9 SCIENCE
QUARTER 1

PIVOT 4A LEARNER'S MATERIAL

This module is a resource of information and guide in understanding the Most Essential Learning Competencies (MELCs). Understanding the target contents and skills can be further enriched thru the K to 12 Learning Materials and other supplementary materials such as worksheets/activity sheets provided by schools and/or Schools Division Offices and thru other learning delivery modalities including radio-based and TV-based instruction (RB/TVI).

CLMD CALABARZON

Science
Grade 9

Regional Office Management and Development Team: Job S. Zape, Jr., Viernalyn M. Nama, Ma. Leonora M. Natividad, Romyr L. Lazo, Fe M. Ong-Ongowan, Lhovie A. Cauilan, Ephraim Guibas

Schools Division Office Development Team: Elpidia B. Bergado, Gemma G. Cortez, Noel S. Ortega, Leylanie V, Adao, Marissa O. Aguirre, Wenifreda N. Diquit, Paula Jan Martinez,Noel D. Anciado, Maeden A. Ligsa,Cesar Usero Jr., Angelita P. Latina, Kenyrose M. Lungcay, Beverly B. Meon, Cindi N. Alejandrino, Karen G. Lambon,Luis L. Rufin, Ma. Antonette DF. Marquez, Jan Criz O. Montero, Cindi N. Alejandrino, Nestle K. Besana, Rhoanne I. Biagon, Beverly M. Hebron, Beverly M. Hebron, Jenny Jean E. Balazon, Nestle K. Besana, Rhoanne I. Biagon, Hiyasmin Capello, Jenny Jean E. Balazon

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PIVOT IV-A Learner's Material
Quarter 1
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Guide in Using PIVOT Learner's Material

For the Parents/Guardian

This module aims to assist you, dear parents, guardians, or siblings of the learners, to understand how materials and activities are used in the new normal. It is designed to provide the information, activities, and new learning that learners need to work on.

Activities presented in this module are based on the Most Essential Learning Competencies (MELCs) for Science as prescribed by the Department of Education.

Further, this learning resource hopes to engage the learners in guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

You are expected to assist the child in the tasks and ensure the learner's mastery of the subject matter. Be reminded that **learners have to answer all the activities in their own notebook**.

For the Learners

The module is designed to suit your needs and interests using the IDEA instructional process. This will help you attain the prescribed grade-level knowledge, skills, attitude, and values at your own pace outside the normal classroom setting.

The module is composed of different types of activities that are arranged according to graduated levels of difficulty—from simple to complex. You are expected to **answer all activities on separate sheets of paper** and submit the outputs to your respective teachers on the time and date agreed upon.

PARTS OF PIVOT LEARNER'S MATERIAL

	Parts of the LM	Description
Introduction	What I need to know	The teacher utilizes appropriate strategies in presenting the MELC and desired learning outcomes for the day or week, purpose of the lesson, core content and relevant samples. This allows teachers to maximize learners awareness of their own knowledge as regards content and skills required for the lesson
	What is new	
Development	What I know	The teacher presents activities, tasks , contents of value and interest to the learners. This shall expose the learners on what he/she knew, what he /she does not know and what she/he wanted to know and learn. Most of the activities and tasks must simply and directly revolved around the concepts to develop and master the skills or the MELC.
	What is in	
	What is it	
Engagement	What is more	The teacher allows the learners to be engaged in various tasks and opportunities in building their KSA's to meaningfully connect their learnings after doing the tasks in the D. This part exposes the learner to real life situations /tasks that shall ignite his/ her interests to meet the expectation, make their performance satisfactory or produce a product or performance which lead him/ her to understand fully the skills and concepts .
	What I can do	
	What else I can do	
Assimilation	What I have learned	The teacher brings the learners to a process where they shall demonstrate ideas, interpretation , mindset or values and create pieces of information that will form part of their knowledge in reflecting, relating or using it effectively in any situation or context. This part encourages learners in creating conceptual structures giving them the avenue to integrate new and old learnings.
	What I can achieve	

Transport of Nutrients in the Respiratory and Circulatory System

I Lesson

This lesson will provide you information on how respiratory and circulatory system work together in transporting nutrients, gases and other molecules to and from the different parts of the body.

