



ZIAUDDIN UNIVERSITY

EXAMINATION BOARD

BIOLOGY CLASS X Student Resource



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Disclaimer


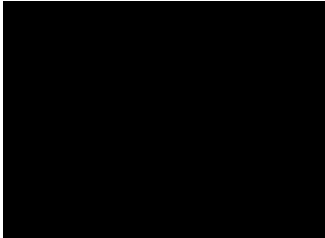

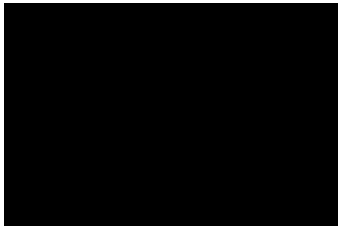
The web based resources are reference materials for teachers. They have been compiled under the supervision of the Ziauddin College of Education for Ziauddin's Examination Board.

GRADE 10

Sections	Chapters	Weightage in Evaluation
Section 1 Biodiversity	Biodiversity	03 %
Section 2 Cell Biology	Enzymes Bioenergetics	12 %
Section 3 Life Processes	Homeostasis Coordination Support and Movement	20 %
Section 4 Continuity in Life	Inheritance	14 %
Section 5 Application of Biology	Biotechnology Pharmacology	08 %

SECTION 1 : BIODIVERSITY



	SUB TOPICS	STUDENT LEARNING OUTCOMES	REFERENCE MATERIAL
CHAPTER 3	Definition and Introduction of Biodiversity	UNDERSTANDING Define biodiversity.	
	Aims and Principles of Classification	Describe the basis of classification of living organisms.	
	History of Classification Systems	Explain the aims and principles of classification, keeping in view its historical background.	
	Five-Kingdom Classification System	Explain the basis for establishing 5 kingdoms.	
	Conservation of Biodiversity	Describe the major variety of life on the planet earth. Define the concept of conservation. Explain the impact of human beings on biodiversity. Identify causes of deforestation and its effects on biodiversity. Describe some of the issues of conservation in Pakistan (especially with regard to deforestation and hunting).	
		SKILLS Examine some living or preserved plants and animals. Classify representative animals and plants into their respective kingdoms, using data.	
Content Overview			
Refer the chapter of 'Biodiversity' from Punjab Textbook			
https://pctb.punjab.gov.pk/system/files/Biology%209.pdf			
STUDENT ACTIVITIES			
Top 4 activities your school can do to improve biodiversity			

Plant native trees

- Trees offer many benefits to both students and biodiversity. Be sure to plant native trees that will thrive in your area. Make sure you have a maintenance plan set up to care for the health of these new members of your community.

A Tree for each class: Create an arboretum by planting a different native tree species for each class in your school. Each year as students progress through different classes they care for and become familiar with another native species of tree.

Monitor local biodiversity by participating in citizen science

Engage in a programs that observe and report on nature: For example,

Organize a campaign that combines both learning about biodiversity (e.g., species at risk, threats to biodiversity, International Day for Biological Diversity) and taking action for biodiversity (e.g., letter writing campaign, fundraise to protect an endangered habitat, host a

Get outside and help protect a locally biologically diverse areas Conservation volunteering:

Many environmental organizations offer volunteer opportunities to learn about and help conserve biodiversity through hands on activities (e.g., tree planting, stream and river clean ups, invasive species removal, and habitat restoration).

Connect with local biodiversity:

Plan a hike, design a neighbourhood walk, or create a nature guide for your school yard and invite students and teachers to take part.

Reduce your school's ecological footprint Target school practices:

Schools have a large impact on the environment. By assessing daily energy and waste practices, students can work to reduce their ecofootprint. practices in the use of energy and the production of waste, students can work to change practices to reduce their school's ecofootprint. Monitoring and evaluating target practices are an important part of ensuring success, as well as informing the whole school of your goals and celebrating milestones along the way.

Change a personal habit:

Invite students to make a personal pledge to help biodiversity. This could include making choices that reduce waste (wastefree lunch, reusable water bottles), reducing energy use (turning off lights, unplugging electronics when not in use) or protecting habitat (not littering, planting native species).

A Teacher's Guide to Biodiversity

Lesson One - What is Biodiversity and [1]How Does Organizing Life on Earth Help us Understand it?

Materials: student handout, What is biodiversity?; chalk board or equivalent on which to write data

Academic Objective: Students will understand what the word "biodiversity" means and how scientists organize life on Earth. Vocabulary: biodiversity, species, taxonomy, classification Essential question: What is biodiversity and how is it measured? Estimated Time: Approximately 30 minutes

[2]Instructions: 1. Have students read the handout, "What is biodiversity and how does it affect me and the place where I live?

Spend a few minutes discussing how much life there is on Earth as well as the three types of biodiversity (species, ecosystem and genetic). These are huge concepts so be sure that all students understand them before proceeding with the rest of the unit. Be sure and tell students that they will be measuring biodiversity in a place near their school at the end of the unit.

2. Tell students you are going to talk about how organisms are classified but first you are going to design a classification system for students in your class. Have each student share one thing that is divided into groups (e.g., library books, athletic teams, food in the grocery store, Yellow Pages, etc.). Post the responses.

Ask, Why do you think people organize things into groups? How would you begin to organize things? If you were to organize the students in this class into groups, how might you divide them? Ask volunteers to develop a system for classifying the rest of the students. When the students have this concept, tell them they are going to use one method of classification sometimes used by scientists. Make sure they understand that the characteristics they choose must be unambiguous. For example, a person either has brown eyes or not and a person is either under 5'6" or above it and a person either has on blue jeans or not.

3. H[3]ave one student think of a way of dividing the students into two groups based on one specific characteristic, but the student is not to reveal to the class what the characteristic is. After the classifier has divided the students into the two groups, ask the other students to guess the characteristic used by the classifier. What were the clues? Ask the classifier to develop a chart that reflects the class being divided into the two groups. Example: All Students - boys and girls

4. Ask another student to select a different characteristic to further divide each group. After the classifier has divided the students into the groups, ask the other students to guess the characteristic used by the classifier. What clues? Ask the classifier to continue the chart so that it reflects the two groups being divided into more groups with more specific information. Example: All Students – boys, girls - brown hair, not brown hair. Continue to repeat Step 2—only subdividing groups, not shifting people between groups—until the students are broken down into small subgroups.

