Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) In which of the following terrestrial biome pairs are both parts dependent upon periodic burning?   1) _____
    A) desert and savanna
    B) chaparral and savanna
    C) tundra and coniferous forest
    D) grassland and tundra
    E) tropical forest and temperate broadleaf forest

2) Carrying capacity is   2) _____
    A) seldom reached by marine producers and consumers because of the vast resources of the ocean.
    B) fixed for most species over most of their range most of the time.
    C) the term used to describe the stress a population undergoes due to limited resources.
    D) the maximum population size that a particular environment can support.
    E) determined by density and dispersion data.

3) During the course of the formation of a parasite/host relationship, a critical first step in this   3) _____
evolution would be
    A) starting as an ectoparasite and then later becoming an endoparasite.
    B) developing asexual reproduction.
    C) utilizing heterotropic nutrition during infection and autotrophic nutrition during dormancy.
    D) changing the behavior of the host or intermediate host.
    E) deriving nourishment without killing the host.

4) Imagine five forest communities, each with 100 individuals distributed among four different tree   4) _____
species (W, X, Y, and Z). Which forest community would be most diverse?
    A) 50W, 25X, 15Y, 10Z
    B) 100W, 0X, 0Y, 0Z
    C) 40W, 30X, 20Y, 10Z
    D) 25W, 25X, 25Y, 25Z
    E) 70W, 10X, 10Y, 10Z

5) Which of the following best describes resource partitioning?   5) _____
    A) competitive exclusion that results in the success of the superior species
    B) slight variations in niche that allow similar species to coexist
    C) differential resource utilization that results in a decrease in community species diversity
    D) a climax community that is reached when no new niches are available
    E) two species that can coevolve to share identical niches

6) Which of the following is an example of aposematic coloration?   6) _____
    A) eye color in humans
    B) stripes of a skunk
    C) green color of a plant
    D) colors of an insect-pollinated flower
    E) a katydid whose wings look like a dead leaf

Use the following diagram of a hypothetical food web to answer the following questions. The arrows represent the transfer of food energy between the various trophic levels.
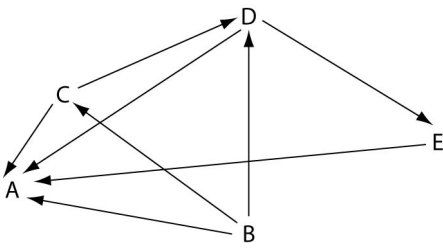

Figure 54.3

7) Which letter represents an organism that could be a primary consumer?   7) _____
   A) A   B) B   C) C   D) D   E) E

8) Food chains are sometimes short because   8) _____
   A) only a single species of herbivore feeds on each plant species.
   B) most of the energy in a trophic level is lost as it passes to the next higher level.
   C) local extinction of a species causes extinction of the other species in its food chain.
   D) most producers are inedible.
   E) predator species tend to be less diverse and less abundant than prey species.

9) Species richness increases   9) _____
   A) as we increase in altitude in equatorial mountains.
   B) as depth increases in aquatic communities.
   C) as we travel southward from the North Pole.
   D) as community size decreases.
   E) on islands as distance from the mainland increases.

10) Why is a pathogen generally more virulent in a new habitat?   10) _____
   A) Pathogens evolve more efficient forms of reproduction in new environments.
   B) Hosts in new environments have not had a chance to become resistant to the pathogen
      through natural selection.
   C) New environments are almost always smaller in area so that transmission of pathogens is
      easily accomplished between hosts.
   D) More pathogens tend to immigrate into newer habitats.
   E) Intermediate host species are more motile and transport pathogens to new areas.

