



STSN GOVERNMENT DEGREE COLLEGE

KADIRI - 515591

SRI SATHYA SAI DT.



2.2.1 - The institution assesses the learning levels of the students and organizes special Programmes for advanced learners and slow learners.

The college admits students from various socio-economic backgrounds allotted by the APSCHE (Andhra Pradesh State Council of Higher Education) through online admission process (OAMDC). After admitting the students, they are thoroughly counseled, guided and oriented to make them aware of the course syllabus, programme outcomes, mode of internal assessment, external assessment, curricular and co-curricular activities, rules and regulations of the institution as well as the facilities like JKC, Skill development centre etc., that are available in the college. At the beginning of the course, the advanced and slow learners are identified, accordingly materials will be supplied. For the advanced learners reference books are suggested by the teachers concerned to study extensively to score good marks and to get mastery over the subject. Remedial and extra classes are conducted for slow learners. Teachers will be in constant touch to clear the doubts and counsel the students even on a one to one basis. Advanced learners are encouraged to become class mentors so as to be available to their peer group all the time in getting the doubts clarified. Extension lectures, remedial classes educational tours, archeological sites, diversity rich areas, geographical sites etc., and universities are regularly conducted, for edutainment purpose.

PRINCIPAL

STSN Govt. DEGREE COLLEGE

KADIRI - 515 591

Sri Sathya Sai (Dist).

1. Bridge Course:

BOTANY - Bridge course: 2022-23
Bridge course (For IBZC students)

Syllabus:

1. Plant Kingdom Classification; General characteristics of Bacteria and Virus

- 02 Periods

2. General characteristics of Lower group and Higher group of Plants - 2 Periods
(Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms)

3. Plant Taxonomy - 01 Period

4. Plant cell structure; Cell organelles - 01 Period

5. Plant Physiology – 01 Period

No. of Periods: 07 (22.11.2021 to 27.11.2021)

STSN Govt. College

KADIRI - 515591

Department of English

***Bridge Course
for
1 year students***



Prepared by:

*Dept. of English,
STSN Govt. Degree College
Kadiri - 515591
(Academic year - 2021-22)*

Contents

1. *Introduction to Language Learning*
Parts of Speech
2. *Noun*
3. *Pronoun*
4. *Adjective*
5. *Verb*
6. *Adverb*
7. *Preposition*
8. *Conjunction*
9. *Interjection*

Dates of the Course held:

29th Nov. 2021 to 4th Dec. 2021 (07 periods)

Benefits of being bilingual



In Demand
Bilingual speakers are always in high demand.



Higher Salaries
Bilingual ppl are paid more due to language skills



More options
Bilingual skills open up more career paths



Less Competition
Language jobs abroad have less applicants compared to jobs at home



Easier to learn new information
Bilingual speakers find it easier to learn new languages & skills



Great Multitaskers
Studies have proven that multitaskers are better multitaskers



Boost your memory
People that are bilingual find it easier to remember new information



Travel
If bilingual you're more likely to travel in your career



Problem Solver
Being bilingual helps you resolve problems more quickly.



Benefits of Learning Another Language

COGNITIVE

- Train your **brain!** Improve memory and attention by up to **20%**
- Increase your math skills by up to **12.5%**
- Improve your score on standardized tests by **10%**!



- Learn about other cultures and the **world**.
- Make new **friends!** 75% of the world does not speak English.
- **Travel** more easily—out of 7.2 billion people, only 339 million speak English.

SOCIAL

CAREER

- **Stand out** from the crowd—only **25%** of Americans speak two or more languages.
- **Nine of 10** employers prefer candidates with language skills.
- Earn up to a **20%** higher wage.



10 Most Powerful Languages IN THE WORLD

Kai L. Chan PhD compiled a list of the 10 most powerful languages in the world using the Power Language Index (PLI). The PLI compares the efficiency of more than a hundred of the top spoken languages by using 20 indicators across 5 opportunities: geography, economy, communication, knowledge & media, and diplomacy. The overall score of each language ranges from 0 (least powerful) to 1 (most powerful).



ENGLISH
Power Language Index Rating: 0.889
Native Speakers: 446 million



MANDARIN CHINESE
Power Language Index Rating: 0.411
Native Speakers: 960 million



FRENCH
Power Language Index Rating: 0.337
Native Speakers: 80 million



SPANISH
Power Language Index Rating: 0.329
Native Speakers: 470 million



ARABIC
Power Language Index Rating: 0.273
Native Speakers: 295 million



RUSSIAN
Power Language Index Rating: 0.244
Native Speakers: 150 million



GERMAN
Power Language Index Rating: 0.191
Native Speakers: 92.5 million



JAPANESE
Power Language Index Rating: 0.133
Native Speakers: 125 million



PORTUGUESE
Power Language Index Rating: 0.119
Native Speakers: 215 million



HINDI
Power Language Index Rating: 0.117
Native Speakers: 310 million

ENGLISH THE WORLD LANGUAGE

Speakers of English as a percentage of world population*



- Native (approx. 430 million)
- Non-native (approx 950 million)
- Non-speakers (approx 5.1 billion)

1 in 5 of the world's population speak English as either a native, second or foreign language.



Non-native speakers outnumber native speakers of English by more than two to one.



Non-native



Native



... of all websites are written in English

India has over



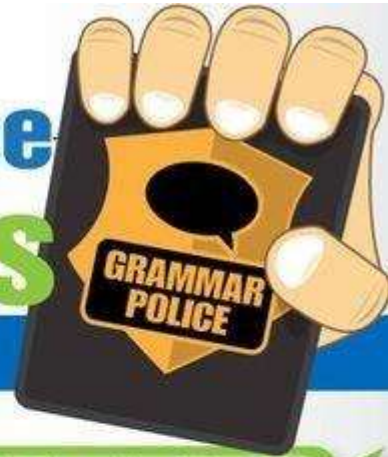
125,000,000

ESL speakers

“English belongs to everyone or to no one”

Oh My Grammar!

Language Felonies



Grammar Basics

What is **grammar**?

It's the systematic study and description of a language.

A set of rules and examples dealing with the syntax and word structures of a language.

Why does **grammar** matter?

It names the types of words and word groups that make up sentences in any language.

Knowing about it offers a window into the human mind and our amazingly complex mental capacity. It also helps us understand what makes sentences and paragraphs clear and interesting.

Importance of Correct Grammar

Spelling and Recruitment

57.9%
of recruiters responded that **spelling proficiency** was **'vital'** for candidates employed within the industry they represent

72.2%
said they had **discarded CVs** as a result of seeing one or more **spelling mistakes** included

2.3% of respondents agreed that *"Poor spelling is a reflection of low intelligence"*

71.3%
said they would think twice about employing an applicant if their CV contained incorrectly spelt words, even if the candidate fulfilled all other desired credentials

72.9%
asserted **autocorrect** and **spell check** features do not cancel out the need for employees to be adequate self-prooferers

Introduction

భాష అనునటువంటిది కొన్ని వాక్యముల సముదాయము. వాక్యము అనగా అర్థవంతమైన కొన్ని పదాల సముదాయము. దైనందిన జీవితము (daily life) లో మనము రకరకాల వాక్యములను ఉపయోగించవలసి ఉండును. అనగా సందర్భాన్ని బట్టి కొన్ని సమయాలలో ప్రశ్నలు, కొన్ని సమయాలలో ఆశ్చర్యాన్ని వ్యక్తపరిచే వాక్యములు మొదలగునవి చెప్పవలసి మరియు మాట్లాడవలసి వుండును.

పైన ఉదహరించినటువంటి రకరకాల వాక్యములను వ్రాయడానికి అర్థవంతమైన పదాల అమరిక అవసరము. వాక్యముల అమరిక యొక్క నియమముల సారమే వ్యాకరణము. అనగా ఒక భాషలో ఉండే నియమాలన్నింటిని కలిపితే దాని పేరు వ్యాకరణము. వ్యాకరణము అనగా కొన్ని నియమాలు మాత్రమే. నియమము (rule) అనేది ఏదైనా గాని హేతుబద్ధంగా (reasonable) గా వుంటుంది. ప్రతి నియమానికి కొన్ని మినహాయింపులు (exceptions) ఉండవచ్చు. ప్రతి భాషకు కూడా లింగ, వచన, కాల నియమాలు, భాషాభాగాలు, కర్త, కర్మ మరియు క్రియ లాంటి లక్షణాలు ఉంటాయి. అలా లేకపోతే అది భాష అవదు.

ప్రతి పరాయి భాష ఒక కీకారణ్యమే. అది చిన్నది కావచ్చు, పెద్దది కావచ్చు. ఆ కీకారణ్యము లోనికి ప్రవేశించే ఏకైక మార్గము దాని నియమములను నేర్చుకుంటూ వెళ్ళడమే. ఆ నియమాలను మాతృభాషలో ఉండే నియమాలతో సాధ్యమైనంతవరకు పోల్చుకుంటూ వెళ్ళాలి. భాషను నేర్చుకోవడానికి దాని వ్యాకరణముతో సంబంధము లేని సులువైన మార్గములు ఏవి ఉండవు. భాష అనునటువంటిది కొన్ని శబ్దాల కలయిక. ఈ శబ్దాలను రాతలో చూడడానికి అక్షరాలు అవసరము.

ఒక వాక్యములో వాడేటటువంటి పదాలను అవి నిర్వర్తిస్తున్న పనిని బట్టి పలు రకాలుగా విభజించడము జరిగినది. వీటిని (ఈ విభజననే) “భాషాభాగములు (Parts of Speech)” అందురు.

A group of words which gives complete meaning (sense) is called a sentence. In a sentence the words are divided into various parts according to the function they perform in that particular sentence. They are called the “Parts of Speech (భాషాభాగములు)”. They are:

1. Noun (నామవాచకము)
2. Pronoun (సర్వనామము)
3. Adjective (విశేషణము)
4. Verb (క్రియ)
5. Adverb (క్రియావిశేషణము)
6. Preposition (విభక్తి ప్రత్యయము)
7. Conjunction (సంయోజకము లేదా సముచ్ఛయము)
8. Interjection (భావోద్వేగ పదము)



8 Parts of Speech

01

NOUN: The nouns stand for the names of people, places, animals and things. The word noun means name.

02

VERB: These are used for saying something about persons or things. The verb is concerned with doing or being.

03

ADJECTIVE: These are joining to nouns to describe them.

04

ADVERB: Describing words that are added to verbs. Adverbs are added to verbs to modify their meaning.

05

PRONOUN: Words used instead of nouns to avoid tiresome repetition. Instead of using word "man", we write he, him.

06

PREPOSITION: Words placed before a noun or pronoun to show how the person or thing denoted stands in relation to some other person or thing.

07

CONJUNCTION: They join words or sentences. For example, and, but, or etc.

08

INTERJECTIONS: These are through into a sentence to express some feeling of a mind. For example, hurrah, alas.

English Grammar

There are eight parts of speech in the English language: noun, pronoun, verb, adjective, adverb, preposition, conjunction, and interjection.

	Function or Job	Examples	Sentences
Noun	Thing or person	Pencil, cat, work, notebook	This is my cat .
Verb	Action or state	Get, come, cut, open, like	I like apple.
Adverb	Describe a verb, adjective or adverb	Silently, badly, really	My cat eats quickly .
Adjective	Describes a noun	Small, big, good, well, blue	We like big cake.
Pronoun	Replaces a noun	I, you, he, she, it	He is very clever.
Preposition	Links a noun to another word	At, in, of, on, after, under	She was hiding under the table.
Conjunction	Joins clauses or sentences	But, and while, when	I am very hungry, but the fridge is empty.
Interjection	Short exclamation	Oh!, hi!, ouch!, Wow!	Wow! What a beautiful car!

PARTS OF SPEECH

Words are divided into different kinds or classes, called Parts of Speech, according to their use; that is, according to the work they do in a sentence. The parts of speech are eight in number:

Noun

- Eg: - 1. The teacher speaks to his students.
2. Mice fear cats.
3. There are three windows in this room.
4. There were three cakes on the plate.
5. These apples and mangoes are sweet.

The above underlined words are nouns. Words which are used as names of persons, animals, places or things are called nouns.

Noun: A noun may be defined as the name of a person, animal, place or thing. By “thing” we mean something that can be seen and touched (concrete) or something that can only be thought of and not seen and touched (abstract).

Eg:

Persons: Raju, Raheem, Rani, Sita, Aruna, Kavita;

student, cook, teacher, butcher, athlete, lawyer, cobbler, grocer, soldier;

baby, child, boy, girl, man, woman, adult, infant;

mother, father, son, daughter, aunt, niece, nephew, sister-in-law, brother-in-law, etc.

Animals: horse, mare, tiger, lion, peacock, peahen, dove, dog, cat;

Ramu, Bhairava, etc.

Places: Kadiri, Anantapur, Mumbai, Hyderabad;

ocean, sea, river, tank, pond, well, stream, canal;

college, kitchen, club, factory, road, street, lane, church, temple, village, town, city, etc.

Things: *concrete*: book, wall, pen, mat, needle, thread, flag;

abstract: patience, mercy, education, wisdom, Friday, April, Vinayaka Chaviti, Dasara,

Diwali, Ramzan, etc.

Arrange the following nouns in four lists, namely, 1. Person, 2. Animal, 3. Place, and 4. Thing

Hill	Salt	Hare	Wolf	Flour
Officer	Jelly	Cheese	Frog	Bird
Inn	Den	Pond	Priest	Queen
Guard	Geese	Friend	Whale	Pilot
Country	Animal	Sparrow	Butcher	Butter
Tortoise	Stable	Island	Aeroplane	Umbrella
Policeman	Porridge	Mountain	Envelope	Pudding
Servant	Nest	Stream	Onion	Hotel
Mason	Cousin	Floor	Snake	author

