

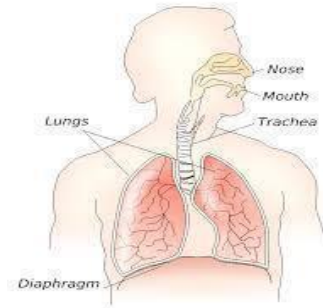
## My Organs T-shirt (Level 3)

<b>Description</b>	Learners will explore four different internal human body systems (respiratory, circulatory, digestive and urinary systems) by investigating their functions using simple models.
<b>Leading Question</b>	How would your organs look on a t-shirt
<b>Total Time Required</b>	5 days – 1 hour 30 minutes a day
<b>Supplies Required</b>	Cardboard, pencil, colors, scissors, 4-6 small tubes, 4-6 empty plastic bottles, 4 small balloons and 2-3 big balloons, plain old T-shirt or big paper bag or any old cloth. Cotton, coffee filter papers (or paper towel or piece of cloth), small plastic funnel or the bottom part of a plastic water bottle. 1 jar of any size.
<b>Subjects</b>	Science, Art, Physical Education, Literacy
<b>Supervision</b>	Medium
<b>Learning Outcomes</b>	By the end of this project, the learner will be able to: <ol style="list-style-type: none"> <li>1. Identify the internal organs and the function of the respiratory system.</li> <li>2. Identify the internal organs and the function of the circulatory system.</li> <li>3. Identify the internal organs and the function of the urinary system.</li> <li>4. Identify the internal organs and the function of Digestive system.</li> <li>5. Draw the main organs of digestive, respiratory, circulatory and urinary systems.</li> </ol>
<b>Previous Learning</b>	1. Identify the external body parts.
<b>Topics/Concepts Covered</b>	<ul style="list-style-type: none"> <li>● Respiratory system</li> <li>● Circulatory system</li> <li>● Urinary System</li> <li>● Digestive System</li> </ul>
<b>Inspiration</b>	<a href="https://www.pinterest.com/pin/157977899402928647/">https://www.pinterest.com/pin/157977899402928647/</a> All diagrams are from Pinterest website.

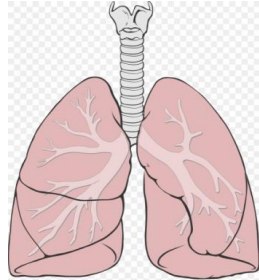
**DAY 1** - Today you will learn to identify and draw the different parts of the respiratory system and learn how it works

Suggested Duration	Activity and Description
10 minutes	<p>Can you answer the following questions?</p> <ul style="list-style-type: none"> <li>● Which part of the body do you use to hold things?</li> <li>● Which part of the body do you use to walk and run?</li> <li>● Which part of the body helps you hear sounds?</li> <li>● Which part of the body do you use to sense hot or cold objects?</li> <li>● Which part of the body holds you up and allows you to walk upright?</li> <li>● Which part of the body do you use to smell things?</li> <li>● Which part of the body do you use to see things?</li> <li>● Extension: Label the diagram of the external body parts in the appendix</li> </ul>
15 minutes	<p>Can you answer the following questions?</p> <ul style="list-style-type: none"> <li>● What happens when you inhale?</li> <li>● What happens when you exhale?</li> </ul> <p>Place one of your hands under your chest and the other one on your stomach. Take a deep breath in and slowly breathe out. Notice your chest and stomach expanding and contracting.</p> <p>Measure your stomach using a tape or alternatively using a string.</p> <ul style="list-style-type: none"> <li>● How much more string or tape will be required when you expand your stomach when breathing in?</li> <li>● How many more finger spaces is required when you breathe in compared to when you breathe out?</li> </ul> <ul style="list-style-type: none"> <li>● How long can you hold your breath?</li> <li>● What happens if we cannot breathe for a long time?</li> <li>● Why does that happen?</li> </ul> <ul style="list-style-type: none"> <li>● Find a family member or a friend who can compete with you and try saying one long word in one breath e.g. Hiiiiiii...</li> <li>● Count how many seconds you each can say it without taking a breath.</li> <li>● Now other family members or friends can try the same and we can see who can do it for longer.</li> </ul>
30 minutes	Let's build a <b>simple model</b> using the instructions below:


	<ul style="list-style-type: none"> <li>- Cut open an empty plastic bottle at the bottom</li> <li>- Tie or tape two straws (or any two tubes made of any material) together from the middle and attach two small balloons to the bottom of each straw so that the balloons cover the bottom part of the straws</li> <li>- Insert the straws into the bottle from the bottom so that the opposite ends stick out from the mouth of the water bottle</li> <li>- Bring another balloon and cut off the bottom half and tie the top part</li> <li>- use the open end of the balloon to cover the bottom half of the plastic bottle as shown in the image below</li> <li>- What part of the human body does this model look like?</li> </ul> <p>Write your observations on the respiratory system (one page for each system):</p> <ol style="list-style-type: none"> <li>1. What would happen if you pulled the balloon on the bottom of the bottle?</li> <li>2. What would happen if you push the balloon on the bottom of the bottle upward?</li> </ol> <p>The bottle represents your chest and the big balloon at the bottom represents an organ called the <b>diaphragm</b>. The two balloons inside the bottle represent your lungs and the two straws/pipes attached to the balloons represent the airway passage called the <b>bronchus</b>. The main pipe/straw represents the <b>trachea</b>.</p> <p>Based on the image to the right, how similar is the model you created to your respiratory system?</p> <p><b>Where is the respiratory system located? Can you name the area and how it's protected?</b></p>
<p><b>15 minutes</b></p>	<p>Write a paragraph on the following topic: "How do we breathe?", describing the functions of the respiratory system and its component parts</p> <p>The act of <b>breathing</b> engages the diaphragm, a strong sheet of muscle that divides the chest from the abdomen. As you breathe in, the diaphragm drops downward, pulling <b>your lungs</b> with it and pressing against abdominal organs to make room for <b>your lungs</b> to</p>



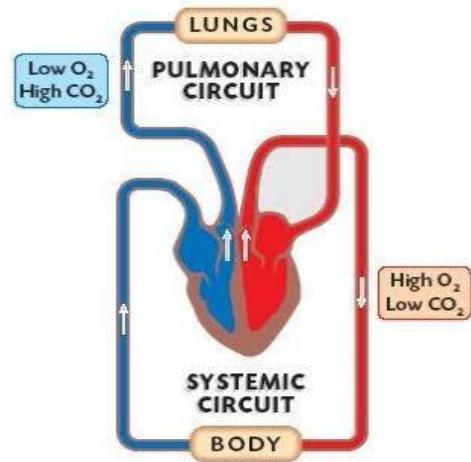
	<p>expand as they fill with air.</p> <p>When you <b>inhale (breathe in)</b>, air enters your lungs and oxygen from the air moves from your lungs to your blood. At the same time, carbon dioxide, a waste gas, moves from your blood to the lungs and is exhaled (<b>breathed out</b>). This process is called gas exchange and is essential to life. This is why people die if they cannot breathe because this prevents oxygen from reaching the blood.</p>																																
<p><b>20 minutes</b></p>	<p>This activity will help you to understand the effect of movement and effort on breathing: race your friends/family members, covering a distance of 200 meters. Then, observe how running affects your breathing and the frequency at which you and your friends/family breathe.</p> <p>count the number of breaths per minute for you and each family member before running and after running using a table to record the results:</p> <table border="1" data-bbox="467 785 1395 1121"> <thead> <tr> <th>Members</th> <th>Number of breaths per minute before running</th> <th>Number of breaths per minute after running</th> </tr> </thead> <tbody> <tr> <td>Member 1</td> <td></td> <td></td> </tr> <tr> <td>Member 2</td> <td></td> <td></td> </tr> <tr> <td>Member 3</td> <td></td> <td></td> </tr> </tbody> </table> <p>Calculate how many numbers of breaths increase for each family member. Calculate the percentage of increasing the breadths after running in the table below and write your observations about the observed change.</p> <table border="1" data-bbox="467 1297 1395 1690"> <thead> <tr> <th>Members</th> <th>Number of breaths per minute before running</th> <th>Number of breaths per minute after running</th> <th>The difference</th> <th>The percentage of change</th> </tr> </thead> <tbody> <tr> <td>Member 1</td> <td>30</td> <td>50</td> <td>50-30=20</td> <td>20/30x100=66.67 or 67%</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Do you know why does the number of breaths increases? When you run/exercise and your muscles work harder, your body uses more oxygen and produces more carbon dioxide. To cope with this extra demand for</p>	Members	Number of breaths per minute before running	Number of breaths per minute after running	Member 1			Member 2			Member 3			Members	Number of breaths per minute before running	Number of breaths per minute after running	The difference	The percentage of change	Member 1	30	50	50-30=20	20/30x100=66.67 or 67%										
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	oxygen, your breathing has to increase from about 15 times a minute (equivalent to 12 liters of air) when you are resting to about 40-60 times a minute (100 liters of air) during a run/ exercise.
<b>10 minutes</b>	<p>Draw a diagram of the human respiratory system and use it to make your own internal systems T-shirt</p> 

