

## **Green Generation**

Holt Division B Science Olympiad Invitational

February 20, 2016

Welcome to Green Generation! Before you get started, here are a couple reminders:

1. Teams are only permitted ONE 8.5" X 11" page of notes and any kind of calculator. Teams may not use any other resources, or risk disqualification.
2. Put your answers on the **ANSWER SHEET**, not on the exam. Answers on the exam but not the answer sheet will not be graded and you will lose all points.
3. Each multiple choice question is worth 2 points. Each part of the fill-in the blank questions are worth 1 point. (Thus, if there is only 1 blank, the question is only worth 1 point). Short answers have points as indicated within the test.
4. Tiebreakers will be selected questions within the test. They are labeled in bold on the test as "**TIEBREAKER**". Further tiebreakers will start at the end of the test and go toward the beginning (that is, Tiebreaker #6 will be question 52, Tiebreaker #7 will be question 51, etc.)  
  
Tiebreakers are in this priority order: Question 5, 12, 19, 35, 41.
5. You will have 50 minutes to complete the test. You may turn your test in early, but time turned in will not be used as a tiebreaker.
6. Good luck!

1. How much energy moves up trophic levels in an energy pyramid?

- a. 1%
- b. 10%
- c. 25%
- d. 66%

2. Which of the following cannot fix nitrogen?

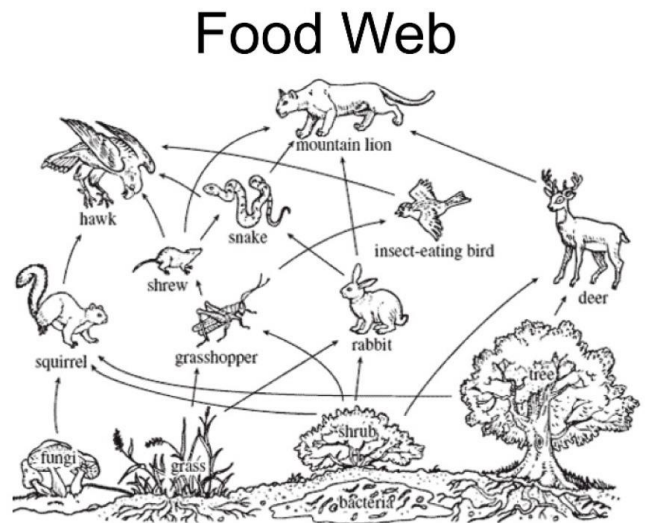
- a) rhizobia bacteria
- b) lightning
- c) fertilizer factories
- d) plants

3. In the following food web, what do the grasshoppers act as?

- a. primary producers
- b. primary consumers
- c. secondary consumers
- d. b and c

4. In the following food web that hawk acts as a:

- a) primary consumer
- b) secondary consumer
- c) tertiary consumer
- d) quaternary consumer
- e) b and c



5. **TIEBREAKER:** If the mountain lions were to be hunted to extinction, which of the following would you **NOT** expect to happen?

- a. increase in tree biomass
- b. increase in number of rabbits
- c. increase in number of shrews
- d. increase in the number of deer

6. Which nutrient, in its cycle, does not have an atmospheric stage?

- a. carbon
- b. nitrogen
- c. phosphorous
- d. sulfur

7. An ecological interaction in which one species is hurt and the other is not affected is called:

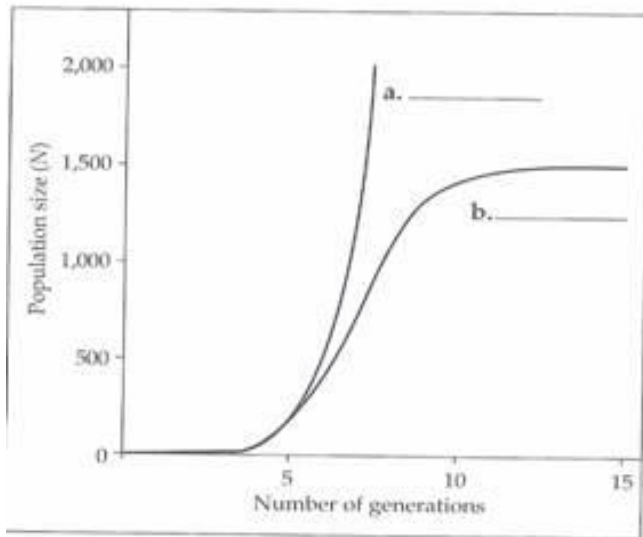
- a. commensalism
- b. mutualism
- c. parasitism
- d. amensalism

8. Both species are benefited in this ecological interaction: \_\_\_\_\_ .

9. One species is benefited while the other is not affected in this ecological interaction:  
\_\_\_\_\_ .

10. (5 points) Draw a trophic pyramid (also called an energy or ecological pyramid) with 4 layers, label what each layer represents, and give an example of at least one organism for each level that would be found together in an ecosystem.

