**Environmental Science BM1: Study Guide Answer Key Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

What is Environmental Science? An multidisciplinary field that integrates physical, biological and information sciences (including ecology, biology, physics, chemistry, zoology, mineralogy, oceanology, limnology, soil science, geology, atmospheric science, and geodesy) to the study of the environment, and the solution of environmental problems.

**Metrics**

|  |  |  |
| --- | --- | --- |
| Basic Unit for Mass | Basic Unit for Length | Basic Unit for Volume |
| Gram | Meter | Liter |

9 m = .009 km 8 cm = 80 mm 7.4 km = 7400 m

Would the gymnasium be measured in mm, cm, m, or km? meters *Review your metric measurements lab.*

Topic 4: Scientific Method

1. What is a control group?

The group that does not have the change and the experimental group data is compared to.

2. How many variables should you change in an experiment?

1

3. What is a Quantitative observation? Give one example?

Dealing with an amount 4 fish

4. What is a Qualitative observation? Give one example?

Uses 1 or more of the 5 senses Red fish

5. Provide an example of data that is both qualitative and quantities?

4 red fish

6. What is an independent variable?

The variable that is manipulated or changed

7. What is a dependent variable?

The variable that responds to the change

8. Why is it important to have repeated trials in an experiment?

To make sure the experiment data was accurate and not flawed

9. What is a hypothesis?

A testable explanation to a question

10. What is a theory?

A well tested explanation

Identify a-f in the scientific method scenario below:

Gloria wanted to find out if the color of food would affect whether kindergarten children would select it for lunch. She put food coloring into 5 identical bowls of mashed potatoes. The colors were plain, red, green, yellow, and blue. Each child chose a scoop of potatoes of the color of their choice. Gloria did this experiment using 100 students. She recorded the number of students that chose each color.

a. Question: Does the color of food affect what kindergarten children select for lunch?

b. Hypothesis: If the food is colored, then the children will select it.

c. Control group: The plain group

d. Experimental group: The group choosing colors

e. Independent variable: The color

f. Dependent variable: The chosen ones

Place the following steps of the scientific method in order 1-5.

5 record and analyze data 3 form a hypothesis 1 make an observation

4 set up a controlled experiment 2 identify a problem

**Name 10 Famous Environmentalist and their major contributions:**

**1. John Muir-**

**- Yosemite and Sequoia National Park**

**- Sierra Club**

**2. Rachel Carson-**

**- Author of Silent Spring (A book about the effects of DDT and pesticides)**

**3. Aldo Leopold-**

**- Godfather of Wilderness Conservation**

**- Author of A Sand County Almanac**

**4. Julia Hill**

**- Known as butterfly**

**- Tree-sitter**

**- Lived in a tree she named Luna for 2 years**

**5. Henry David Thoreau**

**- Author of Walden (A book about the relationship between humans and nature)**

**6. Theodore Roosevelt**

**- Champion of wilderness preservation**

**- Helped create over 200 national forests, parks and wildlife refuges**

**7. Chico Mendes**

**- Amazon Rainforest**

**- Killed at age 44 by cattle ranchers**

**8. Gaylord Nelson**

**- Founder of Earth day**

**- Helped develop the national trails system**

**9. Garrett Hardin**

**- Wrote The tragedy of the commons**

**10. David Suzuki**

**- Hosted a show called The Nature of Things**

**What is an ecological footprint?**

**The impact of a person or community on the environment, expressed as the amount of land required to sustain their use of natural resources.**

**What does an ecological footprint measure?**

**How many hectares of land a person uses**

**What is earth overshoot day?**

**The day in which humans use of their allowance of natural resources that the earth can replenish in 1 year**

**How much bio-productive land and sea is available globally?**

**29 billion acres**

**On average, how much bio-productive land and sea do humans use?**

**5.8 acres**

**Basic Ecology:**

**1. List the correct levels of ecological organization in order from smallest to broadest and define each.**

|  |  |
| --- | --- |
| Level | Definition |
| Species | A single living organism (individual) |
| Population | A group of individuals that belong to the same species and live in the same area at the same time |
| Community | All living things in an area |
| Ecosystem | All the living and nonliving things in an area. |
| Biome | A group of ecosystems that have the same climate and dominant communities. |
| Biosphere | All of Earth that can maintain life |