You should have a chart that looks like this (remember, your students may choose different classifiers to divide the group.)

All Members of the class

Boys		Girls	
Brown hair	Not brown hair	Brown hair	Not brown hair
Glasses	No glasses	Glasses	No Glasses

4. When this classification has been completed, have students use their positions in the classification chart to identify themselves, For example, Jared is a brown-haired boy; Ashley is a not-brown-hair girl. 5. Repeat Steps 1–4, using different students to choose the characteristics. Thus, each time the system will be new.

OPTION: Have one student leave the area while the groups and subgroups are being formed. Then, ask the student to return and see if he or she can figure out how the class is organized and place him or herself in the group where he or she belongs and explain why

5. Explain that scientists use a similar kind of system to classify all life on earth and then do a standard lesson on taxonomy, the importance of using Latin names and how scientists are now using genetics to refine the “tree of life”.

Lesson Two - How do Scientists Measure Biodiversity?

Materials: copies of the student handout, “What is Biodiversity and How Do Scientists Measure it?”, copies of the “How Science is Done” sentence (included), four tent stakes, a large ball of twine at least 40 meters long, one meter sections of dowel rods or pvc pipe to make a lightweight square one meter on each side, a very large bag of great northern beans, flip chart for recording data outside. Advance Preparation: This activity requires some preparation. First construct a sturdy square one meter on each side using pvc pipe or dowel rods. Then, using stakes and string, mark out a ten meter square area on the school grounds near your classroom. Finally count out 1000 beans into a large container. Academic Objective: Students will understand how scientists use data to build a body of knowledge and how scientists gather data about biodiversity. Vocabulary: sampling, ground-truthing, data Essential Question: How do scientists measure biodiversity? Estimated time: 1 hour to prepare for the sampling activity, 30 minutes for the sentence activity, one class period to prepare for, and conduct the sample.

Instructions: Part I 1. Make several large font copies of the following “How Science is done” sentence, The small green tree frog looked up at the long black snake with white stripes through the sun dappled leaves of the old sycamore tree. You need enough copies of the sentence so your class can be divided into groups of about five and each group can have one copy. Cut each sentence into its component words (leave out the period) and put them in an envelope (one envelope per sentence).

2. Put the students into groups and give each group an envelope. Tell them not to open it yet. Tell students you are going to model how scientists gather data and come to conclusions. Have each group open the envelope and pull out only five words. Then have them try and make a sentence out of the words. After a few minutes, have them pull out five more words and, using all the words they have, try to build another sentence. Proceed in this way until all 25 words are used and each group has made one sentence with all the words. Be sure and tell the students that it is okay if their sentences don’t make perfect sense.

3. Next have each group read their sentence out loud or write it on the board. Compare sentences. Students will note that the sentences are not necessarily all alike. Ask them to pretend they are scientists

and ask what they could do to make sure their sentences were correct? Discuss with students how the nature of science is to continue to gather data even when it is thought the correct answer is already known.

Part II 1. Scatter the beans around the 10 meter square area.

2. Take students to the marked area and ask them to tell you how many beans are in the area. (They will have to guess, of course.) Ask them how they might find out the number of beans more exactly? Listen to the various answers. Students may come up with the idea of sampling by themselves. If not, explain what sampling is and then have students toss the one square meter randomly in the ten meter square and count the beans in the smaller square each time. By averaging the number of beans in each toss, they will begin to get a more concise picture of how many beans are in the larger square.

3. Discuss with students why scientists might want to sample organisms in this way rather than trying to count each one. Explain that the BioBlitz they will do at the end of the unit is very much like a sampling activity.

4. From the student handout, discuss other ways that scientists measure biodiversity and ask why it might be important to have an internationally standardized way to classify their findings.

Lesson Three - What Does my Ecosystem Do for Me?

Materials: Copy of the handouts, "Ecoregional Survey" and "What are Ecosystems and What Services do they Provide for Us?" both included in this lesson. One coffee can and at least ten tokens for each student. Academic Objective: Students will begin to understand they live in a unique ecosystem. Vocabulary: native species, introduced species, Tragedy of the Commons Essential Question: Why are ecosystem services important? Estimated time for this lesson - about 30 minutes to take the initial survey, then several days to conduct research. Finally one class period for students to share their research on the ecoregional survey and to play the Tragedy of the Commons.

Instructions: 1. Give students a copy of the handout, "Ecosystems Services" From the Ecological Society of America, and ask them to read it through.

2. Briefly discuss what ecosystem services are and ask students to give examples of how local ecosystems provide these services. (e.g., mountain streams clean water, hummingbirds pollinate crops, insects and worms produce soil, forests create topsoil and protect us from the sun.)

3. Take the Ecoregional survey. As a pretest of the students' knowledge, give a copy of the "Ecoregional Survey" to each student and review any unfamiliar terms, such as native species and introduced species. Then give students about 10 minutes to complete the survey. Afterward, without sharing possible answers at this point, ask the students how they think they did. Collect the completed sheets and retain them. You will give the survey again at the end of the unit to see what students have retained.

4. Divide the class into teams to complete the survey. Divide your class into teams of 2 or 3 students apiece. Give each team a clean copy of the ecoregional survey. Tell the students that the members of each team should work together over the next few days to complete the survey as accurately as possible. Explain that the students can use whatever resources they can find to answer the questions, including the resources listed on the "Resources" list, additional resources you gathered, the library, the Internet,

c[4]ommunity elders or a local naturalist. Stress that they should find the most accurate information they can and encourage them to collect drawings or pictures of the animals and plants they list.

5. Go over the survey results. Once the students have finished the survey, have them share the information they found and compare their answers to the pretest. Did students find different answers to some of the questions? (For example, how extensive was the group's list of native plants?) What sources proved to be the most helpful? Were they surprised by any of the information they found?

6. Play the Tragedy of the Commons. Materials: One coffee can and at least ten tokens for each student. Before students arrive, put three tokens in the can for each student. Seat the students in a circle and tell them you are going to pass around the coffee can and they may take out one, two or three tokens. It is their choice and they may also choose to show their tokens or hide them. Tell them "whoever gets ten tokens, wins." (It is important that you say this phrase exactly). Also tell them there will be no talking.

Pass the can around and when it comes back to you, count the number of tokens left and add that same amount to the can. For example, if there are 40 tokens left, put forty back in. Then pass the can around again and keep doing so (each time replenishing the number of tokens still in the can) either until someone gets ten, or until you run out of tokens.