**DAY 2** - Today you will be able to identify the parts of the circulatory system and the functions of each part using a simple model of the heart

<b>Suggested Duration</b>	<b>Activity and Description</b>
<b>10 minutes</b>	<p>Did you or any family member ever cut a finger accidentally? The following is how you should respond to what happens.</p> <ol style="list-style-type: none"> <li>1. The cut will bleed and you will need to stop the bleeding.</li> <li>2. Apply direct pressure on the cut or wound with a clean cloth, tissue, or piece of gauze until the bleeding stops.</li> <li>3. Gently clean the cut and wound with soap and warm water.</li> <li>4. Protect the wound. Apply antibiotic cream to reduce the risk of infection and cover with a sterile bandage.</li> </ol> <p>Why do you need to apply direct pressure on the cut to stop it from bleeding? By the end of today we will discover why you need to apply pressure to a cut.</p>
<b>20 minutes</b>	<p>Make a simple model of the human heart:</p> <ul style="list-style-type: none"> <li>• Fill 3/4th of a jar with water and add red food coloring or paint or you can also use red colored juice (like cranberry juice)</li> <li>• Cut a balloon in half (or any piece of stretchy material) and use it to cover the jar</li> <li>• Make two holes in the balloon and insert a straw in each hole</li> </ul> 

	<ul style="list-style-type: none"> <li>• push down and pull up the balloon continuously. What do you notice? Write your observations.</li> </ul> <p>This jar and the balloon work like a pump - when they push down, the liquid will flow through the pipes or straws, the same way the heart acts as a pump that pumps blood to all parts of the body. The two straws represent the main <b>blood vessels</b> that carry blood away from and towards the <b>heart</b>. <b>Arteries</b> carry blood away from the <b>heart</b> and <b>veins</b> carry blood back to the <b>heart</b>.</p> <p>To answer our first question (why do you need to apply pressure to a cut), since our heart pumps blood and makes it flow fast all over the body, applying pressure slows down the pressure of the blood.</p> <p>Where is the heart located in your body?</p> <p><b>What are the main functions of the circulatory system?</b></p> <p>The circulatory system carries oxygen, nutrients, and hormones to cells, and removes waste products, like carbon dioxide. These roadways travel in one direction only, to keep things going where they should. See the diagram.</p>
<p><b>15 minutes</b></p>	<p><b>Drawing a heart</b></p> <p>Draw a heart on cardboard and cut it out (the size of the heart should be similar to the size of your fist). Keep this drawing to make your organs T-shirt.</p>
<p><b>25 minutes</b></p>	<p>Find a friend or family member who would do the following activity with you:</p> <ul style="list-style-type: none"> <li>- Draw the table below. Players will check their pulses before they start the physical activities and record their initial pulse in the table</li> <li>- Each player then does the first activity: jumping 5 times</li> <li>- Players will record their pulse after activity 1 and do the second activity: running 50 meters or for 10 seconds</li> <li>- Players will record their pulse after activity 2 and do the last activity: running 100 meters or for 40 seconds</li> </ul>