For respiratory system, you will learn the parts of the human respiratory system, how gas exchange and transport of nutrients happen. You can match air flow and blood flow during ventilation and learn the securing and guarding in the respiratory tract.

Likewise in circulatory system, you will be familiarized with the parts of the circulatory system. You will also know more about the functions and mechanisms involve in it. This lesson is very important specially this time of pandemic because what is affected in our body are the main organs of respiratory system and circulatory system.

When you eat foods, you are actually using the chemical energy that fuels your body to do various activities. How are these nutrients, other fluids, gases and other molecules transported in your body? Can you enumerate the different organ systems in your body that work together to perform each functions to maintain homeostasis?

You can start by doing a simple exercise! Are you ready? Try to jump five times before you continue studying the lesson. Have you felt some changes in your body? Try to feel the left part of your chest. Do you feel an increased and faster heartbeat than when you are just sitting or doing a regular routine of being stationary in your place? Are you grasping for more air?

There are two organ systems that work together to allow the exchange of gases when you are doing strenuous activity like jumping. These are the respiratory system and the circulatory system.

Nowadays in the time of pandemic, if a person is experiencing symptoms like fever, colds and has a hard time breathing, there is a necessary measure to keep oneself away from the suspicion of having acquired the virus that weakens the respiratory system. This can be explained by the interaction of respiratory and circulatory system if the virus gets in the body. How is this possible?

You will learn all these in the succeeding lessons.

Let`s start by studying the coordinated parts and functions of the organs in the respiratory and circulatory system that will aid in the transport of nutrients, gases, and other molecules to and from the different parts of the body.

In humans and other animals, the necessary nutrients , gases and liquids are transported in the body though the blood. Blood is carried through the body via blood vessels. There are three blood vessels in the human body. These are the vein, artery and capillary.

An artery is a blood vessel that carries blood away from the heart, where it branches into ever-smaller vessels. All arteries have relatively thick walls that can withstand the high pressure of blood ejected from the heart. Eventually, the smallest arteries, vessels called arterioles, further branch into tiny capillaries, where nutrients and wastes are exchanged, and then combine with other vessels that exit capillaries to form venules, small blood vessels that carry blood to a vein, a larger blood vessel that returns blood to the heart.

The respiratory system works directly with the circulatory system to provide oxygen to the body. This substance moves into the blood vessels that circulates the oxygen-rich blood to tissues and cells in the body. The chart below shows the comparison of the arteries and veins in human body.

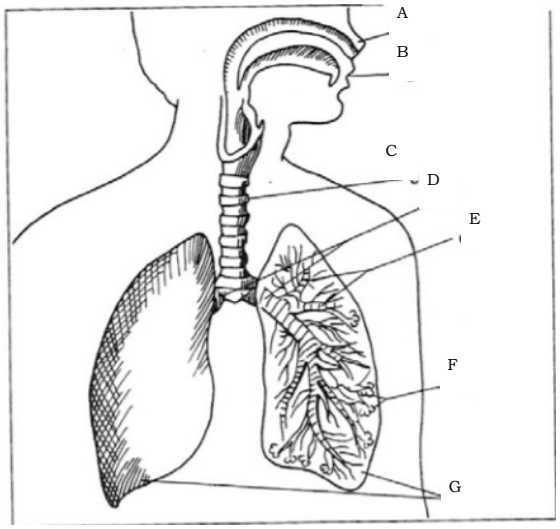
Comparison of Arteries and Veins

	Arteries	**Veins**
Direction of blood flow	Conducts blood away form the heart	Conducts blood toward the heart
General appearance	rounded	Irregular; often collapsed
pressure	high	low
Well thickness	thick	thin
Relative oxygen concentration	Higher in systemic arteries; lower in pulmonary arteries	Lower in systemic veins; higher in pulmonary veins
valves	Not present	Present most commonly in limbs and veins inferior to the heart

Blood flow refers to the movement of blood through a vessel, tissue, or organ, and is usually expressed in terms of volume of blood per unit of time. It is initiated by the contraction of the ventricles of the heart. Ventricular contraction ejects blood into the major arteries, resulting in flow from regions of higher pressure to regions of lower pressure, as blood encounters smaller arteries and arterioles, then capillaries, then the venules and veins of the venous system .