**2. Differentiate between an organism’s habitat and niche.**

Habitat is where it lives, niche is the organism’s job or role

**3. What are limiting factors in ecosystems?**

Factors that limit the size of a population

1. **Give examples of biotic limiting factors.**

Disease, competition

1. **Give examples of abiotic limiting factors.**

Natural disasters, human impact

**4. Define and give examples of the following interactions:**

**a. Predation- Predator and prey. Predator eats prey. Predator- Trout, Prey- Mayfly**

**b. Mutualism-** **Both organisms benefit. Bee and flower**

**c. Commensalism- 1 benefits and the other is unaffected. whale and barnacle**

**d. Parasitism- 1 benefits and the other is harmed. Must have a host. Dog and Fleas**

**e. Competition- organisms fight for resources. Intraspecific- same species. Interspecific- different species**

**5. What does the word “trophic” mean? Energy level**

**6. Identify the major trophic levels in an ecosystem.**

**1st Trophic Level- Producers**

**2nd Trophic Level- Primary Consumers**

**3rd Trophic Level- Secondary Consumers**

**4th Trophic Level- Tertiary Consumer**

**7. Construct a food chain of a terrestrial ecosystem.**

**producer- first trophic level (Grass) ->primary consumer- 2nd trophic level (grasshopper)-> secondary consumer- 3rd trophic level (rabbit) ->tertiary consumer- 4th trophic level (wolf)**

**9. Which way does the energy flow through an ecosystem? 1 direction, moves up the trophic levels**

**10. Define and give examples of decomposers and detritivores.**

**Decomposers break down dead or decaying matter, detritivores feed on dead or decaying matter.**

**11. Contrast native and nonnative species and give examples of each.**

**Native is originally in the area (pine tree) and nonnative is introduced to the area (kudzu)**

**12. Explain the 1st and 2nd Laws of Thermodynamics.**

**1st- energy cannot be destroyed but can be transformed.**

**2nd-When energy is changed from one form to another, we always end up with lower-quality or less usable energy than we started with (usually heat).**

**13. On average, how much energy is transferred from one trophic level to the next? 10%**

**14. Where does the lost energy go? 90% eliminated as heat**

**15. Define and give an example of biomagnification.**

**The toxin concentration increases as you increase trophic levels. DDT**

**Biogeochemical Cycles:**

**1. What are biogeochemical cycles?**

**Water cycle, nitrogen, phosphorus, carbon, sulfur**

**2. What are the 6 essential elements of earth? CHONPS**

**3. Explain the 4 major process involved in the water cycle:**

**a. Evaporation- liquid to gas**

**b. Precipitation- sky to ground**

**c. Transpiration- evaporation of water through plant leaves (stomata)**

**d. Condensation- gas to liquid, crystalize to form clouds**

**4. The carbon cycle depends on which 2 life processes?**

**Photosynthesis and cellular respiration**

**5. What happens when there is too much or not enough CO₂ in the atmosphere?**

**Too much- Earth overheats, Too little- Earth Freezes**

**6. Explain how producers and consumers help cycle the CO₂ and O₂ gases.**

**Producers take in CO2 during photosynthesis and release oxygen. Consumers take in the oxygen and release CO2**

**7. Most of the atmospheric nitrogen is unusable. How is it converted to a usable form?**

**Bacteria convert is through nitrogen fixation.**

**8. Explain denitrification.**

**Nitrate and nitrites are converted back to nitrogen gas**

**9. How is the phosphorus cycle different from the other biogeochemical cycles?**

**Phosphorus is not found in the atmosphere**

**10. How does sulfur cycle through the earth?**

**Stored in rocks and minerals**