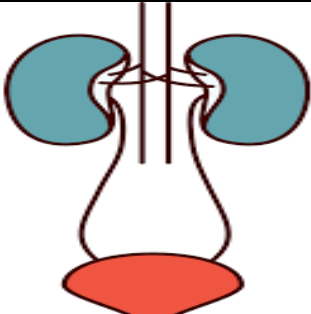
	Number of pulses per minute before the start of activities	Number of pulses per minute after activity1	Number of pulses per minute after activity2	Number of pulses per minute after activity 3
Player 1				
Player 2				
Player 3				

What did you notice? How did the activities affect the number of pulses?

During exercise, your body may need three or four times your normal cardiac output, because your muscles need more oxygen when you exert yourself. During exercise, your heart typically beats faster so that more blood gets out to your body.

### DAY 3 - Today you will learn about the urinary system.

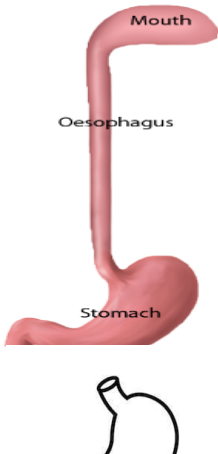
Suggested Duration	Activity and Description
45 minutes	<p><b>Making a model of the urinary system</b></p> <p><b>Materials:</b> 2 empty water bottles, clay, tubes(straws), coffee filters (or a piece of cloth, paper towel, or cotton balls), large piece of cardboard to mount model onto, tape, food coloring, small funnel or plastic container (see appendix).</p> <p><b>Instructions:</b></p> <ul style="list-style-type: none"> <li>- Cut off the bottom part of the empty water bottles. Use a pen or pencil to create a small hole in the cap.</li> <li>- Snip approximately 12-16 inches of the tubes (2 pieces). Insert one end of the tube through the hole in the cap. Make sure the end of the tip is as far down and secure as possible to ensure that the water bottle drains as much as possible.</li> <li>- Do the same for the other water bottle.</li> <li>- Place 6-7 coffee filters or a piece of cloth in each water bottle and a couple of cotton balls.</li> <li>- Using clear tape, affix the water bottles to a large sheet of cardboard or a box leaving approximately 5 inches between each bottle (leave room for the funnel and container underneath)</li> <li>- Place the ends of tubing into a funnel to give you an idea of where to place funnel on cardboard. Use packing tape to secure the funnel in</li> </ul>

	<p>the appropriate spot. Secure the model to a wall/countertop. Place a plastic container underneath. See the image below</p> <ul style="list-style-type: none"> <li>- You can reuse the bottom parts of the water bottles that were cut off to mix food coloring and water. Gently pour “waste” into the “kidneys” and watch what comes out.</li> </ul>  <p>Write your observations about the above experiment.</p> <p>You can reuse the bottoms of the water bottles that were cut off to mix food coloring and water. Gently pour “waste” into the kidneys and watch what comes out.</p> <p>This model represents the <b>urinary system</b>:</p> <p>What is the function of this system? How does it work? The urinary system's function is to filter blood and create urine as a waste by-product. In our model:</p> <ol style="list-style-type: none"> <li>1. The two bottles represent the <b>kidneys</b></li> <li>2. Each tube represents <b>ureter</b></li> <li>3. The funnel represents the <b>bladder</b></li> </ol> <p>From the above model, we know that the main parts of the urinary system include the <b>kidneys, ureters, and bladder</b>.</p> <p>Draw the urinary system on cardboard, cut it out then color it and keep it for the organs t-shirt</p>
<p><b>15 minutes</b></p>	<p>draw the following diagram:</p> 

