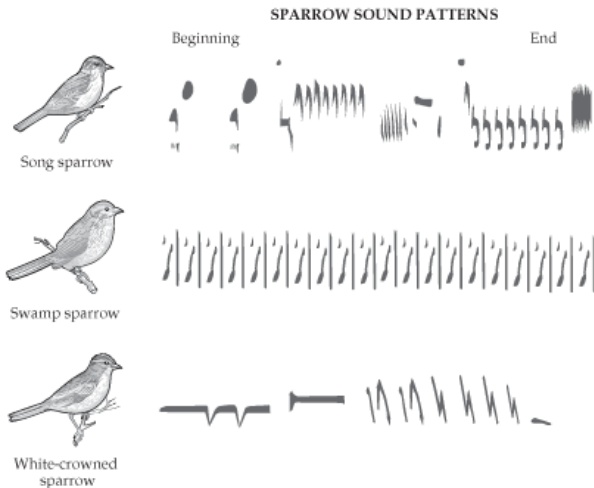


Name \_\_\_\_\_

## Winter Break Packet 2015

**Multiple Choice:** Darken the circle with the correct answer in the answer sheet provided.

1. A scientist is comparing the bird sound patterns among three species of sparrow. He uses a machine to produce an image of their sounds. His data are shown in the figure below.



Which of these is an accurate statement about the data?

- A The end of the white-crowned sparrow's sound pattern is very different from its beginning.
- B The end of the swamp sparrow's sound pattern is identical to the end of the song sparrow's sound pattern.
- C The swamp sparrow's sound pattern is similar to the white-crowned sparrow's sound pattern.
- D The beginning and the end of the song sparrow's sound pattern are identical.

The breathing rate of a goldfish can be measured by the number of times the goldfish opens its mouth. In an experiment, students placed a goldfish in a container of water at 26°C and counted the number of times the fish opened its mouth. They gradually lowered the water temperature and counted the number of times the fish opened its mouth at 20°C, 14°C, 8°C, and 2°C. The results are shown in the table below.

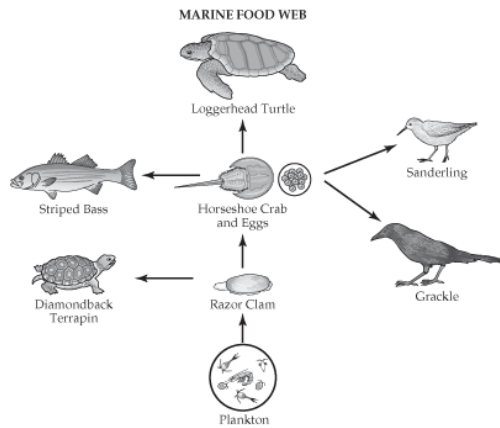
BREATHING RATES OF GOLDFISH

Trial	Water Temperature				
	26°C	20°C	14°C	8°C	2°C
1	101	80	54	30	2
2	98	75	52	27	3
3	102	81	53	29	2
4	103	78	55	28	4

2. Which of these procedures would be a good control for this experiment?
- A Determine the breathing rate of a goldfish kept at a constant 26°C
  - B Put the goldfish in 2°C water and then increase the temperature
  - C Use a different kind of fish for each water temperature
  - D Repeat the experiment using a different species of goldfish.
3. Which of these descriptions best explains the decrease in the breathing rate of the goldfish?
- A The demand for carbon dioxide decreased
  - B The demand for oxygen increased
  - C The fish's activity level increased
  - D The rate of metabolic activity decreased

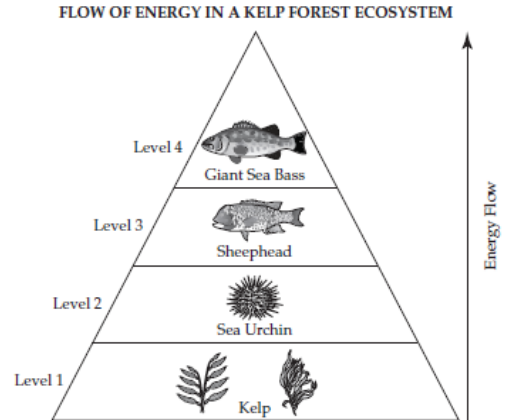
4. Students are conducting an experiment to determine if sugars are present in foods. They heat a test tube containing a sugar solution in a beaker of water. Which of these is an unsafe laboratory practice in this experiment?
- A heating the sugar solution in a closed test tube
  - B wearing safety goggles while heating the sugar solution
  - C rinsing hands with water after handling the materials
  - D using a test tube clamp to hold the test tube

**A marine environment provides a habitat for a variety of plants and animals. A small part of a marine food web is shown below.**



5. Which of these describes the role of the sanderling in the marine food web?
- A producer
  - B omnivore
  - C carnivore
  - D herbivore
6. Horseshoe crabs are used by fisherman for bait. If the horseshoe crab population were reduced by overfishing, which of these groups of organisms would most likely decrease in number?
- A plankton, razor clams, and loggerhead turtles
  - B grackles, plankton, and diamondback terrapin
  - C striped bass, sanderlings, and razor clams
  - D sanderlings, loggerhead turtles, and striped bass

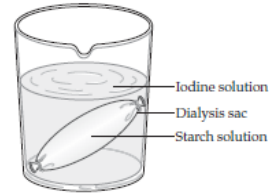
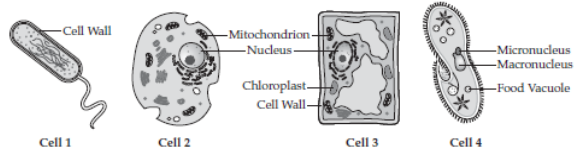
The energy pyramid below shows the flow of energy through the organisms in a kelp forest ecosystem in the Pacific Ocean. Use the energy pyramid to answer the following questions.