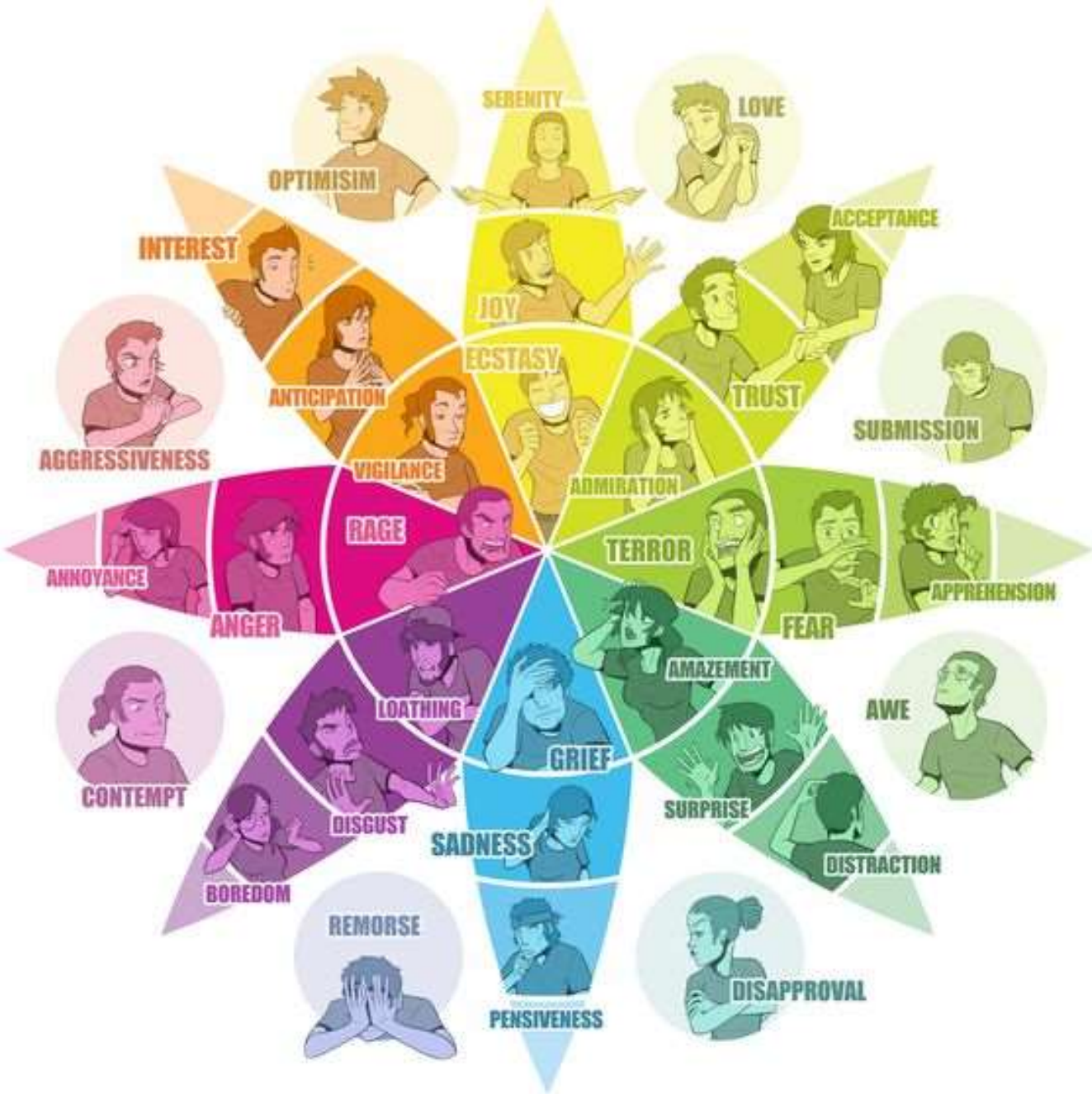
Person

Animal























































Place

Thing

Names of Emotions



BODY PARTS VOCABULARY

					
Head	Mouth	Arm	Hair	Finger	Nose
					
Eye	Cheek	Foot	Leg	Teeth	Face
					
Knee	Waist	Chest	Neck	Armpit	Chin
					
Thumb	Forehead	Hip	Belly	Navel	Nostrils
					
Palm	Shoulder	Lip	Eyebrow	Pulse	Ear
					
Lungs	Stomach	Tongue	Jaw	Liver	Pupil
					
Elbow	Heel	Ankle	Nail	Wrist	Throat
					
Ribs	Gums	Eye-lash	Eyelid	Ear-drum	Joint
					
Sole	Parting	Backbone	Vein	Kidney	Toe

Geometric Shapes



circle



triangle



rectangle



ellipse



square



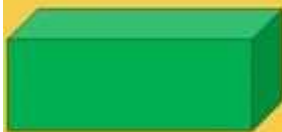
right triangle



parallelogram



heart



rectangular prism



cone



cylinder



star



trapezoid



rhombus



cube



pentagon



hexagon



heptagon



octagon



decagon

Irregular Plurals

Person → **People**

Foot → **Feet**

Tooth → **Teeth**

Child → **Children**

Mouse → **Mice**

Sheep → **Sheep**

Fish → **Fish**

Leaf → **Leaves**

Goose → **Geese**

Woman → **Women**

Aircraft → **Aircraft**

Apex → **Apices**

Bison → **Bison**

Crisis → **Crises**

Curriculum → **Curricula**

Datum → **Data**

Focus → **Foci**

Series → **Series**

Vita → **Vitae**

Tuna → **Tuna**

Quiz → **Quizzes**

Index → **Indices**



Ellipsis → **Ellipses**

Codex → **Codies**

Lavra → **Lavrae**

Alumna → **Alumnae**

Erratum → **Errata**

Ox → **Oxen**

Oasis → **Oases**

Swine → **Swine**

Trout → **Trout**

Genus → **Genera**
















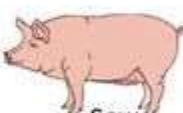













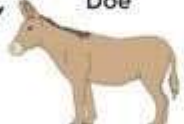


















Focus → **Foci**

Diagnosis → **Diagnoses**

Analysis → **Analyses**

Man → **Men**

Masculine and Feminine Gender of Animals

MASCULINE	FEMININE	MASCULINE	FEMININE
 Dog	• DOG  Bitch	 Lion	• LION  Lioness
 Rooster	• CHICKEN  Hen	 John	• MULE  Molly
 Boar	• BEAR  Sow	 Peacock	• PEACOCK  Peahen
 Drone	• BEE  Queen	 Boar	• PIG  Sow
 Bull	• CAMEL  Cow	 Ram	• SHEEP  Ewe
 Tom	• CAT  Queen	 Cob	• SWAN  Pen
 Buck	• DEER  Doe	 Tiger	• TIGER  Tigress
 Jack	• DONKEY  Jennet	 He-wolf	• WOLF  She-wolf
 Todd	• FOX  Vixen	 Stallion	• ZEBRA  Mare
 He-goat	• GOAT  She-goat	 Bull	• COW  Cow
 Gander	• GOOSE  Goose	 Drake	• DUCK  Duck
 Leopard	• LEOPARD  Leopardess	 Stallion	• HORSE  Mare



Parts of the feet and legs



Underline the nouns in the following sentences and say whether they are *common* or *proper nouns*:

1. Rama is writing in a book.
2. The cow eats grass.
3. Dogs bark.
4. Asoka ruled India.
5. Ravi teaches English.
6. Sita opened the door.
7. Columbus discovered America.
8. Rani washed the clothes.
9. My mother likes Sita.
10. The ball was kicked by the boy.
11. Gopal sat on the bench.
12. The Godavari is a holy river.
13. Calcutta is a big city.
14. Boys and girls go to school.
15. The tank is full of water.
16. The book is on the desk.
17. The chair is in the room.
18. The duster is on the floor.
19. Mangoes are very sweet.
20. Children love their parents.
21. Raja is a handsome boy.
22. Hyderabad and Secunderabad are twin cities.
23. The calf goes with the cow.
24. The map is on the wall.
25. There are fruits on the tree.
26. The birds sit on the branch.
27. The cap is on his head.
28. The house is beside the river.
29. Delhi is the capital of India.
30. The Himalayas are in India.
31. Rama and Gopal went to Bangalore.
32. Rice is the major crop in India.
33. Divide the rupee between Lata and Bindu.
34. This mango belongs to Gopal.
35. I attended to school from Monday to Friday.
36. The Missisipi is the longest river in America.
37. London is the capital of England.
38. Agra has many beautiful buildings.
39. Mahatma Gandhi was a great leader.
40. I went to a film yesterday.
41. Connaught Circus is in New Delhi.
42. King George was the ruler of Great Britain.
43. The man who first sailed to America was Christopher Columbus.
44. The largest city in America is New York.
45. We sailed to England on *Queen Elizabeth*.
46. Paris is the capital of France.
47. Last Saturday Henry Brown took his sons George, Peter and John to see Jaipur.
48. The Taj Mahal is at Agra.
49. We see television daily.
50. The Nile is in Egypt.

Pronoun

Eg: Tom is a good boy. He works hard.
Mary is good girl. She goes to school every day.
I have a book. There are many pictures in it.
Look at the children. They are playing in the park.

The above underlined words are pronouns. They are used instead of nouns.

Definition: A pronoun is a word used instead of a noun. [“pro” means “for”. “Pronoun” means “for a noun”.]

Eg: *I* am young.
We are young.
He is young.
She is young.
It is young.
They are young.

□ We use pronouns to avoid monotony or repetition in the language.

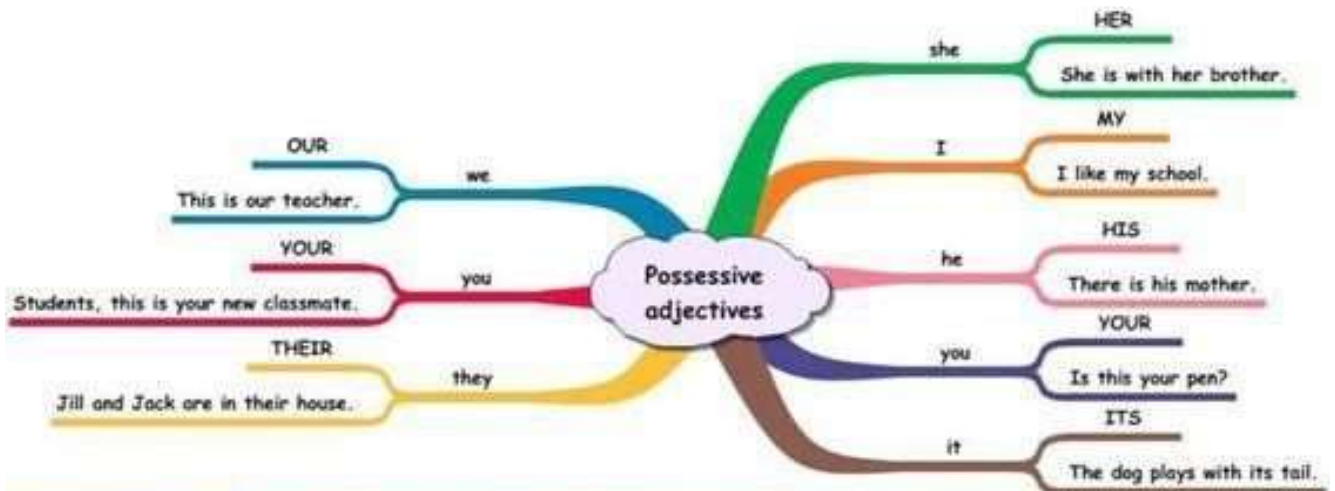
Eg:

*Ramaswami is a gardener. **Ramaswamy** saw a snake in the garden. **Ramaswamy** was afraid that the snake would bite **Ramaswamy**. **Ramaswamy** wanted to kill the snake with a stick. **Ramaswamy** had a stick in **Ramaswamy**'s hand.*

*Ramaswamy is a gardener. **He** saw a snake in the garden. **He** was afraid that it would bite **him**. **He** wanted to kill it with a stick. **He** had a stick in **his** hand.*

PLURAL

SINGULAR



PRONOUN CHART

	SUBJECT PRONOUNS	OBJECT PRONOUNS	POSSESSIVE ADJECTIVES	POSSESSIVE PRONOUNS	REFLEXIVE PRONOUNS
1 ST PERSON	I	me	my	mine	myself
2 ND PERSON	you	you	your	yours	yourself
3 RD PERSON (MALE)	he	him	his	his	himself
3 RD PERSON (FEMALE)	she	her	her	hers	herself
3 RD PERSON	it	it	its	not used	itself
1 ST PERSON (PLURAL)	we	us	our	ours	ourselves
2 ND PERSON (PLURAL)	you	you	your	yours	yourselves
3 RD PERSON (PLURAL)	they	them	their	theirs	themselves

RELATIVE PRONOUNS

PRONOUNS

USAGE

Examples

WHO

refers to people
(subject)

He who overcomes his anger
subdues his greatest enemy.

WHOM

refers to people
(objects of the verb)

She's the woman whom I met
in Greece.

WHOSE

refers to
possessions

Whose keys are on the
kitchen counter?

WHICH

refers to animals
and objects.

That is not good language
which all understand not.

THAT

refers to people,
things, and animals

It's a poor mouse that has
only one hole.

WHERE

refers to places

Sign your name on the
form where I've put a cross.

WHEN

refers to time

Let's cross the
bridge when we come to it.

WHY

refers to reasons

I'd like to know the
reason why you're so late.

WHAT

refers to things

Pardon me - I didn't
hear what you said.

Use suitable pronouns instead of the underlined words and rewrite the sentences meaningfully:

1. Look at Rama. Rama is sleeping. Wake Rama up.
2. Leela is a pretty girl. Leela is ten years old. All like Leela.
3. I have a book. The book is very interesting. The book has many pictures. I like the pictures very much.
4. Meera is a good girl. I like Meera because Meera works very hard.
5. When the girl saw the snake, the girl ran after the snake and the snake bit the girl.
6. The girl went to school but the girl was late and the teacher was angry with the girl.
7. The teacher was explaining the word to the students but the students were not paying any attention to what the teacher was saying to the students.
8. I was giving some instructions to a student. The student did not pay any attention to the instructions but the student was looking towards his friends. His friends were calling the student.
9. Raju and Rani are classmates. One day Raju and Rani fought with each other and Raju's shirt was torn by Rani. In response to this, Raju slapped Rani.
10. The teacher gave an exercise to the students. The exercise is very easy. The students should do the exercise and tell the answers to the teacher.

Adjectives

1. Look at the tall boy.
2. He has a fat dog.
3. Look at the short boy.
4. He has a thin dog.
5. The fat man has a black dog.
6. She is poor but happy.
7. I don't like that boy.
8. He gave me five mangoes.
9. There is little time for preparation.

Definition: An adjective is a word used with a noun or pronoun to describe or to point out the person, animal, place or thing which the noun or pronoun names or to tell the number or quantity.

Kinds of Adjectives : There are seven kinds of Adjectives. They are:

1. Adjectives of Quality
2. Adjectives of Quantity
3. Adjectives of Number (or) Numeral Adjectives
4. Demonstrative Adjectives
5. Possessive Adjectives
6. Interrogative Adjectives
7. Distributive Adjectives

24 MOODS



CONTENTED



GLAD



JOYFUL



DEJECTED



HEARTBROKEN



DEMORALIZED



ANTSY



AGITATED



DISTURBED



IRRITATED



MAD



ANNOYED



ANXIOUS



PANIC-STRICKEN



TERRIFIED



TRAPPED



FLUSTERED



BAFFLED



MELLOW



UNEASY



AMAZED



EAGER



UPSET



ENERGETIC

Emotions



happy



sad



angry



excited



afraid



shy



guilty



tired



jealous



loved



hopeful



bored



proud



sorry



embarrassed



surprised

Feelings

Word List



Happy

Adored
Alive
Appreciated
Cheerful
Ecstatic
Excited
Grateful
Glad
Hopeful
Jolly
Jovial
Joyful
Loved
Merry
Optimistic
Pleased
Satisfied
Tender
Terrific
Thankful
Uplifted
Warm

Mad

Aggravated
Accused
Angry
Bitter
Cross
Defensive
Frustrated
Furious
Hostile
Impatient
Infuriated
Insulted
Jaded
Offended
Ornery
Outraged
Pestered
Rebellious
Resistant
Revengeful
Scorned
Spiteful
Testy
Used
Violated

Sad

Alone
Blue
Burdened
Depressed
Devastated
Disappointed
Discouraged
Grief-stricken
Gloomy
Hopeless
Let down
Lonely
Heartbroken
Melancholy
Miserable
Neglected
Pessimistic
Remorseful
Resentful
Solemn
Threatened

Scared

Afraid
Alarmed
Anxious
Bashful
Cautious
Fearful
Frightened
Horried
Lost
Haunted
Helpless
Hesitant
Insecure
Nervous
Petrieved
Puzzled
Reassured
Reserved
Sheepish
Tearful
Uncomfortable
Useless

Surprise

Astonished
Curious
Delighted
Enchanted
Exhilarated
Incredulous
Inquisitive
Impressed
Mystified
Passionate
Playful
Replenished
Splendid
Shocked
Stunned

Disgust

Embarrassed
Exposed
Guilty
Ignored
Inadequate
Incompetent
Inhibited
Inept
Inferior
Insignificant
Sick
Shame
Squashed
Stupid
Ugly
Unaccepted



80

Positive Words

To Describe Someone

adaptable	enthusiastic	patient
adventurous	faithful	peaceful
affable	fearless	persistent
agreeable	generous	playful
ambitious	gifted	polite
amiable	giving	practical
amorous	gregarious	proactive
amusing	hardworking	quick-witted
bright	helpful	relentless
charming	hilarious	reliable
cheerful	humble	resilient
compassionate	humorous	resourceful
cool	impartial	sangfroid
considerate	intelligent	self-disciplined
convivial	intuitive	sincere
courageous	joyous	sophisticated
decisive	kind	strait-forward
dependable	likable	suave
determined	lively	sympathetic
diligent	loving	trustworthy
diplomatic	loyal	unassuming
dynamic	magnetic	understanding
easy-going	non-judgmental	versatile
ebullient	observant	well-read
efficient	organized	wise
enchanting	passionate	witty
energetic	patient	zealous

Numbers **100%**

32% **10m^x 3m** **8.3**

Thirty two
per cent

Ten metres by
three metres

Eight point
three

1 $\frac{2}{3}$ **$\frac{3}{4}$** **3²** **2³** **2⁴**

One and
two thirds

Three
fourths

Three
squared

Two
cubed

Two to the
power of four

1975 **2001** **263-3847**

Nineteen
seventy-five

Two thousand
and one

Two-six-three,
three-eight-four-seven

26^oC **1,325,476**

Twenty six
degrees

One million, three hundred and
twenty-five thousand, four
hundred seventy-six

21st **92nd** **53rd** **67th**

Twenty-first Ninety-second Fifty-third Sixty-seventh

How To Place Adjectives In Order



Easy to change

1. Opinion

Beautiful

2. Size

Large

3. Age

Young

4. Shape

Round

5. Color

Brown

6. Origin

British

7. Material

Wool

More difficult to change

VERB

A **Verb** is a word used to express an action or state; as

The girl *wrote* a letter to her cousin

Kolkata *is* a big city.

Iron and copper *are* useful metals.

A **Verb** is a word that tells or asserts something about a person or thing. Verb comes from the Latin *verbum*, a word. It is so called because it is the most important word in a sentence.

A Verb may tell us—

(1) What a person or thing does; as,

(2) What is done to a person or thing; as,

(3) What a person or thing is; as,

1. Hari *laughs*.

The clock *strikes*.

2. Hari *is scolded*.

The window *is broken*.

3. The cat *is dead*.

Glass *is* brittle. I *feel* sorry.

Def: - A Verb is a word used to tell or assert something about some person or thing.

A Verb often consists of more than one word; as,

The girls *were singing*.

I *have learnt* my lesson.

The watch *has been found*.

Read these sentences:

1. The boy *kicks* the football.

2. The boy *laughs* loudly.

In sentence 1, the action denoted by the verb *kicks* passes over from the doer or subject boy to some Object football. The verb *kicks* is, therefore, called a Transitive Verb. (Transitive means passing over.)

In sentence 2, the action denoted by the verb *laughs* stops with the doer or Subject boy and does not pass over to an Object. The verb *laughs* is, therefore, called an Intransitive Verb (Intransitive means not passing over.).

Def.—A **Transitive** Verb is a Verb that denotes an action which passes over from the doer or Subject to an object.

Def.—An **Intransitive** Verb is a Verb that denotes an action which does not pass over to an object, or which expresses a state or being; as





























Exercise

Name the Verbs in the following sentences, and tell in each case whether the Verb is Transitive or Intransitive. Where the Verb is Transitive name the Object:

1. The sun shines brightly.
2. The boy cut his hand with a knife.
3. The clock stopped this morning.
4. The policeman blew his whistle.
5. The sun rises in the east.
6. An old beggar stood by the gate.
7. The clock ticks all day long.
8. I looked down from my window.
9. Put away your books.
10. The moon rose early.
11. The cat sleeps on the rug.
12. Cocks crow in the morning.
13. Your book lies on the table.
14. The fire burns dimly.
15. Time changes all things.
16. We eat three times a day.
17. Tell the truth.
18. The birds sing in the green trees.
19. The little bird hopped about and sang.
20. My new watch does not keep good time.
21. The beggar sat down by the side of the road.
22. I could not spare the time.
23. He took shelter under a tree.
24. The boy easily lifted the heavy weight.
25. Balu wrote a letter to his uncle.
26. A tiny bird lived under the caves.
27. I know a funny little man.
28. Birds fly in the air.
29. A light rain fell last night.
30. I shall bring my camera with me.

