Honors Biology Summer Assignment

Mrs. Burns

The summer assignment will be regarding the topic of evolution. Evolution is a central theme to the study of Biology and this assignment will give you an overview of what it is, how it occurs and how it explains not only the diversity of life but also how all life is connected.

The assignment itself will require you to define terms, answer questions and do some research. The assignment is due the first day of school and should be done electronically. **It will be counted as a test grade.** I have posted the glossary and chapter 16 from the textbook. If you have any questions, feel free to email me during the summer at mburns@hopatcongschools.org. I only check my email once or twice a week during the summer so I may not respond immediately.

You should not start this assignment until you hear from your guidance counselor to ensure that your schedule is done and that you are, in fact, in honors biology.

Enjoy doing the assignment, and I look forward to working with you in the fall!

1. **Define** the following terms:
    a. Characteristic
    b. Adaptation
    c. Speciation
    d. Niche
    e. DNA (deoxyribonucleic acid)
    f. Mutation

2. **Influencing Darwin** - Read chapter 16 in the textbook and answer the following questions.
    a. Darwin is credited with developing the Theory of Evolution. How did the following scientists help him with developing his theory?
        i. Lyell
        ii. Hutton
        iii. Malthus

    b. Like Darwin, Lamark suggested that species change. How does he explain how organisms change?

    c. Explain how artificial selection, used by farmers and animal breeders, helped Darwin develop his theory of evolution.

3. **Natural Selection** is the mechanism by which evolution occurs. Read pages 460-463 and describe natural selection in your own words.

4. **Darwin and his Finches** - Log onto the website below and answer the questions 1 - 4 at the bottom of the reading. When asked to identify the finches, just label them going from left to right (I don't think you will be able to cut and paste). https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/35875-Y6Evolution-DarwinsFinches.pdf
    1.
    2.
    3.
    4.

    Research - Choose two of the birds listed in question #5 and describe the habitat in which they live and what they eat. Using natural selection, explain why their beaks are shaped as they are.

    Adaptive radiation - Research and describe what it is. Are the different finches found on the Galapagos Islands an example of adaptive radiation? Explain your answer.

5. **Showing relationships between organisms** - In addition to explaining life's diversity, evolution can also explain how life is connected. Darwin used a "tree" to show the connection between organisms. Today scientists use cladograms when showing connections. Log onto https://evolution.berkeley.edu/teach-resources/what-did-t-rex-taste-like/ and learn how to read a cladogram and determine what a T-Rex would taste like!

    Question: So what will T. rex taste like? Explain why this might be the case.

    Use the link below to open up the completed cladogram so that you can answer the questions about T. rex at the end of the activity. Write your answers below. **You may have to do some research!** (This link will bring you to the cladogram but you will need to click on the letters to see the characteristics that each represents.)

    https://ucmp.berkeley.edu/education/explorations/tours/Trex/phych3C.html

    a. Did T. rex have an amniotic egg? Explain.
    b. Was T. rex warm-blooded or cold-blooded? Explain.
    c. Could T. rex have had feathers? Explain.
    d. Did T. rex have color vision? Explain.
    e. How many chambers were there in T rex's heart? Explain.
    f. Did T. rex sing to its offspring? Explain.

6. **Make a Cladogram** - Using the explanations of the characteristics below, fill in the data table provided by placing an "x" in the box of the animal that has each characteristic (you may have to do some research).

Set #1 Dorsal nerve cord - A hollow cord of nervous tissue that runs along the back of an organism.
Notochord - A flexible but supporting cartilage–like rod running along the back of an organism.

Set #2 Paired appendages - Includes legs, arms, wings, fins, flippers, antennae
Vertebral column - Backbone

Set #3 Paired Legs - Self explanatory.

Set #4 Amnion - A membrane that holds in the amniotic fluid surrounding the embryo; may or may not be inside of an egg.

Set #5 Mammary glands - Milk-secreting glands that nourish young.

Set #6 Placenta - Structure attached to the inside of the uterus of the mother and joined to the embryo by the umbilical cord.

Set #7 Canine teeth short - Canine teeth that are the same length as other teeth.
Foramen magnum forward - Spinal cord opening, located forward, under the skull.

Sets	Trait	Kangaroo	Lamprey	Rhesus Monkey	Bullfrog	Human	Snapping Turtle	Tuna
1	**Dorsal Nerve Cord** Notochord							
2	**Paired Appendages** Vertebral Column							
3	Paired Legs							
5	Amnion							
5	Mammary Glands							
6	Placenta							
7	**Canine Teeth Short** Foramen magnum forward							
	Total # of Xs							

On a separate sheet of paper, draw a cladogram using the information from the above chart.

7. **Evolution Today**

a. *Antibiotic resistance and natural selection*

Bacteria are single-celled organisms that are responsible for many illnesses. Antibiotics are used to treat infections caused by these types of organisms. Over time, many bacteria have become resistant to the antibiotics that have in the past destroyed them.

i. **Explain** how natural selection is the mechanism for such an occurrence.

ii. Using this new information, explain why people are told not to use hand sanitizers on a regular basis.

b. **HIV and evolution** – HIV (Human Immunodeficiency Virus) is responsible for AIDS.

i. Explain why a multiple drug therapy regime is used to combat this illness.

ii. Often a drug regime must be temporarily stopped by the infected individual. Using your knowledge of natural selection, explain why this might be helpful to the patient.