The point of the game is that if everyone just took one token on each turn, you would be constantly replenishing the "resource" and it would be sustainable. However, if most or all people take three tokens each time, the resource cannot recover and becomes "extinct". This occurrence is called the Tragedy of the Commons because those resources we all hold in common, such as water, clean air and biodiversity, are not valued as much as those things we can "own" and thus are often polluted or depleted. Have students discuss why they took three. Remind them that you said, "Whoever gets ten, wins." Not, "Whoever gets ten first, wins." [5]Talk about the fact that this game was developed in the 1960's and has been played all around the world since then. When it is played in less developed countries, people often take only one token each time. This is a good opportunity to talk about culture and its effects on the environment. Ask students how this might relate to conserving biodiversity.

Extension: Have students take photographs of some of the plants and animals they have identified then have them create a PowerPoint using the photographs and information from the eco survey. Have them share the PowerPoint with other students.

Ecoregional Survey How much do you know about where you live? 1. What major habitat type do you live in? (Temperate forest, temperate rain forest, grassland, scrubland, taiga, tundra, desert, etc...) 2. Name three native trees that live in your area. 3. Name five native edible plants that grow in your region and list in which season(s) each is available. 4. Name one poisonous plant that lives in your area. 5. Name ten native animals that live in your region. 6. Name three native animals that you can see in your area at any time of the year. 7. Name three migratory animals that visit or live in your area, and list in which season(s) you're able to see them. 8. How much average rainfall does your community get each year? 9. What is the elevation at your school? 10. Is there any old growth (more than 300 years old) forest within five miles of your school? 11. When (during what season or month) does your community normally get the most precipitation? 12. How long is the growing season in your community? 13. What is the average temperature in July? In December? 14. What are some of the natural signs in your community that show that the seasons are changing? 15. What body of water – lake, pond, stream, or river – is closest to your

school? 16. How has your area changed in the past 25 years? (Ask your parents or neighbors)

17. What types of plants and animals lived in your area 10,000 years ago? What was the climate like then?

18. What species in your area – if any – are threatened or endangered? 19. What natural events or processes influence the land around your community? How have they affected the land? (For example, have there ever been glaciers, earthquakes or volcanic eruptions in your area? Do frequent fires, high winds or flooding shape where and how things grow?) 20. What human caused events or processes influence land and biodiversity in your community? 21. Are there any

threatened ecological areas in your community? (Are any wetlands, rivers, or forests, for example, in trouble?) 22. Name a nonnative species that has created problems in your community.

Cell Biology



It Includes

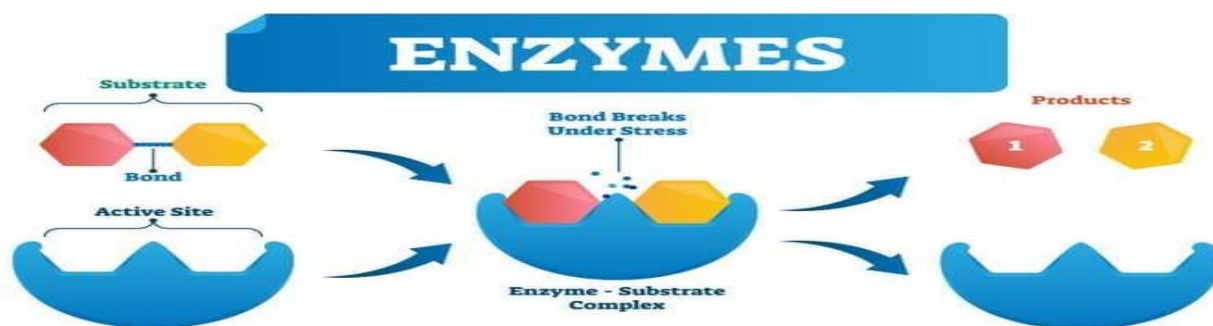
Chapter 1: Cell Structure and Function


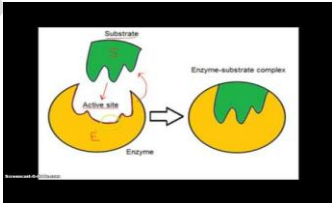

Chapter 2: Biological Molecules

Chapter 3: Enzymes

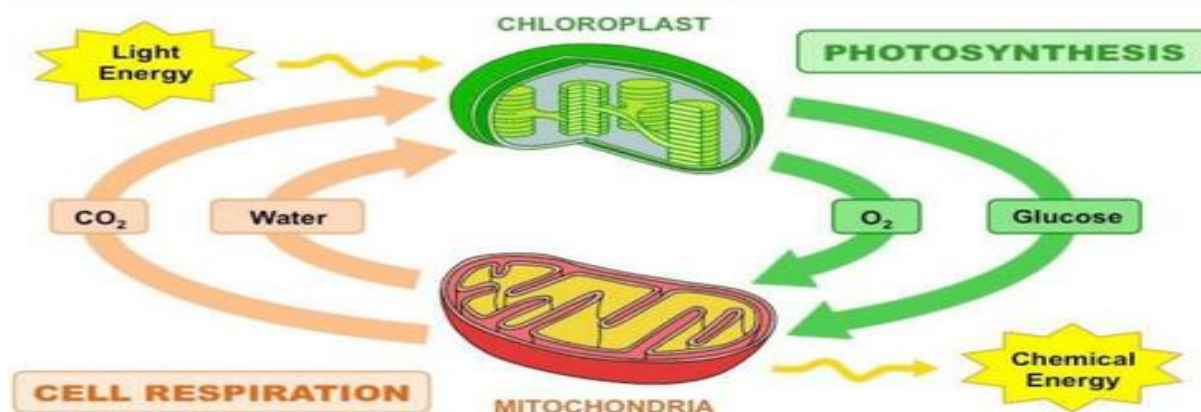
Chapter 4: Bioenergetics

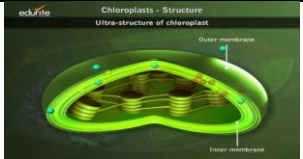
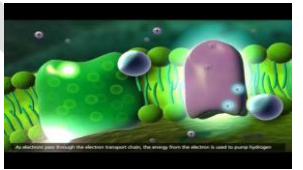


