

National
Ecology &
Environmental Science

Exam

**EMS Ecology & Environmental Science National
Championship Exam**

Name _____

School

Grade _____

Email address _____

**Instructions – Circle the correct answer
or leave it blank. Correct answers are
worth 2 points. Incorrect answers are
worth –1 point. Questions left blank are
worth 0 points.**

1. A particular location on Earth with interacting biotic and abiotic components is called a(n)
 - A. Feedback loop
 - B. Ecosystem
 - C. Speciation
 - D. Biophilia
2. Which of the following is an abiotic component?
 - A. An eagle
 - B. A tree
 - C. A rock
 - D. A human
3. Shrimp are most often fished for using
 - A. Bottom trawling
 - B. Cast netting
 - C. Drift gill-netting
 - D. Longline fishing
4. Living on Earth in a way that allows humans to use its resources without depriving future generations of those resources is
 - A. Consumption
 - B. Development
 - C. Sustainability
 - D. Carbon Footprint
5. A physical law that states energy can neither be created nor destroyed but can change from one form to another is
 - A. Law of Conservation of Matter
 - B. Law of Conservation of Energy
 - C. Law of Conservation of Momentum
 - D. Newton's Laws of Motion
6. What is the pH of pure water?
 - A. 5
 - B. 8
 - C. 7
 - D. 3
7. Which greenhouse gasses contribute most to climate change?
 - A. Carbon dioxide and water vapor
 - B. Carbon dioxide and methane
 - C. Carbon dioxide and nitrous oxide
 - D. Carbon dioxide and sulfur hexafluoride
8. An organism that uses the energy of the Sun to produce their own energy is?
 - A. Roses
 - B. Rabbits
 - C. Hawks
 - D. Snakes
9. The region of our planet where life resides is the
 - A. Atmosphere
 - B. Geosphere
 - C. Biosphere
 - D. Cryosphere
10. The connections of which organism eat what is a(n)
 - A. Energy chain
 - B. Trophic pyramid
 - C. Trophic levels
 - D. Food chain
11. An organism that consumes dead animals is called a(n)
 - A. Scavenger
 - B. Virus
 - C. An invasive species

- D. An endemic species
12. The amount of energy transferred from grasses to zebra is on average
- 1%
 - 4 %
 - 10%
 - 50%
13. A zebra is an example of a(n)?
- Primary producer
 - Primary consumer
 - Secondary consumer
 - Scavenger
14. Water turning from liquid to a gas is?
- Evapotranspiration
 - Condensation
 - Transpiration
 - Evaporation
15. Most carbon is found in
- Oceans
 - The atmosphere
 - Fossil fuels
 - Sedimentary rock
16. The waste product in photosynthesis is
- Carbon dioxide
 - Oxygen
 - Glucose
 - Energy
17. Which layer of atmosphere is closest to Earth?
- Troposphere
 - Stratosphere
 - Mesosphere
 - Thermosphere
18. The amount of water vapor in the air is the
- Adiabatic cooling
 - Latent moisture
 - Saturation point
 - Humidity
19. The upward movement of ocean water due to convection currents is called
- Upwelling
 - Depression
 - Thermohaline Circulation
- D. A gyre
20. Permafrost is an important factor in which of the following biomes?
- Tundra
 - Boreal Forest
 - Cold Desert
 - Temperate Rainforest
21. A phenomenon in which algae in coral dies causing the corals to turn white is ?
- Thermal Accumulation
 - Calcium Deposition
 - Coral Bleaching
 - Carbon dioxide poisoning
22. Which biome contains the aphotic (where no light can reach) zone?
- Open ocean
 - Mangrove swamps
 - Coral reefs
 - Freshwater wetlands
23. An area that has many different species of animals and plants has ?
- Species phylogeny
 - Good (bio)diversity
 - Animal herds
 - Species evenness
24. When a population has a lot of animals in a given space that means they have good
- Population density
 - Population distribution
 - Population ratio
 - Population size
25. When one organism lives in or on another organism called the host, this is an example of
- Commensalism
 - Mutualism
 - Parasitism
 - Predation
26. Which aquatic ecosystems have the highest net primary productivity, conduct the most photosynthesis?
- Open ocean

