

SALWAN PUBLIC SCHOOL, RAJENDRA NAGAR
CLASS – X
LESSON PLAN
CHAPTER-9: HEREDITY AND EVOLUTION

Unit	Science (Chapter -9: Heredity and Evolution)
Class Transaction	Total: 12-16 periods (approx. 40 min each)
Pre-requisite for the course	This lesson requires: 1. Basic knowledge of basic terms, principles and research methods used in the study of genetics. 2. Knowledge of alteration of genetic information and how it functions and is maintained in populations. 3. Understanding of how evolution through natural selection works. 4. Knowledge of fossils and what can be learnt from them. 5. Knowledge of the mechanisms of speciation, the genetic basis of speciation and the relationship between speciation and diversity.
Learning Objectives	1. To make students understand the genetic basis of variation which is responsible for observed variation in the surroundings 2. The make them understand the rules of inheritance and phenotypic expression of traits. 3. To make them understand the role of natural selection in evolution and significance of fossils in unfolding the unwitnessed story of evolution.
Learning Outcomes	KNOWLEDGE: Students will be able to: • Understand that living beings produce offspring of same kind but they vary amongst themselves and are not identical to parents. • Know the sex of offspring (humans) is determined. • Understand natural selection and adaptive evolution and how living things exhibit immense diversity and complexity. • Understand significance of fossils in determining evolutionary relationship in between organisms. SKILLS and COMPETENCIES 1) Analytical skills (scrutinizing an observation) 2) Problem solving (investigating and applying established principles to justify an observation) 3) Critical thinking (Competitive evaluation of given information) 4) The ability to understand complex concepts (Inspecting and analysing reasons for variation in established principles) Teamwork and communication skills (working effectively with others)

Methodology (The teacher can use the mentioned techniques, wherever applicable ,and can use any other too.)	Strategies used- Evidence-based active-learning instructional strategies, Transaction would proceed in the following manner- <i>Brain Storming</i>-The class would start with a discussion on what the students have already learnt in the previous classes and hence what is it that they would learn now. They would also be told the significance of the topic that they would be studying. <i>Real time monitoring</i>- clicker questions can be given to students, which give them an opportunity to practice and solve genetics problems (or crosses) in class and allow instructors to monitor student learning in real time. <i>Introduction of the topic</i>- ppt and Digital Content would be shared <i>Guided practice followed by Independent Practice</i>- NCERT questions to be discussed in the classroom. Techniques to be used: Quiz Daily Practice Problem MCQ Peer Assessment Lab Activities Any Other
Self-Study, Homework Assignments	Independent Practice: Students would do the given questions in their H.W. notebooks as mentioned in the monthly planner. H.W. notebooks to be marked as per the given plan: <i>Assessment Parameters:</i> The total marks for the activity is 5 marks On time submission..... 1 mark Presentation/ Neatness..... 1 mark Content..... 3 marks It is also advised that the students come to the class with proper background knowledge of the topic under discussion. They can refer to the resources stated above.

TOPIC	ACCUMULATION OF VARIATION DURING REPRODUCTION AND HEREDITY (3-4 PERIODS)
Pre- Requisite for the course	Knowledge of the rules of heredity that determine the process by which traits and characteristics are reliably inherited from one generation to another.
Assessment of qualifying knowledge	1. Students will be able to make proper monohybrid and dihybrid crosses. 2. They are able to explain the dominant and recessive character of alleles.
Objective	1. To make them reason out why offspring have a unique combination of phenotypic characters which is not exclusive to any one of the parent. 2. The make them understand the rules of inheritance and phenotypic expression of traits.
Learning Outcomes	Students will know that the character of the offspring is not the mean or average of parent's phenotype but follow Mendelian rule of inheritance (exception linkage, environmental influence etc.)
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Strategies used- Evidence based learning Transaction would proceed in the following manner- The facilitator introduces the chapter by Brain Storming (Critical, Collaboration). Group of 5 students each will made and following activities can be given: 1. Ask students to count the number of children with blue and brown eyes in given class and to reason out the low frequency of blue eyed children. 2. Reason out why their complexion is not exactly as their siblings (if any) though their parents are same. 3. To reason out low frequency of albino and probable reason of albinism. 4. Is gender of an individual controlled by genes? Is the probability of having girl child or boy child 50% after any number of conception. Why or why not? After discussion of viewpoint of each group in the class, facilitator can introduce terms like Recessive, Dominant, Homozygous, Heterozygous, Genotypes, Phenotypes, the way they are denoted [Y Y] , [R R], [Y y], [R r] etc Crosses can be taught and practice can be given. Example: - Complete the incomplete monohybrid and dihybrid crosses of different difficulty level.

