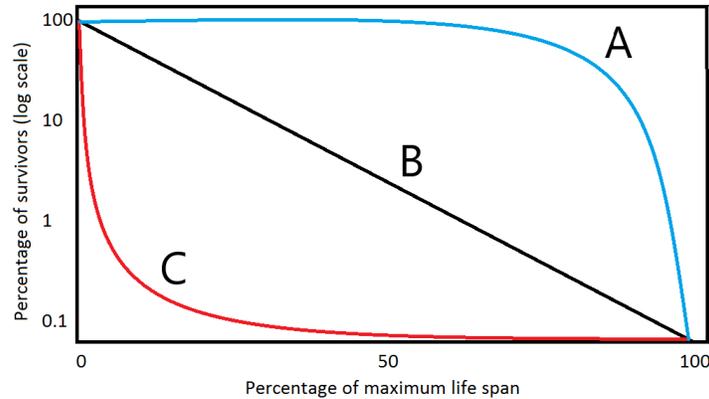


Section A: General Ecology

Use the following diagram for the next six (6) questions.



- (1 point) What type of survivorship curve is line A representing?
A. Type I B. Type II C. Type III D. None of the above
- (1 point) What type of survivorship curve is line C representing?
A. Type I B. Type II C. Type III D. None of the above
- (1 point) What type of survivorship curve is line B representing?
A. Type I B. Type II C. Type III D. None of the above
- (2 points) Which of the following organisms exhibit Type I survivorship curves? (select all that apply)
A. Elephants B. Trees C. Humans D. Songbirds E. Rodents F. Fish
- (2 points) Which of the following organisms exhibit Type II survivorship curves? (select all that apply)
A. Elephants B. Trees C. Humans D. Songbirds E. Rodents F. Fish
- (2 points) Which of the following organisms exhibit Type III survivorship curves? (select all that apply)
A. Elephants B. Trees C. Humans D. Songbirds E. Rodents F. Fish
- (1 point) How much energy (in percent) is lost, if any, between trophic levels?
A. 0% B. 10% C. 20% D. 50% E. 90% F. None of the above
- (1 point) What metric does a trophic pyramid measure?
A. Biomass B. Population C. Energy D. None of the Above
- (1 point) What does the bottom level of a trophic pyramid represent?
A. Primary Consumers B. Primary Producers C. Second Order Consumers D. Decomposers
- (1 point) What does the third layer of a trophic pyramid represent?
A. First Order Consumers B. Primary Producers C. Secondary Consumers D. Decomposers
- (1 point) What is an interaction where 2 different species both benefit known as?
A. Amensalism B. Parasitism C. Commensalism D. Mutualism
- (1 point) What is an interaction where 1 species benefits and the other is harmed known as? (select all that apply)
A. Commensalism B. Parasitism C. Mutualism D. Predation E. Competition
- (1 point) What is an interaction where 2 different species are harmed known as?
A. Mutualism B. Amensalism C. Predation D. Competition

14. (2 points) In the Amazon Rainforest, special groves of trees known as devil's gardens can be found. In these, ants and trees live together. The trees provide shelter for the ants, and the ants kill other trees nearby. What type of interaction is occurring between the ants and the trees?
 A. Comensalism B. Mutualism C. Parasitism D. Competition
15. (2 points) Is the above example an example of symbiosis?
 A. Yes B. No
16. (2 points) In coral reefs, some species of shrimp can be found eating parasites off of larger fish. What type of interaction is occurring between the shrimp and the fish?
 A. Predation B. Parasitism C. Mutualism D. Comensalism
17. (2 points) Is the above example an example of symbiosis?
 A. Yes B. No
18. (4 points) In the 1970s, wolves were hunted to near 0 populations in Yellowstone National Park. This caused a drastic increase in moose populations, and destroyed local grass populations. The collapse of these parts of the ecosystem caused some types of trees to stop being found. This is an example of:

19. (3 points) What are the 3 types of distribution patterns.

20. (3 points) Which of the following organisms have a uniform distribution pattern? (select all that apply)
 A. Penguins B. Wolves C. Flowers D. Fish E. Walnut trees F. Dandelions
21. (3 points) Which of the following organisms have a clumped distribution pattern? (select all that apply)
 A. Penguins B. Wolves C. Elephants D. Fish E. Walnut trees F. Dandelions
22. (3 points) Which of the following organisms have a random distribution pattern? (select all that apply)
 A. Penguins B. Wolves C. Elephants D. Fish E. Walnut trees F. Dandelions
23. (4 points) What is allelopathy, and what kind of distribution pattern does it form?

