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NEW Amazing Science

TEACHING GUIDE

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GRADE 7

Based on Single National Curriculum 2020

OXFORD
UNIVERSITY PRESS

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Introduction

New Amazing Science Teaching Guide is a vital resource for science teachers in class to help deliver knowledge, problem-solving and thus reach academic objectives.

Key Terms

Starter Activity:

These help in bringing focus to the lesson and set the tone for learning.

Lesson Methodology:

It suggests the method to cover the learning objectives for having a complete teaching and learning experience.

PMI Chart:

It is a type of graphic organizer in which student examines pluses, minuses and interesting factors of the lesson.

Plus – Advantages

Minus – Disadvantages

Interesting -Implications

It is filled using ticks or cross

PLUS MINUS INTERESTING

PLUS	MINUS	INTERESTING
X	-	x
-	X	x

Home Learning:

For revision and reinforcement of the topic learned for strengthening knowledge of students.

Worksheets present at the end of the lessons.

Remember to use Mind Tree and STEM at the end of every unit.

Contents

Unit 1 PLANT SYSTEM

SUBTOPICS

- Explain the root and shoot system in plants and label different parts of leaf, stem and root (external and internal structure).
- Predict the role of xylem and phloem in transport of water and food in plants by observing the cross section of the stem.
- Define the process of photosynthesis and derive word equations for it.
- Know that plants require minerals to maintain healthy growth and life processes (limited to magnesium to make chlorophyll, and nitrates to make protein).
- Explain that the structure of leaves is adapted to the process of photosynthesis.
- Describe the process of respiration and write word equation for it. Compare and contrast the processes of photosynthesis and respiration.
- Investigate the phenomena of transpiration and its importance in a plant (wind, temperature, light, humidity affecting rate of transpiration in plants).
- Explore natural raise of water based on the principle of transpiration.

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 1

Topic: Plant System

Subtopics:

- Plant systems
- Root systems
- Transport systems
- Shoot systems
- Stem
- Leaves

Date: _____ **Duration:** 2 x 40
Term: _____ **Week:** _____

Learning Objectives:

- To introduce the topic.
- To enable students to comprehend plant system comprising of root system, shoot system, stem and leaves.

Learning Outcomes:

- Explain the root and shoot system in plants and label different parts of leaf, stem and root (external and internal structure).

Resources:

- Textbook (NAS Book 7)
- A seasonal potted plant
- Transverse section of stem specimen and Microscope related slides
- Charts (Plant's external and internal structure, section of stem)

Starter Activity (10 min)

- Bring a potted plant to the class and ask students to name different parts of plants, choose randomly. They should come up and answer with words like shoot, stem, leaves, etc.

Lesson Methodology (30 min)

- After the starter activity, teacher will write keywords on the board and briefly define each including shoot (As shoot is not only the stem but the above ground part of the plant that includes the flowering buds, lateral buds and flowering stem).
- Students will be asked to open their books and read silently and

Teacher Ideas

especially look at the diagrams and their labels. The teacher will take rounds and facilitate accordingly. Furthermore, the teacher will read along the students in the next step. The teacher will explain the lesson and the charts will be used during explanation.

- The teacher will facilitate a classroom discussion to elaborate key points about plant system, focusing on shoot system, root system, transport system, stem and leaves and their structures (external/ internal) will be explained. The students will also be taken to the laboratory to see the microscopic slides and specimen.
- The teacher will give a quick analysis of the lesson and have students attempt Quick Review.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Have students attempt relevant unit review questions.

Home learning

- Ask students to draw a diagram of a young plant and label it.
- Read and revise topic for revision and comprehension.

Lesson Evaluation (5 min)

- Ask them to attempt worksheet 1.

Further Notes

Lesson Plan 2

Class: 7 **Subject:** General Science

Unit: 1

Topic: Plant System

Subtopics:

- Inside the leaf
- Photosynthesis
- How leaves are suited for photosynthesis.

Date: _____ **Duration:** 2x40

Term: _____ **Week:** _____

Learning Objective:

- To enable students to have clear concepts of the process of photosynthesis and adaptations of the leaves for the same.

Learning Outcomes:

- Define the process of photosynthesis and derive the word equation for it.
- Explain that the structure of leaves is adapted to the process of photosynthesis.

Resources:

- Textbook (NAS BOOK 7)
- Charts page 6
- Potted plant

Starter Activity (10 min)

- Bring a potted plant in the class and ask students to observe the object and think about various systems running in it.
- As they come up with words like living things and that living things need foods, conduct a brainstorming session amongst the students about it and record their ideas and information on board.

Lesson Methodology (30 min)

- The chart (Reference page 6) showing a green plant in sunlight will be put on the board.
- Students will be asked based on their prior knowledge about concepts related to photosynthesis and write its word equation on board.
- Students will be asked to open their books and read relevant

Teacher Ideas

assigned page numbers. In the next step, the teacher will read along followed by an explanation by the teacher.

- The teacher will facilitate a classroom discussion to elaborate the key points about photosynthesis and the involvement of its raw materials in the presence of sunlight. The word equation will also be discussed and the chart will be used more frequently during this discussion.
- In the end, the teacher will give a quick analysis of the lesson and have students attempt questions from the Quick Review present in the unit.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Have the students attempt the explore activity.

Explore Activity:

- An aquatic plant will be placed in a boiling tube filled with water and will then be covered using a cork placed in light. Ask students to observe over a course of half an hour the formation of bubbles on the walls of the boiling tubes. Explain that this is evident that a chemical reaction has taken place.
- Ask students to attempt relevant questions from Unit Review.

Home learning

- Assign reading and highlighting important points as homework.

Lesson Evaluation (5 min)

- Ask student some random questions about their personal experiences on the topic discussed.

Further Notes

Lesson Plan 3

Class: 7 **Subject:** General Science

Unit: 1

Topic: Plant System

Subtopics:

- Respiration in green plants
- Transpiration
- The importance of transpiration
- Effects of minerals on plant growth

Date: _____ **Duration:** 2 x 40

Term: _____ **Week:** _____

Learning Objectives:

- To enable students to understand the process of transpiration and how potometer is used to measure it.
- To give clear concept of transpiration stream.
- To learn about importance of minerals, absorption from soil in plant growth.

Learning Outcomes:

- Describe the process of respiration and write the word equation for it. Compare and contrast the process of photosynthesis and respiration.
- Investigate the phenomenon of transpiration and its importance in a plant (wind, temperature, light, humidity affecting rate of transpiration in plants).

Resources:

- Textbook (NAS BOOK 7)
- Charts (Transpiration Stream, Potometer)
- Potometer

Starter Activity (10 min)

In the previous class or prior, take two potted plants place one in the class window and the other in a cupboard. During the class brief them about what was done to plants and have plants displayed and ask the students to compare on how they look different? Write a few responses on the board.

Teacher Ideas

Lesson Methodology (30 min)

- After the starter activity, teacher will write some key words on the board, e.g., transpiration, transpiration stream, wind, temperature, humidity, time of the day.
- Students will be asked to open the textbooks to assigned page numbers and read silently. Furthermore, the teacher will read along next, followed by an explanation by the teacher.
- A potometer will also be shown during explanation, as to how transpiration can be measured. Teacher will also talk about the starter activity.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Have the students attempt the remaining questions of the Chapter Review.

Home learning

- Ask students to describe the factors affecting transpiration in form of a note in their notebooks.
- Read the topic again for revision and consolidation of knowledge.

Lesson Evaluation (5 min)

- Ask students following questions: What do they understand by the term transpiration and what is a potometer?

Further Notes

Worksheet # 1

Name: _____

Date: _____

Q1. Label the given diagram:

Q2. Draw two types of leaves showing leaf venation in the spaces provided below.

Worksheet # 2

Name: _____

Date: _____

Q1. Fill in the blanks.

i. _____ is a process by which a plant loses water vapour through its leaves.

ii. _____ are found on the _____ of the leaves through which the water escapes into the atmosphere.

Q2. Name the factors that affect transpiration.

_____

Q3. What is the function of the nitrates, magnesium and phosphates?

_____

_____

Answer key Worksheet # 1

Name: _____

Date: _____

Q1. Label the given diagram:

Shoot system

Root System

Q2. Draw two types of leaves showing leaf venation in the spaces provided below.

Answer key Worksheet # 2

Name: _____

Date: _____

Q1. Fill in the blanks.

i. ***Transpiration*** is a process by which a plant loses water vapor through its leaves.

ii. ***Stomata*** are found on the ***underside*** of the leaves through which the water escapes into the atmosphere.

Q2. Name the factors that affect transpiration.

Wind, Temperature, Humidity and Time of the day

Q3. What is the function of the nitrates, magnesium and phosphates in plants?

Nitrates are used to make proteins; magnesium is needed to make chlorophyll and phosphates are used to make DNA and they are also required for photosynthesis and respiration.

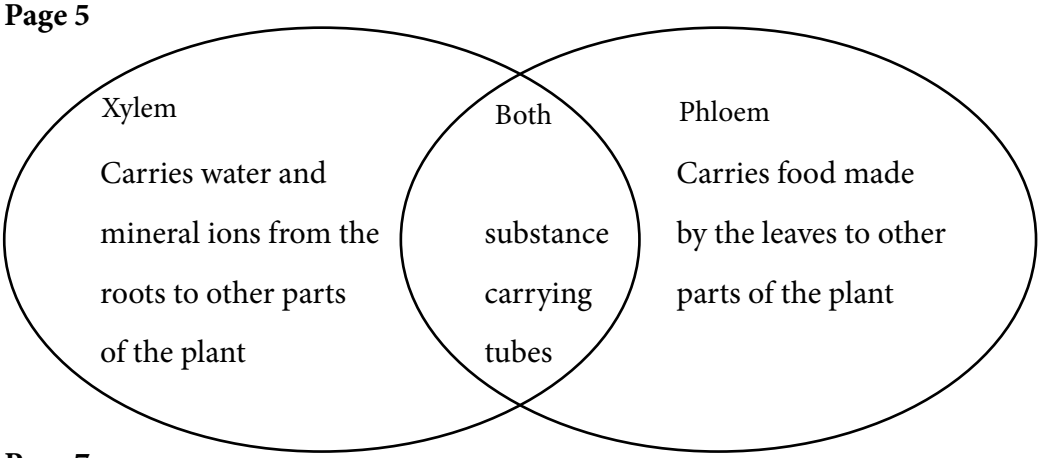
Answer key

NAS book 7

Unit 1

Quick Review

Page 5



Page 7

a. Xylem is a tube that carries water and mineral ions from the root to the other part of the plants whereas phloem is a tube that carries food made by the plant from the leaves to other parts of the plant.
b. Photosynthesis is the process by which green plants make their own food and oxygen is released whereas in respiration food is broken down in the presence of oxygen and carbon dioxide.

Unit Review

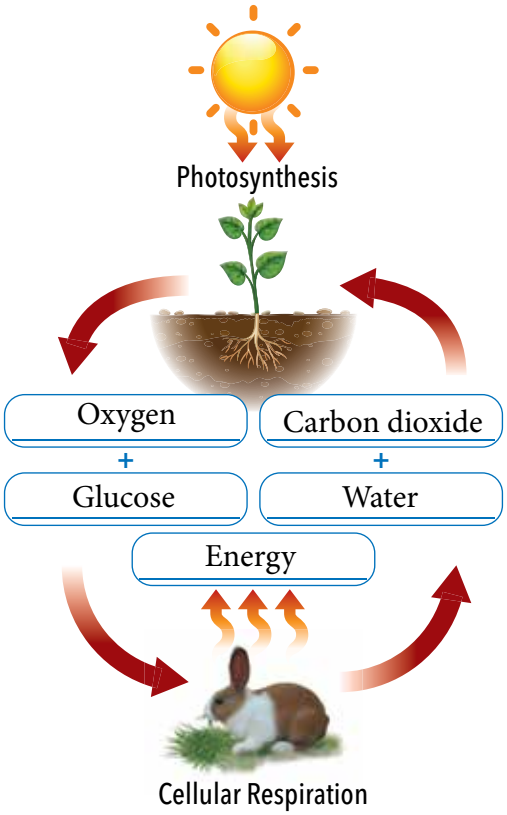
Choose the correct answer

1.	a. increase
2.	b. gaseous exchange
3.	d. soil
4.	d. both a and b
5.	c. both day and night

Vocabulary Review

1.	Xylem
2.	Transpiration
3.	Respiration

Observe and Answer



Recall and Analyse

a. The plant kept in bright sunlight will show growth and green leaves. It will be a healthy plant whereas the plant kept in dark (in a cupboard), it will be unhealthy the leaves will be wilted and yellow.
b. In the absence of sunlight and water, the process of photosynthesis will not take place in the plant kept in dark cupboard. Hence, it wilts. However, the other plant will remain healthy due to presence of sunlight and water.

Recall and Apply

1. The leaves are adapted to photosynthesis because they have many stomata on the underside which are tiny forces surrounded by pairs of guard cells. These guard cells control the decision of gases by regulating the opening and closing of the metal pores. Additionally, the plant ought to have a system of means that carry water to the photosynthesizing cells and carry the food away. Leaves have broad, flat surfaces to absorb plenty of light, and they are thin so that carbon dioxide can reach the inner cells easily.
2. Transpiration is a process that leads to loss of water from the plants leaves, which was absorbed from the roots. It is necessary to get rid of excess water.

Recall and Response

1. Stomata are tiny pores found on the underside of the leaf surrounded by kidney-shaped cells called guard cells that regulate opening and closing. Gaseous exchange takes place through the stomata.
2. Transpiration is influenced by wind, temperature, humidity and time of the day.

Unit 2 HUMAN RESPIRATORY SYSTEM

SUBTOPICS

- Differentiate between the processes of respiration and breathing.
- Differentiate between aerobic and anaerobic respiration.
- Trace the path of air in and out of the body and how the oxygen it contains is used during the process of respiration.
- Describe the role and function of major organs in the Human Respiratory System including trachea, lungs and alveoli (air sacs).

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 2

Topic: Human respiratory system

Subtopics:

- Respiration
- Breathing
- Alveoli
- Comparing respiration and breathing

Date: _____ **Duration:** 2x40

Term: _____ **Week:** _____

Learning Objectives:

- To identify the certain processes taking place in our bodies.
- To explain in detail respiration and breathing to enable students to understand what they are and as to how they are different.

Learning Outcomes:

- Differentiate between the processes of respiration and breathing
- Trace the path of air in and out of the body and how the oxygen it contains is used during the process of respiration
- Describe the role and function of major organs in the human respiratory system including trachea, lungs and alveoli (air sacs)

Resources:

- Textbook (NAS Book 7)
- Chart page 18 (comparing respiration and breathing)
- Model/ Pana flex/ Drawing: Internal structure of human body (Respiratory system)

Starter Activity (5 min)

- A toy car can be shown to the students and they would be asked how it works. Ideal responses such as batteries and self should be written on the board, then they will be asked how do automobiles work? Ideal responses such as petrol or diesel should be written on the board. Then they will be questioned why do they need it to work? Responses such as batteries are source of energy, and diesel burn to provide energy should be written on the board then the teacher will write the terms respiration and breathing on the board and relate how food in our body breaks down (burns) to release energy and relate

Teacher Ideas

breathing as an assisting process for respiration.

Lesson Methodology (20 min)

- After engaging the students, the key words (respiration, breathing, alveoli, energy) will be written on the board, and they will be defined.
- Students will be asked to open their books to assigned page numbers and read while the teacher takes rounds and assist the students.
- The teacher will then explain the lesson in more detail.
- The teacher will facilitate a classroom discussion to elaborate key points about the process of respiration and breathing; their differences will be highlighted and the model of human body showing respiratory system will be simultaneously used during discussion in the lesson.
- In the end, the teacher will give a quick analysis of the lesson and have the students attempt the relevant Quick Review.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (5 min)

- Students will attempt related questions from the Chapter Review.