Chapter:Enzymes



Chapter	Skills	Understanding	Reference web material
<u>Enzymes</u>	<p>Student will</p> <p>Identify the competitive and noncompetitive inhibitors from the given list of chemicals.</p> <p>List the diagnostic uses of enzymes.</p>	<p>Describe the structure of enzyme</p> <p>Explain the role and component parts of the active site of enzyme</p> <p>Explain the mechanism of enzyme action through induced fit model, comparing with lock and key model.</p> <p>Classify enzymes on the basis of the reaction catalyzed.</p>	 <p>What are enzymes?</p>  <p>Structure of an enzyme..</p>  <p>Lock and key theory</p> <p>https://www.slideshare.net/fatimasa/leh94214/enzymes-2-30256325</p> <p>Enzymes terminologies Slide share.</p>

Bioenergetics



Chapter	Skills	Understanding	Reference web material
Bioenergetics	<p>Student will</p> <p>Draw the molecular structure of chlorophyll</p> <p>Draw the Z-Scheme for explaining the events of light-dependent reaction</p> <p>Develop a flow chart of explaining the events of light-independent reaction.</p> <p>Draw the flow chart showing the events of glycolysis and Krebs cycle.</p>	<p>Student will</p> <p>Explain the role of light in photosynthesis</p> <p>Identify two general kinds of photosynthetic pigments.</p> <p>Describe the arrangement of photosynthetic pigments in the form of photosystem I and II.</p> <p>Explain the calvin cycle.</p> <p>Describe the events of non-cyclic and cyclic photophosphorylation</p>	<p></p> <p>Chloroplast</p> <p></p> <p>Photosynthesis with its cycles</p> <p></p> <p>Cellular Respiration</p> <p></p> <p>C3, C4 and CAM plants</p>

SECTION 3 : LIFE PROCESSES

HOMEOSTASIS

SUPPORT AND MOVEMENT

NERVOUS COORDINATION

Theme	Chapter	SLOs
SECTION 3: LIFE PROCESSES	COORDINATION	<p>UNDERSTANDING</p> <p><i>Student will:</i></p> <p>Explain what coordination means.</p> <p>Identify the two main types of coordination in living organisms (Nervous and Hormonal (chemical)).</p> <p>Differentiate between the modes of coordination i.e., electrical and chemical in case of hormonal.</p> <p>Identify the main organs responsible for coordination and control.</p> <p>State that receptors receive stimuli and transmit information to the brain.</p> <p>Label the diagram of human brain.</p> <p>Explain the function of these parts of brain; cerebrum, cerebellum, brainstem, thalamus, hypothalamus, medulla oblongata.</p> <p>Differentiate between the cross sectional views of brain and spinal cord to white and grey matter.</p> <p>Define neuron and describe the structure of a general neuron.</p> <p>Define reflex action and reflex arc.</p> <p>Name the three types of neuron involved in reflex action.</p> <p>Trace the path of a nervous impulse in case of a reflex action.</p> <p>Describe the structure of human auditory and visual receptors.</p> <p>Describe the pupil reflex in dim and bright light.</p>

	<p>State how short and long sightedness can be treated.</p> <p>Associate the role of Vitamin A with vision and effects of its deficiency.</p> <p>Explain the role of ear and eye in maintenance of homeostasis and accommodation.</p> <p>Relate the contribution of Ibn-al-Haitham and Al-Ibn-Isa to the structure of eye and treatment of various ophthalmic diseases.</p> <p>Define the terms; hormone and endocrine system.</p> <p>Outline the parts of endocrine system; major glands of this system (Pituitary, Pancreas, Adrenal, Gonads) and names of their respective hormones.</p> <p>Describe the term “Negative feedback” with reference to Insulin.</p> <p>Explain how adrenaline may be involved in exercise and emergency response.</p> <p>Use gained knowledge to apply to different hormones.</p> <p>SKILLS</p> <p><i>Student will:</i></p> <p>Compare the two types of coordination in tabular form.</p> <p>Record the difference in quickness of response of the two systems (by asking a student to say a few words in front of the class and counting the heartbeat).</p> <p>Analyze why plants (like sunflower) have a very slow response to light.</p> <p>Visualize nervous and hormonal coordination by comparing electrical wires with the transmission of nerve impulse in neurons and electrical currents in liquids to the hormonal transmission in blood.</p> <p>Perform an experiment in which a scale held at its lower end by the index finger is allowed to fall and then recording the time taken for it to reach the ground.</p> <p>Identify different parts and draw a labeled diagram of the brain of sheep or bull.</p> <p>Perform an experiment in which the shin muscle of a frog is used to complete a circuit in a dish filled with methylene blue and using 12 V DC current.</p> <p>Check the vision of a friend to diagnose whether he/she is short sighted or long sighted.</p>
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		<p>shortsightedness.</p> <p>Perform an experiment in which one student flashes a spotlight on a student's eye and record the time taken for the eye to contract its pupil.</p> <p>Compare the BGC (blood glucose concentration) of healthy individuals and those suffering from Diabetes mellitus. <i>(Data/ graph to be given in table)</i></p>
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OVERVIEW OF THE CHAPTER:

For proper functioning of the body of organisms, it is therefore, necessary that various organ and system work to perform their exact type of job and also should not overdo or under do their jobs. When more than one organ is associated with a particular function, organs should operate in a sequence for the successful accomplishment of that particular function. All these functions can be achieved when the body works as one unit, in which its different organs and systems cooperate and work in a coordinated manner, i.e. its diverse functions are coordinated. Their coordination can ensure the profitable existence of the organism. The two control systems produced by the two systems; nervous system and the endocrine system. Both control systems include: receptors, a coordination centre, such as the brain, spinal cord or pancreas, which receives and processes information from the body and the effectors that bring about responses,

The nervous system enables humans to react to their surroundings and to coordinate their behaviour. It comprises of the central nervous system and the peripheral nervous system that consists of millions of neurons and uses electrical impulses to communicate very quickly. Neurons are of three types; sensory, relay and motor. Different types of neurons work together in a single reflex action, an automatic and involuntary response which minimizes any damage to the body from potentially harmful conditions, such as touching something hot. The pathway of a reflex arc.

The central nervous system (CNS) is the part of the nervous system consisting of the brain and spinal cord. The CNS is responsible for receiving the received information and coordinates and influences the activity of all parts of the bodies. The CNS is composed of white matter and grey matter, which can also be seen macroscopically on tissues of brain and spinal cord.