24. (1 point) Which of the following nutrient cycles does not have a significant atmospheric component
 A. Phosphorus Cycle B. Hydrological Cycle C. Sulfur Cycle D. Carbon Cycle
25. (1 point) What is the process of carbon dioxide being converted into sugar known as?
 A. Respiration B. Photosynthesis C. Deposition D. Evaporation
26. (1 point) What is the largest reservoir of carbon on Earth?
 A. Soil B. The Atmosphere C. Organic Matter D. Oceans
27. (1 point) Define carbon sink

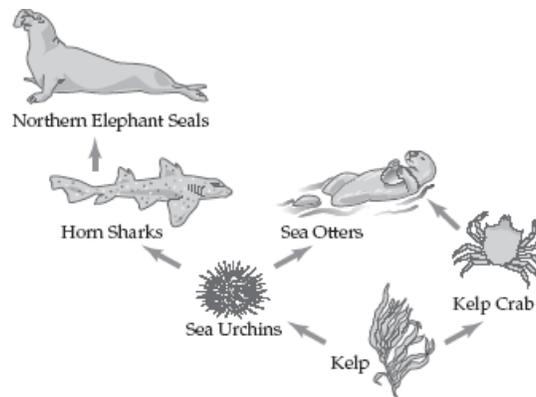
28. (1 point) What is the process of surface water entering soil known as?

29. (1 point) What powers the hydrological cycle?

30. (2 points) Which of the following organisms can fix nitrogen? (select all that apply)
 A. Legumes B. Grains C. Cyanobacteria D. Flowers

31. (2 points) What is the process in which nitrogen is artificially converted to ammonia known as?
-
32. (1 point) In what form is sulfur mainly stored in the ocean?
 A. Hydrogen Sulfide B. Sulfur Dioxide C. Sulfate D. None of the above
33. (1 point) Which aquatic biome is located at the mixing site of salt water and freshwater?
 A. Mangrove B. Kelp Forest C. Estuary D. Coral Reef
34. (1 point) Which aquatic biome is known for its extremely high biodiversity?
 A. Coral reef B. Salt Marsh C. Mangrove D. Hydrothermal vent
35. (1 point) What type of lake is contains low nutrient levels and high oxygen?
 A. Oligotrophic B. Mesotrophic C. Eutrophic D. Anoxic
36. (2 points) Which aquatic biome has a high density of kelp that is anchored to the seabed?
 A. Coral reef B. Mangrove C. Kelp forest D. Kelp Bed
37. (3 points) What is the name of the zone that extends from the high water mark to the shore that is permanently submerged?
-
38. (3 points) What is the name of the zone that occurs on the banks of bodies of water?
-

Use the below image for the next five (5) questions.



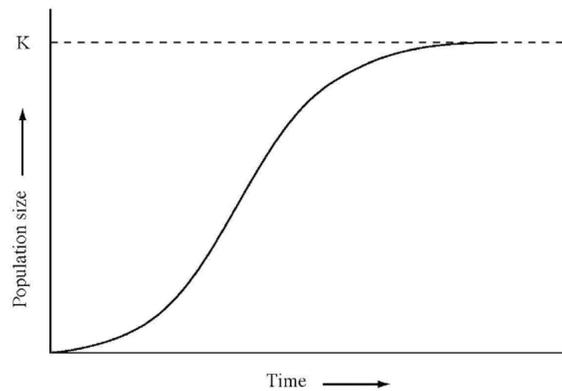
39. (1 point) Which of the following species are first order consumers? (select all that apply)
 A. Sea Urchins B. Elephant Seals C. Horn Sharks D. Sea Otters E. Kelp Crabs
40. (1 point) Which of the following organisms would be harmed if all sea urchins were removed?
 A. Sea Urchins B. Elephant Seals C. Horn Sharks D. Sea Otters E. Kelp Crabs

41. (3 points) Why are there so few levels in this and other food webs?

