Name KEY

Environmental Science

Final Exam Review Packet

STUDY TIPS

- Use your textbook, your notes, and old tests to prepare yourself for the Final.
- DON'T CRAM! It's a proven fact: studying for a little bit each day works better than waiting until the night before the exam.
- Remember to ask questions in class about concepts you want clarified.

GUIDING QUESTIONS FOR FINAL EXAM

Unit 1: Intro to Environmental Science (Ch 1, 2, 4, 21)

1. Define environmental science:

   Study of impact of humans on the environment

2. What is a natural resource?

   Any natural material used by humans

3. Distinguish between renewable and nonrenewable resources. Give an example for each.

   Renewable resources (air, soil, trees, crops, sun) can be replaced relatively quickly by natural processes. Nonrenewable resources form much slower than rate of consumption (fossil fuels)

4. Describe the major environmental effects of hunter-gatherers, the agricultural revolution, and the industrial revolution.

   Hunter-gatherers: Overhunting → extinction of species
   Agricultural revolution: - Enabled rapid human growth
   - Destroyed habitats to create farmland.
   I.R. = Pollution, shift to urban centers, increased consumption

5. What is biodiversity?

   The # and variety of species in an area

6. Describe the law of supply and demand. Give an example.

   The greater the demand for a limited supply of something, the more it is worth. Ex: oil

7. What is an ecological footprint? Which country has the largest ecological footprint? → U.S.A.

   ↳ The productive area of Earth needed to support 1 person's consumption.

8. What is sustainability?

   Condition in which human needs are met in such a way that population can survive indefinitely.

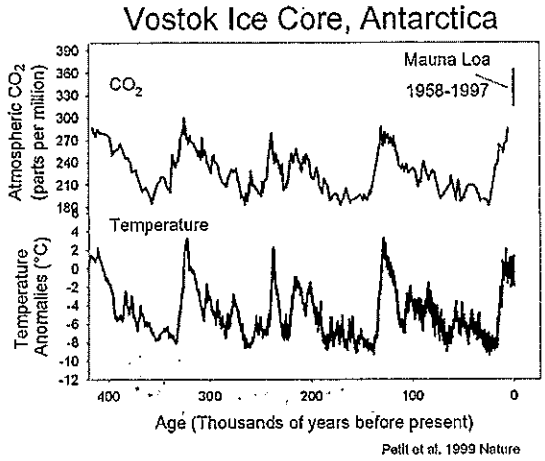
9. Why is it important for scientists to collect extensive amounts of data when experimenting?

   Sample size needs to be large enough to get accurate estimates

10. Why is it important for scientists to communicate their scientific data and conclusions?

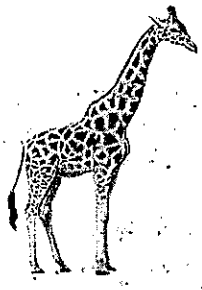
    To share what they have learned

11. What is a valid inference based on the information in the graph below?



CO_2 increases are associated with temperature increases

12. Label the pictures using the following terms: community, population, and organism. Then define the terms.



Organism
One individual living thing

Population
Members of 1 species in an area

Community
Members of 2+ species in an area

13. What is the tragedy of the commons? Give an example.

Conflict between short-term interests of individuals & long-term welfare of society.

Ex: Overgrazing on common lands

Unit 2: Populations (Ch 8, 10)

1. What is a population?

All the members of a species living in same place at same time

2. Define population density.

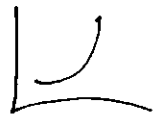
# of individuals per unit area or volume