Home learning

- Students will read the lesson for better comprehension.
- The teacher will also share relevant animated video link relevant for the Grade level showcasing the concepts learned.
- Suggested with video links

  https://youtu.be/mOKmjYwfDGU

  https://youtu.be/X2YVt16Kxak

Lesson Evaluation (5 min)

- Students will do the worksheet provided by the teacher (print from teaching guide)

Further Notes

Lesson Plan 2

Class: 7 **Subject:** General Science

Unit: 2

Topic: Human respiratory system

Subtopics:

- Aerobic respiration
- Anaerobic respiration
- Respiratory disease
- Cancer
- Emphysema
- Asthma
- Bronchitis
- Prevention and treatment of respiratory disease

Date: _____ **Duration:** **2 x 40**

Term: _____ **Week:** _____

Learning Objectives:

- To give the concept of respiration with and without oxygen in nature
- To give awareness of respiratory diseases and their prevention and treatment

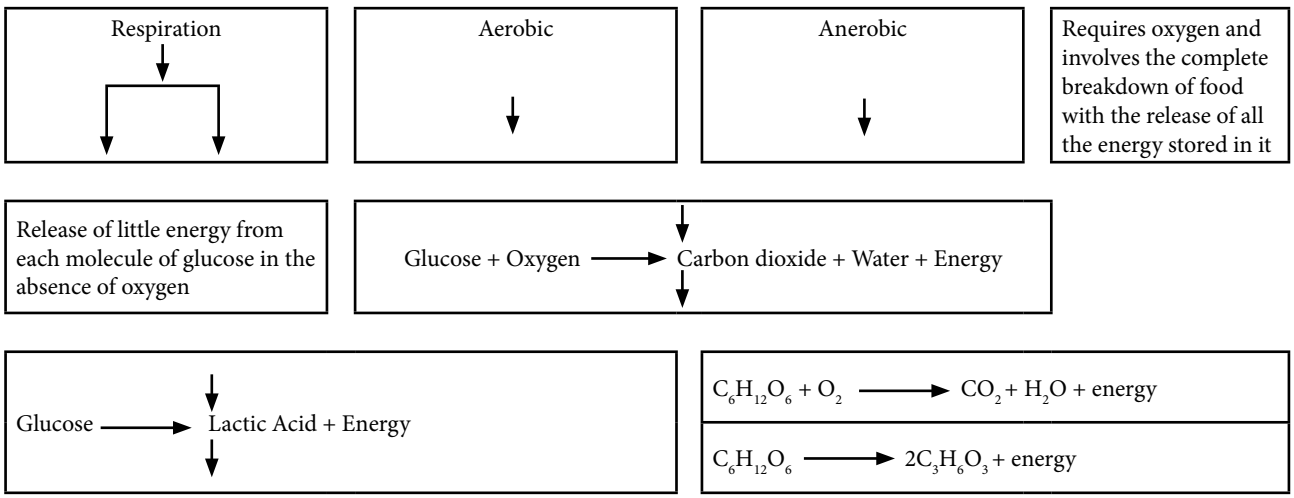
Learning Outcomes:

- Differentiate between aerobic and anaerobic respiration
- Gain knowledge of respiratory diseases and their prevention and treatment

Resources:

- Textbook (NAS Book 7)
- Flash cards (4 sets) 9 cards

Teacher Ideas



Starter Activity (5 min)

- Divide the class into 4 groups and give each group a set of flash cards. Ask them to arrange it in order and the first group to do so, should be clapped for.

Lesson Methodology (20 min)

- After the starter activity has been done and required have been arranged correctly, the students will be assigned to read. The teacher will ask students to do this randomly one by one.
- Then again silent reading will be done under the teacher's supervision.
- The teacher will then elaborate on the lesson and explain the vital concepts.
- In the second-class, discussion on respiratory diseases, their prevention, and treatment will take place.
- In the end, the teacher will make a quick analysis of the topic.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (5 min)

- Remaining part of the Chapter review.

Home learning

- Assign students to read the lesson for better comprehension.

Lesson Evaluation (5 min)

- Students will be randomly asked to speak about the concepts they have learned.

Further Notes

Worksheet # 1

Name: _____

Date: _____

Q1. Define the following:

- Respiration

_____

_____

- Breathing

_____

_____

Q2. What is the difference between breathing and respiration?

_____

_____

Q3. Draw and label the human respiratory system.

Worksheet # 2

Name: _____

Date: _____

Q1. Fill in the blanks.

_____happens in most of the living organisms. The _____ requires oxygen and involves the complete breakdown of food with the release of _____stored in it. The _____of glucose can be written as glucose + oxygen ⟶ carbon dioxide + water+ energy.

Q2. Name three aerobic exercises.

_____

_____

_____

Q3. Give the equation for anaerobic respiration both chemical and word.

_____

_____

Q4. Name any two respiratory diseases.

_____

_____

Q5. What can save us from getting a disease?

_____

_____

Answer key Worksheet # 1

Name: _____

Date: _____

Q1. Define the following:

- Respiration

It is the breakdown of food molecule (glucose) in the presence of oxygen to release energy.

- Breathing

It is the inhale and exhale of air to get oxygen and release carbon dioxide during respiration.

Q2. What is the difference between breathing and respiration?

Breathing is the process by which gaseous exchange takes place whereas, in respiration, food is broken down and energy is released. Oxygen needed for respiration comes from breathing in and the removal of carbon dioxide produced during respiration is done during exhalation.

Q3. Draw and label the human respiratory system.

Answer key Worksheet # 2

Name: _____

Date: _____

Q1. Fill in the blanks.

Aerobic respiration happens in most of the living organisms. The **cellular respiration** requires oxygen and involves the complete breakdown of food with the release of **energy** stored in it. The **breakdown** of glucose can be written as

glucose + oxygen ⟶ carbon dioxide + water+ energy.

Q2. Name three aerobic exercises.

i. **swimming**

ii. **jogging**

iii. **cycling.**

Q3. Give the equation for anaerobic respiration both chemical and word.

Glucose ⟶ Lactic acid + energy

$\mathbf{C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3 + energy}$

Q4. Name any two respiratory diseases.

i. **cancer**

ii. **bronchitis.**

Q5. What can save us from getting a disease?

We can save ourselves by washing our hands and wearing a mask.

Answer key

NAS book 7

Unit 2

Unit Review

Quick Review

Page 17

1. When you inhale

The ribs move **outward**. The diaphragm moves **downward**. There is now **more** space in the chest area. Air rushes in to fill the space.

2. Can you exhale

The ribs move **inward**. The diaphragm moves **upwards**. There is now **less** space in the chest area. Because of this pressure air moves **out of** the lung.

Page 31

Complete the table.

	aerobic	**anaerobic**
Oxygen	Yes	No
Glucose break down	Yes	Yes
Products	CO_2, H_2O	Lactic Acid
Energy released	Yes	Yes

Choose the correct answer

1.	c. Trachea
2.	d. Oxygen
3.	a. Carbon dioxide
4.	b. larynx
5.	c. Diaphragm

Vocabulary Review

1.	Bronchi
2.	Diaphragm
3.	Bronchitis

Observe and Answer

- The nose filters the air and moistens it.
- Trachea carries the air down from nose and mouth into the bronchi. Bronchus leads to the lungs and passes through them.
- In the lungs, gaseous exchange takes place.

Recall and Apply

1. Respiratory disorders are diseases related to the respiratory system which can include bronchitis, asthma and emphysema.

Emphysema is a lung condition in which the alveoli become thin and weak. Large empty spaces in the lungs because of which breathing becomes difficult and painful and it can be caused by heavy smoking.

Asthma is a disease in which the muscles of the bronchioles are irritated by air carrying dust, smoke. Bronchioles become narrower so less air is able to enter the lungs thus causing problem in breathing.

Bronchitis is the inflammation of the air passages in the lung is reduces the ability of the lungs to absorb oxygen and the disease is usually caused by bacteria but smoking can make the condition worse.

2. The best way to avoid getting respiratory diseases include: to maintain your physical health, eat a nourishing and well died, and to avoid overcrowded and poor ventilated places. Treatment of respiratory diseases include antibiotic medicines described by doctors.

Recall and Analyse

- The nose plays an important role in breathing because when we breathe in, the air enters through the nose and in the nose the air is filtered and moistened and when we breathe out the air containing more carbon dioxide and water vapor is exhaled out into the environment from our body.

Recall and Response

1. Anaerobic respiration is the breakdown of Food molecule to form lactic acid and release little energy in the absence of oxygen.
2.

	Word	Meaning
1.	exhalation	A. Breathing in
2.	inhalation	B. The air that is breathed out of the lungs
3.	carbon dioxide	C. Breathing out

3.

		Inhaling	Exhaling
1.	air moves out of the lungs		✓
2.	air moves into the lungs	✓	

3	ribs move out	✓	
4	ribs move in		✓
5	chest space becomes smaller		✓
6	chest space becomes larger	✓	
7	diaphragm moves down	✓	
8	diaphragm moves up		✓

Unit 3 | CIRCULATORY SYSTEM

SUBTOPICS

- Sketch and label the Human Circulatory System.
- Hypothesize how exercises of varying intensity (from rest to high-intensity interval training) would impact their pulse rate. Test their hypothesis, calculate their pulse rate and record their findings.
- Explain that living organisms have a complex transport system for transfer of various solids, liquids, and gases across the body.
- Describe the structure and function of the human heart.
- Explain how blood circulates in the human body through a network of vessels (arteries, veins and capillaries), and transports gases, nutrients, wastes and heat.
- Compare and contrast arteries, veins and capillaries.
- Describe the composition of blood and the functions of red blood cells, white blood cells, platelets and plasma.

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 3

Topic: Circulatory System

Subtopics:

- Blood circulatory system
- Transport system in human body

Date: _____ **Duration:** 2 x 40
Term: _____ **Week:** _____

Learning Objectives:

- To give clear concept of transport system in human body
- To explain with diagrams the heart and various types of blood vessels

Learning Outcomes:

- Sketch and label human circulatory system
- Explain that living organisms have a complex transport system for transfer of various solids, liquids, and gases across the body

Starter Activity (5 min)

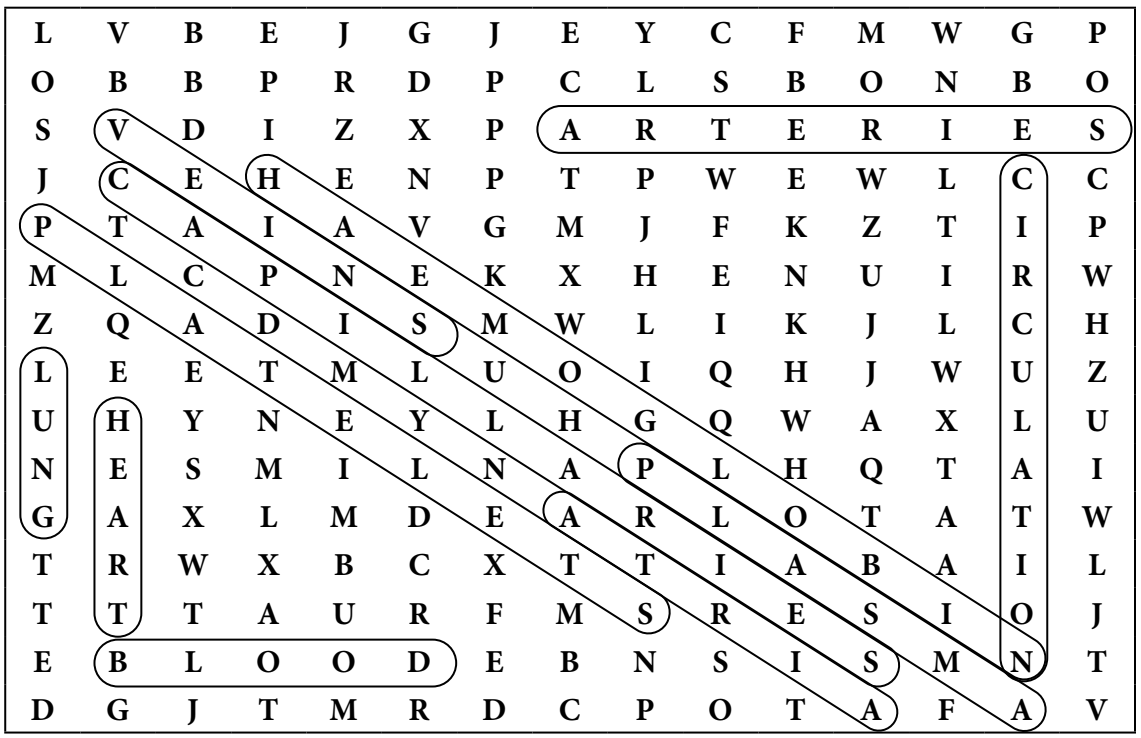
- Write Circulatory system on the board.
- Teacher will provide the word search worksheet (given below) and ask students to do the word search for the terms.

Word Search

L	V	B	E	J	G	J	E	Y	C	F	M	W	G	P
O	B	B	P	R	D	P	C	L	S	B	O	N	B	O
S	V	D	I	Z	X	P	A	R	T	E	R	I	E	S
J	C	E	H	E	N	P	T	P	W	E	W	L	C	C
P	T	A	I	A	V	G	M	J	F	K	Z	T	I	P
M	A	C	P	N	E	K	X	H	E	N	U	I	R	W
Z	Q	L	D	I	S	M	W	L	I	K	J	L	C	H
L	E	E	A	M	L	U	O	I	Q	H	J	W	U	Z
U	H	Y	N	T	Y	L	H	G	Q	W	A	X	L	U
N	E	S	M	I	E	N	A	P	L	H	Q	T	A	I
G	A	X	L	M	D	L	A	R	L	O	T	A	T	W
T	R	W	X	B	C	X	E	T	I	A	B	A	I	L
T	T	T	A	U	R	F	M	T	R	E	S	I	O	J
E	B	L	O	O	D	E	B	N	S	I	S	M	N	T
D	G	J	T	M	R	D	C	P	O	T	A	F	A	V

Teacher Ideas

capillaries circulation platelets atria arteries haemoglobin
plasma lung blood heart veins



Lesson Methodology (30 min)

- As the lesson starts, teacher will write key words on the board.
- Students will be asked to read silently from assigned page numbers. Teacher will facilitate. Loud reading will be done by the teacher.
- Explanation will be done by the teacher. The diagrams in the text will be frequently referred.
- A classroom discussion will follow, and students' queries will be answered.
- At the end quick analysis will be done.
- Students will be asked to do Quick Review given on page # 30.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (5 min)

Students will be asked to attempt relevant questions from Unit Review.

Home learning

- Ask students to read the topic at home for revision.
- Ask students to draw a diagram of human heart and label it.

Lesson Evaluation

Ask students randomly to define the following:

Blood, Human heart, Plasma, White Blood Cells

Lesson Plan 2

Class: 7 **Subject:** General Science

Unit: 3

Topic: Circulatory System

Subtopics:

- Blood Circulation
- Double Circulation
- The Heart and Exercise

Date: _____ **Duration:** 2 x 40

Term: _____ **Week:** _____

Learning Objectives:

- To explain in detail the topics under discussion
- To highlight importance of healthy habits

Learning Outcomes:

- Sketch and label the human circulatory system
- Hypothesize how exercises of varying intensity (from rest to high intensity interval training) would impact the pulse rate. Test their hypothesis, calculate their pulse rate and record their findings.

Resources:

- Textbook (NAS Book 7)
- Charts :1. Double circulation in mammals
  2.Step by step method for checking pulse rate

Starter Activity (10 min)

How to check pulse rate: Write the title on the board and read step by step method for taking pulse rate.

Method:

1. Turn one arm so that you are arm is facing up.
2. Place the three middle fingers of the other arm in the upper groove of the up turned wrist below where your thumb connects to your wrist.
3. Press firmly. You should feel a sudden pulsing, beating or throbbing sensation. If you cannot feel anything apply more pressure with the tips of your fingers.
4. Count each pulse you feel for 30 seconds (A clock or stopwatch is helpful).

Teacher Ideas

5. Double the number of pulses you counted. This equals your heart rate in beats per minute (bpm). If you counted 40 pulses, multiply that by 2. Your heart rate is 80 bpm.

   Place the chart on the board or hand out could be distributed of the same.

   Now ask students to take their pulse rate and note.

Lesson Methodology (30 min)

- As students engage in the lesson, ask them to open their books to assigned page numbers and read silently. Loud reading will be done by the teacher next.
- Explanation of the topic will be done.

Plenary (5 min)

Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Remaining questions of unit Review will be done.

Home learning

- Students will read the topic at home for better comprehension.
- They will be asked to share the information on pulse rate with a family member or friend. Ideally they may also take their pulse rate.