What can you do with your body?

=> I can _____ with my _____.

	see	eyes	
	hear	ears	
	smell	nose	
	eat	mouth	
	bite	teeth	
	taste	tongue	
	kiss	lips	
	hug	arms	
	write	hands	
	snap	fingers	
	run	legs	
	kick	feet	
	think	brain	
	breathe	lungs	

TYPES OF VERBS

01

Regular Verb

A verb that's past (2nd form) and past participle (3rd form) is made by adding 'd' or 'ed' is called regular verb.



02

Irregular Verb

If the formation of the verb is otherwise than the regular verb, it is called irregular verb.



03

Linking Verb

A verb that acts as a link between two words is called linking verb. It connects or links a subject to a noun or an adjective in the predicate.



04

Transitive Verb

A verb that needs object to complete itself is called transitive verb. It is called transitive because it passes its action from subject to object.



05

Intransitive Verb

A verb that doesn't need any object to complete itself is called intransitive verb. It does not pass its action from subject to the object.



06

Finite Verb

Finite verbs mean those verbs which can change their form in accordance with the subject.



07

Infinite Verb

An infinitive is a verb which has "to" before it. It shows infinite action when is used at the beginning of the sentence.



Do - Does - Did - Done

To Do - VERB

Present Tense

Past Tense

Past Participle

I / you / we / they

DO

DID

DONE

he / she / it

DOES

- I **do** exercises

- He **does** exercises

- I **did** my homework

- He **did** his homework

- I have **done** many things

- He has **done** many things

Do/Does/Did - AUXILIARY (To make questions)

P
R
E
S
E
N
T

Auxiliary

DO

+

Subject

I / you / we / they

+

Verb

go ... ?

want ... ?

like ... ?

DOES

+

he / she / it

P
A
S
T

Auxiliary

DID

+

Subject

I / you / we / they

+

Verb

go ... ?
















want ... ?

he / she / it

The ONLY difference between a question in the present tense and a question in the past tense is the auxiliary (*Do/Does* or *Did*).

Do you speak English? **Does** he speak English?

Did you speak English? **Did** he speak English?

	 Past	 Present	 Future
SIMPLE	 He read a book yesterday.	He reads a book daily.	He will read a book tomorrow.
	 He did not read a book yesterday.	He does not read a book daily.	He will not read a book tomorrow.
	 Did he read a book yesterday?	Does he read a book daily?	Will he read a book tomorrow?
PROGRESSIVE	 He was reading a book yesterday.	He is reading a book.	He will be reading a book tomorrow.
	 He was not reading a book yesterday.	He is not reading a book.	He will not be reading a book tomorrow.
	 Was he reading a book yesterday?	Is he reading a book?	Will he be reading a book tomorrow?
PERFECT	 He had read a book.	He has read a book.	He will have read a book.
	 He had not read a book.	He has not read a book.	He will not have read a book.
	 Had he read a book?	Has he read a book?	Will he have read a book?
PERFECT PROGRESSIVE	 He had been reading a book since morning.	He has been reading a book since morning.	He will have been reading a book since morning.
	 He had not been reading a book since morning.	He has not been reading a book since morning.	He will not have been reading a book since morning.
	 Had he been reading a book since morning?	Has he been reading a book since morning?	Will he have been reading a book since morning?



16 Tenses

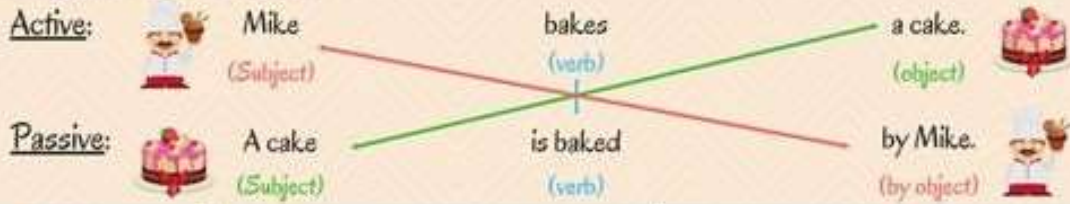
	Tenses	Structure	Example
01.	Simple Present Tense	Subject + Verb (v1) + es/es	She reads book in library.
02.	Present Continuous Tense	Subject + is/am/are + Verb(+ing)	I am studying in a high school.
03.	Present Perfect Tense	Subject + Has/have + Verb (v3)	He has made this colorful chart.
04.	Present Perfect Continuous Tense	Subject + Has/have + been + Verb(+ing)+ since/for	She has been working there since 2017.
05.	Simple Past Tense	Subject + Verb (v2) or irregular verb	He completed the assignment.
06.	Past Continuous Tense	Subject + was/were + Verb(+ing)	He was reading the book.
07.	Past Perfect Tense	Subject + had + Verb (v3)	I had finished my home work.
08.	Past Perfect Continuous Tense	Subject + had + been + Verb(+ing)	I had been playing football since morning.
09.	Simple Future Tense	Subject+ will/shall+ verb(v1)	I shall go to park for a walk.
10.	Future Continuous Tense	Subject + will/shall be + verb(+ing)	He will be playing football.
11.	Future Perfect Tense	Subject + will have + verb(v3)	He will have played football.
12.	Future Perfect Continuous Tense	Subject + will have been + verb(+ing)	He will have been watching the TV for fifty minutes.
13.	Past Future Tense	Subject + would + verb (v1)	I told that I would leave in one hour.
14.	Past Future Continuous Tense	Subj + should/would be + Verb(+ing)	I told that I would be doing my work all the day long.
15.	Past Future Perfect Tense	Subj.+ should / would have + Verb(v3)	She said that she would have done her work.
16.	Past Future Perfect Continuous Tense	Subject + would have been + Verb(+ing)	He said that I should have been working here for two hours by that time.



Passive Voice



Forming the Passive voice:

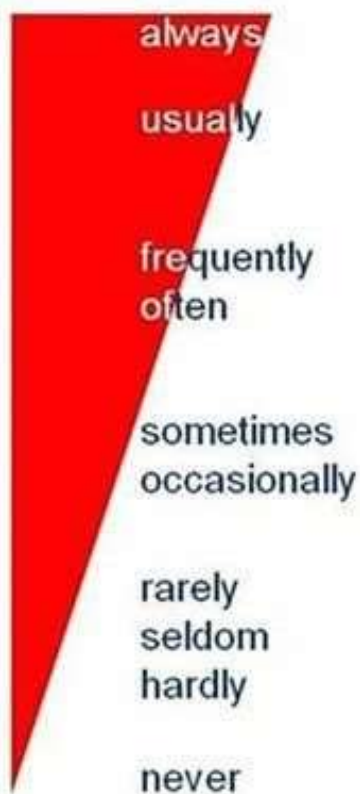


Tenses	Active	Passive
Present Simple	Mike bakes a cake.	A cake is baked by Mike.
Present Continuous	Mike is baking a cake.	A cake is being baked by Mike.
Present Perfect	Mike has baked a cake.	A cake has been baked by Mike.
Present Perfect Continuous	Mike has been baking a cake.	A cake has been being baked by Mike.
Past Simple	Mike baked a cake.	A cake was baked by Mike.
Past Continuous	Mike was baking a cake.	A cake was being baked by Mike.
Past Perfect	Mike had baked a cake.	A cake had been baked by Mike.
Past Perfect Continuous	Mike had been baking a cake.	A cake had been being baked by Mike.
Future Simple (will)	Mike will bake a cake.	A cake will be baked by Mike.
Future Continuous	Mike will be baking a cake.	A cake will be being baked by Mike.
Future Perfect	Mike will have baked a cake.	A cake will have been baked by Mike.
Future Perfect Continuous	Mike will have been baking a cake.	A cake will have been being baked by Mike.
Future Simple (be going to)	Mike is going to bake a cake.	A cake is going to be baked by Mike.
Future Continuous	Mike is going to be baking a cake.	A cake is going to be being baked by Mike.
Future Perfect	Mike is going to have baked a cake.	A cake is going to have been baked by Mike.
Future Perfect Continuous	Mike is going to have been baking a cake.	A cake is going to have been being baked by Mike.
Passive Voice with Modals	Mike should bake a cake.	A cake is going to have baked by Mike.
Modal Perfect	Mike might have baked a cake.	A cake might have been baked by Mike.

Adverbs of Frequency



Adverbs of Frequency



Placement

1. Before verb:
"She always wears a scarf."
2. After BE:
"She is always on time."
3. Between auxiliary and main verb:
"She has always taught English."

HOW TO USE MODAL VERBS

CAN

ABILITY, REQUEST

COULD

PAST ABILITY,
SUGGESTION, FUTURE
POSSIBILITY

MAY

PERMISSION OR FUTURE
POSSIBILITY

MIGHT

PRESENT OR
FUTURE POSSIBILITY

MUST

NECESSITY OR
OBLIGATION

**OUGHT
TO**

WHAT'S RIGHT
AND CORRECT

SHALL

OFFER OR
SUGGESTION

SHOULD

ADVICE OR
UNCERTAIN PREDICTION

WILL

WILLINGNESS,
CERTAIN PREDICTION OR
PROMISE

WOULD

REQUEST, INVITATION
OR MAKING
ARRANGEMENTS

Modal Verbs

CAN	Ability, doubt, astonishment, permission, Polite request
MAY	Permission, if not prohibition, supposition with doubt
MUST	Obligation, firm necessity, logical conclusion, probability
SHALL	intention, supposition
WILL	Wish, desire, will, confidence, in the future
OUGHT TO	Moral duty, insistent advice, strict recommendation
NEED	(un)necessity
BE TO	Obligation arising out of arrangement or agreement
HAVE TO	Unwillingness, forced circumstances
WOULD	Wish (with "to like"), polite request, a habit of the past
SHOULD	Necessity, advice, blame, recommendation, reproach, regret
USED TO	Repeated action in the past

-HOW TO BE MORE POLITE-



DON'T SAY



SAY

I want a hamburger

I'd like a hamburger

Send me the report

Could you send me the report?

Leave me alone

Could you give me a minute?

Tell me when you're available

Let me know when you're available

You're wrong

I think you might be mistaken

That's a bad idea

I'm not so sure that's a good idea

Your work isn't good

I'm not quite satisfied with this work

I don't like the colors in this design

I'm not too fond of the colors
in this design

QUESTION WORDS

who?

person

Who was at the party?
Who is your best friend?

where?

position, place

Where do you live?
Where did you go?

when?

time, occasion, moment

When is your birthday?
When did you get up?

why?

reason, explanation

Why are you sad?
Why didn't you call me?

what?

specific thing, object

What are you doing?
What is your number?

which?

choice, alternative

Which dress is good?
Which leg hurts?

how?

way, manner, form

How was your day?
How do you know her?

THE ADVERB

Read the following sentences:

1. Rama runs *quickly*.
2. This is a *very* sweet mango.
3. Govind reads *quite* clearly.

In sentence 1, *quickly* shows how (or in what manner) Rama runs; that is, *quickly* modifies the Verb runs.

In sentence 2, *very* shows how much (or in what degree) the mango is sweet; that is, *very* modifies the Adjective *sweet*.

In sentence 3, *quite* shows how far (or to what extent) Govind reads clearly; that is, *quite* modifies the Adverb *clearly*.

A word that modifies the meaning of a verb, an adjective, or another Adverb is called an Adverb. The words *quickly*, *very*, and *quite* are, therefore, Adverbs.

Def.—An Adverb is a word which modifies the meaning of a Verb, an Adjective or another Adverb.

KINDS OF ADVERBS

Adverbs may be divided into the following classes, according to their meaning:

- (1) Adverbs of Time (which show when)
- (2) Adverbs of Frequency (which show how often).
- (3) Adverbs of Place (which show where).
- (4) Adverbs of Manner (which show how or in what manner).
- (5) Adverbs of Degree or Quantity (which show how much, or in what degree or to what extent).
- (6) Adverbs of Affirmation and Negation
- (7) Adverbs of Reason

either

ADVERB

used to show that a negative statement is also true of somebody/something else

A: I don't drink coffee after 6:00 pm.
B: Me *either*.

DETERMINER, PRONOUN

one or the other of two; it does not matter which
~ each of two

You have two dark suits, *either* one is fine to wear to the party. (It doesn't matter which suit, both are OK.)



neither

ADVERB

used after negative phrases to state that a feeling or situation is similar to one already mentioned

A: I don't drink coffee after 6:00 pm.
B: Me *neither*.

DETERMINER, PRONOUN

not one nor the other of two things or people

The problem is *neither* of my suits are clean, and the party is tonight! (Not one of my two black suits are clean.)



THE PREPOSITION

Read :

1. There is a cow *in* the field.
2. He is fond *of* tea.
3. The cat jumped *off* the chair.

In sentence 1, the word *in* shows the relation between two things — cow and field.

In sentence 2, the word *of* shows the relation between the attribute expressed by the adjective *fond* and tea.

In sentence 3, the word *off* shows the relation between the action expressed by the verb *jumped* and the chair.

The words *in*, *of*, *off* are here used as Prepositions.

Def.— A Preposition is a word placed before a noun or a pronoun to show in what relation the person or thing denoted by it stands in regard to something else.

[The word Preposition means ‘that which is placed before’.]

It will be noticed that—

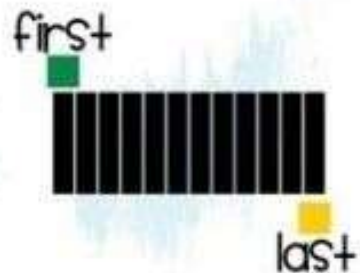
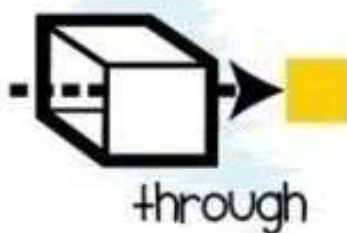
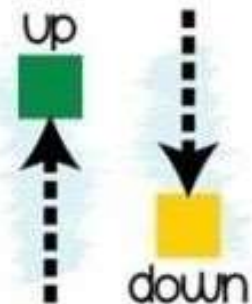
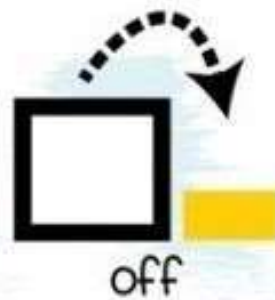
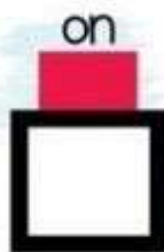
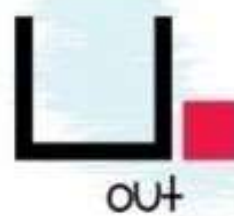
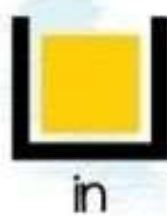
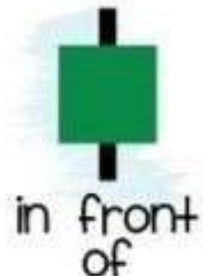
- in sentence 1, the Preposition joins a Noun to another Noun;
- in sentence 2, the Preposition joins a Noun to an Adjective;
- in sentence 3, the Preposition joins a Noun to a Verb.

The Noun or Pronoun which is used with a Preposition is called its Object.

