

N=30

YOUR NAME: KEY your TA's name: _____

Environmental Biology 206 EXAM II 10 March 2006 (exam worth 100 points)

Multiple Choice (questions have only one correct answer; 21 points total; 1.5 points each)

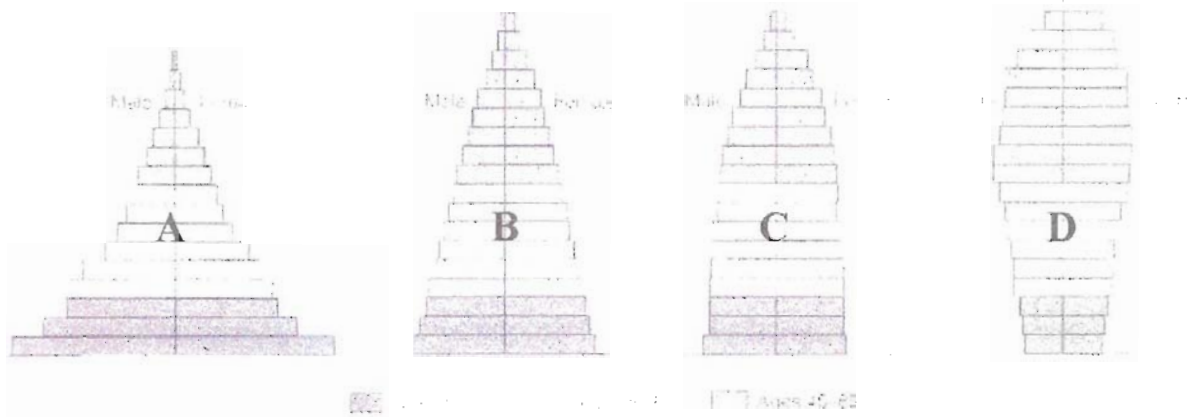
1. Which folly did your Speth book (p.24) argue we would not be forgiven for by future generations?
a) energy depletion, b) economic collapse, c) nuclear war, **(d) loss of biodiversity**, e) fascism
2. How many millimeters are there in an inch?
a) 10 b) 20 c) 2.54 **(d) 25.4** e) 254
3. What species did Taylor Edwards study for his masters thesis?
a. Desert Box Turtle
(b) Desert Tortoise
c. Coyote
d. Bullfrog
e. Lowland Leopard Frog
4. Which value is the best estimate of realistic replacement level fertility rates for humans?
a. 0.2
b. 0.9
c. 1.5
d. 1.7
(e) 2.2
5. According to the short, 7 minute video we watched about global human population growth, what event triggered the dramatic increase in human population?
(a) industrial revolution
b. fall of Roman empire
c. development of polio vaccine
d. discovery of penicillin
e. spread of agriculture
6. What is being done with dog feces in San Francisco (that we discussed in class)?
a. being used as plaster and stucco substitute
b. being used to ward off invasive fly species that harm citrus groves
c. being used to fertilize trees in city parks
(d) being used as a fuel source in methane digesters
e. being shipped to the central valley to feed livestock
7. What percentage of the world's population lives in the USA? What percentage of the world's cars are in the USA? (respectively)
a. 3%, 20%
b. 10%, 20%
c. 10%, 30%
d. 5%, 15%
(e) 5%, 25% *also accepted a + d.*
8. The term UN, in the context of this class, generally means:
a. Ugly Nations
b. Unlimited N
c. 'not' or 'negative'
(d) United Nations
e. None of the above
9. Which fossil fuel source tends to produce the most air pollution?
(a) Coal b. Natural Gas c. Oil d. Methane e. Hydrogen

Key

Using the diagram below, answer the following questions:

10. Which diagram (A, B, C, or D) represents the highest population growth rate? *A*
 11. Which diagram represents a country like Japan or Sweden? *D*
 12. Which diagram best represents the USA? *B*
 13. Which diagram likely has the highest infant mortality? *A*

Key



14. What is important about the ages 15-44 (noted in the lightest color in the figures above)?

Age of reproduction

Fill in the Blank (2 points per blank; 20 points total)

- The population of a given country is the result of births, deaths, immigration, and emigration.
- Women make up 70% of the world's poor, do 2/3 of the work, earn 10% of the income and own 0.01% of the property.
- Ponderosa Pine is the tree species we saw at Bear Canyon, Palisades Ranger Station, and the top of Mt. Lemmon. *(partial for pine)*
- As you drive north from Tucson towards Flagstaff saguaro cacti eventually disappear. The most northern individuals are almost exclusively found on south-facing slopes.
- Two ways of trying to evaluate the worth of biodiversity rely on 1) intrinsic value, and 2) instrumental value.
- Give an example of an endangered species found in Arizona: Kond Amber Snail, etc.
- As atmospheric pressure decreases, ambient temperature **also** decreases. This is called adiabatic cooling and we measured it on Mt. Lemmon.
- In a biosphere reserve, the three categories of land management are core, buffer, and transition.

Key

Really Short Answer (not more than a sentence; 30 points total; 3 points each)

1. Calculate the doubling time for a population growing at 3.0% per year. Show your work. Key

$$\sim 70/R \quad R = 3.0 \quad 70/3 = \sim 23 \text{ years}$$

2. In the equation for calculating population change over time, what do the variables "N₀" and "k" represent?

N₀ = population @ beginning of time step (time zero)

k = population growth rate (rate of population increase)

3. List two of the three characteristics of pollution that determine how large of an impact it has.

1. chemical composition
2. concentration
3. persistence in environment

4. Give two reasons why many people oppose the current plans to store nuclear waste at Yucca Mountain, NV.

1. Won't solve the problem of nuclear waste stored @ power plants
2. Shipping of waste poses threat to people along path.
3. Danger of earthquakes, water seepage, volcanoes

5. Why is hydrogen not currently a very viable energy alternative to fossil fuels?

(currently need quite a large amount of fossil fuels to make the hydrogen, technology for using hydrogen as fuel is still expensive)

6. How is the 2nd law of thermodynamics related to the concept of net energy?

unavoidable energy waste in conversion of fossil fuels → output.

net energy = useable energy generated ; some lost in process (ex. as heat)

7. Give two examples of ecosystem services.

many ; see lecture slide.