7. How would the populations of other organisms in the energy pyramid be affected if the population of sea urchins suddenly decreased?
- A Both the kelp and the sheephead populations would decrease.
  - B The kelp population would increase, and the sheephead population would decrease.
  - C Both the kelp and the sheephead populations would increase.
  - D The kelp population would decrease, and the sheephead population would increase.
8. What is the lowest level of the energy pyramid that contains carnivores?
- A level 1
  - B level 2
  - C level 3
  - D level 4
9. Four important scientific discoveries are listed below.
1. Some animals can regrow their limbs.
  2. All plant and animal tissues are made up of cells.
  3. Dominant and recessive traits are passed from parents to offspring.
  4. Chromosomes replicate during cell division.
- Which two discoveries required the use of a microscope?
- A 1 and 3
  - B 2 and 4
  - C 1 and 2
  - D 3 and 4

Use the information and the diagrams below to answer the next two (2) questions.

A student observed different types of cells under a microscope. Four of the cells he observed are shown below.



10. Which of these structures in Cell 3 releases energy for use in cell processes?

- A cell wall
- B mitochondrion
- C chloroplast
- D nucleus

11. Cell 4 has many hair-like structures that it uses for movement. What are these structures called?

- A pseudopodia
- B flagella
- C vacuoles
- D cilia

12. In humans, the allele for long eyelashes is dominant (L) and the allele for short eyelashes is recessive (l). A female who is heterozygous for long eyelashes and a male with short eyelashes have a child.

What is the probability that their offspring will have short eyelashes?

- A 0%
- B 25%
- C 50%
- D 75%

Use the information and the diagram below to answer the next two (2) numbers.

Starch turns blue-black in the presence of iodine solution. A selectively permeable dialysis sac containing a starch solution is placed into a beaker of iodine solution.

13. If the dialysis sac is permeable only to water and iodine, what will the solutions in the beaker and the sac look like after two hours?
- A The starch solution in the dialysis sac will turn blue-black; the iodine solution will not change.
  - B Both solutions will turn blue-black
  - C The iodine solution in the beaker will turn blue-black; the starch solution will not change.
  - D Neither solution will turn blue-black.
14. Which of these processes is demonstrated by the experiment shown in the diagram?
- A cellular respiration
  - B diffusion
  - C active transport
  - D endocytosis
15. Scientists estimate that 200 non-native organisms have been introduced into Chesapeake Bay. Which of these statements is not true about non-native organisms?
- A They are often aggressive at acquiring and maintaining territory.
  - B They can prey on native organisms causing them to go extinct.
  - C They often form mutualistic relationships with native organisms.
  - D They can deplete the food sources of native organisms.
16. Which of these body systems transports glucose and other substances in the blood to the cells of the body?
- A digestive system
  - B circulatory system
  - C endocrine system
  - D reproductive system

17. A team of marine scientists is studying biotic and abiotic factors that affect the stability of a deep-sea ecosystem.

The scientists discovered a species of fish that eats other fish and decaying matter. Which of these does not describe the newly discovered fish?

- A scavenger
  - B producer
  - C consumer
  - D predator
18. A team of marine scientists is studying biotic and abiotic factors that affect the stability of a deep-sea ecosystem.

The deep-sea ecosystem is a stable ecosystem. Which of these is a characteristic of most stable ecosystems?

- A They contain very few organisms.
  - B They contain a wide variety of organisms.
  - C Organic nutrients are in short supply.
  - D Sunlight is not used to make food.
19. A strand of DNA has a nucleotide base sequence of TAC-CGG-AGT. Which of the following is the complementary mRNA nucleotide sequence produced from the strand of DNA?
- A AGU-UCC-UAC
  - B UAC-CGG-AGU
  - C AUG-GCC-UCA
  - D ACU-GAA-CGA

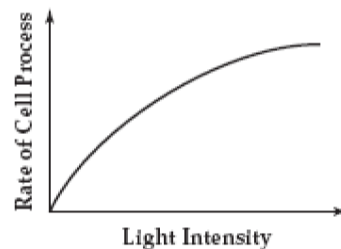
Use the information below to answer the next two (2) questions.

Use the information and the figure below to answer the following.

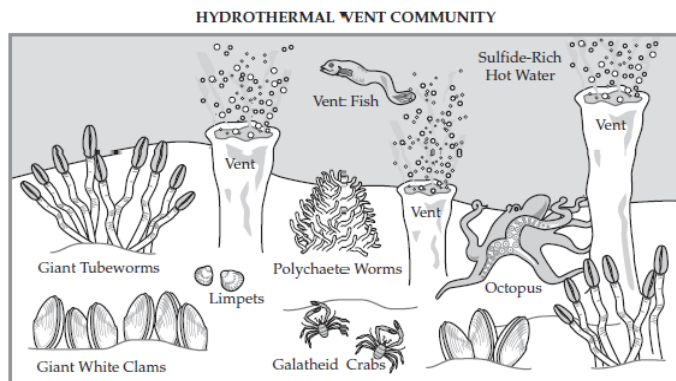
Scientists have recently discovered hydrothermal vent communities on the ocean floor. A diagram of a hydrothermal vent community is shown in the figure below.