KINDS OF PREPOSITIONS

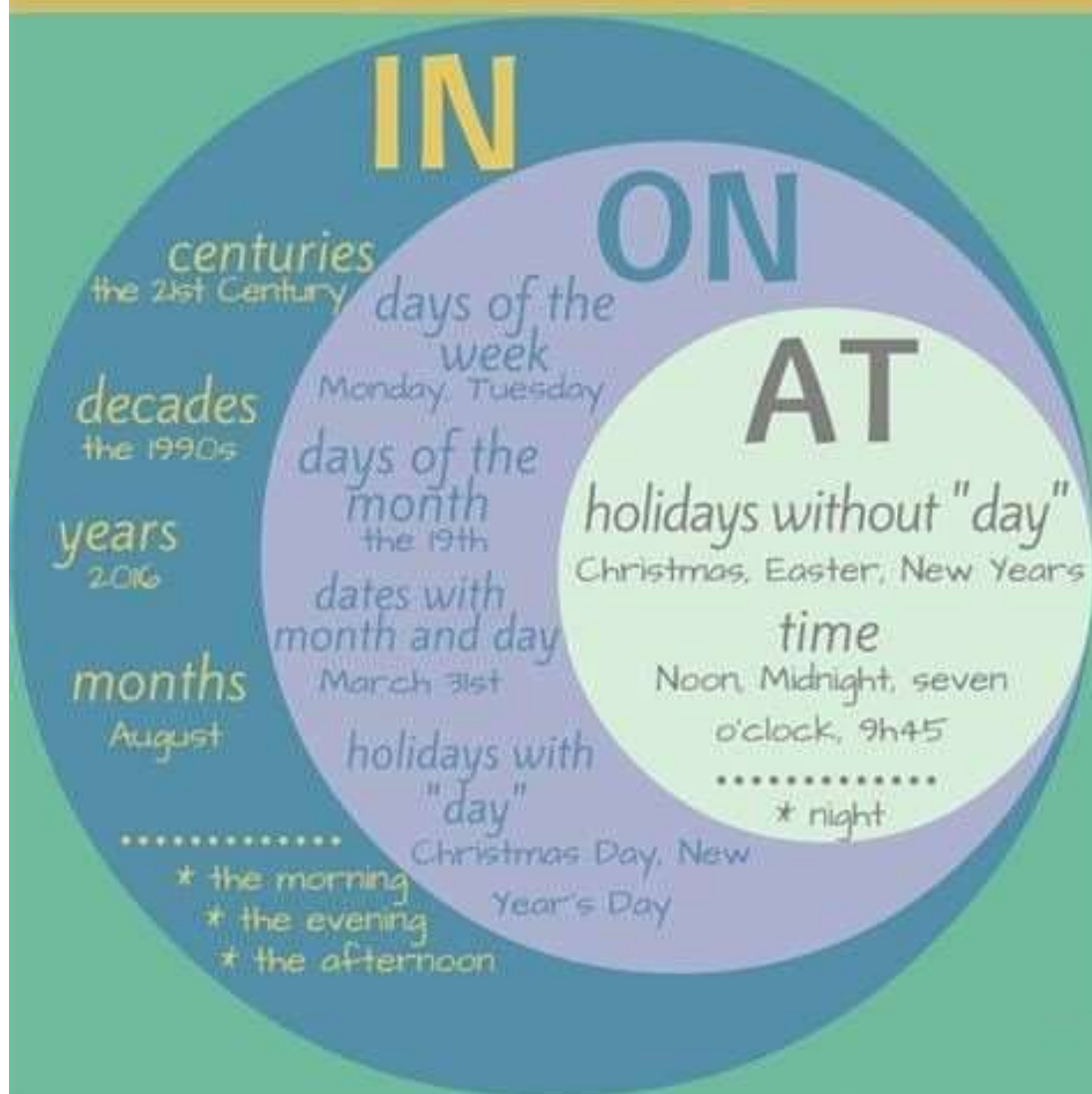
1. Simple Prepositions
2. Compound Prepositions
3. Phrase Prepositions
4. Participial Prepositions
5. Appropriate Prepositions

PREPOSITIONS



Prepositions of Time

at ...	on ...	in ...
at 10 o'clock	on Monday	in 2013 (years)
at noon	on Friday evening	in the morning
at night	on the 20 th of May / on May 20	in the afternoon
at midnight	on vacation	in the evening
at the end of the day	on time	in two hours
at the weekend (British)	on the weekend (American)	in summer (seasons)
at Easter (Christian holidays)	on Yom Kippur (Jewish holidays)	in June (months)
Hägar Language School http://hagarlanguages.wordpress.com/	on Eid-ul-Fitr (Muslim holidays)	in a few weeks
	on Women's Day (other holidays)	in my spare time



Write at/on/in in the blanks.

- 1) _____ 6th June.
- 2) _____ the evening.
- 3) _____ half past two.
- 4) _____ Wednesday.
- 5) _____ 1987.
- 6) _____ September.
- 7) _____ 24th September.
- 8) _____ Thursday.
- 9) _____ 11-45 am.
- 10) _____ Christmas Day
- 11) _____ Christmas function
- 12) _____ the morning.
- 13) _____ Friday morning.
- 14) _____ Saturday night.
- 15) _____ night.
- 16) _____ the end of the day.
- 17) _____ the weekend.
- 18) _____ winter.
- 19) Where were you _____ 28th Feb.
- 20) I got up _____ 8 o' clock this morning.
- 21) I like getting up early _____ the morning.
- 22) My sister got married _____ May.
- 23) Raheem and I first met _____ 1979.
- 24) Did you go out _____ Tuesday?
- 25) Do you go out _____ the evening?
- 26) Let's meet _____ 7-15 tomorrow evening.
- 27) I often go away _____ the weekend.
- 28) I am starting my new job _____ 3rd July.
- 29) We often go to the beach _____ summer.
- 30) George is not here _____ the moment.
- 31) Rani's birthday is _____ January.
- 32) Do you work _____ Saturday?
- 33) The company was started _____ 1969.
- 34) I like to look at the stars _____ night.
- 35) I will send you the money _____ the end of the month.

THE CONJUNCTION

Read the following sentences:

1. God made the country *and* man made the town.
2. Our hoard is little, *but* our hearts are great.
3. She must weep, *or* she will die.
4. Two *and* two make four.

In 1, 2 and 3, the Conjunctions join together two sentences.

In 4, the Conjunction joins together two words only.

Def.—A Conjunction is a word which merely joins together sentences, and sometimes words.

➤ Conjunctions join together sentences and often make them more compact; thus,

'Balu and Vithal are good bowlers.'

is a short way of saying

'Balu is a good bowler and Vithal is a good bowler.'

So,

'The man is poor, but honest'.is a contracted way of saying

'The man is poor, but he is honest.'

Sometimes, however, the Conjunction and joins words only; as,

Two and two make four.

Hari and Rama are brothers.

Hari and Rama came home together.

Such sentences cannot be resolved in two sentences.

➤ Conjunctions must be carefully distinguished from Relative Pronouns, Relative Adverbs, and Prepositions, which are also connecting words.

1. This is the house *that* Jack built. (Relative Pronoun)
2. This is the place *where* he was murdered. (Relative Adverb)
3. Take this *and* give that. (Conjunction)

In sentence 1, the Relative Pronoun *that* refers to the noun *house*, and also joins the two parts of the sentence.

In sentence 2, the Relative Adverb *where* modifies the verb *was murdered* and also joins the two parts of the sentence.

In sentence 3, the Conjunction *and* simply joins the two parts of the sentence; it does no other work.

It will thus be seen that—

Relative Pronouns and Relative Adverbs also join; but they do more.

Conjunctions merely join: they do no other work.

Conjunctions & Examples

Both ... and	Michael can both read and write.	Since	Since is used to show result.
Because	She usually eats at home, because she likes cooking.	Although	Although is used to show two opposite statements.
Unless	She will be sick unless she stops eating.	Provided	Provided means if or only if.
Whereas	Whereas we did all the job, they enjoyed themselves.	Whether	Whether you drive fast or slow, please drive carefully.
Therefore	Mary studied hard for the chemistry exam. Therefore , she got an A+.	After	The day after tomorrow is Mary's birthday.
But	I am very hungry, but the fridge is empty.	As if	It looks as if it's going to rain.
Even if	Even if you take a taxi, you'll still miss your plane.	Moreover	Smoking is a bad habit; moreover , it is a very expensive.
Despite	Our vacation was a lot of fun, despite the hot weather.	Or	Excuse me, Is your dog male or female?
Besides	Besides means in addition to, also. It is a preposition.	Yet	We haven't finished eating the watermelon yet .
Unlike	Unlike means different from, not similar to.	So	Whoever says so is a liar.
		In spite of	In spite of being a millionaire, he lives in a very small flat.

THE INTERJECTION

- Examine the following sentences :

Hello ! What are you doing there ?

Alas ! He is dead.

Hurrah ! We have won the game.

Ah ! Have they gone ?

Oh ! I got such a fright.

Hush ! Don't make a noise.

- Such words as “Hello ! Alas ! Hurrah ! Ah !” etc. are called Interjections.
- They are used to express some sudden feeling or emotion. It will be noticed that they are not grammatically related to the other words in a sentence.

Def.—An Interjection is a word which expresses some sudden feeling or emotion.

- Interjections may express—
 - (1) Joy ; as, Hurrah ! huzza !
 - (2) Grief ; as, alas !
 - (3) Surprise ; as, ha ! what !
 - (4) Approval ; as, bravo !
- Certain groups of words are also used to express some sudden feeling or emotion ; as,
“Ah me ! For shame ! Well done ! Good gracious !”



STSN Govt. Degree College, Kadiri

Zoology - Bridge course: 2021-22

Bridge course

(For I BZC, CZS, Paramedical students)

Syllabus:

జంతు వైవిధ్యం - అకసేరుకాలు 1 Period

Animal diversity – Non-Chordates

జంతు వైవిధ్యం - సకసేరుకాలు 1 Period

Animal diversity – Non-Chordates

జంతు కణం - నిర్మాణం; కణాంగాలు 1 Period

Animal cell structure; Cell organelles

జన్యుశాస్త్రం - Genetics 1 Period

జంతు శరీరధర్మ శాస్త్రం

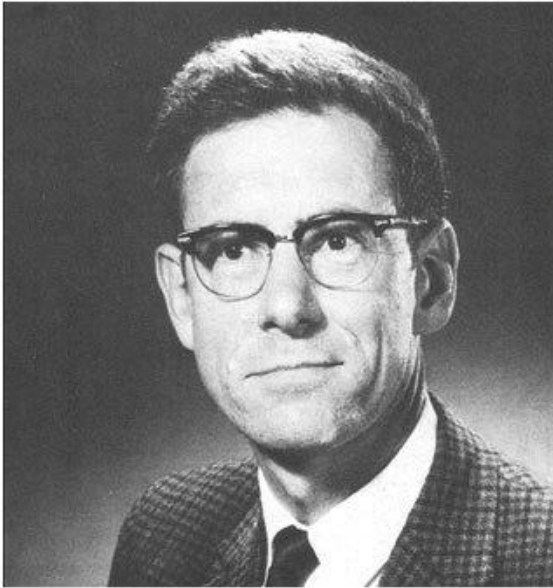
Animal Physiology 1 Period

సూక్ష్మదర్శిని - టెక్నిక్స్

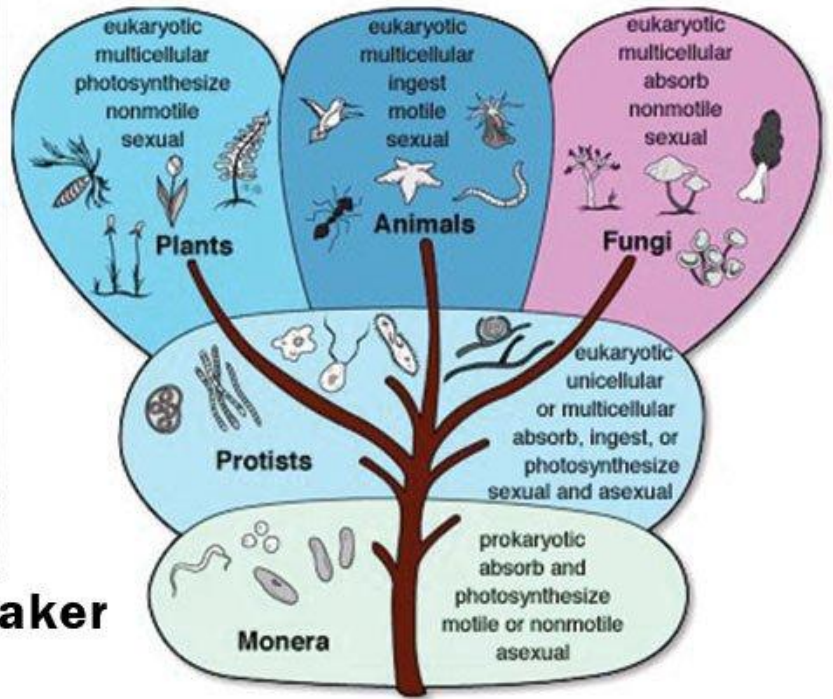
Microscopy Techniques 2 Periods

No. of Periods: 07

(29.11.2021 to 04.12.2021)



Robert Harding Whittaker
(1920 – 1980)



NON-CHORDATES

Phylum 1 : PROTOZOA
e.g. Amoeba

Phylum 6 : ANNELIDA
e.g. Earthworm, leech

Phylum 2 : PORIFERA
e.g. Bath sponge

Phylum 7 : ARTHROPODA
e.g. Crab, Cockroach

Phylum 3 : COELENTERATA
e.g. Hydra, Physalia

Phylum 8 : MOLLUSCA
e.g. Pila, Bivalve

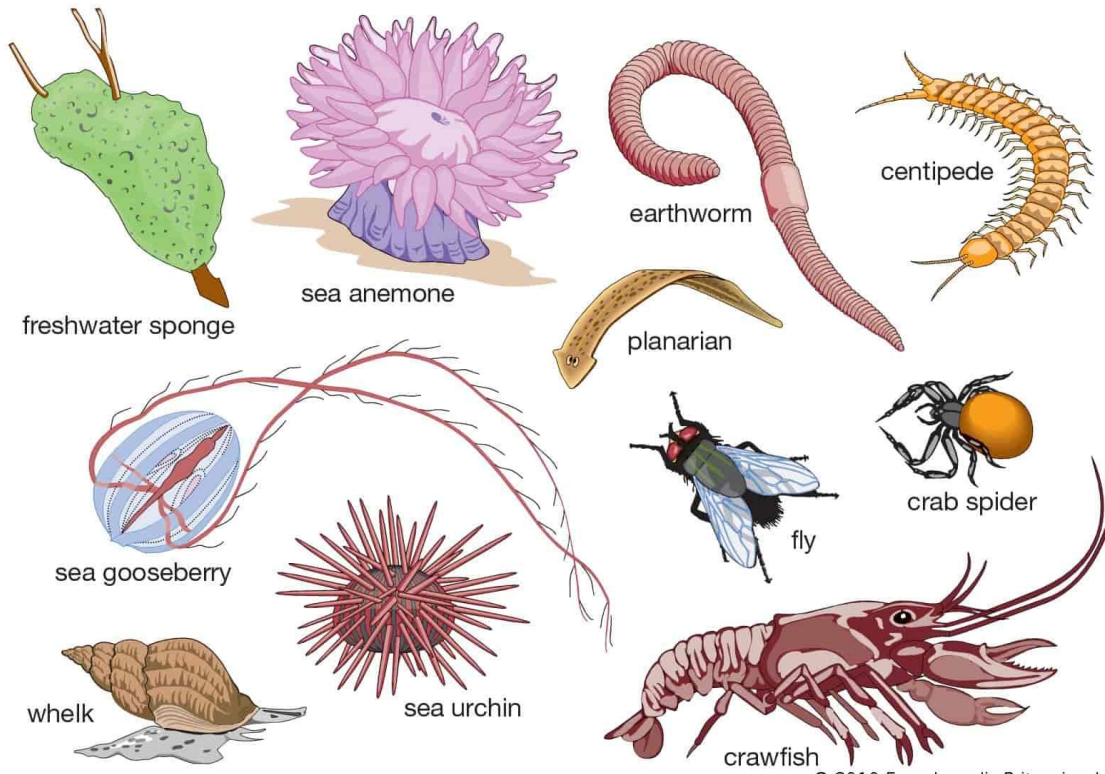
Phylum 4 : PLATYHELMINTHES
e.g. Planaria, Liver fluke

