Science Olympiad Regional Ecology Test

* Please write your answers on the answer sheet – NOT in this test booklet.*

1. Close interaction between organisms of different species over an extended period of time, in which one individual benefits while the other individual neither benefits nor is harmed by the relationship, is know as
    a. predation   b. competition c. commemsnsalism   d. mutualism   e. parasitism
2. Honeyguides are African birds that excitedly lead the way to a bee's nest, and ratels are the honey and bee eating mammals that open up and scatter the contents of the bee's nests, allowing both the ratels and the honeyguides to feed on the contents. The relationship between the Honeyguides and the ratels is
    a. predation   b. competition c. commemsnsalism   d. mutualism   e. parasitism
3. An ecosystem contains
    a) only the biotic components of the environment.
    b) only the abiotic components of the environment.
    c) only the energy flow components of an environment.
    d) both the living organisms and the abiotic components of the environment.
    e) only the food relationships found in an environment.
4. Which kind of organisms would be most likely to perform photosynthesis?
    a) omnivore   b) herbivore   c) detritivores   d) autotroph   e) carnivore
5. Which eats only plant food?
    a) omnivore   b) herbivore   c) detritivores   d) autotroph   e) carnivore
6. Energy flow in an ecosystem is not cyclic because energy is
    a) destroyed as it is used.
    b) evenly spread out over many organisms.
    c) converted to many kinds of useful energy.
    d) increased as you go up the energy pyramid.
    e) no longer useful when it is converted to heat.
7. Why is acid rain, or acid deposition, considered to be harmful?
    a. Moisture in the air becomes acidified and then falls on plants and the soil below, harming them.
    b. Acid rain leeches essential nutrients out of the soil (e.g. potassium and calcium) and kills decomposers in the soil
    c. Dead, or weakened, plants make soil much more susceptible to erosion
    d. All of the above
8. Which may be a secondary or tertiary consumer?
    a) decomposer   b) herbivore   c) detritovore   d) autotroph   e) carnivore
9. Which is Not true about a complex food web?
    a) It remains stable.
    b) Populations tend to remain about the same size.
    c) Energy levels remain about the same for all trophic levels.
    d) Inputs are constant and outputs are minimal except for heat.
    e) Most of the energy entering the system maintains the whole community.
10. Which statement is true about the water (hydrologic) cycle?
    a) Because this is a true cycle, it is impossible to run out of fresh water for human use.
    b) Some water evaporates from land and from plants.
    c) All water molecules that evaporate from the ocean precipitate on land and move by gravity through groundwater to the ocean again.
    d) Once water sinks into the ground, it is safe from human exploitation or pollution until it has rejoined the ocean.

11. Sunlight that passes through the atmosphere, is absorbed, and is radiated back as longer wavelength heat waves that are trapped by gasses in the atmosphere represents
    a) global warming
    b) the carbon cycle
    c) the main input of energy that drives all life energy chains
    d) the theory of the greenhouse effect, although it is just a hypothesis
    e) the greenhouse effect, which is proven and measurable phenomenon
12. The diagram, which shows how energy moves through an ecosystem, is known as a
    a) habitat   b) food chain   c) food net   d) food web
13. At each trophic level, the energy stored in the organisms in that level is
    a) about one-tenth of the energy in the level below it.   c) about one-tenth of the energy in the level above it.
    b) 50 percent of the energy in the level below it.   d) 100 percent of the energy in the level below it.
14. Process by which atmospheric nitrogen gas is changed to forms that plants can use.
    a) biogeochemical fixation
    b) hydrologic fixation
    c) nitrogen fixation
    d) carbon fixation
    e) phosphorus fixation
15. Acid deposition causes
    a) lakes and forests to die.   c) acid indigestion in humans.
    b) the greenhouse effect to lessen.   d) pest to increase decomposition.
16. Photosynthesis and respiration belong to which cycle?
    a) nitrogen cycle   b) carbon cycle   c) phosphorus cycle   d) hydrologic cycle
17. This biome is known for having the greatest diversity of species
    a) taiga
    b) temperate grassland
    c) tropical forest (or rain forest)
    d) savanna
    e) deciduous forest
18. The largest communities on land are called
    a) biospheres   b) estuaries   c) tundras   d) taigas   e) biomes
19. Ecology is best defined as the study of
    a) populations.
    b) the rate of populations changes.
    c) population increases and decreases.
    d) how populations are restricted by environmental resistance.
    e) organisms as they interact with other organisms and with their physical environment.
20. Ecology is derived from the Greek root words for "the study of ____"
    a) populations   b) weather   c) change   d) the environment   e) house or home
21. The location where an organism lives is best described as the organism's
    a) life zone   b) niche   c) ecosystem   d) community   e) habitat
22. The number of individuals per unit area or volume is the
    a) population density
    b) population distribution
    c) carrying capacity
    d) intrinsic rate of reproduction
    e) limiting factors
23. The pattern of dispersal of individuals with in an area is the
    a) population density
    b) population distribution
    c) carrying capacity
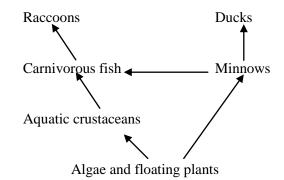   d) intrinsic rate of reproduction
    e) limiting factors