The following graph represents two different types of population growth. Use the graph for the following questions.



11. Curve A represents density- A) \_\_\_\_\_ growth, and has a B) \_\_\_\_\_ curve.

12. **TIEBREAKER:** Curve B represents density- A) \_\_\_\_\_ growth and has a B) \_\_\_\_\_ curve.

13. Conditions that could lead to Curve A include:

- a. limited resources
- b. intraspecific competition
- c. predation
- d. none of the above

14. A species that has an unusually important role in the structure of an ecosystem is a:

- a. Keystone species
- b. Foundation species
- c. Charismatic species
- d. Indicator species

15. Species diversity is the variety in genetic make-up among individuals of a single species.
- True
  - False
16. Re-colonization of an abandoned farm field by plants and animals is an example of:
- primary succession
  - secondary succession
  - tertiary succession
  - crop rotation
17. This biome has short, moist and moderately warm summers and long, cold, dry winters. It is located at 50 to 60 degrees North Latitude and dominated by coniferous forests.
- Tundra
  - Temperate Deciduous Forest
  - Chaparral
  - Taiga
18. Which of the following is true about deserts?
- They cover one third of the earth's terrestrial surface.
  - There is minimal temperature variation.
  - Vegetation is low and sparse.
  - There are no flooding problem during rains.
19. **TIEBREAKER:** Waste heat from a specific power plant that flows into a local stream is considered:
- point-source pollution
  - non-point source pollution
  - thermal pollution
  - a and c
20. The pesticide DDT (dichlorodiphenyltrichloroethane) and its byproduct DDE (Dichlorodiphenyldichloroethylene) persist in soils of farm fields after decades of not being used.
- True
  - False
21. The ecological process by which DDT was concentrated in organisms moving up trophic levels, leading DDT to have more detrimental effects on birds of prey at the top trophic level than fish at lower trophic levels is called: \_\_\_\_\_ .
22. Which of the following is NOT a cause of desertification?
- poor grazing management/overgrazing
  - salinization of soils due to incorrect irrigation practices
  - reforestation
  - urbanization

23. Which of the following is **NOT** a negative impact of conventional, unsustainable farming practices:

- a. nonpoint source pollution
- b. loss of biodiversity
- c. creation of oligotrophic streams
- d. soil erosion

24. Which of the following is/are problems of surface mining?

- a. water emissions of heavy metals
- b. atmospheric emissions of sulfur dioxide
- c. base drainage
- d. a and b

25. The human population has not yet reached its carrying capacity.

- a. true
- b. false

26. \_\_\_\_\_ is the concept suggested in 1968 by ecologist Garret Hardin that when no one has ownership of an area or resource, no one takes responsibility. This leads to the area/resource being exploited, like the over-pumping of the Ogallala Aquifer.

27.(3 points) Briefly explain the difference between conservation and preservation.

28. We can use \_\_\_\_\_ species as an early warning that an ecosystem is being degraded. Examples in aquatic ecosystems include dragonfly nymphs, stonefly larvae, and trout.

29. (3 points) What is the second law of thermodynamics and how does it relate to the amount of energy that is maintained in moving up trophic levels?

30. \_\_\_\_\_ resources are those that can be used again and are clean energy sources.

31. Which of the following is not a renewable energy?

- a. biomass
- b. waves
- c. nuclear fusion
- d. geothermal

32. \_\_\_\_\_ is the form of energy when nuclei of isotopes split apart when struck by neutrons.

33. (5 points) Electricity used in homes is generated by the same general process by fossil fuels, biomass, or nuclear power. Briefly explain how this electricity is produced and gets to homes.

34. This type of renewable energy captures the earth's internal heat to use as energy:  
\_\_\_\_\_.

35. **TIEBREAKER:** The \_\_\_\_\_ Act of 1970 established national primary and secondary air quality standards, setting emission limits for the release of air pollutants.

36. The \_\_\_\_\_ Act of 1973 identified threatened and endangered species in the US, putting their protection ahead of economic gains.

37. The \_\_\_\_\_ of 2005, which the US did not sign, attempted to control global warming by setting greenhouse gas emissions targets for developed countries.

