Design Your Own Ecosystem

*After planning an **imaginary planet**, you will design a specific **ecosystem** there. In that ecosystem, you will create an entire **food web** of plants and animals and describe how the **community** interacts. Finally, you will devastate your ecosystem with a **disaster**, and explain its effects on each member of the food web.*

*The purpose of this project is for you to start to **question the natural order of things**. Why do Earth's blue skies and brown soil allow plants to thrive, but Mars is a barren red wasteland? Why do most mammals have five toes per foot, but birds only have three? Why is there no dinosaur-sized life left on land? Science can explain all of these things. You just need to inquire.*

Step 1: Imagine Your World

Complete your project using a combination of MS Word, PowerPoint, Prezi, Drawings, Posters, Smart Notebook, or any other media you're comfortable with.

- **What kind of planet will you choose?**

Read through the information below and then choose some details to draw a picture of your planet as it appears from space.

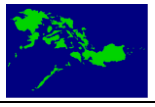
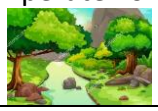
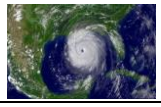
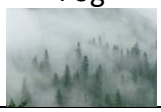
- Simple things like the colour of soil, plants and atmosphere could dramatically change the look of your planet.
  - **Soil** rich in iron will be **red**, like on Mars, whereas glauconite-rich soil is **green**. Though very toxic, cyanide-laced soil has a cool bluish look (cyan). Different materials present in the soil may produce different colours.
  - Some plants can absorb light with yellow or crimson coloured leaves instead of green.
  - The oceans are blue because water absorbs the other colours of light. Only the blue is reflected back at the viewer. If certain particles are dissolved into the water, it may appear green or red instead.
  - Depending on the chemical makeup of your world, it may look like this:

- **Planet size** affects gravity. Bigger planets have stronger gravity. Smaller planets, weaker gravity. Any animals on a giant planet would need to be super tough and strong, and vice-versa.
- **Climate and Weather** can vary from place to place in one planet, but imagine what kind of storms and temperatures are common, and how that will affect the plants and animals in your ecosystem.
    - Snow, rain, hurricane, tornado, volcano, cloud cover, earthquake, tsunami, or just clear, perfect weather.
    - The broad categories are **Tundra/Arctic** (constant freezing temperature), **Tropical** (two seasons with high temperatures), and **Temperate** (four seasons with varying temperatures).
- **Enrichment Options** (for the Science lovers) – There are a number of other factors that influence the environment of the planet and they can have interesting effects on the life found there. Here are some additional details you can investigate along with some of their effects:
    - Distance from sun – volume of organisms/number of living things and temperature
    - Atmosphere – higher oxygen levels allow for larger animals (such as dinosaurs)
    - Distance from other planets/moons – light (reflected from sun) and tides
    - Rotation speed – length of day
    - Orbit speed – length of year
    - Orbital inclination – severity of seasons (a higher axial angle causes more dramatic seasonal extremes)

Step 2: Explain Your Ecosystem's Environment

- Choose terrain, weather, and advanced descriptors from the chart below, or design your own details. Your combination should make scientific sense. For example, don't describe snowy weather in a deep sea ecosystem.
- Describe how the conditions you've selected affect life in your ecosystem.
    - ***Examples:***
        - *Constant strong hurricanes prevent the growth of tall trees and animals.*
        - *Low oxygen levels mean only small, simple animals evolve. Mostly insects, worms, and some small mammals inhabit the mountain.*
        - *Constant fog cover makes it hard to see in the jungle. Predators have evolved broad, heat-sensitive ears to track the tiny sounds and body heat of nearby prey.*
- Create images by hand or computer representing your ecosystem. Label them with the details you have put together.

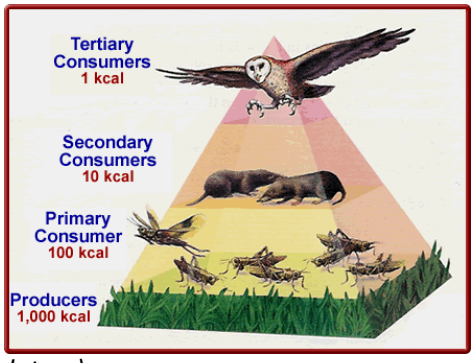
Ecosystem Details

Terrain	Weather	Advanced Descriptors
Mountains 	Dry 	Dark/Bright 
Cave 	Humid 	Pollution 
Ocean 	Rainy 	Small Islands 
Coastal 	Snowy 	Day Length 
Temperate Forest 	Hurricanes 	Unique areas 
Rain Forest 	Tornadoes 	Soil Chemistry 
Desert 	Freezing Rain 	Seasonal Changes 
Swamp 	Hail 	Atmosphere 
Tundra 	Cloud Cover 	Gravity 
Polar Ice Cap 	Toxic Precipitation 	Tides 
Plains/Savanna 	Fog 	Ocean/Land Ratio 