A group of students studied the effect of light intensity on the rate of a cell process in Elodea plants. The students exposed Elodea plants to different light intensities. A gas was produced by the cell process. The amount of this gas was measured. The rate of the cell process was determined by the amount of gas produced. A graph of the students' measurements is shown below.

THE EFFECT OF LIGHT INTENSITY ON A CELL PROCESS IN ELODEA PLANTS



20. Which of these is the independent variable in this experiment?
- A volume of gas
  - B intensity of light
  - C size of Elodea plant
  - D rate of cell process
21. Which of these parts of the Elodea plant cell produces the gas measured in the experiment?
- A ribosome
  - B nucleus
  - C mitochondrion
  - D chloroplast
22. Which of these should be done before beginning a laboratory investigation?
- A review the procedure
  - B record data on table
  - C draw conclusions
  - D collect data



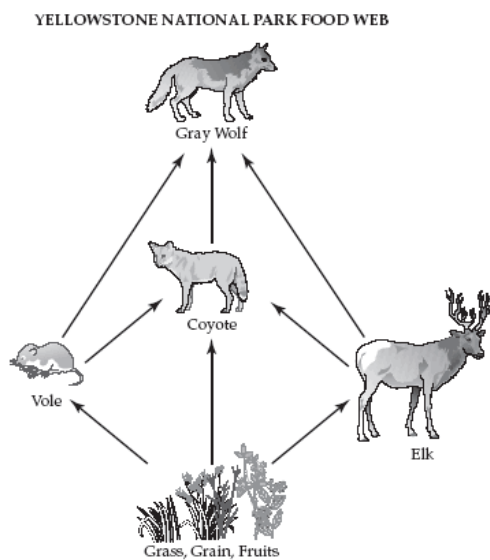
The organisms in this community live near heated vents. Inorganic compounds such as sulfides mix with extremely hot water when they are released from the vents. Bacteria use the sulfides to make food for themselves and other animals. Many of these bacteria live in the bodies of the giant tubeworms and the giant white clams that live in this community.

23. Hydrothermal vent communities are often destroyed by lava erupting from the ocean floor. After the lava has cooled, different organisms begin to inhabit the area. Over a period of a few years, organisms inhabit the area in the following order:

**sulfur bacteria → crabs → giant tubeworms → clams and mussels**

Which of these best identifies this sequence of events?

- A succession
  - B evolution
  - C mutation
  - D translation
24. The bacteria that live in the bodies of the giant tubeworms and the giant white clams are classified as -
- A eukaryotes
  - B prokaryotes
  - C plants
  - D fungi
25. Which of these is an abiotic factor that influences this ecosystem?
- A bacteria
  - B water temperature
  - C giant tubeworms
  - D food



Part of the food web in Yellowstone National Park is shown below.

Gray wolves were reintroduced into Yellowstone National Park in 1995. Two years later, the population of coyotes had decreased by 50%. Coyotes were found in all habitats of the park before the gray wolves were reintroduced. Now, coyotes are most often found in the hills and mountains.

26. Which of these describes the role of the vole in the Yellowstone ecosystem?
- A carnivore
  - B producer
  - C decomposer
  - D herbivore
27. Coyotes and gray wolves have a high degree of relatedness. Which of these best describes why the two species are closely related?
- A They are found in the same habitat.
  - B They have a common ancestor.
  - C They feed on the same types of food.
  - D They have similar behaviors.
28. Reef-building coral are marine animals with single-celled algae living in their tissues. The coral provide protection for the algae and the algae provides food for the coral. Which of these statements best explains what would happen to the coral if the algae die?
- A The coral would grow well because it does not have a parasite.
  - B The coral would grow well because it does not have a competitor.
  - C The coral would die because it needs the food produced by the algae.
  - D The coral would die because it cannot produce food for the algae.
29. The chart below is the nutrition facts found on a bag of pretzels.

**PRETZEL NUTRITION FACTS**

Nutrition Facts	
Serving Size 25 Pretzels (30g)	
Servings Per Bag 10	
Amount Per Serving	
Calories	120
	% Daily Value*
Fat 1 g	1%
Sodium 120 mg	5%
Potassium 50 mg	1%
Total Carbohydrate 23 g	8%
Dietary fiber 7 g	30%
Soluble fiber 5 g	
Insoluble fiber 2 g	
Sugars 11 g	
Other carbohydrates 5 g	
Protein 3 g	6%
*based on a 2000 Calorie diet	

Which of the following equations could be used to determine the number of pretzels in a 100-Calorie serving?

- A  $\frac{X}{100} = \frac{30}{120}$
- B  $\frac{X}{100} = \frac{25}{120}$
- C  $\frac{25}{100} = \frac{120}{X}$
- D  $\frac{30}{100} = \frac{120}{X}$

Use the information and the diagram below to answer the next two (2) questions.

A student observes a unicellular organism under a microscope. After a while, the organism begins to split into two cells, as shown in the diagram.



30. Which of these best describes the process shown in the diagram?
- A binary fission
  - B osmosis
  - C meiosis
  - D sexual reproduction
31. Which of these structures does the organism shown above use to move itself?
- A cilia

- B nuclei
- C ribosomes
- D flagella

32. Glucose is a building block of carbohydrates. Which of these best describes glucose?
- A lipid
  - B monosaccharide
  - C protein
  - D nucleotide

Use the information below to answer the next two (2) questions.

