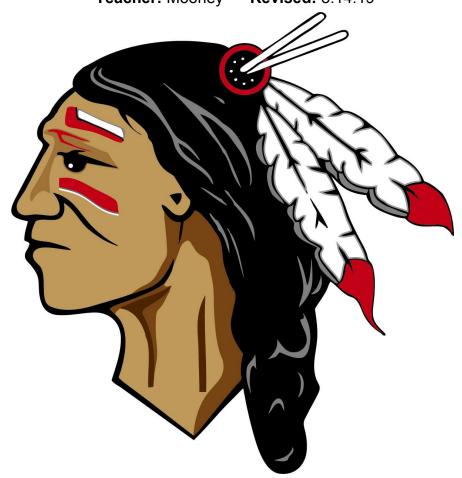
# Westside Middle School 7th Grade Science Curriculum Map 2019-2020

**Teacher:** Mooney **Revised:** 8.14.19



Map is still under construction and will be revised throughout the year.

### WESTSIDE MIDDLE SCHOOL 7TH GRADE SCIENCE CURRICULUM MAP

**Teacher: Mooney** 

### Quarter 1

Topic: Lab equipment and Safety: Scientific Method: Standard Unit of Measure

**Matter Properties and Reaction (Physical Change)** 

#### **Essential Questions:**

### Students will consider.....

- How can particles combine to produce substances with different properties?
- What are the properties of an atom, molecule, element, and compound?
- What stays the same and what changes in a chemical reaction?
- What happens when new materials are formed?

### Students will.....

- Be able to look at various models and distinguish between simple, complex, and crystalline molecules.
- Be able to describe that atoms are not molecules and molecules arise from the attraction between atoms.
- Be able to develop a model to describe unobservable mechanisms.
- Be able to describe the structure of atoms, elements, compounds, and molecules.
- Be able to identify common lab equipment and explain equipment function/use.

#### AR STANDARDS / SKILLS

CONTENT VOCABULARY WITHIN THE STANDARD WILL BE TAUGHT THROUGHOUT DAILY OBJECTIVES / GOALS.

<u>7-PS1-1</u> Develop models to describe the atomic composition of simple molecules and extended structures.

<u>7-PS1-4</u> Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

<u>7-PS1-2</u> Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

<u>7-PS1-5</u> Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Science/Engineering Practices	Disciplinary Core Idea	Crosscutting Concepts:
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.  Develop a model to describe phenomena. (PS1-1) Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.  Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (PS1-4)  Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (PS1-3)	PS1.A: Structure and Properties of Matter Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (PS1-1)  The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (PS1-2)  Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (PS1-3)	Cause and Effect Cause and effect relationships are routinely identified, tested, and used to explain change. (PS1-4) Scale, Proportion, and Quantity Natural objects exist from the very small to the immensely large. (PS1-1) Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (PS1-2, PS1-3)

Activities/Skills	Assessments	Resources	Vocabulary/Terms
<ul> <li>Atomic Structure Concept Sort</li> <li>Build An Atom Activity</li> <li>Build A Molecule</li> <li>Molecule Presentation</li> <li>Develop a model to predict and/or describe phenomena</li> <li>Analyze and interpret data to determine similarities and differences in findings.</li> <li>Gather and synthesize information to explain what happens during changes between solid and gas.</li> <li>Develop and use models to explain how pressure and volume of a gas are related.</li> <li>Use mathematical representations to explain how volume and temperature of gas are related.</li> </ul>	<ul> <li>Formative Assessments</li> <li>Lab Criteria</li> <li>Graphs</li> <li>Writing/CER/Reflections</li> <li>Develop a model to predict and/or describe phenomena</li> <li>Analyze and interpret data to determine similarities and differences in findings.</li> <li>Apply scientific principles to describe the motion of particles of motion in a solid, liquid, gas</li> <li>Construct a scientific explanation based on evidence to describe the motion of particles in a liquid</li> </ul>	<ul> <li>Kesler</li> <li>PHeT Simulations</li> <li>ADI</li> <li>AIMS</li> </ul>	<ul> <li>Independent Variable</li> <li>Dependent Variable</li> <li>Metric system</li> <li>Pipette</li> <li>Digital Scale</li> <li>Triple Beam Balance</li> <li>Weight Boat</li> <li>Scoopula</li> <li>Beaker</li> <li>Graduated Cylinder</li> <li>Erlenmeyer Flask</li> <li>Volumetric Flask</li> <li>Metric Mass</li> <li>Metric Volume</li> <li>Atomic composition</li> <li>Molecules</li> <li>Atom</li> <li>Particle</li> <li>Pure substance</li> <li>Proton</li> <li>Neutron</li> <li>Electron</li> <li>Nucleus</li> <li>Particle</li> <li>Pure substance</li> <li>Thermal energy</li> <li>Chemical reaction</li> <li>Conservation of mass</li> <li>Chemical process</li> <li>Particle motion</li> <li>State</li> </ul>

