

Biology & Chemistry Integration

HIGH SCHOOL SCIENCES UNIT
E.O. MIRIAM ARMBRISTER

Junkanoo

DEPARTMENT OF EDUCATION
CURRICULUM AND INSTRUCTION DIVISION
JUNKANOO INTEGRATION

SUBJECT: Diffusion and Osmosis

GRADE: 10

Pacing Guide Week #	Topic (As displayed on the Pacing Guide)	Objectives (As outlined in the Curriculum)	Integration Strategy (Activities)	Resources
Week One January 6-9, 2025	Transport in Cells	Use coloured substances to demonstrate diffusion. Observe diffusion of substances in air and liquids. Illustrate examples of diffusion in the human body.	Lesson Activity: "How Cells Stay Active During Junkanoo" Begin by discussing the importance of cellular processes like diffusion in maintaining the body's energy levels. Relate this to how people participating in strenuous activities, like dancing or playing drums in Junkanoo, rely on their cells to perform efficiently.	KMnO ₄ Crystals

			Explain how diffusion helps transport oxygen to muscles during activities like parades or performances.	
Week Two January 13-17, 2025	Transport in Cells	<p>Perform an experiment to show osmosis. Use apparatus and materials to demonstrate osmosis.</p> <p>Measure materials needed for osmosis experiment.</p> <p>Make observations of osmosis.</p>	<p>Discuss how festival participants need to stay hydrated. Link this to osmosis, where water moves into cells to keep them functioning.</p> <p>Experiment: Simulating Diffusion and Osmosis</p> <p>Provide students with materials to simulate these processes</p> <p>Show how substances like water and nutrients move in and out of cells during physical activity.</p>	Beaker with water, salt, sugar, dialysis tubing, (cellophane) and starch solutions).
Week Three January 20-24, 2025		<p>Formulate a conclusion from Experiments on diffusion and Osmosis</p> <p>Describe simply the process of active transport.</p>	<p>Interactive Role-Play</p> <p>Assign students roles as "water molecules," "salt," or "cell membranes" to act out diffusion and osmosis scenarios.</p>	

			Create a scenario where "cells" of dancers or drummers absorb water (osmosis) or exchange oxygen and carbon dioxide (diffusion). Adjust players to represent active transport.	
Week Four January 27-31, 2025		<p>Compare and contrast the mechanisms of simple diffusion, facilitated diffusion osmosis and active transport.</p> <p>Classify each type of transport in cells as passive or active.</p>	<p>Reflection and Discussion</p> <p>Ask students to describe how understanding these processes helps us care for our bodies during physically demanding activities.</p> <p>Discuss the significance of hydration and nutrition for Junkanoo participants.</p>	

JUNKANOO INTEGRATION

SUBJECT: The Human Heart

GRADE: 11

Pacing Guide Week #	Topic (As displayed on the Pacing Guide)	Objectives (As outlined in the Curriculum)	Integration Strategy (Activities)	Resources
Week One January 6-9, 2025	The Human heart	<ul style="list-style-type: none"> • Observe the external and internal appearance of the human heart. • Draw and label the external features of a mammalian heart. Use a scalpel or other cutting utensil to dissect the heart of a mammal. • Use a magnifying lens to observe the structure of the heart. • Observe the internal structure of a mammalian heart. • Relate the structures of the heart to their function. • Show the direction through which blood flows through the heart. 	<ul style="list-style-type: none"> ☐ Discussion about Junkanoo, highlighting activities like dancing, drumming, or carrying floats. ☐ Pose a question: <i>What happens to your heart when you engage in these activities?</i> ☐ Use a quick demonstration: have students jog in place for one minute, then feel their pulse. Discuss their observations. ☐ Use a model or diagram to show the heart's chambers, valves, and blood flow path. ☐ Explain how the heart rate increases during strenuous activities to supply muscles with more oxygen. 	

<p>Week Two January 13-17, 2025</p>		<ul style="list-style-type: none"> • Design investigations to determine the effects of external factors on heartbeat. • Show the direction through which blood flows through the heart. 	<p>Hands-On Activity: "Heartbeat Race" – Skill B or C BGCSE Coursework</p> <p>Students will measure their resting heart rates, then perform different festival-like activities (e.g., miming drumming, dancing, or running in place for 2 minutes). Record their heart rates after each activity and plot them on a graph to analyse trends.</p> <p>Discuss why heart rates increase and the importance of recovery time.</p>	<p>Stopwatches, charts, and markers.</p>
<p>Week Three January 20-24, 2025</p>		<p>Research the common causes and effects of heart disease.</p> <p>Describe the relationship between intake of dietary cholesterol and fatty deposits on artery walls.</p> <p>Use sphygmomanometer to measure blood press</p>	<p>Junkanoo Connection</p> <p>Discuss the role of physical activity in festivals from around the world.</p> <p>Highlight how the human heart supports endurance in traditional activities (e.g., drummers maintaining rhythms, dancers performing routines).</p>	<p>sphygmomanometer</p>