Phylum 9 : ECHINODERMATA
e.g. Starfish, Sea urchin

Phylum 5 : NEMATHELMINTHES
e.g. Ascaries, Filaria

Phylum 10 : HEMICHORDATA
e.g. Balanoglossus

Animals without backbones



Phylum Vertebrates

5 Classes

Fish



Amphibians



Reptiles

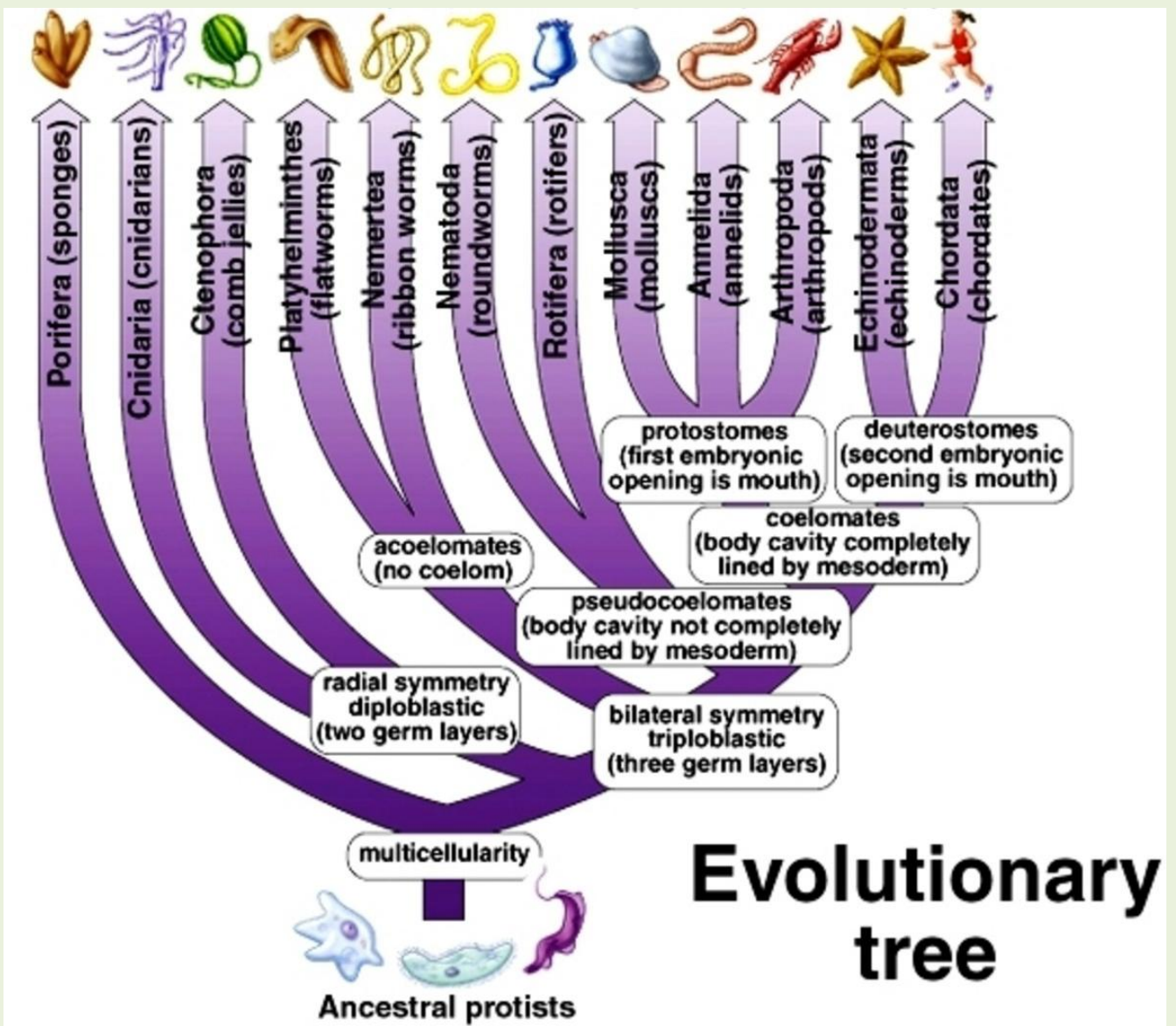


Birds

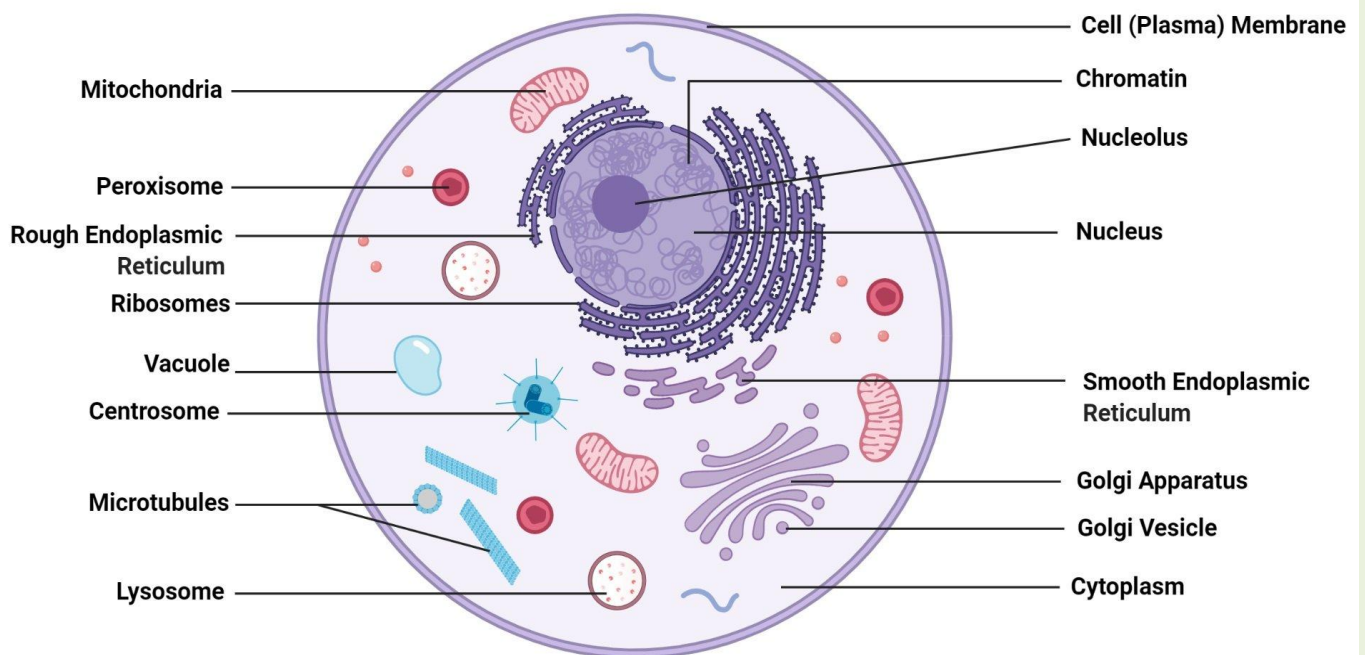


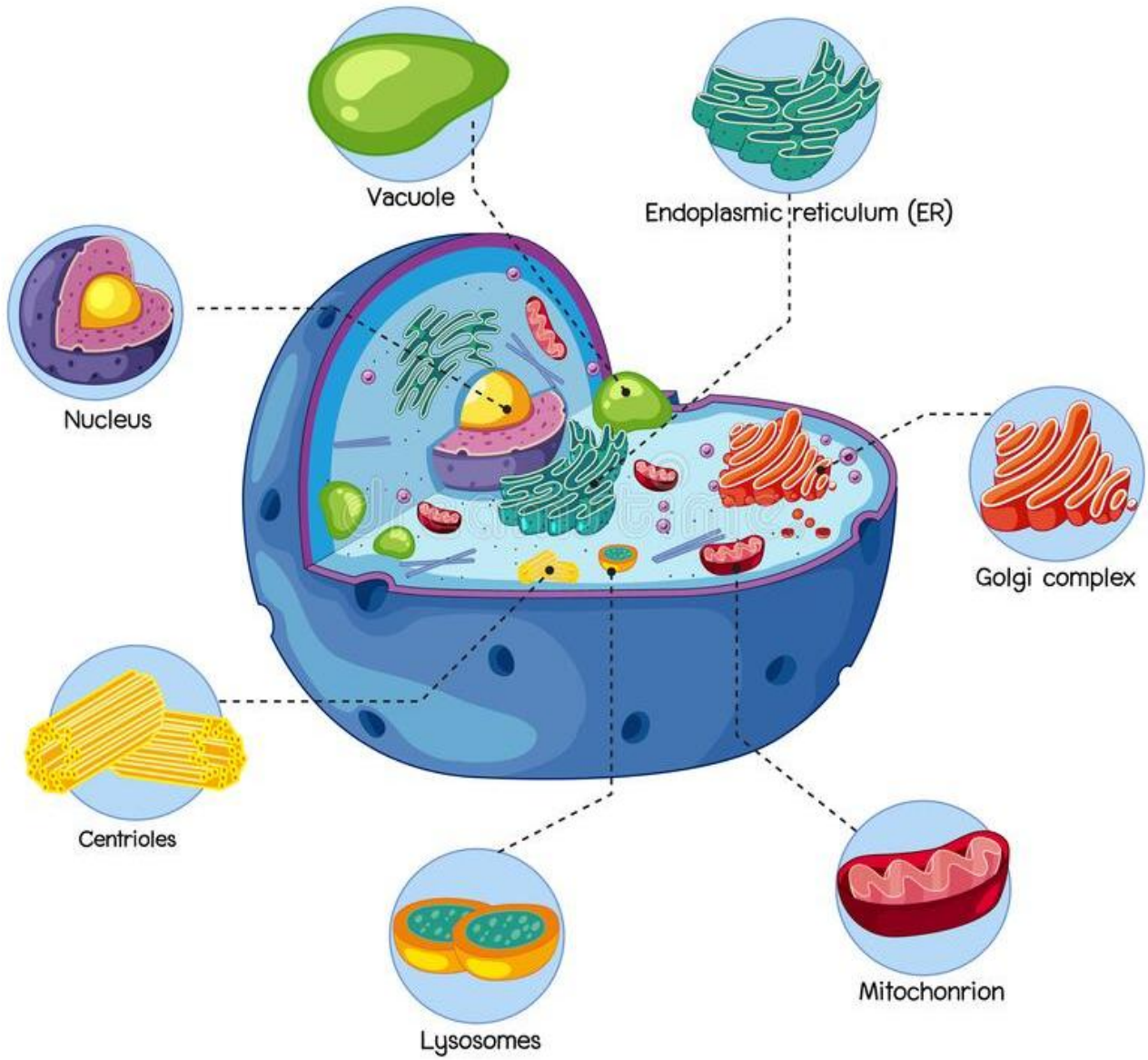
Mammals





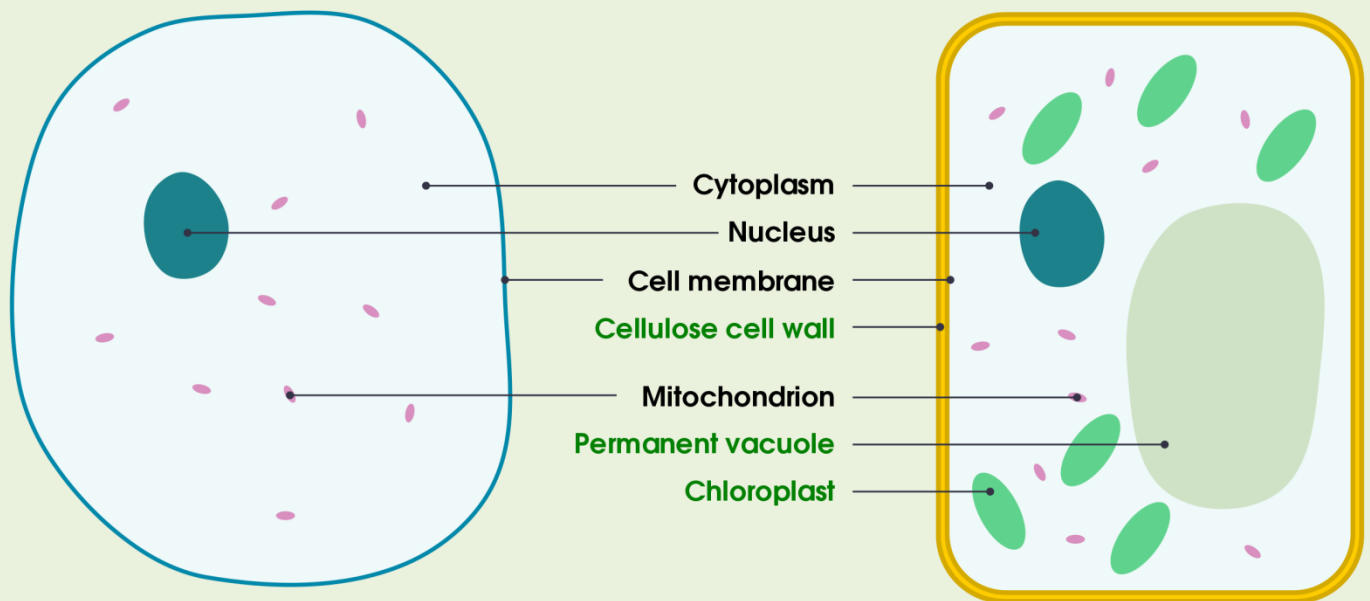
Animal Cell Structure

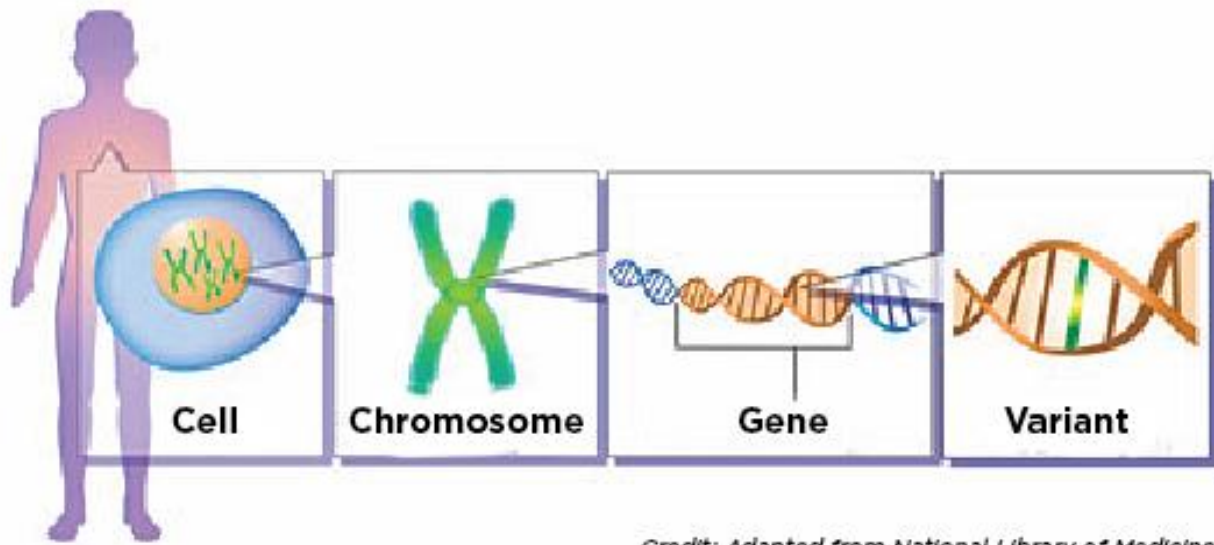




Animal cell

Plant Cell

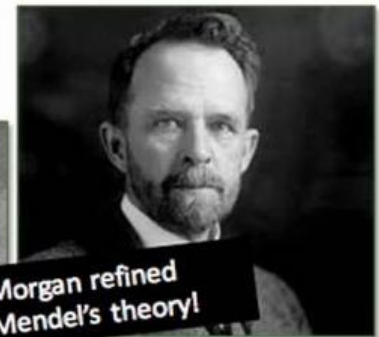




Credit: Adapted from National Library of Medicine

Morgan's discovery of non-Mendelian ratios in *Drosophila*

- Mendel was the *pea guy*
- Developed a theory to explain all his results → **law of independent assortment**
- New results from 20th century didn't fit his model
- Thomas Hunt Morgan developed the idea of *linked genes* to explain the anomalies investigating *Drosophila* flies
- Male and female flies showed different inheritance patterns → **sex linkage**

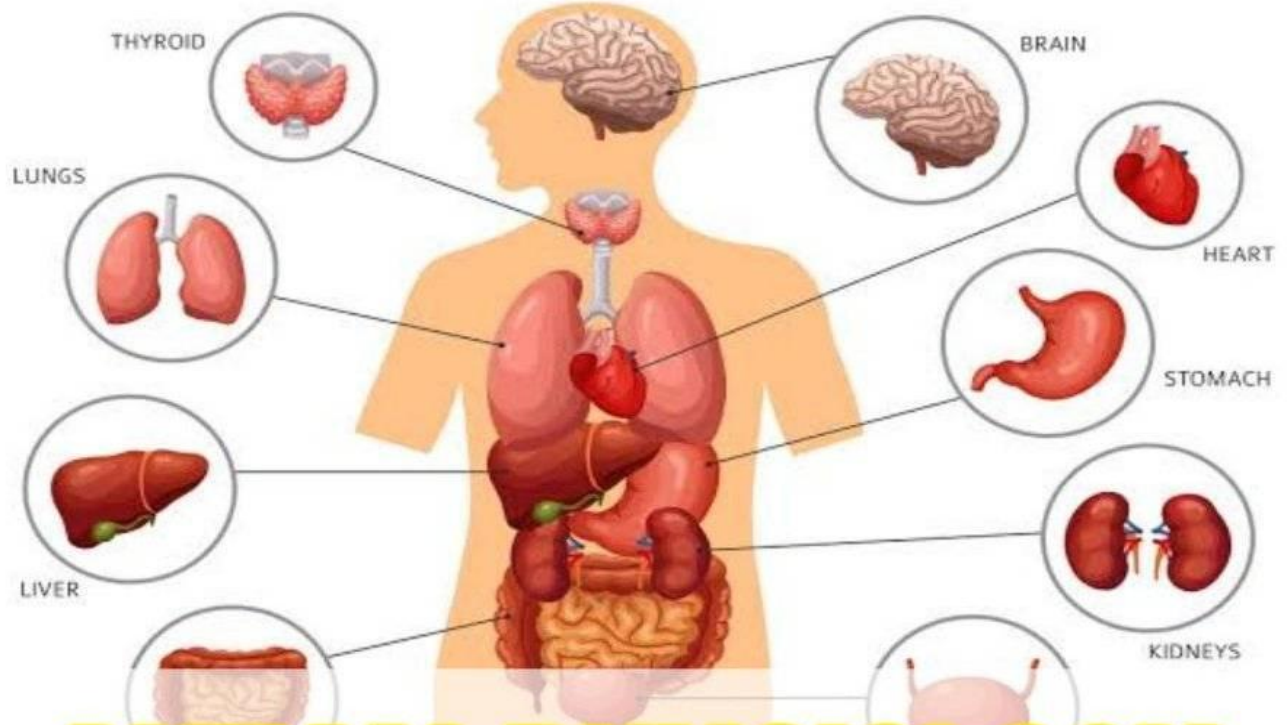


Morgan refined Mendel's theory!