Learning Task 1: Study the diagram of the human respiratory system. Copy the diagram and label the parts correctly. Choose form the words listed below.

mouth
nose
bronchi
air sacs
lungs
branching tubes
trachea



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Learning Task No. 2: Copy and complete each statement. Choose from the words inside the box.

1. The main artery of the body, supplying oxygenated blood to the circulatory system. _____

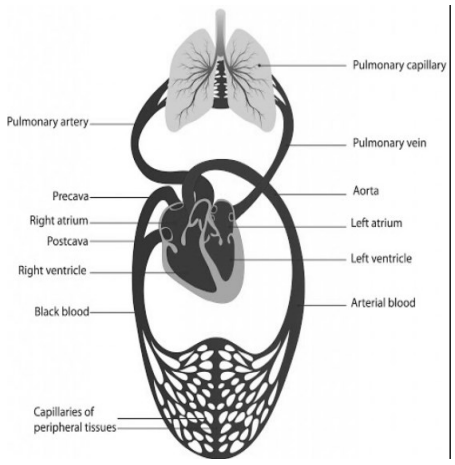
2. The upper right chamber of the heart that receives oxygenated blood from the lungs. _____

3. The chamber within the heart that is responsible for pumping oxygen-depleted blood to the lungs. _____

4. The artery carrying blood from the right ventricle of the heart to the lungs for oxygenation. _____

5. Is the thickest of the heart's chambers and is responsible for pumping oxygenated blood to tissues all over the body. _____

Left atrium
Aorta
Pulmonary artery
Right ventricle
Left ventricle



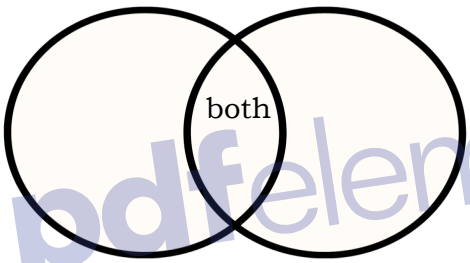
Learning Task 3: Read the instruction in each activity. Prepare and write your answers in your notebook.

A. Venn Diagram of Respiratory and Circulatory System

From the previous lesson you, became familiar with the respiratory system. But as you explore this module you will then realize that respiratory and circulatory system works together to perform their specific functions effectively. Below are the descriptions for the two body systems. Construct a Venn diagram to show their similarities and differences? Write the letter inside the corresponding space.

A-Arteries	F-Larynx	K-Pumps blood
B-Blood	G-Lungs	L-Trachea
C-Bronchioles	H-Nose	M-Uses oxygen
D-Gas exchange	I-Pharynx	N-Veins
E- Heart	J-Capillaries	O-Valve

Respiratory System Circulatory System



B. Inhale and Exhale

Each of the following goes with inhaling or exhaling. Place a checkmark in the box where you think each statement belongs.

	INHALING	EXHALING
1. air moves out of the lungs		
2. air moves into the lungs		
3. ribs move out		
4. ribs move in		
5. chest space becomes smaller		
6. chest space becomes larger		
7. diaphragm moves down		
8. Diaphragm moves up		

E

Learning Task 4: Read the handout about the heart and blood circulation. Prepare and write your answers in your notebook.

Handout: The Heart and Blood Circulation

The human heart consists of *four chambers*: The left and right atrium which are the receiving chambers contracts to push blood into the lower chambers. The left and right ventricles which act as the pumping chambers propel blood to the lungs or to the rest of the human body.