Lesson Evaluation (5 min)

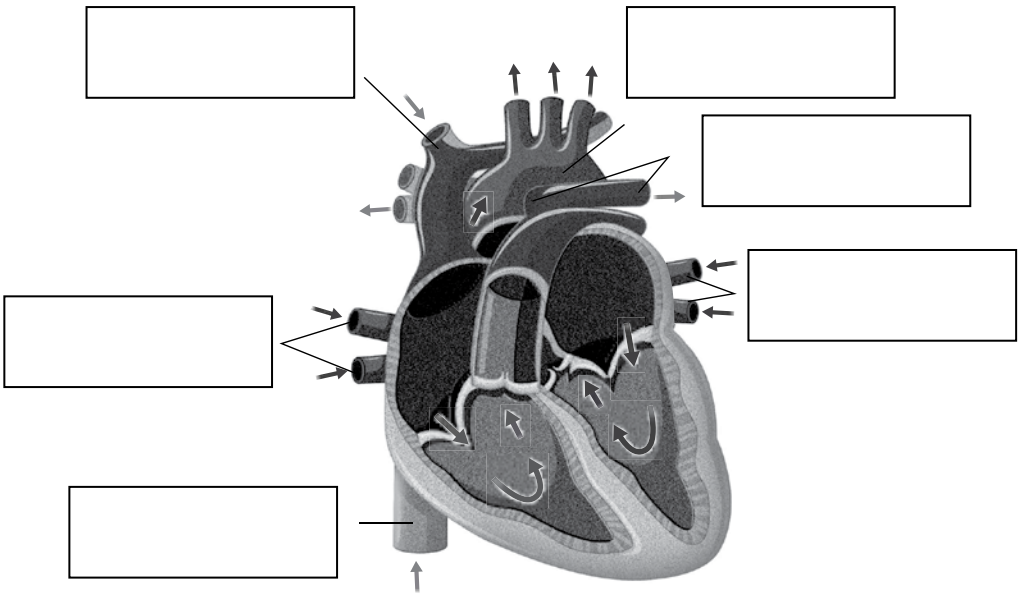
Students will be asked to write down how pulse rate is taken.

Worksheet # 1

*Name:*_____

*Date:*_____

Q1. Label the human heart.



Q2. Choose the correct answer by crossing the incorrect one

a. The formal name of transport system in human body is **circulatory system/ nervous system.**

b. Blood vessels are special network of **neurons/capillaries, arteries and vessels.**

c. Deoxygenated blood is **blue/ deep** red in colour

Worksheet # 2

Name: _____

Date: _____

Q1. Draw and label the double circulation system.

Q2. Answer the following questions.

- Name the type of circulation that takes place in fish.

  _____

- Name the transport system in humans.

  _____

- What kind of walking is good for your heart and why?

  _____

- What does bpm stand for?

  _____

- What factor determines our heart rate?

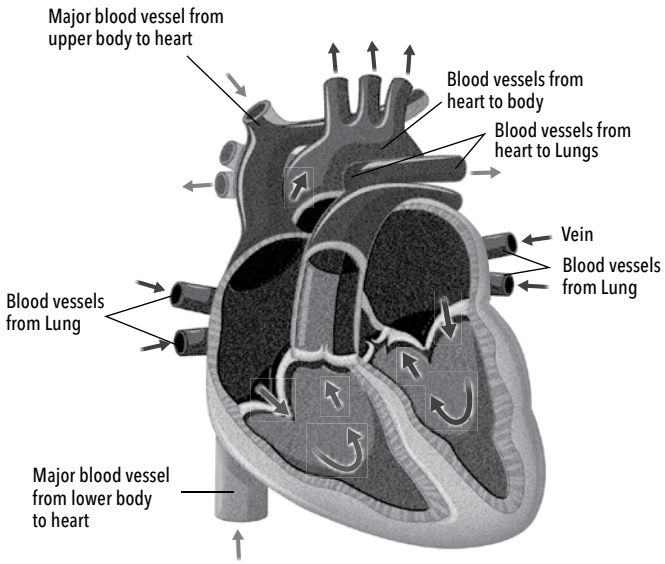
  _____

Answer key Worksheet # 1

Name: _____

Date: _____

Q1. Label the human heart.



Q2. Choose the correct answer by crossing the incorrect one

a. The formal name of transport system in human body is **circulatory system~~/ nervous system~~.**

b. Blood vessels are special network of **~~neurons~~/capillaries, arteries and vessels.**

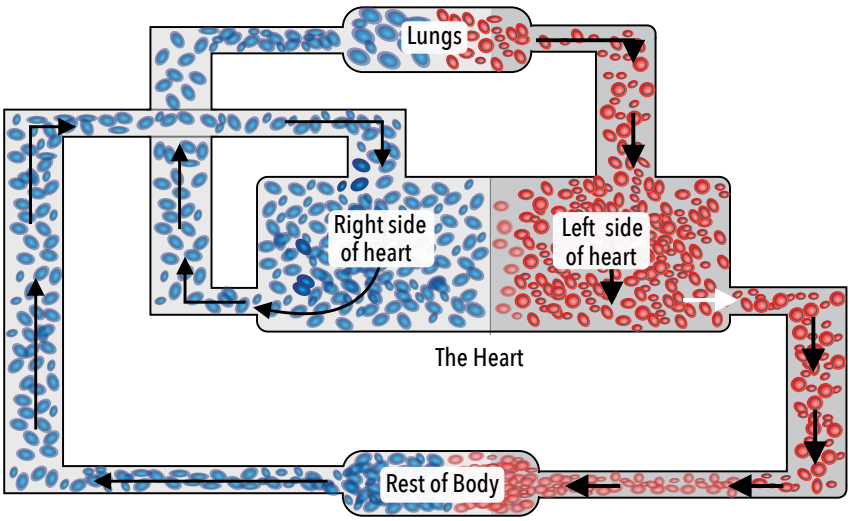
c. Deoxygenated blood is **blue/ ~~deep red~~** in colour.

Answer key Worksheet # 2

Name: _____

Date: _____

Q1. Draw and label the double circulation system of mammals.



Q2. Answer the following questions.

- Name the type of circulation that takes place in fish.

Single circulation

- Name the transport system in humans.

Circulatory System

- What kind of walking is good for your heart and why?

Speed walking, helps strength the heart. Therefore, it is good for us.

- What does bpm stand for?

Beat per minute

- What factor determines our heart rate?

  Age

Answer key

NAS book 7

Unit 3

Quick Review

Page 30

1.	Plasma, red blood cells, white blood cells, platelets
2.	Plasma
3.	Red blood cells transport oxygen in the form of oxyhaemoglobin to all living cells.
4.	White blood cells protect the body against diseases and fights off infections.

Unit Review

Choose the correct answer

1.	a. Blood vessel A carries blood to heart.
2.	c. heart → lungs → other body parts → heart
3.	c.they carry blood to all parts of the body
4.	a. they may bleed to death
5.	b. platelets

Vocabulary Review

1.	Veins
2.	Arteries
3.	Capillaries

Observe and Answer

Answers

1. The right side of your heart receives oxygen-poor blood from your veins and pumps it to the lungs, where it picks up oxygen and gets rid of carbon dioxide. The left side of your heart receives oxygen -rich blood from the lungs and pumps it through your arteries to the rest of your heart.

2. Y represents the pulmonary artery which carries deoxygenated blood away from the heart towards the lungs. Whereas, X that represents the pulmonary vein carries oxygenated blood back to the heart from the lungs.

Recall and Apply

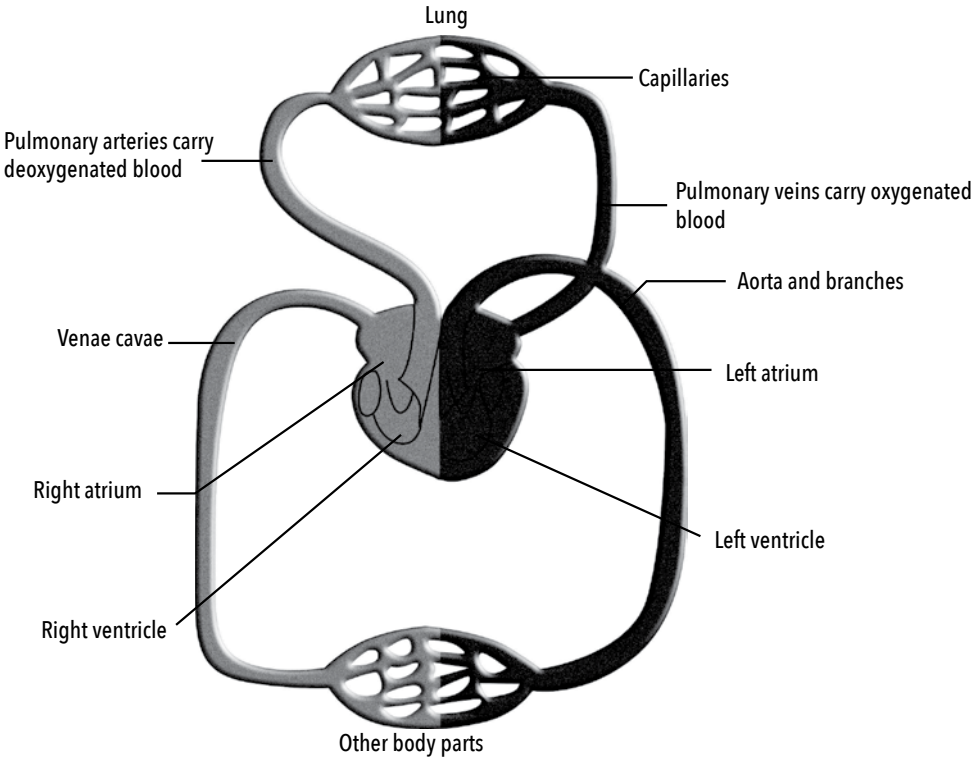
Answers

1. Single circulation means that in one complete cycle the blood passes the heart once and in double circulation in one complete cycle the blood passes the heart twice.

2. It is important for the blood to complete both loops of circulation because in one loop the deoxygenated blood is carried to the lungs and oxygenated blood is brought back to the heart (pulmonary circulation) and then, the oxygenated blood is carried to all other body parts and deoxygenated blood is brought back to the heart in the other loop (systemic circulation).

Recall and Analyse

1. The double circulatory system

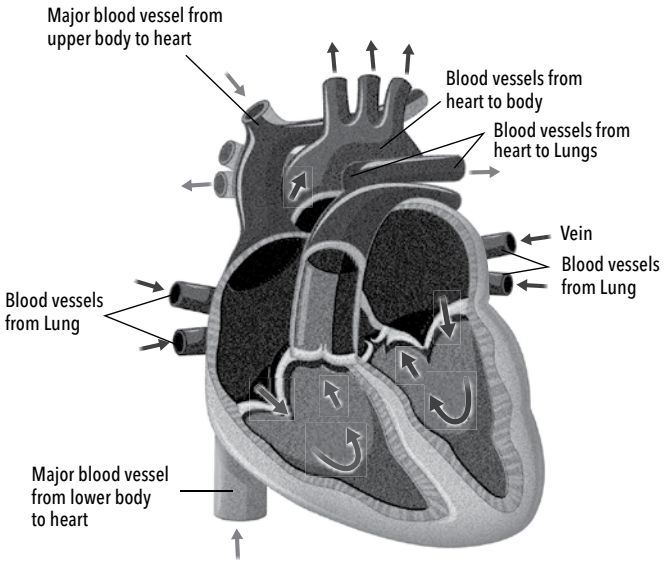


2. The key role of the double circulatory system: It delivers oxygen and nutrients to cells and take away waste material. It is made up of a pump called heart, blood vessels such as arteries, veins and capillaries. Arteries carry oxygenated blood (except for pulmonary artery) away from heart at high pressure and fast speed because of which they have a small diameter with thick muscles having thick walls and are elastic. Veins carry deoxygenated blood (except for pulmonary vein) towards the heart at low pressure. They contain valves to prevent back flow of blood and have large diameter with thin walls with thin muscles and are not very elastic. Whereas, capillaries connect arteries to veins. It allows exchange of gases between blood and body so, blood passes through the thin walls slowly at low pressure. They do not contain valves.

Recall and Response

1.Body → right atrium→ right ventricle→ lung→ left atrium→ left ventricle→ body

2.



3.

- Right atrium
- Right ventricle

3.

1.	Red Blood Cells
2.	White blood cells
3.	White blood cells
4.	Red Blood Cells

Unit 4 IMMUNITY AND DISEASES

SUBTOPICS

- Identify the various types of pathogens that cause infectious diseases.
- Explain the various lines of defences that the body has against pathogens.
- Describe the parts of the immunity system and how they function to produce an immune response.
- Describe the three types of immunity in humans – innate, adaptive, and passive.
- Illustrate how adaptive immunity develops over time.
- Visualize the ways to add additional layers of defence (such as wearing masks, using sanitizers, etc.)
- Propose some common strategies for strengthening their immune system.
- Explain how infectious diseases such as Hepatitis, COVID-19, Typhoid, and Dengue are caused/contracted, how they are tested and diagnosed, and how they can be prevented.
- Suggest ways in which communities of people can safeguard against the spread of infectious diseases.
- Describe the role of vaccines in immunity and explore some strategies on how vaccines can be created.

Lesson Plan 1

Class: *7* **Subject:** General Science

Unit: 4

Topic: Immunity and Diseases

Subtopics:

- Good Health
- Infectious and non-infectious Diseases
- Differences between infectious and non-infectious diseases
- Different ways by which pathogens are spread
- Spread and prevention of diseases
  - Hepatitis C
  - Covid 19
  - Athlete's foot
  - Typhoid
  - Dengue

Date: _____ **Duration:** **2 x 40**

Term: _____ **Week:** _____

Learning Objectives:

- To enable students to understand the main concept of the lesson
- To give awareness of common but fatal diseases in detail.

Learning Outcomes:

- Identify the various types of pathogens that cause infectious diseases
- Explain how infectious diseases such as Hepatitis C, Covid 19, Typhoid, and Dengue are caused/contracted, how they are tested, and diagnosed and how they can be prevented.

Resources:

- Textbook (NAS Book 7)
- Charts
- Videos

Starter Activity (10 min)

Students will be introduced to vocabulary and their prior knowledge will be assessed. At start, words and their definition will be written on the board.

Teacher and students will talk about the terms and meanings. One by

Teacher Ideas

one the definitions will be uncovered. Following is the list:

- **Disease** is a disorder or incorrectly functioning organ, part, structure, or system of the body. Disease can result from genetic or developmental errors, infections, poisons, nutritional deficiency or imbalance or toxicity, or unfavourable environmental factors; an abnormal condition.
- **Germ** is a microorganism that causes diseases
- **Infect** means affect, contaminate, or taint
- Infection means tending to spread from one to another
- **Organism** is a living being, a form of life, considered an entity
- **Symptoms** is a sign or indication of something
- **Transmit** is to send, spread and pass on
- **Transmission** is the act or process of spreading

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Loud reading will be done by the teacher.
- Explanation will follow. The diagrams and images given in the text will be used effectively.
- At the end quick analysis will be done.
- Students will be asked to do Quick Review given on page # 40.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (25 min)

Divide the class into five groups. Assign each group one particular disease to work on. They will have to prepare a presentation of about 4–5 minutes. Announce a date and have it on the day.

Record your observations and share at the end.

Home learning

Ask students to read the topic for better understanding.

Lesson Evaluation

- Ask students to attempt worksheet #1.

Lesson Plan 2

Class: 7 **Subject: General Science**

Unit: 4

Topic: Immunity and Diseases

Subtopics:

- Immunity: Types of Immunity
  1. Innate Immunity
- External Defense: the first unit of Defence;
  - Keeping the pathogens out
  - Bleeding and clot formation
  - Internal defense
- The second line of Defence
  - Destroying invaders

  2. Adaptive Immunity: White blood cells and defense.

  Innate Immunity- First and second line of defense
- Immune response
- Preventing Infection
- Hygiene—Food preparation
- Proper waste disposal

Date: _____ **Duration:** **2 x 40**
Term: _____ **Week:** _____

Learning Objectives:

- To give clear concept of the topic
- To give awareness to students as to how they can lead a good healthy life

Learning Outcomes:

- Explain the various lines of defense that the body has against the pathogens.
- Describe the parts of the immunity system and how they function to produce an immune response.
- Describe the three types of immunity in humans, innate, adaptive and passive.
- Illustrate how adaptive immunity develops overtime.
- Visualize the ways to add additional layers of defense (such as wearing masks, using sanitizers, etc.)
- Prepare some common strategies for strength using their immune system.

Teacher Ideas

- Suggest ways in which communities of people can safeguard against the spread of infectious diseases.
- Describe the role of vaccines in immunity and explore some strategies on how vaccines can be created.

Resources:

- Textbook (NAS Book 7)
- Charts
- Videos on immunity (resources from Internet) for example: https://youtu.be/azE3rv5l28Y

Starter Activity (5 min)

Teacher will ask some questions related to covid-19 as studied earlier. Questions such as what happened a few years ago that changed the whole world dynamics such as the closure of schools and everyone was asked to stay at home.

This will engage students, then introduce the topic and write key words on the board.

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers. Silent reading will be done. Teacher will facilitate. Next, teacher will read loudly.
- Explanation of the topic will be done. The relevant charts as well as images and diagrams in the text will be referred to.
- A quick analysis will follow.
- A video on "Active and passive immunity" will be shown and students will also take notes.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

Students will answer the relevant questions of unit review.