11) Which of the following is an example of Batesian mimicry?   11) _____
   A) a snapping turtle that uses its tongue to mimic a worm, thus attracting fish
   B) an insect that resembles a twig
   C) a nonvenomous snake that looks like a venomous snake
   D) a fawn with fur coloring that camouflages it in the forest environment
   E) a butterfly that resembles a leaf

12) Resource partitioning would be most likely to occur between   12) _____
   A) sympatric populations of species with similar ecological niches.
   B) sympatric populations of a predator and its prey.
   C) sympatric populations of a flowering plant and its specialized insect pollinator.
   D) allopatric populations of the same animal species.
   E) allopatric populations of species with similar ecological niches.

2

13) How might an ecologist test whether a species is occupying its realized or its fundamental niche?   13) _____
    A) Remove a competitor species to see if the species expands its range.
    B) Study the temperature range and humidity requirements of the species.
    C) Measure the change in reproductive success when the species is subjected to environmental stress.
    D) Observe if the niche size changes after the introduction of a similar non-native species.
    E) Observe if the niche size changes after the addition of nutritional resources to the habitat.

14) Based on the intermediate disturbance hypothesis, a community's species diversity is increased by   14) _____
    A) moderate levels of disturbance.
    B) stable conditions with no disturbance.
    C) frequent massive disturbance.
    D) intensive disturbance by humans.
    E) human intervention to eliminate disturbance.

The symbols +, -, and o are to be used to show the results of interactions between individuals and groups of individuals in the examples that follow. The symbol + denotes a positive interaction, - denotes a negative interaction, and o denotes where individuals are not affected by interacting. The first symbol refers to the first organism mentioned.

15) What interactions exist between a bee and a flower?   15) _____
    A) o/o   B) +/+   C) +/o   D) +/-   E) -/-

16) Which of the following terms is used by ecologists to describe the community interaction where   16) _____
one organism makes the environment more suitable for another organism?
    A) commensalism
    B) parasitism
    C) inhibition
    D) mutualism
    E) facilitation

The symbols +, -, and o are to be used to show the results of interactions between individuals and groups of individuals in the examples that follow. The symbol + denotes a positive interaction, - denotes a negative interaction, and o denotes where individuals are not affected by interacting. The first symbol refers to the first organism mentioned.

17) What interactions exist between a "carrier crab" and "sea urchin hitch-hiker"?   17) _____
    A) +/-   B) +/+   C) o/o   D) -/-   E) +/o

18) Which of the following sets of measurements is the most useful when studying populations?   18) _____
    A) minimum and maximum amounts of precipitation and annual temperature extremes
    B) ratio of predators and the number of immigrants and emigrants
    C) gene frequency over time and the ratio of reproductive to nonreproductive individuals
    D) density, dispersion, and demographics of a population
    E) annual precipitation averages and mean annual temperatures

19) Which of the following examples would most accurately measure the density of the population being studied?

    A) counting the number of prairie dog burrows per hectare

    B) counting the number of zebras from airplane census observations.

    C) multiplying the number of moss plants counted in 10 quadrats of $1m^2$ each by 100 to determine the density per $kilometer^2$.

    D) counting the number of times a 1 kilometer transect is intersected by tracks of red squirrels after a snowfall

    E) counting the number of coyote droppings per hectare

20) Which of the following causes populations to shift most quickly from an exponential to a logistic population growth?

    A) removal of predators

    B) favorable climatic conditions

    C) competition for resources

    D) decreased death rate

    E) increased birth rate

21) Which of the following pairs of reproductive strategies is consistent with energetic trade-off and reproductive success?

    A) Female rabbits that suffer high predation rates may produce several litters per breeding season, and coconuts produce few fruits, but most survive when they encounter proper growing conditions.

    B) Free-living insects lay thousands of eggs and provide no parental care, whereas flowers take good care of their seeds until they are ready to germinate.

    C) Pioneer species of plants produce many very small, highly airborne seeds, whereas large elephants that are very good parents produce many offspring.

    D) Some mammals will not reproduce when environmental resources are low so they can survive until conditions get better, and plants that produce many small seeds are likely found in stable environments.

    E) Species that have to broadcast to distant habitats tend to produce seeds with heavy protective seed coats, and animals that are caring parents produce fewer offspring with lower infant mortality.

