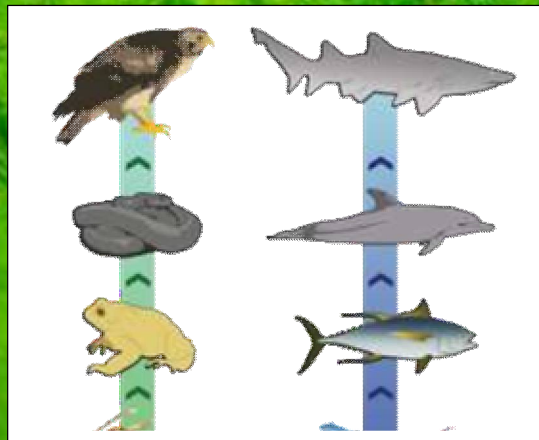




PROFESSIONAL ENGLISH

ENGLISH FOR LIFE SCIENCES



PROFESSIONAL ENGLISH FOR LIFE SCIENCES

OBJECTIVES:

- To develop the language skills of students by offering adequate practice in professional contexts.
- To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
- To focus on developing students' knowledge of domain specific registers and the required language skills.
- To develop strategic competence that will help in efficient communication
- To sharpen students' critical thinking skills and make students culturally aware of the target situation.

LEARNING OUTCOMES:

- Recognise their own ability to improve their own competence in using the language
- Use language for speaking with confidence in an intelligible and acceptable manner
- Understand the importance of reading for life
- Read independently unfamiliar texts with comprehension
- Understand the importance of writing in academic life
- Write simple sentences without committing error of spelling or grammar

(Outcomes based on guidelines in UGC LOCF – Generic Elective)

NB: All four skills are taught based on texts/passages.

UNIT 1: COMMUNICATION

Listening: Listening to audio text and answering questions

- Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning-

Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast

Paragraph-Sentence Definition and Extended definition-

Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES

Listening: Listening to interviews of specialists / Inventors in fields
(Subject specific)

Speaking: Brainstorming. (Mind mapping).
Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations
Interpreting Visuals inputs

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading : Comprehension passages –Note making.
Comprehension: Motivational article on Professional Competence,
Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

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PREFACE

The textbook on Professional English envisioned under the leadership of the Hon. Chief Minister of Tamilnadu, Thiru. Edappadi K.Palaniswami by the Honorable Minister for Higher Education Thiru. K.P. Anbalagan, and Principal Secretary to Government, Department of Higher Education, Selvi. Apoorva, I.A.S., is a pioneering venture and strategic intervention in higher education in Tamil Nadu. It has been prepared with the unstinted support of Thiru. Vivekanandan, I.A.S. Member Secretary, TANSCHHE (Tamil Nadu State Council for Higher Education)

Tamil Nadu has the distinction of having the highest GER (Gross Enrolment Ratio) of 49%, in higher education in the country: this figure attests to the efforts of the government to empower the youth of the state by enhancing access to higher education.

After duly examining the challenges faced by students in learning their subjects and with a vision to equip them to compete in a global scenario, four textbooks, *English for Physical Science*, *English for Life Sciences*, *English for Arts and Social Sciences* and *English for Commerce and Management* have been prepared.

As language is an essential tool with regard to the learning process, a textbook which uses subject/discipline based content to leverage language learning is an ideal approach and fulfills the dual objective language proficiency and professional competence.

The book is bound to fulfill its destiny as teachers and students work in tandem: teachers as facilitators and learners as highly motivated stakeholders.

Disclaimer

Some of the passages given for Listening, Speaking, Reading and Writing lend themselves to the teaching of Grammar items. However, testing and evaluation does not include Grammar.

This material is not for publication: it is only for training purposes.

UNIT – 1 COMMUNICATION

Listening - Listening to audio/ video text and answering questions/ Listening to instructions

Speaking – Pair work and small group work

Reading – Comprehension passages- Differentiate between facts and opinions

Writing – Developing a story with pictures

Vocabulary- Register specific (Incorporated into the LSRW tasks)

UNIT 1 Communication

Language and communication are not the same. But they are part of any speech community. People who share a language for communication are considered as speech community. You use English for academic purposes in your university for learning. You, along with your college mates and your teachers make the academic community. The way you express your views to your teacher is different from how you speak with your family members at home. This differentiated use of language is called 'register' in any language. In language parlance it is called socio-linguistics i.e. the use of language in the social context. Your language used with friends and relatives for casual communication is called Basic Interpersonal Communication. But your use of language for academic purposes is called Academic Communication.

1: LISTENING: Aim

- 1. To understand the concept and the use of words in context as discussed in the passage.**
- 2. To develop the skill of listening for information to facilitate effective learning.**



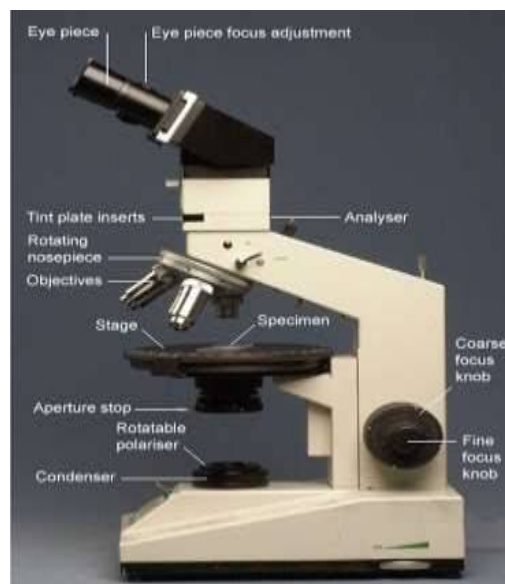
Pre-Listening:

1. What is an instruction?
2. Why are instructions to be listened to?
3. What is the purpose of following instructions?
 - An instruction is an order or detailed information about how something should be done.
 - Listening carefully to the instructions is a vital part of any communication.
 - A strict adherence to the instructions will help the listener produce the desired result.

Listening:

Your teacher will read the following instructions that are necessary to use a microscope.

Listen to the instructions carefully and notice their sentence structure.

**Instructions to Use a Microscope**

1. *Turn* the **Rotating Nosepiece** to set the lowest power **Objective Lens** into position.
2. *Place* the microscopic **Slide** on the **Stage** of the microscope.
3. *Fasten* the **Slide** with the **Stage Clips** on the Stage.
4. *Turn* the **Focus Knob** to move the **Stage** upward.
5. *Look* through the **Eyepiece** and move the **Focus Knob** for the image to come into focus.
6. *Adjust* the **Condenser**.
7. *Move* the **Slide** until the sample is clearly viewed.
8. *Use* the **Focus Knob** to focus the sample.
9. *Readjust* the **Condenser** for the clearest image.
10. *Do not touch* the **lenses** with your fingers.

Discussion:

Notice the words given in *Italics* in the above instructions (*Turn, Place, . . .*). These are the root forms of Verbs (action words).

The root forms of the verbs are used for framing instructions.

The sentences that begin with the base verbs are called Imperative Sentences.

The imperative sentences are direct and are used to give instructions.

'You' is the implied subject of Imperative Sentences.

The root form of the Verb (**V**) is followed by the Object (**O**) pattern while framing an instruction.

Example: **Take the book.**

V O

Do not / Don't is used before the root verb for framing a negative instruction.

Example: **Do not touch the electric wire.**

Sequential order should be followed while giving instructions.

Instructions should be specific and clear.

It is impolite to use instructions to the people in authority.

To make an instruction polite, the word 'please' can be used.

Example: **Please pass the book./ Sit down, please.**

Imperatives

Imperative is a type of sentence. It has its common use in our everyday life. If something is defined as imperative, on a general note, it is to be understood as something important and requiring immediate action.

To to explain its usage briefly, Imperative sentences come as

- Instruction (Use gloves in the lab)
- Request (Plant trees)
- Advice (Read research articles on a bio genesis)
- Command (Sell sugar-free products)
- Invitation (Please join for the trip)

By its usage, it can be called directives because it tells people what to do.

These sentences usually end with a period/ full stop (.) occasionally it ends with an exclamation mark (!)

Structure

- ✓ Imperative sentences begin with a verb
- ✓ Subject is not implied, remains hidden

Practice Sentences

1. Be careful.
2. Do not cross the street on the red light.
3. Speak slowly, please.
4. Don't drink this water.
5. Drive carefully.
6. Don't forget to feed the hamster.
7. Buy two syringes in the pharmacy.

8. Water the flowers.
9. Do not dissect with naked hands.
10. Dilute the concentrated acid slowly.

Post-Listening:

I. Discuss in pairs and complete the following instructions that are to be followed while working in the laboratories by choosing the appropriate root forms of Verbs given within brackets.



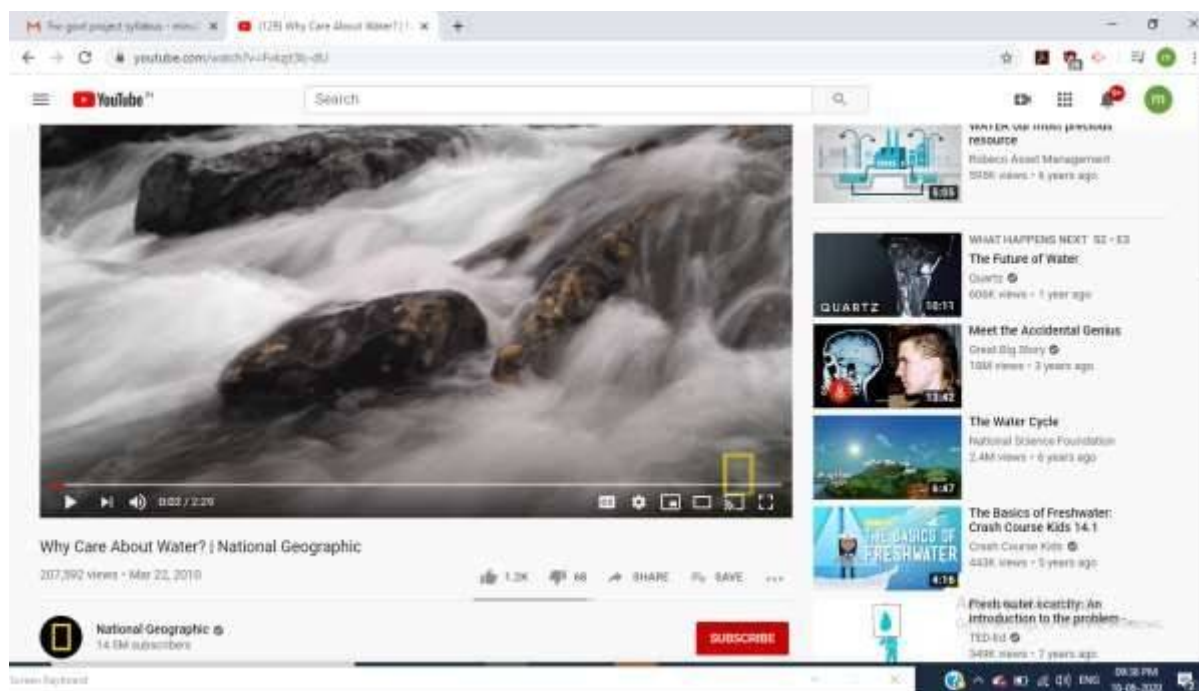
(Rinse, Wear, Arrange, Dispose, Handle, Do not, Clean, Dilute)

1. lab coat before entering the lab.
2. eat in the lab.
3. the concentrated acids in the presence of your professor.
4. glassware with care.
5. the apparatus before and after the experiment.
6. the spills immediately.
7. waste in the dustbin.
8. the apparatus in order after the experiment is over.

II. Listen to the video documentary that highlights the importance of water for the lives on the earth. Write FIVE instructions to conserve water.

Why Care about Water - National Geographic Channel

<https://www.youtube.com/watch?v=Fvkzjt3b-dU>



Transcription of the video:

Why Care about Water

Water is the basis of life and only a tiny share of all the water on Earth is fresh and renewed by the water cycle. If you took all the water in the world and put it into a gallon jug, less than one teaspoon of it would be available to us. We are overusing it. We are over tapping rivers and we are over pumping groundwater. We live at a time in history where over a billion people don't have access to safe drinking water and over three billion people have no access to sanitation.

Water is a global issue but it's also a very local issue. We forget that we live on hydrosphere and that all of our water resources are connected. Water that runs in the Ganges could also end up in the Hudson or could fall over the

plains of Africa or could make a cup of tea in the Queen's palace. To support the average American lifestyle today it takes about twice the global average.

The great American lawn is a great example of one of the myriad ways that we take water for granted. We can't continue to flaunt our water. Agriculture is something that we really need to give thought to. 70% of all the water we extract from rivers, lakes and aquifers goes to irrigated agriculture. To some extent we are using some of tomorrow's water to meet today's food demands. Large number people I talked to are shocked when they learn that the Colorado, the mighty force of nature no longer reaches the sea. There is a look of shock in most people's faces. At the Delta, it literally runs dry. We are using and abusing our water resources in ways that are completely unsustainable and unless we think about it that way and start taking action at an individual level then I don't really see how we'll be able to overcome so many of the issues that we are going to face with in the next 50 years and this is our time in history to do something about it.

TASK 1: Listen to the given Video documentary and match the following words with their meaning:

- | | | |
|----------------|---|---|
| 1. Hydrosphere | - | A unit of liquid |
| 2. Gallon | - | All the waters on the earth's surface |
| 3. Sanitation | - | A body of permeable rock which can contain and transmit groundwater |
| 4. Aquifers | - | A source of supply, support, or aid |
| 5. Resource | - | The process of keeping places clean and healthy |

TASK 2: Five Instructions to Conserve Water:

1.

.....

2.

.....

3.

.....

4.

.....

5.

.....

2-SPEAKING

The most effective way to communicate is through speech. Speaking is a skill and an important mode of communication. It takes place in the form of conversation. Through speech we can express our feelings, ideas and points of view to others. It's important to be effective in both speaking and listening depending on the situation you are in or the person you are talking to. There are two ways of conversation. (i) formal (ii) informal. Formal conversation is speaking with an unknown person or an official. Informal conversation is talking between friends, relatives, elders or persons whom we know.

1. Here is a model dialogue between a patient and a nutritionist. Infer how formal conversation is used:

Nutritionist: *Mr. Bose could you follow this diet for the next two months?*

Patient : *Yes ma'am, I think I can follow because I'm determined to do so.*

Nutritionist: *You need to take food rich in protein and vitamins.*

Patient : *Ok ma'am. Can I consume dairy products?*

Nutritionist : *No Mr. Bose you must avoid milk and milk products.*

Patient : *What can I take instead of milk?*

Nutritionist : *You ought to take veggies, greens and pulses.*

Patient : *Sure ma'am. I will include them in my diet.*

Nutritionist : You could include some small amount of red meat too.

Patient : Ok. Can I take fish?

Nutritionist : Yes you can include.

Patient : May I know what else can be taken?

Nutritionist : Here is a diet plan for a week. You would be able to feel the difference in a month.

Patient : Thank you ma'am. It might work for me this time I hope.

Task 1: Pair work-Develop a conversation between a professor and a student regarding a new robotic machine that waters plants and discuss how it works.

Modals

We can understand our mood by the way we express our feelings both in writing and in speaking. Certain words while used make the listener or reader understand moods and emotions. We do this by using modal auxiliaries.

The modal verbs of English are auxiliary verbs used mostly to express modality such as possibility, obligation, etc. They can be distinguished from other verbs by their defectiveness and by their neutralization. They are also called *Modal Auxiliaries*

By Learning Modals we can:

- **Define and identify modal auxiliaries.**
- **Learn how and when to use modal auxiliaries.**

Modal verbs are:

*can, could,
may, might, must,
shall, should,
will and would.
used to
need to
dare to*

Here is an easy table that makes to understand Modals in a better way:

Modal Auxiliary	Use	Modal Auxiliary + Main Verb
can	Expresses an ability or possibility	I can lift this forty-pound box. (ability)
		We can embrace green sources of energy. (possibility)
could	Expresses an ability in the past; a present possibility; a past or future permission	I could beat you at chess when we were kids. (past ability)
		We could bake a pie! (present possibility)
		Could we pick some flowers from the garden? (future permission)
may	Expresses uncertain future action; permission; ask a yes-no question	I may attend the concert. (uncertain future action)
		You may begin the exam. (permission)
		May I attend the concert? (yes-no questions)
might	Expresses uncertain future action	I might attend the concert (uncertain future action—same as <i>may</i>)
shall	Expresses intended future action	I shall go to the opera. (intended future action)
should	Expresses obligation; ask if an obligation exists	I should mail my RSVP. (obligation, same as <i>ought to</i>)
		Should I call my mother? (asking if an obligation exists)
will	Expresses intended future action; ask a favor; ask for information	I will get an A in this class. (intended future action)
		Will you buy me some chocolate? (favor)
		Will you be finished soon? (information)
would	States a preference; request a choice politely; explain an action; introduce habitual past actions	I would like the steak, please. (preference)
		Would you like to have breakfast in bed? (request a choice politely)
		I would go with you if I didn't have to babysit tonight. (explain an action)
		He would write to me every week when we were dating. (habitual past action)
must	Expresses obligation	We must be on time for class.

ought to	Expresses obligation	I ought to mail my RSVP. (obligation, same as may)
need to	Expresses obligation	I need to finish this on time. (obligation, same as ought to)
dare to	Expresses boldness, challenge etc	I dare to take this risk (boldness, challenge)

Task 2: Fill in the blanks with suitable modal verbs.

- _____ I get in the car?
- It _____ rain tonight.
- _____ I be allowed to join the company?
- You _____ study for the exam.
- I _____ not speak another word.

(*dare, must, will, might, can*)

Task 3: Change the modals underlined by choosing a more suitable one from the list.

- I think it should rain tomorrow morning
- Will I borrow a compass from you?
- Shall you be able to visit me tomorrow?
- You will go now.
- I could finish it by evening.

(will, might, may, can, could)

2. Here is a model dialogue for informal conversation between friends who meet after a long time:

Jitesh: Hi, Aparna. How are you? It has been long since we met.

Aparna: Hi, Jitesh. I am good. How are you? Very happy to meet you.

Jitesh: I am sure you have completed your Graduation. What are you doing now?

Aparna: I did UG in Bio Chemistry in Chennai. I am working in a Diagnostic Centre in Adyar.

Jitesh: That's good.

Aparna: What about you? I remember you joining Engineering at ABC college.

Jitesh: Yes I completed Electronics and Communication Engineering. I got selected in Campus Interview and I am waiting to join CTS, Chennai.

Aparna: Congratulations! I am on my way to Adyar to report for duty at 8'o clock.

Jitesh: Ok. We will keep in touch. Bye for now.

Aparna: Sure. Convey my regards to your parents.

Jitesh: Sure. Good luck. Bye.

Task 4: Small group work-Start an informal conversation among your friends in small groups regarding making plans for a get-together.

3. READING

LSRW is an order of activity with regard to any language skills. Here 'R' refers to READING. It is considered a good source of self education. One of the important elements of reading is the interaction between language and thought.

Sir Francis Bacon, Father of English Essays, once said

Read not to contradict and confute; nor to believe and take for granted; nor to find talk and discourse; but to weigh and consider

The purpose of reading is not to put forth opposite views or forcibly refuse others' point; As well as not to believe everything is true; Similarly reading is not just to get points for any discourse. Instead, a proper reading should result in weighing the concept thoroughly and considering it as a source of information.



Source: <https://www.pxfuel.com/en/free-photo-emsxt>

Reading is a skill. So it can be taught, nurtured, practised and developed over a period of time. Book is a fundamental source of reading. Again, as said by Sir Francis Bacon,

Some books are to be tasted, others to be swallowed, and some few to be chewed and digested: that is, some books are to be read only in parts; others to be read, but not curiously; and some few to be read wholly, and with diligence and attention



Source: <https://www.pxfuel.com/en/free-photo-xnrvo>

Pre-reading task: Learning New words and Concepts

What is molecular biology?

Has an Indian Biologist ever won a Nobel Prize?

What is synthetic gene?

Who is Har Gobind Khorana?

PASSAGE 1-Professor Har Gobind Khorana



Professor Har Gobind Khorana was born on 9th January, 1922(Raipur, Punjab, British India) Died on 9th December, 2011(Concord, Massachusetts, United States) Khorana was one of the first scientists to demonstrate the role of nucleotides in protein synthesis and helped crack the genetic code. He also helped develop custom-designed pieces of artificial genes and methods that anticipated the invention of the polymerase chain reaction (PCR) process, a biochemical technology used to amplify a single or a few copies of a piece of DNA.

Education

Khorana received his first four years of education from a village teacher while sitting under a tree. After this Khorana attended D.A.V. High School in the near-by city of Multan (now West Punjab) and then applied to study English literature and chemistry at the Government College in Lahore which was affiliated to Punjab University. In the end he decided to study chemistry and received his bachelor's degree in 1943. Two years later he had completed a master's degree at the same institution.

In 1945 Khorana gained a Government of India fellowship to undertake a doctorate in England which he intended to use to study insecticides and fungicides. He landed up, however, studying the chemistry of melanins under the supervision of Roger J.S. Beer at Liverpool University. It was the only doctoral placement the Indian High Commission office in London could find him. Khorana completed his doctorate in 1948.

Career

From early on Khorana did not stick to the rigid boundaries of disciplines and his work was to take him across the fields of chemistry, biology and physics. This was unusual for scientists of his generation. Whenever he undertook a new project Khorana secured time in other laboratories so that he could master the techniques he needed to carry an idea forward.

As soon as he finished his doctorate, based on the importance of German scientific literature, Khorana decided he would benefit from pursuing his post-doctoral research in a German-speaking country. To this end he spent 11 months in Zurich between 1948 and 1949 at the Organic Chemistry Laboratory at the Swiss Federal Institute of Technology (ETH) where he researched alkaloid chemistry with Vladimir Prelog. Khorana greatly valued the philosophy and work ethics Prelog passed on to him during this time.

