Event Supervisor Instructions for Ecology Regional Exam (2018)

1. Printing and copying
   a. The test
      i. If running as paper test make one copy for each team.
      ii. If run as stations make enough copies to place the relevant part (A, B, or C) at each respective station.
      iii. Make sure if you are using images that they print clearly in black or white. If not print in color. Also make sure they are big enough to read easily.
   b. The answer sheet - make one copy per team
   c. The key - print copies as needed to cover all graders
2. Options for running the event- give instructions to students prior to the start of the event, point out tie breaker questions are marked
   a. Run as 12 stations, 3.5 minutes each part A, B, and C- Divide the number of teams competing at once by 3, and set up that many replicates of each part
   b. Run as paper test
      i. Hand out test in its entirety
      ii. Tell them they have 50 minutes to finish.

Part A Station 1: Community Interactions

1. The sum total of an organism's interaction with the biotic and abiotic resources of its environment is called its

a.	habitat.	d.	carrying capacity.
b.	logistic growth.	e.	ecological niche.
c.	biotic potential.		
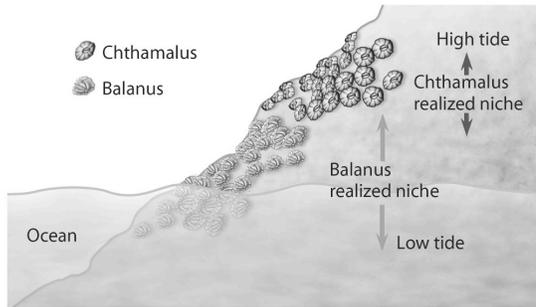
2. Based upon the above image, which of the following is the most logical conclusion about the distribution of the two species of barnacle, Chthamalus and Balanus?
   a.   Chthamalus and Balanus compete for the same types of food.
   b.   Balanus is less able to resist desiccation than Chthamalus.
   c.   Chthamalus prefers higher temperatures than Balanus.
   d.   Balanus is a better osmoregulator that Chthamalus.
   e.   Chthamalus is preyed upon more than Balanus because of its size.

3. Which of the following is an example of cryptic coloration?
   a.   bands on a coral snake
   b.   brown color of tree bark
   c.   markings of a viceroy butterfly
   d.   colors of an insect-pollinated flower
   e.   a "walking stick" insect that resembles a twig

4. Evidence shows that some grasses benefit from being grazed. Which of the following terms would best describe this plant-herbivore interaction?

a.	mutualism	d.	competition
b.	commensalism	e.	predation
c.	parasitism		

5. The species richness of a community refers to the
   a.   complexity of the food web.
   b.   number of different species.
   c.   the bottom-heavy shape of the energy pyramid.
   d.   relative numbers of individuals in each species.
   e.   total number of all organisms.

6. The relationship between legumes and nitrogen-fixing bacteria is

a.	parasitism	d.	facilitation
b.	mutualism	e.	commensalism
c.	inhibition		

**Part A Station 2: Biogeochemical Cycles**

7. The hydrologic cycle refers to the movement of
   a. hydrogen.
   b. oxygen.
   c. nitrogen.
   d. hydrocarbons.
   e. water.

8. Humans strongly affect the hydrologic cycle through all of the following except
   a. water withdrawal in heavily populated areas.
   b. clearing vegetation for agriculture.
   c. creating housing developments.
   d. paving roads and parking lots.
   e. boiling water.

9. A key component of nature's thermostat is
   a. oxygen.
   b. carbon dioxide.
   c. glucose.
   d. methane.
   e. nitrogen.

10. The most common gas in the atmosphere is
   a. nitrogen.
   b. carbon dioxide.
   c. oxygen.
   d. hydrogen.
   e. methane.

11. The form of nitrogen most usable to plants is
   a. ammonia.
   b. nitrogen gas.
   c. proteins.
   d. nitrates.
   e. methane.
12. Sulfur naturally enters the atmosphere from
   a. manufacturing plastic bottles.
   b. nuclear power plants.
   c. burning matches.
   d. hydrogen sulfide from volcanoes.
   e. animal waste runoff.

Part A Station 3: Extinction, Selection, Migration and More

13. A population of peppered moths changed from a light to a dark color in response to smog during the industrial revolution. The change in coloration is an example of
   a. speciation.
   b. selection.
   c. genetic drift.
   d. extinction.
   e. none of these answers.