	Temperature

### **Quarter 2**

**Topic: Matter Properties and Reaction (Physical Change)** 

### **Essential Questions:**

#### Students will consider.....

- How can particles combine to produce substances with different properties?
- What are the properties of an atom, molecule, element, and compound?
- What stays the same and what changes in a chemical reaction?
- What happens when new materials are formed?

### Students will.....

- Be able to look at various models and distinguish between simple, complex, and crystalline molecules.
- Be able to describe that atoms are not molecules and molecules arise from the attraction between atoms.
- Be able to develop a model to describe unobservable mechanisms.
- Be able to describe the structure of atoms, elements, compounds, and molecules.

#### AR STANDARDS / SKILLS

CONTENT VOCABULARY WITHIN THE STANDARD WILL BE TAUGHT THROUGHOUT DAILY OBJECTIVES / GOALS.

- 7-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.
- <u>7-PS1-4</u> Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- <u>7-PS1-2</u> Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
- <u>7-PS1-5</u> Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Science/Engineering Practices	Disciplinary Core Idea	Crosscutting Concepts:	

Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

Develop a model to describe phenomena. (PS1-1) Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (PS1-4)

Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (PS1-3)

PS1.A: Structure and Properties of Matter Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (PS1-1)

The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (PS1-2)

Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (PS1-3)

Cause and Effect

Cause and effect relationships are routinely identified, tested, and used to explain change. (PS1-4) Scale, Proportion, and Quantity Natural objects exist from the very small to the immensely large. (PS1-1)

Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (PS1-2, PS1-3)

Connections to Nature of Science Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Science assumes consistent patterns in natural systems. (PS1-2)

Activities/Skills	Assessments	Resources	Vocabulary/Terms
<ul> <li>Atomic Structure Concept Sort</li> <li>Build An Atom Activity</li> <li>Build A Molecule</li> <li>Molecule Presentation</li> <li>Develop a model to predict and/or describe phenomena</li> <li>Analyze and interpret data to determine similarities and differences in findings.</li> <li>Develop and use models to identify the information included in a chemical reaction.</li> <li>Apply scientific principles to explain how mass is conserved during a chemical reaction</li> <li>Use mathematical representations to identify three categories of chemical reactions</li> </ul>	<ul> <li>Formative Assessments</li> <li>Lab Criteria</li> <li>Graphs</li> <li>Writing/CER/Reflections</li> <li>Develop a model to predict and/or describe phenomena</li> <li>Analyze and interpret data to determine similarities and differences in findings.</li> </ul>	Kesler     PHeT Simulations	<ul> <li>Atomic composition</li> <li>Molecules</li> <li>Atom</li> <li>Particle</li> <li>Pure substance</li> <li>Proton</li> <li>Neutron</li> <li>Electron</li> <li>Nucleus</li> <li>Particle</li> <li>Pure substance</li> <li>Thermal energy</li> <li>Chemical reaction</li> <li>Conservation of mass</li> <li>Chemical process</li> <li>Particle motion</li> <li>State</li> <li>Temperature</li> </ul>

### **Quarter 3**

### **Topic: Chemical Processes and the Natural World Interdependence of Matter and Energy in Ecosystems**

**Essential Question(s)** How does photosynthesis and cellular respiration represent the cycling of matter and flow of energy?

How is the ecosystem organized?

What are the two parts of an organism's habitat?

How does competition benefit species?

How does matter transfer through the ecosystem?

Why are producers and consumers important?

What needs are met by an organism's environment?

What are the two parts of an organism's habitat with which it interacts?

What are the levels of organization within an ecosystem?