3. Fill in the equation below.

Changes in population size	=	Births	-	Deaths

4. Define exponential growth.

Growing faster & faster



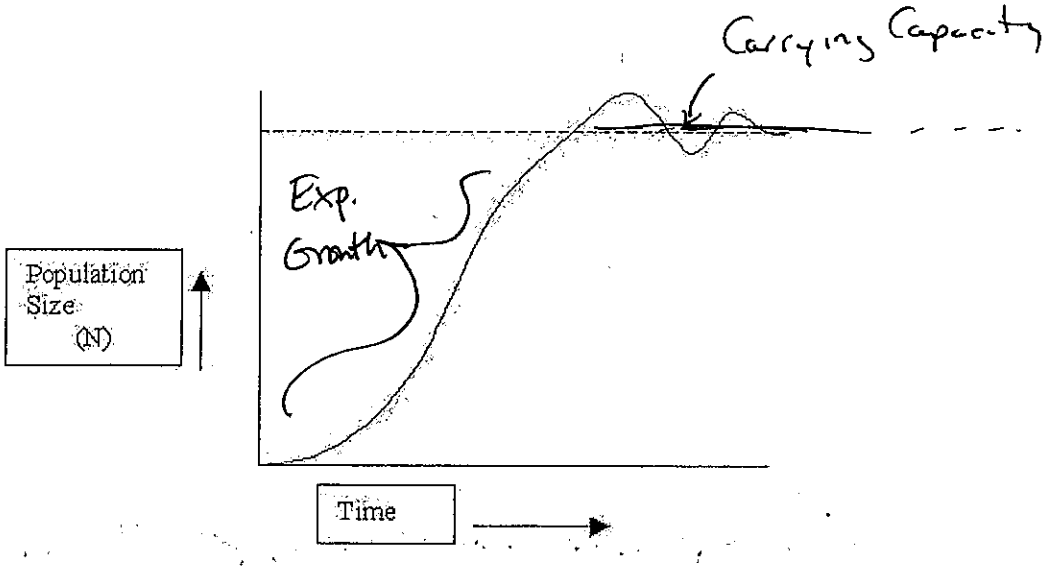
5. Under what conditions does exponential growth of populations take place?

- Plenty of food & space
- Little to no competition or predators

6. Define carrying capacity.

Max. population that ecosystem can support indefinitely

Use the graph below to answer the following questions (#44-46).



7. Label the exponential growth on this graph.

8. Label the carrying capacity on this graph.

9. What happens to the population after it reaches the carrying capacity?

Pop. runs out of resources & declines before stabilizing/recovering

10. Explain the difference between density-dependent and density-independent factors. Give examples of each.

Density-dependent - Based on # of individuals in area (Ex: disease, out of food)

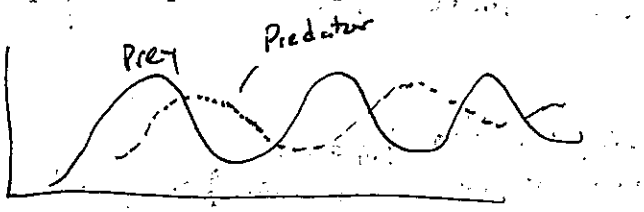
Density-independent - Regulation affects everyone (Ex: weather/natural disaster)

11. What might happen to a species if it has to compete for natural resources?

Species might use less of its potential niche

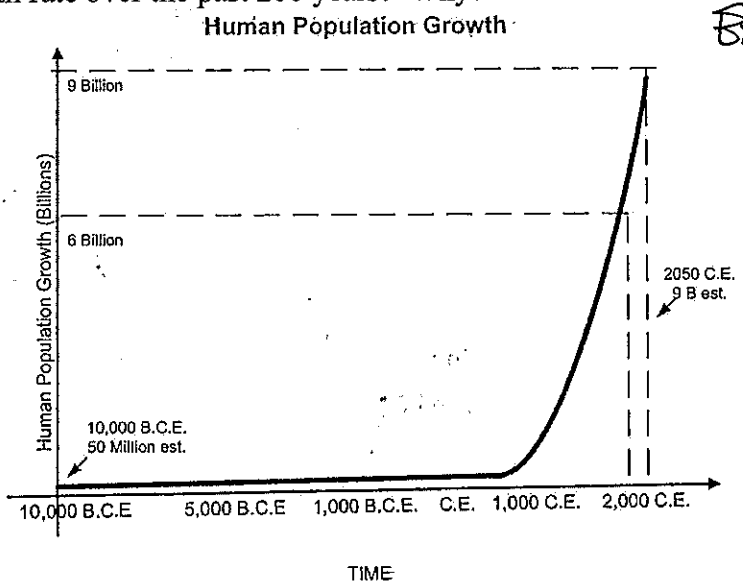
12. Describe the relationship between predator and prey populations over time. What does the graph look like?