14. Which of the following statements about extinctions is *false?*
   a. Biologists estimate that 99% of all the species that have ever existed are now extinct.
   b. Mass extinctions raise the extinction rate above the background extinction rate.
   c. Most mass extinctions are believed to be due to global climatic changes.
   d. Earth has experienced over 1000 great mass extinctions.
   e. none of these answers.

15. True or false, when local environmental conditions change, species may become extinct through background extinction.

16. True or false, extinction is the permanent loss of genetic diversity.
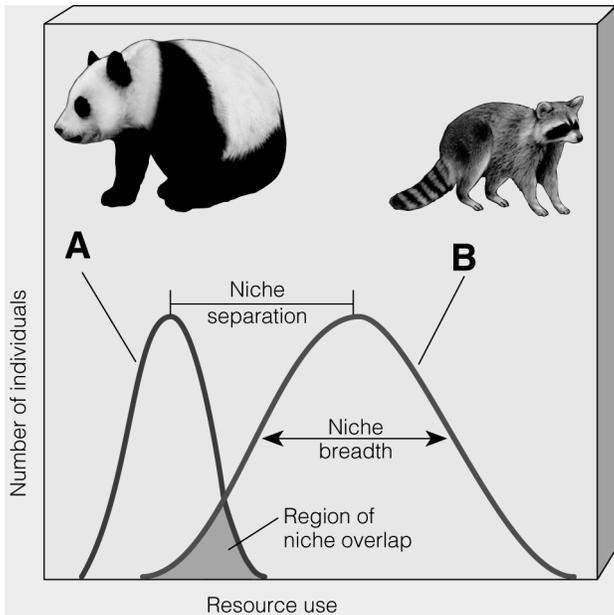

17. In the figure above, which letter represents the species most likely to become threatened or endangered?

18. Prairie potholes are being lost at an alarming rate. What two things could happen to the animals which rely on the potholes?

Part A Station 4: Population Basics
19. Biotic potential is determined by
   a. reproductive age span.
   b. litter size.
   c. how many offspring survive to reproductive age.
   d. all of these answers.
   e. none of these answers.
20. Carrying capacity refers to
   a. reproductive rate.
   b. interaction of natality and mortality.
   c. the maximum size of population the environment will support.
   d. the proportion of males to females.
   e. the intrinsic rate of increase.
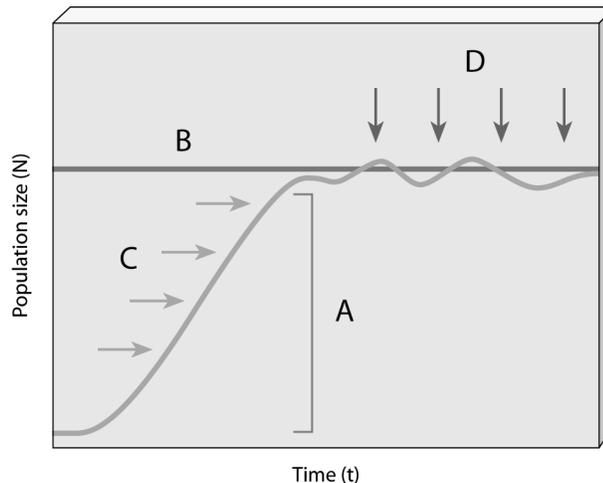
21. On the Population size as a function of time figure, choose the letter that represents when resources are not limiting and a population can grow at its intrinsic rate of increase.
22. Choose the letter that represents population size at which a population in a particular environment will stabilize when its supply of resources remains constant.
23. Choose the letter that represents limiting abiotic factors.
24. Choose the letter that represents a population's capacity for growth.
25. Calculate population change based on the following data.
    Births = 10,000
    Deaths = 5,000
    Immigration = 5,000
    Emigration = 2,000

Part B Station 5: Grassland Basics
1. Many species of hoofed animals can live together in the African tropical savannas because they have _____ eating habits that _____ competition for resources.
   a. specialized . . . maximize
   b. specialized . . . minimize
   c. generalized . . . maximize
   d. generalized . . . minimize
   e. none of these answers.
2. Humans have affected grasslands by
   a. the introduction of livestock.
   b. plowing and conversion to croplands.
   c. oil exploration.
   d. all of these answers.
   e. none of these answers.
3. Which of the following are the dominant herbivores of savanna ecosystems?
   a. antelopes
   b. zebras
   c. buffalo
   d. grass
   e. insects
4. What two disturbances are common in grasslands?
5. The easiest way to tell a savanna from a prairie is to look for the presence of _____.
6. True or false, animals in grasslands migrate to watering holes during the dry season.
7. Where are grasslands found in North America?