Home learning

Ask students to attempt Quick Review on page# 45 and then Unit Review.

Lesson Evaluation

Ask students to attempt Worksheet # 2.

Worksheet # *1*

Name:_____

Date:_____

Q1. Write the definition of the following terms:

a. Disease:

_____

b. Germ:

_____

c. Infectious:

_____

d. Transmission:

_____

Q2. State whether the following statements are True or False:

1. We must share our personal items with friends.
2. It is fine if a person infected with COVID 19 goes out to a market place.
3. We must dispose of used needles.
4. A typhoid victim's faeces are full of bacteria.
5. Dengue is spread by human contact.

Worksheet # 2

Name: _____

Date: _____

Q1. Answer the following questions :

- Define immunity.

_____

- Name types of Immunity:

a. _____

b. _____

- What is the first line of defense?

_____

_____

- What is the second line of defense?

_____

- Define what are white blood cells?

_____

- Name the types of WBCs.

a. _____

b. _____

- What is the third line of defense?

_____

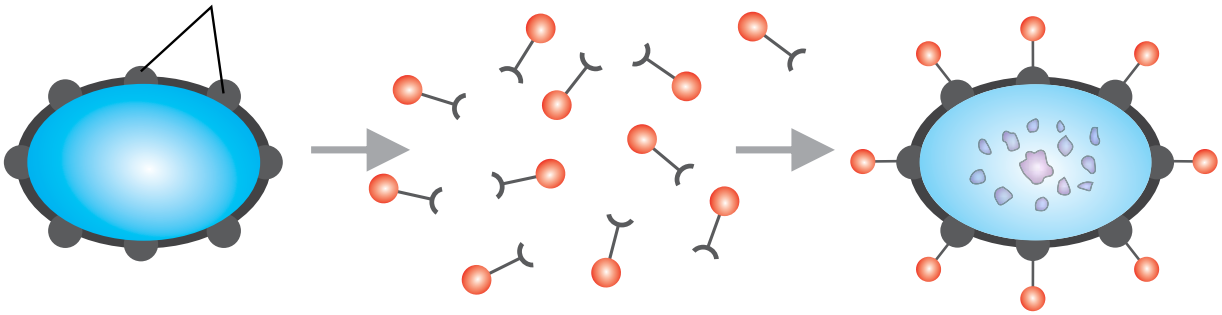
- Name the types of adaptive immunity.

a. _____

b. _____

c. _____

2. Label the following diagram.



Answer key Worksheet # 1

Name:_____

Date:_____

Q1. Write the definition of the following terms:

a. Disease:

It is a disorder or incorrectly functioning organ, part, structures or function.

b. Germ:

A microorganism that causes disease.

c. Infectious:

Tending to spread from one to another.

d. Transmission:

The act or process of spreading.

Q2. State whether the following statements are True or False:

1. We must share our personal items with friends. **(False)**
2. It is fine if a person infected with COVID 19 goes out to a market place. **(False)**
3. We must dispose of used needles. **(True)**
4. A typhoid victim's faeces are full of bacteria. **(True)**
5. Dengue is spread by human contact. **(False)**

Answer key Worksheet # 2

Name: _____

Date: _____

Q1. Answer the following questions :

- Define immunity.

Immunity is the ability of an organism to resist infection from invading disease causing microorganisms or pathogens.

- Name types of Immunity:

a. Innate Immunity or natural immunity

b. Acquired immunity or adaptive immunity

- What is the first line of defense?

It comprises of skin, respiratory and circulatory tract.

- What is the second line of defense?

The second line of defense is white blood cells.

- Define what are white blood cells?

The white blood cells are irregular cells with nuclei and can change shape. They are found in blood and they protect the body against diseases and infection.

- Name the types of WBCs.

a. Lymphocytes

b. Phagocytes

- What is the third line of defense?

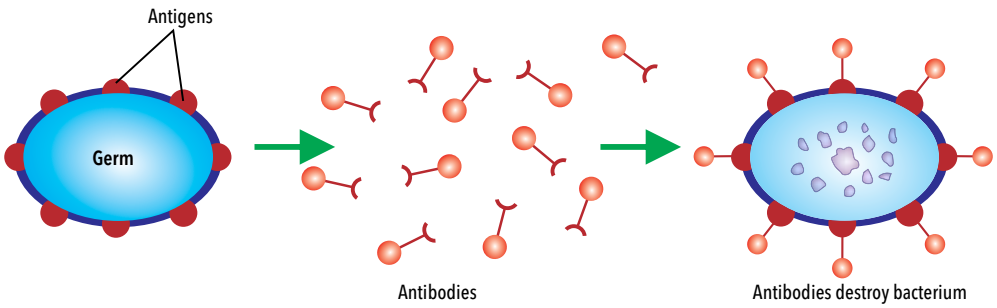
The adaptive immunity is the third line of defense.

- Name the types of adaptive immunity.

a. Active Immunity

b. Passive Immunity

2. Label the following diagram.



Answer key

NAS book 7

Unit 4

Answer key

Quick Review

Page 40

1.

Examples of infectious diseases:

- *Hepatitis C*
- *COVID 19*
- *Athlete's foot*
- *Typhoid*
- *Dengue*

2.

- *Coronary Disease*
- *Asthma*

Page 45

1.The major features of body's first line of defense are skin, respiratory and circulatory tracts.

2. An antibody is a protein produced by the body in response to germs. Each type of germ is killed by a specific antibody.

3. There are two major types of immunity: a. Innate immunity or Natural immunity

b. Acquired immunity or Adaptive immunity

Unit Review

Choose the correct answer

1.	b. Lives in an organism and causes disease
2.	a. Cholera (transmissible disease)
3.	d. Phagocytes
4.	d. Vaccination
5.	c. Any substance that triggers an immune system

Vocabulary Review

1.	Pathogens
2.	Immune response
3.	Diabetes

Observe and Answer

- Mouth:
  Saliva inhibits growth of bacteria in mouth

- Stomach
  The stomach lining produces acids which kills germs that enter the body

- Trachea
  Mucous membrane traps germs and dirt in the air we breathe

Recall and Response

1.

If food is left uncovered, the chances are that it will get contaminated by foreign agents like flies.

Unsafe habits during food processing can result in contamination. For example, meat handled by an infected person not wearing mask.

2.

Infectious diseases can be transmitted by:

a. Usage of syringes used earlier on infected persons and not disposed of.

b. Not maintaining hygiene standards in kitchen, toilet.

c. If an infected person touches different objects, if not sanitized properly, the infection can be passed on. For example; door knobs.

d. Through person to person contact, infectious diseases are transmitted.

3.

a. Antigen: An antigen is any substance that triggers immune response.

b. Antibody: An antibody is a protein produced by the body in response to germs. Each type of germ requires a specific type of antibody.

c. Active Immunity: It is a type of adaptive immunity. It results from the production of antibodies by the immune system in response due to the presence of memory cells. Some of the white blood cells that made antibodies remain in the blood. If a person gets infected with the same germ second time the memory cells quickly reproduce and make the antibodies very quickly. So, the immune system responds very fast. The second time the pathogen is very quickly destroyed before it makes us ill.

Recall and Apply

1. Stomach produces stomach acid (HCl)in its lining and kills germs when they enter our body.
2. Antibodies immobilize microorganisms by clumping them together. This reduces symptoms and prevents the spread of infection. The clump of microorganisms, then are destroyed by phagocytosis.i.e., when white blood cells engulf and digest microorganisms.
3.

   i. Personal Hygiene: There are personal habits for hygiene that one should practice daily for prevention.

      It is the process of promoting good health by washing and caring for your body. Maintaining a strong personal hygiene is especially important for disease prevention.

   ii. Sewage Treatment: Sewage treatment is important as natural detoxification process is overloaded. It helps to remove the waste and keep our system healthy.

   iii. Proper Waste Disposal: It is important for several reasons, as it helps prevent contamination of the environment and its sources. Secondly it reduces risk to overall health, decreases exposure to biological hazards. Thirdly it helps to preserve resources, reduce pollution and prevent health hazards.

Recall and Analyse

1. The first response to antigens is phagocytosis. White blood cells find the bacteria and kill it. However, some of the white blood cells remain in the blood called as memory cells.

   The second response happens very quickly in comparison to first response as memory cells reproduce very quickly and produce antibodies when the same germs enter the body again.
2. When first response is produced by our body, same white blood cells remain in our blood known as memory cells. When germs enter the body again memory cells rapidly reproduce and antibodies kill pathogens very quickly. So, the germs are killed before we get sick. Therefore, we have lifelong protection against diseases.

Unit 5 | STRUCTURE OF AN ATOM

SUBTOPICS

- Describe and draw the structure of an atom in terms of electrons, protons and neutrons.
- Describe how an atom is electrically neutral.
- Differentiate between atomic number and mass number.
- Determine the atomic number and mass number of elements on the basis of the number of protons, electrons and neutrons.
- Show the arrangement of electrons in K, L and M shells of elements.
- Draw the atomic structure of the first eighteen elements of the Periodic Table.
- Explain that the Periodic Table is a way to Organise elements in a systematic order.
- Recognise periods and groups in the Periodic Table.

Lesson Plan 1

Class: *7* **Subject:** *General Science*

Unit: *5*

Topic: Structure of an Atom

Subtopics:

- What are atoms?
  -Protons, Neutron, Electron
- Atomic Number and Mass Number
- How the electrons are arranged?

Date: _____ **Duration:** **2 x 40**
Term: _____ **Week:** _____

Learning Objectives:

- To explain the topic in detail.
- To elaborate further how particles of atom are placed and importance of electrons.

Learning Outcomes:

- Describe and draw the structure of an atom in terms of electrons, protons and neutrons.
- Describe how an atom is electrically neutral.
- Differentiate between atomic number and mass number.
- Determine the atomic number and mass number of elements on the basis of the number of protons, neutrons and electrons.
- Show the arrangement of K, L, and M shells of elements.

Resources:

- Textbook (NAS Book 7)
- Charts
- Models of atoms

Starter Activity (5 min)

Ask students to rearrange anagrams written on the board.

Omta (atom)

Tronsneu (neutrons)

Tonpsro (protons)

Rontclees (electrons)

Clesparit (particles)

Note the responses on the board.

Teacher Ideas

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Loud reading will be done by the teacher.
- Explanation will be done. The resources will be used effectively to give a clear image of the atom.
- At the end quick analysis of the topic will be done.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

Ask students to attempt relevant questions of Unit Review.

Home learning

- Ask students to study the topic for revision.
- Ask the students to draw and label a diagram to show an atom in their notebooks.

Lesson Evaluation (5min)

Ask students to attempt worksheet #1.

Further Notes

Lesson Plan 2

Class: *7* **Subject:** *General Science*

Unit: *5*

Topic: Structure of an Atom

Subtopics:

- Sorting out the elements – the Periodic table
- The electron shells for the first twenty elements

Date: _____ **Duration:** **2 x 40**
Term: _____ **Week:** _____

Learning Objectives:

- To explain the topic in detail to highlight the importance of Periodic table in the subject of Chemistry as it provides basis for study of elements.
- To discuss the first 20 elements.

Learning Outcomes:

- Draw the atomic structure of the first eighteen elements of the Periodic table.
- Explain that the Periodic table is a way to organize elements in a systemic order.
- Recognise periods and groups in the Periodic table.

Resources:

- Textbook (NAS Book 7)
- Charts-Periodic table
- Cards-elements names Group 1-7

Starter Activity (10 min)

- Give each student a piece of card labelled with an element from group 1-7.
- Ask students to look at the Periodic table to find their location and arrange themselves in the correct order.
- Let the students settle in the correct places.
- Ask each student to present the properties of the element they have the card of.

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Loud reading will be done by the teacher.

Teacher Ideas

- Explanation of the topic will be done. Periodic table will be effectively used.
- A quick analysis will be given at the end.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to attempt quick review on page # 55.
- Ask students to attempt remaining questions of Unit Review.

Home Learning

- Ask students to study the topic for revision.
- Learn about the first 18 elements.
- Ask students to draw/paste Periodic table in their notebooks.

Lesson Evaluation (5min)

Ask students to attempt worksheet #2.

Further Notes

Worksheet # 1

Name: _____

Date: _____

Q.1 *Give one word answer.*

1. *Though they differ in size, all atoms are considered this.*

   _____

2. *It is the central dense area of an atom.*

   _____

3. *The number of electrons and protons is always the same, but number of this particle can differ.*

   _____

4. *The atoms are electrically neutral as they do not have it.*

   _____

5. *Atomic number is number of this particle in nucleus.*

   _____

Q2. *Draw a diagram to show structure of an atom and label it.*

Worksheet # 2

Name: _____

Date: _____

Q1. *Fill in the blanks.*

- The rows in the Periodic table are called _____ .
- The outer most electrons are known as _____ .
- The atoms of Group 1 elements have _____ electrons.
- There are _____ columns(groups) in a Periodic table.

Q2. *Look at the Periodic table and answer.*

- An element in Group Zero with only 2 electrons is_____ .
- _____ is placed in Group 1 with only one electron.
- _____ are on the left of the Periodic table.
- Non-metals are on the _____ of the Periodic table.
- _____ means repeated at regular intervals.

Answer Key
Worksheet # 1

Name: _____

Date:_____

Q1. *Give one word answer.*

1. *Though they differ in size, all atoms are considered this.*

   Spheres

2. *It is the central dense area of an atom.*

   Nucleus

3. *The number of electrons and protons is always the same, but number of this particle can differ.*

   Neutron

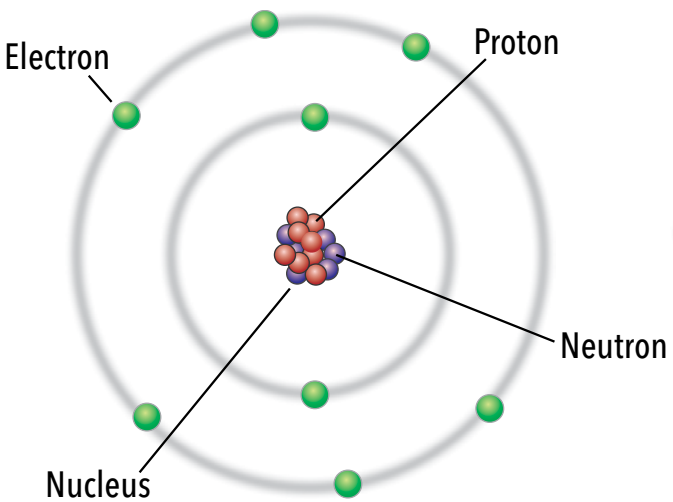
4. *The atoms are electrically neutral as they do not have it.*

   Charge

5. *Atomic number is number of this particle in nucleus.*

   Protons

Q2. *Draw a diagram to show structure of an atom and label it.*



Answer Key

Worksheet # 2

Name: _____

Date: _____

Q1. Fill in the blanks.

- The rows in the Periodic table are called **periods**. .
- The outer most electrons are known as **Valence electrons**. .
- The atoms of Group 1 elements have **1** electron.
- There are **18** columns(groups) in a Periodic table.

Q2. Look at the Periodic table and answer**.**

- An element in Group Zero with only 2 electrons is **Helium**..
- **Hydrogen** is placed in Group 1 with only one electron.
- **Metals** are on the left of the Periodic table.
- Non-metals are on the **right** of the Periodic table.
- **Periodic** means repeated at regular intervals.

Answer key

NAS book 7

Unit 5

Quick Review

Page 55

neutrons	Protons	nucleon
electrons	shells	equal

Unit Review

Choose the correct answer

1.	a. protons have a positive charge
2.	c. protons
3.	d. 4
4.	b.18
5.	Group

Vocabulary Review

1.	Shells
2.	Protons
3.	Nucleus

Observe and Answer

Answer

The neutral atoms are:

A, B and E

Recall and Apply

Q1.

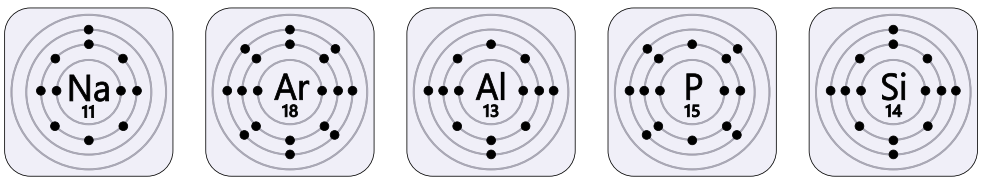
1. Ne(Neon) with 10 electrons.