22) Natural selection involves energetic trade-offs between

    A) choosing how many offspring to produce over the course of a lifetime and how long to live.

    B) high survival rates of offspring and the cost of parental care.

    C) the emigration of individuals when they are no longer reproductively capable or committing suicide.

    D) increasing the number of individuals produced during each reproductive episode with a corresponding decrease in parental care.

    E) producing large numbers of gametes when employing internal fertilization versus fewer numbers of gametes when employing external fertilization.

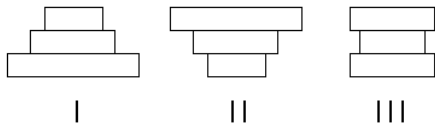The following questions refer to Figure 53.3, which depicts the age structure of three populations.

I   II   III

Figure 53.3

23) Assuming these age-structure diagrams describe human populations, in which population is unemployment likely to be a societal issue in the future? 23) _____
    A) I
    B) II
    C) III
    D) No differences in the magnitude of future unemployment would be expected among these populations.
    E) It is not possible to infer anything about future social conditions from age-structure diagrams.

24) Which of the following choices would most likely promote random distribution? 24) _____
    A) species that secrete chemicals to attract or inhibit other individuals
    B) flocking and schooling behaviors
    C) spacing during the breeding season
    D) territorial species
    E) homogeneous chemical and physical factors in the environment

25) During the spring, you are studying the mice that live in a field near your home. The population density is high, but you realize that you rarely observe any reproductive female mice. This most likely indicates 25) _____
    A) that the breeding season is over.
    B) that this habitat is a good place for mice to reproduce.
    C) that female mice die before reproducing.
    D) that you are observing immigrant mice.
    E) that there is selective predation on female mice.

26) To construct a reproductive table for a sexual species, one needs to 26) _____
    A) keep track of the females in a cohort.
    B) analyze the ratio of deaths to births in a cohort.
    C) keep track of all of the offspring of a cohort.
    D) assess sperm viability for the males in the population.
    E) keep track of all of the offspring of the females in a cohort.

27) Which pair of terms most accurately describes life history traits for a stable population of wolves? 27) _____
    A) iteroparous; K-selected
    B) iteroparous; N-selected
    C) semelparous; r-selected
    D) iteroparous; r-selected
    E) semelparous; K-selected

28) Pacific salmon and annual plants are excellent examples of   28) _____
    A) cohort disintegration.
    B) semelparous reproduction.
    C) iteroparous reproduction.
    D) dispersion.
    E) Allee effect.

29) Consider two forests: one is an undisturbed old-growth forest, while the other has recently been   29) _____
logged. In which forest are species likely to experience exponential growth, and why?
    A) Old growth, because of stable conditions that would favor exponential growth of all species in
       the forest.
    B) Old growth, because each of the species is well established and can produce many offspring.
    C) Logged, because the various populations are stimulated to a higher reproductive potential.
    D) Exponential growth is equally probable in old-growth and logged forests.
    E) Logged, because the disturbed forest affords more resources for increased specific
       populations to grow.

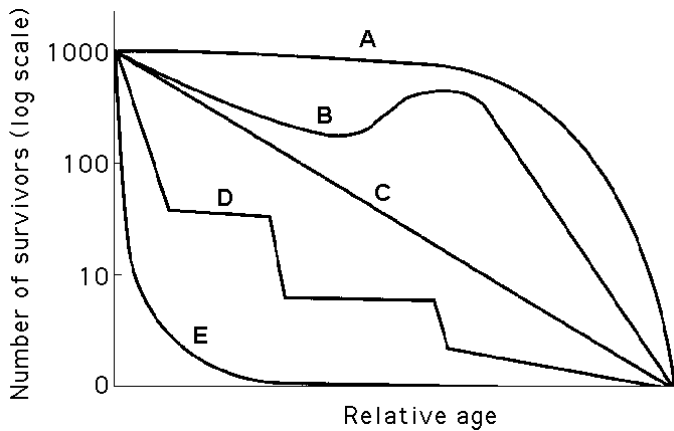Use the survivorship curves in Figure 53.1 to answer the following questions.

