ENTOMOLOGY'S ECOLOGY
B/C TEST

Exploring the World of Science

School Name: _____

Team #: _____

Student Names: _____

NOTE: On this test, tiebreakers are included in the test as normal questions and have point values that will count toward your final score. In the event of a tie, ties will be broken based on who gets the most of these "tiebreaker" questions correct.

You will have 50 minutes to complete this test. Please start when the Event Supervisor instructs you to do so.

SECTION I: MATCHING (Not all words will be used)

All questions in this section are 1 point.

A) Mullerian Mimicry	B) Allopatric Speciation	C) Biodiversity Hotspot	D) Umbrella Species	E) Microclimate
F) Keystone Species	G) Torpor	H) Carbon Anomoly	I) Biomagnification	J) Batesian Mimicry
K) Bioturbation	L) Natural Capital	M) Sympatric Speciation	N) Keeling Curve	O) Indicator Species

1) A state of decreased physiological activity in an animal

2) Must contain at least 0.5% or 1,500 species of vascular plants as endemics

3) Two harmful species mimic each other

4) The reworking of soil through plants and animals

5) Plots the change in concentration of CO_2 in Earth's atmosphere since the 1950s

6) Thought to be the dominant mode of speciation

7) Includes rocks, soils, air, water and all living organisms

8) Defines a trait or characteristic of the ecosystem

9) This type of speciation commonly occurs through polyploidy

10) Has a disproportionately large effect on its environment relative to its abundance

SECTION II: MULTIPLE CHOICE

All questions in this section are 1 point.

11) Plants in the desert include: (select all that apply)

A) Octilla
B) Ephedra
C) Jarrah
D) Turpentine Bush

12) Trade wind deserts occur either side of the horse latitudes at:

A) 40° to 95° N and S
B) 35° to 35° N and S
C) 30° to 35° N and S
D) 70° to 30° N and S

13) The Florida Everglades are an example of which type of grassland?

A) Montane
B) Temperate
C) Flooded
D) Xeric

14) Starting with Nitrogen Fixation, which option correctly states the order of the nitrogen cycle?

A) Nitrogen fixation, ammonification, assimilation, nitrification, denitrification
B) Nitrogen fixation, nitrification, assimilation, ammonification, denitrification
C) Nitrogen fixation, ammonification, denitrification, nitrification, assimilation,
D) Nitrogen fixation, assimilation, ammonification, nitrification, denitrification

15) Death Valley National Park, located in California, is infamously known for being one of the hottest places on earth, often reaching temperatures of 110°F or more. In order to survive, the animals living there have many adaptations--which are true?

I) Entering a state of torpor during extreme weather
II) Crepuscular Activity
III) Burrowing Acitivity

A) I only
B) 1 and II only
C) I and III only
D) II and III only
E) All are true
F) None are true

16) Which of the following is NOT a way to prevent Soil Erosion?
A) The use of contour ploughing and windbreaks
B) Soil compaction
C) Making sure soil is humus rich
D) Conservation of wetlands

17) In a grassland ecosystem, animals with lighter coloring blend in better with the tall grasses and therefore have better fitness than animals with darker coloring. What type of selection is exhibited here?
A) Stabilizing
B) Directional
C) Balancing
D) Disruptive

18) In an ecosystem, species A and species B occupy the exact same niche and use the exact same resources. Species B has a slight reproductive advantage over species A. Over a period of time, which event will most likely occur?
A) Species A will evolve to occupy a different niche
B) Species A will migrate to a different area
C) Species A will have a reproductive advantage over Species B
D) Species A will go extinct