38. This act was designed to identify and clean up "superfund" sites

- Comprehensive Environmental Response, Compensation, and Liability Act
- Surface Mining Control and Reclamation Act
- Resource Conservation and Recovery Act
- Nuclear Waste Policy Act

39. The \_\_\_\_\_ Act of 1972 set maximum permissible standards for water pollutants that can be discharged into waterways and created pollutant discharge permits.

40. Which of the following **NOT** is a benefit of composting?

- reduces landfill waste
- can be used as a natural herbicide
- is an alternative to chemical fertilizers
- introduces beneficial microbes to the soil

41. **TIEBREAKER:** Which of the following is an ecosystem service provided by forests?

- storing of atmospheric carbon
- eutrophication
- storing of atmospheric sulfur dioxide (SO<sub>2</sub>)
- a and c

42. Which of the following statements about wildfires is false?

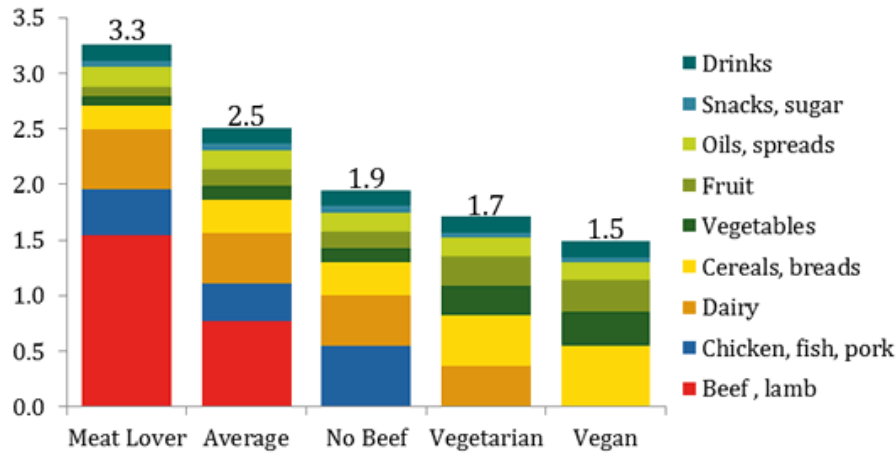
- climate change will increase the frequency and severity of wildfires
- natural surface fires should be prevented to decrease the occurrence of crown fires
- in wildfire-prone ecosystems, mature trees can survive fires
- surface fires can benefit particular animal species

43. The two most common nutrients that initiate eutrophication are: A) \_\_\_\_\_ and B) \_\_\_\_\_.
44. What is the greatest cause of a species becoming endangered?
- poaching/illegal killing
  - widespread pesticide use
  - pollution
  - habitat loss and fragmentation
45. As a result of greenhouse gas emissions, the following will take place in the oceans:
- increase in sea level
  - increase in acidity of the oceans
  - decrease in the ability of mollusks to form shells
  - a and b
  - a, b, and c
46. The gas that makes up the majority of our atmosphere is:
- oxygen
  - carbon dioxide
  - nitrogen
  - argon
47. Which of the following lists contains only greenhouse gases?
- water vapor, methane, nitrous oxide, argon
  - water vapor, methane, carbon dioxide
  - carbon dioxide, helium, tropospheric ozone
  - hydrogen, nitrous oxide, sulfur hexafluoride
48. In terms of the effects of pollution on health, persistent chemicals are less toxic than chemicals that break down rapidly.
- True
  - False
49. The formation of the ozone layer was important to the evolution of life on Earth because it filters visible light.
- True
  - False
50. One of the main roles of the oceans play in our environment is:
- absorption and redistribution of heat
  - release of carbon dioxide
  - dilution of pollution
  - release of nitrous oxide

51. In regards to energy, hydroelectric power represents:
- remnant gravitational potential energy of precipitation
  - remnant chemical energy within water molecules
  - remnant kinetic energy from storms
  - a and b

Use this diagram of Carbon Foodprints for the following question.

### Foodprints by Diet Type: t CO<sub>2</sub>e/person



Note: All estimates based on average food production emissions for the US. Footprints include emissions from supply chain losses, consumer waste and consumption. Each of the four example diets is based on 2,600 kcal of food consumed per day, which in the US equates to around 3,900 kcal of supplied food.

Sources: ERS/USDA, various LCA and EIO-LCA data



52. According to the diagram above, which diet should someone follow to have the lowest carbon footprint (i.e. lowest CO<sub>2</sub> emissions/person)?
- Meat lover
  - Average
  - No beef
  - Vegetarian
  - Vegan