24. The factor(s) that determine(s) if an organism can live in an area is/are
    a) population density
    b) population distribution
    c) carrying capacity
    d) intrinsic rate of reproduction
    e) limiting factors
25. When the number of births exceeds the number of deaths, this results in
    a) population growth
    b) biotic potential
    c) environmental resistance
    d) carrying capacity
    e) steady state
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    a) population growth
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    d) carrying capacity
    e) steady state
27. Biological growth rate would be negative when
    a) birth rate is greater than death rate.
    b) death rate is greater than birth rate.
    c) all couples are married but average fewer that two children apiece.
    d) a country becomes poorer, because it is related to economic growth.
    e) better health care reduces the death rate and increases survivorship of newborns.
28. The maximum rate of natural increase of a population that can occur under ideal conditions is the
    a) population growth
    b) biotic potential
    c) environmental resistance
    d) carrying capacity
    e) steady state
29. Population size is believed to level off at the _____ of an environment.
    a) population growth
    b) biotic potential
    c) environmental resistance
    d) carrying capacity
    e) steady state
30. Biotic potential depends on all of the following Except
    a) the usual number of offspring per reproduction.
    b) how often each individual reproduces.
    c) how many different mates each individual has.
    d) chances of survival until the age of reproduction.
    e) the age at which reproduction begins.
31. Which of the following is a characteristic of an R-selected strategists?
    a) low reproductive rate
    b) extensive postnatal care
    c) relatively constant population size
    d) J-shaped growth curve
    e) members include humans
32. A species that is limited in size primarily by density independent effects so that it produces large numbers of offspring is called
    a) a K-selected.   b) a r-selected.   c) neither, but it has characteristics of both.

33. As the carrying capacity of an environment is reached by a population
    a) births begin to exceed deaths.
    b) deaths begin to exceed births
    c) the rate of reproduction increases.
    d) population growth begins to be exponential.
    e) density dependent environmental resistance increases.
34. Which of the following describes a type I survivorship curve?
    a) Most individuals die of old age.   c) Many individuals die early in life.
    b) Individuals die at a constant rate throughout time.   d) Most individuals die during their
    reproductive years.
35. Which of the following describes a type II survivorship curve?
    a) Most individuals die of old age.   c) Many individuals die early in life.
    b) Individuals die at a constant rate throughout time.   d) Most individuals die during their
    reproductive years.
36. A breeding group of individuals of the same species that inhabit a common area is called a(n)
    a) community   b) species   c) ecosystem   d) population   e) township
37. An interactive group of many species that inhabit a common area is known as a(n)
    a) population   b) township   c) ecosystem   d) community
38. In a series of trophic levels, the animals farthest from the producer usually
    a.   have the most biomass   b. receive the most energy
    c.   are the largest in number   d. receive the least energy

39. A food chain for a prairie could be as follows: grass, rabbit, snake, hawk. The snake represents
    which of the following?
    a.   autotroph
    b.   secondary consumer or second trophic level
    c.   tertiary consumer or third trophic level
    d.   herbivore
    e.   primary consumer or first trophic level

