diet

It is very important to eat a balanced diet as it promotes the following:

1. **Growth and development of the body –** A balanced diet is especially important for children as it helps in the proper development of their growing bodies. A balanced diet also provides energy to all the body parts so that they can perform their functions properly.
2. **Growth and development of mind -** A balanced diet helps in improving memory, concentration, and allows us to focus better on our day-to-day activities.
3. **Maintains an ideal body weight –** A balanced diet helps in maintaining an ideal body weight. It helps in preventing weight gain.
4. **Prevents diseases –** A balanced diet gives our body the strength to fight infections and disease-causing organisms. It also prevents diseases caused due to lack of nutrients.

Questions

Name the following.

1. The component of food found in cereals that provides energy to the body ……
2. The component of food found in butter that provides energy to the body ……
3. The component of food essential for growth and muscle-building ……
4. The component of food that is required in small amounts for the normal functioning of our body ……

JUNK FOOD

The term 'junk food' refers to any food that contains high amount of sugar and fat, and low amount of nutrients and fibres. When eaten, these food items make us feel full, but they provide less nutrition to the body. All the excess fat present in these foods cannot be used completely by the body and gets stored. This leads to weight gain and poor health over a period of time. Examples of junk food include packaged foods such as salted potato chips, candies, chocolates, ice creams, and sugary cold drinks, and other fatty foods such as patties, burgers, pizzas, samosas, and sugary sweets.

Adverse effects of eating junk food

We should not make junk food a part of our daily diet. Eating junk food regularly can have several adverse[1] effects on our health and well-being. Some common ill effects of eating junk food are as follows:

i. Deficiency[2] of certain nutrients
ii. Weight gain and obesity
iii. Lack of energy
iv. Poor digestion

[1]adverse: harmful
[2]deficiency: lack or shortage

v. High levels of salt and sugar in the blood that leads to diseases such as high blood pressure and diabetes, respectively

vi. Heart diseases

WAYS TO MAKE DIET HEALTHIER

We should avoid junk food and eat a balanced diet. There are many ways of making the diet healthier. Some of them are as follows:

i. Use less sugar and salt while cooking food.

ii. Avoid adding more salt to cooked food before eating.

iii. Use less oil while cooking. Avoid deep frying as much as possible. Also, avoid reusing oil that has already been used for frying earlier.

iv. Eat fruits such as apples, oranges, and guavas daily. They provide important vitamins.

v. Add **sprouts** of gram and *moong dal* to at least one meal in a day. Eat lots of fresh fruits and green vegetables.

vi. Add fibre to your diet. Use whole grains instead of polished cereals.

vii. Eat lots of salad and yogurt.

viii. Eat **fermented food** regularly. Fermented food contains many useful bacteria that help in the process of digestion. Some common fermented food items are *idli*, *vada*, *dosa* (South India), *dhokla* (Gujarat), and *panta bhaat* (East India).

Activity

Aim: To classify food items into junk food and healthy food.

Materials required: Pictures of different food items from magazines, newspapers, old books (you could also draw pictures, if you want) for example, milk, packet of chips, biscuits, fruits, green vegetables, and as many more as you can find; a chart paper; glue; and a marker pen

Fresh fruits and vegetables

Procedure:

1. Using the pen, divide the chart paper into two columns – A and B.
2. Write "I am healthy food" as the heading in Column A, and write "I am junk food" as the heading in Column B.

3. With the help of a teacher or an adult, paste the picture of each food item into the correct column. For all the healthy food items that you identify, mention the different nutrients they contain.
4. Similarly, identify the junk food items and note down the nutrients present in them.

Observation: The healthy food items contain a variety of nutrients. Junk food items contain large amounts of sugar and fat, and low amounts of other nutrients.

Conclusion: It is important to include as many healthy food items in your diet and avoid junk food.

Questions

Write T for true and F for False.

1. Fats are essential for growth and repair of the body and for muscle-building. .....
2. Roughage helps in the easy passage of food through our digestive system. .....
3. Eating junk food provides the required nourishment to the body. .....
4. Growing children need to have a protein-rich diet to help in the development of their bodies and minds. .....

DISEASES CAUSED BY INCORRECT FOOD HABITS AND UNHEALTHY LIFESTYLE

Bad food habits (such as eating a lot of junk food) and an unhealthy lifestyle (such as less or no physical activity) may lead to several diseases. These are called **lifestyle diseases**. Some common lifestyle diseases are obesity, high blood pressure (or hypertension), diabetes, anaemia, and various heart diseases.