2. The special thing is that the L shell has 8 electrons and it is complete.

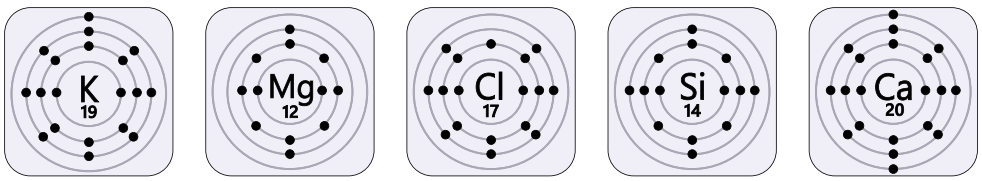
3. This element belongs to Group Zero.

4. It is Ar(Argon) has same number 18 in its outermost shell.

Q2.



Na **Ar** **Al** **P** **Si**



K **Mg** **Cl** **Si** **Ca**

Recall and Analyse

Answer

1. Yes, we can predict as both particles carry opposite charges and it is in balance. Though they differ in size they carry equal charges.

2. No, as the number of neutrons in the nucleus of an atom are sometimes different.

Recall and Response

Answer

A. P

B. N

C. E

D. Isotopes

E. E

F. E

G. N

H. N

Unit 6 PHYSICAL AND CHEMICAL CHANGES

SUBTOPICS

- Differentiate between physical and chemical changes while considering daily life examples.
- Recognise that oxygen is needed in combustion, rusting and tarnishing.
- Explore methods of preventing rusting.
- Relate uses of materials to their chemical properties (e.g., tendency to rust, flammability).
- Evaluate Impact of combustion reaction on environment.
- Relate uses of materials to their physical properties (e.g., melting point, boiling point, solubility, thermal conductivity).
- Distinguish between physical and chemical properties of matter.

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 6

Topic: Physical and chemical changes

Subtopics:

- Introduction
- Physical changes: some common physical changes
- Arrangement of particles
- Change of state, texture, shape, colours
- Thermal expansion and contraction

Date: _____ **Duration:** 2 x 40
Term: _____ **Week:** _____

Learning Objectives:

- To enable students to understand the concept in depth
- To understand the changes in our daily lives

Learning Outcomes:

- Relate uses of materials to their physical properties(e.g., melting point, boiling point, solubility and thermal conductivity).
- Distinguish between physical and chemical changes.

Resources:

- Textbook (NAS Book 7)
- Charts
- Ice cube tray

Starter Activity (5 min)

- Bring ice cube tray on display table and ask students to observe the change. Ice will quickly melt.
- Ask students what they observed.
- Write physical change on the board.

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Loud reading will be done by the teacher.
- Explanation will be done. Teacher will use everyday examples and charts to further elaborate.
- At the end quick analysis will be done.

Teacher Ideas

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

Ask students to attempt relevant questions of Unit Review.

Home learning

- Ask students to study the topic for revision.
- Ask students to make a list of 5 physical changes that they commonly observe in their daily lives.

Lesson Evaluation (5min)

Ask students to attempt worksheet #1.

Further Notes

Lesson Plan 2

Class: *7* **Subject:** General Science

Unit: *6*

Topic*:* Physical and chemical changes

Subtopics:

- Chemical changes
- Arrangements of particles
- Characteristics of chemical changes
- Examples of chemical changes: combustion, rusting, prevention of rusting, tarnishing
- Comparing physical and chemical changes
- Physical and chemical properties of matter
- Materials and their properties
- Combustion and the impacts
- Climate change-the melting ice caps
- Global warming, Acid rain, Silent killer

Date: _____ **Duration:** **2 x 40**

Term: _____ **Week:** _____

Learning Objectives:

- To explain the concept in detail.
- To relate the knowledge to changes happening in everyday life

Learning Outcomes:

- Differentiate between physical and chemical changes while considering daily life examples.
- Recognise that oxygen is needed in combustion, rusting and tarnishing.
- Explore methods of preventing rusting.
- Relate use of materials to their chemical properties(e.g., tendency to rust, flammability)
- Evaluate impact of combustion reaction on environment.

Resources:

- Textbook (NAS Book 7)
- Charts
- Soft drinks-Fizzy carbonated drinks

Starter Activity (5 min)

- Bring a bottle of fizzy drink and ask students to observe. Open

Teacher Ideas

the cane or bottle of fizzy drink. Bubbles of Carbon dioxide will be released.

- Ask students about the change.
- A chemical change took place as the gas was formed and released.
- Write chemical change on the board.

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Teacher will do loud reading.
- Explanation will be done. The charts and images in the book would be used affectively.
- Quick analysis will be done at the end.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

Ask students to attempt Quick Review on page 64 and remaining questions of Unit review.

Home learning

Ask students to study the topic for revision.

Lesson Evaluation (5min)

Ask students to attempt worksheet # 2.

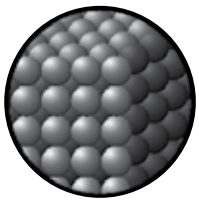
Further Notes

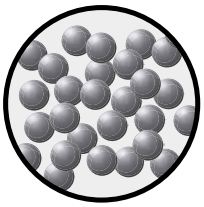
Worksheet # 1

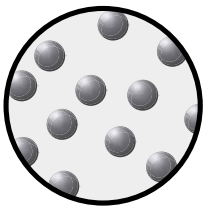
Name: _____

Date: _____

Q1. *Identify state of matter in the given images*







_____ _____ _____

Q2. *Write a brief note on physical change.*

_____

_____

_____

_____

_____

_____

_____

Worksheet # 2

Name: _____

Date: _____

Q1. *Mark as True or False*

Statement	True	False
Many chemical reactions give out energy		
Many chemical reactions absorb energy		
When a fizzing sound is produced it is a temporary change		
A colour change in a half-eaten apple is a physical change		
Unpleasant odours in food is a sign of food decay		

Q2. *Define chemical change*

_____

_____

Q3. *Complete the following.*

- _____ are responsible for some chemical changes.
- _____ consume the sugars in milk and cause the proteins to thicken, resulting in cheese.
- _____ is a chemical change that happens in the presence of oxygen, when natural gas is burning at gas stove.

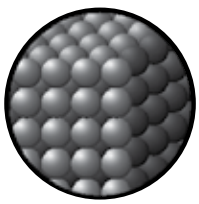
Answer Key

Worksheet # 1

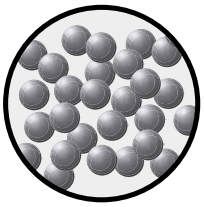
Name: _____

Date:_____

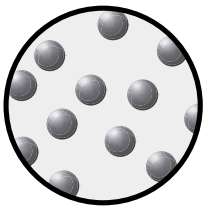
Q1. *Identify state of matter in the given images*



Solid



Liquid



Gas

Q2. *Write a brief note on physical change.*

Answer

When we heat, cool, place under pressure and even mix with other substances, no new substance is formed. The mixed substances do not change chemically. Most physical changes are reversible.

Following are some physical changes which are reversible.

- Change of state
- Change of texture
- Change of colour
- Change of temperature
- Change of shape

Answer Key

Worksheet # 2

Name: _____

Date:_____

Q1. *Mark as True or False*

Statement	True	False
Many chemical reactions give out energy	✓	
Many chemical reactions absorb energy	✓	
When a fizzing sound is produced it is a temporary change		✓
A colour change in a half-eaten apple is a physical change		✓
Unpleasant odours in food is a sign of food decay	✓	

Q2. *Define chemical change*

Answer

A chemical change occurs, when new substances are formed as a result of chemical reaction. This change is known as chemical change.

Q3. *Complete the following.*

- **Microorganisms** *are responsible for some chemical changes.*
- **Fungi** *consume the sugars in milk and cause the proteins to thicken, resulting in cheese.*
- **Combustion** *is a chemical change that happens in the presence of oxygen, when natural gas is burning at gas stove.*

Answer key

NAS book 7

Unit *6*

Quick Review

Page 64

i. Physical Change: *Substance change when they are heated, cooled, placed under pressure or even mixed with other substances. It is a physical change when no new substances are formed.*

ii. Following are some easily reversible changes:

- Solution of salt in water.
- Expansion of Mercury in thermometer
- Change of water into ice.

Unit Review

Choose the correct answer

1.	a. mass per unit volume
2.	Both a and b, steam cooled to water and Salt dissolved in water
3.	a. aluminium
4.	a. physical properties
5.	d. burning wood

Vocabulary Review

1.	hardness
2.	Combustion
3.	Carbon dioxide

Observe and Answer

a. The nail in first tube will rust as it is in water.

b. The nail covered in oil will not rust as oxygen and water will not reach the nail.

c. The painted nail will be protected by paint so water and oxygen will not get in contact with it.

d. The nail wrapped in foil will not get rusty as it will not get in contact with oxygen and water.

Rusting can be prevented by :

- Alloying
- Painting
- Metal Painting

Recall and Response

Answer

i. When wax in a burning candle, melts, it is a physical change. It melts without any decomposition. It deforms and comes back to its shape when pressure is applied.

ii. Flammability is a chemical property because the wax burns and vaporizes and it is a chemical change.

Q2.

Answer

If we take example of cooking utensils in the kitchen, they are made of metal or clay(earthen pots) which conduct the heat and the food gets cooked. Therefore, a particular type of utensils are useful in the kitchen.

Recall and Analyse

Answer

Dissolving table salt in water is a physical change. If we make a salt solution and boil it, the liquid will evaporate and salt will be left at the bottom of the container, unchanged. This proves that it's a physical change.

Recall and Response

Q1.

Answer

- New
- Physical
- New
- Different

Q2. Answer

Object	Material, Metal or Non-metal	What each object is used for	Properties of material that makes it useful
A pair of scissors	Metal	Cutting	Hardness
Screw	Metal	To hold objects together and keep it in position	Hardness
Plastic cup	Non-metal	Multiple uses, storing pens, carrying food	Strong, light weight
Steel fork	Metal	Cutlery for eating	Hardness
Copper wire	Metal	Used in electric cables	Hardness
Shopping bag	Non-metal	To carry garbage, etc.	Flexible and strong

Q3.

Answer

The formation of crystals is known as sugar bloom which is the result of condensation as melted chocolate is kept in fridge. It is a physical change.

Unit 7 CHEMICAL BONDS

SUBTOPICS

- Define valency and explain the formation of ions.
- Write chemical formulae on the basis of valency of the constituent elements, such as H_2O, NaCl, NH_3, CO_2, CO, etc.
- Recognize that a chemical bond results from the attraction between atoms in a compound and that the atoms' electrons are involved in this bonding.
- Discuss formation of ionic bond as a result of electrostatic forces between atoms (e. g, NaCl).
- Discuss types and formation of covalent bond as a result of mutual sharing of electrons between atoms (e. g, H_2, O_2, N_2).
- Name certain ionic and covalent compounds.
- Draw cross and dot structures showing formation of ionic compounds and covalent compounds.

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 7

Topic: Chemical Bonds

Subtopics:

- Introduction
- Valency
- Writing Formulae using valences

Date: _____ **Duration:** 2 x 40

Term :_____ **Week:** _____

Learning Objectives:

- To give clear concepts of Chemical Bonds.
- To explain the concept further with examples.

Learning Outcomes:

- Define valency and explain the formation of ions.
- Write chemical formulae on the basis of valency of the constituent elements, such as water, Sodium Chloride, Ammonia, Carbon dioxide, etc.

Resources:

- Textbook (NAS Book 7)
- Charts
- Models of Molecules

Starter Activity (5 min)

Place charts of atomic structure on the board.

Ask students some questions to recall previous learning of atoms.

What are elements?

What is the basic building block of an atom?

Do atoms exist singly in nature or not?

The chemical change takes place at what level?

- Then put up a chart showing Hydrogen, Sodium, Chlorine, Oxygen and Carbon on board.
- Share that all the atoms exist in nature as molecules depending on their valency.
- Write Valency on the board.

Teacher Ideas

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Teacher will do loud reading.
- Explanation will be done. Charts and models will be effectively used.
- A quick analysis will be done.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to attempt Quick Review on page 77.
- Ask students to attempt relevant questions of Unit Review.

Home learning

- Ask students to study the topic for revision.
- Ask students to find out valency of water, Carbon, Sodium and write down in their notebooks.

Lesson Evaluation (5min)

Ask students to attempt Worksheet 1

Further Notes

Lesson Plan 2

Class: 7 **Subject:** General Science

Unit: 7

Topic: Chemical Bond

Subtopics:

- Two ways of bonding:
  i. Ionic Bonding ii. Covalent Bonding
- Hydrogen
- Chlorine molecules
- Methane
- Oxygen
- Nitrogen

Date: _____ **Duration:** 2 x 40
Term: _____ **Week:** _____

Learning Objectives:

- To further elaborate types of bonding.
- To explain the bonding of some elements from Periodic Table.

Learning Outcomes:

- Recognise that a chemical bond results from the attraction between atoms in a compound and that the atoms' electrons are involved in the bonding.
- Discuss formation of a ionic bonds as a result of electrostatic forces between atoms (e.g., Hydrogen, Oxygen and Nitrogen.)
- Name certain ionic and covalent compounds.

Resources:

- Textbook (NAS Book 7)
- Charts
- Models of atoms and molecules
- Video on the topic https://youtu.be/zvBeAaRGo3U (Starter Activity (10 min)
- Arrange a show a video on the topic(Link provided in resources)

Lesson Methodology (25 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Teacher will read loudly.

Teacher Ideas

- Explanation will be done with charts and models. Book as the main resource will also be used.
- At the end Quick Analysis will be done.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to attempt Quick Review on page # 80 and 82.
- Ask students to attempt some relevant questions of Unit Review.

Home learning

- Ask students to study the topic for revision.
- Ask students to randomly select some elements from Periodic Table and practice drawing their dot and cross diagrams.

Lesson Evaluation (5min)

Ask students to attempt Worksheet #2

Worksheet # 1

Name: _____

Date: _____

Q1. *Define:*

i. Noble Gases

_____

_____

ii. Valency

_____

_____

Q2. *Write valences of the following by looking at the Periodic Table.*

- H

  _____
- Li

  _____
- He

  _____
- C

  _____
- Mg

  _____

Answer Key

Worksheet # 1

Name: _____

Date:_____

Q1. *Define:*

i. Noble Gases

Some elements have full outer shells of electrons. These are known as Noble Gases due to their properties.

ii. Valency

It can be defined as number of electrons in their outer most shells which can be added or shared in a reaction.

Q2. *Write valances of the following by looking at the Periodic Table.*

- *H = 1*
- *Li = 1*
- *He =0*
- *C =4*
- *Mg =2*

Worksheet # 2

Name: _____

Date: _____

Q1. *Answer the given questions;*

a. What are cations?

_____

b. What are negative ions called?

_____

c. What keeps the ions sticking together?

_____

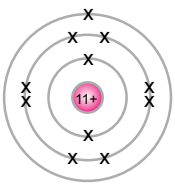
d. What are the two ways chemical bonds form?

_____

e. What force exists in ionic bonds?

_____

Q2*. The following elements have 11 and 17 electrons as shown in the diagram. Look at the diagram and give distribution of electrons.*



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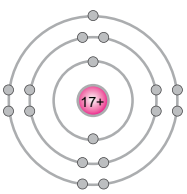


_____

Answer Key

Worksheet # 2

Name: _____

Date:_____

Q1.*Answer the given questions;*

a. *What are cations?*

The positive ions are called cations.

b. *What are negative ions called?*

Negative ions are called anions.

c. *What keeps the ions sticking together?*

The electrostatic force of attraction.

d. *What are the two ways chemical bonds form?*

They are:

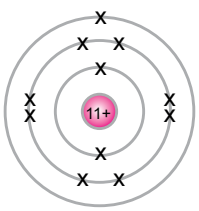
- Ionic Bonds
- Covalent Bonds

e. *What force exists in ionic bonds ?*

Ionic bonds are formed by the electrostatic force of attraction between two oppositely charged (opposite-nature) atoms.

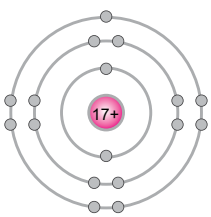
Q2*. The following elements have 11 and 17 electrons as shown in the diagram. Look at the diagram and give distribution of electrons.*

A sodium atom has 11 electrons (2,8,1)



Na atom.
It has 1 electron in its outer shell

A chlorine atom has 17 electrons (2,8,7)



Cl atom.
It has 7 electrons in its outer shell.