In a species of fly, the allele for red eyes (R) is dominant to the allele for brown eyes (r). Red eye color in the flies is not sex-linked. Students crossed male and female flies that had red eyes and recorded the eye color of their offspring. Their data are shown below.

FLY OFFSPRING

Eye Color	Number of Offspring
Red	77
Brown	27

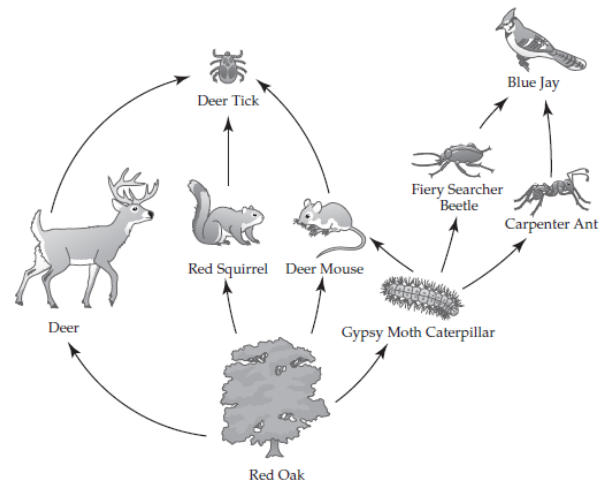
33. What are the most likely genotypes of the parent flies?
- A rr and rr
  - B Rr and Rr
  - C RR and rr
  - D RR and Rr
34. Using the data in the table, what is the approximate ratio of red eyed offspring to brown eyed offspring?
- A 4:1
  - B 3:1
  - C 2:1
  - D 1:1

Corals are marine animals that often live in tropical seas. Many types of corals have unicellular algae living in their tissues. The algae provide up to 98 percent of the corals' food. The corals provide protection and inorganic nutrients for the algae.

35. Some coral cells undergo meiosis. Which of these would not occur during meiosis?
- A formation of a zygote
  - B reduction in number of chromosomes
  - C production of gametes
  - D chromosomes crossing-over
36. Algae leave the coral when the water is too warm. What kind of factor is temperature on this relationship?
- A commensalistic
  - B parasitic
  - C abiotic
  - D biotic

Use the forest food web below to answer the next three (3) numbers.

FOREST FOOD WEB



37. The deer tick feeds on the blood of the red squirrel, deer, and deer mouse. Which of these best describes the role of the deer tick in the forest food web?
- A parasite
  - B omnivore

- C producer
- D carnivore

38. When gypsy moth caterpillars hatch, which of these populations benefits first?
- A red oak
  - B carpenter ant
  - C blue jay
  - D deer tick
39. Which of these describes the role of the red oak in the forest food web?
- A producer
  - B parasite
  - C herbivore
  - D omnivore

**Black skimmers are water birds that live along coastal beaches, bays, estuaries, and marshes. They fly just above the surface of the water using their lower jaw to catch small fish, shrimp, and other small crustaceans.**



**These birds nest in simple, unlined depressions in the sand. Scientists have observed a decline in the number of nests. Some causes of this decline include a lack of suitable nesting sites, beach erosion, and human disturbances.**

**Use the information below to answer the following questions.**

A student conducts an experiment at home to test the effect of different covers on the melting rate of ice. The student places identical ice cubes on separate trays of known mass. The student covers each tray as shown below.



Plastic covered



Foil covered



Paper towel covered



Not covered

The trays are placed on the same table. After ten minutes, the student removes the covers, discards the excess water, and calculates the mass of each ice cube.

**When people approach their nests, the birds become aggressive and chase away intruders. Other animals, like crows, will take advantage of the unprotected nests and feed on the eggs.**

40. Which of these best describes the effects of human disturbance on the black skimmer's eggs?
- A a biotic factor
  - B an allele
  - C a niche
  - D an abiotic factor
41. Which of these terms best describes the relationship between the crows and the black skimmers?
- A predator-prey
  - B parasite-host
  - C mutualism
  - D commensalism
42. A continued decrease in black skimmer's population will most likely lead to
- A an increase in producer populations
  - B a decrease in scavenger populations
  - C a decrease in decomposer populations
  - D an increase in prey animal populations



43. Which of these is the dependent variable in the experiment?
- A mass of each ice cube
  - B shape of each ice cube
  - C temperature of the ice cubes
  - D material covering the ice cubes
44. Which of these is the control in the experiment?
- A mass of the ice cubes
  - B mass of the trays
  - C tray with no covering
  - D tray with the plastic covering
45. Rain forests are often cleared to provide land for farming. Which of these outcomes is the most immediate effect of this practice on the global environment?
- A depletion of ozone layer
  - B an increase in atmospheric carbon dioxide levels
  - C an increase in acid rain
  - D the decreased production of food
46. A scientist believes that a factory has been dumping acid into a local river. To test this hypothesis, which property of water should the scientist monitor?
- A pH
  - B density
  - C polarity
  - D temperature
47. Which of these correctly matches the molecule with its function?
- A enzyme — speeds up chemical reactions
  - B lipid — stores genetic information
  - C carbohydrate — manufactures cell membranes
  - D vitamin — supplies energy to cells
48. Which cell structure contains molecules that direct cell activities?
- A ribosome
  - B mitochondrion

- C chloroplast
- D nucleus

49. Students conducted an experiment to test the effect of antibiotics on bacteria. They placed bacteria in a petri dish that contained agar treated with an antibiotic. Only one of the bacterial colonies survived.