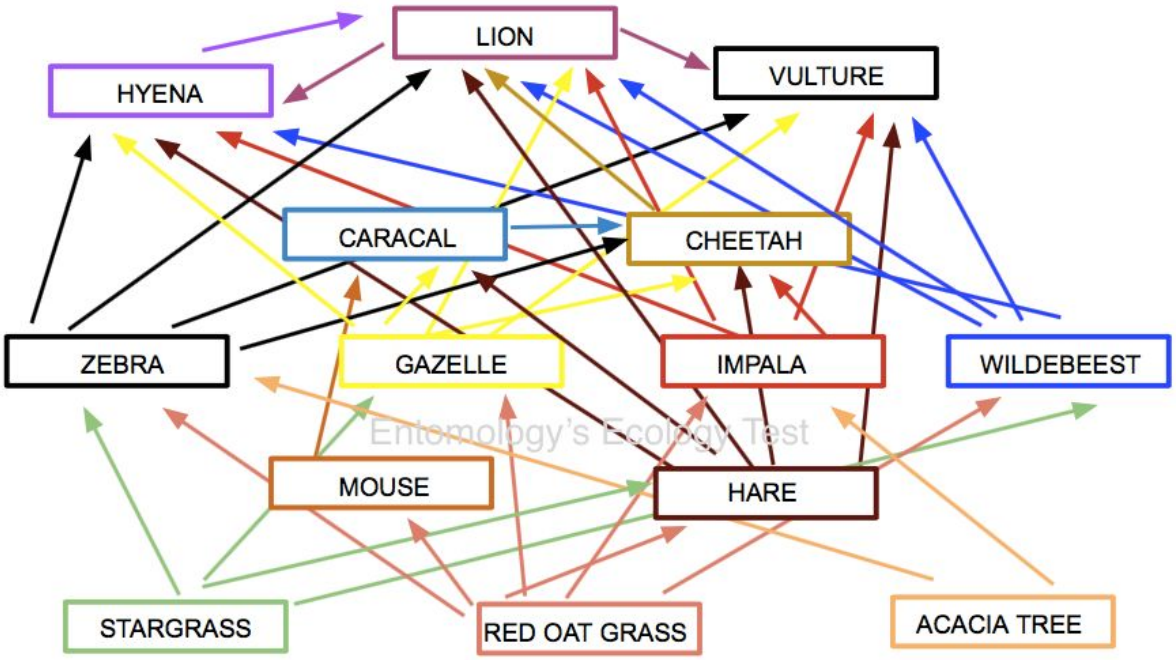
19) In an ecosystem, energy
A) Flows in one direction
B) Flows from the bottom to the top, and then back to the bottom
C) Is constantly recycled
D) Is produced at the smallest trophic level

20) When deforestation occurs in an previously forested area, what effect does this have on the hydrologic cycle?
A) Precipitation occurs more often
B) There is less runoff water
C) Less water is returned to the atmosphere
D) More water is returned to the atmosphere

SECTION III: FOOD WEB

All questions in this section are 2 points unless noted otherwise.

For questions 21-30, please refer to the following diagram. (NOTE: The different colors used in the below diagram do not serve any purpose other than making it easier to see which species consumes which species)



21) Hyenas and Vultures cannot win a fight with a lion. How is it that the above food web shows vultures and hyenas consuming lions? (3 points)

22) The Lion and the Hyena have almost identical diets, as they feed on many of the same prey. To eliminate competition, lions often kill Hyenas and their young. This is termed _____ _____ (Tiebreaker #1)

23) Because the Lion is at the top of the food chain, it is best described as an _____ _____.

24) If a Gazelle has 481 KJ of energy, how much energy would be gained by a Lion if it consumed a Cheetah that consumed a Caracal that consumed a Gazelle? (1 point)

25) What would happen to the Mouse population if the Cheetah population increased? (1 point)

26) Which ecological concept does #25 demonstrate? _____ _____
27) In a stable ecosystem, the biomass of predators is always less than the biomass of producers. This is explained by the _____ _____ _____ _____ (Tiebreaker #2)

28) Because Impalas and Zebras depend on common resources and have common predators, the relationship between them is *best* defined as _____ _____**.**

29) If the Caracal population decreased, what would happen to the Red Oat Grass population? (1 point)

30) Suppose you added or subtracted predators from this ecosystem in an attempt to solve an overpopulation issue. What is this method called?

SECTION IV: FILL IN THE BLANK

All questions in this section are 2 points unless noted otherwise.

31) Common plants in savannas include Acacia trees. These trees have a strong relationship with ants of the genus *Pseudomyrmex.* The plant provides the ants with nest sites and food, in return for the ants' defense. The Acacia cannot survive without the ants, and the ants cannot survive without the tree. Given this information, the relationship the two species have is best described as _____ _____**. (**Tiebreaker #3)

32) Nutrient recycling, water filtration, carbon sequestration, and waste recycling are all examples of _____ _____**.**

33) The practice of renewing damaged ecosystems and habitats in the environment by human intervention and action is best known as _____ _____**.**

34) The lack of vegetation leaves the desert vunerable to _____. (1 point)

35) In deserts, more water is lost through _____ than gained through _____.