8. Draw a compound leaf.



9. How and why are saguaro cacti and palo verde trees associated?

palo verdes are nurse plants for young saguaros.

10. Describe how loss of one species in an area could lead to loss of one or more other species

many answers.

ex - loss of prey species leads to loss of predator, if predator is dependent on it as main food source.

Key

Short Answer (30 points total; 5 points each; a few sentences required)

1. Explain how inclusion of externalities would change the price of gasoline at your local filling station.

(including pollution, military conflicts, etc.)

By including externalities price would approach ~ \$10/gallon.

Lots of students talked about government subsidies which artificially lowers the price of gasoline @ the pump.

Key

2. Describe five factors affecting human birth rates that differ between a developed European country like Sweden and a developing African country like Nigeria.

See list in text or lecture 16 slide 23.

Be sure to indicate how Sweden and Nigeria differ for the five factors you list.

3. Draw a graphical representation of the species-area relationship. Be sure to label your axes. What is important about this relationship in the context of conservation biology?



To preserve biodiversity we need to conserve land as functioning habitat.

4. Explain how, in the context of environmental biology, it might be wise to think hierarchically about recycling, reduction, and reuse as well as about reconciliation, reserve, and restoration ecology. (Hint: in what order should we place these? Why?)

Reduce → Reuse → Recycle.

Discussion of use of resources, 2nd law of thermodynamics, reduction of consumption helped achieve high scores.

Preserve → Restore → Reconcile

Similarly, it is easier to set aside intact habitat than it is to restore it. Reconciliation tries to minimize human impact but concedes that human alteration of landscape will take place.

Key

- 5 Explain why we should or should not flood the Grand Canyon on occasion to mimic the historical flood regime. Justify your answer.

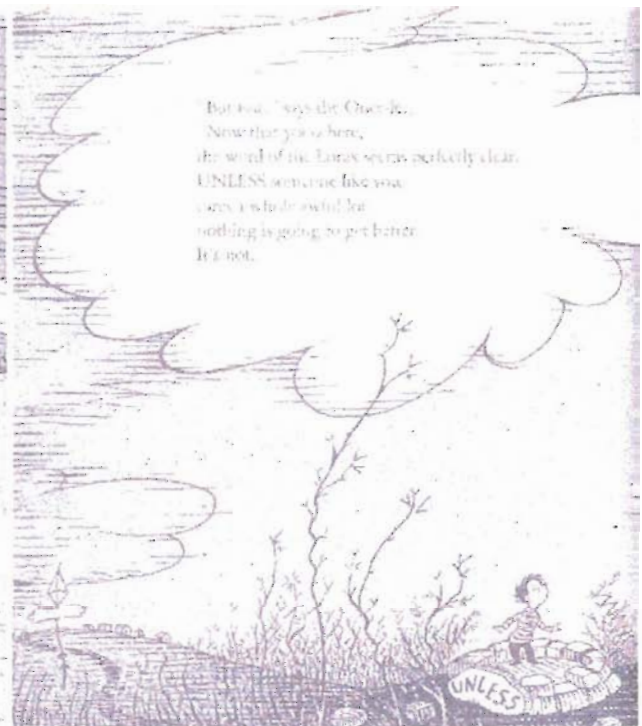
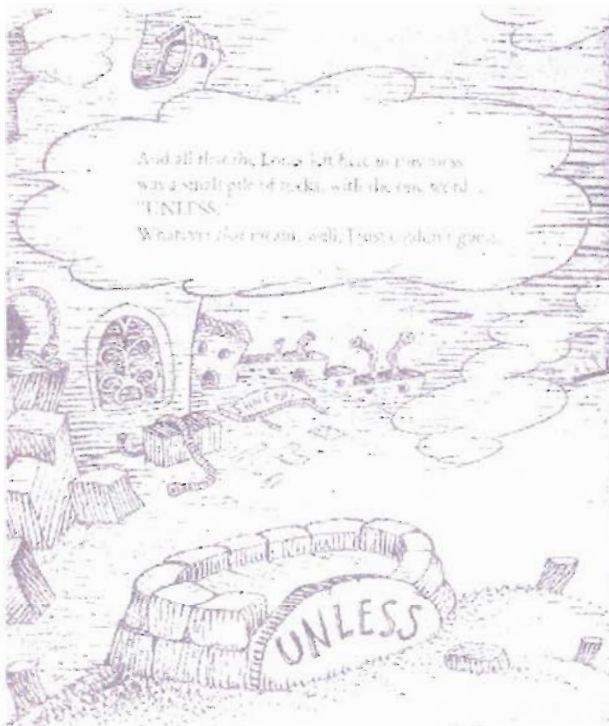
Be sure to justify your answer.

Discussion of Kanab Amber snail and other native species would help inform your rationale

Key

- 6 How does a sewage treatment plant like the one you visited mimic a natural wetland? (Inclusion of specific processes and reactions in your answer will get you a higher score.)

See the handout we posted on your lab website about how sewage treatment plants and wetlands function. Full credit for discussion of solid matter issues, settling ponds, microbial treatment, chlorination, recharge of aquifer



Key