Figure 53.1

30) Which curve best describes survivorship in a marine crustacean that molts?   30) _____
    A) A   B) B   C) C   D) D   E) E

31) Which statement is true with regard to human population growth?   31) _____
    A) It is at a zero reproduction rate.
    B) There is no scientific prediction that can be made about human population growth.
    C) Its rate of growth is increasing.
    D) Its rate of increase continues to grow at an exponential rate.
    E) Its rate of growth is slowing.

32) The three basic variables that make up the life history of an organism are
    A) age when reproduction begins, how often reproduction occurs, and how many offspring are produced per reproductive episode.
    B) life expectancy, birth rate, and death rate.
    C) the number of reproductive females in the population, how often reproduction occurs, and death rate.
    D) number of reproductive females in the population, age structure of the population, and life expectancy.
    E) how often reproduction occurs, life expectancy of females in the population, and number of offspring per reproductive episode.

32) _____

33) A population of white-footed mice becomes severely overpopulated in a habitat that has been disturbed by human activity. Sometimes intrinsic factors cause the population to increase in mortality and lower reproduction rates to occur in reaction to the stress of overpopulation. Which of the following is an example of intrinsic population control?
    A) All of the resources (food and shelter) are used up by overpopulation and much of the population dies of exposure and/or starvation.
    B) Owl populations frequent the area more often because of increased hunting success.
    C) Because the individuals are vulnerable they are more likely to die off if a drought or flood were to occur.
    D) Females undergo hormonal changes that delay sexual maturation and many individuals suffer depressed immune systems and die due to the stress of overpopulation.
    E) Clumped dispersion of the population leads to increased spread of disease and parasites, resulting in a population crash.

33) _____

34) Studying species transplants is a way that ecologists
    A) determine if dispersal is a key factor in limiting distribution of organisms.
    B) determine the abundance of a species in a specified area.
    C) determine the distribution of a species in a specified area.
    D) develop mathematical models for distribution and abundance of organisms.
    E) consolidate a landscape region into a single ecosystem.

34) _____

35) In temperate lakes, the surface water is replenished with nutrients during turnovers that occur in the
    A) spring and summer.
    B) autumn and spring.
    C) autumn and winter.
    D) summer and autumn.
    E) summer and winter.

35) _____

36) Which statement about dispersal is *false*?
    A) Colonization of devastated areas after floods or volcanic eruptions depends on dispersal.
    B) Dispersal is a common component of the life cycles of plants and animals.
    C) Seeds are important dispersal stages in the life cycles of most flowering plants.
    D) Dispersal occurs only on an evolutionary time scale.
    E) The ability to disperse can expand the geographic distribution of a species.

36) _____

Use this description to answer the following question.

In areas of permafrost, stands of black spruce are frequently observed in the landscape, while other tree species are noticeably absent. Often these stands are referred to as "drunken forests" because many of the black spruce are displaced from their normal vertical alignment.

37) What might be the adaptive significance of these unusual forests growing the way they do in this   37) _____
    marginal habitat?
    A) Branches are adapted to absorb more CO_2 with this displaced alignment.
    B) Trees are tilted so snow prevents them from breaking or tipping over.
    C) Needles are adapted to withstand cold arctic temperatures.
    D) Trees tip so that they do not compete with each other for sunlight.
    E) Taproot formation is impossible, so trees developed shallow root beds.

38) Generally speaking, deserts are located in places where air masses are usually   38) _____
    A) rising.
    B) descending.
    C) humid.
    D) tropical.
    E) expanding.

39) Which of the following environmental features might influence microclimates?   39) _____
    A) large boulder
    B) forest canopy
    C) freshly plowed field
    D) log on the forest floor
    E) All of the options are correct.