36) The arid climate of cold deserts is best attributed to the _____ _____**.** (1 point)

37) A version of the arid desert with much more rainfall, vegetation and higher humidity is known as a _____ _____**.** (1 point)

38) The _____ _____ is an international treaty designed to protect the ozone layer.

39) Grasslands created and maintained by human activity are called _____ _____.

SECTION V: CASE STUDIES

CASE STUDY I: GRASSES

You, along with some fellow ecologists, have been recording the populations of 3 different types of grasses in three different regions in the African Savanna. Below are your findings:

	Grass 1	Grass 2	Grass 3
Region 1	78	79	81
Region 2	240	532	692
Region 3	345	218	392

40) Based on the above table, which region has the greatest species richness? (2 points)

A) Region 1
B) Region 2
C) Region 3
D) They all have the same species richness

41) Based on the above table, which region has the greatest species diversity? (2 points)

A) Region 1
B) Region 2
C) Region 3
D) They all have the same species diversity

42) Later in the year, you revisit region 3 when you hear news of a fire occuring. You arrive several hours after the fire has gone out. The 3 grasses that were previously abundant are now nowhere in sight. Your coworker is worried, but you aren't concerned. Why? (Tiebreaker #4) (3 points)

43) You also revisit region 2 and find that it has been turned into a grazing ground for livestock. Describe the effects of grazing on the savanna. (3 points)

CASE STUDY II: GREVY'S ZEBRA

You have been studying a local population of the species *E. grevyi*, known as Grevy's Zebra. It would be nearly impossible to accurately count all the individuals in the area, so you decide to use the Lincoln-Peterson Index:

$$P = \frac{MC}{R}$$

44) What is the name of the method that uses this equation to estimate population size? (2 points)

45) After a long day, you manage to trap 17 zebras unharmed. You carefully tag them, then release them to the wild. After two weeks, you return and capture 14 zebras. 2 of them have tags. Given this information, what is the population size? (2 points)

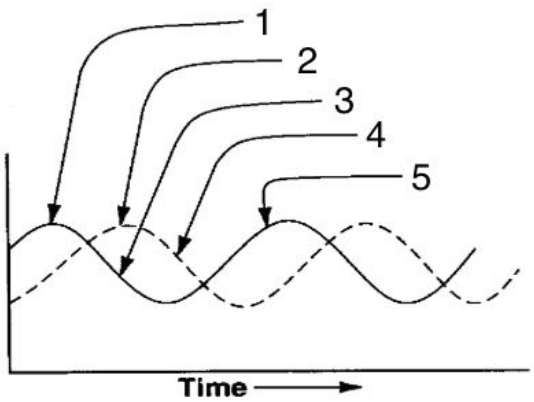
46) As of 2017, it is estimated that there are only 2,680 Grevy's Zebra left in the wild. According to the ICUN Red List, it is classified as endangered. Using your knowledge of threats to biodiversity in the Savanna, come up with an action plan that you believe will create a stable population. (4 points) (Tiebreaker #5)

47) What is the single greatest threat to biodiversity? (1 point)

48) The management of nature and of Earth's biodiversity with the aim of protecting species, their habitats, and ecosystems from excessive rates of extinction and the erosion of biotic interactions is best defined as _____ _____. (1 point)

CASE STUDY III: PREDATOR PREY RELATIONSHIPS

V. m. arsipus, the Desert kit fox, preys on rodents of the Genus *Dipodomys*, Kangaroo rats. Below is a graph tracking their populations:



Theoretical pattern of predator population and prey population over a period of time

49) Which line represents the predator, and which line represents the prey? (1 point)

50) Which number on the graph fits the following statement: A rise in Predator population due to an increase in Prey population. (2 points)

51) Two equations are shown below. What are they called, and what are they used for?(3 points)

$$\frac{dx}{dt} = \alpha x - \beta xy \qquad \frac{dy}{dt} = \delta xy - \gamma y$$

52) List the 5 assumptions made when using these equations to represent predator prey populations. (Tiebreaker #6) (5 points)

SECTION VI: SHORT ANSWER

53) Describe how heat from the sun contributes in the "decay" of mountains and creation of sand. (Tiebreaker #7) (3 points)

54) Compare and contrast Inbreeding Depression and Outbreeding Depression. (2 points)

55) Define Niche Construction, and include an example. (2 points)

56) By which four factors can deserts be classified by? (4 points)

57) Describe a "desert pavement". (2 points)

58) Describe the ecological importance of an oasis in the desert. (2 points)