Khorana unfortunately had to cut short his visit to Switzerland because he had no stipend and his savings were running out. Thereafter, Khorana returned to the Punjab in order to fulfil the requirements of his Indian government scholarship. He found it difficult, however, to find a job because of the upheaval caused by the recent partition of British India.

What came to his rescue was the offer of a fellowship at Cambridge University. This he secured through the help of the Cambridge based scientist G.W. Kenner whom he had met in Zurich. In 1950 Khorana returned to England with money scraped together by his extended family to pay for his ship's passage. Over the next two years Khorana worked alongside Alexander Todd trying to define the chemical structures of nucleic acids. This was an exciting time to be in Cambridge because Fred Sanger was then in the process of sequencing insulin, the first protein to be sequenced, and Max Perutz and John Kendrew were performing the first x-rays of myoglobin and haemoglobin. Such work inspired Khorana to start looking at proteins and nuclear acids.

In 1952 Khorana was offered a position in Vancouver to start a new non-academic research laboratory based on a recommendation by Todd to Gordon M. Shrum, head of the British Columbia Research Council. While the laboratory in Vancouver had very little in the way of facilities, Khorana treasured the freedom the job gave him to pursue his own research. He soon launched a number of projects researching phosphage esters and nucleic acids. Such work necessitated him developing methods to synthesise short oligonucleotides. His publication of these techniques soon attracted the attention of notable biochemists, such as Arthur Kornberg and Paul Berg, who were eager to visit him to learn from him and gain his reagents.

In 1960 Khorana moved to the Enzyme Institute at the University of Wisconsin-Madison where he began working on the genetic code and chemical synthesis of a transfer RNA gene. During this time he and his colleagues determined how the synthesis of proteins is controlled by nucleotides in nucleic acids. In 1970 Khorana transferred to the Massachusetts Institute of Technology where he began investigating the molecular mechanism that governs the cell signalling pathways of vision. This was a topic he pursued until his retirement in 2007.

Achievements

In 1968 Khorana was awarded the Nobel Prize for Physiology or Medicine with Marshall W. Nirenberg of Cornell University and Robert W. Holley of the National Institutes of Health. They were awarded for their elucidation of the genetic code and its function in protein synthesis. Khorana's work confirmed Nirenberg's finding that the chemical composition and function of a new cell is determined by how the four nucleotides are arranged on the spiral 'staircase' of a DNA molecule. He also demonstrated that the nucleotide code is always transmitted in groups of three, called codons, and that these codons instruct the cell to start and stop the production of proteins. Khorana was also one of the first to outline the possibility of gene manipulation. This he did before any individual genes had been characterised from any organism.

Khorana is also credited with having devised techniques for the creation of synthetic DNA oligonucleotides, which provided a building block for the creation of artificial genes and primers and templates for DNA polymerase. This work laid the foundation for the development of the polymerase chain reaction (PCR), a technique that enables the amplification of small fragments of DNA to billions of copies within a matter of hours.

In 1976 Khorana and his colleagues at MIT achieved the first synthesis of an artificial gene in a living cell. Their method of chemically synthesising genes helped facilitate controlled, systematic studies of how genetic structure influences function.

Alongside his Nobel prize, Khorana was awarded the Louisa Gross Horwitz Prize from Columbia University and the Lasker Foundation Award for Basic Medical Research in 1968; the Willard Gibbs Medal of the Chicago section of the American Chemical Society, in 1974; the Gairdner Foundation Annual Award, in 1980; and the Paul Kayser International Award of Merit in Retina Research, in 1987. In 2007 the University of Wisconsin-Madison, the Government of India and the Indo-US Science and Technology Forum founded the Khorana Program in Khorana's honour to facilitate the exchange of students between the university and Indian research institutions.

TASK1: Read the passage and describe any two characteristics of the scientist Har Gobind Khorana. Justify why you consider them as his predominant

characteristics: you can discuss with your friend and arrive at a consensus on your view.

- Discuss in groups and comment on the scientific contribution of the scientist to the field of genetic code and gene manipulation.
- Explain the Nobel Laureate's dedication to the science of gene.
- Explain to your friend what you know about gene manipulation. You can even google search for further knowledge.

Google search link: <https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/genetic-manipulation>

TASK 2: Facts and Opinions

Interpretation is an essential part of reading. While feeling happy about the Indian origin (undivided India under British rule) of the Nobel Laureate, Har Gobind Khorana, don't you feel sad that we have lost our Scientist to another country?

- Say about your conviction to work in our country or to work abroad after completing your education. Ask for your friend's opinion and inform the class.
- What is your opinion on 'brain drain'? Can you justify the facts that influenced the scientist leave India for better opportunities?

TASK 3:

Match the expressions with their meanings (One word substitutes are good for utterance. They make your speech short and to the point without elaborating much.)

1. pioneer - a famous person viewed as a symbol of some idea
 - visionary – chemicals used to destroy fungus
 - icon – chemicals used for killing insects
 - siblings – scientist who studies the chemistry of living things
 - testament - long walk in the country
 - landmark – exceptionally talented
 - insecticides - brothers and sisters born to the same parents
 - fungicides - a person who plans for the future with great imagination
 - Retirement – journey to a holy place for religious reasons

- Pilgrimage - a person who is the first to develop certain area of knowledge
 - Hiking - proof of something
 - Stipend - an experienced person who advises and helps someone with less experience over a period of time
 - Biochemist - something that is clear and distinct from others
 - Mentor - stopping to work because one has reached a particular age
- Extraordinary - an amount of money regularly paid monthly to someone to live on

TASK 4:

'My Favourite Scientist'. Each one can prepare and deliver a one-minute speech on any Scientist.

PASSAGE 2 -Vertebrate or Invertebrate?

Scientists who study the animal kingdom classify animals into different groups, based on different characteristics. Some characteristics scientists study are: what makes up the animal's skin, such as hair or scales whether animals give birth to live babies or lay eggs whether mothers feed their babies milk from their own bodies whether animals are warm-blooded or cold blooded.

Another key characteristic that scientists study is whether animals have a backbone. Animals that have a backbone are called vertebrates. Humans are vertebrates. Place your hand on the back of your neck until you feel a bump. Now, rub your hand up and down the middle of your back. Do you feel bumpy bones that run in a row down your back, from your neck down to your waist? That's your backbone. Another name for a backbone is a spine. The backbone or spine wraps around and protects an important part of your body called the spinal cord. The spinal cord is a bundle of nerves. Messages travel up and down your spinal cord from your brain to other parts of your body. This is the way that your brain sends signals telling the other parts of your body what to do.



Many other animals also are vertebrates. All mammals, reptiles, fish, and birds have a backbone, so they are all vertebrates. They have some type of spinal cord, too.

Animals with a backbone come in all different shapes and sizes. Apes, rhinos, horses, rabbits, bats-and yes, rats and humans, too-are all mammals and vertebrates. Lizards, turtles, snakes, and crocodiles are reptiles and vertebrates. Huge sharks and tiny goldfish are also vertebrates. Small hummingbirds and large eagles are vertebrates, too.

But there are many more animals that do not have a backbone. Animals without a backbone are called invertebrates. Insects are the largest group in the animal kingdom. Insects are also the largest group of invertebrates. Insects include flies, wasps, beetles, cockroaches, ladybugs, and butterflies. Other kinds of invertebrates include earthworms and spiders.

Source: <https://images.app.goo.gl/dVyQgBMC7Zamwe9g6>
<https://youtu.be/mRidGna-V4E>

This text is adapted from an original work of the Core Knowledge Foundation.

Task 1:

List out new words you learnt in the passage above and find their meanings

Source: <https://4.files.edl.io/9d86/05/18/20/063351-7b4f1401-ac8e-4752-9a97-f6d7e987f248.pdf>

Task 2:

Find the vertebrates (V) and invertebrates (Iv).





Source: <https://4.files.edl.io/9d86/05/18/20/063351-7b4f1401-ac8e-4752-9a97-f6d7e987f248.pdf>

Task – 3

Word puzzle: Find out the hidden words from the given grid and write them in the table given below.

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

VERTEBRATES					INVERTEBRATES				
1.					1.				
2.					2.				
3.					3.				
4.					4.				
5.					5.				
6.					6.				

7.	7.
8.	8.
9.	9.
10.	10.

Task 4: Find out the type of species which is mentioned below with the help of a dictionary

1. Newt -
2. Amphibian -
3. Echinoderm -
4. Arthropod -
5. Molluscs -

Task 5: Match the following:

S. No	Who am I ?	I am a/an
1.	I have five arms but neither have blood nor brain. I live in sea.	Spider
2.	I have eight legs but don't have antennae.	Dog
3.	I am a domestic animal. A friend of police and enemy for thieves.	Lion
4.	I am the king of the jungle. I belong to cat family.	Earthworm
5.	I live inside the soil. I do not have, eyes, arms or legs.	Starfish

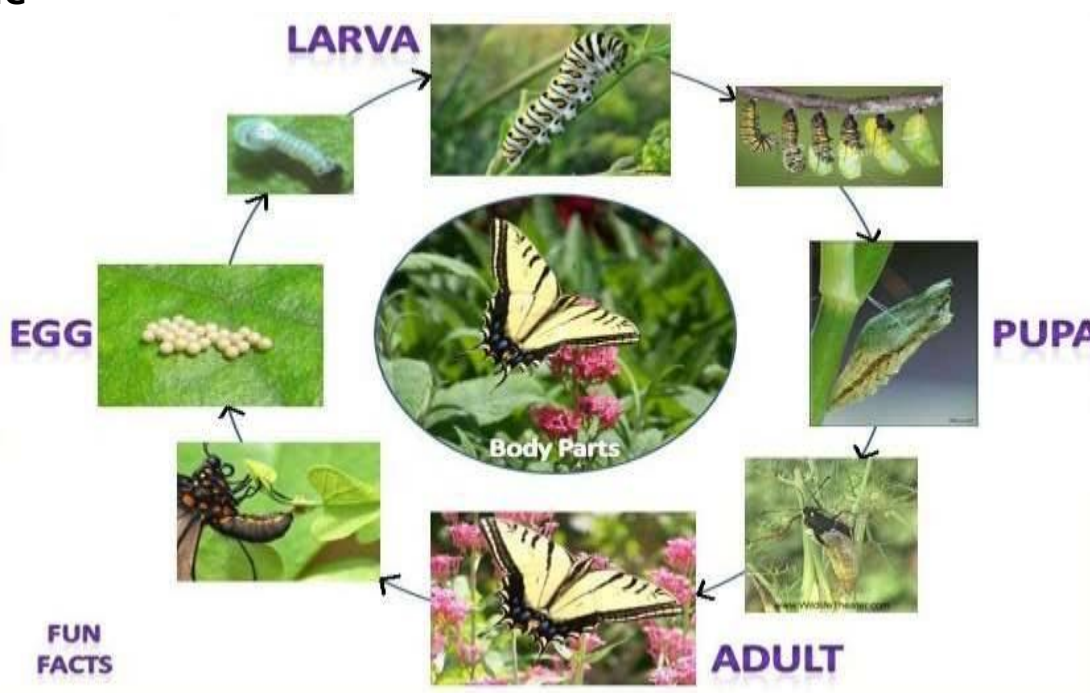
WRITING

Pictures are usually considered to be forerunners of true writing. Picture writing is defined as recording of events or expression of messages, actions or facts. A picture writing is a great way to convey your message quickly to an audience. It is easy to understand the information and difficult concepts. Pictures help us connect what we observe with reason and link concepts with words. Pictures are not mere decorations or illustrations of the text. They enhance the writing with emotions. Pictures share passions, fears, sadness, hardships and joys and help us understand ourselves better and find commonality with others.

A good picture writing should contain correct pictures related to the content. Look at all the pictures and describe them exactly. Understand the gist of the content given. Take notes on each picture. Start writing the content picture by picture. Use literal speech and active verbs. Conclude the write up based on the last picture.

PASSAGE 1- Life Cycle of a Butterfly-Metamorphosis

Let's explore a butterfly's life cycle in detail, including all four stages of life



The Butterfly's Life Cycle

All butterflies have "complete metamorphosis. To grow into an adult they go through 4 stages: egg, larva, pupa and adult. Each stage has a different goal - for instance, caterpillars need to eat a lot and adults need to reproduce. Depending on the type of butterfly, the life cycle of a butterfly may take anywhere from one month to a whole year.

The First Stage: The Egg

Butterfly Eggs on a Leaf

A butterfly starts life as a very small, round, oval or cylindrical egg. The coolest thing about butterfly eggs, especially monarch butterfly eggs, is that if you look close enough you can actually see the tiny caterpillar growing inside it. Some butterfly eggs may be round, some oval and some may be ribbed while others may have other features. The egg shape depends on the type of butterfly that laid the egg.

Butterfly eggs are usually laid on the leaves of plants, so if you are actively searching for these very tiny eggs, you will have to take some time and examine quite a few leaves in order to find some.

The Second Stage: The Larva (Caterpillar)

Butterfly Caterpillar

When the egg finally hatches, most of you would expect a butterfly to emerge, right? Well, not exactly. In the butterfly's life cycle, there are four stages and this is only the second stage. Butterfly larvae are actually what we call caterpillars. Caterpillars do not stay in this stage for very long and mostly, in this stage all they do is eat.

When the egg hatches, the caterpillar will start his work and eat the leaf they were born onto. This is really important because the mother butterfly needs to lay her eggs on the type of leaf the caterpillar will eat – each caterpillar type likes only certain types of leaves. Since they are tiny and cannot travel to a new plant, the caterpillar needs to hatch on the kind of leaf it wants to eat.

Caterpillars need to eat and eat so they can grow quickly. When a caterpillar is born, they are extremely small. When they start eating, they instantly start growing and expanding. Their exoskeleton (skin) does not stretch or grow, so they grow by "moulting" (shedding the outgrown skin) several times while it grows.

The Third Stage: Pupa (Chrysalis)

Caterpillar Becoming a Chrysalis

The pupa stage is one of the coolest stages of a butterfly's life. As soon as a caterpillar is done growing and they have reached their full length/weight, they form themselves into a pupa, also known as a chrysalis. From the outside of the pupa, it looks as if the caterpillar may just be resting, but the inside is where all of the action is. Inside of the pupa, the caterpillar is rapidly changing.

Monarch Caterpillar Becoming a Chrysalis

Now, as most people know, caterpillars are short, stubby and have no wings at all. Within the chrysalis the old body parts of the caterpillar are undergoing a remarkable transformation, called 'metamorphosis,' to become the beautiful parts that make up the butterfly that will emerge. Tissue, limbs and organs of a caterpillar have all been changed by the time the pupa is finished and is now ready for the final stage of a butterfly's life cycle.

The Fourth Stage: Adult Butterfly

Butterfly Emerging from a Chrysalis

Finally, when the caterpillar has done all of its forming and changing inside the pupa, if you are lucky, you will get to see an adult butterfly emerge. When the butterfly first emerges from the chrysalis, both of the wings are going to be soft and folded against its body. This is because the butterfly had to fit all its new parts inside of the pupa.

Watch a Monarch Hatching

As soon as the butterfly has rested after coming out of the chrysalis, it will pump blood into the wings in order to get them working and flapping – then they get to fly. Usually within a three or four-hour period, the butterfly will master flying and will search for a mate in order to reproduce.

When in the fourth and final stage of their lives, adult butterflies are constantly on the look out to reproduce and when a female lays their eggs on some leaves, the butterfly life cycle will start all over.

Task 1: Write the stages of human life cycle.

Task 2: Narrate a story with the pictures given below. In the land of India, there was a fable told of six blind men who were taken to an elephant and asked to describe what the animal looked like.





Source: <https://www.youtube.com/watch?v=waToWktB7ag>

<https://www.youtube.com/watch?v=jivWeOrCaeI>

<https://www.youtube.com/watch?v=aB-F-yVLbA>

UNIT – 2

DESCRIPTION

Listening

- Listening to process description-drawing a flow chart

Speaking

- Role play (formal context)

Reading

- Skimming and scanning
- Reading passages on products, equipment and gadgets

Writing

- Process description
- compare and contrast
- Single sentence and extended definitions/ Free writing

Vocabulary:

- Register specific (Incorporated into the LSRW tasks)

Unit 2

Description

1. Listening

What is listening? Listening is a conscious process. It is better than hearing which is more or less a mere physical process and done as an unconscious act. Listening requires your complete involvement mentally and physically using your faculties namely auditory, mental and visual. It is not a passive activity but an active process of decoding the communicated message in accordance with the speaker's language use. Listening to correct English regularly helps you strengthen your spoken English with regard to accent, pronunciation of words with correct stress, intonation and modulations in tone and ultimately fluency too.

The following YouTube link will give an opportunity to listen to a content- rich video that tells you how to grow a hibiscus sapling, as a step by step process.

<https://www.youtube.com/watch?v=GCeUfp2p89s>



Listening Comprehension

Initially you can check your understanding with the transcription given in the video. To make you familiar with it, the transcription is given below.

Transcript of the Video

Hey guys! A lot of you many times have requested to do more videos on flowering plants. I have been able to do much of them, so I thought of collaborating with a gardening enthusiast and a very successful YouTuber 'Urban Gardener'. Today, he is going to share a trick on how you can start growing a hibiscus plant in water from a cutting. Now, to him-

Hello friends, today we will learn how to start growing a hibiscus in water which is a very simple way to propagate hibiscus.

- Take 4 to 5 semi hardwood cuttings or semi ripe cuttings like this.
- Prepare the cuttings by removing all the leaves with the help of a secateurs and trim to 4 to 6 inches long.
- Make a cut at about 45 degree angle just below the nodes; these are the nodes; they may occur just below the node like this. This allows the largest surface area to absorb water.
- Prepare all cuttings properly in the same manner.
- Take a glass and fill it with water till three inches from the bottom.
- Take the cuttings and scratch a little to expose the inner layer from one or two sides. This increases the area from which roots will be produced.
- Dip all the cuttings in the water.
- Keep the glass in partial shade and after 3-4 days new roots will start developing from the wounded part of the cuttings.
- After 9 days your cuttings will look like this.
- These are the new roots that are forming at this stage; you can plant this cutting.
- Take a well-drained pot and fill it with the potting mix; for potting mix take 50% normal garden soil 30%organic compost and 20% fine sand; make a hole in the centre and just place the cutting in the middle and gently push the soil against the stem to provide support.

- Keep the pot in a bright location where it can get filtered sunlight and after 45 days your cutting will look like this; you can see the new leaves and after two months your cutting will look like this.
- If you want to watch more videos on urban gardening don't forget to subscribe to his channel.
- Link to the channel is in the description box I will see you next week.

Listen again and again till you recognise the words and their meaning. You need not recognise all the words but you must understand the overall meaning. Now try to answer the questions.

TASK 1

Answer the following questions

1. What is the process about?
1. What is the first step in the process?
2. What is the second step in the process?
3. What is the third step in the process?
4. What is the tool used in the process?

TASK 2

Write the gist of the video in a paragraph and give a suitable title

Post- listening

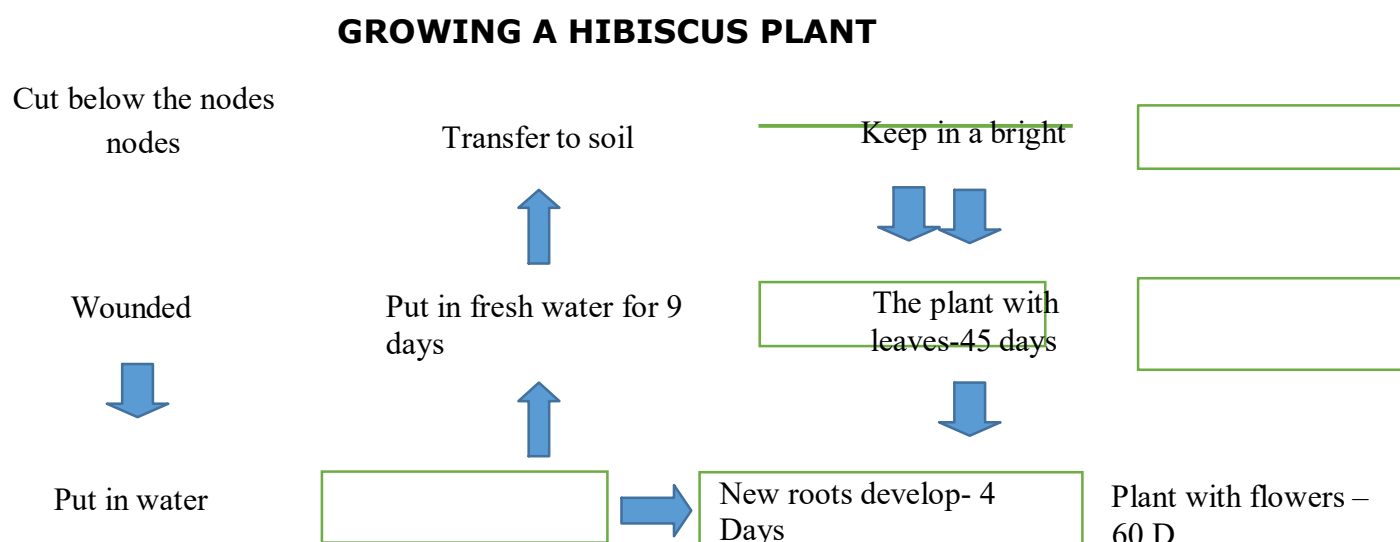
The step by step process of growing a hibiscus plant can be illustrated in a Flow Chart.

Definition:

A flow chart shows the process of production or purification of something through successive stages from the initial to the final stage. Initial stage is the

starting point of the process and it is also called input stage and the finishing point is called output stage. The flow chart illustrates the process in rectangular boxes and arrows to denote the link between the processes – the sequential steps. It is expressed in impersonal passive voice in present tense; only the action is important not the person who does it.