NAS book 7

Unit 7

Unit Review

Quick Review

Page 77

Ans.1. H O

2. H_1 O_2

3. $H_1 \times O_2$

4. H_2O

b.1. Na Cl

2. $Na_1 \times Cl_1$

3. Na_1 Cl_1

4. NaCl

c. Ammonia

1. N H

2. N_3 H_1

3. $N_3 \times H_1$

4. $N_1H_3 = NH_3$

d. Carbon dioxide

1. C O

2. C_4 O_2

3. $C_4 \times O_2 = CO_2$

Page 80

Q1. a. Positive

b. Negative

2. Symbols for ions:

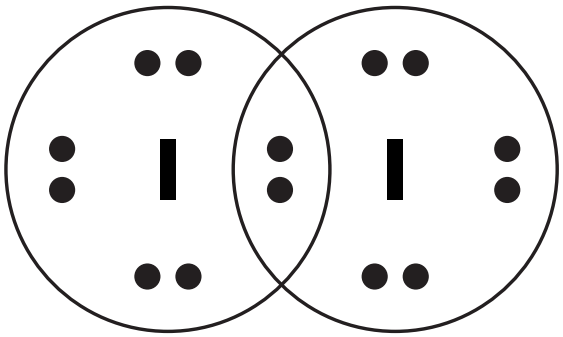
Mg Cl ⟶ $MgCl_2$

Mg^{2+} Mg^2Cl^- Mg Cl_2

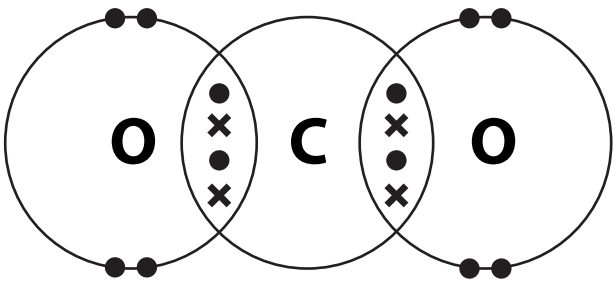
Cl Cl 1 2

Page # 82

1. Iodine molecule



2.CO_2



3. i. b. Na loses an electron to donate to Cl.

ii. d. Transfer of electrons

Choose the correct answer

1.	d. NaCl
2.	a. Ionic bond
3.	c. CH_4
4.	a. molecule and b. compound(as atoms join together to make molecules . In compounds also covalent bond is formed
5.	a. Helium

Vocabulary Review

1.	Electrostatic Force
2.	Covalent bond
3.	Ionic bond

Observe and Answer

1.Na (sodium) can lose one electron and become stable. The loss of one electron leaves the sodium atom with 11 protons and 10 electrons giving it a net positive charge of 1.This makes it more stable because it now has the same number of electrons as the previous noble gas the element Neon(2,8).

2.Ar(Argon) is least likely to react with other, as its outermost shell is complete and therefore is stable.

Recall and Response

When two non-metal atoms react, they share a pair of electrons by overlapping outer shells. This is called covalent bonding. In this way both atoms can gain electrons.

Recall and Analyse

1.A covalent bond is not formed between a metal and a non-metal. It is formed between metals. When two non-metals' atoms share a pair of electrons by overlapping outer shells. For example, Ammonia NH_3.

2. NaCl = Ionic bond

O_2= Covalent bond

N_2 = Covalent bond

$MgCl_2$=Ionic Bond

Recall and Response

Ionic bond: Chemical bond formed using the electrical pull between positive and negative ions. The electrons are transferred.

Covalent bond: A covalent bond forms through sharing of electrons.

Electrostatic attraction: The opposite charges are strongly attracted to each other. This force of attraction between the atoms is known as electrostatic force.

Noble gases: The atoms of some elements have full outermost shells. They are non-reactive and are

Unit 8 SOLUTIONS

SUBTOPICS

- Demonstrate the process of solution formation (using water as a universal solvent).
- Distinguish among solute, solvent and solution; saturated and unsaturated solution.
- Define solubility.
- Recognise that the amount of solute which dissolves in a given solvent has an upper limit at a given temperature.
- Identify the factors which affect the solubility of a solute in a solvent and recognise the importance of these factors in homes and industries.
- Explain what is meant by a concentrated and dilute solution.
- Identify ways of accelerating the process of dissolving materials in a given amount of water and provide reasoning (i.e., increasing the temperature, stirring, and breaking the solid into smaller pieces increases the process of dissolving).
- Explore the effectiveness of various cleaning solutions in cleaning tarnished and oxidized coins. (STEAM).
- Make a rock candy with sugar using crystal seeding technique (STEAM).

Lesson Plan 1

Class: *7* **Subject:** *General Science*

Unit: *8*

Topic: *Solutions*

Subtopics:

- Introduction
- Forming a solution
  - modelling
  - dissolving
- Concentration
  - calculating concentration
  - dilute solution
  - concentrated solution
  - Saturated solution

Date: _____ **Duration:** **2 x 40**

Term: _____ **Week:** _____

Learning Objectives:

- To explain the topic in detail with examples from daily life.
- To enhance the knowledge further with hands on activity.

Learning Outcomes:

- Demonstrate the process of solution formation(using water as a universal solvent).
- Distinguish among solute, solvent, solution, saturated and unsaturated solutions.
- Explain what is meant by a concentrated and dilute solution.

Resources:

- Textbook (NAS Book 7)
- Charts
- Material for solution preparation(i.e., salt, water, beaker, glass rod)

Starter Activity (5 min)

- Place the material on the display table, in the science laboratory.
- Add salt in water and stir. Keep on adding salt till it starts to settle down and is not dissolving further. Heat the solution and stir. The salt will get dissolved.
- Ask students to note their observation.

Teacher Ideas

- Use the terms, solution, solute and solvent during the activity.

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Loud reading will be done by the teacher.
- Explanation will follow.
- At the end, quick analysis will be given.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to attempt Quick Review on page number 89.
- Ask students to attempt relevant questions of Unit Review.

Home learning

Ask students to study the topic for revision.

Lesson Evaluation (5min)

Ask students to attempt worksheet# 1.

Further Notes

Lesson Plan 2

Class: *7* **Subject:** *General Science*

Unit: *8*

Topic: *Solutions*

Subtopics:

- Solubility
- Factors affecting solubility
  1. Stirring 2. Temperature 3. Particle size
- How does temperature affect solubility?
- Helping a solute dissolve
- Solubility in the home and industry

Date: _____ **Duration:** **2 x 40**

Term: _____ **Week:** _____

Learning Objectives:

- To further elaborate the topic
- To discuss various examples from daily life and industry

Learning Outcomes:

- Define solubility
- Recognise that the amount of solute that dissolves in a given solvent has an upper limit at a given temperature.
- Identify the factors which affect the solubility of a solute in a solvent and recognise the importance of these factors in home and industries. Explore the effectiveness of various cleaning solutions in cleaning of tarnished and oxidized coins.
- Make a rock candy with sugar syrup crystals seeding technique(STEM).

Resources*:*

- Textbook (NAS Book 7)
- Charts

Starter Activity (5 min)

Write some of the key words on the board.

Solution, solute, solvent, mixture, concentration

Ask students to describe in their own words.

Teacher Ideas

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers, and read silently. Teacher will facilitate.
- Loud reading will be done.
- Explanation will be done with examples from everyday life and industries.
- At the end, quick analysis will be done.

Plenary (5 min)

- *Quick PMI chart (Plus, minus, interesting) will be filled.*

Assessment Opportunities (30 min)

Ask students to do remaining questions of Unit Review.

Home learning

Ask students to study the topic for revision.

Lesson Evaluation (5min)

Ask students to attempt Worksheet #2.

Further Notes

Worksheet # 1

Name: _____

Date: _____

Q1. *Define:*

a. Solution:

_____

_____

b. Solvent

_____

_____

c. Solute

_____

_____

Q.2 *Give examples of the following types of solutions.*

- Gas-liquid solution

_____

- Liquid-liquid solution

_____

- Gas-gas solution

_____

Worksheet # 2

Name: _____

Date: _____

Q1. *What is solubility?*

_____

_____

Q2. *Define insoluble.*

_____

_____

Q3. *Name the three factors that affect solubility.*

_____

_____

Q4. *Explain the role of solubility in home and industry.*

_____

_____

Answer Key

Worksheet # 1

Name: _____

Date:_____

Q1. *Define:*

a. Solution:

A solution is a homogenous mixture that has uniform composition, and its individual components cannot be distinguished. All parts of the mixture are the same.

b. Solvent

The solvent is part of a solution usually present in the largest amount.

c. Solute

Solute is the substance that is dissolved by the solvent.

Q2. *Give examples of the following types of solutions.*

Answer

- *Gas-liquid solution* ⟶ *Fizzy drinks*
- *Solid-Solid* ⟶ *Bronze (i.e., tin dissolved in copper)*
- *Liquid-liquid solution* ⟶ *Iodine dissolved in water.*
- *Gas-gas solution* ⟶ *Air= Oxygen+CO_2+ Noble gases dissolved in Oxygen*

Answer Key

Worksheet # 2

Name: _____

Date:_____

Q1. *What is solubility?*

The mass of solute that dissolves in 100 g of water to make a saturated solution is called the solubility of the solute.

Q2. *What is insoluble?*

Some substances cannot dissolve in water. They are known as insoluble.

Q3. *Name the three factors that affect solubility.*

The three factors that affect the solubility are:

- Stirring
- Temperature
- Particle size

Q4. *Explain the role of solubility in home and industry.*

Solubility plays an important role in everyday, both at our homes as well as industries. The drinks that we intake through out the day are prepared based on the solubility of solute and solvent. e.g., coffee

In modern paints, and other hazardous chemicals, water is used as solvent.

CO_2 is added to some drinks under pressure, so when opened they fizz.

-

Answer key

NAS book 7

Unit 8

Quick Review

1. Dissolves

2. Solution

3. Solute

4. Solvent

Unit Review

Choose the correct answer

1.	a. solute
2.	b. salt and water
3.	d. water is a good solvent because it dissolves many substances
4.	d. sand
5.	a. saturated solution

Vocabulary Review

1.	Solvent
2.	Solubility
3.	Insoluble

Observe and Answer

Answer

i. Soda water

ii. a. Salt water

b. Soda water

iii. a. Soda water

b. Grape juice

Recall and Response

a. Soluble. When a substance gets dissolved in water, it is known as soluble.

b. Insoluble**.** When a substance cannot get dissolved in water, it is known as insoluble.

c. Universal solvent. Water is the universal solvent , which dissolves many substances therefore it is known as universal solvent.

2. a. Solids you dissolve in water at home:

- Coffee in water
- Salt in water
- Sugar in water

b.

- Mustard seed in water
- Fennel seeds in water
- Cumin seeds in water

3. **Ethanol** : It is used for paints, varnishes and other substances as a solvent.

Methanol ; It is used as a solvent for paints , varnishes, gums.

4. A. A substance which dissolves a solute.

Solvent

B. A substance which dissolves in another substance.

Solute

C. A mixture of a solute and a solvent .

Solution

D. Dissolved in water.

Aqueous

E. A solution that contains the maximum amount of solute.

Saturated

Recall and Apply

a. When a large amount of solute dissolves in a given amount of solvent the solution formed is known as concentrated solution.

b. Solution:

Concentration=Mass/Volume

Conversion—into the unit for solution

250/1000dm^3= 0.25 dm^3

30/0.25=120 gm/dm^3

c. Solution:

If solution A has twice as much solute as solution B, we can add solvent to solution A until its volume is twice that much of solution B. This will make concentration of both the solutions equal.

Recall and Analyse

To convert a dilute solution into a concentrated, we can add some more solute to the solution or remove solvent from the solution.

For example, if we have a dilute solution of sugar in water and want to make it more concentrated , we can add more sugar to the solution.

Similarly, if we have a dilute solution of hydrochloric acid and we want to make it more concentrated, we can remove some of the water from the solution.

Unit 9 FORCE AND MOTION

SUBTOPICS

- Describe the effect of force on changing the speed and direction of motion with time.
- Define and state the SI unit of force.
- Formulate the relationship between speed, distance, and time.
- State SI (System International) unit of speed.
- Calculate average speed.
- Interpret a distance-time graph.
- Give examples of contact forces and non-contact forces.
- Demonstrate that forces always work in action and reaction pairs (equal in magnitude, opposite in direction).

Lesson Plan 1

Class: *7* **Subject:** General Science

Unit: *9*

Topic: Force and Motion

Subtopics:

- Introduction
- Changing Position
- Speed
- Measuring Speed

Date: _____ **Duration:** **2 x 40**

Term: _____ **Week:** _____

Learning Objectives:

- To give a clear concept of the topic.
- To explain in detail its applications in daily life.

Learning Outcomes:

- Describe the effect of force on changing the speed and direction of motion with time.
- Formulate the relationship between speed, distance and time.
- State SI(System International) unit of speed. Calculate average speed.
- Interpret a distance time graph.

Resources:

- Textbook (NAS Book 7)
- Charts

Starter Activity (5 min)

The teacher will begin by asking some questions related to speed and motion. For example:

- How can you tell that one car is covering more distance than other?
- While bicycling, how do you cover more distance?
- When you have to reach another city urgently, what mode of transport would you prefer?
- Write the topic on the board.

Lesson Methodology (30 min)

- Ask students to open their books to the assigned page number

Teacher Ideas

and read silently.

- Teacher will facilitate.
- Loud reading will be done by the teacher.
- Explanation will follow. Teacher will use resources efficiently.
- Arrange a video on speed https://youtu.be/e28-IcdAMHg https://youtu.be/OuehNbiYisw
- At the end, quick analysis will be done.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

Ask students to attempt relevant questions of Unit Review.

Home learning

Ask students to study the topic for revision.

Lesson Evaluation (5min)

Ask students to attempt worksheet number 1.

Further Notes

Lesson Plan 2

Class: *7* **Subject:** General Science

Unit: *9*

Topic*:* Forces and Motion

Subtopics:

- Forces in Action
- Describing Forces
- Measuring Forces
- Contact Forces
- Non-contact Forces
- Gravity
- Electrons and Magnetic Forces

Date: _____ **Duration:** **2 x 40**

Term: _____ **Week:** _____

Learning Objectives:

- To give the concept of forces around us.
- To understand forces at work.

Learning Outcomes:

- Define and state SI unit of forces.
- Give examples of contact forces and non-contact forces.

Resources:

- Textbook (NAS Book 7)
- Charts

Starter Activity (5 min)

- Ask students to give definitions of the following:

  Speed, instantaneous speed, Unit for speed.

  Then share what can change speed

- Write the word Force on the board and brainstorm the ideas that come in their mind. Note those ideas on the board.

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently.
- Loud reading will be done by the teacher.
- Explanation will follow.

Teacher Ideas

- At the end, a quick analysis will be done.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to answer the questions of Unit Review.

Home learning

Ask students to attempt read the topic for revision.

Lesson Evaluation (5min)

Ask students to attempt Worksheet # 2.

Further Notes

Worksheet # 1

Name: _____

Date: _____

Q1. *Define:*

a. Speed

_____

_____

b. Instantaneous Speed

_____

_____

c. Speed =----------/----------

d. Time taken=----------/----------

e. Distance traveled= ----------x----------

Q2*. Match the statements to facts:*

Statements	Facts
Athletic races	16 m/s
Snail's travel speed	Photographs are taken at the finishing line
Roads have marker posts	Every 50 km only
Greyhounds	0.003 m/s

Worksheet # 2

Name: _____

Date: _____

Q1. *Mark whether True or False.*

Statement	True	False
Force is a push or pull		
Newton (N) is the SI unit of speed		
When forces being applied are balanced, the objects move faster		
Forces can change direction of motion		
When two materials rub against each other, friction is produced		

Q2. *Define*

- Contact Force

_____

- Non-contact Force

_____

- Gravity

_____

Answer Key

Worksheet # 1

Name: _____

Date:_____

Q1. *Define:*

a. Speed

It is defined as distance travelled per second.

b. Instantaneous Speed

It is the speed of an object at a particular moment in time.

c. Speed =Distance travelled/Time taken

d. Time taken= Distance/speed

e. Distance traveled= Speed x Time

Q2*. Match the statements to facts:*

Statements	Facts
Athletic races	16 m/s
Snail's travel speed	Photographs are taken at the finishing line
Roads have marker posts	Every 10 km only
Greyhounds	0.003 m/s

Answer Key

Worksheet # 2

Name: _____

Date:_____

Q1. *Mark whether True or False.*

Statement	True	False
Force is a push or pull	✓	
Newton (N) is the SI unit of speed		✓
When forces being applied are balanced, the objects move faster		✓
Forces can change direction of motion	✓	
When two materials rub against each other, friction is produced	✓	

Q2. *Define*

- **Contact Force**

  A force that requires matter to touch is known as contact force.
- **Non-contact Force**

  A force that does not require matter to touch is called as non-contact force.
- **Gravity**

  Every object in the universe exerts pull on any other object. So, we can say that it is the force of attraction between any two objects. On Earth it is the force by which Earth pulls objects.