	<u>Inquiry based learning</u> (Critical Thinking and Problem Solving) ▪ The students will do the QUESTIONS from NCERT book with the help of facilitator and then do Q.1- 2 on page no. 143 and Q.1- 4 on page no. 147. ▪ The facilitator would take rounds and help the students in solving the questions. A short oral test would be taken to check proper assimilation of the topic discussed.
Self Study, Home Work, Assignments	Students will make monohybrid and dihybrid crosses along with exercise of NCERT text book (Q.1 & 4) in Homework notebooks and revise the content taught in the class.

TOPIC	3-4 PERIODS: EVOLUTION
Pre- Requisite for the course	Knowledge of the genetics-centered approach to explain key concepts in scientific understanding of evolution beside Darwin and Hardy Weinberg's rule.
Assessment of qualifying knowledge	Students should clearly explain different ways in which individuals with a particular trait increase in a population and role of environmental challenges in evolution.
Objective	The purpose of this section of lesson is for students to understand that evolution a long process, and results in speciation. To introduces students, the work done by Charles Darwin on his voyage to the Galapagos islands, 1831-1836. To make students realize that by "biological evolution" one means that many of the organisms that inhabit the Earth today are different from those that inhabited it in the past. Understand that natural selection is one of several processes that can bring about evolution, and that natural selection and adaptation can occur over large geological times
Learning Outcomes	- Students will know that adaptations arise in response to environmental challenges which are the "driving force of evolution". - Students will be able to formulate explanation for evolution due to natural selection. - Students will be able to explain common descent.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Strategies used- Evidence based learning Transaction would proceed in the following manner- Recapitulation: 10 min Quick revision on the previous concept would be taken up. Transaction would proceed in the following manner:- - Teacher asks students to predict the relationships among the different types of Darwin's finches. Students might suggest the following: - The different finches were always belonging to different species from the very beginning (incorrect). - The finches adapted according to different environmental conditions and are now a different species although they all might have evolved from common ancestor common ancestry. - After declaring that second answer is correct, next teacher can ask students about the reasons that caused one species to change into

	many different species? a) They are different from each other because of the isolation that resulted in living on different islands with distinct food supplies. Teachers should explain that “The Galápagos finches” are seen as a classic example of an “adaptive radiation”, the rapid evolution of ecologically different species from a common ancestor. 3. Pressing for explanations: For example: Why do you think that beak-size of Darwin’s finches varied? What is difference in sudden occurrence of albinism and variation in Darwin’s finches? 4. Orienting students to each other's’ thinking by conducting a debate session. This activity will help students to think about other possibilities which have not been defined. Note: Teachers can create a table on a board and tally students’ response. Inquiry based learning (Critical Thinking and Problem Solving) • The students will do the QUESTIONS from NCERT book with the help of facilitator and then do Q.1- 3 on page no. 150 & 151. • The facilitator would take rounds and help the students in solving the questions. Independent Practice: Students will go through the solved example before doing Exercise of NCERT text book and do Q.2, 3, 4, 6, 7, 8& 9 in Homework notebooks. A short oral test would be taken to check proper assimilation of the topic discussed.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Strategies used- Evidence based learning Transaction would proceed in the following manner- Recapitulation: 10 min Quick revision on the previous concept would be taken up. Transaction would proceed in the following manner:- 1. Teacher asks students to predict the relationships among the different types of Darwin’s finches. Students might suggest the following: a) The different finches were always belonging to different species from the very beginning (incorrect). b) The finches adapted according to different environmental conditions and are now a different species although they all might have evolved from common ancestor common ancestry.

	2. After declaring that second answer is correct, next teacher can ask students about the reasons that caused one species to change into many different species? a) They are different from each other because of the isolation that resulted in living on different islands with distinct food supplies. Teachers should explain that “The Galápagos finches” are seen as a classic example of an “adaptive radiation”, the rapid evolution of ecologically different species from a common ancestor. 3. Pressing for explanations: For example: Why do you think that beak-size of Darwin’s finches varied? What is difference in sudden occurrence of albinism and variation in Darwin’s finches? 4. Orienting students to each other’s’ thinking by conducting a debate session. This activity will help students to think about other possibilities which have not been defined. Note: Teachers can create a table on a board and tally students’ response. Inquiry based learning (Critical Thinking and Problem Solving) ■ The students will do the QUESTIONS from NCERT book with the help of facilitator and then do Q.1- 3 on page no. 150 &151. ■ The facilitator would take rounds and help the students in solving the questions. Independent Practice: Students will go through the solved example before doing Exercise of NCERT text book and do Q.2, 3, 4, 6, 7, 8 & 9 in Homework notebooks. A short oral test would be taken to check proper assimilation of the topic discussed.
Self Study, Home Work, Assignments	A questionnaire can be given as assignment. 1. Explain Darwin’s theory of evolution? 2. How sex of a child is determined in human beings? 3. What is speciation? List the factors which bring about speciation. 4. A change that is useful for one property to start with can become useful later for quite a different function during evolution. Explain the statement with the example of feathers in dinosaurs and birds.