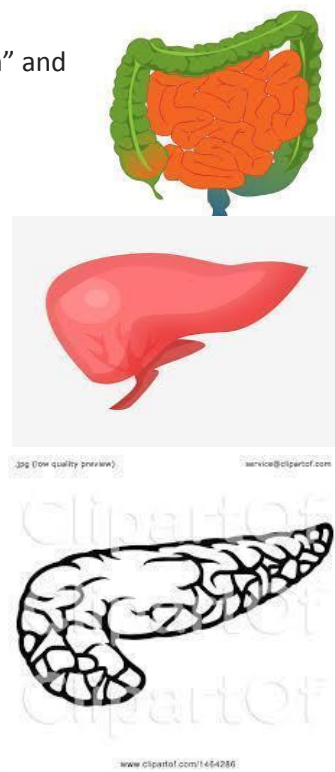


**DAY 4** - Today you will learn about the digestive system.

Suggested Duration	Activity and Description
10 minutes	<p>Today, you will be able to identify the parts and organs of the digestive system, the function of each organ, and draw the digestive system.</p> <ol style="list-style-type: none"> <li>1. Can you live without eating and drinking? Why?</li> <li>2. What happens to the food you eat inside your body?</li> <li>3. Which part of your body do you use to eat?</li> </ol> <p>Let us do the following experiment to understand what happens to the food you eat inside your body:</p>
10 minutes	<p><b>The Journey of Digestion</b></p> <p>Step 1: chewing food. Can you describe what happens when you are chewing food? It looks something like this:</p> <ul style="list-style-type: none"> <li>● The digestive process starts in the mouth when you chew,</li> <li>● Salivary glands will make <b>saliva</b>, a digestive juice, which moistens food so it moves more easily through a pipe called <b>esophagus</b> into the stomach.</li> <li>● Bite a piece of bread and chew it, observing how saliva moistens it and makes it easier to swallow.</li> <li>● What would happen if we did not produce saliva? Write down your observations</li> </ul>
30 minutes	<p><b>Food in the stomach:</b></p> <p><b>Materials:</b> balloon (or any piece of stretchy material), vegetable oil, white vinegar (or juice of two lemons), a piece of bread or a handful of oatmeal. See appendix</p> <p><b>Instructions:</b></p> <ul style="list-style-type: none"> <li>- Pour a few drops of the oil into the balloon and rub the balloon between your hands so the oil lines the inside of the balloon. Tip the balloon upside down so any extra oil will drop out.</li> <li>- Break some pieces of bread off and drop into the balloon, or, drop about 15 oats into the balloon.</li> <li>- Pour about 1 tsp of the white vinegar into the balloon; you may need a bit more if you add more food.</li> <li>- Squish the balloon around for a minute or so. Then carefully start at the fattest part of the balloon and squeeze up.</li> <li>- Can you describe what comes out?</li> </ul>