Answer key

NAS book 7

Unit 9

Unit Review

Choose the correct answer

1.	a. distance/time
2.	a. friction
3.	b. air resistance
4.	b. spring balance
5.	a. 4 m/s

Vocabulary Review

1.	Speed
2.	Gravitational force
3.	Newton

Observe and Answer

Solution:

The car was moving fastest from start to 4 seconds.

The speed was

Speed= distance travelled/ time taken

Speed=4/4=1 m/s

Recall and Response

Q1. Force can be defined as a push or pull.

Q2. Forces cause objects to :

1. Begin to move
2. Speed up
3. Slow down or stop moving
4. Change direction
5. Change shape
6. Remain still

Q3. Force can be measured by weighing scale or spring balance, by chefs.These instruments work due to gravity.

Q4. The SI unit of force is Newton(N).

Q5. The unit of force is named after Isaac Newton, a renowned physicist.

To work out the speed of the object we divide the **distance** that it has travelled by the **time** that it took .

Recall and Analyse

A.When forward forces are bigger than the opposing forces, we speed up. As we go faster, the force of air resistance pushing back on us increases. Eventually the forces become balanced(the forward forces are the same size as the opposing forces). Once the forces become balanced, our speed stays the same.

Recall and Apply

Q1 Forces act on us whenever our motion changes.

Forces act on us all the time. Usually more than one force is acting on any object at one time, but often we do not notice them.

There are two types of forces based on whether the object comes in contact or not. They are:

- Contact forces like friction
- Non-contact forces like gravity, electric forces, magnetic forces.

Q2.

a. Non-contact force (gravity)
b. Non-contact forces (magnetism)
c. Contact force (air, drag)
d. Contact force(pulled down by the tension in the cord).
e. Contact Force(friction).

Q3.

a. $d_1 = x = d_2$

t_1 = 60min = 1hour

s_1 = 60km/hr

s_2 = ?

$t_2 = t_1$ -40min = 20min = 0.33hr

d_1 = sxt = 60x1 = 60km

$d_1 = d_2$

Car	**Train**
d=600m	d=75
b. s_2 = 60/0.33 = 181.81km/hr	d=75km
t = 2=min	t= 50 min
s = 600/2 = 300m/m	s= 7500 / 150 = 150 m/m

ratio of speed

Car : Train

300 : 150

2 : 1

d= 300m

s= 1.0 m/s

t=?

t= d/s = 300/1 = 300 sec

Unit 10 | WAVES AND ENERGY

SUBTOPICS

- Define a wave.
- Compare the types of waves (mechanical and electromagnetic) with daily life examples.
- Distinguish between Longitudinal and Transverse waves.
- Identify: (1) water wave and Sound wave as mechanical wave; (2) light wave as electromagnetic wave.
- Define the terms: wavelength, frequency, and time period of wave.
- Define and relate:

  Pitch and frequency

  Amplitude and frequency
- Explain the factors affecting pitch and loudness of sound.
- Compare and interpret waveforms in terms of pitch and loudness.
- Construct the inverse relation between time period and frequency.
- Relate common phenomenon (e.g., echo, hearing thunder after seeing lightning) to the properties of sound.

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 10

Topic: Waves and Energy

Subtopics:

- Introduction
- Waves transfer energy
- Transverse Waves
- Longitudinal Waves

Date: _____ **Duration:** 2 x 40
Term: _____ **Week:** _____

Learning Objectives:

- To enable students to comprehend the concept of waves and energy.
- To study the topic in detail.

Learning Outcomes:

- Define a wave.
- Compare the type of waves(mechanical and electromagnetic) with daily life examples.
- Distinguish between Longitudinal and Transverse waves.
- Identify(i) water waves and sound waves as mechanical waves;(ii) Light waves as electromagnetic waves.

Resources:

- Textbook (NAS Book 7)
- Charts

Starter Activity (5 min)

Ask students random questions like:

- When you go to the beach, what do you see and hear?
- What do you call them?

So, sound energy is the same. You cannot see it but it has similar waves.

Write 'Waves and Energy' on the board.

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.

Teacher Ideas

- Teacher will do loud reading.
- Explanation will follow. The resources would be used effectively.
- At the end quick analysis will be done.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

Ask students to attempt some relevant Unit Review.

Home learning

Ask students to study the topic for revision.

Lesson Evaluation (5min)

Ask students to attempt Worksheet #1

Further Notes

Lesson Plan 2

Class: 7 **Subject:** General Science

Unit: 10

Topic: Waves and Energy

Subtopics:

- *Features of waves*
- *Wave calculator* ⟶ *Time period*
  ⟶ *wave speed*
- More about sound waves
- Characteristics of sound
- Loudness and pitch
- Frequency and pitch
- Amplitude and loudness
- Amplitude, frequency and loudness
- Difference between frequency and amplitude
- The speed of sound
- Electromagnetic waves
- Why does thunder always follow lightn?
- Echoes

Date: _____ **Duration:** 2 x 40
Term: _____ **Week:** _____

Learning Objectives:

- To discuss further details about waves.
- To explain various aspects about waves, energy and natural phenomena like, echoes, thunder, lightning.

Learning Outcomes:

- Define and relate:

1. Pitch and frequency

2. Amplitude and frequency

- Explain the factors affecting pitch and sound.
- Compare and interpret waves forms in terms of pitch and loudness.
- Construct the inverse relations between time period and frequency.
- Relate common phenomenon (e.g., echo, hearing thunder after seeing lightning to the properties of sound.)

Teacher Ideas

Resources:

- Textbook (NAS Book 7)
- Charts
- A video on sound energy

Starter Activity (5 min)

Arrange a video of natural phenomenon.

Link: https://youtu.be/tKVadXBIyLA

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Loud reading will be done by the teacher.
- Explanation will follow. Teacher will elaborate further with examples.
- A quick analysis will be given in the end.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to attempt Quick Reviews on page # 110 and 115.
- Ask students to attempt remaining questions of Unit Review.

Home learning

- Ask students to read the topic for reinforcement.
- Ask students to write a note on 'Natural Phenomena-Thunder, lightning' using notes made earlier. Further research is also suggested.

Lesson Evaluation (5min)

Ask students to attempt worksheet #2.

Further Notes

Worksheet # 1

Name: _____

Date: _____

Q1. What are waves?

_____

_____

_____

2. Define with examples.

a. Mechanical waves

_____

_____

_____

b. Electromagnetic waves

_____

_____

_____

3. Write three characteristics of waves.

- _____
- _____
- _____

Worksheet # 2

Name: _____

Date: _____

Q1. What is Transverse wave?

_____

_____

Q2. What are Longitudinal waves?

_____

_____

Q3. Give example of the following sounds.

a. High pitched sounds

_____

b. Low pitched sounds

_____

Answer Key

Worksheet # 1

Name: _____

Date:_____

Q1.

a. What are waves?

Waves are series of oscillations (or vibrations) which travel from one place to another. However, in water, waves water molecules only move up and down.

Q2. Define with examples.

a. Mechanical waves

These are vibrations that travel through medium.

Examples:- sound waves, seismic waves

b. Electromagnetic waves

The waves that travel through a vacuum and do not require a medium at the speed of 300000 km/sec.

Examples:- Microwave, light waves, radio waves,

Q3. Write three characteristics of waves.

The three characteristics of waves are:

- They can be reflected(bounce back).
- They can be refracted.
- They diffract(spread out)

Answer Key

Worksheet # 2

Name: _____

Date:_____

Q1. *What are Transverse waves?*

If we send the wave along the rope, the spot will move up and down, without moving along the rope. This kind of wave is known as transverse wave.

2. What are Longitudinal waves?

Longitudinal waves can be demonstrated with the help of a slinky spring. When one end of the spring is pushed in and out repeatedly, vibrations travel along the spring. These oscillations are in the direction in which waves transfer energy. Waves that travel in this way are known as Longitudinal waves.

3. Give example of the following sounds.

a. High pitched sounds

Whistle, thunder

b. Low pitched sounds

Wind turbine

Bass drums

Answer key

NAS book 7

Unit 10

Quick Review

Page # 110

Q1.

a. wave speed= v= metres /sec

b. frequency= f= hertz(Hz)

c. wavelength = λ = meter

2. What is the wave equation?

Wave speed V= frequency (f) X wavelength (λ)

m/s= Hz/s X m

Wave equation

Wave speed, v= frequency X wavelength

4. What is the difference between transverse waves and longitudinal waves?

- Longitudinal waves are transverse waves that require a medium for propagation, but transverse waves are non-mechanical waves that do not require a medium for propagation.
- Longitudinal waves consist of compression, rarefaction, while transverse waves consist of crust and troughs.
- In longitudinal waves, the medium moves in the same direction as the waves while the transverse waves , medium moves perpendicular to the direction of waves.
- Longitudinal waves have a pressure variation, while transverse waves do not.

Quick Review

Page # 115

Q1.

1. Waves

2. Louder

3. decibels

4. Hertz

Choose the correct answer

1.	d. waves transfer energy without transferring matter
2.	d. sound waves
3.	b. 2
4.	a. 300 m/s.
5.	a. v= frequency X lambda -wavelength

Vocabulary Review

1.	Decibels
2.	Electromagnetic waves
3.	Echoes

Observe and Answer

The image shown in the diagram are transverse waves.

Characteristics:

- The vibrations and oscillations move up and down
- The spot does not move from its place when wave is produced, like in ripple effect.

Recall and Response

1. Define the following terms:

Mechanical waves

These are vibrations that travel through a medium

Echo:

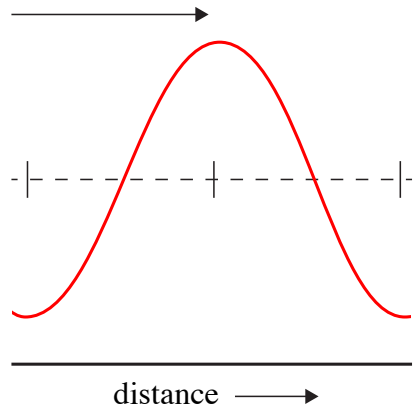
Hard surfaces reflect sound waves. The reflected sound is known as echo.

Decibel:

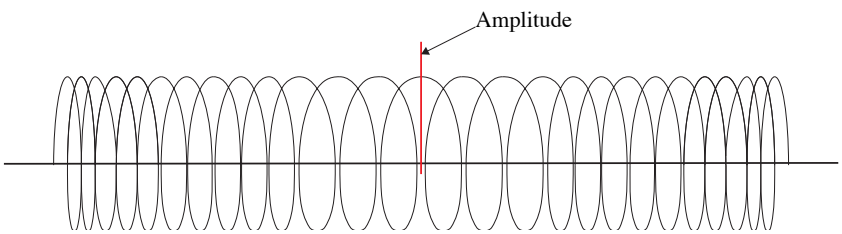
It is the unit for measurement of loudness of sounds.

2. Diagrams

a. Transverse wave



b. Longitudinal wave



3. a. Transverse waves:- Radio waves, Electromagnetic Waves

b. Longitudinal waves :- Sound waves

Recall and Analyse

When a sound wave passes through air, the air particles oscillate and the wave propagates through various elastic collisions between air molecules. The wave is propagated as a longitudinal wave, in the form of compression and rarefaction. So, the medium particles vibrate in the direction of wave propagation.

Recall and Apply

Demonstration for a friend

Place the slinky spring on the floor and fix one end with the small amplitude and a frequency of

about five cycles per second. Impulse at regular time period a continuous travelling wave. These are transverse waves.

Travelling Longitudinal waves can be produced by oscillating the end of the slinky backward and forward.

2. A small ball will move up and down but will not move with the wave. The ball is floating on a pond when waves travel across the pond as such ball moves up and down repeatedly on surface between waves consist of successive troughs and crusts moving across the surface, each crest pushes ball up each trough allows it to move down.

3. a. Transverse

b. 1 m

c. The amplitude of the waves is the distance between two crest or crest to crest.

d. i. 2 Hz ii. ½ sec

e. $v = f \times \lambda = 2 \times 2 = 4$ m/s

f. 4 Hz

g. 4/4 = 1

Unit 11 | HEAT AND TEMPERATURE

SUBTOPICS

- Describe the expansion of the three states of matter on heating, and contraction on cooling, in terms of particles.
- Predict the effects of heat gain and heat loss.
- Compare all three scales of temperature (including inter-conversion of temperature scales).
- Define the terms heat and temperature on the basis of Kinetic Molecular Theory.
- Explain why metals are good thermal conductors and fluids are poor conductors of heat using the particle model.
- Construct the concept of heat conduction, convection and radiation by applying particle theory including daily life examples.
- Identify the effects of thermal expansion and contraction with their applications in daily life.
- State and explain the practical methods of thermal insulation used for constructing buildings.

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 11

Topic: Heat and Temperature

Subtopics:

- Effect of heat and matter
  - solid
  - liquid
  - gas
- Temperature: -
  - Kelvin scale
  - Celsius scale
  - Fahrenheit Scale

Date: _____ **Duration:** 2 x 40
Term: _____ **Week:** _____

Learning Objectives:

- To discuss the topic in detail.
- To elaborate further on how temperature is measured.

Learning Outcomes:

- Describe the expansion of three states of matter on heating and contraction.
- Predict the effect of heat gain and heat loss.

Resources:

- Textbook (NAS Book 7)
- Charts
- Material for lab activity (beakers, thermometer, ice cubes, water, Bunsen burner)

Starter Activity (5 min)

Arrange a practical activity.

- Take two beakers, put ice cubes in A and liquid water in B
- Place on display table and let the ice melt.
- Put beaker B on the burner and let the water evaporate.
- Ask students to share their observations randomly.
- Write, 'Change of state of matter on the board'.

Lesson Methodology (30 min)

Teacher Ideas

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Loud reading will be done by the teacher.
- Teacher will explain the lesson using resources effectively.
- A quick analysis will be done at the end

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to write their observations and conclusions of practical activity.
- Ask students to attempt remaining questions of Unit Review.

Home learning

- Ask students to study the topic for revision.
- Ask students to look at the clinical thermometer to study the scales marked on it.

Lesson Evaluation (5min)

- Ask students to attempt Worksheet #1.

Further Notes

Lesson Plan 2

Class: 7 **Subject:** General Science

Unit: 11

Topic: Heat and Temperature

Subtopics:

- Differences between heat and temperature
- Heat transfer- Conduction
  - Uses of heat conductors in everyday life
  - Convection
  - Conduction currents are used to keep a building well-ventilated and cool
- Radiation
- Heat transfer analysis in the oven
- Expansion and contraction
- Train tracks
- Concrete roads and Paths
- Overhead wires
- Bridges

Date: _____ **Duration:** 2 x 40

Term: _____ **Week:** _____

Learning Objectives:

- To study the topic in detail.
- To understand the architectural innovations in construction, etc., to counter the effect of expansion and contraction.

Learning Outcomes:

- Define the terms heat and temperature on the basis of Kinetic theory.
- Explain why metals are good thermal conductors and fluids are poor conductors of heat using the particle model.
- Construct the concept of heat conduction, convection and radiation by applying particle theory including daily life examples.
- Identify the effects of thermal expansion and contraction with their application in daily life.
- State and explain the practical methods of thermal insulation used for constructing buildings.

Teacher Ideas

Resources:

- Textbook-NAS 7
- Charts
- School paths and other areas showing measures for expansion and contraction.

Starter Activity (5 min)

- Start the lesson by taking students on a walk in the school areas showing construction with room for expansion and contraction.
- Ask students to observe.

Lesson Methodology (30 min)

- Ask students to open their books to assigned page numbers and read. Teacher will facilitate.
- Teacher will do loud reading.
- Explanation will follow. All the resources will be effectively used.
- At the end quick analysis will be given.
- Plenary (5 min)
- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to attempt Quick Review on page #124 and page # 128.
- Ask students to attempt Unit Review.

Home learning

- Ask students to read the topic for revision.

Lesson Evaluation (5min)

- Ask students to attempt worksheet # 2.

Further Notes

Worksheet # 1

Name: _____

Date: _____

Q1*. Write whether the following objects are good conductors of heat or insulators.*

- Iron _____
- Plastic cup _____
- Wooden spoon _____
- Steel fork _____
- Copper wire _____

Q2. *Explain how clinical thermometer works.*

_____

_____

_____

Worksheet # 2

Name: _____

Date: _____

Q1. *What are three modes of heat transfer?*

_____

_____

_____

Q2 *Mark whether true or false. If false write the correct statements.*

a. Heat is transferred from the sun through conduction.