The process is illustrated in a flow chart.



DESCRIBING A PROCESS

How to describe a process is discussed here.

Description of the process is either done by you or by somebody else. Only the action is important and not the one who does it. So the impersonal passive voice should be used in the present tense for describing the action.

Example:

The stem **is wounded** at the lower end with a sharp knife.

1. It is **put** in a glass of water for four days.

TASK 3

Describe the process of growing the hibiscus plant in your own words and write a paragraph of about 150 Words.

2. Speaking

Role Play:

Role-play is an effective speaking activity. It is a technique that allows students to explore imaginary but realistic situations by interacting with each other. For instance 'at the restaurant', 'checking at the airport', 'looking for lost property' etc., are all possible situations for role plays. The joy of role play is reflected when the students imagine themselves to 'become' anyone as they like for a short time! For eg: as a President, the Queen, a millionaire, a pop star. The choice is endless! This allows them to improve their speaking skills and get the liberty to use the language in an interesting manner.

Role play also helps the students develop different strategies in a supported environment. Through this, a student can put himself or herself in different situations and act according to the character assigned. This will help them develop and understand the situation from another point of view.

TASK – 1 Role play

Let's have a role play between a Botany teacher and a student. The teacher has given a homework to the students to describe a flower with botanical description. A student in the class explains a flower named Petunia with detailed and interesting facts to the teacher and his classmates.

Teacher: Hello students! Hope each one of you is excited to speak about your favourite flower.

Class: Yes ma'am!!!

Teacher: Can anyone describe why you like flowers?

Saran (student), *tells his wish to the teacher that he wants to speak about a flower that impressed him a lot.*

Teacher: Yes, Saran, you can answer my question.

Saran: Thank you ma'am. Usually I am very fond of flowers. They are attractive and appealing to see. They have a wide variety of designs and colours. It is an astonishing sight to behold. Some have wonderful fragrance that spreads aroma wherever they are placed. The world would be uninteresting without their delightful faces and lovely floral odour.

Teacher: Good, go ahead. What is your favourite flower?

Saran: I like many flowers, but amongst them I admire a flower named PETUNIA. I saw this flower in a place named "Miracle Garden" when I happened to visit Dubai during my summer vacation.



Teacher: Oh! That's interesting. Tell us about the flower Petunia.

Saran: *Petunia* is genus of 20 species of flowering plants of South American origin. It is in the shape of a trumpet.

Teacher: How are they pollinated?

Saran: Petunias are generally insect pollinated.

Teacher: What is the process for cultivation?

Saran: Petunias can tolerate relatively harsh conditions and hot climates, but not frost. They need at least five hours of sunlight every day and flourish in moist soil and conditions of low atmospheric humidity. Its flowers bloom profusely from early summer until frost. The plant grows well in temperate climates and does not tolerate shade.

Teacher: Is there any possibility to grow this flower plant at home?

Saran: Yes, of course. They are best grown from seed. Petunia species are mostly annual herbs. Watering once a week should be sufficient in most regions. Hanging baskets and other containers need more frequent watering.

Teacher: When can we see the maximum growth?

Saran: Maximum growth occurs in late spring. Applying fertilizer monthly or weekly, depending on the variety will help the plant grow quickly.

Teacher: Does it have fragrance? What are the uses of Petunia?

Saran: The flower is extremely fragrant and has a number of medicinal uses for digestive disorders, coughs and colds. It can also be given as a strengthening tonic for senior people and children.

Teacher: Do you have any questions to ask about the flower Petunia?

Class: No ma'am.

Teacher: Wow! That's a wonderful and interesting piece of information about Petunia. Can you share the pictures of Petunia that you took in Miracle Garden to the class?

Saran: My pleasure ma'am. Thanks for giving me an opportunity to speak about this attractive flower.

Speaking Activity:

Task 1:

Role Play: Interview with a famous scientist.

The students can be put in pairs or groups to have dialogue between an interviewer and a celebrity in the field of Science. The teacher can monitor the students' use of grammar and language. This activity allows students to improve their creativity and fluency.

Source:

<https://pxhere.com/en/photo/818489>

<https://pxhere.com/en/photo/646747>

<https://www.thompson-morgan.com/p/minitunia-kabloom-mixed/t57171TM>

<https://www.youtube.com/watch?v=YsDQus56GbM>

TASK - 2

Let's have a role play between the class monitor and the classmates. The class teacher has informed about an educational tour to Ooty. All the students are excited and happy. The class representative has been given the responsibility of collecting the details and clearing the doubts of his classmates.

Rushil: Dear friends, as we have been already informed about our educational tour, our class teacher has assigned me the responsibility of explaining the tour in detail. If you have any doubts, please let me know.

Jinisha: Can you tell us the sight-seeing places that we are going to visit within three days?

Rushil: Day 1, we will visit the places within the city limits. They are Botanical Garden, which is right in the heart of beautiful scenic hill station, Ooty Lake, Rose Garden.

Shiva: How do we commute from Chennai to Ooty?

Rushil: There is no direct train from Chennai to Ooty. However, we can take a direct train from Chennai Central Station to Mettupalayam Railway Station (**Nilagiri express**). It takes around 10 hours. From Mettupalayam to Ooty we will take a bus and reach the hotel.

Kumari: How much do we have to pay for this tour?

Rushil: As of now, the estimation is Rs. 1500/- per head.

Santosh: Where are we going to stay?

Rushil: In Hotel Tamil Nadu.

Veena: What are the things to be taken for the trip?

Rushil: Sweaters, mufflers, woollen leg warmers are enough and some essential things according to your requirement.

Sreeman: Do we follow the same way of transportation from Ooty to Chennai?

Rushil: Yes, again from Ooty to Mettupalayam, we will travel by bus and from there we will reach Chennai by Nilagiri Express.

Shafia: Can you tell us when is the last date to confirm this tour?

Rushil: Sure. Dear friends, hope I have answered all your doubts. Can I get the names of the interested students by Friday so that it will be easy for our teachers to make the necessary arrangements.

Class: Sure Rushil.

Rushil: Thank you!!!

Task 3: Ask the students to pick the roles they want to play, like shop keeper-customer, doctor-patient, police-thief etc.

3. Reading

Reading is not just a leisure activity because it has its own techniques to make it effective. Skimming and scanning are the techniques employed while reading. These two are not just techniques for reading but also the best reading strategies depending on the purpose.

Skimming

Skimming is a way in which one reads at a faster rate to get the general idea about the text without paying heed to the intentional and detailed meaning of the text.

Example -When one reads the text in order to understand the thesis statement, in one or two lines.

Skimming is achieved by reading only that which is considered to be relevant.

Skimming requires a lower understanding of word recognition when compared to scanning.

Procedure -The introductory paragraph and the concluding paragraph are read very carefully. You should also search for headings and subheadings to get a good grasp of the idea.

Scanning

Scanning refers to the technique when one looks into the document or the text provided for searching some specific text such as some keywords.

Example -It may be applied to the reading of a dictionary, wherein one looks for a specific word meaning or a directory wherein one searches for the phone number of someone.

Scanning requires one to have a look at the whole document quickly at least once.

Scanning requires a higher understanding of word recognition when compared to skimming.

Procedure -You should search for headings and subheadings to get a good grasp of the idea, as to where your required detail will be found.

Skimming and scanning, therefore, are two very different strategies for speed reading. They are used for different purposes and they require different reading skills, but they are very significant for comprehension.

Pre-Reading:

Basic Equipment Used in Biology Experiments.



Image source:

<https://www.indiamart.com/proddetail/biology-equipment-11808755030.html>

The daily routine of a biologist involves the use of basic equipment in their biology experiments from visualizing cells and organelles, to preparing samples of cells or fluids for testing or visualization, dissecting specimens, or mixing chemicals. Some of the basic equipments are microscopes, test tubes, beakers and Bunsen burners — as well as high-tech scientific equipment and computers.

Slides, test tubes, and petri dishes

To examine a specimen, biologists must place a sample — whether the sample is blood, mucus, saliva, skin cells, or urine — in or on something:

- **Slides:** If the sample is going to be viewed under a microscope, some of the cells are gently smeared onto a glass slide, treated with a fixative so that the cellular components don't move, and covered with a glass cover slip.
- **Test tubes:** If the sample needs to be *centrifuged* — spun very rapidly to separate fluid and particles — or needs to have solutions added to it, then the sample most likely is placed in a test tube.
- **Petri dishes:** If a sample must be grown before it can be identified, the sample must be *cultured*. To culture a sample, a petri dish containing a culture medium is *inoculated*, or smeared and pressed, onto the medium.

The scientist must keep the petri dish at normal body temperature for the species being studied (humans: 98.6°F, 37°C) for approximately 24 to 72 hours and wait for the specimen to grow. A series of tests can then be done on the cultured specimen to determine what organism it is.

Dyes and other indicators

Dyes are agents that colour structures of the cell, which allow the structures to be more easily viewed when using a microscope. In some cases, stains make usually invisible structures visible. Some common stains include iodine and methylene blue. If iodine is placed on a sample that contains starch, such as a piece of potato, it will turn the sample dark blue.

Indicators are pre-made solutions or papers that are used to determine chemical characteristics, such as acidity and composition). Litmus paper is a common example. When dipped into a solution,

litmus paper will turn red if the solution is acidic and blue if the solution is basic. Strips of pH paper have a range of colors that can be matched up to estimate the approximate pH of a solution.

Forceps, probes, and scalpels

Sometimes animals are *dissected*, or cut apart in an orderly fashion, to find out more about structure or to teach the person doing the dissecting. Scientists already know volumes of information on the structure of animals, but dissection not only teaches you structure, it teaches you technique.

The following equipment is used to perform a dissection:

- A *scalpel* is an extremely sharp bladed instrument that can neatly split open skin and cut through muscle and organs.
- *Forceps* are used to hold tissue out of the way or to pick up a structure.
- A *probe* can be used to remove connective tissue or to lift a structure before it is dissected.

Beakers, flasks, and Bunsen burners

The equipment that is common in a chemistry laboratory is often seen in a biology laboratory, too. Biologists also mix solutions and chemicals.

- *Beakers* are used when the solution mixed in it is going to be poured into something else. (They have a lip on them for pouring.)
- *Flasks* have a narrow neck and are used when the solution may splash out of a beaker or when the container of solution needs to be plugged at some point in the experiment.
- *Bunsen burners* are heat sources. They are cylinders attached to a gas line. When the gas line is opened, a spark ignites a flame in the Bunsen burner, which is then used to heat solutions. Sometimes solutions need to be boiled to release gases or to dissolve a solid into the solution.

Task:

Fill in the blanks using the help box:

Bunsen burners, Test tube, slides, Forceps, indicator

Cells are gently smeared onto a_____.

_____needs to be centrifuged.

Litmus paper is used as an_____.

_____ are used to hold tissue out of the way or to pick up a structure.

_____ are attached to a gas line.

PASSAGE 1. Ultrasound Scanning Machine

Read the following passage on *Ultrasound Scanning Machine* for your practice.



Image source: <https://www.radiologyinfo.org/gallery-items/images/radiologist-doing-sonogram.jpg>

Ultrasound imaging uses sound waves to produce pictures of the inside of the body. It is used to help diagnose the causes of pain, swelling and infection in the body's internal organs and to examine a baby in pregnant women and the brain and hips in infants. It's also used to help guide biopsies, diagnose heart conditions, and assess damage after a heart attack.

Ultrasound is used to help physicians evaluate symptoms such as pain, swelling, infection. Ultrasound is also used to blockages to blood flow (such as clots), narrowing of vessels, tumors and congenital vascular malformations, reduced or absent blood flow to various organs, such as the testes or ovary, increased blood flow, which may be a sign of infection.

Ultrasound is safe, non invasive, and does not use ionizing radiation. It is safe and painless. Ultrasound imaging is also called ultrasound scanning or sonography.

The Equipment:

Ultrasound scanners consist of a computer console, video display screen and an attached transducer. The transducer is a small hand-held device that resembles a microphone.

Procedure:

The technologist applies a small amount of gel to the area under examination and places the transducer there. The gel allows sound waves to travel back and forth between the transducer and the area under examination. The ultrasound image is immediately visible on a video display screen that looks like a computer monitor. The computer creates the image based on the loudness (amplitude), pitch (frequency) and time it takes for the ultrasound signal to return to the transducer.

Ultrasound imaging is based on the same principles involved in the sonar used by bats, ships and fishermen. When a sound wave strikes an object, it bounces back, or echoes. By measuring these echo waves, it is possible to determine how far away the object is as well as the object's size, shape and consistency. This includes whether the object is solid or filled with fluid.

Limitations:

Ultrasound waves are disrupted by air or gas. Therefore, ultrasound is not an ideal imaging technique for the air-filled bowel or organs obscured by the bowel. Ultrasound is not as useful for imaging air-filled lungs, but it may be used to detect fluid around or within the lungs. Similarly, ultrasound cannot penetrate bone, but may be used for imaging bone fractures or for infection surrounding a bone.

Source: An excerpt from <https://www.radiologyinfo.org/en/info.cfm?pg=genus>

PASSAGE 2-Centrifuge

A **centrifuge** is a piece of equipment that puts an object in [rotation around a fixed axis](#) (spins it in a circle), applying a force perpendicular to the axis of spin (outward) that can be very strong. The centrifuge works using the [sedimentation principle](#), where the [centrifugal acceleration](#) causes denser substances and particles to move outward in the radial direction. At the same time, objects that are less dense are displaced and move to the center. In a laboratory centrifuge that uses sample tubes, the radial acceleration causes denser particles to settle to the bottom of the tube, while low-density substances rise to the top.



Image courtesy: <https://www.medsorimpex.in/product/digital-centrifuge-machine-2/>

There are three types of centrifuge designed for different applications. Industrial scale centrifuges are commonly used in manufacturing and waste processing to sediment [suspended solids](#), or to separate [immiscible](#) liquids. An example is the [cream separator](#) found in [dairies](#). Very high speed centrifuges and [ultracentrifuges](#) able to provide very high accelerations can separate fine particles down to the nano-scale, and molecules of different masses.

Large centrifuges are used to simulate high gravity or acceleration environments (for example, [high-G training](#) for test pilots). Medium-sized centrifuges are used in [washing machines](#) and at some [swimming pools](#) to draw water out of fabrics. [Gas centrifuges](#) are used for [isotope separation](#), such as to enrich [nuclear fuel](#) for [fissile isotopes](#).

Courtesy: <https://www.youtube.com/watch?v=NqVaMiTI8Uw>

Task 1: State true or false:

- A centrifuge does not rotate around a fixed axis.
- During the [centrifugal acceleration](#) denser substances and particles to move outward in the radial direction.
- Centrifuges are designed for different applications.
- Very high accelerations in centrifuge can separate fine particles down to the nano-scale, and molecules of different masses.
- [Gas centrifuges](#) are not used for [isotope separation](#).

4. Writing

1. Descriptions

Descriptions help the readers visualize the content or messages provided by the author in the book. The tone, mood of the author is well established in descriptive writing. Reading such descriptions makes the readers enjoy every detail such as sight, sound, smell, taste and other feelings the author describes. Reading descriptions helps the reader connect with the text. The lucid description helps the reader get to the point of the author. While reading descriptions the reader gets into the author's world.

How reading description helps the reader?

To :

- Understand the themes, settings and purpose of the text
- Acquire language and vocabulary used by the author
- Read texts with similar themes
- Evoke interest for further reading
- Use the acquired vocabulary with regard to their discipline.

PASSAG
divers

Bio-

What Happened to the Reptiles?
By Zai Whitaker
(Adapted and abridged from the original short story)



It happened a long, long time ago, he began. So long ago that there were no schools and no teachers. Children lived in caves with their parents and helped them to collect fruit and berries from the forest. At that time, there were no tigers or panthers or elephants in Pambupatti forest. There were only reptiles, many kinds of reptiles. Now you know what reptiles are. Snakes, crocodiles, turtles, lizards.

Every month, the reptiles of Pambupatti had a big meeting. The president of these meetings was Makara, the biggest crocodile of the forest. All the animals thought he was very important. When someone is strong and powerful, you know, it is difficult not to go along with what he says or does. "Brothers and sisters," he began. All the reptiles, even the beautiful king cobras, stopped talking. Makara continued his speech. "I have decided that we don't need the tortoises! I have told them not to come today.

And by the following Tuesday, they were all gone. At first the animals were sad, but then they realised that what Makara had said was true. There was more food, more water and more space for them! But soon, a strange smell began to fill the forest. It was the smell of rot — rotting fruit on the ground, rotting animals in the river. This was what the tortoises used to eat. And even Makara had to go about holding his nose with his big claws. In the following months Makara sent the snakes and the lizards.

But now, when life should have been wonderful for the crocodiles of Pambupatti, all kinds of awful things began to happen. To begin with, the rats grew bolder by the day. They became so fearless that they jumped and turned somersaults on the crocodiles' backs! And there were too many frogs. They seemed to be growing larger and there was no one to eat them but the crocodiles. These huge frogs began to eat the baby crocodiles. And the insects! Now that the lizards were gone, there were millions of them, growing bigger and nastier by the day.

Makara sent urgent messages all over the place for the tortoises, snakes and lizards to come back to Pambupatti

In two months, the forest was back to normal. The rats disappeared and the insects and the smell and the world finally went back to its familiar old self.

Nature plays an important role in helping mankind. Bio-diversity is an essential factor for all living things to enjoy life on Earth. One creature depends on another. Man should not mar nature.

Moral: Live and let live.

TASK:1

Answer the following questions

- Where did the story take place?
- List the reptiles mentioned in the story.
- Who is the leader of the reptiles?
- What happened to the forest after chasing all the reptiles of the forest?
- Who pointed out the reason for the disaster that happened in the forest?
- How did the normalcy return to the forest?

2. COMPARE AND CONTRAST EXPRESSIONS

There are certain words or expressions in English to compare people or ideas to express how they are same. Similarly, there are certain words or expressions of contrast to highlight how people or ideas are different.

Words or Expressions used to Compare:

In the same way, Same as, Similarly, As well as, Both, Like, Likewise, Also, Too.

Words or Expression used to Contrast:

Even though, On the other hand, Although, However, Unlike, Yet, But, Whereas, While, On the Contrary. . .

Read the given chart carefully. Compare and contrast Plant Cell and Animal Cell using the expressions given above.

	Animal Cell	Plant Cell
Cell wall	Absent	Present (formed of cellulose)
Shape	Round (irregular shape)	Rectangular (fixed shape)
Vacuole	One or more small vacuoles (much smaller than plant cells).	One, large central vacuole taking up 90% of cell volume.
Centrioles	Present in all animal cells	Only present in lower plant forms.
Chloroplast	Animal cells don't have chloroplasts	Plant cells have chloroplasts because they make their own food
Plastids	Absent	Present
Plasma Membrane	only cell membrane	cell wall and a cell membrane
Lysosomes	Lysosomes occur in cytoplasm.	Lysosomes usually not evident.
Cilia	Present	It is very rare

Source: <https://i.pinimg.com/736x/0f/84/5a/0f845a9c2554516a7f243dca868ebe70.jpg>

3. Definition and Sentence Definition

Definition

The main purpose of communication, be it any form, is to make things clear and understandable. When one has difficulty in understanding a word, he or

she asks for an explanation. This, in formal tone, is called “defining” or “definition”.

Definition of definition:

A statement expressing the essential nature of something

A statement of the meaning of the word/sign/symbol

We infer two

ideas from the above stated definition:

1. Definition is a statement i.e., it is a single sentence
2. Definition in single sentence would express only the most important quality of a term or an object

With regard to second inference, there arises a question- “what if one doesn’t understand something when stated in single sentence?”

Solutions are always easy: Extend the definition

First, let us learn to define a term or an object in a single sentence and then learn how to extend the definition.

Single Sentence Definition

A single sentence definition is always precise. Hence, it is otherwise called formal definition. To formulate it, only three features are needed. Let’s learn it in three simple steps.

Step 1	Step 2	Step 3
<i>Term</i> <i>(anything that is to be defined)</i>	<i>Class</i> <i>(what is it/to which category it belongs)</i>	<i>Distinguishing feature</i> <i>(its main purpose)</i>
Laboratory	Place	conduct experiments

Endoscope	Instrument	look inside the body by the doctors
Hypnoanalysis	psychoanalytical technique	get information from a patient's unconscious mind
Melanin	Pigment	protect skin from sun damage
Dam	Barrier	restrict the flow of water
Anatomy	branch of natural science	structural organization of living things
Agronomist	Expert	soil management and crop production
Pollination	transfer pollen grains	create offspring
Prey	hunted living organism	food to eat
Carbohydrate	Nutrient	body's main source of energy
Hormone	chemical substance	regulate cellular activities

After identifying the class and use of the term, put them in a full grammatical sentence as shown:

A laboratory is a place that is used to conduct experiments.

An endoscope is an instrument that doctors use to look inside the body.

To avoid: circle definition.

Circle definition uses the same term in its definition instead of simplifying and elaborating the term. Example: Incorrect-A pathologist is a person who studies pathology

Correct- A pathologist is a person who studies about diseases

TASK 1:

Using the table given above, attempt to write a single-sentence definition.

1. Hypnoanalysis

2. Melanin

3. Dam

4. Anatomy

5. Agronomist

6. Pollination

7. Prey

8. Carbohydrate

9. Hormone

10. Choose a term and write a single-sentence definition for it.

Extended Definition

An extended definition begins with a single sentence definition and is then elaborated. This happens when defining a term or a thing requires explanation in more than a sentence. To make it clearly understandable, additional information is added to understand the whole concept. This in turn looks like a paragraph. The additional information may belong to any of the category mentioned below.