Repeat!
- Prey ↑, Pred ↑
- Pred ↑, Prey ↓
- Prey ↓, Pred ↓
- Pred ↓, Prey ↑



13. Use the graph below to answer the following questions. What has happened to the human population growth rate over the past 200 years? Why?

Exponential growth



14. How does human population growth impact the environment?

Consumption of nat. resources, pollution, urbanization

15. How has educating women affected birthrates worldwide?

↓ Birthrates

16. Why is it difficult to reduce human population growth?

Can't really prevent reproduction.
- Strategies include economic incentives & legal punishments

17. What would happen to the human population if over a long period of time, each couple in a population had only two offspring?

Human pop. would stabilize (ZPG) -- replacement-level fertility

18. Describe the tag and recapture method. What is it used to do?

1. Sample
2. Mark all captured & release
3. Re-sample & count # with tags.

Goal: Estimate pop. size

19. What is an age pyramid?

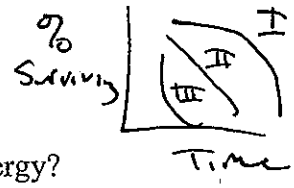
Distribution of ages & sexes in pop.

20. What is the difference between a developed and a developing nation?

Developed - Postindustrial stage of demo transition (slow, zero or neg. pop. growth)

Developing - Still growing, pre- or industrial, [illegible]

21. Describe the three types of survivorship curves.



I - Developed

III - Developing (high infant mortality)

Unit 3: Communities (Ch 5)

1. What is a producer? How does a producer get energy?

Autotroph -- photosynthesis

2. What is a consumer? How does a consumer get energy?

Heterotroph -- eating other organisms

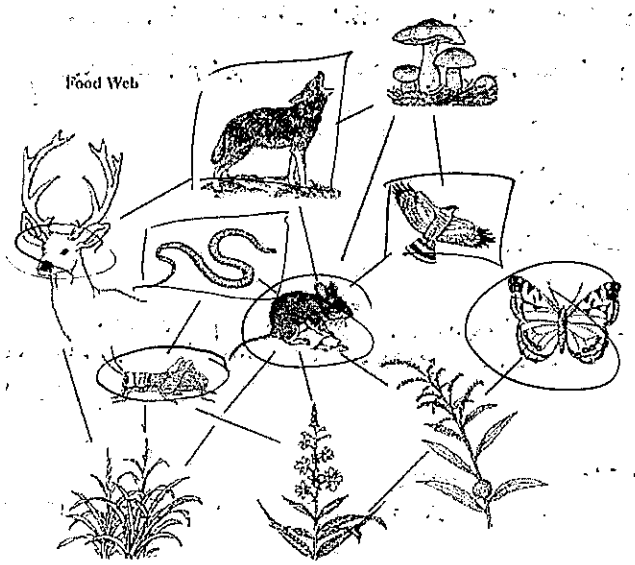
3. What is a decomposer? How does a decomposer get energy?

Break down dead organisms

4. What is the difference between a food chain and a food web?

Chain: Sequence of energy transfers
Web: Many interlinked chains

Use the food web diagram below to answer the following questions (#5-6).



5. Which species in the diagram are herbivores?

Circled

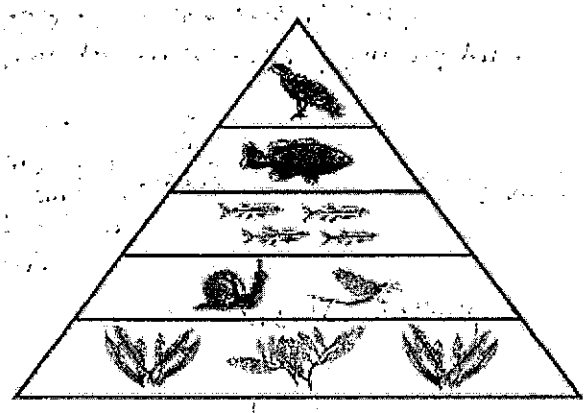
6. Which species in the diagram are carnivores?