40) If a meteor impact or volcanic eruption injected a lot of dust into the atmosphere and reduced the   40) _____
    sunlight reaching Earth's surface by 70% for one year, which of the following marine communities
    most likely would be least affected?
    A) coral reef
    B) intertidal
    C) deep-sea vent
    D) pelagic
    E) estuary

41) Which of the following statements best describes the interaction between fire and ecosystems?   41) _____
    A) Fire is unnatural in ecosystems and should be prevented.
    B) Many kinds of plants and plant communities have adapted to frequent fires.
    C) The suppression of forest fires by man has prevented certain communities, such as
       grasslands, from reaching their climax stage.
    D) Chaparral communities have evolved to the extent that they rarely burn.
    E) The likelihood of a wildfire occurring in a given ecosystem is highly predictable over the
       short term.

42) Which lake zone would be absent in a very shallow lake?   42) _____
    A) limnetic zone
    B) pelagic zone
    C) littoral zone
    D) aphotic zone
    E) benthic zone

43) The oceans affect the biosphere in all of the following ways *except*   43) _____
    A) moderating the climate of terrestrial biomes.
    B) being the source of most of Earth's rainfall.
    C) removing carbon dioxide from the atmosphere.
    D) producing a substantial amount of the biosphere's oxygen.
    E) regulating the pH of freshwater biomes and terrestrial groundwater.

44) Which of the examples below provides appropriate abiotic and biotic factors that might determine   44) _____
the distribution of the species in question?
    A) the amount of nitrate and phosphate in the soil, and wildflower abundance and diversity
    B) available sunlight and increased salinity in the top few meters of the ocean, and the
       abundance and diversity of phytoplankton communities
    C) increased predation and decreased food availability, and a prairie dog population after a
       prairie fire
    D) the pH and dissolved oxygen concentration, and the streams in which brook trout can live
    E) the number of frost-free days, and competition between species of introduced grasses and
       native alpine grasses

45) In mountainous areas of western North America, north-facing slopes would be expected to   45) _____
    A) be warmer and drier than comparable southern exposed slopes.
    B) consistently be steeper than southern exposures.
    C) support biological communities similar to those found at higher elevations on similar
       south-facing slopes.
    D) support biological communities similar to those found at lower elevations on similar
       south-facing slopes.
    E) receive more sunlight than similar southern exposures.

46) Which marine zone would have the lowest rates of primary productivity (photosynthesis)?   46) _____
    A) abyssal
    B) intertidal
    C) pelagic
    D) neritic
    E) continental shelf

47) Which of the following examples of an ecological effect leading to an evolutionary effect is most   47) _____
correct?
    A) A few organisms of a larger population survive a drought and then these survivors emigrate
       to less arid environments.
    B) A few individuals with denser fur survive the coldest days of an ice age, and the reproducing
       survivors of the ice age all have long fur.
    C) The insects that spend the most time exposed to sunlight have the most mutations.
    D) Fish that swim the fastest in running water catch the most prey and more easily escape
       predation.
    E) When seeds are not plentiful, trees produce more seeds.

48) "How do seed-eating animals affect the distribution and abundance of the trees?" This question   48) _____
   A) would be difficult to answer because a large experimental area would be required.
   B) is one that a present-day ecologist would be likely to ask.
   C) would be difficult to answer because a long-term experiment would be required.
   D) would require an elaborate experimental design to answer.
   E) All options are correct.

1) B
2) D
3) E
4) D
5) B
6) B
7) C
8) B
9) C
10) B
11) C
12) A
13) A
14) A
15) B
16) E
17) B
18) D
19) B
20) C
21) A
22) B
23) A
24) E
25) D
26) A
27) A
28) B
29) E
30) D
31) E
32) A
33) D
34) A
35) B
36) D
37) E
38) B
39) E
40) C
41) B
42) D
43) E
44) E
45) C
46) A
47) B
48) E