- Etymology :explaining the origin of the word
- History/ Background :elaborating its use
- Cause and Effect :discussing how it happened and what effects it would cause
- Description :listing all its parts and defining it
- Contrast :explaining how it differs from others of the same class
- Compare :explaining how it is similar to others in the same class
- Analogy :comparing it with a completely different item
- Examples :giving instances

Examples:

Vaccine: A vaccine is a substance that helps to protect against certain diseases. They contain a weakened version of a particular microbe. It helps the immune system to recognize and destroy the disease-causing microbe and prevents from future infection.

Anatomy: Anatomy is a branch of natural science which deals with structural organization of living things. It is an old science, having its beginnings in prehistoric times. It is characterized by a progressive understanding of the functions of the organs and structures of the human body.

Melanin: Melanin is a pigment that protects skin from sun damage. It is produced by the epidermis. It gives colour to skin and eyes.

TASK:

From each sentence given below recognise the term and write appropriate extended definition.

1. Sudha is **myopic**.

--

4. The length of the **internode** decreased.

--

7. She was born with **umbilical cord** wrapped around her neck.

UNIT – 3

NEGOTIATION STRATEGIES

Listening - Listening to interviews of specialists/ inventors in their fields

Speaking – Brainstorming (Mind mapping)

Reading – Longer reading passages for comprehension

Writing – Essay writing

Vocabulary- Register specific (Incorporated into the LSRW tasks)

UNIT 3

1. Listening

Listening to interviews

Source

<https://ohiostate.pressbooks.pub/writingfabulousfeatures/chapter/chapter-4-lets-interview/>

Are interviews, simply asking questions and getting answers? The true interview skills come from asking the right questions for the right sources and gathering all of the information your reader needs and wants to know.

What is an interview actually?

An interview can be defined as an interaction between two people, where questions are asked to elicit information. They are the key, quite simply, to information transmission, be it social, formal or business. That is why journalists use interviews every day to find and report the news that keeps a society informed.

What can we develop by listening to interviews?

- Acquire a good communication skill and vocabulary.
- Identify the facts of the interview.
- Determine what information you need from the interview.
- Determine what kind of sources you need to get that information from.
- Find sources for a story and who can provide the answers you need.
- Working out when and where to meet those sources.
- Conceptualizing a mix of open-ended and closed questions to get the information you need.
- Asking questions in a way that they can get the facts you need and result in at least some good, usable quotes.
- Getting information down quickly and accurately.
- Selecting which facts and quotes best present information you need.

The video link given below is an interview with a famous Mexican Chemist. Listen to the interview and find out how the conversation goes on.



Source: https://www.youtube.com/watch?v=iGf4TGHO_Jc

Task 1:

Dr. Mario J. Molina is a Nobel Laureate (1995) from Mexico. Dr. Mario and his friend Sherwood Rowland were the first to find that CFCs (Chloro Fluoro Carbons) affect the ozone layer and it's the sole reason for its depletion. Listen to this interview and write down a paragraph of 100 words on how Dr. Mario found out that climate is affected due to CFCs and the solution for the problem.

Task 2:

Can we see how plants feed themselves? Can we listen to their heart beat? What! do plants have heart? Yes it is true as **Sir J.C. Bose** proved it by his invention "**The Crescograph**". The passage given is an extract from an essay "**J.C Bose**" which is a part taken from **Aldous Huxley's** travelogue collections "**Testing Pilate**". Read out loud the given passage and listen to it and answer the questions below.

The Crescograph

Originally adapted from the essay "J.C. Bose" by Aldous Huxley



Picture courtesy: Wikimedia commons

The experimenter is curious and has special talent. Armed with a tea canister and some wire, with silk, a little sealing wax and two or three jam - pots, Faraday marched forth against the mysterious powers of electricity. He returned in triumph with their captured secrets. It was just a question of suitably juxtaposing the wax, the glass jars, and the wires. The mysterious powers couldn't help surrendering. So simple - if you happened to be Faraday. And if you happened to be Sir J. C. Bose it would be so simple, with a little clockwork, some needles and filaments, to devise machines that would make visible the growth of plants, the pulse of their vegetable 'hearts', the twitching of their nerves, the processes of their digestion. It would be so simple - though it cost even Bose long years of labour to perfect his instruments.

At the Bose Institute in Calcutta, the great experimenter himself was our guide. Through all afternoon we followed him from marvel to marvel. We watched the growth of a plant being traced out automatically by a needle on a sheet of smoked glass; we saw its sudden, shuddering reaction to an electric shock. We watched a plant feeding; in the process it was exhaling minute quantities of oxygen. Each time the accumulation of exhaled oxygen reached a certain amount, a little bell, like the bell that warns you when you are nearly at the end of your line of typewriting, automatically rang. When the sun shone on the plant, the bell rang often and regularly. Shaded, the plant stopped feeding; the bell rang only at long intervals or not at all. A drop of stimulant added to the water in which the plant was standing set the bell wildly tinkling, as though some record breaking typist were at the machine.

In one of the laboratories we were shown the instrument which records the beating of a plant's 'heart'. By a system of levers, similar in principle to that with which the self-recording barometer has made us familiar, but enormously more delicate and sensitive, the minute pulsations, which occur in the layer of tissue immediately beneath the outer rind of the stem, are magnified – literally millions of times – and recorded automatically in a dotted graph on a moving sheet of smoked glass. Bose's instruments have made visible things that have been hitherto impossible to see, even with the aid of the most powerful microscope.

Task3:

1. Whose experiment is talked about in the beginning of the passage?
2. Where is Bose Institute located?
3. What did they encounter in Bose's lab?
4. How did the instrument record the beating of plant's heart?
5. How did the plant feed itself?
6. How is the growth of the plant recorded?

2. SPEAKING

Brainstorming



Image Source:

<https://www.flickr.com/photos/143716469@N06/45479649134>

Brainstorming is a process carried out to generate ideas within a group which is done in the initial stages of a project. It paves way to unleash many creative ideas in a non judgemental environment. An effective brainstorming session will last anywhere between 15 and 45 minutes. An ideal time frame would be 30 minutes. The size of a group may vary from four to eight members.

Instructions to be followed during brainstorming:

1. Articulate the research topic clearly to the group members.
2. Encourage the generation of creative ideas.
3. Accept every idea discussed in the group.
4. Do not abstain from any idea.
5. Do not criticize or evaluate ideas.

6. Try to build upon the ideas.
7. Record ideas accurately.
8. Evaluate the brainstorming session.

Mind Mapping:

Mind Mapping is one of the effective forms of Brainstorming. A mind map gives a visual representation to our ideas and concepts. This visual tool will help us structure our ideas in an enhanced way. The visual representation of ideas will promote a better analysis, comprehension and synthesis of the ideas. The use of different words, images, colours to highlight or to differentiate the ideas will give a visual appeal to our thought.

Mind Map can be created on a paper or digitally using different visual mapping soft wares. There are many websites that help us construct mind map digitally.

Example:

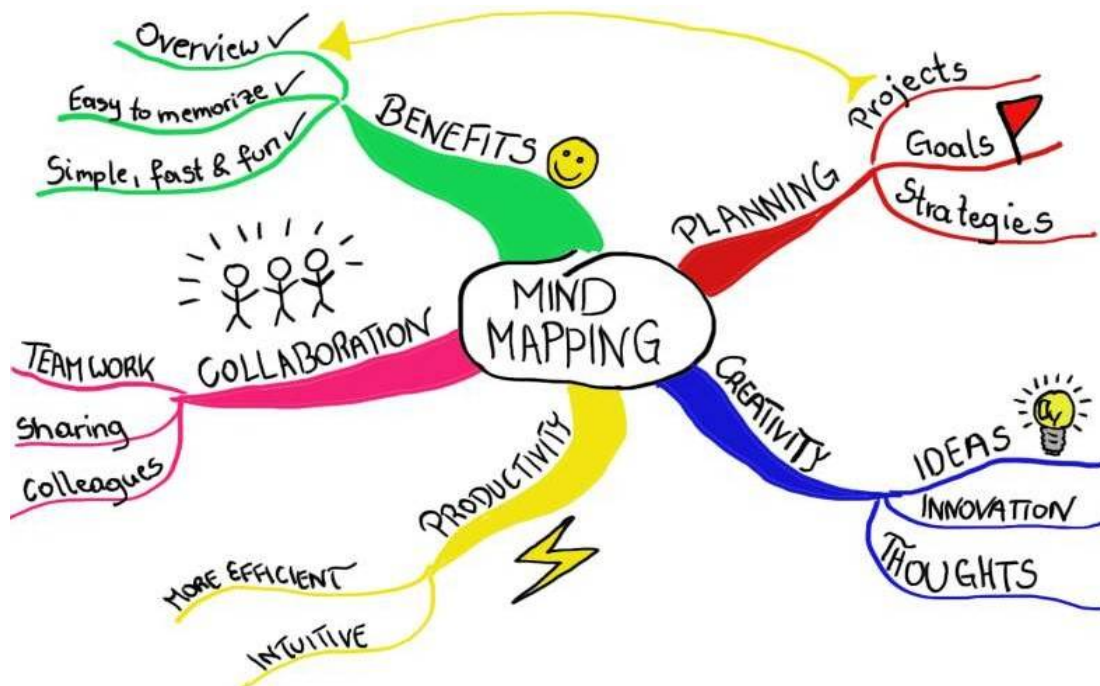


Image Source: <https://www.active-talents.com/en/mind-mapping-course-18-september-2018-nice/>

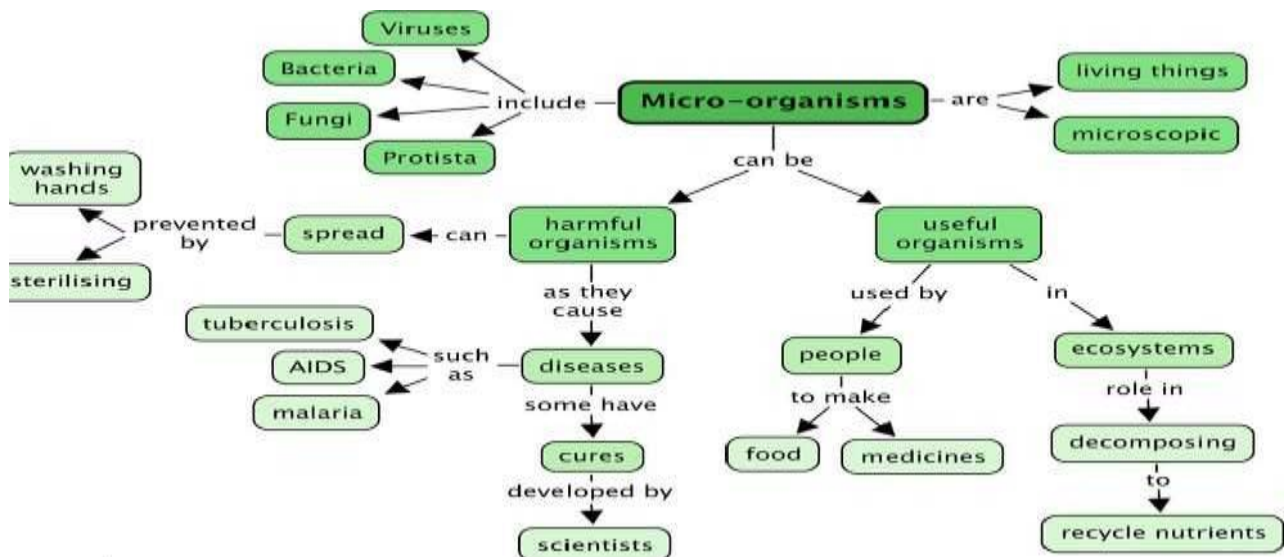
Instructions to generate a Mind Map:

1. Write the research topic in the centre of a blank sheet.
2. Jot down the sub topics around the research topic.
3. Repeat the same process for generating the associated ideas to the subtopics.
4. Do not filter out ideas.
5. Keep the topics and ideas as short as possible.
6. Determine how the ideas are associated with the subtopics and how the subtopics are linked to the given research topic.
7. Identify the relationships between the ideas and between the subtopics and the research topic with lines or arrows.
8. Use of images and different colours will add effect to your mind map.
9. Reorganise the ideas using the identified relationships.

Mind Map: Micro-Organisms

Image Source:

<https://www.flickr.com/photos/121935927@N06/13537347284>



Task 1: Sketch mind maps for the following:

1. Food Adulteration
2. Protein rich diet
3. Role of Microbes in human welfare

Small Group Discussion



Image Source: <https://webstockreview.net/images/conversation-clipart-group-work-1.png>

A small group discussion allows everyone in the group to contribute their ideas for others to reflect upon. In other words, it follows the democratic

guidelines that give opportunity to all to exchange their ideas as per the direction of the Moderator. Brewer in *13 Proven Ways to Get Your Message Across* says, "Its (Small Group Discussion) goals are to spark new thought and concept exploration, encourage analysis of factual information and develop open-mindedness towards new attitudes and beliefs, so as to accept the opinions of others."

Steps to be followed:

1. The Moderator must initiate the discussion by announcing the topic and its background information to make the topic familiar to the participants.
2. The Moderator must explain the objective and the purpose of the discussion to the participants.
3. If the topic is unfamiliar to the participants, the Moderator should give some time to the participants to do a little research about the topic.
4. Once the discussion begins, the Moderator should stimulate the discussion by asking various questions related to the objective of the topic.
5. Each and every participant in the group should contribute ideas.
6. When the ideas are articulated by the participant, it should be analysed and evaluated by others in the group.
7. Every Small Group Discussion should end with summarizing the ideas discussed and recorded.

Re frame Disagreements in Constructive Ways

Source: <https://uni.edu/~reineke/guidelin.htm#What%20Happens>

Say This	Instead of This
-----------------	------------------------

I don't think I agree. Could you explain?	That doesn't make sense at all.
I disagree because ` I see it differently because	Wow! That is ever drub.
I think we should check our notes and the original assignment.	That is not what the teacher asked us to do.
It might be better to Have you considered	You are dead wrong.
Does everyone agree?	Let's vote on it.
I understand how you feel, but I think you might consider also	That really offends me!

Advantages of Small Group Discussion:

1. A small group will facilitate the participants to gel easily with others which in turn will help them discuss without fear.
2. It allows all the participants to contribute their ideas.
3. The moderator can easily identify the participant who needs assistance.

Disadvantages of Small Group Presentations:

1. Time Consuming
2. If unchecked by the Moderator, the discussion might move away from its right track.

PASSAGE 1 GM seeds: the debate, and a sowing agitation

The screenshot shows the top portion of a web browser displaying an article on The Indian Express website. The URL in the address bar is indianexpress.com/article/explained/gm-seeds-the-debate-and-a-sowing-agitation-6452995/. The page header includes the site's name in English and several Indian languages, the logo for 'The Indian Express', and the date 'Saturday, July 04, 2020'. A navigation menu lists various sections like Home, India, Cities, Opinion, Sports, Entertainment, Lifestyle, Tech, Videos, Explained, Audio, Real Estate, and Epaper. A red banner at the top of the article area reads 'COVID19 Vaccine by August 15: Scientists say ICMR claim absurd and risky'. The main title of the article is 'GM seeds: the debate, and a sowing agitation'. Below the title, a sub-headline states: 'In the current kharif season, farmers would undertake mass sowing of GM seeds for maize, soyabean, mustard brinjal and herbicide tolerant (Ht) cotton, although these are not approved.' Social media sharing icons for Facebook, Twitter, and Reddit are visible. The author's name, 'Parthasarathi Biswas', and the update date, 'Updated: June 12, 2020 12:56:06 pm', are also present. A 'MORE EXPLAINED' section is partially visible on the right side of the page.

Written by [Parthasarathi Biswas](#) | Pune | Updated: June 12, 2020 12:56:06 pm



Genetic engineering aims to transcend the genus barrier by introducing an alien gene in the seeds to get the desired effects. (File Photo)

Last week, Shetkari Sanghatana — the farmers' union founded by the late leader Sharad Joshi — announced fresh plans in its agitation for use of genetically modified seeds. In the current kharif season, farmers would undertake mass sowing of GM seeds for maize, soya bean, mustard, brinjal and herbicide tolerant (Ht) cotton, although these are not approved. Farmers had carried out a similar movement last year, too.

What are genetically modified seeds?

Conventional plant breeding involves crossing species of the same genus to provide the offspring with the desired traits of both parents. Genetic engineering aims to transcend the genus barrier by introducing an alien gene in the seeds to get the desired effects. The alien gene could be from a plant, an animal or even a soil bacterium.

Bt cotton, the only GM crop that is allowed in India, has two alien genes from the soil bacterium *Bacillus thuringiensis* (Bt) that allows the crop to develop a protein toxic to the common pest pink bollworm. HtBt, on the other, cotton is derived with the insertion of an additional gene, from another soil bacterium, which allows the plant to resist the common herbicide glyphosate.

In Bt brinjal, a gene allows the plant to resist attacks of fruit and shoot borer. In DMH-11 mustard, developed by Deepak Pental and his colleague in the South Campus of University of Delhi, genetic modification allows cross-pollination in a crop that self-pollinates in nature.

Across the world, GM variants of maize, canola and soya bean, too, are available.

What is the legal position of genetically modified crops in India?

In India, the Genetic Engineering Appraisal Committee (GEAC) is the apex body that allows for commercial release of GM crops. In 2002, the GEAC had allowed the commercial release of Bt cotton. More than 95 per cent of the country's cotton area has since then come under Bt cotton. Use of the unapproved GM variant can attract a jail term of 5 years and fine of Rs 1 lakh under the Environmental Protection Act, 1989.

Why are farmers rooting for GM crops?

In the case of cotton, farmers cite the high cost of weeding, which goes down considerably if they grow HtBt cotton and use glyphosate against weeds. Brinjal growers in Haryana have rooted for Bt brinjal as it reduces the cost of production by cutting down on the use of pesticides.

Unauthorised crops are widely used. Industry estimates say that of the 4-4.5 crore packets (each weighing 400 gm) of cotton sold in the country, 50 lakh are of the unapproved HtBt cotton. Haryana has reported farmers growing Bt brinjal in pockets which had caused a major agitation there. In June last year, in a movement led by Shetkari Sanghatana in Akola district of Maharashtra, more than 1,000 farmers defied the government and sowed HtBt cotton. The Akola district authorities subsequently booked the organisers.

Environmentalists argue that the long-lasting effect of GM crops is yet to be studied and thus they should not be released commercially. Genetic modification, they say, brings about changes that can be harmful to humans in the long run.

What is the movement about?

The Sanghatana has announced that this year they are going to undertake large-scale sowing of unapproved GM crops like maize, HtBt cotton, soya bean and brinjal across Maharashtra. Farmers who plant such variants will put up boards on their fields proclaiming the GM nature of their crop. Anil Ghanwat, President of the union, has said this action will draw attention to the need for introduction of the latest technology in the fields. He said farmers will not be deterred by any action taken against them by the authorities.

Source: <https://indianexpress.com/article/explained/gm-seeds-the-debate-and-a-sowing-agitation-6452999/>

Reference:

Brewer, Ernest w. *13 Proven Ways to Get Your Message Across: The Essential reference for Teachers, Trainers, Presenters and Speakers.*

California: Corwin Press, Inc, 1997.

Task 2

Read the News Article on Genetically Modified (GM) Crops. Divide the class into small groups of six and discuss the advantages and disadvantages of Genetically Modified (GM) Crops. One person in the group will act as the moderator of the discussion.

3. READING

Reading is a great habit, which can change human life significantly. It can entertain, amuse and enrich people with knowledge and experiences. All aspects of life are learnt through reading and writing. Reading helps you build your repertoire of vocabulary, grammar and ability to organise your ideas for oral and written presentations. Reading and writing are inter related skills. That is why we say good writers are good readers.

Now, read to understand the given passage as a whole; try to understand the new vocabulary in the context. Do not refer to dictionary very often.

PASSAGE 1-THE BASIC MACRONUTRIENTS AND MICRONUTRIENTS

There are many essential plant nutrients, but they can be divided into two general groups based on the quantities of the nutrient needed for a healthy plant: the macronutrients, which are required in relatively large amounts, and the micronutrients, which are sometimes required in only trace amounts. This separation of macronutrients and micronutrients is a useful idea for tracking the importance of various minerals to plant nutrition.

There are six basic macronutrients required virtually by all plants: nitrogen (N), phosphorus (P), potassium (K), sulphur (S), calcium (Ca), and magnesium (Mg). These are the main elements, apart from carbon (C), hydrogen (H), and oxygen (O), which are not considered plant nutrients. For each macronutrient, there is a set of properties that must be considered, namely:

- The functions of the element in the plant
- The original sources of the element in the natural world (other than decaying matter from other organisms) and the nutrient's abundance or availability
- The forms of the nutrient available to the plant
- The likelihood of deficiency in a plant
- The specific effects of deficiency

Micronutrients are the essential elements required by plants in relatively low concentrations. Micronutrients form a coherent group, including eight core elements: iron (Fe), sodium (Na), chlorine (Cl), boron (B), manganese (Mn), zinc (Zn), copper (Cu), and molybdenum (Mo). Some scientists consider silicon (Si) a micronutrient. Though, not known to be essential, it is accumulated by plants and used in the plant body at a fairly high concentration. Cobalt (Co) is an essential micronutrient for plant species that form root nodules. Additionally, nickel (Ni) is a micronutrient that, while essential, is virtually never limiting or deficient in the natural world. In the rare cases when it is limiting, symptoms include reduction in leaf size, cupping of the leaf, and reduced vegetative growth. It is also a component of a single enzyme, urease. When grown without nickel, plants fail to produce urease in sufficient quantity and can suffer effects of accumulating toxic quantities of urea in the cells. Plants need micronutrients in low enough concentrations that the relative likelihood of deficiency is far less than for the macronutrients.

Task 1

I. Answer the following questions in your own words:

1. What are macro and micro nutrients?
2. What is the source of macro and micro nutrients?
3. List the macronutrients and the micronutrients.
4. What is the difference between macro and micro nutrients?
5. Enumerate the consequence of the micronutrient nickel deficiency in a plant.