#### Students will consider.....

- The reaction required to create food for the system needs an energy input (sunlight) to start the process of photosynthesis.
- Photosynthesis is a model of moving matter and flowing energy.
- That molecules are broken apart and put back together and that in this process, energy is released
- Different organisms live in different habitats.
- The need for varying habitats and the supporting factors that make the habitat inhabitable for varying organisms
- The effects of overhunting

#### I will.....

- Model the transfer of matter and energy through organic systems indicating no loss of matter or energy throughout the system.
- Demonstrate how media can manipulate data to misrepresent facts and critical reading and critical analysis can expose the misrepresentation
- Trace movement of matter and flow of energy.
- Use graphical displays to identify biotic and abiotic parts of a habitat
- Gather and synthesize information to identify the needs that must be met by an organism's surroundings

#### AR STANDARDS / SKILLS

CONTENT VOCABULARY WITHIN THE STANDARD WILL BE TAUGHT THROUGHOUT DAILY OBJECTIVES / GOALS.

<u>7-LS1-6</u> Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

<u>7-LS1-7</u> Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

<u>7-LS2-1</u> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

7-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

<u>7-LS2-4</u> Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

7-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.\*

Science/Engineering Practices	Disciplinary Core Idea	Crosscutting Concepts:	
Science and Engineering Practices Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. Develop a model to describe phenomena. (7-LS2-3) Develop a model to describe unobservable mechanisms. (7-LS1-7) Analyzing and Interpreting Data Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. Analyze and interpret data to provide evidence for phenomena. (7-LS2-1)	LS1.C: Organization for Matter and Energy Flow in Organisms § Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (7-LS1-6) § Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (7-LS1-7) LS2.A: Interdependent Relationships in Ecosystems § Organisms, and populations of organisms, are dependent on their	Cause and Effect  § Cause and effect relationships may be used to predict phenomena in natural or designed systems. (7-LS2-1)  Energy and Matter  § Matter is conserved because atoms are conserved in physical and chemical processes. (7-LS1-7) § Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (7-LS1-6) § The transfer of energy can be tracked as energy flows through a natural system. (7-LS2-3)  Stability and Change § Small changes in one part of a system might cause large changes in another part.	

- environmental interactions both with other living things and with nonliving factors. (7-LS2-1)
- § In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (7-LS2-1)
- § Growth of organisms and population increases are limited by access to resources. (7-LS2-1)

### LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

§ Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (7-LS2-3)

### LS2.C: Ecosystem Dynamics, Functioning, and Resilience

§ Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (7-LS2-4)

### PS3.D: Energy in Chemical Processes and Everyday Life

§ The chemical reaction by which plants produce complex food (7-LS2-4)

Connections to Nature of Science

# Scientific Knowledge Assumes an Order and Consistency in Natural Systems

§ Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (7-LS2-3)

	molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (7-LS1-6) § Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (7-LS1-7)		
Diagram of leaf     Use of manipulatives to balance equations     Illustrated the law of conservation of matter     Create a model to represent the flow of energy     Create a diagram of how energy is transferred to humans     Compare habitats: describe habitat and make list of biotic and abiotic features     Use graphical displays to identify factors that limit population growth	<ul> <li>Formative Assessments</li> <li>Lab Criteria</li> <li>Graphs</li> <li>Writing/CER/Reflections</li> <li>Develop a model to predict and/or describe phenomena</li> <li>Analyze and interpret data to determine similarities and differences in findings.</li> <li>Creation of energy flow model using student choice of presentation tools.</li> <li>Which model is stronger defense using CER writing - in slides</li> <li>Gallery walk post-it graphic organizer - examination of last column for student summary</li> <li>Use mathematical representations to explain the causes of changes in population size</li> </ul>	Resources  • Kesler • BetterLesson Activities	<ul> <li>photosynthesis</li> <li>matter</li> <li>energy</li> <li>organism</li> <li>glucose</li> <li>ATP</li> <li>oxygen</li> <li>oxygen-gas</li> <li>Biotic</li> <li>Abiotic</li> <li>Habitat</li> <li>Population</li> <li>Community</li> <li>Limiting factor</li> <li>cause/effect</li> </ul>

### **Quarter 4**

### Topic:

Interdependence of Matter and Energy in the Ecosystem Earth's Systems

#### **Essential Questions:**

How do you determine population size?

What causes populations to change in size?

What factors limit population growth?

How do an organism's adaptations help it to survive?

What are the major ways in which organisms in an ecosystem interact?

What are the three types of symbiotic relationships?

What are the 10 major biomes?

What are the environmental factors associated with my biome?

What vegetation and animal life are in my biome?