Which of these statements best explains why only one colony survived?

- A There was not enough antibiotic in the dish to kill all the bacteria.
  - B The bacteria in the colonies competed for survival.
  - C The bacteria in the surviving colony had genetic variations that allowed them to survive.
  - D There was only enough food in the dish for some of the bacteria to survive.
50. A student's hypothesis is that increased exercise causes increased heart rate. Heart rate is determined by taking the pulse, which is measured in beats per minute (BPM).

Which of the following data would support this student's hypothesis?

- A When running, her pulse was 65 BPM; when standing, her pulse was 70 BPM.
- B When sitting, her pulse was 90 BPM; when walking, her pulse was 90 BPM.
- C When sitting, her pulse was 70 BPM; when standing, her pulse was 50 BPM.
- D When running, her pulse was 100 BPM; when sitting, her pulse was 60 BPM.

Use the information and the Punnett square below to answer the next two (2) numbers.

	B	b
B	1	2
b	3	4

In guinea pigs, the allele for black fur (B) is dominant. The allele for brown fur (b) is recessive. Two guinea pigs were crossed as shown in the Punnett square below. Numbers 1, 2, 3, and 4 represent the types of offspring produced from the cross.

51. What is the probability that an offspring from this cross would have brown fur?
- A 75%
  - B 0%
  - C 50%
  - D 25%
52. Which of these describes the phenotypes of the parent guinea pigs?
- A Both parents have brown fur.
  - B One parent has black fur, and the other has brown fur.
  - C One parent has a mixture of black and brown fur, and the other has black fur.
  - D Both parents have black fur.

Use the technical passage below to answer the following:

#### EXOTIC SPECIES VERSUS NATIVE SPECIES, WHO'S WINNING?

The introduction of non-native or "exotic" organisms is thought to be responsible for about half of the endangered or threatened species in the United States. This often happens by the "crowding out effect," in which an exotic plant or animal survives better than a native organism. Exotic species usually have no natural predators or parasites in their new environments. This enables them to take over entire areas where native species used to live. Biologists call this phenomenon *eco-invasion*. Chris Bright, an author on this subject, says that a non-native species will establish itself by adjusting to its new surroundings. "It tends to get better and better at exploiting an area's resources and at suppressing native species," says Bright.

The island of Guam is an example of an area that has been affected. The brown tree snake was accidentally introduced to the island about 60 years ago. Since then, nine of eleven native bird species have become extinct due to overpopulation by the brown tree snake.

Another example involves the Eurasian zebra mussel. Scientists believe this mussel was accidentally transported to the United States by ships in 1988. Colonies of the zebra mussels have since caused costly damage to waterpipes around the Great Lakes.

Airplane and boat traffic across the world has been blamed for the introduction of exotic organisms. Species are usually contained in certain areas because of natural borders such as mountains, oceans, and deserts. However, natural borders are no longer effective boundaries with the increase in worldwide travel.

53. Which of these explains why the number of exotic organisms is increasing in ecosystems around the world?
- A The number of prey organisms is increasing worldwide.
  - B The amount of global travel is increasing.

- C Native organisms are migrating to more remote locations.
- D Increasing temperatures favor non-native organisms.

54. Which of these is a false statement about exotic species?

- A They often lead to the extinction of other species.
- B They often out-compete native species.
- C They are transported to new areas by airplanes and boats.
- D They usually have predators in their new environments.

55. Eco-invasion of an area will most likely result in

- A a decrease in biological diversity
- B a decrease in exotic organisms
- C an increase in natural disasters
- D an increase in habitat

56. The populations of wolves and other large predators have decreased throughout the United States. This disruption of the natural food web will most likely lead to -

- A the overpopulation of scavengers
- B the overpopulation of prey animals
- C a decrease in prey animals
- D an increase in producers

Male fiddler crabs attract females by quickly waving their large front claw. If a claw is lost in a fight or accident, they quickly grow a hollow claw of equal length.

Because the new claw is lighter, they can wave it faster. A male fiddler crab is shown below.

MALE FIDDLER CRAB



57. The male fiddler crab 's new claw can be described as

- A a genotype
- B a clone
- C a dominant trait
- D an adaptation

58. The new claw probably helps the male fiddler crab to

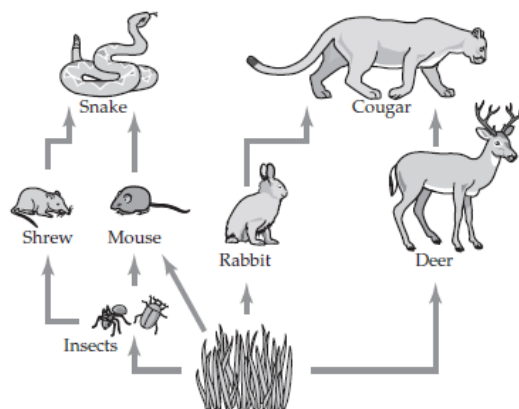
- A successfully reproduce
- B fight more successfully
- C evolve into a new species
- D maintain homeostasis

59. Some adult insects are unable to swim but are able to walk on top of water. What characteristic of water enables these insects to walk on top of water?