			<p>Relate this to health: how a strong heart supports Junkanoo expressions.</p> <p>Discuss dangers of rushing with a un healthy heart. Recap how the heart works harder during festivals. Ask students: <i>Why is it important to maintain heart health, especially for Rushing activities?</i></p> <p>Encourage students to share their favourite Junkanoo activities and discuss how they can care for their hearts during them. 78</p>	
<p>Week Four January 27-31, 2025</p>		<p>Construct a model of the human heart.</p>	<p>Construct a model of the heart using Junkanoo techniques.</p> <p>Students create a diagram or drawing that shows the connection between the heart, muscles, and Junkanoo.</p> <p>Encourage them to label how oxygen and nutrients travel to support energy and movement.</p>	<p>Crepe paper, glue, tricks etc.</p>

DEPARTMENT OF EDUCATION
CURRICULUM AND INSTRUCTION DIVISION
JUNKANOO INTEGRATION

SUBJECT: Endocrine System

GRADE: 12

Pacing Guide Week #	Topic (As displayed on the Pacing Guide)	Objectives (As outlined in the Curriculum)	Integration Strategy (Activities)	Resources
Week One January 6-9, 2025		Distinguish between exocrine and endocrine glands. Identify the major endocrine glands. Match hormones to the glands that secrete them.	<ul style="list-style-type: none"> ☐ Set the stage: Describe Junkanoo with activities like dancing, drumming, and playing instruments ☐ Pose the question: <i>How does the body prepare for and sustain energy during such a festival?</i> ☐ Briefly introduce key endocrine glands (e.g., adrenal glands, pancreas, pineal gland etc.). ☐ Explain their roles: e.g. <p>Adrenal glands: Release adrenaline to boost energy</p>	

			<p>and heart rate during physical activity.</p> <p>Pancreas: Regulates blood sugar for energy.</p> <p>Relate these functions to Junkanoo activities like staying alert and energetic during night time performances.</p>	
<p>Week Two January 13-17, 2025</p>		<p>Make a visual presentation to describe the importance of maintaining a specific amount of a hormone in the body.</p>	<p>Interactive Activity: "Gland Relay"</p> <p>Divide students into groups and assign roles as glands, hormones, or body parts (e.g., muscles, heart).</p> <p>Create scenarios: "The dancers need energy for their routine." Students role-play how glands release hormones (adrenaline, insulin) and how these hormones act on body parts.</p> <p>Include night time factors, such as melatonin levels being lower to stay alert.</p>	<p>Materials: Gland cards, role descriptions, and props.</p>

<p>Week Three January 20-24, 2025</p>		<p>Rate the importance of the pancreas and adrenal glands compared with two other organs.</p>	<p>Experiment: Hormonal Impact on Energy</p> <p>Simulate the pancreas' role: Students drink a small amount of sugar water, then perform a short physical activity (e.g., jumping jacks).</p> <p>Discuss how insulin helps cells use sugar for energy and how this relates to sustaining activity during the festival.</p>	<p>Materials: Sugar solution, timers, and activity prompts.</p>
<p>Week Four January 27-31, 2025</p>		<p>Continuation of previous week's objectives</p>	<p>Cultural and Biological Reflection</p> <p>Discuss: How adrenaline helps performers stay energetic during a parade.</p> <p>How the body balances melatonin to stay awake at night.</p> <p>How proper nutrition and hydration support the endocrine system during festivals.</p>	

			<p>Creative Connection</p> <p>Students create a comic strip or short story showing how the endocrine system helps someone participate in a cultural festival at night.</p> <p>Share and discuss their creations.</p>	
--	--	--	---	--

CHEMISTRY

The Chemistry of Junkanoo

DEPARTMENT OF EDUCATION
CURRICULUM AND INSTRUCTION DIVISION
JUNKANOO INTEGRATION

SUBJECT: Chemistry – Atomic Structure

GRADE: 10

Pacing Guide Week #	Topic	Objectives	Integration Strategy (Activities)	Resources
Week One January 6-9, 2025	Atomic Structure	The relative mass and charge of protons, neutrons and electrons	<p>"Atomic Structure and Junkanoo"</p> <p>Building Blocks of Junkanoo</p> <p>Begin by asking: <i>What makes up the materials used in Junkanoo—drums, costumes, floats, or even the energy we use to perform?</i></p> <p>Relate these to atoms as the building blocks of everything, including the materials and energy used in a cultural festival.</p>	

Week Two
January 13-17,
2025

Atomic number, mass number,
isotopes and relative atomic mass.