- B. Lakes and streams
 - C. Coral Reefs
 - D. Swamps and marshes
27. All of Earth's energy can be traced back to
- A. The Sun
 - B. Coal
 - C. Electricity
 - D. Nuclear
28. The major source of energy used for electricity in the United States is
- A. Oil
 - B. Natural gas
 - C. Coal
 - D. Nuclear
29. Natural gas is primarily
- A. Ethane
 - B. Propane
 - C. Butane
 - D. Methane
30. What is an advantage to nuclear power?
- A. The desire for low energy costs
 - B. Decreased energy independence
 - C. The need for low carbon dioxide emissions
 - D. Because of the lack of significant accidents
31. Which of the following is NOT a nonrenewable energy source?
- A. Oil
 - B. Coal
 - C. Nuclear fuels
 - D. Wind
32. What is a cold front?
- A. Warmer air that cools off rapidly
 - B. When cool air releases hail and snow
 - C. A cold mass of air that is replaced by a warm mass of air
 - D. A leading edge of a cold mass of air that replaces a warm mass of air
33. Acid deposition (acid rain) is caused when
- A. Sulfur and nitrogen oxide are released into the atmosphere
 - B. Factories release waste into rivers
 - C. Temperatures rise during the summer
 - D. Carbon dioxide is given off by plants
34. What is a rain shadow?
- A. A patch of land that is a desert on one side of a mountain because all the rain is on the other side
 - B. A patch of land that is under a thick grove of trees and rarely gets rain
 - C. The shadow that follows cloud systems
 - D. Shadow systems produced by large storm systems
35. What is the name of the natural process where the sun's energy is absorbed and re-radiated which warms the atmosphere?
- A. Radiation
 - B. Albedo
 - C. Greenline Effect
 - D. Greenhouse Effect
36. Which list only contains organic material?
- A. Dead trees, decomposing leaves, earthworms
 - B. Water, Ash, Carbon dioxide gas
 - C. Cellulose, ethanol, calcium chloride
 - D. Proteins, lipids, salts
37. The process by which producers use solar energy to convert carbon dioxide and water into glucose is
- A. Cellular respiration
 - B. Aerobic respiration
 - C. Photosynthesis
 - D. Anaerobic respiration
38. Organisms that specialize in breaking down dead organic material?
- A. Carnivores
 - B. Autotrophs
 - C. Herbivores
 - D. Decomposers
39. What are wetlands?
- A. Areas that receive a lot of rain
 - B. Biomes that are like grasslands
 - C. An ecosystem that is permanently or seasonally covered in water
 - D. Areas that shift between desert like

seasons and rainy seasons

40. Survival of the fittest refers to
- The largest, strongest animals always survive
 - Being able to survive and reproduce
 - The organisms that produce the most offspring
 - The organisms that care for their offspring the longest
41. The abiotic (non-living) conditions like temperature that a species can live in is
- Fundamental niche
 - Realized niche
 - Range of Tolerance
 - Distribution of species
42. How many global mass extinctions have occurred (include the current one)?
- 6
 - 5
 - 3
 - 2
43. What is the pH of an acid like lemon juice?
- 12
 - 11
 - 9
 - 2
44. Which example describes artificial selection?
- Whales have evolved tails that propel them through water
 - Thoroughbred racehorses have been bred for speed
 - Ostriches have lost the ability to fly
 - Darwin's finches have beaks adapted to eating different foods
45. Interactions between remoras (that eat parasites on sharks) and sharks is an example of
- Mutualism
 - Herbivory
 - Parasitism
 - Commensalism
46. Who is the Swedish environmental activist that has challenged world leaders to take immediate action on climate change?
- Malena Ernman
 - Greta Thunberg
 - Annika Henroth-Rothstein
 - Joakim Fohlman
47. Which of the following choices would increase among members of a squirrel population
- An epidemic of rabies
 - An increase in the food supply
 - An increase in hawks in the area
 - An increase in the number of squirrels in the area
48. Which is true about ozone?
- Ozone is an air pollutant in the lower atmosphere
 - Ozone is beneficial in the stratosphere
 - Ozone is harmful in the stratosphere
 - A and B
49. The way biomes are situated around the world is determined by
- Ocean Currents
 - The angle the sun's rays hit the earth
 - The amount of sunlight released at certain times of the year.
 - The distance from Earth to the sun during a particular time of year
50. Groundwater is
- Water in lakes
 - Rivers
 - Water that sinks underground like in aquifers
 - Is found in deserts
51. How does acid rain affect lakes?
- Increases the pH
 - Doesn't affect lakes much
 - Raises the water level
 - Decreases the pH