- A surface tension
- B atomic bonds
- C pH
- D solvent properties

Use the relationships in the food web below to answer the following questions.

TERRESTRIAL FOOD WEB

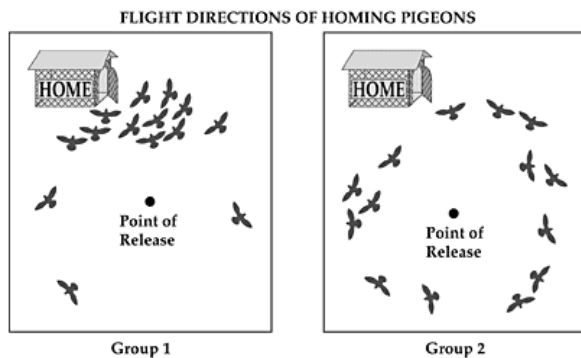


60. Which of these lists all of the predators shown in the food web?

- A cougars, snakes, shrews, and mice
- B cougars and snakes
- C cougars, snakes, and shrews
- D cougars only

61. The relationship between the mice and the insects is an example of
- commensalism
  - parasite - host
  - predator - prey
  - mutualism
62. According to the food web, which of these supply energy for all the other organisms?
- snakes
  - cougars
  - insects
  - grasses
63. A scientist hypothesizes that homing pigeons use their sense of smell to find their way home. She tests this idea on two groups of pigeons. She releases the pigeons in Group 1 and records the direction of their flight.

The pigeons in Group 2 are given a substance that blocks their sense of smell for a short time. The scientist then releases them and records the direction of their flight. Her data are shown on the diagram below.



From these results, what can be concluded about the scientist's hypothesis?

- It must be modified and tested again.
- It is not supported by the data.
- It can be applied to all bird species.
- It is supported by the data.

64. The human body functions properly when organ systems work together. Which organ system works with the muscular system to control muscle contraction?
- nervous
  - excretory
  - circulatory
  - reproductive

Use the information below to answer the following questions.

**A scientist wanted to find out if low numbers of fish found in a nearby lake were related to acid rain. During his three-year study, he analyzed rainwater and lake water samples. By gathering samples of fish, he estimated the number of fish in the lake.**

**Each year he found that both the rainwater and lake water became more acidic, and the number of fish decreased.**

**His data suggested that acid rain may be responsible for the decrease in the number of fish found in the lake.**

65. The lake ecosystem includes frogs, freshwater algae, and inorganic sediment. Which of these is an abiotic factor contained within the lake ecosystem?
- sediment
  - frogs
  - fish
  - algae
66. What most likely led to the rainwater's increasing acidity?
- sedimentation
  - ultraviolet radiation
  - global warming
  - burning fossil fuels

67. A researcher is testing the effect of acid rain on living organisms. She takes a tissue sample and places it in acid rainwater, which decreases its pH. As the pH decreases, what will most likely happen to the enzyme reaction rates in the cells of this tissue?
- A They will increase and level off
  - B They will increase.
  - C They will decrease.
  - D They will stay the same.

68. A group of students conducted an experiment to study the growth of bean plants. An equal number of bean plants of similar size were planted in containers A and B. Each day for five days, Container A received water only, while Container B received an equal amount of weak fertilizer solution. The table below shows the average height of the plants in each container for each day of the experiment.

**PLANT GROWTH EXPERIMENT**

Day	Average Height (in centimeters)	
	Container A: Water Only	Container B: Water plus Fertilizer
1	2.0	2.0
2	2.2	2.3
3	2.3	2.8
4	2.5	3.2
5	2.6	3.8

Which of these is being tested in this experiment?

- A effect of water on plant height
  - B number of days the plants will grow
  - C maximum height the plants will grow
  - D effect of fertilizer on plant height
69. **Evidence suggests that bacteria supplied with a cup of sugar could run a 60-watt light bulb for 17 hours.**
- Which of these was most likely used to affirm this scientific idea?
- A conduct an experiment

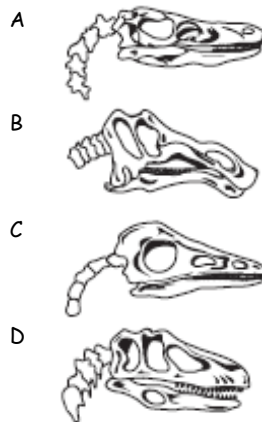
- B write a conclusion
- C formulate a hypothesis
- D identify the problem

70. **The skull of a modern bird, the herring gull, is shown below.**



**Herring Gull**

**Which of the vertebrate skulls shown below is probably most closely related to modern birds?**



71. **Fluoride is added to drinking water supplies in many states. People cannot see fluoride in the water because it**
- A turns into water
  - B dissolves to form a colorless solution
  - C is less dense than water so it floats
  - D settles to the bottom of a container
72. **Many bacteria live in fresh water. Which of these statements best describes what will happen when freshwater bacterial cells are placed in salt water?**
- A Water leaves the cell, causing the cell to shrink.
  - B Water leaves the cell, causing the cell to expand.
  - C Water enters the cell, causing the cell to expand.
  - D Water enters the cell, causing the cell to shrink.

73. Some bacteria live in habitats without light. They produce their own food using inorganic substances from the environment.

Which of these terms best describes this process?