**Atomic Basics: Relative Mass
and Charge:**

Explain the structure of the atom, focusing on protons (positive charge, relative mass = 1), neutrons (no charge, relative mass = 1), and electrons (negative charge, relative mass = ~ 0).

Atomic Number and Mass Number:

Define atomic number (number of protons) and mass number (protons + neutrons).

Relate atomic number to an element's "identity," just as Junkanoo has unique elements.

Isotopes and Relative Atomic Mass:

Use the concept of isotopes to explain how some elements have variations with different numbers of neutrons.

			Discuss relative atomic mass as a weighted average, just as Junkanoo might average the participation of groups over years.	
Week Three January 20-24, 2025		Use the mass number and atomic number to calculate the particles (protons, neutrons and electrons) in an atom. Simple electronic structure of atoms (first 20 elements with Lewis dot diagrams).	Hands-On Activity: Junkanoo Atom Models Students create a model of an "Junkanoo atom parade," with beads representing protons, neutrons, and electrons: Protons = Drummers (positive energy) Neutrons = Dancers (neutral but adding to the parade mass) Electrons = Spectators (negative charge but buzzing with energy). Assign atomic numbers and mass numbers to their models and label isotopes.	Coloured beads, glue, small sticks, and baseboards.

<p>Week Four January 27-31, 2025</p>		<p>Construct Bohr model of an atom.</p> <p>The relationship between the outer electronic structure and their groupings into families.</p>	<p>Hands-On Activity: Junkanoo Atom Models</p> <p>Students create a model of an "Junkanoo atom parade," with beads representing protons, neutrons, and electrons:</p> <p>Protons = Drummers (positive energy)</p> <p>Neutrons = Dancers (neutral but adding to the parade mass)</p> <p>Electrons = Spectators (negative charge but buzzing with energy).</p> <p>Assign atomic numbers and mass numbers to their models and label isotopes.</p> <p>Role-Playing Game: Atomic Junkanoo Parade</p> <p>Students act out an "atomic Junkanoo parade": Drummers (protons) and dancers (neutrons) march at the centre.</p>	<p>Coloured beads, glue, small sticks, and baseboards.</p>
---	--	---	---	--

			<p>Spectators (electrons) form a buzzing outer ring, "orbiting" the core.</p> <p>Introduce isotopes by varying the number of dancers (neutrons) while keeping the number of drummers (protons) constant.</p> <p>Discuss how this relates to isotopic variations.</p> <p>Real-Life Connection: Junkanoo Materials</p> <p>Discuss how elements like iron (Fe) in drums or copper (Cu) in wires are made up of atoms with specific atomic and mass numbers.</p> <p>Explore isotopes used in lighting or energy sources (e.g., carbon isotopes in fireworks chemistry).</p> <p>Relate this to the energy required for dancers, drummers, and spectators, linking atomic-level processes to physical energy.</p>	
--	--	--	--	--

			<p>Creative Reflection: Junkanoo Atomic Poster</p> <p>Students create a poster connecting the components of a Junkanoo to atomic structure (e.g., "Drums powered by iron atoms: Atomic number 26, mass number 56").</p> <p>Include isotopic variations and the role of relative atomic mass in materials used for Junkanoo lead pieces and costumes.</p>	
--	--	--	---	--

DEPARTMENT OF EDUCATION
CURRICULUM AND INSTRUCTION DIVISION
JUNKANOO INTEGRATION

SUBJECT: Acids, Bases and Salts

GRADE: 11 Chemistry

Pacing Guide Week #	Topic	Objectives	Integration Strategy (Activities)	Resources
Week One January 6-9, 2025	Acids, Bases and Salts	Acids, Bases and Salts. Acids: General properties of acids. Chemical reactions of acids in aqueous solution.	Junkanoo Chemistry <i>Discuss: What kinds of materials or reactions do you think are involved in Junkanoo?</i> Highlight examples: Bright colours in Junkanoo decorations (acid-base indicators). Salts used in fireworks and dyes. Food and beverages with acidic or basic properties.	
Week Two January 13-17, 2025		Basicity of an acid. Acid Anhydrides. Acids in living systems Bases & Alkalis: General properties of alkalis.	Basics of Acids, Bases, and Salts	

