2013 Spring Semester Study Guide

***Use the graphs to answer questions 1 and 2***

Number of Individuals 🡪

Number of Individuals 🡪

Number of Individuals 🡪

Number of Individuals 🡪

A B C D D

Time 🡪

Time 🡪

Time 🡪

Time 🡪

*When Lake Pleasant was formed as the result of a dam, there were no fish present. Shortly after its formation 25 crayfish were added. At that time there were no predators of the crayfish in the water and catching the crayfish was not permitted. Plenty of food was available for them to eat. After several generations have passed the population resembles graph A.*

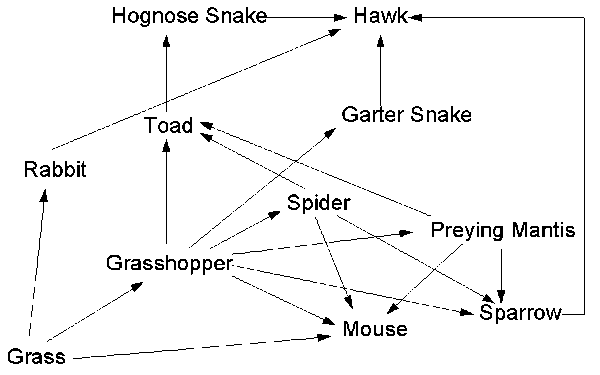
1. Explain why the population would resemble graph A.
2. Imagine that bass and catfish (which eat crayfish) were introduced into the lake at the same time the crayfish were introduced. Which of the graphs from above (A, B, C or D) would show how the population of crayfish would be expected to change over several generations? Explain your answer.



Bacteria with the genotype AA or Aa are highly susceptible to antibiotics, while individuals with the genotype aa are not affected at all.

1. Which of the graphs (A, B, C, or D) shows how the entire population of bacteria in a community would change over time in response to antibiotics?
2. Why did you answer question 12 like you did?
3. This change in the bacteria population over time is an example of…

Use the food web below to answer questions 6 through 9.

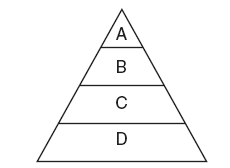


1. Starting with grass make two food chains from the above food web.
2. List autotroph(s), and two heterotrophs, in the food web.
3. Leafy spurge was accidentally introduced into the above food web. The plant propagates quickly and is not eaten by any of the above organisms. How will this competitive plant affect the above ecosystem?
4. In this ecosystem, where does the grass get the energy they need in order to survive?

Herbicide was used to remove the leafy spurge in the above ecosystem. The concentrations used and the effects are illustrated in the table below. Use it to answer questions 19 and 20 below.

|  |  |
| --- | --- |
| **Concentration Level** | **Effect** |
| 3.5-4 ppm | * Not lethal to plants or animals |
| 4.5-5 ppm | * Affects digestive systems of mice. |
| 5.5-6 ppm | * The number and variety of grasshopper species begin to decrease * Spiders become rare * Sparrow eggs become fragile and break. |
| 6.5-9 ppm | * Leafy spurge no longer propagates |

1. Which level of herbicide does not affect other organisms?
2. Can the herbicide be used to kill the leafy spurge without affecting other organisms? Explain your answer

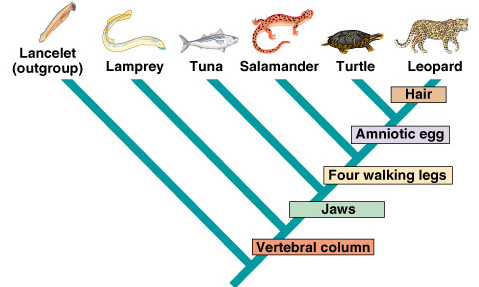


1. Label the diagram above with appropriate organisms and explain what happens to energy as you go from D to A.
2. Place the following levels of biological organization from smallest to largest start with organism and end with biome.

The diagrams below show the bones in the forelimbs of three different organisms.

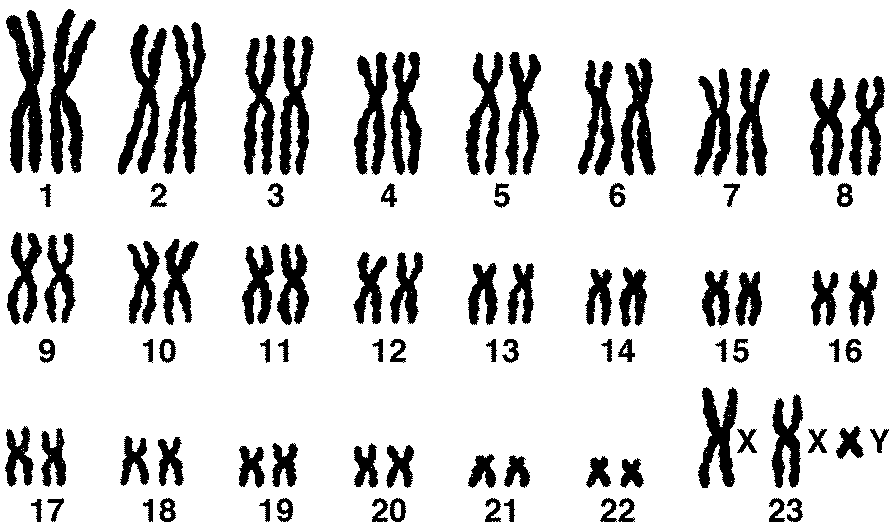


1. What type of structures do the bones above represent?
2. Similarities in the bone arrangements support the hypothesis that these organisms