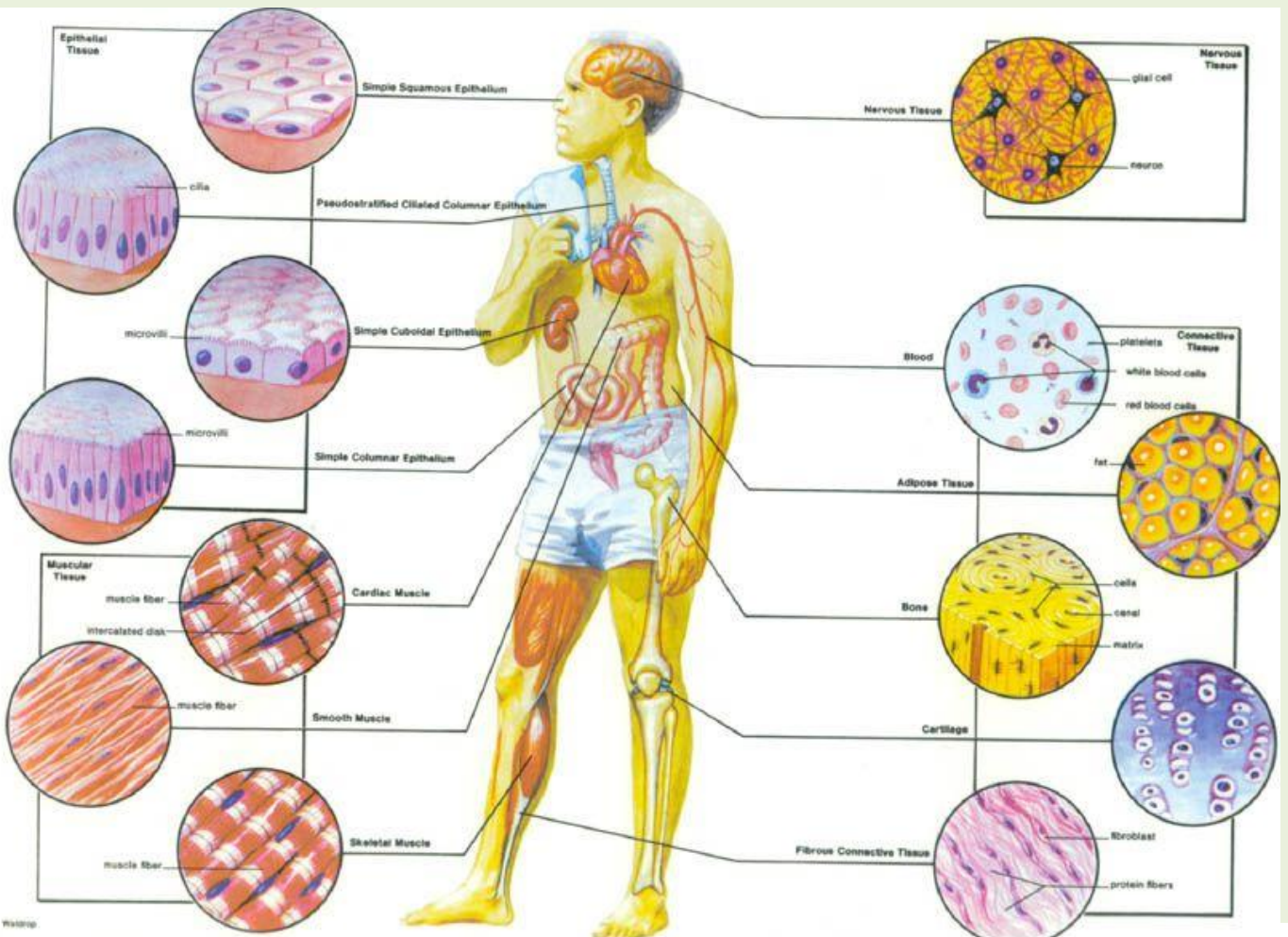
Mendel's law still works for most pairs of genes being considered: on different chromosomes



HUMAN ORGANS

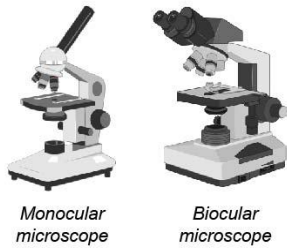


IN ANIMAL PHYSIOLOGY



Types of Microscopes

Compound microscope



stereoscopic view →

Stereo microscope



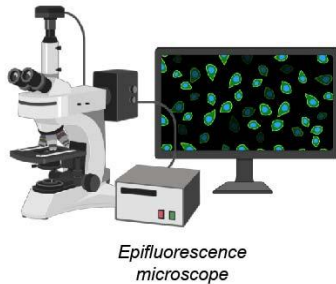
digital imaging →

Digital microscope



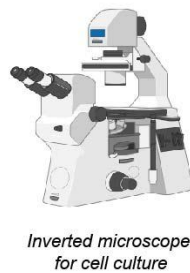
viewing fluorescent objects ↓

Fluorescence microscope



viewing specimens from the bottom ↘

Inverted microscope



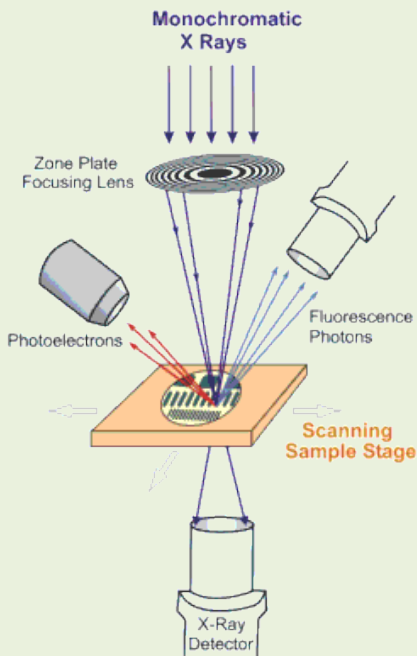
automation →

Automated imaging system

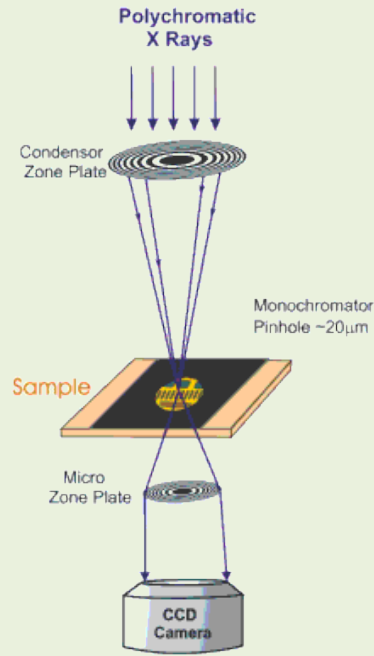


rsscience.com

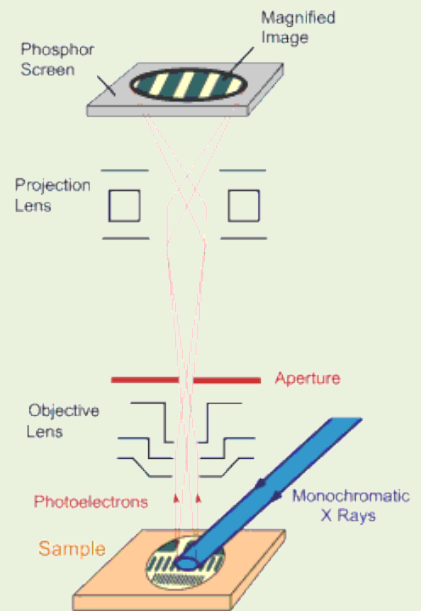
Scanning Transmission X-ray Microscopy STXM



Transmission X-ray Microscopy TXM



X-Ray Photoemission Electron Microscopy XPEEM



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STUDY MATERIAL - ENGLISH PAPER III**English Praxis Course –III: A Course in Conversational Skills
(II Year III Semester)****Unit - I****1.Tryst with Destiny**

‘Tryst with Destiny’ was a historical speech made by Jawaharlal Nehru, the first Prime Minister of India. This speech was made to the Indian Constituent Assembly on the eve of India’s Independence, on the midnight of 14 August 1947. It is one of the greatest speeches of the 20th century. It shows the essence of Indian triumph over British colonial rule.

Nehru began his speech by referring to the pledge made by Indians long years ago to win the freedom for the homeland. Freedom finally has come, and so Nehru asks the people of India to dedicate themselves to the service of India. He opines that freedom and power bring responsibility. He feels that service of India means the service of the millions who suffer. It means the ending of poverty, disease and inequality of opportunity. The ambition of the greatest men of our generation has been to wipe every tear from every one. He strongly advises the people to work hard to give reality to the dreams of the nation. Freedom brings responsibilities and burden. So, we have to face them in the spirit of a free and disciplined people. He recollects Mahatma Gandhi in this speech and refers to him as the Father of our Nation and Architect of this Freedom. He says that we promise ourselves to cooperate with the people of the world in furthering peace, freedom and democracy.

Unit - II**2.Yes, We Can**

‘Yes, We Can’ was a speech made by Barack Obama, 44th President of the USA and the first African-American to hold this office. He was awarded Nobel Peace Prize in 2009. He is known for delivering inspiring speeches.

President-elect Barack Obama spoke to the world from his home city of Chicago as he became the first black President of the United States. His speech focussed on the major issues facing the United States and the world. This speech is about change, reaching for a higher purpose and uniting to solve the problems in America. He greets Chicago and says that his winning is the answer for those who still question the power of their democracy. Americans sent a message to the world that they had never been just a collection of individuals or a collection of red states and blue states. They would always be the United States of America. He expressed his gratitude to all in his speech. In his speech, Obama repeats the slogan ‘yes we can’. This acts like an encouragement that all things are possible and the people of America are able to overcome all difficulties that they may come across in the journey towards complete economic and social freedom. It points that more change is yet to come during Obama’s presidency. Finally, it also epitomizes that American dream which every citizen of the country can realize through maintaining a positive mentality in life.

3.A Leader Should Know How to Manage Failure

‘A Leader Should Know How to Manage Failure’ is an interview by *India Knowledge at Wharton* (a business journal) with Dr. A.P.J. Abdul Kalam on leadership. Kalam was among India’s best-known scientists before he became the country’s President. He worked for the ISRO where he helped launch India’s first satellites into orbit. He was the President of India from 2002 to 2007.

In this interview, Kalam talks about his career as a scientist, his vision for India’s future, and the most important traits for leaders among other issues. Kalam humbly mentions his achievements. He further says how to be a great leader with nobility, integrity, honesty and transparency. He emphasizes that a leader should have six traits. First, the leader must have vision. Without vision, one cannot be a leader. Second, the leader must be able to travel into an unexplored path. Normally, the tendency is for people to travel along well-laid out ways. Third, the leader must know not only how to manage success, but also, more importantly, failure. Fourth, the leader should have the courage to make decisions. Fifth, the leader should have nobility in management. Every action of the leader should be transparent. And finally, the leader should work with integrity and succeed with integrity. He says that all the traits apply especially to the President of a country. At last, he talks about the non-conventional sources of energy. They can help our country free from dependence on fossil fuels and maintain a clean environment.

Unit – III

4.Nelson Mandela's Interview with Larry King

‘Nelson Mandela's Interview with Larry King’ is about an interview of Nelson Mandela, former South African president and the 1993 Nobel Prize winner with Larry King, an American television and radio host. This interview took place when Nelson Mandela was released from prison in 2000 after 27 years of his struggle for freedom in prison. Larry King once declared that interviewing the former president in 2000 was ‘one of the greatest moments of my life.’

In the interview, Larry King feels that it is a special honour to have Nelson Mandela as their guest for the programme. Mandela says that he joined African National Congress Youth League in 1944 and was a lawyer from 1952. He was called a terrorist for fighting for freedom. He was arrested and kept in prison for 27 years. He also told that he was called a terrorist, but when he came out of jail, he was admired. He was supposed to be put to death, but because of the intervention of the President of India and some other Presidents of the world, he was imprisoned for life. In prison, he was able to acquire a lot of wisdom by reading great literature. Moreover, there were many learned people and so they all could share their knowledge and dream of freedom for their country. Larry King says that according to a well-known novelist, Nelson Mandela and Mother Teresa are the great people that one has to choose to meet in the 20th century.

Unit - IV**5.JRD Tata's Interview with T.N. Ninan**

‘JRD Tata's Interview with T.N. Ninan’ is published in the India Today magazine in August 1986. JRD Tata is the grand old man of Indian industry. He is alert and very involved in his giant group’s diverse business. TN Ninan was the Executive Editor of the India Today.

In this interview, Tata compares the situation in business before 50 years and at the time of interview. Fifty years ago, there was no licensing system, no bribe, and business was reasonably honest. When taxes were started, tax evasion, black-marketing and corruption were also started. He says that unlike Nehru and Indira Gandhi and some others, TT Krishnamachari was in many ways a terrible man, very authoritarian. He was the only one to ignore the socialism thing and did what he thought was right. He was the one who encouraged TELCO to manufacture trucks. He almost instructed Tata Steel to put in another million tonnes, double capacity, in 1954. He says that Birla was a thinking man and man of vision. He also talked about Reliance that Dhirubhai Ambani has tremendous drive, capability and novelty of ideas. He said that he was 82, and he was still group chairman. He would help the group to stay united and to follow Jamshedji Tata’s ideals.

Unit - V**6.You've Got to Find What You Love**

‘You've Got to Find What You Love’ is a speech by Steve Jobs, Chief Executive Officer and co-founder of Apple Computer and Pixar animation Studios. He addresses the graduates at the university’s 114th Commencement in Stanford Stadium. In his speech, he urges the graduates to pursue their dreams and see the opportunities in life’s setbacks. The goal of Steve Jobs’ speech is to persuade the graduates to find the jobs that they can truly love because of their passion for the definite activities.

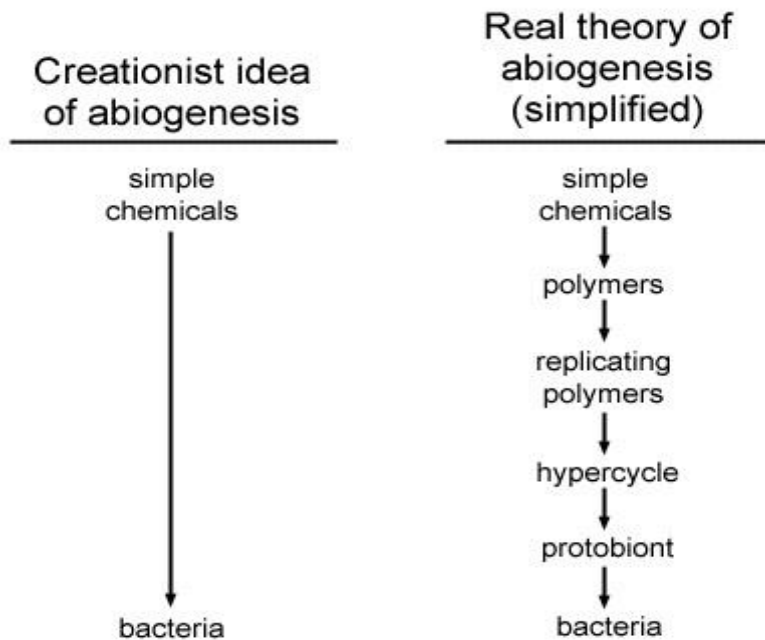
In his speech, Steve Jobs tells them three stories from his life. The three stories presented in the speech are used to develop Jobs’ argument about the necessity to do what a person loves and the importance of finding these things and activities. The first story Steve told the students was about connecting the dots. Here, he says that we can’t connect the dots looking forward; we can only connect them looking backwards. So, we have to trust that the dots will somehow connect in your future. In the second story Steve tells the students to find what they love in life and follow that. Steve also goes on to say that it is okay to have some ups and down and rough road on their way to success. Lastly, Steve shares a story about death. Steve Jobs shares his story of cancer where he deals with the biggest obstacle of all and manages to still smile and act like he has everything needed in life.

* * *

Unit - 1: Origin of life and Viruses (జీవం పుట్టుక మరియు వైరస్లు)

1.Explain about concept of primary Abiogenesis and Miller and Urey experiment.

Concept of primary Abiogenesis: Abiogenesis (the origin of life) is the natural process by which life has arisen from non-living matter, such as **simple organic compounds**. Life formed on Earth more than 3.5 billion years ago. The process may include Molecular self-replication, self-assembly, autocatalysis. The details of this process are still unknown.



Modern Theory of Origin of Life:

Currently widely accepted theory for **origin of life** is **Oparin-Haldane theory**. It was proposed by A.I. Oparin (1923) and supported by J.B.S. Haldane (1928).

The **Oparin- Haldane** theory stated '**Chemical Evolution of Life**'. According to this theory under the strong reducing conditions **inorganic molecules** would spontaneously form **organic molecules** (simple sugars and amino acids). These molecules would combine in even more **complex molecules** (coacervates). This process leads to form primitive cell on earth. The experimental support for **Oparin - Haldane** theory provided by **Miller and Urey** through their innovative experiment.

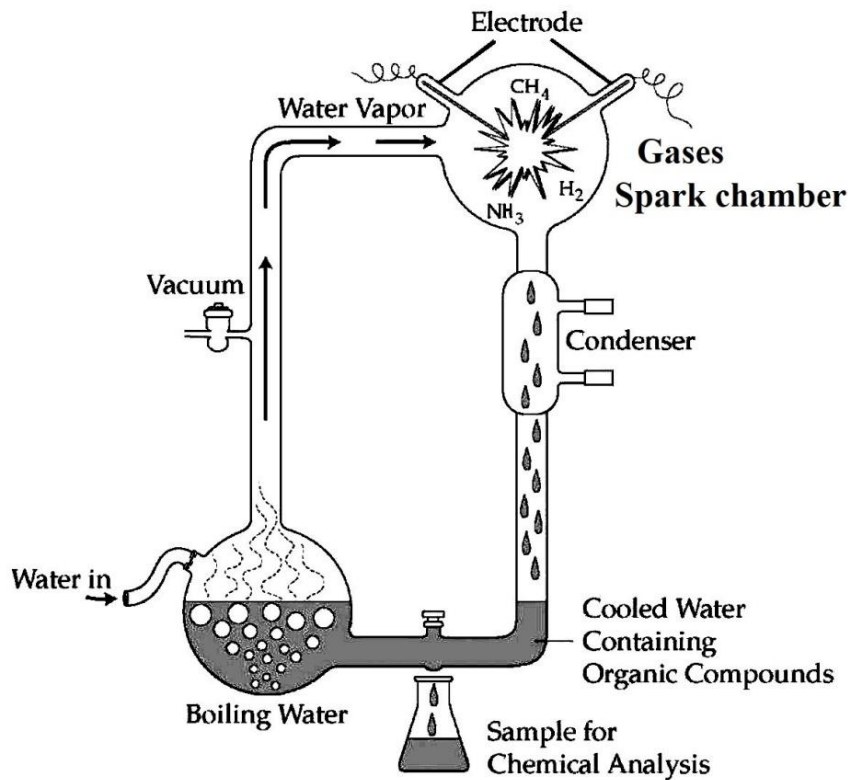
Miller and Urey Experiment:

In 1953, Stanley **Miller** and Harold **Urey** did an experiment to test Oparin and Haldane's hypothesis.