Obesity

Obesity or excessive weight gain is increasingly becoming a common problem among children and adults. Weight gain occurs due to eating large amounts of junk food, and also because of lack of physical exercise. People start gaining weight if

they regularly eat junk food, or mostly stay indoors (in offices or homes) doing activities that do not involve much physical effort. Over a period of time, this leads to excessive weight gain or obesity.

Symptoms: The first sign of obesity is an unhealthy weight gain. The excess fat from junk food get stored in the body causing an increase in weight. Fat around the waist is considered very bad. It may lead to heart diseases. Tiredness and lack of energy are other signs of obesity and poor health. People suffering from obesity become slow in all activities and get tired easily.

High blood pressure

High blood pressure (or hypertension) is another common lifestyle disease. Although it was seen mostly in adults earlier, it has now also started affecting children. The main causes of high blood pressure are lack of physical exercise, stress and anxiety, and eating food rich in salt and fat. Hypertension is a dangerous disease as it may lead to several heart diseases.

Symptoms: Usually there are no clear symptoms of high blood pressure. In some people, it may cause heaviness in head and dizziness. It may also cause breathlessness or excessive sweating on slight physical activities.

Diabetes

Diabetes is a major lifestyle disease in India. Millions of people in India are affected by diabetes. Obesity, lack of exercise, and stress are thought to be the major causes of diabetes.

Symptoms: Patients suffering from diabetes suffer from excess thirst, excess hunger, and excess passing of urine. They also suffer from urinary, skin, and lung infections. In some people, diabetes may also lead to high blood pressure, tuberculosis, and heart diseases.

Anaemia

Although earlier anaemia was caused in people who did not get enough food to eat, it is now increasingly being seen in children and adults who appear healthy

otherwise. This is because they eat food that does not contain important nutrients, especially iron. Eating junk food rich in sugar, salt, and fat, and avoiding healthy food rich in iron (e.g., spinach and lentils) may also lead to anaemia.

Symptoms: Anaemia may cause tiredness, lack of energy, loss of appetite, pale skin, and breathlessness. Anaemia may also lower the body's ability to fight infections and disease-causing organisms.

PREVENTION OF LIFESTYLE DISEASES

Lifestyle diseases can be prevented by adopting a healthy lifestyle. The following are some ways in which we can prevent lifestyle diseases:

i. Eat a balanced diet that contains important nutrients. Include fresh fruits and green vegetables in the diet. Avoid eating junk food. Stay away from foods that contain large amounts of salt or sugar.

ii. Exercise regularly. Practice yoga under the guidance of an expert or in the presence of a teacher/adult. Also, spend time outdoors and do activities such as walking, running, swimming, and cycling. Playing games such as football, cricket, tennis, badminton, and so on.

iii. Avoid spending too much time indoors. Watch television or play games on computers, tablets, or smartphones for short intervals of time only.

iv. Set a healthy sleeping routine for every day. Get up early in the morning and go to bed early at night.

v. Lead an active life. Avoid using vehicles for short journeys. Instead, walk or cycle, if possible. Use stairs instead of lifts or escalators, wherever we can.

vi. Avoid sitting or lying down for long periods of time. Take breaks and move around at regular intervals.

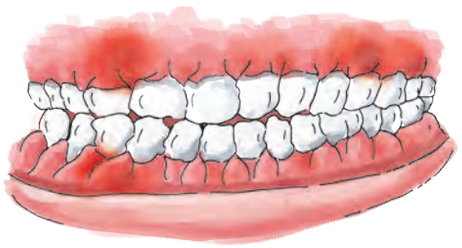
vii. Drink at least 8 glasses of water every day.

DEFICIENCY DISEASES

Regular lack or deficiency of a particular nutrient in the diet may cause certain diseases. Such diseases are called **deficiency diseases**. Some common deficiency diseases are given in the following table.