What is a mineral?

What are the 3 main types of rock?

What is the rock cycle

Students will consider.....

#### I will.....

- Identify the needs that must be met by an organism's surroundings.
- Identify biotic and abiotic parts of a habitat.
- Describe the levels of organization within an ecosystem.
- Describe methods for determining the size of a population.
- Explain the causes of changes in population size.
- Identify factors that limit population growth.
- Explain how an organism's adaptations help it survive.
- Describe the major kinds of interaction among organisms in an ecosystem.
- Identify the three types of symbiotic relationships.
- Identify terrestrial and aquatic biomes
- Describe the environmental factors and the plants and animals of each biome

- Identify the location of different biomes on a world map
- Understand the interrelationship between environmental factors and the plants and animals within a biome
- Describe examples of plant and animal adaptations to specific biomes
- Identify the 3 main types of rocks.
- construct an explanation to explain how rocks form

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#### **AR STANDARDS / SKILLS**

CONTENT VOCABULARY WITHIN THE STANDARD WILL BE TAUGHT THROUGHOUT DAILY OBJECTIVES / GOALS.

<u>7-LS2-1</u> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

7-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

7-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

<u>7-LS2-4</u> Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

7-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.\*

7-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

quantitative relationships between variables that predict phenomena. (7-LS2-2)

### **Engaging in Argument from Evidence**

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

• Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (7-LS2-5)

Developing

### and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to describe phenomena. (7-LS2-3)
- Develop a model to describe unobservable mechanisms. (7-LS1-7)

Analyzing and Interpreting Data Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing (7-LS2-2)

### LS2.C: Ecosystem Dynamics, Functioning, and Resilience

Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (7-LS2-5)

### LS4.D: Biodiversity and Humans

Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (7-LS2-5)

### ETS1.B: Developing Possible Solutions

§ There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (7-LS2-5)

# Engineering, and Technology on Society and the Natural World

The use of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (7-LS2-5)

### Connections to Nature of Science

# Science Addresses Questions About the Natural and Material World

§ Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (7-LS2-5) between correlation and causation, and basic statistical techniques of data and error analysis.

• Analyze and interpret data to provide evidence for phenomena. (7-LS2-1)

### **Constructing Explanations and Designing Solutions**

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.

• Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (7-LS1-6)

### **Engaging in Argument from Evidence**

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or

solutions about the natural and designed world(s).  • Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (7-LS2-4) Connections to Nature of Science Scientific Knowledge is Based on Empirical Evidence  • Science knowledge is based upon logical connections between evidence and explanations. (7-LS1-6)  • Science disciplines share common rules of obtaining and evaluating empirical evidence. (7-LS2-4)			
Activities/Skills	Assessments	Resources	Vocabulary/Terms
<ul> <li>construct a model and explanation based on evidence of geoscience processes to describe the theory of plate tectonics.</li> <li>Create model of energy flow through the food web</li> <li>Analyze and interpret graphs to determine relationship between resource availability and population</li> <li>Observe an area of the school grounds and write using</li> </ul>	<ul> <li>Formative assessments</li> <li>Exit tickets</li> <li>CER writing</li> <li>Use research to write predictions about relationships among organisms in two ecosystems</li> <li>Perform and analyze an experiment that tests the effects of water availability on marigold seeds.</li> <li>Construct an explanation to to define minerals</li> </ul>	<ul> <li>Gizmos</li> <li>Readworks</li> <li>Kesler</li> <li>Better Lessons</li> </ul>	<ul> <li>Density independent limiting factors</li> <li>Density dependent limiting factors</li> <li>Symbiosis</li> <li>Parasite</li> <li>Mutualism</li> <li>Predator</li> <li>Natural Selection</li> <li>Commensalism</li> <li>Extrusive Rock</li> <li>Intrusive Rock</li> </ul>

consideration of biotic/abiotic/limiting factors that will contribute to tree growth  Gather and synthesize information to identify resources humans obtain from ecosystems.  Explain how human activities affect ecosystems  Identify characteristics of igneous rock  Identify and classify the three major types of sedimentary rocks	<ul> <li>Construct an explanation to explain how minerals are formed.</li> <li>Create model to explain the rock cycle</li> </ul>		<ul> <li>Sediment</li> <li>Compaction</li> <li>Organic Rock</li> <li>Chemical Rock</li> <li>Erosion</li> <li>Deposition</li> </ul>
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