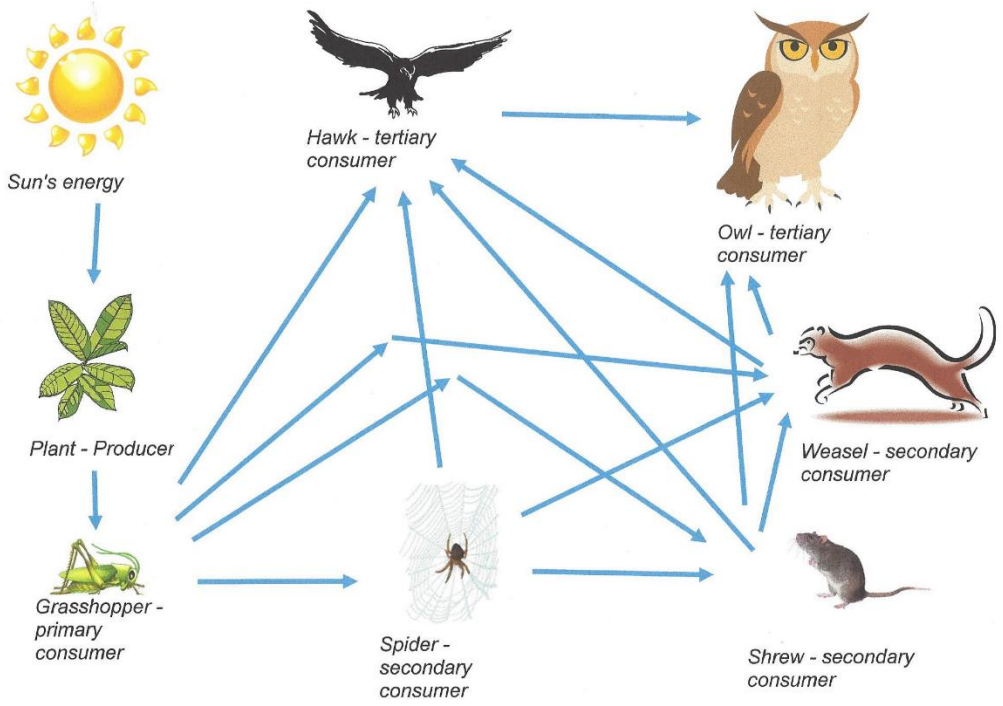
Step 3: Illustrate and Describe the Community of Organisms

Optional Media: MS Word, PowerPoint, Prezi, Drawings, Posters, Smart Notebook

- Name and describe each species in your community.
  - *Choose or create animals from each level of the food pyramid:*
    - *Producers*
    - *Primary Consumers*
    - *Secondary Consumers*
    - *Tertiary Consumers*
    - *Decomposers (Worms, Fungi, Bacteria)*
  - *Write specific details on each member of your community, including:*
    - *What they look like/physical features*
    - *Strengths and weaknesses*
    - *What they eat (prey) and what eats them (predators)*
    - *Physical traits that give them advantages in their environment (e.g., camouflage, cold blood, thick fur, flight, night vision, etc.)*



- Create images, by hand or by computer, of the different species in your community's ecosystem and place them on a food chain.
- Place the pictures and labels in a food web formation, indicating the cycle of energy (what eats what). Make sure to include the sun/star that generates energy for the producer class of organisms. ***Enrichment Option: Build an ecosystem that doesn't rely on solar energy (e.g. geothermal energy).*



Step 4: Create a Disturbance

- Add a disturbance that will affect your ecosystem and/or the community within it.
    - Give specific details about your disturbance. How does it affect species and environments?
    - ***Examples:***
        - *A disease (will affect certain species, as well as your food chain)*



        - *Natural disaster (will affect all species in ecosystem in one way or another, altering your food chain) such as: flood, tropical storm, comet, volcano, climate change, **drought**, heavy snowfall, **tsunami**, hail, **ice storm**.*



        - *Toxin (perhaps a pesticide or chemical spill introduced by humans)*


        - *Invasive species (something from outside the food web that competes for food)*

Step 5: Explain the Immediate Impacts of your Disturbance

- Describe, in detail, how your disturbance will, or will not, impact each member of your ecosystem's community.

Step 6: Explain the Long- Term Impacts of your Disturbance

- Describe, in detail, how your disturbance will impact the species in your community over a longer period of time.
    - Focus on the species that will be impacted the most by your disturbance, and how that will impact your food chain, and ecosystem as a whole.