Deficiency disease	Symptoms	Cause	Prevention
Kwashiorkor	Swelling in the abdomen and other parts of the body due to accumulation[3] of fluids, flaky and dry skin, reduced growth, frequent infections	Deficiency of proteins	Eat diet rich in proteins, carbohydrates, and fats.
Marasmus	A lot of weight loss, loose and dry skin that hangs in folds, accumulation of fluids in several parts of the body, diarrhoea (excessive loose motions)	Deficiency of proteins and carbohydrates	Eat diet that includes milk, meat, eggs, and cereals.
Night blindness	Inability to see at night or in poor light	Lack of vitamin A in the diet	Eat diet that contains green leafy vegetables, papayas, carrots, mangoes, milk, butter, and egg yolk.
Anaemia	Feeling of weakness or fatigue	Lack of iron in the diet	Eat lots of green leafy vegetables such as spinach, fruits such as apples and guavas, jaggery, and meat.
Rickets	Softening of bones, bow legs, and knock knees	Lack of vitamin D in the diet	Eat diet that contains milk and milk products and saltwater fish. Spend a little time in the sun every day, especially early in the morning, as sunlight helps in the formation of vitamin D in the body.
Scurvy	Swollen gums that bleed easily	Lack of vitamin C in the diet	Regularly eat citrus fruits such as amla, oranges, lemons, and tomatoes.
Beriberi	Fatigue and weakness	Lack of vitamin B1 in the diet	Eat diet that includes milk, peas, cereals, and green vegetables.
Goitre	Swelling of the front portion of neck	Lack of iodine in the diet	Use iodized salt for cooking.

[3]accumulation: storage



Scurvy

Goitre

Rickets

Some common deficiency diseases

FOOD ADULTERATION

Food adulteration refers to the addition of unwanted and unsafe substances to food items. These substances are usually added by sellers to increase the quantity of the product as well as to make the product look fresh and attractive.

Sellers may add other food items which are of less value to increase the quantity and make more profit. They may also add colors to a food item to make it look more attractive to the buyers. These added substances may affect the health of the buyers when the adulterated food item is consumed.

The unwanted substances that are added to a food item to change its quantity and presentation are called **adulterants**.

Food adulteration is mainly done to cheat the buyers. It is a punishable act by law in India.

Common examples of food adulteration

i. A commonly seen food adulteration is the addition of water to milk by milk sellers. This is done to increase the volume of milk. The milk seller thus makes a profit by selling this adulterated milk.

ii. Other common adulterants are chalk powder, marble chips, stone chips, and harmful colours. These are often found in cereals and pulses.

iii. Common kitchen spices such as turmeric powder and chilli powder are often adulterated with lead pigments.

Questions

Name the diseases caused due to the lack of the following nutrients.

1. Vitamin C .....
2. Vitamin D .....
3. Iron .....
4. Vitamin A .....
5. Iodine .....

Wrap Up

- There are five main components of food: carbohydrates, fats, proteins, vitamins, and minerals. These components are also known as **nutrients**.
- A diet that contains all the components of food in the right proportions for the healthy functioning of our body is called a **balanced diet**.
- The different components that need to be a part of the balanced diet are carbohydrates, proteins, fats and sugars, milk and dairy products, and fruits and vegetables.
- It is very important to eat a balanced diet as it promotes growth and development of the body and mind, helps in maintaining an ideal body weight, and also prevents diseases.
- The term 'junk food' refers to any food that contains high amount of sugar and fat, and low amount of nutrients and fibres.
- Regular eating of junk food can have several adverse effects on our health and well-being.
- We should avoid junk food and eat a balanced diet. There are many ways of making the diet healthier.
- Bad food habits (such as eating a lot of junk food) and an unhealthy lifestyle (such as less or no physical activity) may lead to several diseases. These are called **lifestyle diseases**.
- Some common lifestyle diseases are obesity, high blood pressure (or hypertension), diabetes, anaemia, and various heart diseases.
- Lifestyle diseases can be prevented by adopting a healthy lifestyle.
- Some diseases are caused due to the lack or deficiency of a particular nutrient in the diet. These are called **deficiency diseases**.
- Food adulteration refers to the addition of unwanted and unsafe substances to food items. These substances are usually added by sellers to increase the quantity of the product as well as to make the product look fresh and attractive.

