THE FRAGILE PLANET INTRODUCTION

The Goldilocks Effect (4 conditions), GAIA, the 4 spheres (BLAH), and the 4 Laws of Ecology

The Goldilocks Effect (4 conditions) or the notion of 'just right':

Four Conditions to make simple and complex life possible on earth:

1) Constant and relatively mild temperature (-50 C to 50 C)

2) Abundance of water

3) Sufficient quantity of gasses such as oxygen, nitrogen and carbon dioxide

4) An atmosphere of sufficient thickness to protect living things from the sun's ultraviolet radiation.

Why do scientists refer to the earth as the ***'fragile miracle'?***

Earth is a balance of the four conditions which support a diversity of life forms. Its fragile because one big change could affect all of the other conditions.

Additional terms:

feedback - information that tells a system what the results of its actions are.

homeostasis - state of being in balance; the tendency of an organism to maintain constant internal conditions despite large changes in the external environment.

photosynthesis - chemical process by which plants containing chlorophyll use sunlight to manufacture their own food by converting carbon dioxide and water to carbohydrates, releasing oxygen as a by-product.

symbiosis/symbiotic - a pattern in which two or more organisms live in close connection with each other, often to the benefit of both or all organisms.

Gaia and Mother Earth

The **Gaia** (pronounced GUY-ah) hypothesis is the idea that Earth is a living organism and can regulate its own environment. This idea, by James Lovelock (1919 - 2022) argues that Earth is able to maintain conditions that are favorable for life to survive on it; all of the living things on Earth that give the planet this ability. Gaia is the name of the Greek goddess of Earth and mother of the Titans. In modern times, the name has come to symbolize "Earth Mother" or "Living Earth."

The Four Spheres:

living things	Earth	Air	Water
BIOSPHERE	**LITHOSPHERE**	**ATMOSPHERE**	**HYDROSPHERE**

Daisy world **https://www.youtube.com/watch?v=sCxIqgZA7ag** and

albedo: fraction of solar energy reflected from the Earth back into space. It is a measure of the reflectivity of the earth's surface.

ecology - the study of organisms' relationships to one another and their environment

The 4 Laws of Ecology (from PowerPoint):

1) **Everything is connected to everything else, for example** bees(Pollinators) --> plants | Trees - Oxygen
2) **Everything must go somewhere, for example** Landfills (Garbage)
3) **Nature knows best,** Water Cycle, Day/Night
4) **There is no such thing as a free lunch, for example** fast fashion

Biodiversity - the variety of life found on Earth and all of the natural processes; ecosystems, genetic and cultural diversity, and the connections between these and all species.

Why is it important?

More food sources, balances ecosystem, produces food, eliminates waste

Consider the fact that earth is a closed system - where nothing can be obtained from outside of earth (no shopping on the moon!) Why would this matter?

Resilience - a species' ability to withstand disturbances and thrive. (Ability to adapt to change)

1) **individual resilience resulting from traumatic events.**
2) **group resilience in overcoming global events such as conflict, pandemics and climate change.**
3) **individual and group resilience in overcoming systemic discrimination.**

(just a few examples)

Definitions:

Sustainable - Development that meets the need of the present without compromising the ability of future generations to meet their own needs.

Netukulimk - A cultural concept based on achieving adequeate standards of community nutrition and economic wellbing that does not jeopardize the integrity, diversity, or productivity of the environment.

Textbook questions:

1) **What is ozone? P. 48**
2) **What is an ecosystem? P. 48**
3) **What is a food chain and a food web? P. 71**
4) **What are 5 effects of deforestation? P. 116…**
5) **What are two ways deforestation is related to global warming? P. 118**
6) **What is the definition of desertification? P. 120**
7) **What are the four causes of desertification and their definitions (if you don't know them)? P. 120**
8) **What causes soil to lose its ability to absorb rain (impervious)? P. 121**
9) **How can irrigation be harmful? P. 121**
10) **What are 5 effects of desertification? P. 120-2**