	<p>You can observe that the bread is dissolved. The stomach contains acid that helps break down the food you eat so your body can get the nutrients it needs from the food.</p> <p>Draw the following table. Repeat the same experiment with different food items and record your observations</p> <table border="1" data-bbox="467 447 1393 785"> <thead> <tr> <th data-bbox="467 447 776 569">Food</th> <th data-bbox="776 447 1084 569">Observation: Description before experiment</th> <th data-bbox="1084 447 1393 569">Observation: Description after experiment</th> </tr> </thead> <tbody> <tr> <td data-bbox="467 569 776 625">Small piece of potato</td> <td data-bbox="776 569 1084 625"></td> <td data-bbox="1084 569 1393 625"></td> </tr> <tr> <td data-bbox="467 625 776 682">Small piece of fruit</td> <td data-bbox="776 625 1084 682"></td> <td data-bbox="1084 625 1393 682"></td> </tr> <tr> <td data-bbox="467 682 776 739">Water</td> <td data-bbox="776 682 1084 739"></td> <td data-bbox="1084 682 1393 739"></td> </tr> <tr> <td data-bbox="467 739 776 785"></td> <td data-bbox="776 739 1084 785"></td> <td data-bbox="1084 739 1393 785"></td> </tr> </tbody> </table> <p>After food enters the stomach, the stomach muscles mix the food and liquid with digestive juices. The stomach slowly empties its contents, called chyme, into your <b>small intestine</b>.</p> <p>Do you know what happens to water in the stomach? You will notice that nothing happens to water. There is no need to break down water. It helps digestion because solid food needs water to be digested faster.</p> <p>Step 3: the <b>small intestine</b> absorbs most of the nutrients in Chyme.</p> <p>Step 4: the <b>large intestine</b> will absorb water, minerals then it will change the leftovers into stool.</p>	Food	Observation: Description before experiment	Observation: Description after experiment	Small piece of potato			Small piece of fruit			Water					
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Small piece of fruit																
Water																
<p><b>25 minutes</b></p>	<p><b>Drawing the organs of the digestive system</b></p> <p>draw each organ on cardboard, cut it out and color it to use in your T-shirt design.</p> <p><b>Description of each organ and its location:</b></p> <ol style="list-style-type: none"> <li data-bbox="467 1472 971 1535">1. <b>The oesophagus</b> is the hollow tube that leads from the throat to the stomach.</li> <li data-bbox="467 1612 976 1713">2. <b>The stomach</b> is a J-shaped, hollow organ located just below the diaphragm in the left part of the abdominal cavity.</li> <li data-bbox="467 1787 1045 1822">3. <b>The small intestine</b> is a long, narrow, folded or</li> </ol> <div data-bbox="1117 1381 1333 1835" style="text-align: right;">  </div>															

	<p>coiled tube extending from the stomach to the large intestine</p> <p>4. <b>The large Intestine</b> has the shape of the letter “n” and surrounds the small intestine.</p> <p>5. <b>The liver</b> is shaped like a cone. It is a dark reddish-brown organ located in the upper right-hand portion of the abdominal cavity, beneath the diaphragm</p> <p>6. <b>The pancreas</b> is spongy, about six to ten inches long, and is shaped like a flat pear or a fish extended horizontally across the abdomen. The wide part, called the head of the pancreas, is positioned toward the center of the abdomen.</p>
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**DAY 5** - Today, you will design your organs T-Shirt and present it to your family/friends!

Suggested Duration	Activity and Description
20 minutes	<p><b>Introduction</b></p> <p>Literacy extension:</p> <p>Write a paragraph about each system, (or any two systems) describing their and their organs’ functions, and their location.</p>
30 minutes	<p>Design your internal organs t-shirt:</p> <ul style="list-style-type: none"> <li>- Collect all the diagrams you made and use them to design their t-shirt</li> <li>- Pick a design from the following ideas:</li> </ul> <p>Idea 1:</p>

- use a plain old t-shirt and glue the organs in order.



The organ diagrams must be glued in the following order:

1. Esophagus
2. Two lungs and between them the heart
3. Stomach and on top of it the liver
4. The large intestine and inside of it the small intestine
5. The urinary system (kidneys and bladder) behind the large and small intestines

Label and/or write on each organ one sentence or some words indicating its function. For example, on the stomach, you can write “blends food”.

Idea 2:

- Instead of old plain t-shirts, you can use a big paper bag
- Make a round hole at the bottom of the bag so that you are able to “wear” it by inserting your head through the hole
- Cut the sides of the bag so you can insert your arms.
- On the front side, glue all the organs in the same order suggested above.