Squared

7. What is the role of photosynthesis and respiration on gases in our atmosphere?

Photo: Removes CO_2 / Produces O_2
Resp: Removes O_2 / Produces CO_2

Use the energy pyramid diagram below to answer the following questions (#8).



8. Which species would have the least amount of available energy?

Hawk

9. Define keystone species. What is its importance in an ecosystem?

Species critical to functioning of ecosystem

10. What is the difference between primary succession and secondary succession? Give an example for each.

1°: No soil (Ex: after volcano)
2°: starts w/ soil (Ex: After fire/clearcutting)

11. List three ways in which biodiversity is important to humans.

1. Medicine
2. Crops
3. Ecotourism

12. Why is biodiversity important to ecosystems?

Ensures ecosystem stability/survival when environmental conditions are changed/disturbed

13. What are invasive species? How can they disrupt communities?

Non-native species
--Outcompete native species

14. What is the difference between an endangered species and a threatened species?

Endangered: Likely to become extinct if not protected
Threatened: Species w/ declining pop → likely to become endangered if not protected

15. Define extinction.

Loss of a species

16. List 4 ways humans cause extinctions.

- Habitat destruction & fragmentation
- Invasive exotic species
- Harvesting, hunting, poaching
- Pollution

17. How can endangered species be saved?

- Captive-breeding
- Preserving genetic material
- Zoos, Aquariums
- Protecting habitats w/ laws
- Habitat recovery & conservation

18. What is coevolution? Give an example.

When 2 species evolve in response to long-term interactions with each other

Ex: Bird w/ long beak & flower w/ deep-seated nectar

19. Explain the difference between a habitat and a niche.

Habitat: Place organism lives

Niche: Role in ecosystem

20. What is the competitive exclusion principle?

No 2 species can occupy same niche

Unit 4: Ecosystems (Ch 4,5,7)

1. Define ecosystem. All ~~parts~~ organisms living in an area together w/ the physical environment
2. What is a biotic factor? Give an example.

   Living parts of ecosystem (Ex: plants)
3. What is an abiotic factor? Give an example.

   Nonliving parts of ecosystem (Ex: H_2O)
4. What is a plant's role in the:
   a. Carbon cycle – Remove CO_2 from air, make sugar
   b. Nitrogen cycle – Remove N from soil; provide N to predators
   c. Phosphorus cycle – Remove P from soil; provide P to predators
5. What is primary productivity?

   Gross: Total photosynthetic output by producers

   Net: Total output – what is used during respiration

Unit 5: Water Use and Pollution (Ch 11)

1. What is the water cycle?

   Condensation → Precipitation
   ↑ ↓
   Evaporation

2. Why is groundwater important?

   Provides aquifers that serve as H_2O sources

3. What are the positive and negative effects of building a dam?

   + → energy, flood protection
   - → Displaces residents, sediment removal

4. Compare point-source pollution and non-point pollution. Give an example of each.

   From 1 location (Ex: Gas leak)

   Many sources (Ex: Agricultural runoff)

5. In general, what causes most water pollution?

   Activities on land

6. At which level of an aquatic food chain/energy pyramid would pollution have the greatest effect on organisms? Why?

   Top levels, due to biomagnification/ bioaccumulation (Ex: mercury in fish, DDT in birds)

7. Describe the general process of wastewater treatment.

   Primary
   1. Filtration
   2. 1st settling tank

   Secondary
   3. Aeration tank
   4. 2nd settling tank
   5. Chlorination

8. How can water be conserved in the home?

   - Shorter showers
   - Only full laundry loads
   - Efficient appliances

   etc.

Unit 6: Land Use and Pollution (Ch 16, 19)

1. What is an ore mineral? How are they obtained?

   Minerals that are valuable & economical to extract.