TOPIC	3-4 PERIODS: EVOLUTION AND CLASSIFICATION
Pre- Requisite for the course	This topic requires knowledge of hierarchy of characteristics between species i.e., which characteristics decide more fundamental differences among organisms, and which ones decide less basic differences based on which species can be classified. One should be aware of significance of fossils in unfolding the unwitnessed story of evolution of life on earth.
Assessment of qualifying knowledge	Students should list given number of characters on the basis of their priority in classification. They must properly define and understand the meaning of terms like, fossils, carbon dating, evolution, autotrophs, heterotrophs, prokaryotes, eukaryotes, homologous organs, analogous organs etc.
Objective	1. To make student understand the principles applied in arranging living and fossil species, into a hierarchical, multi-level classification. 2. To explain students, the need for grouping of organisms. 3. To explain students that fossils are the evidence for the change of organisms over time.
Learning Outcomes	• Students will know evolutionary relationships of the species around them and will be able to demonstrate how among given group of species some are closely related. • Students will be able to understand that fossils are footprints to construct defensible hypotheses or explanations for events that took place in the geologic past. • Humans have generated different vegetables from cabbage by selection- Artificial Selection. Students will better Understanding Earth's Changes Over Time
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Strategies used- Evidence based learning Transaction would proceed in the following manner- Recapitulation: 10 min Quick revision on the previous concept would be taken up. Transaction would proceed in the following manner- 1. Teacher asks students to predict which two in given group (Algae, plants, earthworm) are closely related. Students might suggest the following: a) They are completely different from each other and none are closely related (incorrect). b) Algae and plants are closely related as they both are autotrophic as they both can produce their own food from nutrients and sunlight by photosynthesis. 2. After declaring that second answer is correct, next teacher can ask

	students how algae and plants are different from each. a) Algae are simple organisms, sometimes unicellular, and even the largest types are relatively simple in structure. True plants on the other hand, are quite complex, with many specialized structures, even in the smallest types. 3. Pressing for explanations: characteristics in different organisms would be similar because they are inherited from a common ancestor. Teacher should re-enforce “Homologous and analogous organs” Oral test on the taught concept would be taken up. Guided Practice: The students will solve the questions 1-3 on page on 156 and question 1-2 on page number 1-2 on page no. 158 from NCERT book in the class with the help of their teacher. The teacher would ensure that each student tries to be independent at the work as well as be under the teacher’s guidance. Closure A short oral test would be taken to check proper assimilation of the topic discussed.
Self Study, Home Work, Assignments	Independent Practice: Students will answer Q. 8 & 9 in their homework notebook.
Assessments	1. Explain analogous and homologous organs. Identify the homologous and analogous organs from the following: wings of an insect, wings of a bat, forelimbs of a frog, and forelimbs of humans. 2. What is artificial selection? Explain with the example of wild cabbage plant

TOPIC	3-4 PERIODS: EVOLUTION SHOULD NOT BE EQUATED WITH 'PROGRESS
Pre- Requisite for the course	Understanding of concept that natural selection and genetic drift have together led to the formation of a population that cannot reproduce with the original one that lead to formation of species.
Assessment of qualifying knowledge	Written test on writing Roman Numerals as Hindu Arabic Numerals and vice versa.
Objective	To make student understand that • Evolution is simply the generation of diversity and the shaping of the diversity by environmental selection. • The only progressive trend in evolution seems to be that more and more complex body designs have emerged over time
Learning Outcomes	• Students will understand that one species need not be eliminated to give rise to a new one. • Natural selection and genetic drift have together led to the formation of a population that cannot reproduce with the original one. • Human beings have not evolved from chimpanzees. Human beings and chimpanzees had a common ancestor and the two resultant species have probably evolved in their own separate ways to give rise to the current forms.
Transaction Methodology (The teacher can use the mentioned techniques, wherever applicable, and can use any other too.)	Strategies used- Think pair &share. Transaction would proceed in the following manner- Recapitulation: 10 min Quick revision on the previous concept would be taken up. Learning through Discussion: (Creativity, Collaboration) We begin the discussion by asking our students “Are humans still evolving? If so, what trait is changing? Explain why or why not.” Students discussed this question in groups and then presented answers to the class. Teacher can discuss the likelihood of new changes occurring, given the requirements for natural selection (variation, heritability, differential reproductive success). Guided Practice: 15 min
Self Study, Home Work, Assignments	Independent Practice: Students would do the given questions in their H.W. notebooks as mentioned in the monthly planner. 1. Why are human beings who look so different from each other in terms of size, color and looks said to belong to the same species? 2. How are Humans and Chimpanzees related? Independent Practice: Students will solve the various problems independently. Closure: Discussion of muddiest point

Assessments	1. Bacteria have a simpler body plan when compared with human beings. Does it 2. In evolutionary terms, can we say which among bacteria, spiders, fish and chimpanzees have a 'better' body design? Why or why not?
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