There are two distinct but linked circuits in the human circulation called the **pulmonary and systemic circuits**. Both circuits transport blood and gases. The **pulmonary circuit** transports blood to and from the lungs, where it picks up oxygen and delivers carbon dioxide for exhalation. The **systemic circuit** transports oxygenated blood to virtually all of the tissues of the body and returns relatively deoxygenated blood and carbon dioxide to the heart to be sent back to the pulmonary circulation.

The right ventricle pumps deoxygenated blood into the pulmonary trunk, which leads toward the lungs and divides into two branches into the left and right pulmonary arteries. These vessels in turn branch many times before reaching the **pulmonary capillaries,** where gas exchange occurs. The *carbon dioxide* exits the blood and *oxygen* enters. The *pulmonary trunk arteries* and their branches are the only arteries in the post-natal body that carry relatively *deoxygenated blood.*

Highly oxygenated blood returning from the **pulmonary capillaries** in the lungs passes through a series of vessels that join together to form the pulmonary veins—the only post-natal veins in the body that carry *highly oxygenated blood.* The **pulmonary veins** conduct blood into the left atrium, which pumps the blood into the left ventricle, which in turn pumps *oxygenated blood* into the aorta and on to the many branches of the systemic circuit.

Eventually, these vessels will lead to the **systemic capillaries**, where exchange with the tissue fluid and cells of the body occurs. In this case, *oxygen and nutrients* exit the systemic capillaries to be used by the cells in their metabolic processes, and carbon dioxide and waste products will enter the blood.

The **blood exiting the systemic capillaries** is *lower in oxygen concentration* than when it entered. The capillaries will ultimately unite to form venules, joining to form ever-larger veins, eventually flowing into the two major systemic veins, the ***superior vena cava and the inferior vena cava***, which return blood to the right atrium. The blood in the superior and inferior venae cavae flows into the ***right atrium***, which pumps blood into the ***right ventricle***. This process of blood circulation continues as long as the individual remains alive.

Dual System of the Human Blood Circulation Blood flows from the **right atri**um to the **right ventricle**, where it is pumped into the **pulmonary circuit**. The blood in the pulmonary artery branches is *low in oxygen* but relatively *high in carbon dioxide*. **Gas exchange** occurs in the **pulmonary capillaries** (oxygen into the blood, carbon dioxide out), and *blood high in oxygen* and *low in carbon dioxide* is returned to the **left atrium**. From here, blood enters the **left ventricle**, which pumps it into the *systemic circuit*. Following exchange in the systemic capillaries (oxygen and nutrients out of the capillaries and carbon dioxide and wastes in), blood returns to the **right atrium** and the cycle is repeated.

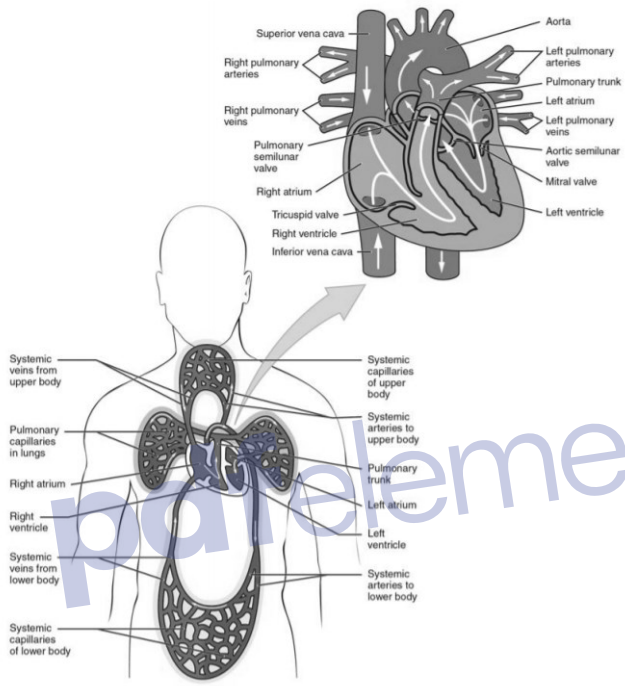


Diagram showing the dual blood circulation

Guide Questions:

After reading the handout about the heart and blood circulation, answer the following questions.

