**Unit Essential Question(s):** What are the characteristics of each of the world's biomes?

**Concept:** Biome basics

**Concept:** Biome Characteristics
- Biome Characteristics (4.4.7.C, 4.6.10.A)

**Lesson Essential Question(s):**
- What is a biome and what characteristics distinguish each biome? (A)
- What adaptations does the tapir have to survive in its rainforest habitat? (ET)
- Why do we have different biomes? (A)
- How can we design an experiment to test the characteristics of the biomes? (ET)

**Lesson Essential Question(s):**
- What are the characteristics of each of the forest biomes? (A)
- What are the characteristics of each of the desert biomes? (A)
- What are the characteristics of each of the grassland biomes? (A)
- What are the characteristics of the polar and mountain biomes? (A)
- What are the characteristics of each of the aquatic biomes? (A)

**Vocabulary:**
- biome, theory, soil, climate, adaptation
- forest, desert, grassland, aquatic, tropical rainforest, coniferous forest, boreal forest, temperate deciduous forest, hot desert, cold desert, chapparal, temperate grasslands, savanna, tundra, polar regions, mountain, open ocean, marine coastal, freshwater ponds, streams, etc., freshwater wetlands

**Additional Information:**
Students will use other essential questions to extend and refine at science centers.

**Attached Document(s):**
Concept: Biome basics
biome -
theory -
soil -
climate - the average rainfall and temperature
adaptation -

Concept: Biome Characteristics
forest -
desert -
grassland -
aquatic -
tropical rainforest -
coniferous forest -
boreal forest -
temperate deciduous forest -
hot desert -
cold desert -
chapparal -
temperate grasslands -
savanna -
tundra -
polar regions -
mountain -
open ocean -
marine coastal -
freshwater ponds, streams, etc. -
freshwater wetlands -
**Unit Essential Question(s):** In what ways do living things interact with each other and their environment?

<table>
<thead>
<tr>
<th>Concept: Organization of an ecosystem</th>
<th>Concept: Energy Transfer</th>
<th>Concept: Cycles</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Lesson Essential Question(s):</th>
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</tr>
</thead>
<tbody>
<tr>
<td>What are the needs of all living things? (A)</td>
<td>What are some interactions (living and nonliving) in the grasslands? (ET)</td>
<td>What are the major cycles that take place in an ecosystem? (A)</td>
</tr>
<tr>
<td>What is an ecosystem and what is it made up of? (A)</td>
<td>How is energy transferred in and ecosystem? (A)</td>
<td></td>
</tr>
<tr>
<td>What are some ways living things interact with each other? (A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What living things rely on water for part of their lives? (ET)</td>
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<td></td>
</tr>
<tr>
<td>What niches does an earthworm fill in its ecosystem? (ET)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Vocabulary:**
- ecology, ecosystem, abiotic, niche, organism, organism, community, species, habitat, population, biotic
- producer, secondary, scavenger, niche, energy, consumer, carnivore, decomposer, food chain, primary, omnivore, trophic level, food web, herbivore, tertiary, energy pyramid
- water cycle, carbon cycle, nitrogen cycle

**Additional Information:**
Students will use other essential questions for extending and refining at the science centers.

**Attached Document(s):**
Concept: Organization of an ecosystem
- ecology
- ecosystem
- abiotic
- niche
- organism
- community
- species
- habitat
- population
- biotic

Concept: Energy Transfer
- producer
- secondary
- scavenger
- niche
- energy
- consumer
- carnivore
- decomposer
- food chain
- primary
- omnivore
- trophic level
- food web
- herbivore
- tertiary
- energy pyramid

Concept: Cycles
- water cycle
- carbon cycle
- nitrogen cycle
How can we protect our living world through proper pest management?

Concept: **Introduction to Pests**
- 4.5.7.A, 4.5.10.A, 4.5.12.A

Lesson Essential Question(s):
- How did the cane toads become an exotic pest in Australia? (A)

Vocabulary:
- pest, forest pest, exotic pest, pesticides, toxic

Concept: **Integrated Pest Management**

Lesson Essential Question(s):
- How can we develop a plan to control a pest problem using the steps of integrated pest management? (ET)

Vocabulary:
- pest management, integrated pest management, cultural method, physical method, genetic method, biological method, chemical method, regulatory method

Additional Information:
- Students will use other essential questions to extend and refine at science centers.
Concept: Introduction to Pests
pest -
forest pest -
exotic pest -
pesticides -
toxic -

Concept: Integrated Pest Management
pest management -
integrated pest management -
cultural method -
physical method -
genetic method -
biological method -
chemical method -
regulatory method -
Key Learning: Students should have an understanding of the effects of changes in an ecosystem.

Unit Essential Question(s): How do changes in an ecosystem affect the organisms that live there?