II. Find the one word substitute in the passage for the following:

- a. a substance that provides nourishment essential for the maintenance of life and for growth.
- b. a solid, naturally occurring inorganic substance.

III. Inferential understanding: (Find the words from the passage)

- a. Macro and micro nutrients are the _____ required for plant nutrition.
- b. Plants require less of _____ than _____

IV. Say whether the following statements are correct.

- a. Macro and micro nutrients are grouped on the basis of quantities of their need for a healthy plant.
- b. Silicon is a micronutrient found in large concentration in plant bodies.
- c. Cobalt is an essential macronutrient.

Task 2

- a. With your understanding of the above passage prepare a tree diagram of nutrients required for a healthy plant.

PASSAGE 2- Fashion Trends

Clothing in India varies depending on the different ethnicity, geography, climate and cultural traditions of the people of each region of India. In a country like India, variety of attire can be spotted. In current days, colours for each occasion are also brought into practice due to the mass availability of materials and swift labouring of designing the clothes. It has a diversity in terms of weaves, fibres, colours and material of clothing. India's recorded history of clothing goes back to the 5th millennium BC in the Indus valley civilization where cotton was spun woven and dyed. Dhoti wrap is a predecessor to the modern sari. Likewise, trends in clothing have been changing from to time.

Initially Romans and Egyptians showed great interest in fashion and spent a lot of effort and currency on it. The court decided the fashion. During 17th century the working class people started imitating the aristocrats at an affordable price. Gradually, the clothing during this period reflected the social standing of the wearer. The traders and merchants and the aristocrats differed by the choice of their clothing. The Industrial Revolution in Britain that took place from 1760 to 1840 greatly helped the textile manufacturing to flourish by bringing machines for production and tailoring. Until then weaving, embroidery, cutting, stitching were only hand-crafted by skilled craftsmen and seamstress. Knitted and woven fabric of fine gauge were started to be produced by these machines. Thus the invention of sewing machine in the year 1790 enabled speedy manufacturing of garments with less labour. The mechanised mass production of textiles meant clothing became more widely available and cheaper. Yet, at the same time it was made easy to meet the designers' need.

Only after this, fashion became a stigma to showcase a personal style. Around 20th century, even the common mass adopted fashion in a larger scale. This changed a great deal in fashion history. The introduction of synthetic fibre, the availability of cheaper and much practical clothes are the main reasons for this change. This denotes that following fashion trends was really expensive during past-time.

During the La Belle Epoque period dresses were extravagantly decorated and no woman was able to dress on her own because of many layers and petticoats under the gown. Fashion magazines and Cinema industry are the greatest impacts for the spread of new trends in fashion. Designers and boutique brands are all over the world now. In many Asian countries, local designers can charge a small fortune for exclusive bridal wear, wedding attire and other formal wear apart from regular wear. Thus, history shows us that changes in costume often took place at times of social and economic change.

Task 1. Read the passage again and answer the questions that follow.

1. Is fashion closely interlinked with the history of the world?

2. What is embroidery?

3. Infer what is style.

4. Infer what is fashion.

5. Why were fashion dresses most welcomed by the masses?

6. Initially common people only wore plain clothes often. How do you find it in 20th century?

7. What could be the reason that 20th century became the abode of fashion styling by every country?

8. When did the Industrial Revolution take place?

9. How did Industrial Revolution help textile industry?

10. What does the word 'mechanised' refer to?

4. WRITING

Essay Writing

Why learn the skill of writing an essay?

What do you do with information gained through a class lecture or by reading articles and books or browsing the internet? Do you verify its legitimacy? Do you dig in deep to confirm the data analysed and statistical 'facts' presented? We live in a time of misinformation where fake news travels fast through social media. While information is power, misinformation is an utter disaster. It can ruin people's lives and career. Therefore it is our responsibility to learn how best information can be used to build lives and benefit the society.

Information, when properly utilized gets transformed into knowledge. The key learning of how to process information into knowledge can be learnt through the timeless art of essay writing. Who writes an essay in this age of digital communication you may ask. But the fact is, every scientific progress and development that ever existed was written as a research paper.

You may be brilliant in comprehending the world around you. Innovation can ooze from your very being. But, unless you learn how to present your thoughts and creative ideas in the form of a well composed essay, all your brilliance may only be a former shadow that will soon disappear into the night. So buckle up. Let us journey through the process of converting information into knowledge through essay writing.

First things first

Before you begin to write your essay you need to ask yourself three questions: To whom am I writing? Why am I writing? What am I going to say? Bearing these questions in mind will keep your writing focused and avoid digressions.

Form and content

A well composed essay has a beginning, middle and an end or an introduction, the body of the essay and a conclusion. What you are going to say will be your core or the central idea. This should appear in the first paragraph which is the

introductory paragraph. Why? This will set the purpose of your essay and will attract your reader. So you need to make this part as interesting and captivating as possible. The introductory paragraph sets the reader in anticipation for what is to follow. So make sure that you include the main points of discussion in this paragraph.

The rest of the composition will focus on expanding, explaining, arguing, comparing, contrasting, describing or substantiating your core idea through valid points that you had already mentioned in the introductory paragraph. To make things smooth for your readers, you will have to devote one paragraph for one idea. Depending on the word limit you may have the required number of paragraphs. Remember the golden rule of paragraph writing: One idea is equal to one paragraph.

Give leverage to your writing by adding quotations in order to substantiate your statements. Provide examples, facts, quotations and any other form of proof that can validate a stronger emphasis to your ideas. Leave your emotions bottled up for the time being and focus on how you may evolve objectivity in your writing. Then you can sprinkle the flourish of your emotions in subtle places to add the element of pathos wherever appropriate. This will connect your essay with your readers.

Read and reread your essay and check if the cohesive devices are put to good use. Check for coherence within each paragraph, i.e. check if each paragraph explains one idea. If your essay looks like a seed slowly grown into a tree then it is good to go. If you feel it looks like a flower garden trampled upon and all over the place then you would have to go over your ideas to see how you have developed them. Reinforce and summarize your arguments at the end of every paragraph in one sentence so that it will provide that connectivity and seamless flow of thoughts. Edit your essay and proofread it to avoid gaining negative popularity among your critics.

Now that you have journeyed your readers through the body of the essay you need to gently let them dock. Otherwise you have lost the readers in an ocean of ideas not knowing where it all leads to. Compose a conclusion that will enable your reader to retrace your ideas and connect it to the core idea with which your journey began. You need to gently lead them on to the shore where they will relish memories of a pleasant journey with you. At the end of this endeavour you would have gained the skill to transform information into knowledge. This is the learning outcome of the essay writing process.

PASSAGE 1-Essay on Conservation of Nature

Introduction

Nature has provided us numerous gifts such as air, water, land, sunlight, minerals, plants, and animals. All these gifts of nature make our earth a place worth living. Existence on Earth would not be possible without any of these. Now, these natural resources are present on Earth in plenty. Unfortunately, the

necessity of most of these has increased extremely over the centuries due to growth in the human population.



What is Conservation of Nature?

Conservation of nature means the preservation of forests, land, water bodies, and minerals, fuels, natural gases, etc. And to make sure that all these continue to be available in abundance. Thus all these natural resources make life worth living on Earth. Life would not be imaginable without air, water, sunlight as well as other natural resources present on the earth.

Thus, it is essential to conserve these resources in order to retain the environment integral. Here is a look at the types of natural resources existing on Earth and the ways to conserve these:

Types of Natural Resources:

Renewable Resources: These are resources such as air, water, and sunlight that refill naturally.

Non-Renewable Resources: These are resources like fossil fuels and minerals that do not restock reform very slowly.

Biotic: These originate from living beings and organic material like plants and animals.

Abiotic: These come from non-living things and non-organic material. These comprise air, water, and land as well as metals like iron, copper, and silver.

Natural resources are also categories such as actual resources, reserve resources, stock resources and potential resources based on their development stage.

How to Conserve Nature and Its Resources?

Many of the natural resources are being used at a faster rate when compared to their speed of production. There is so a necessity for conservation of nature and the natural resources it offers. Here are some of the ways in which these resources can be conserved.

Reduce Water Consumption

Water is available in abundance on Earth. This is one of the reasons people do not consider much before using it. However, if we keep using it at this speed. In future, we may not be left with as much of it. Therefore, simple things such as turning off the tap while brushing or reusing the leftover water to water the plants can help in this direction.

Reduce Usage of Electricity

Use only as much energy as you require. It is thus advised to limit the use of electricity. Simple habits such as turning off the lights before leaving your room, turn off the electric appliances after use. Switching to energy-saving fluorescent or LED bulbs can make a change.

Restrict Usage of Paper

Paper manufacturing depends only on trees. Increasing the use of paper means encouraging deforestation. This is one of the key reasons for concern in today's world. Always ensure you use only as much paper as necessary. Stop taking print outs and use e-copies instead to do your bit.

Use Newer Agricultural Methods

The government must be aware of the methods such as mixed cropping and crop rotation. Also, the government should teach the minimum use of pesticides, insecticides. Appropriate use of manures, bio-fertilizers, and organic fertilizers by the farmers must be taught and encouraged.

Spread Awareness

Spreading awareness about the conservation of nature is always a necessary step. It can be achieved only when more and more people understand its importance and the ways in which they can help. Besides this, it is essential to plant more and more trees. It is necessary to contribute towards lowering air pollution. We must use shared transport and employ rainwater harvesting systems to conserve nature.

Conclusion

Nature comprises of everything that surrounds us. The trees, forests, rivers, rivulets, soil, air are all part of nature. Keeping nature and its resources is integral as it is very important for the continuation of life on earth. It would be difficult to imagine life on earth, which has a spoiled natural environment.

Therefore, taking appropriate steps to conserve nature in its untouched form is the need of the hour. It must be a priority for the human race. Only human beings with their power and ability can save nature in its purest forms.

Source:

<https://www.toppr.com/guides/essays/essay-on-conservation-of-nature/>
<https://www.youtube.com/watch?v=HvrmAdjcEbY>

Activity:

- Write an autobiographical essay on 'I am a butterfly' or 'I am a lion'
- Write an essay on how ocean pollution harms marine creatures.

PASSAGE 2- HEALTHY DIET



World Food Day 2019: FAO calls for healthy diet to build zero-hunger world

The United Nations body noted that people around the world were either suffering from obesity or food insecurity. People globally should eat healthy diet for a zero hunger world, the United Nations (UN) Food and Agriculture Organization (FAO) has said in a booklet that it released ahead of World Food Day on October 16.

Shifting to a healthier diet by eating more seasonal fruits and vegetables and reducing the consumption of junk food could help in meeting the 'zero hunger' goal of the UN-mandated Sustainable Development Goals, the document said. Over 820 million people — approximately one in nine people around the world — were hungry and malnutrition affected one in every three people, the FAO noted. The world was facing a crisis of extremes, the UN body said, with many affected by obesity and others by food insecurity.

Humans have become more obese with their diets shifting from seasonal, mainly plant-based and fibre-rich dishes, to high-calorie diet, rich in refined starches, sugar, fats, salt, processed food and often marked by excessive consumption of meat, according to FAO.

This was due to globalisation, urbanisation and income growth, it added. People spent less time preparing meals at home and cooked food and packed food were available at just a mouse click.

On the other hand, many people globally were suffering from food insecurity, a situation in which people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. "But food security in our times isn't only a matter of quantity. It's also a question of quality. Unhealthy diets have now become a leading risk factor for disease and death worldwide. There is an urgent need to make healthy and sustainable diets affordable and accessible to everyone," the FAO document stated.

Farm to fork

To make a change, all key stakeholders need to join hands and make the shift, the FAO said. Over 30,000 edible plant species are known to humanity, out of which, only 200 are cultivated at the farm level. At the end of the day, 50 per cent of humans' calorie intake comes from just eight major crops namely wheat, maize, rice, barley, beans, groundnut, maize, potatoes, and sorghum.

At the farm level, more seasonal, indigenous crops need to be cultivated to meet nutritional needs, the booklet said. In India, this is already being done as millets have become a super food and are believed to fight against food insecurity. Private industries need to produce products with less sugar, salt and fat, the booklet added.

In this case, India is still waiting for the red-label regulation from the Food Safety and Standards Authority of India (FSSAI). On the other hand, though, FSSAI has mandated that food products should not contain more than three per cent industry-made trans-fat from January 2021. By 2022, FSSAI plans to bring the trans-fat level down to two per cent.

Another factor that could help in fighting food insecurity is less wastage of food. The State of Agriculture report published by FAO on October 14, 2019, stated that "globally, around 14 per cent of the world's food is lost after harvesting. Around 60 per cent of the total micronutrients are lost because of wastage of fruits, vegetables, and animal-based products at various levels after harvest".

If these losses could be avoided by providing more infrastructure and new technologies, 60 per cent of micronutrient losses would be saved. To reduce the amount of food waste entering landfills, a new strategy is being followed by city-dwellers around the globe which is called the community fridge. Similarly, a new strategy needs to be brought in at each stage of the food market chain post-harvest.

Task 1: Write an essay on the main ideas explained in the passage on 'Healthy Diet'.

Task 2

Communication becomes expressive and aesthetic with the use of language in certain contexts. Stylistic and figurative use of language is part of social and cultural aspect of any language. For example, take collocations and idioms in English: the term collocation refers to a set of words that regularly seem to occur together within the same context. On the contrary, the term idiom means an expression which functions as one unit and whose meaning cannot be found out from its separate components. Such expressions found in the passage have to be understood in the context for better understanding.

Explain the following collocational and Idiomatic use of vocabulary

1. Healthy diet
2. Zero Hunger World
3. fibre-rich dishes,
4. high-calorie diet
5. Farm to fork
6. stakeholders
7. Seasonal crops
8. Indigenous crops
9. food waste entering landfills
10. food market chain

UNIT – 4
PRESENTATION SKILLS

Listening - Listening to lectures

Speaking –Short talks/ speeches

Reading - Comprehension passages

Writing – Recommendations/ Interpreting visual inputs

Vocabulary- Register specific (Incorporated into the LSRW tasks)

1. Listening

Listen to the video using the link given above. It's a lecture by a Professional who explains what iron deficiency is, its causes, diagnosis and treatment for the deficiency.

Iron Deficiency- Anaemia



<https://www.youtube.com/watch?v=Q3b-Vsh5NEo>

Here is the lecture transcription:

Iron deficiency anaemia is a type of anaemia caused by low iron levels in the body. Anaemia is a condition where there is a low amount of red blood cells or haemoglobin in the body. Red blood cells and haemoglobin are responsible for the transport of oxygen throughout the body to the tissues and organs. Iron is responsible for making haemoglobin. When iron levels are low in the body red blood cells and hemoglobin do not work properly which leads the patient to feel symptoms of lethargy, pallor, tachycardia, weird food cravings (ice, clay, dirt), inflammation of the tongue (glottis), nail changes such as koilonychia (spoon-shape of the nails) etc. Treatment for iron-deficiency anaemia includes iron supplementation, increasing iron in the diet with foods rich in iron (such as egg yolks, red meats, poultry, shellfish, fish, legumes, seeds etc), and prevention. The causes of iron-deficiency anaemia include poor intake of iron (as with pregnancy, vegetarian diet, or malnourishment), blood loss (GI bleed, menstruation), or absorption issues (as with Celiac disease, GI surgery etc). It is diagnosed with complete blood count (CBC), iron level, or blood smear to assess the RBC which may appear hypochromic (pale) and microcytic (small)

What is Anaemia? Anemia is a decreased amount of red blood cells or hemoglobin in the body. These components play a huge role in **carrying oxygen throughout the body**. If you are low in RBCs or hemoglobin, your body won't receive enough oxygen to function properly.

Key Points about Iron-Deficiency Anaemia:

- Most common type of anaemia (there are various types)
- Body uses **IRON to make hemoglobin**
- **Low levels of iron lead the body to produce fewer red blood cells** which leads to less hemoglobin in the body. Hence, your body receives less amounts of oxygen.
- Signs and symptoms are vague at first and as it progresses the signs and symptoms become more noticeable
- A blood test such as a **CBC (complete blood count) or iron level** will help the doctor detect anemia.
- Women who are of childbearing age may be plagued with this due to heavy menstruation or pregnancy and people with poor digestion (intestinal issue) or poor intake of iron.
- Treatment includes: **incorporating more iron in the diet, taking iron supplements, and prevention.**

Some Listening Activities

Syllabification.

Words are made of letters. Each letter has a sound. But in a word the sounds are pronounced in a different way. Syllabification is the separation of a word into syllables, whether spoken or written.

Try pronouncing the following words with pauses shown by the strokes.

1. Iron - Mono syllabic word
2. De /fi/ci/en/cy - Penta syllabic word
3. Cli/ni/cal - Tri syllabic word
4. Treat/ment- Bi syllabic word
5. Pha/go/cy/tose- Tetra syllabic word

So it is understood that words can be mono syllabic or poly syllabic.

Task 1

Syllabify the following words:

Crucial

Absence

Reduction

Associated

Hypochromic

Task 2

Read the following comprehension passage related to anaemia and answer the questions.

Poverty, malnutrition and famine are self-explanatory causes of anaemia in the multitude of people living with iron deficiency in developing countries, especially children and pregnant women. In addition, a cereal-based diet decreases iron availability because phytates in grains sequester iron in a poorly absorbable complex.

Other common causes in developing countries include hookworm infections and schistosomiasis, which cause chronic blood loss. Strict vegan and vegetarian diets, mal absorption, and chronic blood loss resulting from heavy menstrual losses are well-known causes of iron-deficiency anemia in developed countries. Chronic blood loss from the gastrointestinal tract, including occult blood, especially in male patients and elderly patients, may reveal the presence of benign lesions, angio dysplasia, or cancer.

Answer the following questions:

1. What are the causes of anaemia in developing countries?
2. What is the meaning of the term 'sequester'?
3. Which are the causes of blood loss?
4. List out the causes of iron-deficiency anaemia in developed countries.
5. What condition may reveal the presence of benign lesions, angio dysplasia, or cancer?

Task 3

Given below is a lecture by Dr. John Campbell in You Tube. Using the link listen to his lecture and take notes.

<https://www.youtube.com/watch?v=Dh9ptiJj7TE>



2. SPEAKING

Short speech

As University students, each one will have to deliver seminars and presentations in one's subject area. These could be achieved by practising short speech of 2-5 minutes. This practice will gradually help any student present his or her ideas comfortably in the seminars and other presentations. Let us learn step by step.

Step 1: Choose a topic you feel comfortable with.

Step 2: Get familiarized with the topic by doing a background study (this will help in making you more comfortable with the topic).

Step 3: Know the types of speech that can be delivered to present any idea.

Types of speech	Purpose
Persuasive	To make your audience accept what you believe
Informative	To give information on the chosen topic
Cause and Effect	To explain the phenomena
Problem and Solution	To state the problem and to propose/suggest a solution

Now we are clear about which type to choose to deliver our idea.

Step 4: Frame a preparation outline of the topic.

A preparation outline is where you write your content in full sentences. It helps you to be organized.

Step 5: Don't add too many ideas. Limit it because you are preparing a short speech.

Step 6: Find supporting points for your chosen ideas.

Step 7: Write what you have planned to deliver. This will help you shape the Introduction, the Body and the Conclusion of the speech.

While writing

(rewrite until you find it organized and as stated below)

Explain your supporting points as you would explain to your friend

Write in short sentences

Write the content as you would talk

Step 8: Read it aloud. If you sound like a person talking,

then you are ready to rehearse.

Additionally, prepare a speaking outline. Speaking outline carries your keywords and phrases on note cards to have speaking sequence.

While rehearsing
(first with your written notes, then with your note cards)

Do not read

Speak like you are having a conversation

Relate it to you and rehearse

To ensure that everyone listens to you, concentrate on your tone and pauses as well.

Practice short speech preparation

Topic: Eating healthy in busy lifestyle

Purpose: To inform audience how to prefer healthy food

Introduction:

How many of you want to be healthy?

How many of you find it difficult in finding healthy food routine because you are always busy? Most of us are.

Today we will discuss how each of us can incorporate healthy eating into our lifestyle even if we are busy.

Body:

I Healthy choice- packing lunch

- Try new healthy recipes rather than buying in restaurants
- Less expensive
- Less time consuming varieties are available
 1. Fire free cooking
 2. Fruits
 3. Cut vegetables/fruits the night before for convenience and time management

II Wise choice-if eating out

- Identify the restaurants that have healthier choices in their menu
 1. Salads
 2. baked foods
 3. Fruits
 4. Low-carb options
- Make choices that are better
 1. Ask to hold mayo and other fattening sauces
- Choose broiled or grilled instead of fried

III Keep healthy snacks to save you from hunger

- Whole grain cereal bars
- Nuts
- Fruits
- Yogurt smoothies
- Water-lots of it

Conclusion

Today we have looked into various options available for healthy intake in our busy schedule. We took a minute or two to really think on packing healthy food from home and choosing healthy items from menu cards. Let us not miss our easy to carry nutritious snacks that help us a lot in maintaining our size too. And thus a busy life style can very well have space for healthy eating.

This is how a worked out written copy of your short speech would appear. Practice videos: watch Ted and Tedx talks on your favourite topics and understand how their speech is short and organized. These talks are presented for a minimum of 3 minutes to 18 minutes for a short presentation.

YouTube links for reference on short speech:

<https://youtu.be/ayegWKPJTK8>

<https://youtu.be/VISQDMuL8Qw>

<https://youtu.be/MfxPXvYEglU>

<https://youtu.be/iPNXUHwKFJo>

Task 1:

Work-out a short speech on the topic given below

Chocolate is a psycho addictive food

Purpose: _____

Introduction

Body

I _____

Supporting points

II _____

Supporting points

III _____

Supporting Points

Conclusion

Task 2

Develop your speaking skill in an organized way by training yourself with Just-A—Minute game.