The endocrine system consists of a series of glands that produce chemical substances known as hormones. Hormones are secreted by the glands and bind to a receptor in order to send their signal. They are secreted into the bloodstream and travel throughout the body, where they bind to receptors for them. Also, hormones are slower to take effect and tend to be longer lasting.

Hormones can influence behaviour, and behaviour can sometimes influence hormone concentrations. Hormones are involved in aggression, mating, and parenting of individuals. Hormones are involved in regulating all sorts of bodily functions, and through interactions between the hypothalamus (in the central nervous system) and the pituitary gland (in the endocrine system), hormones are related to a number of disorders.

REFERENCE MATERIAL:

SINDH TEXT BOOK BOARD (STBB) FOR IX-X

AVAILABLE RESOURCES ON INTERNET:

<http://www.gcestudybuddy.com/5-google-conversation-element/coordination-and-response>

<http://www.gcestudybuddy.com/5-google-conversation-element/human-eye>

<https://www.bbc.co.uk/bitesize/guides/z2nkv9g/revision/1>

<https://www.eimacs.com/gogsatstatics/download/sense%20organs%20the%20eye.pdf>

<https://www.asu.edu/courses/pgs461/Reflexes%20Arcs PGS%20461.pdf>

<http://www.biologydiscussion.com/chemical-coordination/chemical-co-ordination-and-regulation-of-human-e>

<https://owlcation.com/stem/How-does-the-ear-help-to-balance-the-body>

TEACHER RESOURCE:

LESSON PLANS / NOTES:

http://www.mediafire.com/file/pa05kboxqcoy2q85/Topic_11-Coordination_and_Response.pdf/file

<https://www.jagranjosh.com/general-knowledge/control-and-coordination-in-humans-1459848431-1>

<https://www.excellup.com/classten/scienceten/controlcoordination.aspx>

https://www.it.iitb.ac.in/~vijaya/oscarteam/dokuwiki/media/chemical_coordination_in_animals.pdf

https://www.gneet.com/aipmt_je_e_notes/Chemical%20co-ordination%20and%20integration.pdf

<https://www.britannica.com/science/ear/Transmission-of-sound-waves-through-the-outer-and-middle-ear>

<https://biodifferences.com/difference-between-myopia-short-sightedness-and-hyperopia-long-sightedness.htm>

https://www.soinc.org/sites/default/files/uploaded_files/3-17_NERVOUS_HANDOUT.pdf

<https://sharemylesson.com/teaching-resource/nervous-system-152742>

<https://sharemylesson.com/teaching-resource/nervous-system-174578>

VIDEO:

Human Nervous System

<https://www.youtube.com/watch?v=oHgg4S9xliA>

Anatomy and Physiology of Human Brain

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

<https://www.youtube.com/watch?v=kMKc8nfPATI> (Bozeman Science)

Endocrine Glands

<https://www.khanacademy.org/science/high-school-biology/hs-human-body-systems/hs-the-nervous-and-endocrine-system>

<https://www.youtube.com/watch?v=gfjTBaMF8pY>

Reflex Action And Reflex Arc

<https://www.youtube.com/watch?v=DFuKhBI5STc>

Cross sectional views of brain and spinal cord, with reference to white and grey matter.

<https://www.youtube.com/watch?v=ZZQzMeFoZY0>

Anatomy of eye and pupil reflex in dim and bright light.

<https://www.youtube.com/watch?v=Uk0U16uZpPA>

ASSESSMENT ITEMS:

<https://www.khanacademy.org/test-prep/mcat/organ-systems/biological-basis-of-behavior-the-nervous-system/questions>

http://highered.mheducation.com/sites/0072421975/student_view0/chapter17/multiple_choice_quiz.html

<https://www.mcqlearn.com/grade10/biology/coordination-and-control-multiple-choice-questions-answers.php>

Homeostasis

Theme	Chapter	SLOs
SECTION 3: LIFE PROCESSES	HOMEOSTASIS	<p>UNDERSTANDING</p> <p>Define homeostasis and describe its importance.</p> <p>Describe the mechanisms / adaptations in plants for the excretion / storage of CO₂, H₂O, O₂, latex, resins and gums.</p> <p>Explain osmotic adjustments in plants.</p> <p>State skin, lungs and kidneys as the major organs involved in homeostasis.</p>

	<p>Explain the role of skin in regulating body temperature.</p> <p>Describe how lungs keep the carbon dioxide concentration down to certain level.</p> <p>Explain that kidneys control the blood composition.</p> <p>Identify the different organs of urinary system.</p> <p>Relate the structure of kidney with its function.</p> <p>State that nephron is the excretory unit of kidney.</p> <p>Locate the different parts of nephrons and relate them with their function.</p> <p>State that main role of kidney in urine formation.</p> <p>Describe that urine formation involves three processes i.e. filtration, reabsorption and secretion.</p> <p>Explain that kidney plays an important role in osmoregulation.</p> <p>SKILLS</p> <p>Hypothesize why the dogs hang their tongues out and pant?</p> <p>Predict about the functioning of body without a kidney.</p> <p>Relate too much sugar intake by a diabetic with the functioning of kidney.</p> <p>Examine the structure of kidney (sheep kidney / model).</p> <p>Trace the movement of a molecule of urea from blood to urethra using a flow chart diagram.</p>

REFERENCE MATERIAL:

SINDH TEXT BOOK BOARD (STBB) FOR IX - X

AVAILABLE RESOURCES ON INTERNET:

<https://www.bbc.co.uk/bitesize/guides/z4khvcw/revision/1>

<http://www.gcestudybuddy.com/5-google-conversation-element/homeostasis>

<https://www.britannica.com/science/excretion/General-features-of-excretory-structures-and-functions>

<http://www.biologydiscussion.com/essay/excretion-in-animals-humans-and-plants-with-diagram/1570>