- A photosynthesis
- B binary fission
- C cellular respiration
- D chemosynthesis

74. One kind of chromosomal mutation can occur during meiosis when a pair of chromosomes that carry genes for the same trait fail to separate. Which of these represents the sex chromosomes of a male organism when this type of chromosomal mutation has occurred?

- A XXX
- B XY
- C XXY
- D XX

Use the information below to answer the next two (2) numbers.

A pair of laboratory mice are crossed to obtain offspring. Three alleles found in the female gamete are ABC. Three alleles found in the male gamete are Abc.

75. What is formed when a male gamete combines with a female gamete?

- A chromosome
- B sperm
- C zygote
- D egg

76. Which of these is a possible combination of alleles for the offspring produced by these mice?

- A AaBbCc
- B AABbCC

- C AABbCc
- D aabbcc

77. Most bacteria do not have the ability to break down oil that is accidentally spilled into the ocean by tankers. However, scientists can insert a gene into the DNA of a bacterium to give it the ability to break down the oil. This technology is an example of

- A crossing-over
- B DNA replication
- C gene splicing
- D translation

78. Apomixis is a type of asexual reproduction in which adult plants grow directly from egg cells. Which of these does not occur during apomixis?

- A translation
- B transcription
- C fertilization
- D mitosis

79. One parent is homozygous dominant for brown hair (BB). The other parent is heterozygous for brown hair (Bb). What is the probability that the offspring will have brown hair?

- A 100%
- B 50%
- C 75%
- D 25%

80. Which of these make up the primary link between a gene and the expression of a trait?

- A sugars
- B vitamins
- C lipids
- D proteins

81. The nucleotide base sequence of a strand of DNA is TAC-CGG-AGT. What is the sequence of the complementary DNA strand?

- A ATG-GCC-TCA
- B ACT-GAA-CGA
- C AGT-TCC-TAC
- D TAC-CGG-AGT

82. Scientists estimate that dental plaque contains up to  $1 \times 10^{11}$  bacteria per gram. Which number is equal to  $1 \times 10^{11}$ ?
- A 1,000,000,000,000
  - B 100,000,000,000
  - C 1,000,000,000
  - D 10,000,000,000

83. In deep ocean trenches, bacteria produce organic materials from inorganic compounds through the process of
- A decomposition
  - B photosynthesis
  - C respiration
  - D chemosynthesis

Use the information below to answer the following item.

An insecticide is a chemical that kills insects. Most insects are killed the first time they are exposed to an insecticide. However, some insects carry a gene that enables them to survive their first exposure to an insecticide. When these surviving insects reproduce, this gene may be inherited by their offspring. The number of insecticide-resistant insects usually increases over time because increasing numbers of offspring with this gene are able to survive and reproduce.

84. Which process enables increasing numbers of insects to survive their initial exposure to an insecticide?
- A mutation
  - B genetic engineering
  - C natural selection
  - D cloning
85. What is the ecological relationship between insects and crops?

- A commensalism
- B mutualism
- C competition
- D predation

Use the technical passage below to answer the following item.

### Black Bear Sightings are on the Rise

Black bears are the largest mammals native to Maryland. Adults typically weigh between 150 and 400 pounds. Their color can range from black to brown to cinnamon. They have a tan muzzle and may have some white on their chest. Black bears have a short, bobbed tail and small, rounded ears. They live mostly in thick forested areas in Maryland. Black bears are shy, solitary animals. They require a lot of space for their home range. Adult black bears can have a home range of about 15 to 25 square miles.

When the land was being settled, the black bear's habitat was cleared for farms and villages. Because settlers misunderstood bears and felt threatened by them, bears were killed in large numbers. As a result, black bears were soon found only in small numbers and only in the westernmost part of the state. In 1956 there were only about 12 black bears in the whole state. When the black bear population was studied in 2000, as many as 437 bears were estimated to live in Maryland.

Black bears eat a lot of different foods. They will eat whatever is easy to get. Their favorite natural foods include plants, berries, fruits, acorns, insects, roots, and grasses. They may also eat reptiles, amphibians, fish, and dead animals. If available, black bears will eat non-natural foods associated with humans, such as garbage, bird seed, pet food, and agricultural crops like corn. Black bears will only come near a home if there is something to attract them, such as food. Once a bear finds available food, it will likely return again and again.

Both black bears and humans feel threatened when confronted with one another. When threatened, bears often display unusual behaviors, such as hitting the ground with its paws, charging only to stop several feet from the threat, or standing upright on its hind legs. Since humans usually perceive these behaviors as being aggressive, black bears are once again being viewed as a problem.

86. What is the ecological role of the black bear?
- A decomposer
  - B carnivore
  - C omnivore
  - D producer
87. Recent increases in bear-human interactions in the westernmost part of Maryland are causing serious problems. Which of these is the most likely cause for this increased interaction?
- A decrease in the black bear population
  - B larger forested areas
  - C increase in non-natural food sources
  - D changes in climate
88. The use of certain chemicals by humans has caused holes to form in the Earth's ozone layer. This allows more ultraviolet (UV) light to reach the oceans. Scientists are concerned that an increase in UV light will start killing microscopic marine algae.

**Which of these statements describes how the ocean food web would be affected by a large decrease in microscopic marine algae?**

- A There will be more consumers because the UV light kills producers.
- B There will be fewer marine animals because there will be fewer producers.
- C There will be no change because the

algae are very small.

- D There will be fewer consumers because the UV light kills decomposers.