- ❖ Miller and Urey built a closed system containing a heated pool of water and a mixture of gases (Hydrogen, Methane, and Ammonia). These gases are to be abundant in the atmosphere of early earth.
- ❖ The gas chamber was connected to a bulb filled with water that could be **heated**.
- ❖ Gaseous mixture and water was exposed to an **electric discharge** that simulated that of storm lightning.
- ❖ After conducting experiment for one week, Miller and Urey found that various types of amino acids, sugars, lipids and other organic molecules are present in the collected cooled water.
- ❖ These organic molecules would combine to form **primitive cell on earth**.

Significance of Miller and Urey Experiment:

- This experiment was the **first attempt to scientifically explore ideas about the origin of life**.
- This experiment provided the first evidence that **organic molecules needed for life could be formed from inorganic components**.



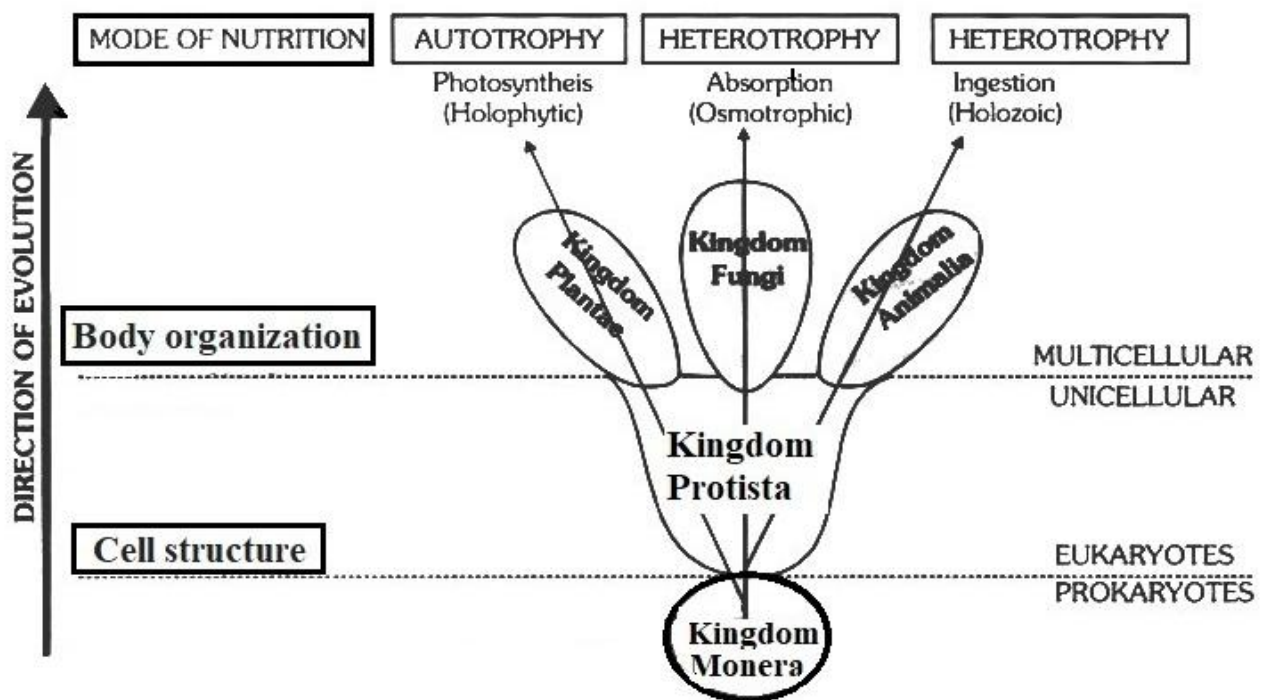
Miller and Urey Experiment

2.Explain about Five kingdom classification of R.H.Whittaker.

Five Kingdom Classification of R.H. Whittaker

The five kingdom classification was proposed by the American taxonomist, R.H. Whittaker in 1969. He classified all the living organisms (except viruses) into five kingdoms viz. **1.Monera 2.Protista 3.Fungi, 4.Plantae 5.Animalia.**

The main criteria of the five kingdom classification were **cell structure, body organization, mode of nutrition and phylogenetic relationships**



Five Kingdoms showing increasing complexity during evolution

1. Monera:

- The kingdom Monera consists all **prokaryotic organisms**.
- These organisms are **unicellular** and cosmopolitan distribution.
- They lack membrane bound cell organelles like mitochondria, nucleus etc.
- The nuclear material remains freely suspended in the cellular cytosol. It is called **nucleoid**.
- Plasmamembrane invaginates to form respiratory structure called **mesosome**.
- The cell walls are made up of peptidoglycon, teichoic acid but it is absent in Mycoplasma.
- Cells have 70S type ribosomes.
- Nutritionally they are autotrophs or heterotrophs or symbionts or saprophytes.
- Monerans multiply or reproduce asexually. They lack true sexual reproduction but partial genetic material transfer from one organism to another through conjugation, transformation or transduction.

E.g. Archaeobacteria, Eubacteria, Mycoplasma, Cyanobacteria etc.

2. Protista:

- Kingdom protista includes all the **unicellular eukaryotic organisms** such as phytoplanktons, zooplanktons and disease causing parasites.
- These are microscopic, unicellular eukaryotic organisms with cosmopolitan distribution.
- Presence of well developed membrane bound organelles.
- Mode of nutrition may be parasitic, photosynthetic, saprophytic, mixotrophic.
- Some organisms have cell wall like peripheral covering called exoskeleton, sometimes covered by a soft pellicle, but most of them are covered with plasma membrane only.
- Pseudopodia, flagella and cilia are the principal locomotory organs.
- Reproduction occurs generally by asexual methods like - binary fission, budding, sporulation etc. Sexual reproduction is takes place through conjugation or by the fusion of nuclei called syngamy.

E.g. Amoeba, Paramecium, Euglena, Chlorella.

3. Fungi:

- These are multicellular, eukaryotic, achlorophyllous, heterotrophic organisms.
- Fungal body is made of **hyphae**, which aggregate to form mycelia. Hyphae may be septate or aseptate.
- Usually they grow as parasites or saprophytes.
- Some of them can live as symbionts in association with roots of higher plants as mycorrhiza.
- Show **absorptive mode of nutrition**.
- Cell wall is composed of **chitin** and polysaccharides.
- Stored food material is **glycogen**.
- Reproduction in fungi may be sexual (Gametangial contact) or asexual (Spores / Budding).

E.g. Yeast, Rhizopus, Puccinia, Mushroom.

4. Plantae:

- The kingdom plantae includes multicellular, photoautotrophic organisms, commonly known as **plants**.
- The cells of plants are eukaryotic and contain **cellulosic cell wall**.
- Presence of chloroplasts and chromoplasts apart from other membrane cell organelles.
- Plant pigments include chlorophyll, carotenes, xanthophylls, Phycobilins etc.
- Photoautorophic mode of nutrition is found due to the presence of chlorophyll. (**Producers**)
- Reproduction is both by sexual and asexual means.
- Growth is indefinite.
- E.g. Spirogyra, Funaria, Lycopodium, Pinus, Mangifera etc.

5. Animalia

- This kingdom includes organisms which are multicellular, eukaryotes and do not possess chlorophyll.
- This is a very large group which includes great diversity of organisms like mammals, birds, reptiles, fishes, worms, insects etc.
- The cells of animals are eukaryotic and devoid of cell wall and central vacuole.
- Heterotrophic mode of nutrition.
- Body has definite shape and organs are present internally.
- Sexual reproduction is predominant, but the lower invertebrate forms also exhibit asexual reproduction.
- They are consumers in the ecological trophic level.

3. Discovery of microorganisms, Pasteur experiments, germ theory of diseases.**Abiogenesis**

- Abiogenesis is the generation of life from non-living matter. Abiogenesis is now precisely known as *spontaneous generation*.
- According to this theory complex living organisms are generated from **non - living decaying** substances. E.g. organisms like mice spontaneously appear in stored grain or maggots spontaneously appear in decaying meat.
- However this theory was disproved by several scientists through their experiments.

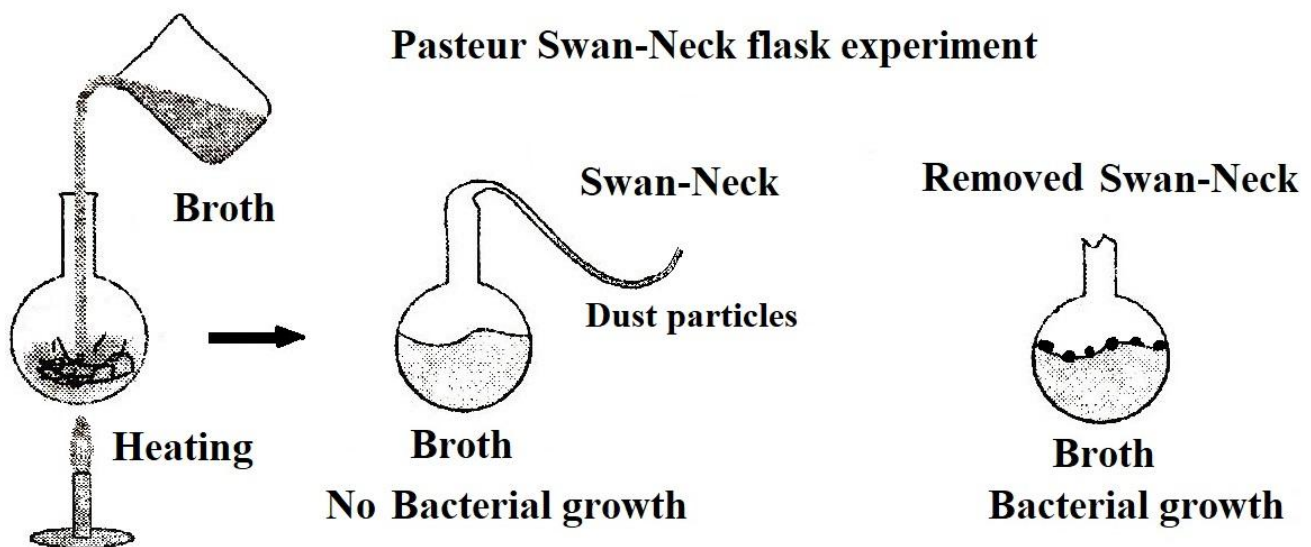
Louis Pasteur Experiment; (5 Marks Question)

In 1862 **Louis Pasteur** disproved the *Theory of Spontaneous Generation* through his experiments.

Louis Pasteur designed a procedure to test whether sterile nutrient broth could spontaneously generate microbial life. To do this, he set up two experiments. In both, Pasteur added nutrient broth to flasks, bent the necks of the flasks into S shapes (swan neck) and then boiled the broth to kill any existing microbes.

- Sterilized broth in his swan-neck flasks would remain sterile as long as the swan necks remained intact. Dust particles remained near the tip of the swan necks. They were unable to travel against gravity into the flasks.
- Pasteur broke off the swan necks of the flasks, were contaminated with bacteria. It happened due to dust particles from the air fell into the broken flasks. Microbes are present in the air.

Conclusion: Pasteur's experiment showed that living things cannot arise from nonliving materials.



Germ Theory of Disease: (5 Marks Question)

- The **germ theory of disease** is the currently accepted scientific theory for many diseases.
- Germ theory of disease explains that many diseases are caused by **germs** or **microorganisms**.
- "Germ" may refer to not just a bacterium but to any type of microorganism, such as protists or fungi, or viruses, prions, or viroids.
- **Louis Pasteur, Joseph Lister, and Robert Koch** are given much of the credit for development and acceptance of this theory.
- **Robert Koch** developed a set of postulates to prove that a specific microorganism causes a specific disease. E.g. *Bacillus anthracis* causes anthrax disease .
- **Koch's postulates:**
 - 1.The microorganism must be present in every case of the disease and absent in healthy organisms.
 - 2.The microorganism must be isolated from a diseased organism and grown in pure culture.
 - 3.The cultured microorganism should cause disease when introduced into a healthy organism.
 - 4.The microorganism must be re-isolated from the inoculated, diseased experimental host.

Significance of germ theory of disease:

- ✓ The germ theory is very important in understanding and preventing a variety of diseases.
- ✓ Germ theory enabled sanitation, vaccines, and effective medicines.

4.Shape and symmetry of viruses**Viruses:**

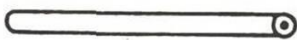
Viruses are simple, acellular, ultramicroscopic entities consisting of either DNA or RNA enclosed in a coat of protein .They are obligate intracellular parasites. Study of viruses is called Virology.

They were discovered by **Iwanowski** in 1892.

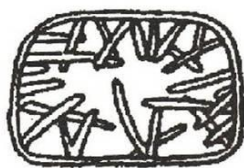
Shape of Viruses: (5 Marks Question)

The protein coat or capsid gives the virus a definite shape.Viruses are found in the following shapes:

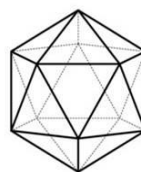
- | | | | |
|--------------------|-----------------------------|-----------------|-----------------------|
| A)Rod shaped | : E.g. Tobacco mosaic virus | D)Spheroidal | : E.g. Polio virus |
| B)Rectangular | : E.g. Vaccinia virus | E)Tadpole virus | : E.g. Bacteriophages |
| C)Polyhedral virus | : E.g. Adeno virus | F)Bullet shaped | : E.g. Rhabdo virus |



**Tobacco mosaic virus
(TMV)**



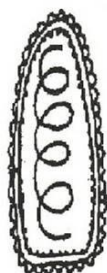
Vaccinia virus



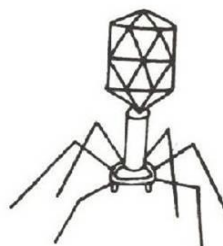
Adeno virus



Poliovirus



Rhabdovirus



Bacteriophage

Symmetry of Viruses: (5 Marks question)

Symmetry of the virus depends upon the mode of arrangements of capsomeres in capsid. There are three basic symmetries noticed in viruses. They are Helical symmetry, Cubic symmetry and Binal Symmetry.

I. Helical symmetry:

The capsomeres are arranged in helical manner around the core of nucleic acid.

The length of the helical viral nucleocapsid is determined by the length of the nucleic acid.

The identical protein subunits are arranged in the form of a circle to form a disc shaped appearance.

The cylinder or helical structure is formed as a result of stacking of multiple discs.

E.g. Tobacco mosaic virus (TMV)

II. Icosahedral or cubic symmetry:

In this type the capsid is polyhedral in shape. The capsomeres are arranged in Cubic symmetry. Which is also called as icosahedral symmetry. Icosahedron is an object with 12 vertices (corners) and 20 identical faces and 30 edges). Each face is an equilateral triangle.

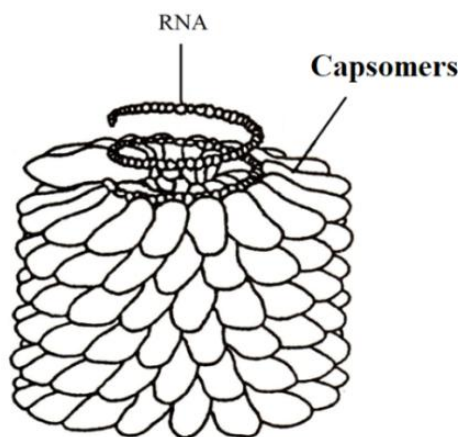
They have less contact with the virus genome than the capsid proteins of viruses with helical symmetry.

E.g. Adeno virus.

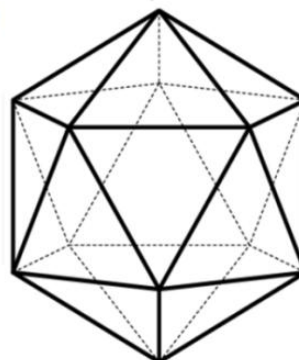
III. Binal symmetry

In this type a combination of both helical and icosahedral symmetry is present. This symmetry is called 'binal symmetry'. **E.g. T2 and T4 bacteriophages.**

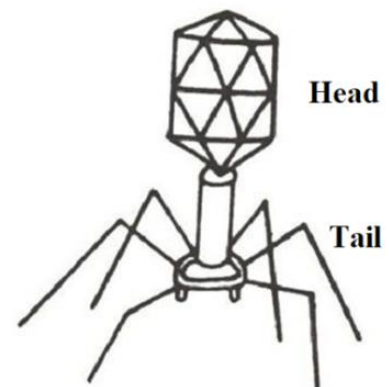
In these viruses the head is icosahedral but the tail is helical.