1. What are the two circuits by which the gases are circulated in and out of the lungs?
2. What tissues in the body transport the nutrients, gases and other substances in the human body?
3. Describe the transport of gases in a pulmonary circuit.
4. Describe the transport of gases in a systemic circuit.

Learning Task No. 5: Examine the diagram showing the pulmonary and systemic circuit. A blood that carries gases enters into the venules and gas exchange happens in the capillaries.

Write the number that corresponds to the correct order by tracing the blood flow in correct order. Some numbers are indicated already.

____5___Tricuspid valve

_____Pulmonary veins

_____Left ventricle

_____Lungs

_____Mitral Valve

_1_ Venules

___7___Pulmonary semilunar valve

_____Pulmonary arteries

_____Veins

_____Right atrium

_____Right ventricle

_____Capillaries

_14_ Aortic semilunar valve

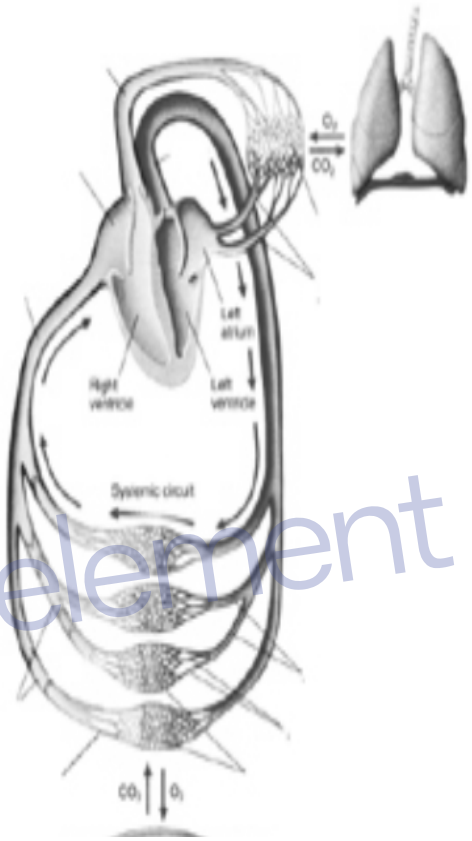
_____Arteries

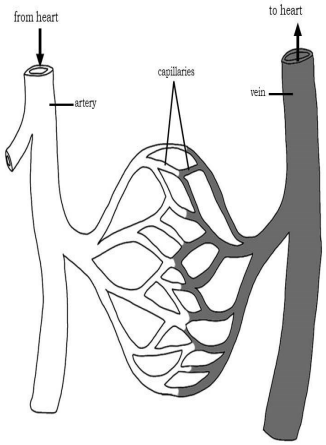
_____Inferior vena cava & superior vena cava

_____Left atrium

_____Arterioles

_____Aorta





Jael Faith Ledesma_illustrator

A

Learning Task 6: Read and understand the procedures indicated in the activity. Perform them one by one. Make use of other materials available to you.

Face Mask Design

In this activity, you will learn to make a face mask from used clothing available in your house. Look for three different textures of textile. Find out which is the best textile for face mask and what design is best to protect the user.

Materials:

Used clothing (3 different textures)
Scissors
Tape measure

Procedure:

1. Make patterns for the desired design of your face mask.
2. Using three different textures of textile, find out which texture of textile is the best cloth for face mask.
3. Fill in the template below

Project Description:

Type of Textile	Describe how you inhale and exhale using the face mask (test it by jumping as fast as you can in 3 minutes)	Describe the comfort of wearing the face mask like: sweat absorbing capacity, heat absorbing capacity and moist release when wearing eyeglasses)
A		
B		
C		

1.Design 2. Usability 3. Comfort

Guide Questions:

1. What is the economic implication of making your own washable face mask?
2. Why is it that wearing of face mask is mandatory in this time of pandemic caused by Covid 19?
3. How will you relate this activity in your lesson on respiratory and circulatory exchange of gases?