_____

b. Convection currents travel through a vacuum as electromagnetic waves

_____

c. Hot air rises.

_____

d. Convection is the transfer of heat from one part of a fluid to another by the circulatory movement of the heated fluid.

_____

e. Concrete surfaces such as roads and paths contract when heated.

_____

Answer Key

Worksheet # 1

Name: _____

Date:_____

Q1*. Write whether the following objects are good conductors of heat or insulators.*

- Iron

  Good conductor
- Plastic cup

  Insulator
- Wooden spoon

  Insulator
- Steel fork

  Good conductor
- Copper wire

  Good conductor

Q2. *Explain how clinical thermometer work?*

Answer

Clinical thermometers are filled with Mercury. Exterior of the thermometer is made of glass which has scales marked on it, both Centigrade and Fahrenheit. Mercury expands and contracts with changes in temperature. These can be read on the scales.

Answer Key

Worksheet # 2

Name: _____

Date:_____

Q1. *What are three modes of heat transfer?*

The three modes of heat transfer are:

- Conduction
- Convection
- Radiation

***Q2** Mark whether true or false. If false write the correct statements.*

a. Heat is transferred from the sun through conduction.

Answer. False. Heat is transferred from the sun through radiation.

b. Convection currents travel through a vacuum as electromagnetic waves

Answer. False. Radiation travels through a vacuum as electromagnetic waves.

c. Hot air rises.

Answer. True.

d. Convection is the transfer of heat from one part of a fluid to another by the circulatory movement of the heated fluid.

Answer. True.

e. Concrete surfaces such as roads and paths contract when heated.

Answer. False. Concrete surfaces such as roads and paths expand when heated.

Answer key

NAS book 7

Unit 11

Quick Review page # 124

Quick Review

Page # 128

Q1. Convection:- i. Air when heated moves upwards and is replaced by cold air.

ii. Water in oceans gets heated and thus evaporates while below the surface currents move due to convection.

Conduction:-i. Cooking on stoves happens due to conduction of heat through metal utensils.

ii. When a metal spoon is used to stir sugar in coffee it gets heated due to conduction.

Q2.

- Ironing: Irons have a metal base which is a good conductor of heat.
- Plastics: They are insulators which are used in ice boxes for keeping the things cold.

Q3 i. Heat

ii. Heat flow

iii. SI unit of heat is Joule J

iv. Move

v. Convection

Q4. i. True

ii. False

iii. False

iv False

v. False.

Choose the correct answer

1.	b. thermal energy
2.	a. conduction
3.	c. $T_c = T_F$-32/1.8
4.	c. heat of an object
5.	Silver

Vocabulary Review

1.	Conduction
2.	Celsius- Metric System
3.	Radiation

Observe and Answer

a. Thermometer A= 80 ^{0}C

b. Thermometer B= 46.5 ^{0}C

c. Thermometer C= 36 ^{0}C

d. Thermometer D= 190 ^{0}C

Recall and Response

1.

i. solids

ii. close

iii. vibrate

iv. other

v. kinetic energy

vi. good

vii. electrons

2.

Types of Material	Example	Good Conductor	Good Insulator
Solid Metal	Iron	✓	X
Solid Non-metal	plastic	X	✓
Liquid	Mercury	✓	X
Gas	Air	X	✓

Recall and Apply

1. Explanation: The radiation of the fire causes the saucepan to heat up. The conduction of the saucepan then helps to distribute the heat over the saucepan and to give heat to the water. The convection of the water helps in distributing the heat within the water, till all the water is boiling.

2. Since heat energy is unable to be transferred through conduction and convection in a vacuum or empty space, it can only be transferred through radiation. Radiation refers to the transfer or emission of energy using electromagnetic waves. These waves are responsible for warming the Earth's surface.

3. Heat energy always flows from hotter material to colder material. When you hold an ice cube, which results in ice cube obtaining higher temperature and eventually melting. Most people think that the ice feels cold because the cold from the ice is penetrating the skin, but the hand feels cold because the heat from our hand is leaving our skin and moving into the ice.

4. Temperature conversions:

A. Into Fahrenheit

i. 10^0 C

10(^{0}C)-23/1.8=-77.7 ^{0}F

ii. 30^0 C

=30(^{0}C)-32/1.8=12.2 ^{0}F

B. Into Celsius

i. 32^{0}F

T_F= 1.8xT_c+32= 89.6^0 C

ii. 45 ^{0}F

T_F=1.8x45+32= 113^{0}C

C. Into Kelvin

i. O^{0}C

T_K=0+273= 273^{0}K

ii. –50 ^{o}C

Tk = –50 + 273 = 223 K

d. Into Celsius

i. 100^{0}K

T_C= 100-273=-173^{0}C

ii. 200 K

T_C=200-273=-73

Recall and Analyse

1.

Electric Iron: Ironing clothes is an example of conduction, in our homes. Heat is conducted from the iron to the clothes which helps to remove wrinkles. When using an iron, heat level can be adjusted to low, medium or high with steam being the highest heat level. When using steam or spraying water on the material, the water helps transfer heat evenly on the surface.

2.

Conduction is made of transfer of heat in solids. When two objects are in contact with each other, heat is transferred through them in by conduction.

3.

Radiation is different from conduction and convection as no medium is required for heat energy transferred and radiation waves can travel through vacuum.

Unit 12 | EARTH AND SPACE

SUBTOPICS

- Recognise that the force of gravity keeps planets and moons in their orbits.
- Differentiate between mass and weight, using examples of weightlessness experienced by astronauts on the surface of the Moon.
- Recognise that tides are caused by the gravitational pull of the Moon.
- Describe the effects of the Earth's annual revolution around the Sun, given the tilt of its axis (e.g., different seasons, different constellations visible at different times of the year).
- Describe how seasons in Earth's Northern and Southern Hemispheres are related to Earth's annual movement around the Sun.

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 12

Topic: Earth and Space

Subtopics:

- Gravitational field
- Mass versus weight
- The impact of gravity
- Understanding gravity

Date: _____ **Duration:** 2 x 40

Term: _____ **Week:** _____

Learning Objectives:

To enable students to gain knowledge of our part of the universe, solar systems, constellations , etc.

Learning Outcomes:

- Recognise that the force of gravity keeps planets and moons in their orbits.
- Differentiate between mass and weight using examples of weightlessness experienced by astronauts on the surface of the moon.
- Recognise that the tides are caused by gravitational pull of the moon.

Resources:

- Textbook-NAS 7
- Charts

Starter Activity (5 min)

- Place a poster of solar system on the board(cover labels).
- Call students to the board and ask them to identify any one of the celestial bodies. Remove the cover if correct.
- At the completion of the activity, write Earth and Space on the board.

Lesson Methodology (25 min)

- Ask students to open their books to assigned page numbers and read. Teacher will facilitate.
- Loud reading will be done by the teacher.
- Teacher will explain the topic in detail.

Teacher Ideas

- At the end quick analysis will be given.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

Ask students to attempt activity given in the book on page number 133 titled 'Solar Olympics'. Follow the plan given and facilitate.

Home learning

- Ask students to study the topic for revision.

Lesson Evaluation (5min)

Ask students to attempt Worksheet # 1.

Further Notes

Lesson Plan 2

Class: 7 **Subject:** General Science

Unit: 12

Topic: Earth and Space

Subtopics:

- Night and Day
- A year
- Seasons
- The Earth and Moon
- Tides
- Various constellations in space
- Importance of constellations.

Date: _____ **Duration:** 2 x 40
Term: _____ **Week:** _____

Learning Objectives:

- To give a clear concept of changes around us due to movement of Earth, Sun, planets and Moon.
- To develop interest in watching for stars, constellations on the night sky which may develop into lifelong hobby.

Learning Outcomes:

- Describe the effects of the Earth's annual revolution around the Sun, given the tilt of its axis(e.g., different seasons, different constellations, visible at different times of the year).
- Describe how seasons in Earth's Hemisphere are related to Earth's annual movement.

Resources:

- Textbook NAS 7
- Charts
- Video on the topic Link

Starter Activity (5 min)

Arrange an activity for demonstration of galaxies. Choose any two galaxies (e.g., scorpion, big dipper)and take students(volunteers) and give them playcards. Ask students to come and show pattern of one galaxy then next.

Lesson Methodology (25 min)

- Ask students to open their books to assigned page numbers and

Teacher Ideas

read silently. Teacher will facilitate.

- Loud reading will be done by the teacher.
- Explanation will follow. All the resources will be effectively used.
- A video on solar system and constellations will be shown: https://youtu.be/lcZTcfdZ3Ow
- A visit to the planetarium is suggested.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

- Ask students to attempt Quick Review on page # 139
- Ask students to attempt Unit Review.

Home learning

Ask students to study the topic for revision.

Lesson Evaluation (5min)

Ask students to attempt Worksheet #2

Further Notes

Worksheet # 1

Name: _____

Date: _____

Q Answer the given questions:

I. What is gravity?

_____

_____

2. What does gravitational field attract?

_____

_____

3.What is the strength/value of gravitational fields on objects near Earth?

_____

_____

4. What object in our solar system attracts all planets towards it?

_____

_____

5. a. Name the eight planets in our solar system in order.

_____

_____

b. What keeps them in their orbits?

_____

_____

6. Which planet is no more a part of part of our solar system? What group is it a part of?

_____

_____

Worksheet # 2

Name: _____

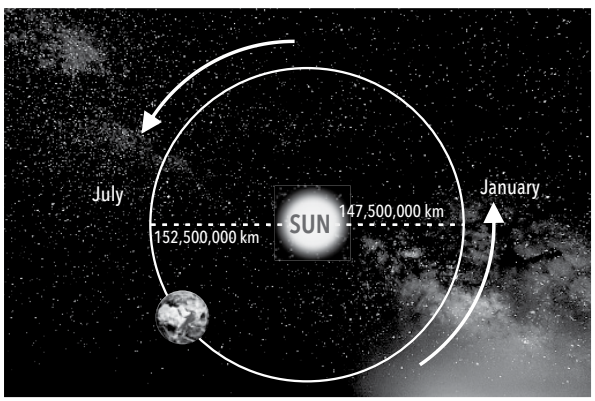
Date: _____

Q1. *Look at the pictures and answer.*

a.

b.

2. What does the given diagram indicate?



3.*Define:*

- Tides

  _____

  _____

- Constellations

  _____

  _____

4. *Name any four constellations.*

- _____
- _____
- _____
- _____

Answer Key

Worksheet # 1

Name: _____

Date:_____

Q Answer the given questions:

I. What is gravity?

Gravity is the force of Earth which pulls the Earth towards its centre.(Same is valid for other celestial planets like and stars).

2. What does gravitational field attract?

It attracts everything that has mass.

3.What is the strength/value of gravitational fields on objects near Earth?

10 N/kg

4. What object in our solar system attracts all planets towards it?

The Sun

5. a. Name the eight planets in our solar system in order.

The eight planets of our solar system are:

- Mercury
- Venus
- Earth
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune

b. What keeps them in their orbits?

Gravitational field of the Sun and other planets.

6. What planet is no more a part of our solar system? What group is it a part of?

Pluto is not considered a part of the solar system. It is now considered a dwarf planet.

Answer Key

Worksheet # 2

Name: _____

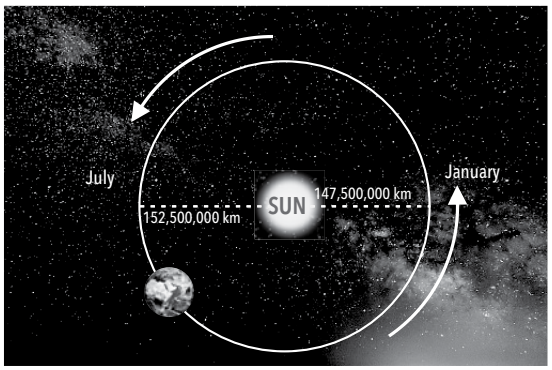
Date:_____

Q1. *Look at the pictures and answer.*

a. Night

b. Day

2. What does the given diagram indicate?



The diagram shows that the Earth's distance varies from the Sun during the year.

3.*Define:*

- Tides
  The regular rise and fall of the water level along a shore.
- Constellations
  A constellation is a group of stars that form a certain pattern in the sky.

4. *Name any four constellations.*

- Orion
- The Big Dipper
- Scorpion
- Southern Cross

Answer key

NAS book 7

Unit 12

Choose the correct answer

1.	ii and iv (ii. It is day on part facing the sun. iv. It is day at P and night at Q
2.	ii and iii (ii. The Earth takes 24 hours to make one complete rotation.
3.	Ii and iv(ii. The Moon moves around the Earth from West to East. iv. The Moon takes about 27 days to move around the Earth.
4.	a.40000 km
5.	d. all of these

Vocabulary Review

1	Gravity
2	constellations
3	Tides

Observe and Answer

Answer It is scorpion. It looks like its given name. Its long curving long tail, trails to south. It can be seen in the southern sky from June to August.

Recall and Response

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

Definitions

- **Gravitational Fields:** Stars and planets have gravitational fields in which they hold the objects due to gravity.
- **Seasons:** The tilt of the Earth on its axis causes different regions of the Earth to experience periods of time with different amount of heat. And light, which we know as seasons.

One word answers

- Orion
- Ursa minor
- The big dipper

Recall and Analyse

1. The rotation of the Earth around its axis causes day and night. Axis is the imaginary line that runs from North to South. The part of the Earth facing the Sun has day time and opposite side has night as there is no light there.

2. It is winter season in Pakistan when it is summer season in Australia.

3. At the North or South Pole, the Sun doesn't rise or set every day. It rises once a year at spring equinox, giving six month of day and six months of night.

4. The weight of an object sometimes changes:

   - If on Earth, an object moves from ground to higher altitude the weight will change.
   - In space, if an object goes where the gravitational field strength is different from gravitational field strength on Earth.

Recall and Apply

1. Gravity holds the Earth on its orbit around the Sun(gravitational field of the Sun).

2. The tides of the Earth are affected when the Moon, Sun and the Earth are aligned. This occurs at the new moon, when Sun, Earth and Moon are in a straight line and at full Moon. When the sequence is Sun, Earth, Moon it cause heavy tides.

Unit 13 TECHNOLOGY IN EVERYDAY LIFE

SUBTOPICS

- Design a model to demonstrate drip and sprinkler irrigation system for conservation of water.
- Use different techniques of preserving foods like orange juice, apple jam and pickles.
- Make a simple Stethoscope.
- Make a sanitizer using suitable substances.

Lesson Plan 1

Class: 7 **Subject:** General Science

Unit: 13

Topic: Technology In Everyday Life

Subtopics:

- Technology in Irrigation
- Drip Irrigation System
- Sprinkler Irrigation System
- Techniques to preserve food
- Making a Sanitizer at home
- How to preserve pickles
- Technology In Health

Date: _____ **Duration:** **2 x 40**
Term: _____ **Week:** _____

Learning Objectives:

- To give awareness of technology and its importance in everyday life.
- To conduct hands-on activities in school and home to demonstrate advantages of technology in our lives.

Learning Outcomes:

- Design a model to demonstrate drip and sprinkler irrigation system for conservation of water.
- Use different techniques of preserving food like orange juice, jams and pickles.
- Make a simple stethoscope.
- Make a sanitizer using suitable substances.

Resources:

- Textbook NAS 7
- Posters of various activities
- Materials for the hands-on activities as given in the book. (For class/lab)

Starter Activity (5 min)

Teacher will ask students some questions;

- What do we use to keep our hands germ free?
- Would you like to make sanitizer at home?
- Share that you will be making several objects through hands on

Teacher Ideas

activities in school and home.

- Write the projects on board.

Lesson Methodology (25 min)

- Ask students to open their books to assigned page numbers and read silently. Teacher will facilitate.
- Loud reading will be done by the teacher.
- Explanation will follow.

Activities

Students will be divided into groups. Following activities will be assigned to each group.

a. Drip Irrigation System

b. Sprinkler Irrigation System

- Make arrangements for the materials earlier which are required for the activities. Distribute.
- Arrange extra support from faculty(lab assistants) to coordinate and facilitate during the progress of the projects.
- At completion, display their products in school garden as working models.

Plenary (5 min)

- Quick PMI chart (Plus, minus, interesting) will be filled.

Assessment Opportunities (30 min)

The drip and sprinkler systems will provide grounds for teachers to assess success or failure of the projects.

Home learning

- Ask students to study the following topics.
- Use the following techniques at home:

1. Techniques to preserve food.

2, Making a sanitizer at home.

3. How to preserve pickles.

4. Technology in health—Making a stethoscope.

Lesson Evaluation (5min)

- Ask students to bring home-made sanitizers and stethoscope to school and display.