BASIC 9

WEEKLY LESSON PLAN – WEEK 4

Strand:	Health Education		**Sub-Strand:**	Nutrition and Physical activity	
Content Standard:	B9.1.1.1 Demonstrate understanding of nutritional problems associated with participation in physical activity.				
Indicator (s)	B9.1.1.1.2: Discuss the role of water in relation to nutrition and physical activity.		**Performance Indicator:** Learners can describe the importance of water activity in food.		
Week Ending	04-10-2024				
Class	B.S.9	**Class Size:**		**Duration:**	
Subject	Physical Education				
Reference	Physical Education Curriculum, Teachers Resource Pack, Learners Resource Pack.				
Teaching / Learning Resources	Poster, Pictures and Video		**Core Competencies:**	• Critical thinking • Problem Solving	

DAYS/DATE	**PHASE 1 : STARTER**	**PHASE 2: MAIN**	**PHASE 3: REFLECTION**
MONDAY	Ask Learners to explain reasons why they drink water.	1. Discuss with the Learners about the meaning of "water activity" in food. 2. Assist Learners to identify examples of water activity ($a_{w)}$ values in food. 3. Demonstrate using the water activity formula to measure vapor pressure of food and vapor pressure of pure water. **What is water activity (a_w)?** Knowing how much water your food contains is relatively simple. If you don't know what it is, can determine it by drying the food. The weight loss during drying represents how much water was present. If you know the water content of the ingredients that make up the product, you can calculate the water content of the overall mixture of these ingredients. You might need to take into account some evaporation, but generally, basic math will suffice. **Examples of a_w-values in food** Generally speaking, the 'wetter' a product, the higher the water activity. As you can see in the list below, most of these values are still quite intuitive.	Assist Learners to calculate the water activity using a formula. **Exercise;** 1. What is water activity? 2. State 4 examples of water activities.

Food Product	**Typical water activity**
Fresh fruits & vegetables	0.99
Fresh meat	0.99

Milk	0.99
Bacon	0.97
Bread	0.95
Flour tortilla	0.92
Jams	0.8
Soy sauce	0.8
Peanut butter	0.7
Rice	0.5-0.6
Honey	0.5-0.6
Roasted coffee beans	0.1-0.3

The formula for water activity

Water activity is a physical measure and can be described using a basic formula:

$$a_w = p_{vapor} / p_0$$

Where:

- p_{vapor} = vapor pressure of your food
- p_0 = vapor pressure of pure water (under those same conditions)

The vapor pressure of a liquid is a measure for how easily that liquid evaporates. More formally said, it's the pressure that results from the evaporation of a liquid above a liquid in a closed container.

Liquids always evaporate to some extent. If you leave a glass of water on your countertop, the amount of water in that glass will decrease over time. Water activity compares just how easily water from your food product evaporates compared to that of pure water. If the water in your food is bound, thus not available, it won't evaporate as easily, thus lowering the water activity. The water activity of pure water is always the highest possible value

THURSDAY	Review Learners knowledge on the meaning and examples of water activities.	1. Discuss with the Learners about how to increase and lower water activity. 2. Learners in small groups to discuss and report to the class on the importance of water activity in food. 3. Learners brainstorm to differentiate between water activity and humidity. **How do you lower (or increase) the water activity?** Even though water content and water activity are not the same thing, they are related. Generally speaking, keeping everything else the same, adding more water, will increase the water activity for instance. Less water does decrease water activity. For instance, a dry cracker has a lower water activity than a moist bread. So you can decrease the water activity of your food product by drying it. The other major factor that impacts water activity is the composition of your food. Some ingredients 'bind' water, making it less available. Sugar for instance is very good at binding water and thus lowering the water content. Salt can do so as well, but to a lesser extent (without it becoming inedible because of the saltiness!). **Humidity and water activity** The air that surrounds us also contains moisture. How much moisture is in the air depends on the weather and climate. In humid areas, air contains a lot more water than the air in dry desert-like areas does. Just how much water is in the air, is expressed using the relative humidity. You might have seen it being used in weather forecasts. It is expressed in a value ranging from 0 to 100%, with 0% being completely dry air. The relative humidity and water activity of a product are closely related. If you leave a product in air of a specific relative humidity the moisture content will balance out over time. In other words, if the air is very humid and the product has a low water activity, the product will absorb moisture from the air. Its water activity will increase. However, if the relative humidity of the air is very low the opposite will happen, the product will dry out over time. **Measuring water activity** Scientists use this phenomenon of moisture balancing out between the air and a food product to determine the water activity of a food. If you enclose the food product in a small chamber, the humidity of the surrounding air will be in equilibrium with that of the sample. By measuring that equilibrium relative humidity value (ERH), you know the water activity of the food. This is expressed	Through questions and answers, conclude the lesson. **Exercise;** Differentiate between water activity and humidity.

		in a very simple formula: $a_w = ERH / 100$	

Name of Teacher: **School:** **District:**