<table>
<thead>
<tr>
<th>Concept: Population</th>
<th>Concept: Long-term changes</th>
<th>Concept: Effects of humans</th>
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</table>

Lesson Essential Question(s):
- How does a population grow? (A) 4.6.10.A
- What is carrying capacity and how does it affect a population? (A)
- How do ecosystems change over time, through the process of succession? (A)
- How have changes affected living things in ecosystems? (A)
- What adaptations do birds have to get their food and survive? (ET)
- How do humans affect ecosystems? (A)
- How did pollution affect a population of moths through natural selection? (ET)

Vocabulary:
- population, carrying capacity, limiting factor, birth rate, exponential, death rate, homeostasis
- pioneer species, behavioral, ecological succession, natural selection, survival of the fittest, primary, secondary, physical, adaptation, responding, climax community
- biodiversity, endangered, biomonitoring, extinct, bio-indicators, threatened, biomagnification

Additional Information:
Students will use additional extending and refining essential questions with the science centers.
Concept: Population
- population
- carrying capacity
- limiting factor
- birth rate
- exponential
- death rate
- homeostasis

Concept: Long-term changes
- pioneer species
- behavioral
- ecological succession
- natural selection
- survival of the fittest
- primary
- secondary
- physical
- adaptation
- responding
- climax community

Concept: Effects of humans
- biodiversity
- endangered
- biomonitoring
- extinct
- bio-indicators
- threatened
- biomagnification
What resources do we get from the Earth?

Key Learning: Students will understand the different resources we get and use from the Earth.

Lesson Essential Question(s):
- "What are some raw resources we get from the Earth and what are they used for?" (A)
- Why are some resources used more than others? (A)
- What is the difference between renewable and nonrenewable resources taken from the Earth? (A)

Lesson Essential Question(s):
- What are the Earth’s energy resources? (A)
- What are the pro’s and con’s of the Earth’s resources? (A)

Lesson Essential Question(s):
- What are some problems the Earth faces due to the use of our resources? (A)
- What can we do to protect our resources? (A)
- How much will items of trash decompose in 4-6 weeks in a model landfill? (ET)

Vocabulary:
- renewable, nonrenewable, availability, resources, raw, fiber, lumber, mineral, ore, metal, nonmetal, cycle
- energy, wind, biomass, oil, hydropower, trash, hydrocarbon, solar, coal, solar cell, geothermal, hydrogen, natural gas, solar collector, nuclear power, petroleum, fossil fuel
- USDA (United States Department of Agriculture), Landfill, reuse, EPA (Environmental Protection Agency), Pollution, decomposition, recycle, DEP (Department of Environmental Protection), waste management, conserve, closing the loop, FDA (Food and Drug Administration)

Additional Information:
- Students will use other essential questions to extend and refine at science centers.
Concept: Types of resources
  renewable -
  nonrenewable -
  availability -
  resources -
  raw -
  fiber -
  lumber -
  mineral -
  ore -
  metal -
  nonmetal -
  cycle -

Concept: Energy resources
  energy -
  wind -
  biomass -
  oil -
  hydropower -
  trash -
  hydrocarbon -
  solar -
  coal -
  solar cell -
  geothermal -
  hydrogen -
  natural gas -
  solar collector -
  nuclear power -
  petroleum -
  fossil fuel -

Concept: Effects of resource use
  USDA (United States Department of Agriculture) -
  Landfill -
  reuse -
  EPA (Environmental Protection Agency) -
  Pollution -
  decomposition -
  recycle -
  DEP (Department of Environmental Protection) -
  waste management -
  conserve -
  closing the loop -
  FDA (Food and Drug Administration) -
In what ways is water important to our world?

Key Learning: Students will understand how watersheds work and the importances of water systems to the living world.

Unit Essential Question(s):

<table>
<thead>
<tr>
<th>Concept: Water Basics</th>
<th>Concept: Watersheds</th>
<th>Concept: Wetlands</th>
</tr>
</thead>
</table>

Lesson Essential Question(s):
Water Basics: What is the water cycle? (A)
What are the properties of water? (A)

Watersheds:
What is a watershed and why is it important to us?
How can we develop the land around Dragonfly Pond with the least negative outcome? (ET)
How do humans affect wetlands and watersheds? (A)
What non-human events affect watersheds and wetlands? (A)

Wetlands:
What are wetlands and why are they important? (A)
How do humans affect wetlands and watersheds? (A)
What non-human events affect watersheds and wetlands? (A)
How can we create metaphors between salt marshes and everyday items? (ET)

Vocabulary:
Water Basics: evaporation, groundwater, transpiration, precipitation, condensation, surface water, water cycle, runoff
Watershed: watershed, mouth, source, load, tributary
Wetland: wetland, marsh, salt marsh, swamp, bog
What is water quality and how does it affect us? (A)

What is the water quality of our water sample, and how can we explain those results? (ET)

What causes acid rain and how does it affect our ecosystems? (ET)

Vocabulary:
pollutants, water quality, acid rain, pollution, sediment, cholera, salinity, dissolved gases, Clean Water Act, waterborne disease, pH

Additional Information:
Additional extending and refining essential questions will be used at the science centers.

Attached Document(s):
Concept: Water Basics
- evaporation
- groundwater
- transpiration
- precipitation
- condensation
- surface water
- water cycle
- runoff

Concept: Watersheds
- watershed
- mouth
- source
- load
- tributary

Concept: Wetlands
- wetland
- marsh
- salt marsh
- swamp
- bog

Concept: Water Quality
- pollutants
- water quality
- acid rain
- pollution
- sediment
- cholera
- salinity
- dissolved gases
- Clean Water Act
- waterborne disease
- pH
How do the activities of humans affect the Earth?"
Concept: Pollution
- Pollution
- Point-Source Pollution
- Nonpoint-Source Pollution
- thermal pollution
- effluent
- sewage

Concept: Laws and Regulations
- Environmental Protection Agency
- Lacey Act
- National Environmental Policy Act
- Wilderness Act
- Clean Air Act
- Safe Drinking Water Act
- Toxic Substance Control Act

Concept: Environmental Issues
- smog
- global warming
- greenhouse effect
- CFC
- acid rain
- ozone layer