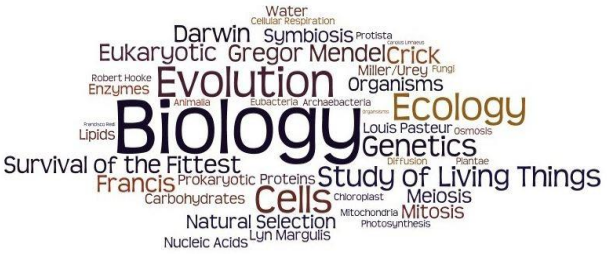
Name:_____ Period:_____ Date:_____

IS2 Semester 1 Final Review

About the Final:

- Final will be cumulative of last semester + science practices
- Covers Experimental design and Ecology/Biodiversity Units-
- Approx. 90 minutes-



Inquiry/Experimental Design

Major Concepts from Chapter 1:

- Be able to explain how to write a conclusion and interpretation for lab da
  See lab rubric – restate hypothesis, provide supporting data (high/low val
  evidence to conclusion.

- Explain what a control group is and how is used; know how this is different from the controlled variables in an experiment
  The **control group** is defined as the **group** in an experiment or study that does not receive treatment by the researchers and is then used as a benchmark to measure how the other tested subjects do

- Be able to identify the key elements of a given experimental design (manipulated variable, responding, etc.)
  Testable question and hypothesis
  Definable MV and RV, controlled variables, experimental control (group), well thought out procedure, is both valid and reliable

- In terms of an experimental design what is the difference between reliability and validity?
  Validity means that the experimental design is set up to test or answer the question investigated and that all variables are controlled except for the MV. Reliability means that the investigation can be repeated with consistent results.

Review Questions from Chapter 1:

For each experiment below, identify the manipulated variable, responding variable, control group and any controlled variables.

1. A student wanted to test how the mass of a paper airplane affected the distance it would fly. Paper clips were added before each test flight. As each paper clip was added, the plane was tested to determine how far it would fly.

   Manipulated variable _____mass of paperclip_____
   Responding variable _____distance plane travels_____
   Control group _____paper airplane w/o paperclip_____
   Controlled Variables
   The same airplane design, same force applied to launch, same launch technique, same wind speed outside, etc.

2. Two groups of students were tested to compare their speed working math problems. Each group was given the same problems. One group used calculators and the other group computed without calculators.

   Manipulated variable: Use of calculators for making calculations

   Responding variable: speed for doing math problems

   Control group: group- w/o/ calculators

   Controlled Variables: Same problems, same testing environment, same math background.

3. Larry was told that a certain muscle cream was the newest best thing on the market and claims to double a person's muscle power when used as part of a muscle-building workout. Interested in this product, he buys the special muscle cream and recruits Patrick and SpongeBob to help him with an experiment. Larry develops a special marshmallow

weight-lifting program for Patrick and SpongeBob. He meets with them once every day for a period of 2 weeks and keeps track of their results. Before each session Patrick's arms and back are lathered in muscle cream, while SpongeBob's arms and back are lathered with the regular lotion. Muscle power is measured using a "Muscle O'meter."

Time	Patrick	SpongeBob
Initial Amount	18	5
After 1 wk	24	9
After 2 wks	33	17

Which person is in the control group? SpongeBob

What is the manipulated variable? use of muscle cream

What is the responding variable? muscle power

What should Larry's conclusion be based on the data?
Claim of effectiveness of muscle cream is not supported by the data. Muscle power of SpongeBob more than tripled, whereas musclepower of Patrick only doubled.

Chapter Review: Ecology

Major Concepts from Chapter 14 (ecology):

- Compare and contrast the movement of matter and energy in an ecosystem.

Matter cycles continuously throughout an ecosystem whereas energy flows one direction. Based on the second law of energy the quality of energy is reduced from a higher quality to a lower quality through each transformation. For example light energy is changed to chemical in plants through photosynthesis (light energy is a higher quality energy form than chemical energy, which is a higher energy form than heat).

- Interpret food webs – identify producers (autotrophs), primary, secondary, and tertiary consumers.
  You did this with the last lesson on the savanna ecosystem.-
- Identify organisms in different trophic levels and predict the amount of energy in each tropic level.
  You did this with the last lesson on the savanna ecosystem.-

- Provide an example of the following types of species interactions. Explain why that example fits that association.

Mutualism and Symbiosis (difference?): Lichen (algae and fungus) symbiosis/clownfish and anemone mutualism/shark and remora- cleaner fish

Predator/prey: Fox and hare

Parasitism: tapeworm and human (longest one found 100" FYI)

Herbivory: deer and your geraniums

Competition: members of any population competing for same resources.