   Surface & subsurface mining

2. Define reclamation. What are the environmental benefits of reclamation?

   Returning land to original / better condition → Minimizes impact of surface mining

3. What does it mean for waste to be biodegradable?

It breaks down by biological processes

4. How can resources be conserved? Describe the 3R's.

Reduce
Reuse
Recycle

5. What types of waste can be composted?

- Biodegradable
- Food
- Manure from feedlots
- Municipal sewage sludge

6. What are some problems associated with modern landfills?

① Leachate → liquid ~~[illegible]~~ leaks & pollutes drinking water
② Methane gas

7. Define hazardous waste.

Waste that is a risk to health of humans or other species

Unit 7: Energy (Ch 17-18)

1. Define fossil fuel.

Remnant of ancient organisms that changed into coal, oil, gas

2. What are the advantages and disadvantages of producing energy by burning fossil fuels?

ADVANTAGES	DISADVANTAGES
- Readily available source of cheap energy	- Limited supply - Causes environmental problems (pollution, greenhouse effect)

3. What is nuclear energy?

Energy from within nucleus of atom

4. What are the advantages and disadvantages of nuclear energy?

ADVANTAGES	DISADVANTAGES
- Concentrated energy - No greenhouse gasses	- Radioactive waste needs to be stored - Safety concerns (meltdowns)

5. Describe each of the following types of renewable energy, including their advantages and disadvantages.

- Solar Energy
  - Readily available
  - Weak energy current in photovoltaic cells
  - Need batteries when cloudy/dark

-Wind Energy
Cheap & abundant

-Biomass
- Plant material, manure, other organic matter that is burned.
- Can cause air pollution

-Hydroelectric Energy
Expensive
Power from moving H_2O
- Does not release air pollutants
- Dams last longer than fossil fuel power plants

-Geothermal Energy
Energy from heat in earth's crust
→ H_2O must be carefully managed so that its not depleted

-Tidal Energy
Waves
--developing technology

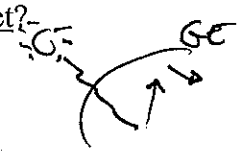
Unit 8: Climate Change and Air Pollution (Ch 12-13, 20)

1. What is the main function of the ozone layer in our atmosphere?
   Protect against UV radiation

2. What human-made chemical damages the ozone layer?
   CFCs

3. How might humans (and animals) be impacted by ozone depletion?
   - Increased skin cancer
   - Ground-level O_3 causes respiratory problems

4. Define global warming. How is global warming different than the greenhouse effect?



GW: Increase in avg. temp of planet during 20th cent.

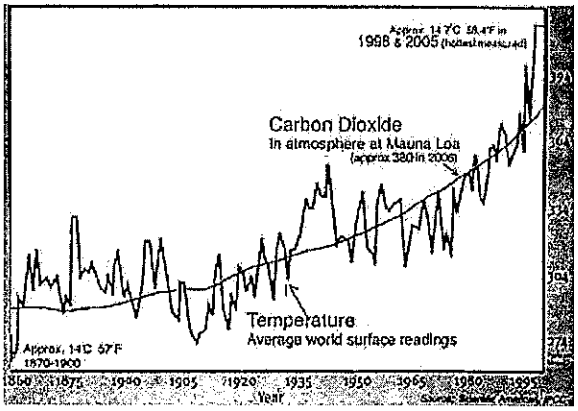
GE: Warming of Earth by trapping of sun's rays

5. What might be the cause for increased levels of carbon dioxide in our atmosphere during the 20th century?

~~GE: Warming of Earth by trapping reflected sun rays~~

6. Use the graph below to answer the following question. According to scientific evidence, what is the relationship between carbon dioxide levels and global temperature?

Avg $[CO_2]$ has gone up, leading to increase in temp.



7. What are the major differences between today's global warming and Earth's previous climate changes?

It's happening much faster! (due to humans)

8. Identify some potential strategies for reducing carbon emissions.

- Invest in cleaner energy (cut down on FFs)
- Conservation (see Wedges activity)

9. What is fracking? What are the associated environmental concerns?

Drilling into shale for natural gas

10. Identify some major indoor and outdoor air pollutants.

Smoking → CO, NO_2, SO_2, O_3