Part B Station 6: Desert Basics

8. All of the following are common adaptations made by animals to the desert *except*
   a. living underground during the heat of the day.
   b. having thick outer coverings to minimize water loss.
   c. drinking and storing large amounts of water.
   d. becoming dormant during periods of extreme heat or drought.

9. _____ plants, or water storage plants, such as cacti are commonly found in the desert.

10. A desert is a biome that receives less than _____ cm/yr of precipitation.
   a. 5 to 10   b. 25 to 50   c. 100 to 200   d. 300 to 350

11. True or false, disturbances such as cold are common in deserts.
12. Do deserts recover quickly, moderately, or slowly from habitat damage?
13. Deserts can be hot, warm or _____.

Part B Station 7: The Prairies of Iowa

14. Historically Iowa was _____ percent prairie.
    a.100   b. 85   c. 60   d. 50   e. 10

15. The _____ Hills of western Iowa contain the largest prairies currently in the state.

16. This type of prairie is the most common in Iowa.
    a. Tallgrass
    b. Mixed
    c. Shortgrass
    d. All the above are found in equal amounts.

17. The chief grass of the tallgrass prairie in Iowa is
    a. Indian grass
    b. Cordgrass
    c. Big bluestem
    d. Switchgrass

18. This wildflower has a strong smell.
    a. Compass
    b. Milkweed
    c. Lead plant
    d. Sage
    e. All of the above.

19. Which of the following is not found in the Iowa prairie?
    a. Red fox
    b. Meadowlark
    c. Box turtle
    d. Deer
    e. All of the above are found in the Iowa prairie.

Part B Station 8: Biodiversity Basics

Match the following terms and descriptions.

20. genetic diversity   a. diversity in density
21. organismal diversity   b. diversity in ecological interactions
22. population diversity   c. diversity in morphology
23. species diversity   d. diversity in biotic and abiotic factors
24. community diversity   e. diversity in an allele
25. ecosystem diversity   f. diversity in number variations in genera

Part C Station 9: Remediation of Polluted Water

1. A conventional water treatment plant is not designed for the removal of the following
    a. Dissolved solids b. Suspended solids c. Colloidal solids d. Pathogens

2. Which of the following is specific to the removal of iron and manganese from water?
    a. Green sand b. Anthracite coal c. Filtralite d. Granular activated carbon

3. Which of the following can serve as both primary and secondary disinfectant?
    a. UV radiation b. Hypochlorite c. Chloramines d. Ozone

4. The disinfectant available in the form of tablets is
    a. Calcium hypochlorite   c. Stabilized chloramines
    b. Sodium hypochlorite   d. Stabilized chlorine dioxide

5. Which of the following method is used for the removal of heavy metals from water/wastewater?
    a. Coagulation-flocculation settling   c. Adsorption
    b. Precipitation-flocculation-settling   d. Filtration

6. Phosphorus from water is removed by
    a. Coagulation-flocculation b. Neutralization   c. Precipitation d. None of the above

7. What must be present in order to call a process bioremedition?

Part C Station 10: Alternative Energy

Match ALL that apply for full credit.

8.	Solar	a.	intermittently available
9.	Wind	b.	generally available
10.	Bioenergy	c.	domestically produced
11.	Geothermal	d.	clean
12	Hydropower	e.	abundant nationwide
13.	Hydrogen		

Part C Station 11: Conservation Biology

Questions 14 to 16: What three factors determine the severity of harmful effects of pollution?

17. Use the IPAT equation to estimate the percentage increase in the amount of energy that would be required, worldwide, in 2060, relative to 2017. Assume that the popoulation grows 2% per year and that global economic activity per person grows 4% per year. Assume that the energy consumption per dollar of GDP (the T in the IPAT equation remails at 2017 levels. Show your work.

18. How much does this estimate change if population growth is 1% and econmic growth is 5%? Show your work.

19. In the year 2011 the automobile industry produced 4 million cars which were driven for 150,000 miles on average. Assuming gasoline consumption is 28 mpg estimate the average energy consumption in gallons of gasoline. Show your work.