Helical symmetry
- TMV



Cubic Symmetry
- Adenovirus

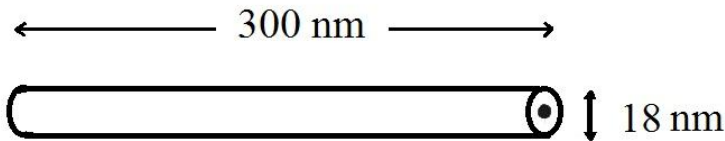


Binal symmetry
- T2 Bacteriophage

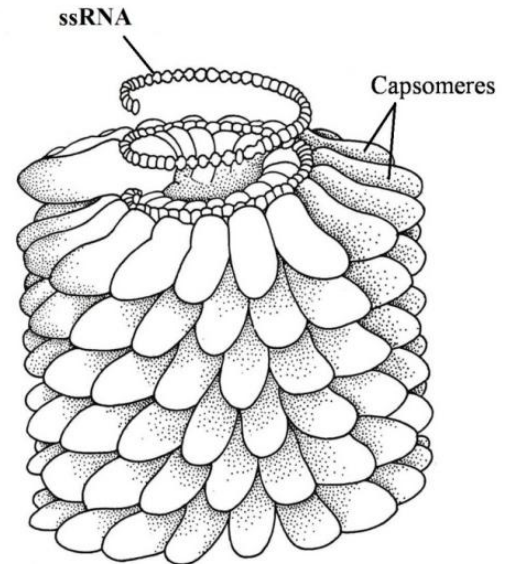
5.Explain about structure and multiplication of TMV. (10 Marks Question)**Structure of Tobacco Mosaic Virus (TMV) - (5 Marks question)**

TMV is a plant virus which infects a wide range of plants, especially tobacco and other members of the family Solanaceae.

- It is a simple **rod-shaped helical virus** consisting of centrally located single stranded RNA (ssRNA) enveloped by a protein coat called capsid .
- It is about **300 nm** long and **18 or 19 nm** in diameter with a molecular weight of 39×10^6 daltons.
- The capsid is made up of **2,130 protein sub units** of identical size. They are called capsomeres.
- The protein sub units are arranged in a **helical manner** around a central hole of 4 nm.
- Each protein sub unit is made up of a **single polypeptide** chain which possesses **158 amino acids**.
- Inside the capsid there is a **spirally coiled** single stranded RNA.
- RNA of TMV consists of **6,500 nucleotides**.



Tobacco Mosaic Virus



Structure of TMV

Multiplication of Tobacco Mosaic Virus (TMV)

TMV replication (multiplication) involves five different steps such as the **entry, release of nucleic acid, RNA synthesis, capsid synthesis and assembly.**

1.Entry: TMV cannot directly enter into the host cell. It takes help of break due to injury or through a vector. Insect vectors with long proboscis facilitate the entry of virus into the plant cell.

2.Release of nucleic acid (uncoating): It is a process in which capsid is removed and nucleic acid is released into the cytoplasm. The enzymes of host plant helps to dissolve the protein coat (capsid) leading to the release of viral nucleic acid (RNA) into the host cell.

3.RNA synthesis: TMV contains single stranded positive type of RNA as its genetic material.

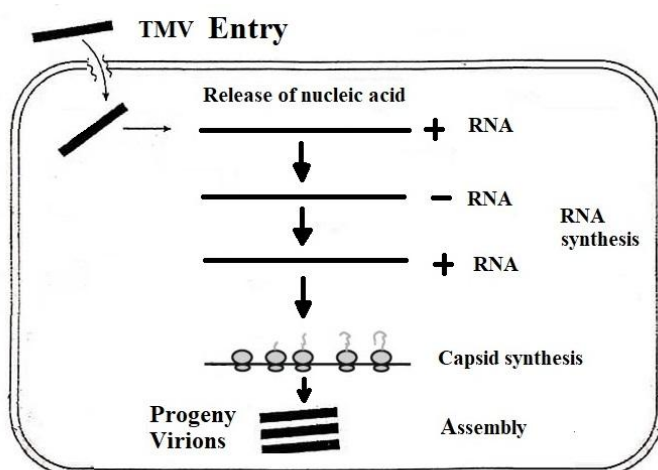
RNA synthesis completes in 2 steps.

i) Synthesis of negative strand RNA using positive strand as a template.

ii) Synthesis of positive strand RNA using negative strand RNA as a template. (RNA dependent RNA)

4.Capsid synthesis: A part of the positive type of viral RNA act as template for m-RNA synthesis. It involves in the formation of capsid sub units. (Protein synthesis)

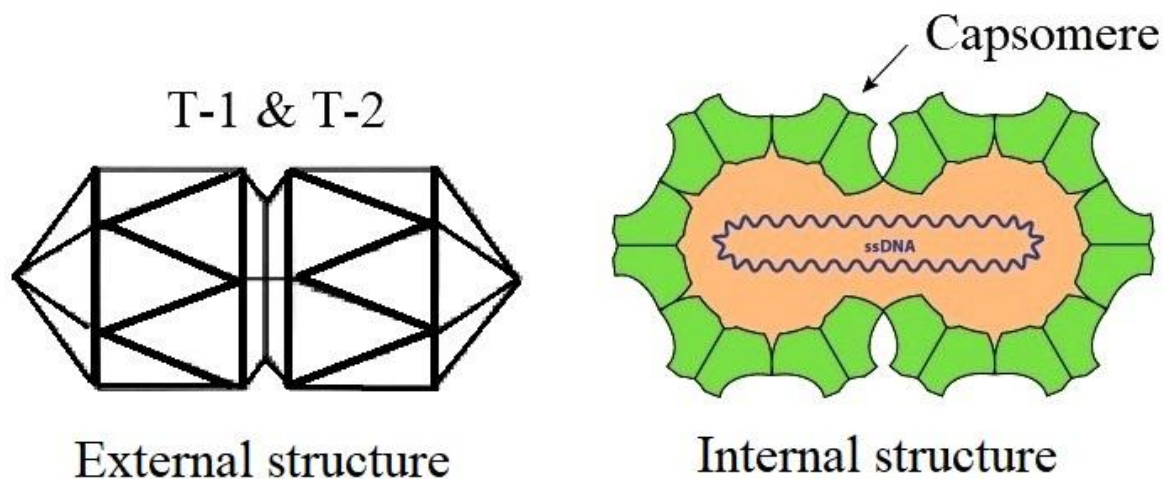
5.Assembly: The coat subunits encapsulate the core viral RNA strand giving a final shape to the nucleocapsid of TMV. Ultimately the protein frames arrange in a tubular form with the RNA. The viral particles travel from one cell to other and continue their replication in the host.



TMV Multiplication

6. Structure of Gemini Virus: (5 Marks Question)

- Gemini viruses are biologically and genetically diverse group of plant viruses.
- Gemini virus family comprises of 9 Genera and 485 species.
- They contain a twinned (geminate) quasi-icosahedral capsid (T-1 & T-2) that contains 22 pentameric capsomeres made of 110 capsid proteins (CP proteins).
- Capsid measures about 18 X 30 nanometers.
- Virus particles are non-enveloped.
- Capsid encapsulated Mono, or bipartite (means that the genome is segmented into two segments referred to as **DNA A** and **DNA B**, that are packaged into separate particles)
- DNA is circular, single stranded DNA genome (+) of about 2.5-3.0 (monopartite) or 4.8-5.6 kilo base pairs (bipartite).
- These viruses are responsible for a significant amount of crop damage worldwide.
- Diseases associated with this family includes: **Bean Golden Mosaic**, **Cotton Leaf Curl**, **Maize Streak** and **Tomato Yellow Leaf Curl** etc.
- In nature, Gemini viruses are transmitted by phloem-feeding insects, including various species of leafhoppers, treehopper and whiteflies.



Structure of Gemini Virus

7.A brief account of Prions and Viroids. (5 Marks Question)**Viroids**

- Viroids are the smallest infectious pathogens.
- They possess only a short strand of circular, **single stranded RNA (ssRNA)** that has **no protein** coat.
- Viroids were discovered and named by **T.O. Diener** in 1971.
- All known viroids are inhabitants of angiosperms.
- They are responsible for a few plant diseases such as **potato spindle-tuber disease**, **cucumber pale fruit**, **citrus exocortis disease** etc.
- Transmission of Viroids: Viroid infections can be transmitted by aphids / by mechanical damage to plants as a result of horticultural or agricultural practices, or from plant to plant by leaf contact.

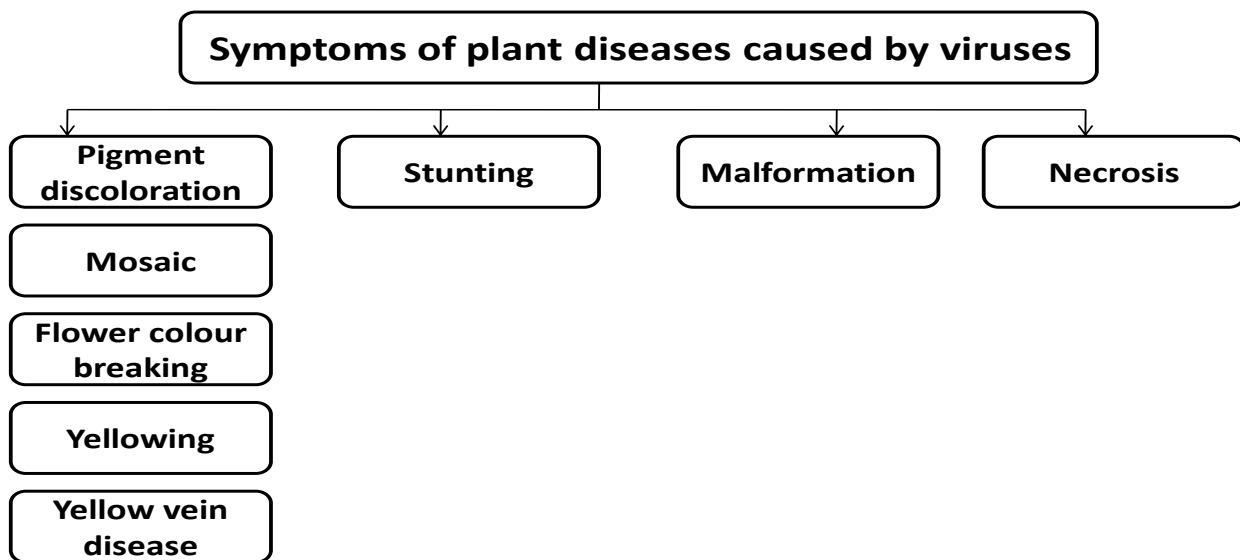
Prions

- ❖ The infectious agents which possess **only protein** but not nucleic acids are known as prions. (is derived from protein and infection, hence **prion**)
- ❖ **Prions** are misfolded proteins.
- ❖ They were discovered by **Stanley B. Prusiner** in 1982.
- ❖ E.g: Infectious agents that cause “**scrapie disease**” of sheep and “**mad cow disease**” of cow.
- ❖ Transmission of Prions: Direct contact or indirectly through environmental contamination of soil, food or water.

8.A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and their control. (10 Marks question)

Symptoms of plant diseases caused by viruses

Symptoms of plant diseases caused by viruses may occur on all plant parts. Generally leaves exhibit the most characteristic symptoms. These symptoms are classified as follows



1.Pigment discoloration: It is common symptom. The pigment loss and discoloration results in four important characteristic symptoms viz. mosaic, flower colour breaking, yellowing and yellow vein disease.

a)Mosaic:It is the colour change that occurs in isolated patches in the green lamina. E.g: Tobacco mosaic disease.

b)Flower colour breaking: This symptom associated with loss of colour in petals at certain parts and formation of dark colours at other parts. E.g: Tulip mosaic break.

c)Yellowing: The infected leaves completely lose the chlorophyll pigment resulting in the yellowing of leaves. Loss of chlorophyll is often associated with increased carotinoids. E.g: Peach yellowing disease.

d)Yellow vein disease: In this symptom the tissue close to the veins turn yellow, while the remaining areas remain green. E.g. Bhandi vein clearing.

e)Vein Banding: In this symptom the tissue close to the vein remain green and the remaining areas of the lamina undergo chlorosis. E.g: Citrus vein banding

2.Stunting: In this symptom overall growth of the plant including leaves, flowers and fruits are reduced resulting in yield losses. E.g. Rice dwarf.

3.Malformations: Abnormal growth of plant or plant parts due to ‘hyperplasia’ (excessive cell division) or ‘hypertrophy’ (excessive increase in cell size). E.g. Swollen shoot of cocoa.

4.Necrosis: In this symptom the cells encircling the infected are deteriorate and die. The necrotic cells typically turn into light brown or dark brown colour. E.g: Tobacco necrosis.



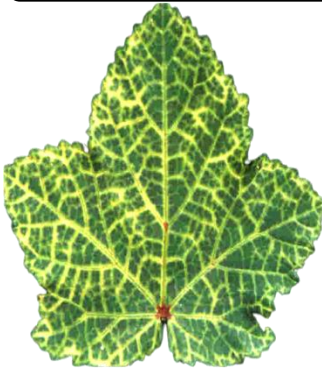
Tobacco mosaic disease



Tulip break



Peach yellowing disease



Bhendi vein clearing



Rice stunt



Swollen shoot of Cocoa



Tobacco necrosis

Transmission of plant viruses:

The mode of transmission of plant viruses and the diseases caused by them vary according to the virus and host. Very few viruses are freely transmitted through air, water, and contact. However, a majority of them are transmitted from one host to another through vegetative parts, cell sap, seeds, pollen grains, insects, nematodes, fungi and parasitic angiosperms (*Cuscuta*).

1. Vegetative parts: In vegetatively propagated plants like potato, sugarcane, banana, rose etc. the concerned viruses are transmitted through the buds, stem cuttings etc.

2. Mechanical transmission: The sap of the infected plant transmitted to healthy plant through physical contact, agricultural implements and hands of labour. **E.g:** Potato virus and Tobacco mosaic virus.

3. Seed transmission: Some viral diseases are transmitted through seeds. E.g: Bean mosaic virus.

4. Pollen transmission: The pollen grains produced from virus infected plants usually possess the viruses. Such pollen grains transmit the viruses to pollinated plants. E.g: Virus causing cherry ring spot disease.

5. Insect transmission: Many plant viruses are transmitted through insect vectors (aphids, mosquitoes, thrips, white flies etc.). E.g: Rice tungro virus, Papaya mosaic virus.

6. Nematode transmission: Nematodes belonging to the genera *Xiphinema* and *Longidorus* are known to be involved in transmission of tobacco ring spot virus

7. Fungus transmission: *Olpidium*, a root infecting fungus known transmit tobacco necrosis virus (TNV)

8. Parasitic angiosperms: Several viruses can spread through haustoria of the parasitic angiosperms (*Cuscuta*).

Control of plant viral diseases:

The following general methods can be adapted to control the viral diseases.

- 1.**Exclusion of the source of infection:** Preventing the entry of the source of infection into an area where it is not naturally existing. Strict enforcement of quarantine laws restricts the entry of infection.
- 2.**Isolation of the source of infection:** Isolation of diseased plants and eradication of weed plants.
- 3.**Eradication of vectors:** By using suitable insecticides vectors can be eradicated from the crop field.
- 4.**Cleaning implements:** To prevent mechanical transmission of the disease, workers have to take disinfective measures as well as cleaning implements with trisodium phosphate (TSP 3-5%).
- 5.**Selection of planting material:** Selection of Tubers, cuttings, bulbs, tubers etc. from healthy plants.
- 6.**Seed treatment:** Use of treated seeds (hot water (35-95⁰C) treatment or Ultra violet rays treatment) to prevent seed transmission of viruses.
- 7.**Chemotherapy:** Chemicals such as cytovirin, thiouracil, methylene blue, zinc sulphate, malachite green etc. may control viral diseases to certain extent.
- 8.**Breeding and cultivation of resistant varieties:** It is the best method to control plant viral diseases.

9. Write about Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.**Significance of viruses in vaccine production:**

- A **vaccine** is a biological preparation that provides active acquired immunity to a particular disease.
 - The administration of vaccines is called vaccination.
 - Vaccination produce immunity against a disease. It is the only effective method to control viral diseases.
 - **Edward Jenner** developed the modern concept of vaccination.
 - A vaccine typically contains an agent that resembles a **disease-causing microorganism** and is often made from weakened or **killed forms of the microbe**, its **toxins**, or one of its **surface proteins**.
 - Generally vaccines stimulate the body's **immune system** to recognize the agent as a threat.
 - Vaccination has been made an enormous contribution to global health.
 - Eradication of **smallpox** and **Polio** was possible through vaccination only.
 - In future vaccines will play crucial role in controlling the current pandemic viral disease COVID -19.
- Covaxin** and **Covishield** vaccines are available in India

Viruses as Biopesticides:

- Biopesticides are pesticides derived from natural materials, including animals, plants, fungi and microbes
- Viruses belonging to **baculovirus** family are widely used as an effective viral biopesticides
- Baculoviruses are extremely small and rod shaped viruses. They contain ds DNA as the genetic material.
- Important Biopesticides are Nuclear polyhedrosis viruses (**NPVs**), Granulosis viruses (**GVs**).
- Viral biopesticides gaining importance due to their ecofriendly nature and also high host specificity.
- These are serving as a better alternative to chemical pesticides. Use of viral biopesticides is an important component of integrated pest management.

Viruses as cloning vectors:

- A cloning vector is a small piece of DNA in which a foreign DNA can be inserted for cloning process.
- The foreign DNA is duplicated and expressed by utilizing the host cell machinery.
- Viral cloning vectors are ideal than other cloning vectors because they infect cells with high efficiency.
- **Bacteriophages** are widely used as cloning vectors e.g. M 13 phage, bacteriophage lambda.
- Phagemids and cosmids are also used as cloning vectors in genetic engineering.
- A **phagemid** is a DNA-based cloning vector, which has both bacteriophage and plasmid properties.
- A **cosmid** is a type of hybrid plasmid that contains a Lambda phage *cos* sequence.