42. (2 points) A dangerous chemical is spilled into the water of the ecosystem. This chemical is mistakenly absorbed by kelp and is harmless at the low concentrations in the kelp. Which of the following organisms will most likely contain the highest concentration of this chemical? (select all that apply)
 A. Sea Urchins B. Elephant Seals C. Horn Sharks D. Sea Otters E. Kelp Crabs

43. (2 points) What is the above example an example of?
 A. Biomagnification B. Bioaccumulation C. Trophic Cascade D. None of the above

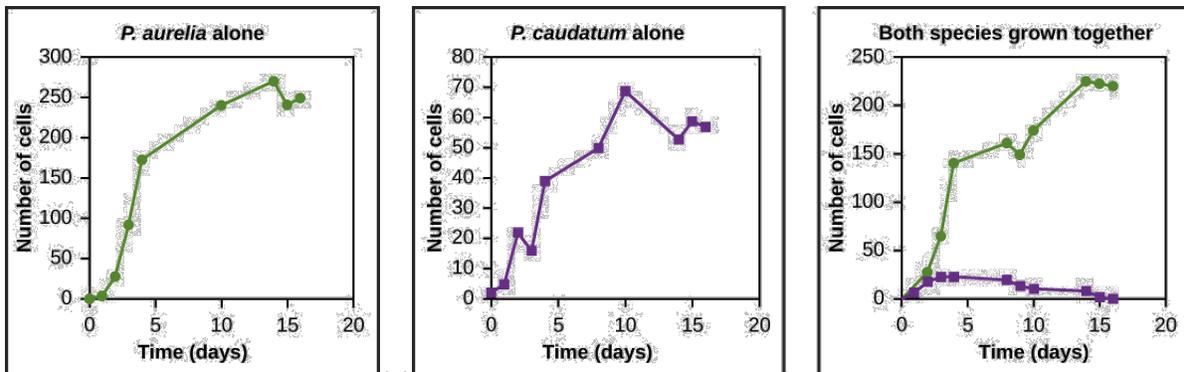
Use the below image for the next two (2) question.



44. (2 points) What does this graph model?

45. (2 points) What variable does k stand for?

Use the below image for the next one (1) question.



46. (3 points) What is the above picture an example of?

47. (3 points) How can two (2) organisms with the same niche coexist? (2 words)

48. (5 points) List the levels of biological organization from smallest to largest starting at cells:

49. (1 point) What is a close, long term interaction between 2 species known as?

50. (1 point) What is the process where organisms with better adaptations survive and reproduce more known as?

51. (2 points) What are bacteria and archaea that can fix nitrogen known as?

52. (3 points) What is a mutual symbiotic relationship between a plant and fungus known as?

53. (4 points) What is a parasitic plant that derives nutrition partly or fully from a fungus known as?

54. (3 points) What is an indicator species?

55. (3 points) What are keystone species?

56. (2 points) What is an indigenous species?

57. (2 points) What are invasive species?

58. (8 points) What is the difference between species richness and biodiversity?

59. (10 points) Write five (5) of the properties that contribute to invasive species' success in their new environments.

60. (5 points) Is it possible for a biomass pyramids lowest layer to not be the largest layer? If yes, where might this occur? If no, why not?

Use the below chart for the next question

Species	Grassland	Chaparral	Forest
A	✓		
B	✓		✓
B	✓		✓
D	✓	✓	✓
E	✓	✓	✓
F	✓		✓
G	✓	✓	
H	✓	✓	
I	✓		
J	✓	✓	
K	✓	✓	✓
L		✓	
M		✓	
N		✓	
O		✓	✓
P			✓
Q			✓
R			✓
S			
T			✓

61. Solve for each of the below values

- (a) (3 points) α Diversity of the Grassland: _____
- (b) (3 points) α Diversity of the Chaparral: _____
- (c) (3 points) α Diversity of the Forest: _____
- (d) (4 points) β Diversity of the Grassland and Chaparral: _____
- (e) (4 points) β Diversity of the Grassland and Forest: _____
- (f) (4 points) β Diversity of the Chaparral and Forest: _____
- (g) (3 points) γ Diversity: _____

Section B: Human Impacts to the environment

62. (1 point) What are the two (2) most common limiting nutrients in aquatic ecosystems?
A. Iron B. Oxygen C. Nitrogen D. Phosphorus
63. (1 point) What is an excess of nutrients in an ecosystem known as?

64. (3 points) What are HABs, and why are they bad?

65. (1 point) How many ocean garbage patches are there? _____
66. (3 points) Unsurprisingly, plastics are the main component of the ocean garbage patches. What type of plastic is the main component of the garbage patches?

67. (2 points) What are dead zones in ecology?

68. (3 points) What is the term for unwanted organisms (wrong gender, wrong size, wrong species, etc.) caught in fishing? About how much of the organisms caught is unwanted (to the nearest 10 percent)?

69. (2 points) The primary cause for ocean defaunation is:
A. Overfishing B. Oil spills C. Microplastics D. Hypoxic waters
70. (6 points) What is the difference between point source and nonpoint source pollution?