D. B and C

52. Why does oil float on water?

- A. Higher Boiling point
- B. Lower Density
- C. Dissolves in water
- D. Does not flow well

53. The locations where two tectonic plates move away from each other and have features like the Mid-Atlantic Ridge are

- A. Divergent boundaries
- B. Convergent boundaries
- C. Tectonic boundaries
- D. Transform boundaries

54. What type of energy uses water falling through dams?

- A. Solar
- B. Geothermal
- C. Hydropower
- D. Wind

55. Which of the following best represents El Nino conditions near Peru - water temperature and rainfall

- A. Low temperature, low rainfall
- B. Low temperature, high rainfall
- C. High temperature, high rainfall
- D. High temperature, low rainfall

56. The primary cause(s) of worldwide tropical deforestation is/are

- A. Agricultural expansion (crops and cattle)
- B. Clearing of land for cities
- C. Commercial logging
- D. All of the above

57. What is an indoor air pollutant, and an element on the periodic table, that comes from the ground?

- A. Asbestos
- B. Radon
- C. Formaldehyde
- D. Chlorofluorocarbons (CFCs)

58. Which is a problem with global warming and climate change?

- A. Increasing crop production
- B. Melting of land-based ice and glaciers
- C. Rising sea levels

59. The relationship between dogs and ticks is

- A. Parasitism
- B. Mutualism
- C. Commensalism
- D. Herbivory

60. Which of the following characteristics would generally put a species at risk of extinction?

- A. High reproductive rate
- B. Feeding at a low trophic level, like plants
- C. Fixed migratory patterns that are always used
- D. Ample food resources

61. What is carrying capacity?

- A. How many crops can be moved by a tractor
- B. The amount of species an area can support
- C. The number of different species that live in an area
- D. The number of species that help each other survive

62. Wheat is eaten by a rat, which is eaten by a snake, which is eaten by a hawk. Which of the following is the snake?

- A. A primary producer
- B. A primary consumer
- C. A secondary consumer
- D. A tertiary (third order) consumer

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64. Which foods listed below make up approximately 60% of the world's human food energy intake?

- A. Beans, rice, corn
- B. Meat, fish and milk and milk products
- C. Rice and fish

D. Rice, corn, wheat

65. What happens to the population of coyotes when the population of rabbits decreases?

- A. The population of coyotes increases
- B. The population of coyotes decreases
- C. The population of coyotes is not dependent on rabbits
- D. The population of coyotes does not change

66. Almost one-third of the carbon dioxide in the atmosphere created by human activities

- A. Is absorbed by the oceans
- B. Is taken in by plants and converted to oxygen through photosynthesis
- C. Naturally decomposes in the presence of ultraviolet light
- D. Remains in the atmosphere

67. What is the biggest threat now to a species' survival?

- A. Not enough energy
- B. Loss of habitat
- C. Too many animals
- D. Too many plants

68. All of the different kinds of life in an area is

- A. Geosphere
- B. Habitat
- C. Biodiversity
- D. Niche

69. Which biome consists of dry, grassy plains with cold winters and warm summers?

- A. Montana
- B. Savanna
- C. Steppe
- D. Taiga

70. Earth's climate is primarily determined by

- A. Earth's longitude
- B. The amount of rainfall in an area
- C. The distance of the Earth from the sun
- D. The tilt of Earth's axis

71. Which layer of the atmosphere does most of Earth's weather occur?

- A. Thermosphere
- B. Troposphere
- C. Stratosphere
- D. Mesosphere

72. Which type of soil has the lowest permeability (ability for liquids to pass through)?

- A. Humus
- B. Sand
- C. Clay
- D. Silt

73. After a hurricane which destroys a forest, what happens next?

- A. Primary succession
- B. Secondary succession
- C. Old growth forest
- D. None of these

74. When a volcano erupts in Hawaii and lava covers an area, cools off and becomes a thick layer of rock, what happens next?

- A. Primary succession
- B. Secondary succession
- C. Old growth forest
- D. Soil depletion

75. What type of storm system rotates in a large circular formation and depends on warm water for energy?

- A. Tornado
- B. Warm front
- C. Hurricane
- D. El Nino

Tie Breaker

List the following biomes in order of increasing latitude

Tundra, Tropical rainforest, Temperate Forest, Desert, Coniferous Forest, Temperate grassland