The steps are the same. The number of supporting points are reduced.

The topics are:

1. Why are monkeys so good at climbing trees? (informative)
2. The Animal Welfare Act of 1996 is outdated and needs to be revised (persuasive)
3. Frustrations of colour-blind people. (informative)

3. Reading

Reading is a vital means to learn any language. In the process of reading, one understands the meaning of any given text either factually or by making inferences. It depends on the readers' interaction with the given text. This understanding while reading is called reading comprehension.

It is not necessary to understand every word in order to grasp the meaning. Good reading means the ability to process chunks of language larger than single words. The context will help in comprehending.

SOURCE PASSAGE 1-Era of Louis Pasteur vaccination



Pasteur

Photograph by G. B. S. in Berlin

In 1879 in France, Louis Pasteur was studying the bacterium that causes a disease of chickens called fowl cholera. Pasteur possessed a culture a culture of this bacterium that, when injected into chickens, consistently caused an infection that killed them. One afternoon he told his assistant, Charles Chamberland, to infect some birds with the culture. Since it was late in the day and he was about to go to vacation, Chamberland decided to postpone the experiment until he returned. As a result, the chickens eventually received an injection of the bacterial culture that had remained in the bench for several weeks. The inoculated chickens remained healthy. Pasteur then decided to inject these chickens with a second dose of bacteria from the fresh bacterial culture. To Pasteur's surprise, the birds survived this second dose without becoming ill. Pasteur, with remarkable insight, recognized that this phenomenon was identical in principle to vaccination. By injecting his chickens with the aged culture of bacteria (a vaccine), he had protected them against disease caused by a fresh culture of the same organism.

Once he had established the general principle of vaccination, Pasteur tried to apply it to other infectious diseases. He first produced a vaccine against anthrax, a disease caused by a bacterium called *Bacillus anthracis*. Pasteur found that he could not make this organism safe by aging it on the laboratory bench, but he could do so by growing it at an unusually high temperature. Pasteur then conducted a public experiments that convincingly showed that administration of hi heated anthrax culture would protect sheep, cattle and goats against s subsequent lethal dose of anthrax bacteria. A few years later he developed an effective vaccine against rabies. He thus showed that the general principles of vaccination applied to diseases other than smallpox, and this approach could be used to protect animals and humans against other infections. Louis Pasteur can therefore be considered the founder of the science of Immunology.

Era of First Nobel Prize in medicine for production of antibodies

Pasteur, although remarkably successful in developing effective vaccines, had little concept of the mechanisms involved. He suggested that the organisms in the vaccines removed essential nutrients from the body and thus prevented the subsequent growth of the disease-causing agent. It was in Berlin about ten years later, in 1890, that Emil von Behring and shibasaburo Kitasato demonstrated that the protection induced by vaccination was not due to removal of nutrients but was associated with the appearance of protective factors in the blood. They called these factors antibodies.

The first Nobel Prize in medicine was awarded to Emil von Behring in 1901 for his work on the production of antibodies against toxins (antitoxins). Within a few years Paul Ehrlich had proved that antibodies could protect animals against foreign toxins other than those found in bacteria (in 1908 Paul Ehrlich was awarded Noel Prize) and other German, Richard Pfeiffer, had shown that antibodies could clump and then destroy *Vibrio cholera* bacteria, the cause of cholera in humans. The demonstration that antibodies could make a suspension of bacteria clump was soon applied by Isidore Widal to the diagnosis of enteric disease such as typhoid fever. Thus serum from an infected

individual would make the bacteria clump, whereas serum from an unaffected individual would not.

Synonyms

A synonym is a word or phrase that means exactly or nearly the same as another word or phrase in the same language, for example *shut* is a synonym of *close*.

- a person or thing so closely associated with a particular quality or idea that the mention of their name calls it to mind.

"the Victorian age is a synonym for sexual puritanism"

- **BIOLOGY**

a taxonomic name which has the same application as another, especially one which has been superseded and is no longer valid.

Example

- Novel** – innovative, unique, singular, modernistic, contemporary
- myth** – legend, lore, fantasy, fiction, tradition
- huge** – monstrous, colossal, gigantic, enormous, tremendous
- survivor** – legacy, remnants, leavings, oddments, surplus
- determined** – resolute, decisive, strong-willed, steadfast, resolved

Task 2

Give the synonyms of the following:

Resistant, mild, hazards, procure, eventually, procedure, technique, portrait, Persist, dissuade, enthusiasm, belief, phenomenon, insight, occasionally, adapt, eradicate, essential, remarkable, enteric, principle, subsequent, infect, inject, induce.

Task 3

Frame sentences using the following words:

adapt, eradicate, essential, remarkable, resistant, mild, hazards, occasionally, infect, inject.

Task 4

Collect information on vaccination and write a time-line

Task 5

Match column A with Column B

Sl. No.	A	B	
1	Vaccination	a	following in time, order, or place
2	Antibody	b	the act of identifying a disease

			from its signs and symptoms
3	Variolation	c	very potent or effective
4	Culture(v)	d	a poisonous substance that is a specific product of the metabolic
5	Immune	e	a blood protein produced in response to and counteracting a specific antigen.
6	Lethal	f	the death of large numbers (as of people or animals)
7	Toxin	g	maintain (tissue cells, bacteria, etc.) in conditions suitable for growth.
8	Subsequent	h	not susceptible or responsive; having a high degree of resistance to a disease
9	Mortality	i	inoculation
10	Diagnosis	j	the deliberate inoculation of an uninfected person with the smallpox virus

SOURCE PASSAGE 2- Digestive System

Prof. Radha wanted to explain to her students the functions of the digestive system. Before the class, she penned down the functions as i) Ingestion ii) Digestion iii) Absorption iv) Egestion. She, then went to class, taught her students elaborately and asked them to write down the entire content of the class. The write-up of one of her students reads this way:

Food nourishes our body and influences our health by the nutrition it provides. Nutrition is relatively a new discipline of science that studies food and how the body uses it. Nutrients are substances in food which are carbohydrates, fats, proteins, vitamins, minerals and water. These are the fuels of our body which help us do our job just like any vehicle would need. The energy of these nutrients are measured in kilo calories. On food labels, 'calorie' actually refers to kilo calories (kcal).

The digestive system takes care of the body's need for its fuel. It is made of a group of organs that work together. It starts functioning the moment the food is put into our mouth. First, the salivary glands containing amylase moistens the food. Teeth get involved in biting and grinding the larger chunks of food into smaller pieces. The tongue then pushes the food after forming it into a bolus, to the back of the mouth to swallow. Through esophagus the bolus reaches the stomach and reacts with gastric juices, mucus and enzymes making it into a soupy liquid. The soupy liquid enters the small intestine and remains there up to six hours. It is after this process, the nutrients pass into the circulatory system and are taken to where they are needed in the body. The ileum compacts the leftovers to pass through into the large intestine. The large intestine absorbs water from the waste material leftover and produce vitamin K and some B vitamins using the helpful bacteria that live in it. Now, all leftover waste is compacted and stored at the end of the large intestine called the rectum.

Task 1. Answer the following questions based on the reading passage.

(Go back to the passage to find your answers)

1. How does the food we take help us in nourishing our body and influencing our health?
2. What does the word bolus mean?
3. Where is Vitamin K produced?
4. In which organ does the digestion end?
5. What will happen to the leftovers in the rectum

The questions above require answers on various rubrics. The rubrics are mentioned so as to help you realise how reading helps in understanding a text.

4. Writing

1. Writing Recommendations

Recommendations are suggestions that mildly inform a reader or a listener on certain procedures. A report on an accident usually gives recommendations to avert accidents. They make use of modals and impersonal passive voice structure as far as possible. The following is the list of Sentence Patterns with which recommendations could be framed.

Object + should be + verb (participle)

Object + must be + verb (participle)

Object + can be + verb (participle)

Object + need to be + verb (participle)

Object + ought to be + verb (participle)

PASSAGE 1-How to use a laptop or personal computer.

Observe the sentence pattern of the recommendations (given in bold) in the passage on *How to use a laptop or personal computer*.

- 5. The laptop should be kept in a well-ventilated, cool environment.** The fan grills on the sides, back, or bottom of the machine at any time should not be blocked because a laptop computer generates a lot of heat, especially when running the latest high-powered software. Too much heat may damage the internal circuitry.
- 6. The screen should be handled carefully. LCD screen should never be touched or played with.** You may be thrilled to watch the waves generated by your finger against the screen, but LCD displays are fragile devices that must be cared for.
- 7. Only approved cleaning materials should be used to wipe the screen.**

- 8. The rubber feet underneath must be maintained in good condition and should be checked if they are attached.** This will prevent the device from sliding around accidentally.
- 9. Be careful with those drinks...** If you need to have a drink while working or playing, be careful not to spill it. Your laptop computer could suffer the consequences from just a few drops of liquid poured in the right places.
- 10. Anti-virus protection is a must for the laptop/ Desktop.** Security wise, an anti-virus program must be obtained to safeguard the system from virus attacks
- 11. Secondly, keep it updated!** Buying an anti-virus one month and not updating it for the next six really negates its purpose. Your laptop computer could be exposed to hundreds and thousands of new viruses every month if it is not updated with anti-virus software.
- 12. Pop ups must be avoided.** Pop-ups are particularly annoying on a laptop computer. Trying to close a bunch of windows without a regular mouse can be a nuisance. You'll want a pop-up blocker, such as the Google Toolbar (located at <http://tools.google.com>), to prevent these pop- up ads.
- 13. Always firewall should be utilized** on Internet or network-enabled laptop computer. Even if you use Windows XP's built- in firewall (or purchase one from such companies as Norton), your security will greatly benefit from it.
- 14. Blocking out all the unnecessary ports and closing all the loopholes must be done** to prevent a hacker or virus from freely entering the system's hard drive.

TASK:

Write *Eight* recommendations for the following contexts:

1. For reducing mosquito menace in your locality
2. For strengthening our immune system

VOICE: ACTIVE/ PASSIVE/IMPERSONAL PASSIVE VOICE

Note the following sentences

Ram cleans the room (Active Voice)

The room is cleaned by Ram. (Passive voice)

Both the sentences convey the same information when we say that Ram cleans the room/ The room is cleaned by Ram.

When the form of the verb shows that the subject is active i.e. doing the work denoted by the verb, the verb is said to be in the active voice. (Sentence 1)

When the form of the verb shows that the subject is subjected to the action and that the subject is passive, the verb is said to be in the passive voice. (Sentence 2)

If you ask questions like - Is the room cleaned?

Your answer is - Yes, it is cleaned

Who cleans it? / Cleaned by whom?

It is cleaned by Ram

The by-agent denotes the action is not done by the subject and the subject is receiver of the action.

You can change an active sentence into a passive one.

Example

The workers are demolishing the unauthorised structures.

(Active)

The unauthorised structures are being demolished by the workers. (Passive)

The cattle grazed the entire field. (Active)

The entire field was grazed by the cattle. (Passive)

Note: All active sentences cannot be changed into passive form.

You can change only the verbs in the transitive i.e. the verb that has an object

Ruby loves Latha. The structure of the sentence is: S+V+O

Latha is loved by Ruby - The structure of the sentence is again : S +V+O – But the object of the verb love in the active sentence (Latha) has become subject of the second sentence and receives the action of love done by the object (Ruby)

Look at this sentence:

The baby sleeps – the action 'sleep' ends within the subject. It does not have an object. This sentence with an intransitive verb cannot be changed into Passive voice.

When the active form of the verb is changed into passive one:

The helping verbs denote the mood of the verb (is, was, are, were, has, had) and the past participle of the verb are used. Example: is arrested, was written, are being worked, have been punished.

Impersonal Passive Voice

In this kind of passive voice the focus is on the action and not on the doer of the action. It does not have the 'by agent' to denote the doer of the action. The scientific and technical writings which report actions and the results mostly use this form of writing. (Example: The details are furnished as follows)

Find the difference in the expressions of information in the following sentences

Experienced drivers **drive** the superfast trains fast. (Active)

The super fast trains **are driven** fast by experienced drivers. (Passive)

The super fast trains **are driven fast. (Impersonal Passive)**

INTERPRETATION

Communication can be both verbal and non-verbal. Non-verbal communication, is communicating with others using signs, body gestures and figures. Graphics, tables, pie chart, bar chart, flow chart, and tree diagrams are extensively used in scientific and technical writings. Trans coding or interpreting them is understanding non-verbal communication.

1. TABULAR COLUMN/ TABLE

Language is a medium of communication. But it is difficult to be accurate about statistical information and many fail to understand the numerical representations in oral and written communication. But when the same information is tabulated in columns and rows it is easily understood. The tabular form avoids phrases and sentences; uses only words and numbers. By far, interpreting a table is easy. A table shows the data in columns for easy analysis and interpretation. It does not need any special skill to decode the information. It gives scope for comparing and contrasting the information given specifically either in numbers or words.

The following TASK will give you the reason why a table is understood in no time.

The following passage is an excerpt from Gerald Durrell's 'Animals for ever'

"People get worked up when a couple of thousand human beings per annum are killed on the roads of Great Britain. That is a tragedy of course - but few people know that two million wild birds are killed per annum on the roads, or that in a small area studied by a Danish scientist the number of road deaths were: hares 3,014; hedge-hogs 5,377; rats 11,557; various small mammals 27,834; birds 111,728; amphibians 32,820. These, of course, are only figures for the main roads; if you included the figures for the side roads they would probably be trebled. Now, if human beings were knocked down to that extent in any country in the world there would be such a shriek of protest, such an outcry, such a lamentation, that any government in power would be forced to make us give up the motor car as a means of locomotion and go back to the horse and cart. Not that I'm against the motor car per se, but you do see my point ?"

(https://www.grijalvo.com/Gerald_Durrell/Animals_for_ever.htmGerald Durrell)

As urban dwellers we have very little knowledge about the wild animals except for certain information regarding their enjoying their natural habitats and straying into cities without being disturbed by human beings locked down during COVID – 19 Pandemic. Now that human beings are dying in millions,

the whole world is mourning. It is because we sympathise with each other. It is sad that the extermination and road death of animals is not realised as a cause for grieving. Common man does not realise the extermination and death of animals. The detail given in the previous passage may be given in a table which can easily inform even an illiterate person about the plight of wild animals.

The data obtained from the given passage is tabulated as follows:

Sl. No.	Name of the animals	Animals died/annum
1.	Hares	3,014
2.	Hedge-hogs	5,377
3.	Rats	11,557
4.	Various small mammals	27,834
5.	Birds	1,11,728
6.	Amphibians	32,820
	TOTAL	1,92,33 0

TASK 1

Now, can rewrite

you the data

given in the table in a paragraph of 100 words? Also give a title to the paragraph.

TASK 2

Interpret the following table and write about it in a paragraph (200 words)

Municipal solid waste collection and segregation at Source (Source: Solid Waste Management in India: ICRIER Report Jan 2019)

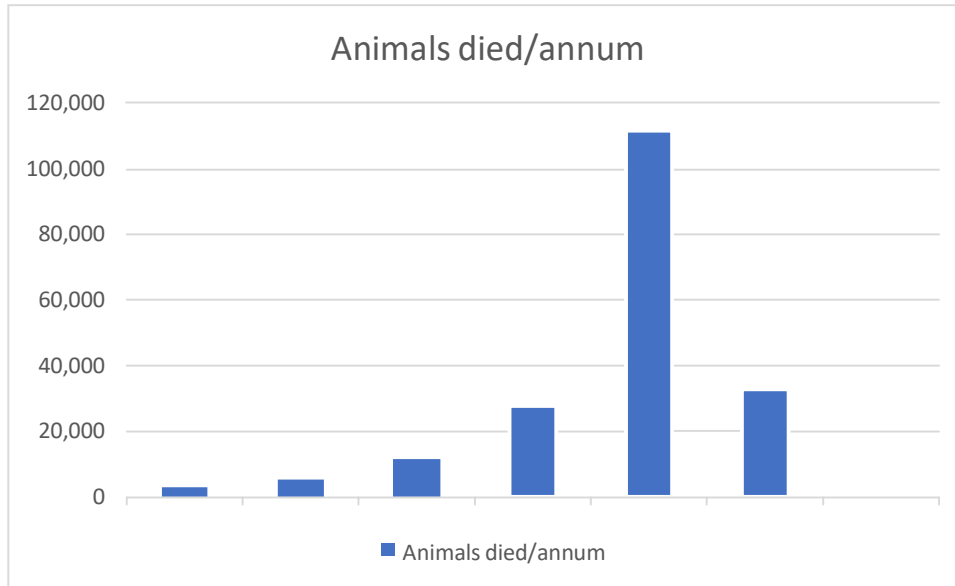
City	State	Population (in million)	Door to door collection from households(%)	Segregation at source (%)
Mumbai	Maharashtra	20.0	80	Nil
Delhi	-	19.1	39	2
Bengaluru	Karnataka	10.4	71	50
Chennai	Tamil	10.0	80	Nil
Hyderabad	Nadu	9.1	73	Nil
	Telungana			

2. Bar Chart

A bar chart or bar graph presents data in bars that are of proportional length to the values they represent. The bars are plotted vertically or horizontally. They are best for grouped or disconnected data over a period of time. Refer to the passage above. The following bar chart illustrates the death of animals in a year in Great Britain. The wild animals like hares, hedge hogs, rats, various small mammals, birds and amphibians die caught under moving vehicles every year. The statistics made provides the following data. 3014

hares , 5377 hedge hogs, 11557 rats, 27834 various small mammals , 1,11,728 birds and 32820 amphibians die ever year under wheels. If people are considerate to the animals, the deaths of animals can be averted.

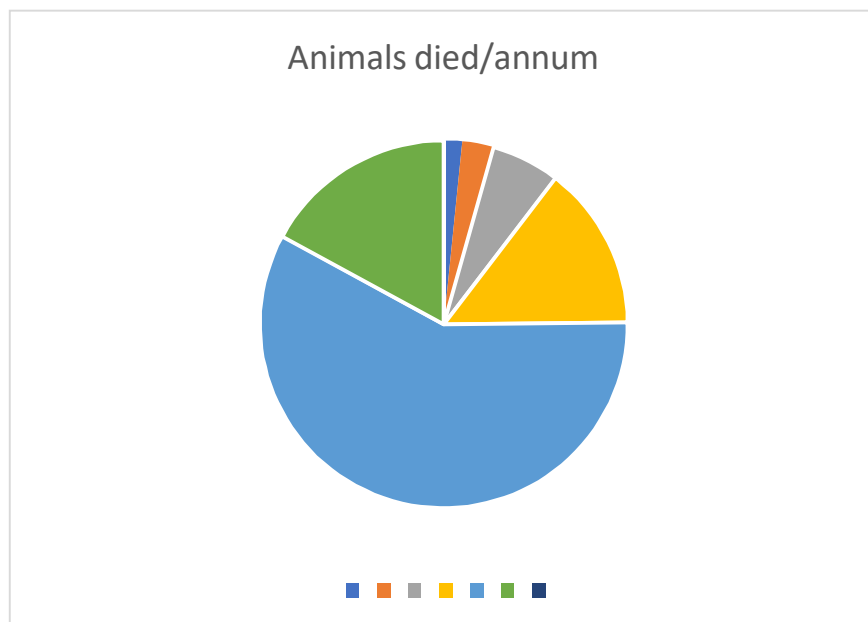
2. BAR CHART DEPICTING ANIMALS THAT DIED EVERY YEAR



3. Pie Chart




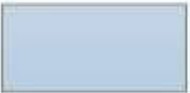

A pie chart is a circular graph that represents data in percentile proportion to the whole. It makes easy understanding for even less educated people.

Task 1. A Pie Chart model is given in which the data has to be entered. Draw a pie-chart in your notebook and fill in the data in the segments based on the details from the passage given above.



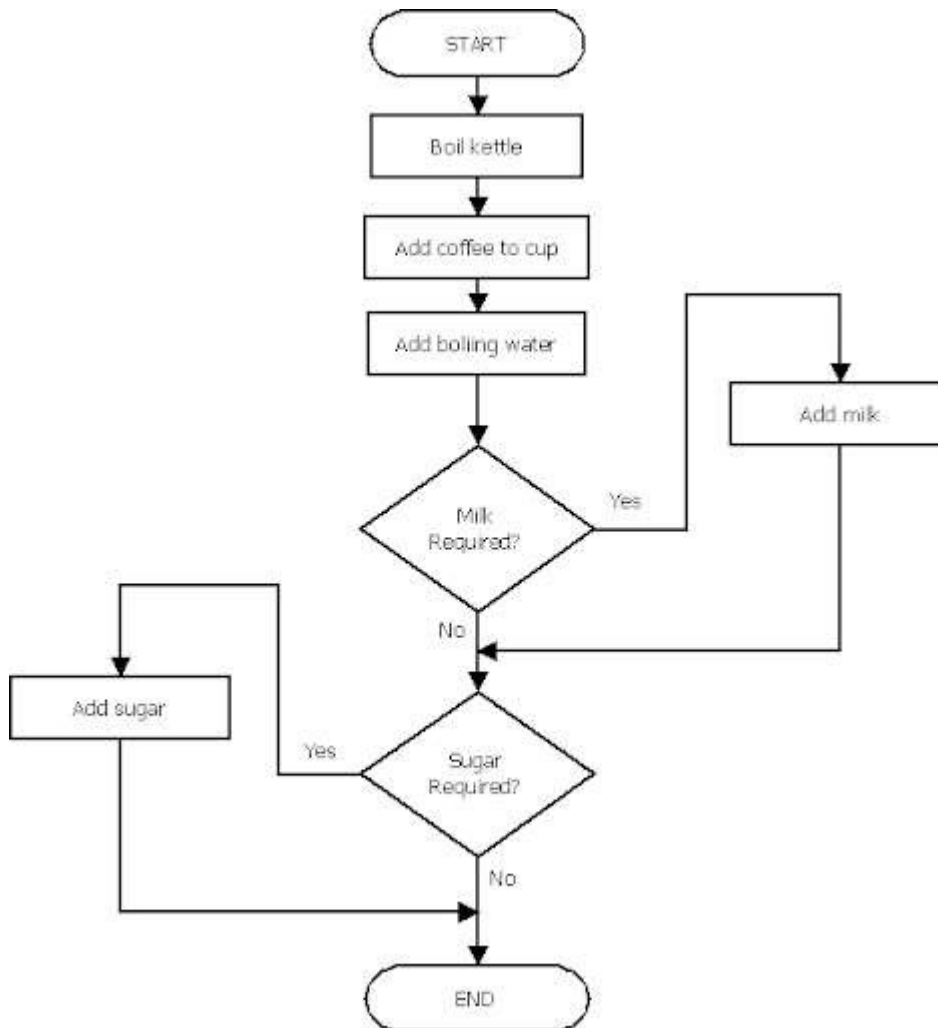
4. FLOW CHART

Definition: A flow chart shows the sequential process of the production of certain things in steps for easy interpretation. While description of a process is to be written in a paragraph, use an introductory and a concluding sentence with proper sequential expressions and appropriate connectives. The use of impersonal passive voice and connectives like: Then, Similarly, now, thus, is an important component of process description.