			<p>Acids: Sour taste, $\text{pH} < 7$, found in citrus fruits, and used in cleaning agents for festival preparation.</p> <p>Bases: Bitter taste, slippery, $\text{pH} > 7$, used in soap and paint for decorations.</p> <p>Salts: Formed from the reaction of acids and bases, used in preserving food and making dyes.</p> <p>Introduce pH scale and neutralization reactions: $\text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water}$</p>	
<p>Week Three January 20-24, 2025</p>		<p>Chemical reactions of bases.</p> <p>Indicators and pH scale to determine acidity, alkalinity and neutrality</p>	<p>Experiment: pH and Colourful Decorations</p> <p>Test the pH of different festival-related materials (e.g., lemon juice for acidic properties, soapy water for basic properties).</p> <p>Use red cabbage juice as a natural indicator to see how acidic or basic substances change colours, mimicking vibrant festival hues.</p>	<p>Litmus paper, turmeric powder, red cabbage juice, and festival items like coloured dyes.</p>
<p>Week Four January 27-31, 2025</p>		<p>Continuation of previous week objectives</p>	<p>Hands-On Activity: Making Festival Salts</p> <p>Conduct a neutralization reaction to form a salt (sodium acetate): $\text{CH}_3\text{COOH} + \text{NaHCO}_3 \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$</p>	<p>Vinegar (acid), baking soda (base), small beakers, and heat sources.</p>

			<p>Relate the process to making salts for preserving food or enhancing fireworks.</p> <p>Fireworks and Dyes Connection (15 minutes)</p> <p>Discuss how salts of metals produce colourful fireworks (e.g., sodium for yellow, copper for green).</p> <p>Sometimes Junkanoo groups use sparklers on their lead pieces</p> <p>Show pictures or videos of firework displays and identify the salts responsible for the colours.</p> <p>Creative Reflection: Junkanoo Chemistry Poster</p> <p>Students design a poster showcasing how acids, bases, and salts are used in various aspects of Junkanoo, such as cleaning, food, decorations, laser lights, fireworks.</p>	
--	--	--	---	--

**DEPARTMENT OF EDUCATION
CURRICULUM AND INSTRUCTION DIVISION
JUNKANOO INTEGRATION**

SUBJECT: Metals

GRADE: 12

Pacing Guide Week #	Topic (As displayed on the Pacing Guide)	Objectives (As outlined in the Curriculum)	Integration Strategy (Activities)	Resources
Week One January 6-9, 2025	Metals	Metals The reactivity series of metals. Extraction of metals from their ores. Properties of Metals.	The Sound of Chemistry. <i>Discussion: What are Junkanoo musical instruments made of, and why are metals commonly used?</i> Highlight examples: Tubas, horns, trumpets: Made of brass (an alloy of copper and zinc). Cowbells: Often made of steel (iron-carbon alloy).	

			<p>Drum frames: Typically aluminium or steel for lightweight durability.</p> <p>Properties of Metals</p> <p>Physical Properties: Lustrous, malleable, ductile, and good conductors of heat and electricity.</p> <p>Chemical Properties: Reactivity with oxygen, acids, and water, leading to corrosion or tarnishing.</p> <p>Relate these properties to why metals are chosen for instruments:</p> <p>Brass produces rich sound due to its density and malleability.</p> <p>Steel's durability makes it ideal for cowbells and drum frames.</p>	
--	--	--	---	--

<p>Week Two January 13-17, 2025</p>	<p>Metals</p>	<p>Extraction of Aluminium. Extraction of Iron. Blast furnace. The role of limestone.</p>	<p>Experiment: Sound and Metal Density</p> <p>Students strike each metal to compare the sound produced.</p> <p>Discuss how density and composition affect sound quality and pitch.</p> <p>Relate this to why specific metals are used in instruments like trumpets or cowbells.</p>	<p>Small metal plates or rods of different metals (e.g., aluminium, copper, and steel), a mallet or stick, and a resonance board</p>
<p>Week Three January 20-24, 2025</p>	<p>Metals</p>	<p>Creative Reflection</p>	<p>Chemistry in Instrument Design</p> <p>Activity: Students design their own festival instrument using a metal of their choice.</p> <p>Include a brief explanation of why they chose the metal based on its properties (e.g., malleability, resonance).</p>	
<p>Week Four January 27-31, 2025</p>	<p>Metals</p>	<p>Alloys and uses of alloys.</p>	<p>Cultural Connection: Metals in Junkanoo Instruments</p> <p>Explore how traditional materials like goat skin are</p>	

			<p>paired with modern metal frames for drums.</p> <p>Compare how different cultures use specific metals (e.g., brass trumpets in parades, steel cowbells in rhythm sections).</p> <p>Discuss how the chemistry of alloys (e.g., brass and bronze) enhances the sound and durability of instruments.</p>	
--	--	--	---	--