<https://www2.estrellamountain.edu/faculty/farabee/biobk/BioBookEXCRET.html>

Support and Movement

Theme	Chapter	SLOs
SECTION 3: LIFE PROCESSES	SUPPORT AND MOVEMENT	<p>UNDERSTANDING</p> <p><i>Student will:</i></p> <p>Define skeleton and differentiate between cartilage and bone.</p> <p>Describe the role of skeleton in support and movement.</p> <p>Explain that skeleton system is actually a dynamic, living tissue that adapts to stress and repairs itself after injury.</p> <p>Describe the main components of the axial skeleton and the appendicular skeleton.</p> <p>Describe the contribution of Vitamin D in describing the bones and bone health.</p> <p>Differentiate between moveable joints and immovable joints.</p> <p>State the role of ligaments and tendons.</p> <p>Describe the location and movement of hinge joints.</p> <p>Identify ball-and-socket joints in human body.</p> <p>Define antagonism.</p> <p>Describe the action of flexors and extensors as a pair of opposite muscles, biceps and triceps as example.</p> <p>Describe the effect of deficiency of calcium on bones and osteoporosis.</p> <p>Discuss the causes, symptoms, and treatment of arthritis.</p> <p>Relate the onset of arthritis with age and weight-bearing joints.</p> <p>SKILLS</p> <p><i>Student will:</i></p> <p>Identify and draw labeled diagrams of different bones of the human skeleton.</p>

		<p>skeleton from real specimen models or charts.</p> <p>Describe the movement of various human joints through ob</p> <p>Describe the movement of various human joints through ob</p> <p>Investigate the nature of bone (by putting three pieces of NaOH and dilute HCl).</p>
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OVERVIEW of the Chapter:

Support and movement in man is carried out with the help of the skeleton and muscles. The human skeleton is an endoskeleton for the body. This framework consists of many individual bones and cartilages. There also are bands of fibrous connective tissue—the tendons—in intimate relationship with the parts of the skeleton.

The human skeleton, like that of other vertebrates, consists of two principal subdivisions, each with origins of its own, each presenting certain individual features. These are Axial skeleton consists of the skull, the backbone (vertebrae). The backbone supports the ribs which are also attached to the breastbone or sternum. Appendicular skeleton consists of the girdles, hips (pelvic girdles) and the bones of arms (humerus, radius & ulna), legs (femur, tibia & fibula), hands and feet.

The muscular system is an organ system that permits movement of the body, maintains posture and circulates blood. The muscular systems in vertebrates are controlled through the nervous system. Together with the skeletal system, the musculoskeletal system, which is responsible for movement of the human body. Muscles transfer force to bones. They move our bones and associated body parts by pulling on them – this process is called muscle contraction.

However, muscle contraction cannot act to push the bone back into its original position, and because of this, muscles work in 'muscle pairs'. One muscle of the pair contracts to move the body part, the other muscle in the pair then contracts to return it back to the original position. Muscles that work like this are called antagonistic pairs.

Osteoporosis is a condition in which the bones become less dense and more likely to fracture. Fractures from osteoporosis can cause significant pain and disability. Risk factors for developing osteoporosis include: low calcium intake and lack of physical activity.

Arthritis means joint inflammation, but the term is used to describe around 200 conditions that affect joints, the surrounding muscles, joint, and other connective tissue. Arthritis is more common among adults aged 65 years or older, but it can affect people of all ages, including children.

REFERENCE MATERIAL:

SINDH TEXT BOOK BOARD (STBB) FOR IX- X

AVAILABLE RESOURCES ON INTERNET:

<https://www.britannica.com/science/human-skeleton>

<https://www.livescience.com/22537-skeletal-system.html>

<https://biodifferences.com/difference-between-bones-and-cartilage.html>

<https://www.khanacademy.org/science/high-school-biology/hs-human-body-systems/hs-the-musculoskeletal-tendons-and-joints>

<https://www.bones.nih.gov/health-info/bone/osteoporosis/conditions-behaviors/osteoporosis-arthritis>

<https://www.bbc.co.uk/bitesize/guides/zpkr82p/revision/4>

Section04: Continuity of life



It Includes


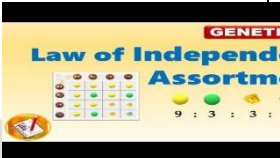
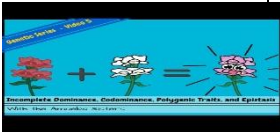
Chapter : Inheritance

Chapter : Chromosomes and DNA

Chapter: Evolution



DRAFT

Chapter	Skills	Understanding	Reference web material
Inheritance	<p>Student will:</p> <ul style="list-style-type: none"> Hypothesize that in a dihybrid inheritance pattern of color and texture of pea seed, the two traits are not inter dependent. Solve at least 4 genetic problems, to illustrate the law of independent assortment. Build a thematic chart for the blood groups of his/her class fellows and identify the antigens present in blood Differentiate between autosomes and sex chromosomes from the karyotype 	<p>Student will:</p> <ul style="list-style-type: none"> Associate inheritance with the laws of Mendel. Explain the law of independent assortment, using a suitable example. Differentiate between incomplete dominance and co-dominance. Name the various human blood group systems. Associate multiple alleles with the ABO blood group system. Associate the positive and negative blood groups with the presence and absence of Rh factor. Explain the terms; polygenic and epistasis. 	 <p>Genetics</p>  <p>Law of independent assortment</p>  <p>Incomplete dominance and Codominance</p> <p>https://www2.paloalto.mar.edu/anthro/mendel/glossary.htm</p> <p>Important terminologies related to genetics</p>

Father of Genetics

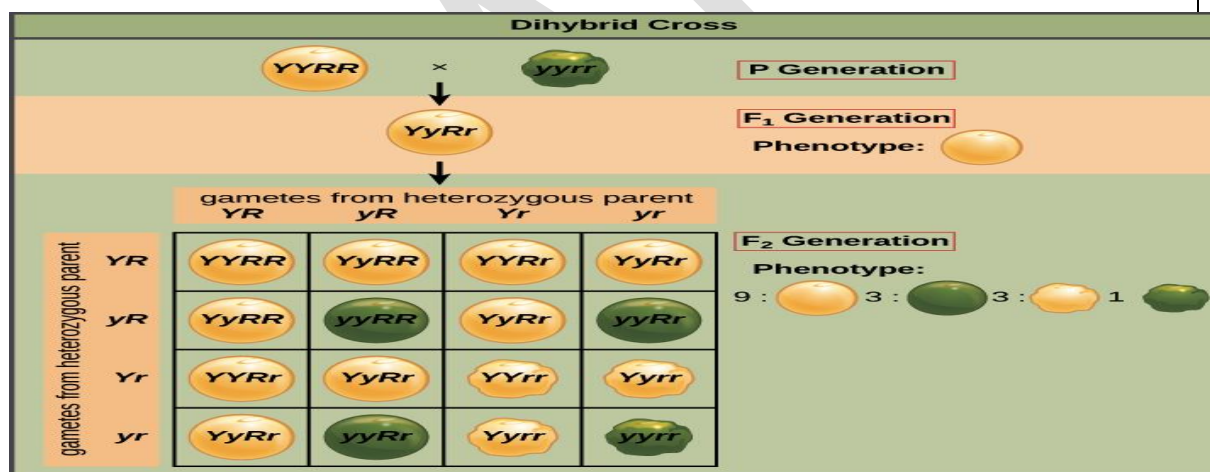
Gregor Mendel, through his work on pea plants, discovered the fundamental laws of inheritance.. Mendel's Laws of Heredity are usually stated as:

- 1) **The Law of Segregation:** Each inherited trait is defined by a gene pair. Parental genes are randomly separated to the sex cells so that sex cells contain only one gene of the pair. Offspring therefore inherit one genetic allele from each parent when sex cells unite in fertilization.
- 2) **The Law of Independent Assortment:** Genes for different traits are sorted separately from one another so that the inheritance of one trait is not dependent on the inheritance of another.
- 3) **The Law of Dominance:** An organism with alternate forms of a gene will express the for

What is the law of independent assortment?

Mendel's law of independent assortment states that the alleles of two (or more) different genes get sorted into gametes independently of one another.

In other words, the allele a gamete receives for one gene does not influence the allele received for another gene. Example: Pea color and pea shape genes



Polygenic inheritance occurs when one characteristic is controlled by two or more genes. Often the genes are large in quantity but small in effect. Examples of human polygenic inheritance are height, skin color, eye color and weigh

Incomplete dominance is a form of intermediate inheritance in which one allele for a specific trait is not completely expressed over its paired allele.

Codominance

Codominance occurs when two versions, or “alleles,” of the same gene are present in a living thing, and both are expressed.

Epistasis

Epistasis is the interaction between genes that influences a phenotype. Genes can either mask each other so that one is considered “dominant” or they can combine to produce a new trait. It is the conditional relationship between two genes that can determine a single phenotype of some traits.

Multiple alleles

Three or more alternative forms of a gene (alleles) that can occupy the same locus..

ABO blood group system

The ABO blood group system is determined by the ABO gene, which is found on chromosome 9. The four ABO blood groups, A, B, AB and O, arise from inheriting one or more of the alternative forms of this gene (or alleles) namely A, B or O. Genetic Combinations of ABO Blood Groups

Blood group	Possible genes	Parental blood groups	Child's blood group
A	AA or AO	O and O	O
B	BB or BO	O and A	O or A
AB	AB	O and B	O or B
O	OO	O and AB	A or B
		A and A	A or O
		A and B	O or A or B or AB
		A and AB	A or B or AB

The Rh factor

The Rh factor genetic information is also inherited from our parents, but it is inherited independently of the ABO blood type alleles. There are 2 different alleles for the Rh factor known as Rh+ and Rh-.

Rh Inheritance		
Rh inheritance is independent of A, B, O blood type.		
Rh factor		Possible genotypes
Rh+		Rh+/Rh+ OR Rh+/Rh-
Rh-		Rh-/Rh-
Parent 1 Rh allele	Parent 2 Rh allele	Child's phenotype
Rh+	Rh+	Rh+
Rh-	Rh+	Rh+
Rh-	Rh-	Rh-

The most common X-linked recessive disorders

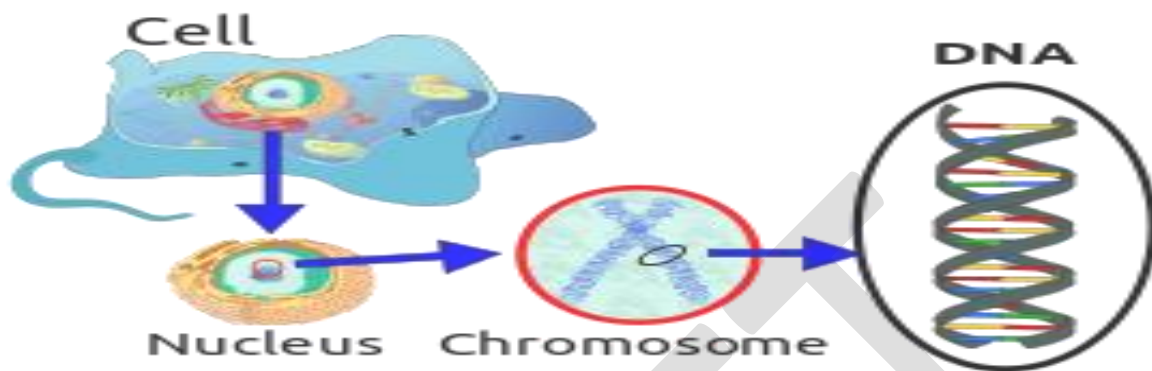
Red-green color blindness, a

very common trait in humans and frequently used to explain X-linked disorders. Between seven and ten percent of men and 0.49% to 1% of women are affected. Its commonness may be explained by its relatively benign nature. It is also known as daltonism.



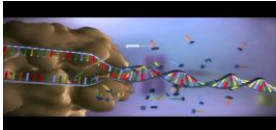

Hemophilia A, a blood clotting disorder caused by a mutation of the Factor VIII gene and leading to a deficiency of Factor VIII. It was once thought to be the "royal disease" found in the descendants of Queen Victoria.