Symbol	Name	Function
	Start/end	An oval represents a start or end point
	Arrows	A line is a connector that shows relationships between the representative shapes
	Input/Output	A parallelogram represents input or output
	Process	A rectangle represents a process
	Decision	A diamond indicates a decision

The process of making coffee is illustrated in a flow chart.

Making of coffee



TASK 1

Describe the process making coffee in your own words and write in a paragraph (150 WORDS)

Connectives and Linkers

Connectives and Linkers are used to connect and relate ideas, sentences and paragraphs. They play a crucial role in the construction of a paragraph as they help in the coherent flow of ideas and reveal the interaction of the ideas expressed.

Connectives connect two ideas in the sentence whereas linkers establish the relationship between two ideas in sentences.

Connectives: and, also, as well as, besides, firstly, since, when, while, now, previously, especially, in fact, on the contrary, in specific, similarly, as a result, due to, so, accordingly, until, owing to, although, apart from, despite, as long as, among however, yet, unless, although, for instance, such as, in the case of, finally . . .

Examples:

Raj **and** David came home yesterday.
I enjoy travelling **especially** to historic places.
You can have the book **as long as** you want.
I **finally** left Chennai.

Linkers: Consequently, Therefore, Because of, In addition to, Originally, Unfortunately, Firstly, Conversely, Fortunately, Typically, In summary, To sum up, Generally, In this connection, In this Context, Besides, Such as, Regardless, As soon as . . .

Examples:

I was sick during the study holidays. **Consequently**, I failed in my exams.
Generally, I like eating ice cream.
In this context, it becomes important to discuss the disadvantages of technology.

To sum up, your resume is the representation of your social self

Task 2. Make 5 sentences using connectives/ linkers

UNIT – 5

CRITICAL THINKING SKILLS

Listening

- Listening comprehension- Listening for information.

Speaking

- Making presentations (with PPT- practice)

Reading

- Comprehension passages
- Note making

Writing

- Problem and Solution essay
- Professional Competence and Ethics
- Summary writing

Vocabulary- Register specific (Incorporated into the LSRW tasks)

1. LISTENING

Pre-Listening:

Listening is a skill which helps one to collect information, understand and keep the material stored in one's memory.

Self Check:

1. What is the function of catalyst?
2. What is enzyme?
3. What is the role of enzyme in your body?

Listening:

Listen to your teacher reading the following passage and comprehend it.

PASSAGE 1-INTRODUCTION TO ENZYMES

Chemical reactions in biological systems hardly occur in the absence of a catalyst. The biological catalysts that catalyse the biological reactions are enzymes. Almost all bio chemical reactions in living things need enzymes. Even a reaction as simple as the hydration of carbon di oxide is catalysed by an enzyme.



In the absence of enzyme, the transfer of CO_2 from the tissues into the blood and then to the alveolar air would be incomplete. Carbonic Anhydride is the enzyme that catalyses this reaction. This is one of the fastest known catalysts for catalysing this reaction. Each enzyme molecule can hydrate 10^5 molecules of CO_2 in one second. This catalysed reaction is 10^7 times faster than the un-catalysed reaction.

There are approximately 1300 different enzymes found in the human cell. They are vital for life and serve a wide range of important functions in the body, such as aiding in digestion and metabolism. Metabolic enzymes

are an essential component for optimal cellular function and health. Enzymes are biologically active proteins found in all living cells. All enzymes are proteins, but all proteins are not enzymes. They significantly increase the rate of almost all the chemical reactions taking place within cells. The striking characteristics of all enzymes are their catalytic power and specificity. Some enzymes help break large molecules into smaller pieces that are more easily absorbed by the body. Other enzymes help bind two molecules together to produce a new molecule. Furthermore, the activity of many enzymes is regulated. In addition, some enzymes are intimately involved in the transformation of different forms of energy.

Enzymes are highly selective catalysts, meaning that each enzyme only speeds up a specific reaction. They are highly specific both in the reaction catalyzed and in their choice of reactants. The molecules that an enzyme works (reacts) with are called substrates. For example, Trypsin is quite specific in that it splits peptide bonds on the carboxyl side of lysine and arginine residues only. Many enzymes have been named by adding the suffix "-ase" to the name of their substrate or to a word/phrase describing their activity. Thus, the enzyme catalyzes the hydrolysis of urea is urease, and DNA polymerase is the enzyme that catalyzes the polymerization of nucleotide to form DNA. Before the specific reaction catalyzed by an enzyme was known, enzymes were named by their discoverers for a broad function. For example, an enzyme known to act in the digestion of foods was named pepsin, from the Greek word Pepsis, meaning, "digestion".

The Role of Enzymes in the Digestive System

The foods we eat contain many complex molecules. These complex molecules should be broken down to simple molecules, for absorption in the body. Breaking down of large food molecules into small molecules is called chemical digestion. Chemical digestion could not take place without the help of digestive enzymes. Digestive enzymes speed up chemical reactions that break down large food molecules into small molecules. They turn the food we eat into energy. Digestive enzymes are released or

secreted, by the organs of the digestive system. These enzymes include proteases which digest proteins, and nucleases that digest nucleic acids. Important digestive enzymes include: (1) Amylase, produced in the mouth, which helps to break large starch molecules into smaller sugar molecules; (2) Pepsin, produced in the stomach, helps to break proteins into amino acids; (3) Trypsin formed in the pancreas also breaks down proteins; and (4) Pancreatic Lipase, produced in the pancreas, is used to break apart fats.

Enzymes Transform Different Kinds of Energy

In many biochemical reactions, the energy of the reactants is converted into a different form with high efficiency. For example, in photosynthesis, light energy is converted into chemical bond energy. In Mitochondria, the free energy contained in small molecules derived from foods is converted into free energy of adenosine triphosphate (ATP). The chemical-bond energy of ATP is then utilized in many different ways. These transformations of energy are carried out by enzyme molecules that are integral parts of highly organized assemblies.

Mechanism of Enzyme Action

The making and breaking of chemical bonds by an enzyme are preceded by the formation of an enzyme-substrate (ES) complex. The substrates bind to a specific region on the enzyme called the active site. As already mentioned, most enzymes are highly selective in their binding of substrates. Certainly, the catalytic specificity of enzymes depends largely on the specificity of the binding process. Furthermore, the control of enzymatic activity may also take place at this stage. The widely accepted theory for explaining the enzyme-substrate interaction is the lock-and-key model. In the lock-and-key model, the active site of an enzyme is exactly shaped to hold specific substrates. In the other model called induced-fit model, the active site and substrate do not fit perfectly together. But, both of them alter their shape to connect. In any case, the reactions that occur get accelerated by a million fold. Once the chemical reactions result in a new

product, it separates from the enzyme. The freed enzyme goes on to catalyse other reactions. For example, when the salivary enzyme amylase binds to a starch, it catalyses hydrolysis. The hydrolysis results in maltose or malt sugar. The maltose departs from the enzyme.

Post Listening:

Answer the following using your understanding of the above passage.

Task 1:

Fill in the blanks:

- 1) The catalysts in the biological reactions are called -----.
- 2) There are approximately----- different enzymes found in the human cell.
- 3) The striking characteristics of all enzymes are their -----and -----.
- 4) ----- enzymes speed up chemical reactions that break down large food molecules into small molecules.
- 5) The ----- results in maltose or maltose sugar.

Task 2:

Answer the following questions:

1. What is called chemical digestion?
2. Can chemical digestion take place without the help of digestive enzymes?
3. What is the role of amylase?
4. Name any two digestive enzymes.
5. Where is pepsin produced?

Task 3:

Find the meaning for the following words using the dictionary:

- Catalyst
- Enzyme
- Hydrolysis
- Substrate
- Hydrate

2. SPEAKING

POWERPOINT SLIDE SHOW IN CLASSROOMS

Power Point Presentations came into the education scenario more than a decade ago. One of the cardinal principles of effective communication is the use of audio-visual aids. In times past, charts and models were used to capture the attention of listeners. With the advent of electronic media and advancement in computer programming and computer literacy, classrooms and lecture halls are equipped with facilities for Power Point Presentations. Pictures, videos, music and graphs can be included on the slides as required. For instance, heart beat can be depicted with an animated image of a heart. Video clips of events and phenomena can also be inserted onto a PowerPoint slide.

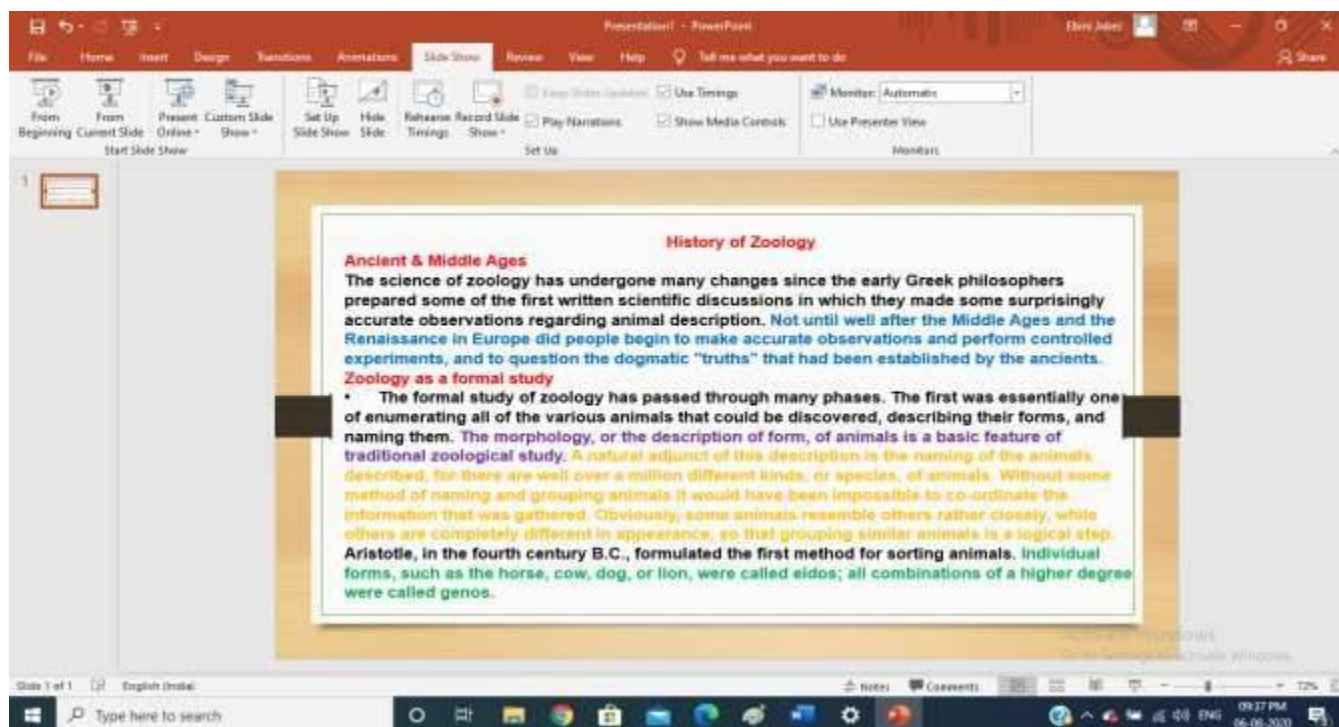
PPTs can be created with voice over by recording narration for each of the slides. The running of the PPTs can also be set by recording a slide show with rehearsal timings. With audio recordings working in sync with the slides (pictures, videos, graphs, data and text), PowerPoint proves to make an indelible impact on listeners.

POWER POINT – DOs AND DON'Ts:

1. Do not put up too much of text (matter) on the slide. Only the point (not a whole paragraph)
2. Do not read what is on the slide. The slide is only a memory trigger. You should use it only to remind you/guide you as to the course of your speech
3. For a professional or academic presentation do not have designs or make it too colourful
4. Use pie charts and graphs when discussing any quantitative analysis
5. Use photographs or pictures when necessary. There is a saying, "A picture says a thousand words." Photos and pictures speak volumes.
6. When you complete your presentation, do a recap of all the points you have made in your power point

TASK 1:

Form small groups and identify the errors in the slide given. Also discuss how it can be improved.



Task 2:

Choose a simple topic related to your subject and prepare a PPT to be presented in class.

3. READING

NOTE MAKING

Have you ever wondered how to collect information from class, connect ideas together and revise for exam in an easy way? Then try this important study skill – Note making.

Note-making is an advanced process that involves reviewing, synthesizing, connecting ideas from the lecture or reading and presenting the information in a readable, creative way that will stick in your mind. Making notes is different as they are the resources you create yourself. They tend to be more concise.

Why Note Making is important?

The importance lies in the fact that it -

- Promotes active listening / reading
- Provides a framework for revision
- Improves understanding

Note making, like all other skills, can be mastered through practice. How you take and make notes will depend on the subject, context and the way you work for the best. You will need to reflect on your skills as you progress.

The 5 R's of Note Taking / Note Making

Record: During the lecture, write all meaningful information legibly.

Reduce: After the lecture, write a summary of the ideas and facts using key words as cue words.

Recite: Recite all the information in your own words without looking at our notes or the text.

Reflect: Think about your own opinions and ideas. Raise questions and record original ideas

Review: Before reading new material, take 10 minutes to review your older notes. Skim over the main ideas and details.

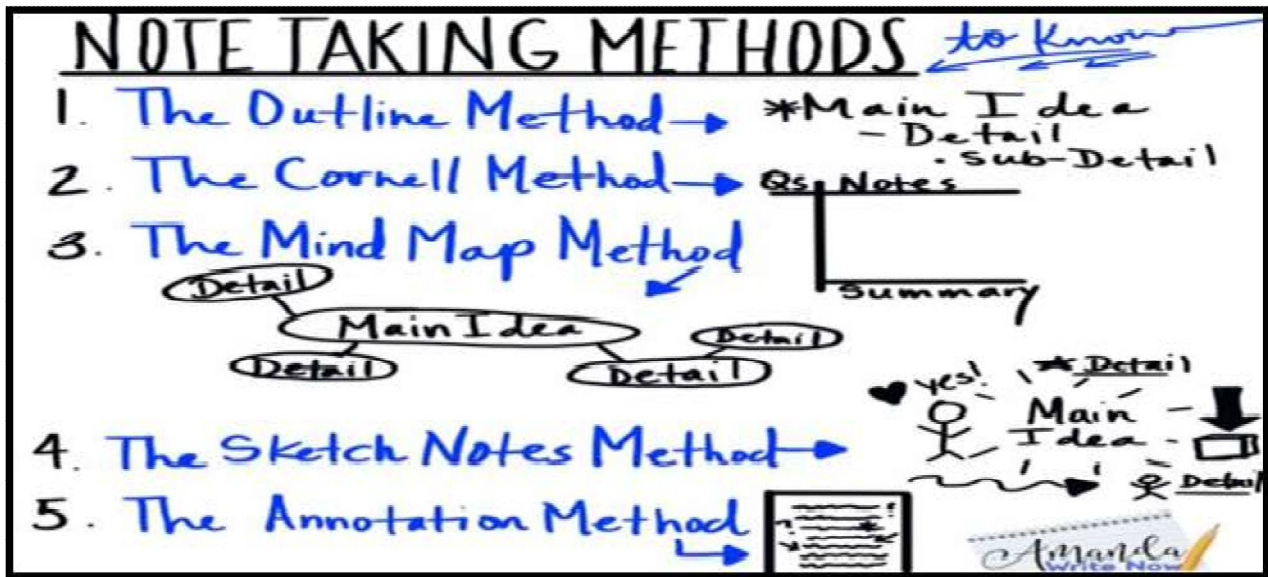
Pauk, W., (1989), *How to Study in College*, (4th Ed.), Boston, MA: Houghton Mifflin.

What format of Note Making suits you best?

This may depend on your learning preference. Are you best visually or auditorily or kinesthetically? Or do you have a mixture of more than one? Do think about the easiest way for you to produce and review your notes. The structure of the lecture should help you organise the content, so it is important to work on that as well.

Whatever format you decide on (and it might be different for different lectures) the general principles are the same:

- Use your ownwords.
- Be concise.
- Use abbreviations, phrases and key words, not sentences.
- Date and reference notes clearly.
- Number pages and points.
- Use headings and subheadings.
- List details.
- Use boxes, underlining, colour coding, CAPITALS and highlighting.
- Use arrows to show links between sections.
- Use diagrams and drawings.
- Leave a margin and plenty of space between sections.
- Use a well-spaced layout.

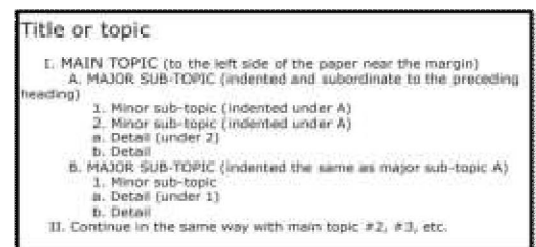


<https://in.pinterest.com/pin/389561436524014933/>

Formats for Notes

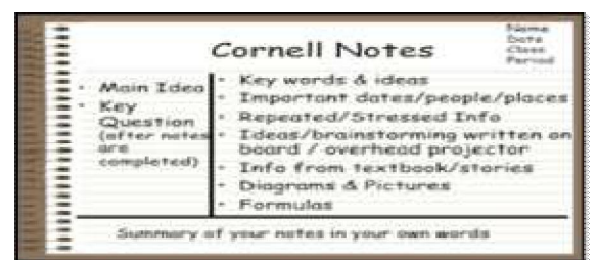
1. Outline Method or Linear notes

This is the simplest and therefore the most common style of notes, both for reading and listening. The word linear is the adjective of the word line, which indicates that these notes are written down the page, one line after the other.



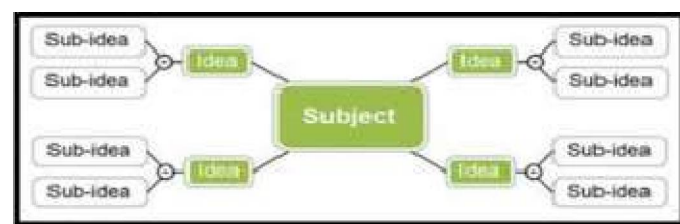
2. Cornell Method

The Cornell notes is a note taking system that was invented back in 1950s by Walter Pauk. The Cornell notes taking method ensures to divide a single page in three sections namely Main idea, Notes and Summary Section.



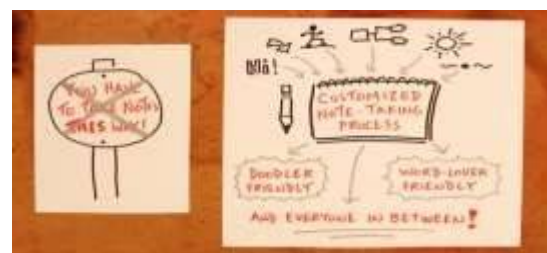
3. Mind Maps

This is a pictorial way of organizing your thoughts and ideas. The visual nature of the notes can make it easier to understand and remember information. You can use colour, diagrams, pictures, and symbols.



4. Sketch notes Method

Sketch notes (sketch + notes) are visual notes, so more than just the regular text notes we are used to take. When sketch noting you enhance your regular notes with visual elements such as small drawings, frames, arrows, lettering etc.



<https://www.verbaltovisual.com/what-is-sketchnoting/>

5. Annotation Method

Annotation is an important part of note-taking. You annotate printed materials by marking up the text-writing in the margins, highlighting text, etc.



Annotating is useful when you

want to identify key passages so you can find them quickly later.