Review Questions from Chapter 14:

1. What is an ecological niche? What is the difference between a niche and a habitat? Apply the concept of niche to explain why some invasive species thrive in an area.

The role a species plays **in the** ecosystem is called its **niche**. A **habitat** is the physical environment in which a species lives.

2. Snails die and leave their shells behind. Hermit crabs find their shells and move in. Identify the type of species relationship illustrated.
   Commensalism

3. A tropical rainforest is an example of an ecosystem. Which of the following statements about matter and energy in a tropical rainforest is the most accurate? Please choose ONE answer that you think is best.
   a. Energy is recycled, but matter is not recycled.
   b. Matter is recycled, but energy is not recycled.
   c. Both matter and energy are recycled.
   d. Both matter and energy are not recycled.

4. Give an example of the following species relationships in a community:
   a. Mutualism
      Butterfly pollinator and flower

   b. Predator-prey
      Lynx and hare

   c. Herbivory
      Elk and willow trees

   d. Competition
      Gray squirrel and Douglass squirrel

5. Why are there typically only 4-5 links in a food chain?
   Not enough energy to sustain other feeding levels (energy to obtain and process food)

6. What is the difference between biotic and abiotic factors? Abiotic= not living factors: climate, water, soil,/Biotic= living. Provide an example of how an abiotic factor regulates a population. Water temperature could affect population of icefish. Provide an example of how a biotic factor regulates a population. Malaria can regulate human populations (increased mortality).

7. Autotrophs
   a. can live without heterotrophs.
   b. cannot do photosynthesis.
   c. might eat heterotrophs.
   d. are known as decomposers.

Use the diagrams below to answer questions #13-14:

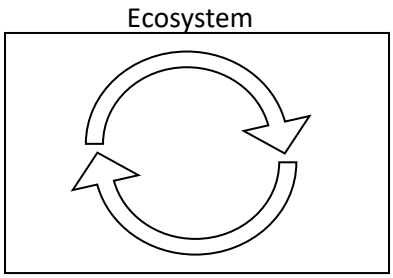


Diagram A

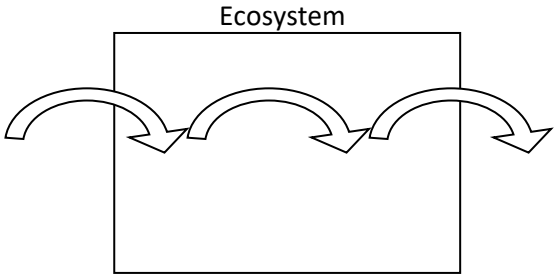
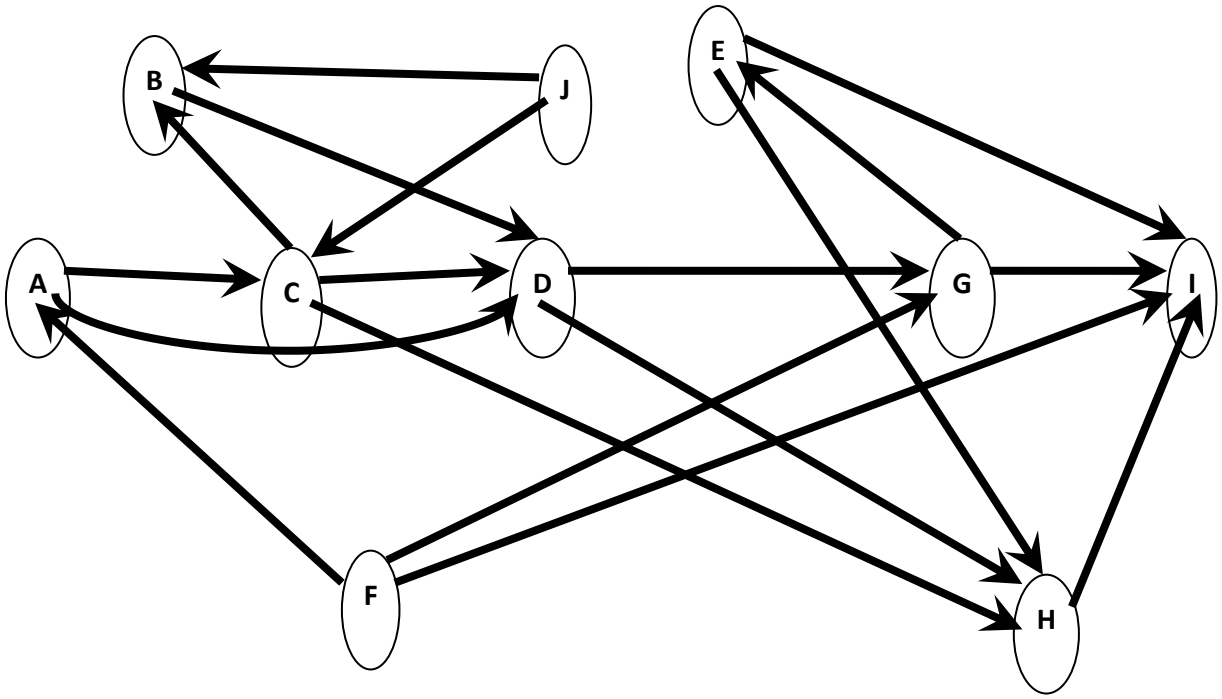