71. (1 point) Can a coral survive from being bleached?
A. Yes B. No
72. (2 points) Where have mangrove forest losses been most extensive?
A. Southeast Asia B. South America C. North America D. West Africa
73. (2 points) Which of the following gases commonly cause acid rain? (select all that apply)
A. Carbon Dioxide B. Sulfur Dioxide C. Nitrogen Oxides D. Nitrogen gas
74. (2 points) Under what pH is precipitation considered acid rain? _____
75. (4 points) What is the principle natural source of the gases that cause acid rain?

76. (6 points) What are three (3) effects of acid rain on the natural environment?

77. (2 points) Which of the following are sources of atmospheric particulate matter? (select all that apply)
A. Volcanoes B. Vehicles C. Air Conditioning D. Ocean Spray
78. (2 points) What human body system does particulate matter affect the most?
A. Cardiovascular B. Respiratory C. Immune D. Integumentary
79. (2 points) What is the largest carbon sink on Earth?
A. Soil B. Organic Matter C. The Atmosphere D. Oceans
80. (2 points) In one sentence, briefly describe what the Greenhouse effect is.

81. (8 points) Which of the following gases are greenhouse gases: (select all that apply)
A. Argon B. Ammonia C. Carbon Dioxide D. Sulfur Dioxide E. Water Vapor F. Nitrous Oxide G. Ozone H. Oxygen I. Hydrofluorocarbons
82. (2 points) The increased temperatures of the planet has caused snow and ice to melt. This decreases the _____ of the planet.
83. (2 points) What unit is ozone concentration measured in?
A. Hooke Units B. Parts per Million C. Dobson units D. Parts per Billion
84. (2 points) What was the first tool that could measure ozone concentration from the ground called?

85. (3 points) Under what concentration is an area considered a hole in the ozone layer?

86. (4 points) Which group of molecules containing only fluorine, chlorine, oxygen, and hydrogen, are known to damage the ozone layer.

87. (1 point) What is the main function of the ozone layer?
A. Temperature regulation B. Blocking UV radiation C. Regulating water concentration
88. (12 points) Increased carbon dioxide levels in the atmosphere causes what to happen in the oceans? What are 3 reasons this process is harmful to wildlife?

89. (9 points) What is the Claus Process used for? How does it reduce emissions of a air pollutant?

90. (10 points) What are five (5) causes of the loss of mangrove forests?

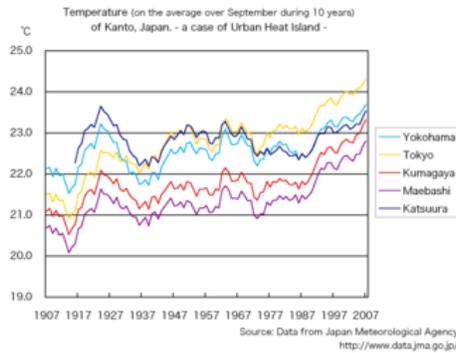
Section C: Solutions to Environmental Problems

91. (1 point) The fire at Cuyahoga River caused the revision of this influential piece of legislation.
 A. Clean Air Act B. Safe Drinking Water Act C. Federal Water Pollution Control Act
92. (1 point) What was the first piece of legislature controlling air pollution passed in the US?
 A. Clean Air Act B. Air Pollution Control Act C. Air Quality Act
93. (2 points) The Clean Air Act specifies 2 sources of air pollution. What 2 are these? (select all that apply)
 A. Mobile B. Fixed C. Modern D. Pre-Industrial revolution E. Stationary
94. (4 points) What is the main function of the Marine Protection, Research, and Sanctuaries Act?

95. (7 points) This piece of legislature was designed to help clean up contaminated or hazardous waste sites. Ironically, despite of its name, it is unable to do this. What act is being referred to, and why can't it do what it was made to do?

96. (3 points) The addition of iron into the oceans to increase biological productivity is known as:

97. (6 points) (3 points each blank) Willow has the ability to absorb large amounts of cadmium from soil. Willow is a _____ for cadmium and a plant used for the process of _____ (be specific).
98. (3 points) The *Mega Borg* oil spill was a oil spill in 1990 off the coast of the Gulf of Mexico. To clean up the spill, officials used about one hundred pounds of bacteria to break down the oil. This is an example of: _____
99. (3 points) The filtration of contamination liquid through plant roots is known as:



100. (12 points) The above graph shows data from five (5) Japanese cities. What effect causes this upward trend of temperatures, why, and how can it be prevented? List two (2) reasons why it is caused.