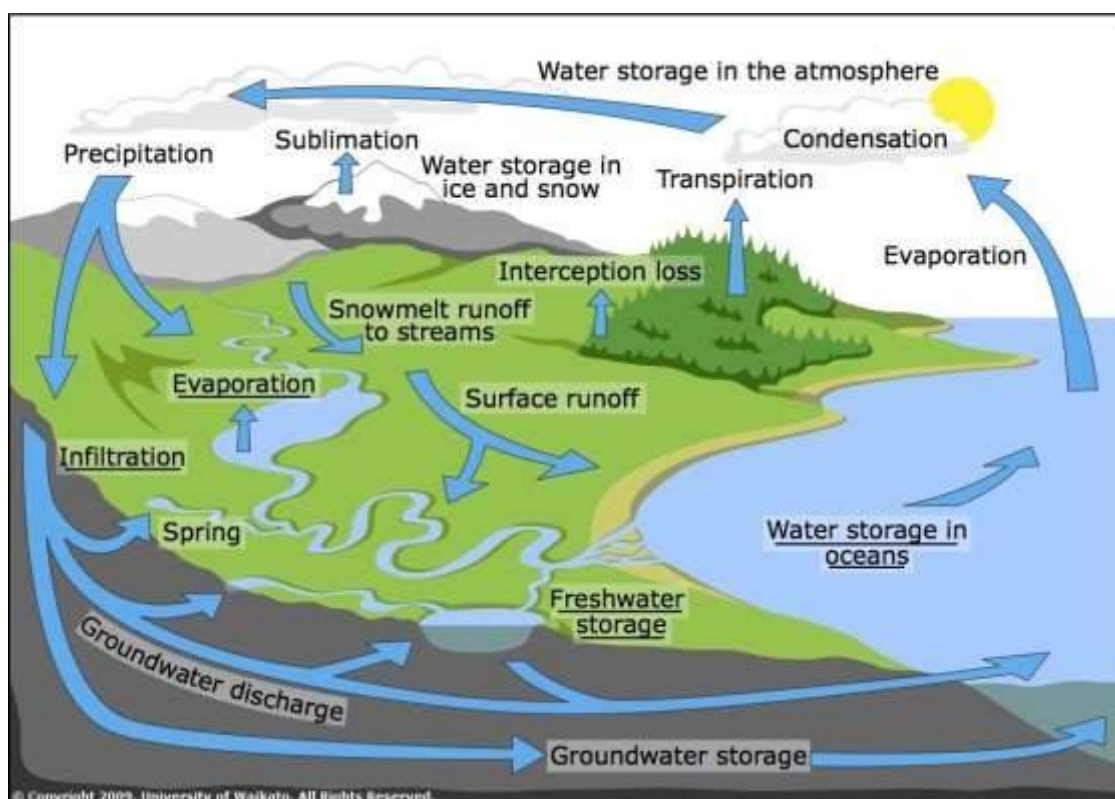
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Practice Exercise:

Passage 1: WATER CYCLE

Read the passage carefully and make notes from it using any one of the formats mentioned above:

Water is one of the most essential sources of life. Plants and animals must have water to survive. If there was no water there would be no life on earth. A hydrosphere is the total amount of water on a planet. The hydrosphere includes water that is on the surface of the planet, underground and in the air. A planet's hydrosphere can be liquid, vapour, or ice.



Hydrosphere covers 70% of earth's surface. 97.6% of water found on Earth is in the oceans in the form of salt water. Only 2.4 % of water on Earth is fresh water. Out of this, 87% is in frozen form as glaciers and 13% is available as liquid water which is easily accessible to human. Of this 13 % liquid water 95 % remain as ground water, 3 % distributed as lakes, rivers and streams and the remaining 2 % as soil moisture. It is important to know the cycle of processes by which water circulates between the earth's oceans, atmosphere and land which in other words can be called as Water Cycle.

Water continually cycles around the planet in 10 distinctive steps:

- **Evaporation** is the primary pathway that water moves from the liquid state back into the water cycle as atmospheric water vapour.
- **Transpiration** is the process of water movement through a plant and its evaporation from aerial parts, such as leaves, stems and flowers.

- **Sublimation** describes how snow and ice change to water vapour without becoming liquid.
- **Condensation** happens when water vapour becomes water droplets via cloud formation.
- **Transportation** defines how water moves through the atmosphere in its solid, liquid or gaseous form.
- **Precipitation** is any form of liquid or solid water particles that fall from the atmosphere and reach the surface of the Earth in the form of drizzle, rain, hail etc.
- **Deposition** is how water vapour changes to a solid state without becoming liquid, like frost.
- **Infiltration** defines how water seeps into the ground and then percolates into the water table
- **Surface flow** describes how rivers, lakes and stream flow to the ocean along with underground aquifers.
- **Plant uptake** explains that plants only use 1 percent of the water pulled in by their roots, while the rest goes back into the atmosphere.

While almost 70% of the Earth is made of water, many parts of the world suffer from clean water shortage. Conserving water is important because it keeps water pure and clean while protecting the environment. Conserving water means using our water supply in a responsible manner. As every individual depends on water for livelihood, we must learn how to keep our limited supply of water pure and away from pollution. Keeping our water supply safe and pure will protect the water for the generations to come.

Source:

<https://www1.health.gov.au/internet/publications/publishing.nsf/Content/ohp-enhealth-manual-atsi-cnt-l~ohp-enhealth-manual-atsi-cnt-l-ch6~ohp-enhealth-manual-atsi-cnt-l-ch6.1#:~:text=Water%20is%20one%20of%20the,be%20no%20life%20on%20earth.&text=A%20part%20from%20drinking%20it%20to>

Passage 2: Professional Competence and Professional Ethics

The two important ingredients in our recipe for success in our career life, are nothing but Professional Competence and Professional Ethics. They are not to be confused as they mean two different concepts.

Competence in any area of work is a combination of knowledge and skill and application of the same. Competence is much more than a skill. For instance, a driver may have the necessary skill to drive. But when something goes wrong with the vehicle the driver must be able to identify the problem and fix it himself if possible. Similarly, a person may be good at all the four skills of language, namely, Listening, Speaking, Reading, and Writing. But linguistic competence refers to one's ability to use language effectively in any situation. It should help person transfer knowledge, ideas and information while at the same time using it for interpersonal relationship, by understanding the feelings of others, influencing and motivating others.

Obviously different kinds of professions and even jobs call for the respective skills and competence. Right from the lab assistant to a cobbler, there is a certain amount of skill and competence required to set a microscope or to mend the shoes respectively. In the corporate world, the in-roads to success must be known to the person doing the business. In the field of computers, there is a clear distinction between software professionals and hardware, because both demand a different set of skills and expertise. Skills can be acquired with training whereas competence comes with experience. As Noam Chomsky says, with regard to language intuition plays a very important role in developing competence. It may be true with other fields of work as well.

Professionalism, which is a combination of knowledge, skill, expertise and competence, is essential to increase efficiency and productivity, ultimately leading to success. Professionalism also refers to the attention to every detail and the care with which every minute work or even great challenging work has to be done. It also calls for preparedness. A simple tip to the students who are going to attend an interview: Your professionalism is visible when you report in time at the venue, neatly dressed for the occasion and taking all the necessary certificates and documents, properly arranged. A candidate will be judged by his or her professionalism even before joining the profession. Hence it is necessary we learn to take particular care in everything that we do.

It is not enough if we develop professional competence alone to become successful. Our dealings should be driven by a set of rules or a code of behaviour, called 'ethics'. Professional Ethics refers to the values or principles that govern any profession. Even though the idea was associated with religion basically, it found its application in Divinity, Law and Medicine and later to the Military Services. It took a secular dimension further when it was applied to every field of activity. A fine example of Professional Ethics can be taken from the Hippocratic Oath, taken by medical professionals. By this, every medical practitioner or physician swears to uphold the specific ethical standards of the medical profession. It is attributed to Hippocrates, the ancient Greek doctor and his book Hippocratic Corpus. Similarly lawyers swear that what they speak is nothing but the truth.

Professional Ethics also means one's ability to make judgements or evaluations while taking important decisions. While giving service to the public the professional must disseminate knowledge that should be governed by values. The means adopted should justify the end. If a person's personal values and belief systems are strong and authentic, then his or her professional ethics also will have a strong foundation. If an individual has very strong principles of hard work and honesty, with values of punctuality and integrity, then this will enable the person to adhere strictly to the ethics of the profession.

The professions can be grouped into two broad categories. One is product oriented and the other is service oriented. For instance, business organisations and corporate companies, are product oriented and look for the three Ps - Product, Productivity and Profit. Education, Law, Medicines, to name a few, are service oriented and take into consideration another set of three Ps- People, Prosperity and Peace. So each profession is guided by certain moral standards to follow. To give an example, in science, any discovery or invention should be guided by the principle of uplifting humanity. It should be done for constructive purpose. The question of ethical aspect can be understood when majority of the world raised ethical concerns regarding cloning. In the area of computer science there is an idea called 'ethical hacking'. Alfred Nobel realised how destructive dynamite could be after inventing. He instituted Nobel Prize with all the wealth he had, to encourage scientists to discover or invent to help living beings for their comfortable and peaceful living and also save the planet.

Sometimes there may be situations where value conflicts arise. There may be a clash of individual beliefs and institutional objectives. We should try to resolve such conflicts by our art of influencing or negotiating skills. Here again interpersonal skills come in handy. We also need to understand that sometimes our individual goals may have to be kept aside in order to accomplish group goals. It is equally important to have a win-win approach, to help ourselves and others grow. Meaning to say, anything that we do should lead to development, both as individuals and those surrounding us and the society at large.

What is success after all? Is it just earning money or getting a position and improve our standard of living? Or does it mean finding satisfaction and serving the people? Whatever is our definition of success or goal in life will determine the kind of importance we give to the ethical aspect of our profession. As students we need to be initiated into thinking about this very important aspect of our professional and personal life. In our own small and simple ways we can start practising. The aim of education is not just to create knowledge society but more importantly a value-based society.

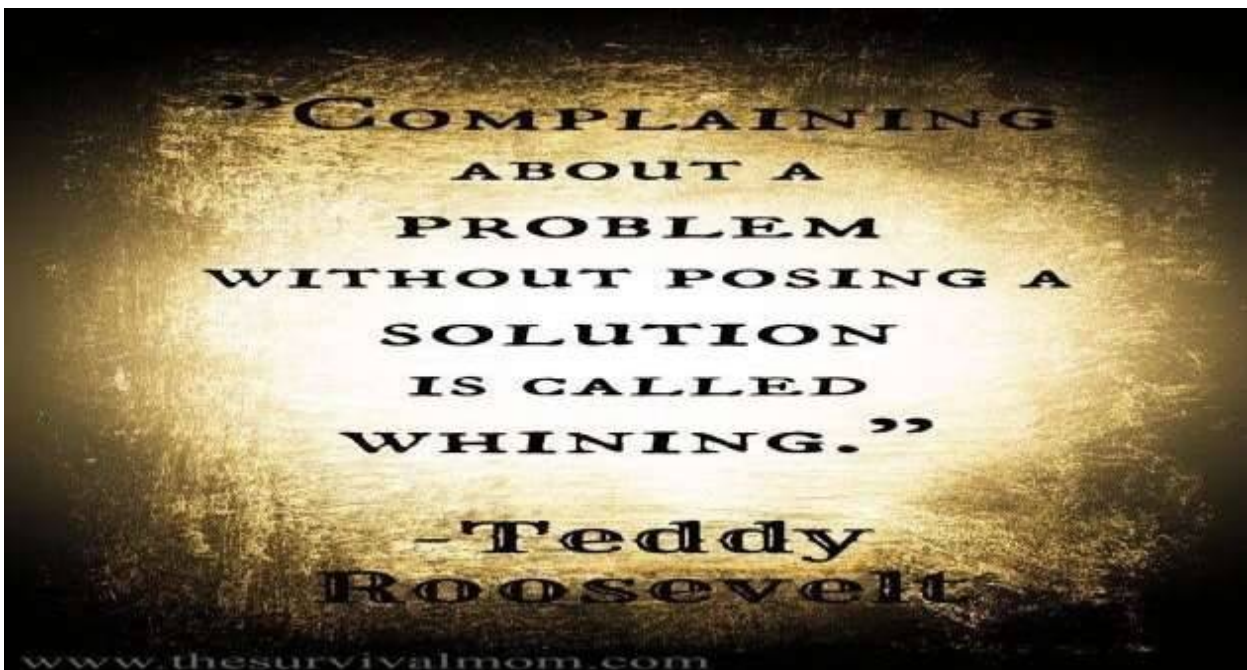
TASK 1:

Form small groups of four or five and discuss the various job opportunities related to your subject of study.

TASK 2:

Think about the different skill sets required for some of the jobs specific to your course of study and discuss in small groups.

4. WRITING

**Self-Check:**

1. Do you agree with this above quote?
2. How do you try to resolve your problem?

Passage 1- Obesity

Read the following essay on Obesity and observe its structure.

Consumption of processed and convenience foods and our dependence on the car have led to an increase in obesity and reduction in the fitness level of the adult population. In some countries, especially industrialized ones, the number of obese people can amount to one third of the population. This is significant as obesity and poor fitness lead to a decrease in life expectancy, and it is therefore important for individuals and governments to work together to tackle this issue and improve their citizens' diet and fitness.

Obesity and poor fitness decrease life expectancy. There is a reliance today on the consumption of processed foods, which have a high fat and sugar content is considered as one of the important factors of causing obesity. Overweight people are more likely to have serious illnesses such as diabetes and heart disease, which can result in premature death. It is well known that regular exercise can reduce the risk of heart disease and stroke, which means that those with poor fitness levels are at an increased risk of suffering from those problems.

Changes by individuals to their diet and their physical activity can increase life expectancy. By preparing their own foods, and consuming more fruit and vegetables, people could ensure that their diets are healthier and more balanced, which could lead to a reduction in obesity levels. In order to improve fitness levels, people could choose to walk or cycle to work or to the shops rather than taking the car. They could also choose to walk up stairs instead of taking the lift. These simple changes could lead to a significant improvement in fitness levels.

Governments could also implement initiatives to improve their citizens' eating and exercise habits. This could be done through education, for example by adding classes to the curriculum about healthy diet and lifestyles.

Governments could also do more to encourage their citizens to walk or cycle instead of taking the car, for instance by building more cycle lanes or increasing vehicle taxes. While some might argue that increased taxes are a negative way to solve the problem, it is no different from the high taxes imposed on cigarettes to reduce cigarette consumption.

In short, obesity and poor fitness are a significant problem in modern life, leading to lower life expectancy. Individuals and governments can work together to tackle this problem and so improve diet and fitness. Of the solutions suggested, those made by individuals themselves are likely to have more impact, though it is clear that a concerted effort with the government is essential for success. With obesity levels in industrialized and industrializing countries continuing to rise, it is essential that we take action now to deal with this problem.

Inference:

The above essay is an example for **Problem - Solution essay**. The problem discussed in the essay is Obesity. The problem is well analysed in the essay and the solutions are given in the form of recommendations.

When the essay is observed carefully, one can understand the following structure:

- **First paragraph states the problem**

- **Second paragraph highlights the causes and effects of the problem**
- **Third and Fourth paragraphs recommend solutions**
- **Fifth paragraph serves as the conclusion of the essay.**

Considering the above essay as an example, any Problem Solution essay should comprise:

- 1. Statement of the problem.**
- 2. Analysis of the problem.**
- 3. Examination of the cause and effect of the problem.**
- 4. Finding the possible solutions.**
- 5. Evaluation of the solutions found.**
- 6. Conclusion of the essay.**

According to EAP Foundation.com, there are two different ways to structure the Problem – Solution essay namely **Block structure** and **Chain Structure**.

Block Structure: All the sub problems related to the main problem given are stated first and the list of solutions to the sub problems are listed afterwards.

Chain Structure: Unlike Block Structure, in the Chain Structure each sub problem is immediately followed by the solution.

Block

Introduction
(including 'situation')

Problem 1
Problem 2

...

Transition sentence/paragraph

Solution 1
Solution 2

...

Conclusion
(including 'evaluation')

Chain

Introduction
(including 'situation')

Problem 1

&

Solution to Problem 1

Problem 2

&

Solution to Problem 2

Problem 3

&

Solution to Problem 3

...

Conclusion
(including 'evaluation')

Source: Problem Solution Essays

<https://www.eapfoundation.com/writing/essays/problemsolution/>

Task 1:

Write Problem – Solution Essays for the following topics:

1. Non-biodegradable waste



Image source: <https://www.wallpaperflare.com/pile-of-blue-plastic-bottle-lot-garbage-plastic-waste-pollution-wallpaper-wvqnd>

2. Genetically modified animals



Two genetically modified mice (on either side) expressing enhanced green fluorescent protein (eGFP) under UV-illumination flanking.

Image Source:

https://commons.wikimedia.org/wiki/File:GFP_Mice_01.jpg

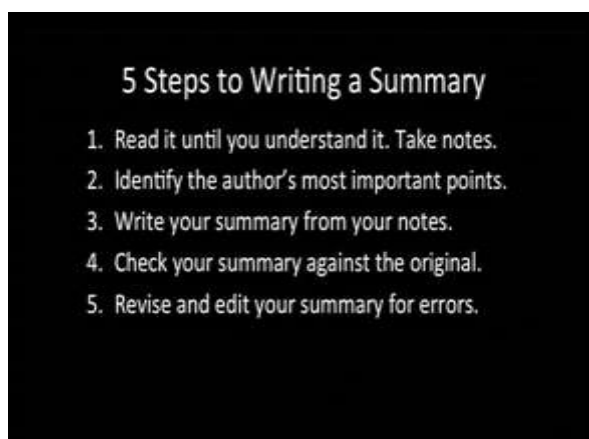
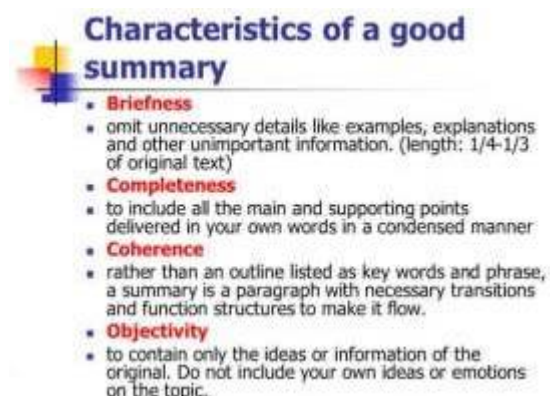
Summary Writing

Pre-Writing Task:

1. What is summary writing?
2. Is it essential to possess the skill of summary writing?

Summary Writing

The skill of summarizing is essential as it helps us discern the most important details in a text by ignoring the less significant information. The summary comes to a form with the integration of the key ideas.



Source:

https://images.slideplayer.com/25/7741098/slides/slide_4.jpg

<https://i.ytimg.com/vi/WZFI6dvgOzU/maxresdefault.jpg>

Passage 2: Read the following passage on *Human Immune System*

What is immunity?

The ability of an organism to resist a particular infection or toxin by the action of specific **antibodies** or sensitized white blood cells in the host is referred as immunity.

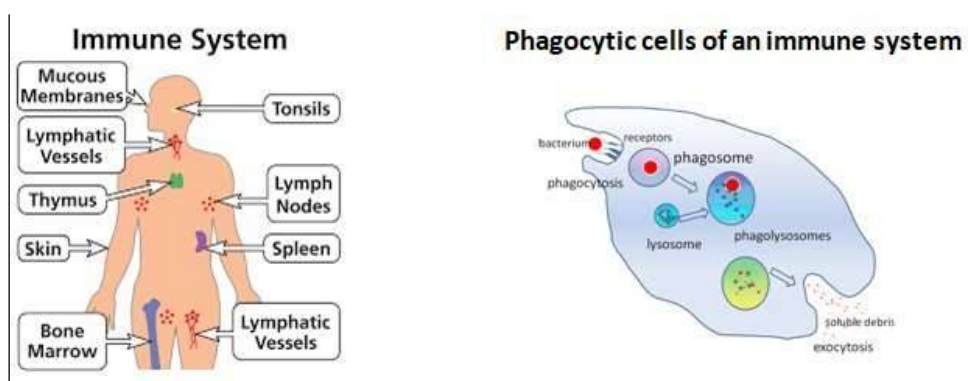
Types

Passive immunity: It is a transfer of active immunity in the form of ready-made antibodies from one individual to another. It also can occur naturally when maternal antibodies are transferred to the foetus through the placenta. Passive immunization is used when there is a high risk of infection and insufficient time for the body to develop immune response. It provides immediate protection but at risk of being infected by the same pathogen later.

Active immunity: Naturally acquired active immunity occurs when a person is exposed to a live pathogen and develops a primary immune response. This type of immunity is "natural".

Immune systems

The **immune system** is a complex network of cells and proteins that defends the body against infection. The immune system keeps a record of every germ (microbe) it has ever defeated so it can recognise and destroy the microbe quickly if it enters the body again. There are two major immune systems: the innate immune system and the adaptive immune system. Both subsystems use humoral immunity (antibodies mediated) and cell-mediated immunity to perform their functions.



The immune system produces an immune response to the **pathogen** by generating antibodies, killer cells, or both.

- In the first type of immune response (humoral response), the body's B-cells produce antibodies to neutralize antigens and eliminates,
- In the second type of immune response (termed the cell-mediated response), specific killer cells called cytotoxic T-cells attack the pathogen in the infected cells.

How to enhance immunity?

Inadequate or poor quality sleep is linked to susceptibility to sickness, Whole plant foods like fruits, vegetables, nuts, seeds and legumes are rich in nutrients and antioxidants that may give you an upper hand against harmful pathogens. Healthy fats, like those found in olive oil and salmon, may boost your body's immune response to pathogens.

Getting to Know: Technical Terms or Jargon

- 1. Pathogen-**a bacterium, virus, or other microorganism that can cause disease.
- 2. Microbe-** a microorganism, especially a bacterium causing disease or fermentation.
- 3. Foetus-** an unborn or unhatched offspring of a mammal, in particular an unborn human more than eight weeks after conception.
- 4. Placenta-**a flattened circular organ in the uterus of pregnant eutherian mammals, nourishing and maintaining the foetus through the umbilical cord.
- 5. Antibody-** a blood protein produced in response to and counteracting a specific antigen. Antibodies combine chemically with substances which the body recognizes as alien, such as bacteria, viruses, and foreign substances in the blood.

Task: 1

Prepare a summary of the passage on Human Immune System in about 250 words.

READ, IMAGINE, INNOVATE



The following books and channels are recommended for you to widen and expand your learning experience:

Books:



1. Joy Adamson - *Born Free, Living Free*
(movie also available)
2. Ruskin Bond – *My Favourite Nature Stories*
3. Janaki Lenin – *Every Creature Has a Story*
4. Vance Packard – *The Human Side of Animals*
5. Salim Ali – *The Book of Indian Birds*

Channels

1. Discovery
2. National Geographic