Idea 3:

- Make your own apron out of cloth or paper, and glue the organs on to the apron

	 <p>Each organ is pasted in velcro and is removable.</p> <p>Small Intestine</p>
<p><b>15 minutes</b></p>	<p>Present your t-shirt or apron to their family or friends, describing the functions of each organ and their location.</p>

<p><b>Additional enrichment activities:</b></p>	<ul style="list-style-type: none"> <li>For advanced learners, the internal organs and their functions can be described in more scientific detail (for example, discuss the four chambers of the heart and their functions)</li> </ul>
<p><b>Modifications for simplification</b></p>	<p><b>Day 1:</b></p> <ul style="list-style-type: none"> <li>Skip the measurement exercises and instead emphasize the basic process of inhaling and exhaling.</li> <li>Remove technical terms and use simpler language to describe the functions of body parts.</li> </ul> <p><b>Designing Organs T-Shirt:</b></p> <ul style="list-style-type: none"> <li>Simplify the design by using pre-made organ images or stickers to represent the internal organs on the T-shirt.</li> <li>Focus on a few key organs, such as the heart, lungs, and stomach, instead of covering the entire digestive and urinary systems.</li> </ul>

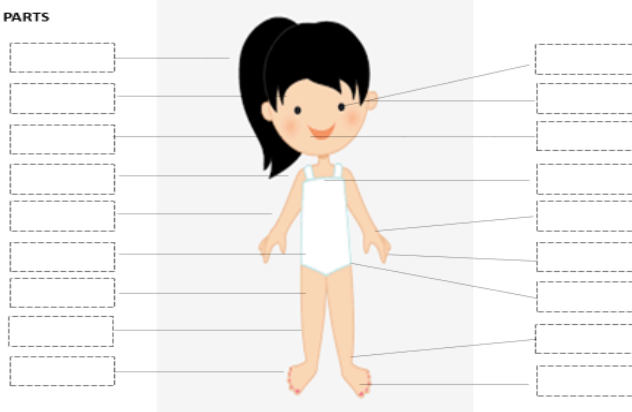
## ASSESSMENT CRITERIA

A majority of my learners were able to:

- Identify the name of interior organs and their functions accurately
- Draws the internal organs accurately.
- Design an Organs T-Shirt creatively.
- Write a paragraph describing any two systems and their functions with scientific accuracy.

## APPENDIX – DAY 1

LABEL ALL THE BODY PARTS



Description of each part of respiratory system

- **Mouth and nose:** Openings

that pull air from outside your body into your respiratory system.

- **Pharynx (throat):** Tube that delivers air from your mouth and nose to the trachea (windpipe).
- **Trachea:** Passage connecting your throat and lungs.
- **Bronchial tubes:** Tubes at the bottom of your windpipe that connect into each lung.
- **Lungs:** Two organs that remove oxygen from the air and pass it into your blood.
- **Diaphragm:** Muscle that helps your lungs pull in air and push it out

### Additional information on the respiratory system:

#### Does the respiratory system have other functions?

- Allows you to talk and smell
- Brings air to body temperature and moisturizes it to the humidity level your body needs
- Protects your airways from harmful substances and irritants

## APPENDIX – DAY 3

### Additional information on the urinary system:

Describe each part, its location, and the function of each organ:

1. The **kidneys** are two bean-shaped organs, each about the size of a fist, located just below the rib cage, one on each side of your spine. The kidneys are responsible for getting rid of waste products, drugs, and toxins through our urine (It acts as a filter)
2. The **ureters** carry the urine away from the **kidneys** to the urinary bladder, which is a temporary reservoir for the urine.
3. The **bladder** temporarily stores **urine** – it is a hollow organ with stretchable walls.

Sample materials needed to create urinary system model

## APPENDIX – DAY 4