89. **A protozoan lives inside a rat and takes its nourishment from the rat's body. Because the protozoan damages the rat's brain, the rat loses its fear of cats. A cat attacks an infected rat; the protozoan enters the cat's body and completes its life cycle.**

**Which of these describes the relationship between the protozoan and the rat?**

- A commensalism
- B parasite-host
- C mutualism
- D predator-prey

**Use the information below to answer the following item.**

**Hummingbirds need large amounts of energy to flap their wings between 60 and 200 times per second. Their wings beat so rapidly that it is difficult to see them move. They often appear suspended in air for extended periods of time without changing their location. Hummingbirds have long bills and grooved tongues to reach into flowers to feed on flower nectar. They also feed on insects.**

90. The body system most directly interacting with the skeletal system to enable hummingbirds to beat their wings between 60 and 200 times per second is the -
- A muscular system
  - B circulatory system
  - C endocrine system
  - D digestive system
91. Which term best describes the ecological relationship between hummingbirds and insects?
- A mutualism
  - B commensalism
  - C parasite-host
  - D predator-prey



92. An increase in the use of fossil fuels has increased the amount of sulfur compounds in Earth's atmosphere. Which of these is a direct result of the increased amount of sulfur in the atmosphere?
- A an increase in severe storms
  - B an increase in the rate of ozone depletion
  - C an increase in acid rain
  - D an increase in global warming

93. Students tested two cleansers for their effectiveness against bacteria. In their experiment, each cleanser was used on two different household surfaces. The students took samples from each surface before and after using each cleanser. Then they transferred each sample to a culture medium. The students counted the number of bacterial colonies that grew on each culture medium. The results of their test are shown in the table below.

EFFECTIVENESS OF HOUSEHOLD CLEANSERS

Cleanser	Household Surface	Number of Colonies Before Scrubbing	Number of Colonies After Scrubbing
1	Counter 1	160	2
1	Sink 1	240	4
2	Counter 2	145	28
2	Sink 2	250	60

Which of these would be the best control for their experiment?

- A Use Cleanser 1 on the sinks and Cleanser 2 on the counters.
  - B Test the number of bacteria on the counters and sinks without scrubbing with cleansers.
  - C Use only Cleanser 1 on both sinks and counters.
  - D Test the number of bacteria on the counters and sinks after scrubbing without using cleansers.
94. Which of the following pairs of materials is required for a cell to carry on respiration?
- A water and carbon dioxide
  - B glucose and oxygen

- C water and oxygen
- D glucose and carbon dioxide

Use the information and the chart below to answer the next two (2) items.

Several students are conducting an experiment to test the effect of exercise on heart rate. Students do 20 sit-ups in one minute of exercise. The data chart below shows the heart rate at one-minute intervals for each student.

HEART RATE DURING EXERCISE

Student	Heart Rate (bpm*)				
	1 min. of exercise	2 min. of exercise	3 min. of exercise	4 min. of exercise	5 min. of exercise
1	88	98	102	110	110
2	92	96	103	115	118
3	87	100	112	112	130
4	93	109	115	120	122
5	90	93	101	112	112
Average	90	99	107	114	118

\*bpm = beats per minute

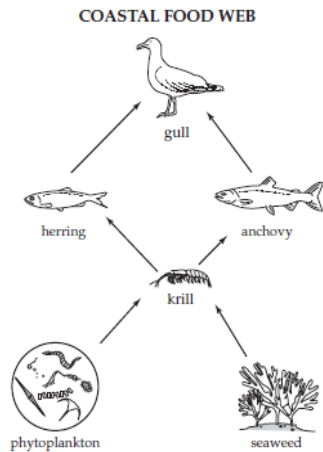
95. Which of these is the dependent variable?
- A number of sit-ups
  - B heart rate
  - C type of exercise
  - D time

In an ocean environment, marine life is most abundant in the euphotic zone. This zone extends from the surface waters to a depth of 200 meters, the deepest depth that sunlight can reach. It is in this range that phytoplankton capture energy from the sun. Although they are microscopic organisms, phytoplankton are the foundation that supports the marine food web.

96. Through which process do phytoplankton use energy from the sun to make their food?
- A respiration
  - B chemosynthesis
  - C evaporation
  - D photosynthesis
97. Which trophic level is most likely missing from an ocean floor food web at a depth of 800 meters?

- A producers
- B decomposers
- C scavengers
- D carnivores

98. The diagram below represents a coastal food web.



Global warming causes an increase in coastal water temperatures. Increased coastal water temperature causes a decrease in reproduction of krill. Which of these would most likely experience an increase in population?

- A Herring
- B anchovy
- C phytoplankton
- D gull

Use the information below to answer the following item.

Scientists determined that excess fertilizer from farms entered a shallow lake. The fertilizer caused an increase in aquatic plants in the lake and then a decrease in oxygen in the water. Next, organic debris collected on the bottom of the lake. Over several years, the lake gradually filled in with organic sediment.

99. One species of aquatic plant found in the lake has 84 chromosomes in each cell. As nutrient levels increased, the population of this species increased through vegetative reproduction. How many chromosomes were in the cells of the offspring?

- A 84
- B 168
- C 42
- D 21

1100 As the fertilizer levels increased, the population of consumers in the lake declined. Which change most likely caused this decline?

- A increase in light intensity
- B decrease in carbon dioxide
- C decrease in available oxygen
- D increase in temperature