Exercises

SECTION I

A. Choose the correct option.

1. Which of the following provides energy to the body?
   a. Carbohydrates b. Fats
   c. Both (a) and (b) d. Neither (a) nor (b)
2. Which of the following helps in muscle-building?
   a. Carbohydrates b. Fats c. Proteins d. Vitamins
3. Which of the following helps in easy passage of food through our digestive system?
   a. Proteins b. Vitamins c. Roughage d. Carbohydrates
4. Scurvy is caused due to the lack of
   a. vitamin A b. vitamin B c. vitamin C d. vitamin D
5. Anaemia is caused due to the lack of
   a. calcium b. iron c. iodine d. none of these
6. Iodine deficiency leads to
   a. anaemia b. beriberi c. goitre d. all of these

B. Choose the correct option to fill in the blank.

1. Roughage is the ..... (undigested/digested) portion of the plant food.
2. Lack of vitamin C can cause ..... (rickets/scurvy).
3. Lack of vitamin D can cause ..... (rickets/anaemia).
4. Junk food contains high amount of ..... (sugar/roughage).
5. A commonly seen food adulteration is the addition of water to ..... (milk/ghee).

C. Give two examples of the following.

1. Protein-rich foods ....
2. Foods rich in roughage ....
3. Deficiency diseases ....

4. Lifestyle diseases ....
5. Food adulterants ....

D. Name the following.

1. Any food that contains high amount of sugar and fat, and low amounts of nutrients .....
2. Diseases due to bad food habits and unhealthy lifestyle .....
3. A disease caused by the deficiency of iron .....
4. A disease caused by the deficiency of iodine .....
5. Addition of unwanted and unsafe substances to food items .....

SECTION II

E. Short answer questions.

1. What is roughage?
2. Define balanced diet.
3. Write any two reasons why we should eat a balanced diet.
4. Write any two ways in which we can make our diet healthier.
5. We should not make junk food a part of our daily diet. Why?
6. What are lifestyle diseases? Name any two common lifestyle diseases.
7. Why is hypertension considered to be a dangerous disease?
8. What is anaemia? State any four symptoms of it.
9. Write any two ways in which lifestyle diseases can be prevented.
10. What is deficiency disease? Give three examples.
11. What do you understand by food adulteration?

F. Long answer questions.

1. Describe the functions and sources of different components of food.
2. What are the adverse effects of regularly eating junk food? Discuss the different ways in which we can make our diet healthier.
3. Describe the different ways in which you can prevent lifestyle diseases.
4. What are deficiency diseases? Discuss any three deficiency diseases explaining their symptoms, causes, and food sources that contain the required nutrient.

5. Why do sellers add unwanted or unsafe substances to food items? What is this practice called? Explain with the help of two examples.

MY LEARNING CORNER

A. Think about

1. Sameer was suffering from tiredness, lack of energy, and breathlessness. His mother took him to a doctor. The doctor advised him to eat lots of spinach, jaggery, and guava. Can you tell why?

   .....

   .....

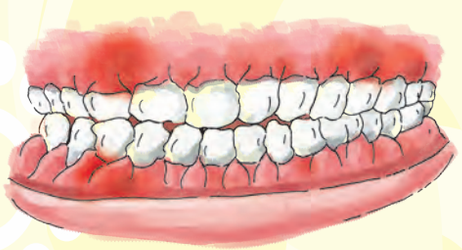
2. Rani's mother first picked out certain things from the rice and then washed the rice in water before cooking? Can you tell why?

   .....

   .....

B. Picture study

Write the names of the diseases shown in the pictures given below and answer the questions that follow.



A. ..... B. ..... C. .....

1. The disease shown in picture A can be prevented by including lemon and other foods rich in ..... (vitamin A/vitamin C) in our diet.
2. The disease shown in picture B is a ..... (lifestyle/deficiency) disease. We should have ..... (carbonated/iodized) salt to prevent this disease.
3. The disease shown in picture C is caused due to the lack of ..... (vitamin D /vitamin C). The bones become ..... (hard/soft) in this disease.

C. Try out

Study the nutritional information printed on packed food items such as juice cartons, chocolates, a packet of chips, etc. In your scrapbook, note down the amount of different components present in such foods. You may use the format given below.

Name of the food item	List of the components present in the food item	Nutritional value of each component (either in one serving or in g or mL)
 Fruit juice		
 Soft drink		
 A packet of chips		
 A bar of chocolate		

Compare the values for each component of food in the food items collected and prepare a report on it. Also, mention the food item that has the maximum and minimum amount of carbohydrates and fats.

Worksheet

Choose the appropriate words from the box to complete the conversation.

sleep	vegetables	muscles	calcium
meals	exercise	fruits	nutrients
roughage	water	balanced