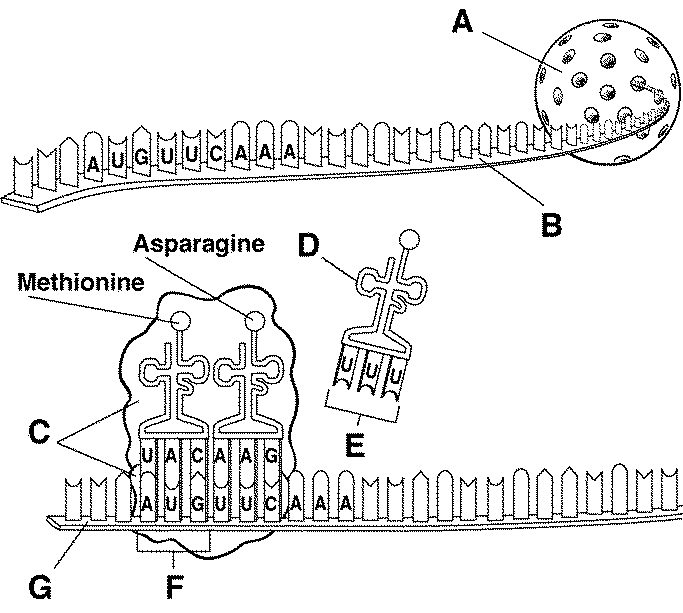


1. Use the diagram above to answer the questions below.
   1. What does the diagram represent?
   2. What do vertebral column, jaws etc represent?
   3. Where would you place an eel like organism on the diagram and why?
   4. Where is the most recent split?
2. The diagram below illustrates the change that occurred in the physical appearance of a rabbit population over a 10-year period. Which change occurred in the population of rabbits? Explain your answer.



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1. How many chromosomes does the above karyotype have?
2. What is the gender of the person in the above karyotype?
3. Does the person have a genetic disorder? If they do what is it?
4. In some cats, the gene for tail length shows incomplete dominance. Cats can have no tails (N), long tails (L), or short tails (NL). Cross a short tail cat and a cat with no tail.
5. In cows, the allele for red hair (HR) and the allele for white hair ( HW) are codominant. The heterozygous condition results in a mixture of red and white hairs and the cows are called roan. Cross a red cow with a white bull. What is the genotype and phenotype ratio of the offspring?
6. In Siamese cats, the fur on the ears, paws, tail, and face is usually black or brown, while the rest of the body fur is almost white. If a Siamese cat is kept indoors where it is warm, it may grow fur that is almost white on the ears, paws, tail, and face, while a Siamese cat that stays outside where it is cold, will grow fur that is quite dark on these areas. The best explanation for these changes in fur color is that.
   1. An environmental factor influences the expression of this inherited trait
   2. The location of pigment-producing cells determines the DNA code of the genes
   3. Skin cells that produce pigment have a higher mutation rate than other cells.
   4. The gene for fur color is modified by interactions with the environment
7. Define the following
   1. Independent assortment
   2. codominance
   3. incomplete dominance
8. What is the phenotypic ratio of a dihybrid cross?
9. Be able to explain how the work of Gregor Mendel and Darwin fit together?

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1. Label the above diagram.
2. Transcribe the following DNA sequence. TTTACGGAT
3. What are the anti-codons of the transcribed sequence?
4. Translate the transcribed sequence into amino acids.
5. What type of bonds hold complimentary strands of DNA together?
6. Explain what is happening in the diagram below.



In an experiment to test the effect of light on plant growth, a student used two marigold plants of the same age. The plants were grown in separate pots. One pot was exposed to sunlight, the other to artificial light. All other conditions were kept the same. The height of each plant was measured at the start and at the end of the experiment. The student’s data are shown in the table below.

Data Table

|  |  |
| --- | --- |
| Plant Grown In | Increase in Plant Height (cm) |
| Sunlight | 9 |
| Artificial light | 8 |

1. The student concluded that all plants grow more rapidly in sunlight than in artificial light. Discuss whether this conclusion is valid. Your answer must include at least
   1. The significance of the difference in the results shown in the data table
   2. The significance of the number of individual plants used in the experiment
   3. The significance of the number of species of plants used in the experiment

Over the last 30 years, a part of the Hudson River known as Foundry Cove has been the site for many factories that have dumped toxic chemicals into the river. Some of these pollutants have accumulated in the mud at the bottom of the river. The polluted cove water contains many single-celled organisms and simple multicellular animals. Curiously, when the same species from nearby regions with non-polluted sediments are moved to the polluted cove water, they die.

Scientists hypothesized that the organisms living in the cove have evolved so that they are able to survive in polluted water. To test this hypothesis, biologists tried to duplicate the history of the cove in the laboratory. They took a large number of one species of simple animal from a cove with unpolluted mud and placed them in a flask that contained polluted mud from Foundry Cove (diagram 1). Most animals died, but a few survived (diagram 2). The scientists then bred the survivors with each other for several generations producing offspring that were descendants of the survivors. When placed in Foundry Cove, most of these descendants survived. The diagrams below represent the steps in this investigation.



1. Explain how the simple animals of Foundry Cove adapted to the polluted water. Your answer must include an explanation of the role of *three* of the following in this process.
   1. Environment
   2. Genetic variation
   3. Selection
   4. Reproduction
   5. Fitness
2. Define species
3. What are two ways nitrogen can be converted to a form plants can use?
4. How is nitrogen returned to the atmosphere?