



4.3 Marking Key

This guide includes sample answers, task-specific observable elements, (Appendices 1 and 2), descriptive evaluation rubrics for each competency (Appendices 3 and 4), and non-descriptive scales (Appendices 5 and 6).

Examples of appropriate responses

Task 1: Preventing the Spread of Chagas Disease

Use scientific principles to explain how the sprayer works. You may use diagrams to support your answer.

Possible key words for answers: pressure, volume, compressible fluid, incompressible fluid

The air pump assembly is used to pump air into the tank of the pesticide sprayer.

As a greater volume of air is added into the tank, the pressure builds up inside. Air is a compressible fluid. As more air is pumped into the tank, the air in the tank becomes increasingly more compressed. The compressed air exerts pressure on the liquid in the sprayer. (The liquid is an incompressible fluid).

When the tank is pressurized, the pressure inside the tank is greater than the air pressure outside of the tank.

When the sprayer handle is pressed down, it opens a valve inside the handle. The force of the compressed air pushes the liquid out of the pesticide sprayer. The liquid will be forced out of the sprayer until the pressure in the tank equalizes with the pressure outside of the tank.

The tank can be re-pressurized once the sprayer is weak. Re-pumping adds more air to the tank and the resulting increase in pressure can once again force the liquid out of the sprayer.





Task 2: Troubleshooting

Sprayer 1

What part(s) of the tank would you check and why?

The pressure builds up in the tank if the air stays inside the tank and is compressed. The pressure may not be building up if the tank is not properly sealed.

I would check:

- *the O-ring on the pump assembly to make sure that the seal between the air pump assembly and the tank assembly is tight*
- *the seal between the dip tube and the hose*
- *the tank to see if there are any cracks or leaks in it*

Sprayer 2

You filled up the tank part way with water and when you used the pump assembly, the tank pressurized. When you pressed on the sprayer handle, nothing happened. No water came out of the hose.

What part(s) of the sprayer would you check and why?

There are two reasons why the water may not have come out of the sprayer:

- 1) Debris is clogging the sprayer, preventing it from moving through the discharge assembly.*
- 2) The cut-off valve is not working properly. If there is no opening to the outside of the tank, then the water cannot leave the sprayer.*

I would check

- *the filter, the dip tube, the nozzle and the hose to see if any debris is stuck inside these parts*
- *the sprayer handle and the cut-off valve to see if it is working properly*





Task 3- Fernando's Fatigue

Circulatory System

Function:

The primary function of the circulatory system is the transportation of materials throughout the body. This includes:

- *Carrying digested food from the small intestine to all areas in the body that need it*
- *Carrying oxygen from the lungs to the rest of the body*
- *Aiding in the disposal of wastes from the body*
- *Distributing heat*

In addition, the circulatory system fights diseases by using white blood cells to fight off infection.

Respiratory System

Function:

The primary function of the respiratory system is to supply the blood with oxygen and to provide a means by which the waste gas of metabolism, carbon dioxide, can be eliminated from the body.

Explanation of how cardiomyopathy affects the circulatory and respiratory systems and makes Fernando feel so tired:

The circulatory and the respiratory systems work together to deliver oxygen to the cells. The respiratory system brings oxygen into the lungs when we breathe in and provides the site for the oxygen to enter the bloodstream (the alveoli). The circulatory system then carries the oxygen to the cells.

The heart is the pump for the circulatory system. Cardiomyopathy causes the walls of the heart to thicken and become rigid so the pump can no longer work as well. A thicker heart wall means that there is not as much space in the heart chambers for blood. Therefore, less blood can be pumped out of the heart to the body each time the heart beats or contracts.

If the heart is not able to pump enough blood, it is harder to transport all of the digested food and oxygen that the body needs to function. Oxygen and glucose (digested food) is needed by the body for cellular respiration. Cellular respiration is a process that releases energy to the body.

Furthermore, the heart will not be pumping blood as efficiently to the lungs and the alveoli for gas exchange. Therefore, oxygen will not be entering the blood stream as quickly.

The heart will also have to beat faster in an effort to meet his body's need for oxygen and nutrients.

Therefore, Fernando is feeling tired because not enough oxygen and digested food is getting to his cells, to produce energy for his body.





Task 4- Fernando's Abdominal Pain

Explain how food is normally digested and absorbed within the digestive tract. You may support your answers with diagrams where appropriate.

Use the following key words in your answer:

Mechanical transformation, chemical transformation, stomach, small intestine, large intestine, proteins, carbohydrates, lipids, water.

Digestion begins in the mouth. When we chew our food, the teeth tear and chop the food, starting the mechanical transformation of our food. Saliva is released into the mouth moistening it for easy swallowing. The saliva also contains enzymes that start to break down the carbohydrates (chemical transformation).

The food is swallowed and travels through the esophagus into the stomach. The mechanical and chemical transformation of food continues in the stomach. The stomach muscles churn and mix the food with acids and enzymes, breaking it into much smaller, more digestible pieces (mechanical transformation). The enzymes then start the digestion of proteins (chemical transformation).

The partially digested food moves into the small intestine. This is where the chemical transformation of proteins, carbohydrates, and lipids is completed.

The end products of this digestion are then absorbed into the bloodstream through the villi of the small intestine.

Waste products move into the large intestine. The function of the large intestine is to reabsorb water, which is always needed by the body. The solid waste is then excreted from the body through the rectum and anus.

Explain how an inflamed large intestine (colon) could interfere with the normal functioning of digestion.

The inflamed large intestine may have the following effect:

The inflamed large intestine may make it difficult for food to move normally through the digestive tract. Since muscle tone is lost in the colon, then the intestinal wall may not be able to contract and move the waste through the colon. The waste may gather in the inflamed area. Since water is reabsorbed in the large intestine, then the waste may become dried out and hard, blocking the system.