Diagram B

8. Which diagram shows how energy moves in ecosystems? Explain your answer.
   Diagram B- energy flows in one direction
9. Which diagram shows how matter moves in ecosystems? Explain your answer.
   Diagram A- matter cycles within an ecosystem and is reused.

10. To sustain an ecosystem, does it constantly need matter or energy added? Explain your answer.
    Energy is needed constantly do drive metabolic processes in an ecosystem.



Look at the food web above, each letter represents an organism.

11. Which organism(s) are the autotrophs? **_F and J_____**

12. What organism(s) most likely get their energy from the sun? ____ **F and J** _____

13. From which organism(s) does B get its energy? _____**J and C**____

14. A mysterious virus kills all the J organisms in our ecosystem. How will this most likely affect the size of the population of organism A?
The population would be significantly reduced with the loss of this key producer and the energy it provided to the other organisms (feeding levels).

15. Which organism(s) can act as primary (first) consumers? __A, G, I, B and C_____

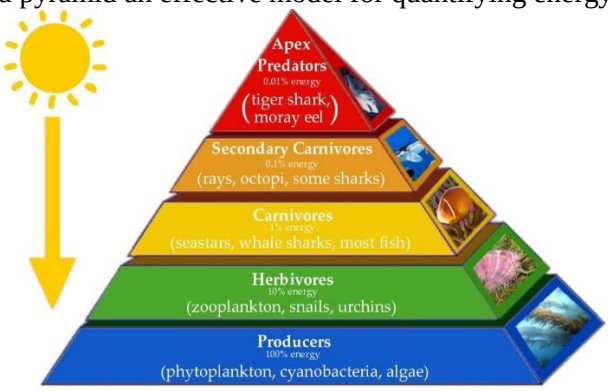
16. Explain how the energy from the sun gets passed to ALL ORGANISMS in the food web.

Light energy from the sun is converted to chemical energy (glucose and then ATP) in plants. Chemical energy in plants is then transferred to consumers and then by decomposers.

17. Which trophic (feeding) level(s) could G be a part of? Check all that apply.

- ☐ 1º (primary consumers)-Yes
- ☐ 2º (secondary consumers) No
- ☐ 3º (tertiary consumers)Yes
- ☐ 4º (quaternary consumers) No

18.Why is a pyramid an effective model for quantifying energy flow?



A pyramid shows the 2nd law of energy, where the amount of usable energy decreases as you move from the base of the pyramid to the apex (top). About 90% of the energy is lost (as heat) and only 10% is transferred to the next trophic level.

19. Write the equation for photosynthesis- be able to explain this equation.

$6CO_2$ (carbon dioxide) + $6H_2O$ (water)→(light energy) $C_6H_{12}O_6$ (glucose) + $6O_2$

20. Write the equation for cellular respiration- be able to explain this equation.
$C_6H_{12}O_6$ (glucose) + $6O_2$ → $6CO_2$ (carbon dioxide) + $6H_2O$ (water) = energy (ATP)

21 What are ecosystem services- provide examples to show your understanding.

An ecosystem service is any positive benefit that wildlife or ecosystems provide to people. The benefits can be direct or indirect—small or large.

- Flood reduction/control
- Pollination of agricultural crops
- Water/air purification
- Habitat for threatened or endangered species
- Removal of greenhouse gasses to slow climate change
- Medicinal (medicine) uses of specific plants

21. Why is biodiversity important and how does it relate to stability in an ecosystem-

This relates directly to the 3.0 model you developed.

Climate change and other human-driven (anthropogenic) environmental changes will continue to cause biodiversity loss in the coming decades in addition to the high rates of species extinctions already occurring worldwide. Biodiversity is a term that can be used to describe biological diversity at a variety of different scales. Species play essential roles in ecosystems, so local and global species losses could threaten the stability of the ecosystem services on which humans depend. For example, plant species harness the energy of the sun to fix carbon through photosynthesis, and this essential biological process provides the base of the food chain for myriad animal consumers. At the ecosystem level, the total growth of all plant species is termed primary production, and communities composed of different numbers and interactions of plant species can have very different rates of primary production affecting energy flow and nutrient cycling.

22. Review your carbon cycle biogeochemical project
23. Review your TIP chart/Quizlet