Part C Station 12: The Goals of Conservation Bioloyg

Questions 20 through 21. Compare and contrast the biocentric and the anthropocentric views in conservation biology.

22. Coral reefs and tropical rain forests are good examples of biologal "_____ _____"

Questions 23 through 25. List the three levels of biodiversity that conservation biologists focus conservation efforts upon.

Division C Sample Succession Question

1. How long does it take natural processes to produce fertile soil?
    a. weeks to months
    b. months to years
    c. decades to a few centuries
    d. several centuries to several thousands of years
    e. several thousand years to millions of years

2. Which of the following would exhibit primary succession?
    a. rock exposed by a retreating glacier
    b. an abandoned farm
    c. a forest that had been clear-cut
    d. newly flooded land to create a reservoir
    e. a forest that has been burned

3. Which of the following would undergo secondary succession?
    a. cooled volcanic lava
    b. an abandoned parking lot
    c. a heavily polluted stream that has been cleaned up
    d. a bare rock outcrop
    e. a newly created shallow pond

4. In immature ecosystems
    a. the species diversity is high.
    b. the decomposers are numerous.
    c. there are many specialized niches.
    d. there are few producers.
    e. the food webs are simple.

5. How does what is going on in your backyard relate to succession?

6. Describe a climax community. Balanced community as a result of succussion

7. Describe the progression of events after a glacier moves through an ecosystem removing everything including the soil.

Answer Key
Part A

1. E
2. A
3. E
4. A
5. B
6. B
7. E
8. E
9. B
10. A
11. D
12. D
13. B
14. D
15. True
16. True
17. A
18. Must adapt or will go extinct
19. D
20. C
21. A
22. B
23. D
24. C
25. (10,000+5,000)-(5,000+2.000)=8,000

Part B

1. B
2. D
3. E
4. Fire and drought
5. Trees
6. True
7. Central states, northern most North Dakota to southern most Texas (MT, ND, MN, SD, IA NE, CO, KS, MO, OK, NM, TX)
8. B
9. Succulent
10. B
11. True
12. Slowly
13. Cold
14. B
15. Loess
16. A
17. C
18. D
19. E
20. E
21. C
22. A
23. F
24. B
25. D

Part C

1. D
2. A
3. B
4. B
5. B
6. C
7. Includes the use of a living organism
8. A C D E
9. A C D E
10. B C
11. B C D
12. B C D
13. B C D
14. Chemical nature (how acitive/harmful to living organisms)
15. Concentration
16. Persistance or degradability
17. 2060 to 2017 is 43 years
    2% x 43 x 4% = 3.44%
18. 1% x 43 x 5% = 2.15%, this is a decrease of 1.29%
19. 150,000miles/ 28 mpg – 5,257 gallons per car
20. Biocentric states that species have a right to exist
21. While anthropoecentric states that nature exists to help humans
22. Hot spots
23. Species
24. Genetic
25. Ecosystem

Sample Succession Questions for Division C

1. D
2. A
3. C
4. E
5. Your backyard would go through the natural process of succession based on what ecosystem sould normally be there if you did not do things like mow the grass and pull weeds.
6. The balanced community that forms as a result of succession.
7. Initially there would only be microbes present. Then lichens and mosses would start to grow. Soil would begin to form. Lastly grasses, shrubs and trees would start to grow.

Sample Ecology Regional Exam Division B

NOTE: At least **THREE** questions should be marked as TIE BREAKER questions.

Student Name(s) _____

School Name and Number _____   JV? Yes or No _____

Part A- 25 points, 1 point each   NOTE- mark tie breaker questions as well

1. ___

2. ___

3. ___

4. ___

5. ___

6. ___

7. ___

8. ___

9. ___

10. ___

11. ___

12. ___

13. ___

14. ___

15. _____

16. _____

17. ___   Point total part A _____

18. _____   Point total part B _____

19. ___   Point total part C _____

20. ___

21. ___   EXAM TOTAL SCORE _____

22. ___

23. ___   TIE BREAKER REQUIRED? ___

24. ___   MODIFIED SCORE ____

25.

Part B- 25 points total, 1 point each

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

21. _____
22. _____
23. _____
24. _____
25. _____   TOTAL PART B _____

Part C- 25 points total, 1 point each
1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17.

18.

19.

20. _____

21. _____

22. _____

23. _____

24. _____

25. _____   TOTAL PART C _____