Hemophilia B, also known as Christmas Disease, a blood clotting disorder caused by a mutation of

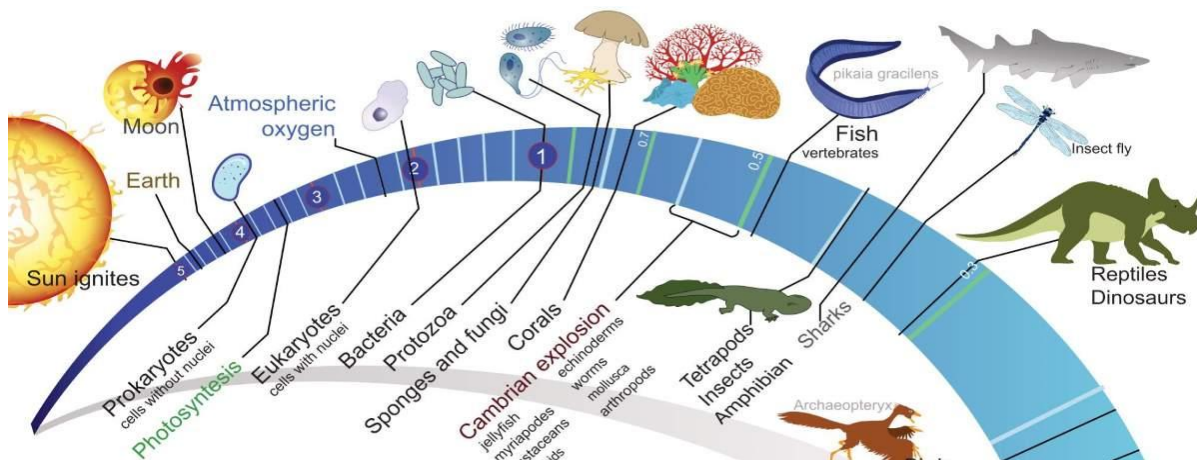
Chromosomes and DNA

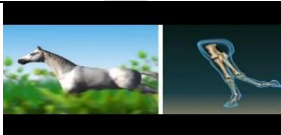




Chapter	Student learning outcomes	Understanding	Reference web material

<p>Chromosomes and DNA</p>	<p>Student will:</p> <ul style="list-style-type: none"> • Make a list of all the proteins that have been studied or referred to till now. • Interpret how many types of t-RNA molecules are necessary for a living cell, if the genetic code is a triplet code. • Make a list of some commonly occurring minor mutations in humans 	<p>Student will:</p> <ul style="list-style-type: none"> • Describe the three models proposed about the mechanism of DNA replication. • Describe the central dogma of gene expression. • Define gene and genetic code. • Explain the mechanism of transcription • Define mutation and identify various sources of mutation. • Describe the symptoms, causes and possible available treatments of some of the gene mutations (Sickle cell anemia, Phenylketonuria) 	<div data-bbox="1123 192 1377 327">  </div> <p>Chromosomes</p> <div data-bbox="1123 423 1390 568">  </div> <p>DNA</p> <div data-bbox="1123 663 1399 792">  </div> <p>DNA to Protein</p> <div data-bbox="1123 891 1394 1059">  </div> <p>DNA Replication</p>
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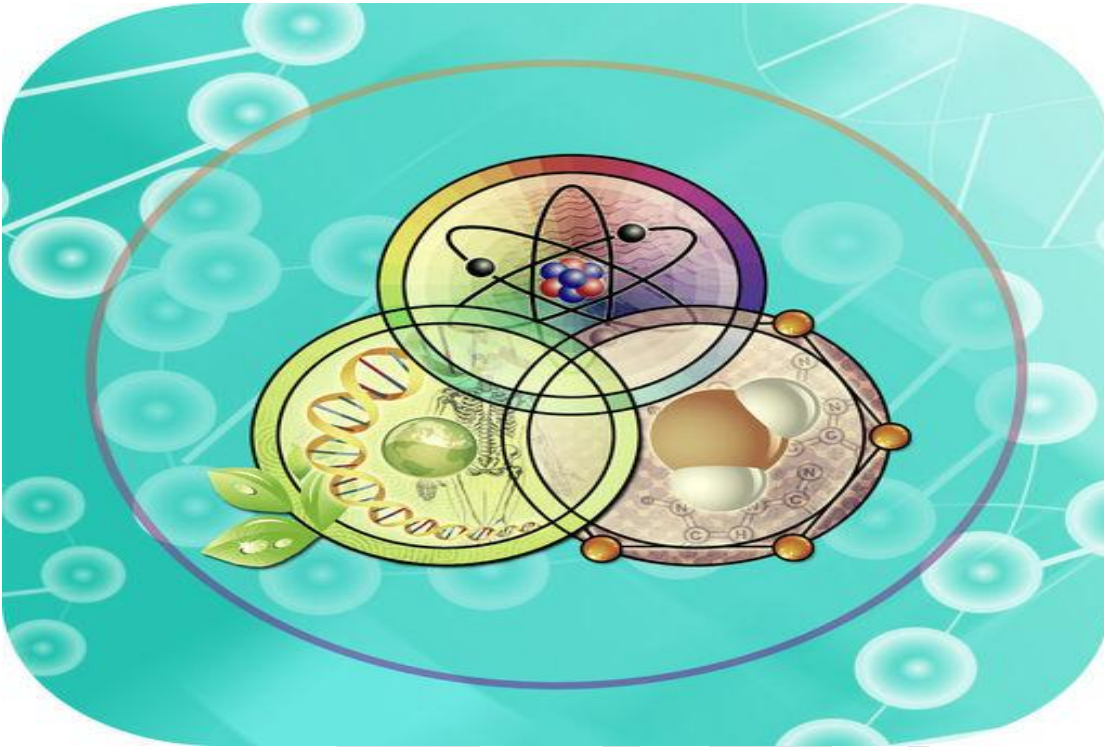
Evolution



Chapter	Skills	Understanding	Reference web material
Evolution	<p>Student will:</p> <ul style="list-style-type: none"> List the vestigial structures found in man and categorize them in homologous or analogous structures. Describe and analyze examples of technology that have extended or modified the scientific understanding of evolution 	<p>Student will:</p> <ul style="list-style-type: none"> Justify Lamarck as an early proponent of evolution. Describe the theory of inheritance of acquired characters, as proposed by Lamarck. Outline the steps of the evolution of the giraffe, as illustrated in Lamarckism. State the drawbacks in Lamarckism. Explain the theory of natural selection as proposed by Darwin. 	 <p>Homologous and analogous organs</p>  <p>Darwin theory</p>  <p>Evidence for evolution</p>

SECTION 5: APPLICATION OF BIOLOGY

Application of biology



Topic	Skills	Understanding
Genetic Engineering Technology	<p>Student will:</p> <p>Describe the application of polymerase reaction.</p> <p>State the importance and limitation of DNA analysis.</p>	<p>Student will:</p> <ul style="list-style-type: none"> Describe the terms of genome analysis, genome map and genetic markers. Explain tissue culture and differentiate between the organ culture and cell culture State the objectives of the production of transgenic bacteria, transgenic plants and transgenic animals. Define gene cloning and state the steps in gene cloning.