40. The ocean region that contains the neritic province and the oceanic province it the
    a) littoral zone   b) benthic division   c) pelagic division   d) profundal zone   e) limnetic zone
41. The nursery of the sea is the
    a) rocky beach   b) sandy beach   c) estuary   d) coral reef   e) ocean floor
42. Which organisms provide the most of the nutrient supply in the ocean?
    a) small fishes   b) large fishes   c) seaweeds   d) phytoplankton   e) zooplankton
43. The neritic zone of the ocean lies between the
    a. Open-sea zone and the photic zone.   b. Intertidal and deep-sea zones
    c. Intertidal and open-sea zones.   d. The open-sea and deep-sea zones

44. Among the following, the term that includes the others is
    a. Salt marsh   b. lagoon   c. mangrove swamp   d. estuary.
45. Marine biomes are divided into ecologically distinct zones depending on
    a. Depth and distance from shore   b. temperature and distance from shore
    c. Plant life present   d. type of fish present.
46. In a marine biome, organisms experience radical changes in their environment each day in the
    a. deep-sea zone   b. open-sea zone   c. neritic zone   d. intertidal zone

47. In the North Sea, tuna feed on herring and herring feed on sand eels. Cod and seabirds also feed
    on the eels. Assuming that North Sea fishermen over fish cod and herring to the point that their
    populations greatly decrease, what is the most likely result on the tuna and seabird populations?
    a.   Tuna and seabird populations will both increase
    b.   Tuna population will increase while seabirds will decrease
    c.   Tuna population will decrease while seabirds will increase
    d.   Tuna and seabird populations will both decrease
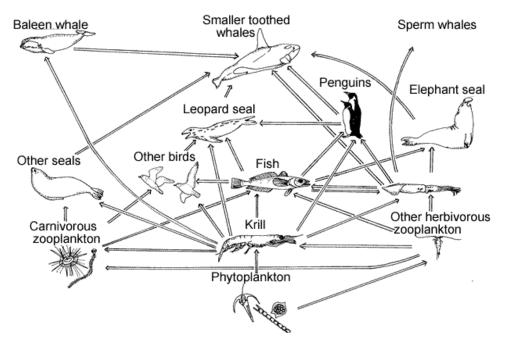   e.   Tuna and seabird populations will stay more or less the same

48. The biome characterized by relatively long, cold winters, soil which is relatively fertile, and herds of grazing mammals is
    a) taiga   b) temperate grassland   c) savanna   d) tundra   e) temperate deciduous forest

49. This biome has cold winters and is known for its pine forests.
    a) desert   b) grassland   c) tundra   d) taiga   e) deciduous forest

50. This biome contains trees that drop their leaves during the winter months.
    a) desert   b) grassland   c) tundra   d) taiga   e) deciduous forest

51. This biome contains plants whose roots cannot go deep due to the presence of permafrost.
    a) desert   b) grassland   c) tundra   d) taiga   e) deciduous forest

52. Long, cold, moist winter and short summers are typical of this biome dominated by gymnosperms.
    a) deciduous forest   b) tropical rain forest   c) desert   d) tundra   e) taiga

53. Which of the following would most likely reduce the population size of the carnivorous fish in the diagram?
    a. A decrease in the duck population
    b. An increase in the raccoon population
    c. A decrease in the pathogens of carnivorous fish
    d. An increase in the autotroph population

54. Using the food web below, create a trophic pyramid that includes all trophic levels and organisms from the food web. (3 points)

55. Winters in the northern regions of North America present a real challenge to animals living in this region.   (4 points)

List and briefly describe four strategies for surviving the winter cold. Also provide an example of animal utilizing this strategy.

56. Contrast exponential growth with logistical growth by completing the chart (3 points)

Criteria	Exponential Growth	Logistical Growth
Graph growth rate		
Assumptions (regarding resources)		
Birth and Death Rates		

1. Mammals differ in size between the warmer, southern biomes and the colder, northern biomes of North America.

    A. Describe the difference in size of mammals between the southern and northern regions.

    B. Use physics and biology to explain the benefits of this difference.

Science Olympiad Regional Ecology Answer Sheet

All answers from the test must be on this sheet to be scored

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54.

55.   A. _____

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B. _____

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56.   A. _____

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B. _____

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57. <u>Strategy</u>   <u>Description</u>   <u>Example</u>

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58.

Criteria	Exponential Growth	Logistical Growth
Graph growth rate		
Assumptions (regarding resources)		
Birth and Death Rates		

57. _____

58. _____