Pavia National High School
Science Department
Department of Education

Lesson Plan
GRADE 9 SCIENCE
HEREDITY: INHERITANCE AND VARIATION

I. Objectives

At the end of the class discussion, the Grade 9 learners must have:

- Defined multiple alleles.
- Enumerated the possible gene pairs of a specific blood type.
- Identified the unknown phenotype of individuals on the basis of the known phenotypes through a punnet square.

II. Learning Content

A. Subject Matter

- Heredity:Inheritance and Variation - Multiple alleles

B. Content Outline

- Review what is Codominance
- Define Multiple alleles
- Give example of Multiple alleles
- Identify the unknown phenotype of individuals on the basis of the known phenotypes through a punnet square.
- Crossing all possible gene pairs of a specific blood type

C. Science Concept

- Codominance occur when both alleles are expressed equally in the phenotype of the heterozygote. Neither of the allele is dominant over the other
- Multiple alleles is when more than two alleles control the inheritance of a character.
- The ABO Blood Type System is governed by Multiple alleles. It is controlled by 3 alleles, the A, B and O alleles.
- A mother who is blood type A and a child who is blood type A can have a father who is blood type A, B, AB or O. A mother who is blood type B and a child who is blood type AB can have a father who is blood type A or AB only. A mother who is blood type AB and a child who is blood type B can have a father who is blood type A, B, AB or O. A mother who is blood type O and a child who is blood type O can have a father who is blood type A, B or O only.
- O is a recessive allele, two O alleles must be present for a person to have type O blood. If A allele or B allele is paired with O allele, the resulting blood type is A or B. A and B are codominant. If a person receives an A allele and a B allele, their blood type is type AB.

D. Science Process Skills

- Inferring

- Predicting
- Analyzing

E. Value Focus

- Participates in class discussion
- Cooperates during group works
- Value the importance of donating blood

III. Instructional Materials

A. Visual Aids

- Printed images,
- Key Concepts written in Manila paper
- Blank Punnett squares in cartolina

B. References

- Science 9 Learner's Module, Module 2 pp. 8-10
- Science 9 Teacher's Guide, pp. 23-24

IV. Lesson Development

	Teacher's Activity	Student's Activity	Teacher's Remarks/Notes

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Engagement 10 mins	"Everyone, please stand. Let us pray."	The students will stand in attention to pray.	
	"Good morning class."	"Good morning Ma'am"	
	"We're already done with our topic about codominance. Now, who can recall what is a codominance?"	"Codominance occur when both alleles are expressed equally in the phenotype of the heterozygote. Neither of the allele is dominant over the other"	"A student will volunteer to recite." The teacher may ask for another volunteer.
	"Can you site some examples?"	"Example is when you cross the red cow with the white cow, the offspring will be a roan cow which has both the red and white phenotype."	
	"Ok. Very good." "We can now proceed to our next lesson. But before anything else I would like to ask if you already know your blood type?"	Students may answer yes or no.	Since not all the studets know their blood type, the teacher will use the fishbowl method to assign the 4 blood types (A, B, AB, O) to each students. The teacher will instruct the students.
Exploration 15 mins	"We're going to play a game wherein the ladies together with their children will have to find their husbands based on the blood type of their child." "Are you all excited?"	"Yes Ma'am"	
	"Listen to the instructions in order for you to get the correct answers." "We will have six groups. As you noticed, the nametags you have picked are in different shapes. You have to find the father who's nametag will fit with your nametags just like a puzzle. You can have as many father as possible as long as the pieces of your nametags will fit with each other."		
	"After searching for the possible fathers, indicate your answers in the table found on pp.23 of your book."		The students will answer Activity 3: What's your blood type in Learner's Module pp. 23
	"The first group who can complete their family will receive the highest score."		Students will write their answers in one sheet of paper.
	"Any questions?"	"None Ma'am"	

	"The game starts now"		
Explanation **20 mins**	"What you have done earlier is finding the father of the child by matching the blood types of the two. The ABO blood type system is an example of another pattern of inheritance which is the Multiple Allele." "What is multiple alleles?" "Very good." "In humans there are four blood types (phenotypes): A, B, AB and O." "Blood type is controlled by three alleles: A, B, and O." "This is why ABO blood type is a Multiple alleles because there can be three possible alleles that can control the phenotype of an individual." "If you are blood type A, the alleles carried by your blood type are I^AI^A (AA) or I^A i(AO)" "If you are blood type B, the alleles carried by your blood are I^BI^B (BB) or I^B i (BO)" "O is recessive, two O alleles must be present for a person to have type O blood." "Example: ii(OO) = blood type O." "A and B are codominant. If a person receives an A allele and a B allele, their blood type is type AB." "Example: I^AI^B (AB) = blood type AB." "Understood?" "Any questions?" "Let's now check your activities." "Who among of you are the children carrying blood type A?" "What must be the blood type of the father if your mother is blood type A?	"When more than two alleles control the inheritance of a character." "None" The students who were assigned to be a child with blood type A will raise their hands. "Blood type A, B, AB or O Ma'am"	The teacher will post the definition of multiple alleles on the board and will let the students read it. The teacher will discuss the concepts written in manila paper and at the same time check the results of the activity. The students must answer based on the cross made with the different alleles of the blood type. Give four points for the complete answer.

	"Give one point for each blood types" "Who among of you are the children carrying blood type B?"	The students who were assigned to be a child with blood type B will raise their hands.	
	"What must be the blood type of the father if your mother is blood type AB? "Very good." "Let's proceed."	"Blood type A, B, AB or O Ma'am."	Give four points for the correct answer.
	"Who among of you are the children carrying blood type O?"	The students who were assigned to be a child with blood type O will raise their hands.	
	"What must be the blood type of the father if your mother is blood type O? "Very good."	"Blood type A, B or O Ma'am."	Give three points for the correct answer.
	"Who among of you are the children carrying blood type AB?"	The students who were assigned to be a child with blood type AB will raise their hands.	
	"What must be the blood type of the father if your mother is blood type B? "Very good." "Count the scores." "Indicate the scores at the upper right corner of your paper and pass it forward."	"Blood type B or AB Ma'am."	Give two points for the correct answer. Perfect score is 13 + 2 = 15 The students will pass their papers.
Elaboration **5 mins**	"Those who are blood type AB can receive blood from persons who have blood type A, AB, B and O. Blood type AB is called the universal receiver." "On the other hand, blood type O is the universal donor, which means they can donate blood to any persons with blood type A, AB, B		

	and O.”		
Evaluation **10 mins**	Given the possible alleles from the father and the mother, give the combination of alleles and the resulting blood type or phenotype.		The teacher will post a manila paper showing a table of the possible alleles from the father on the x axis and the possible alleles from the mother on the y axis. The students need to cross the allele from the mother and the allele from the father in order to get the allele combination of an individual and its blood type or phenotype.

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