Name: _____ Period: ____ Date: _____

Interpreting Finch Data in Daphne Major

Introduction: The Galapagos Islands are a group of volcanic islands lying along the equator in the Pacific Ocean west of the mainland of Ecuador. The islands are famous for their rare animal species, including the giant tortoise. The Spanish word, “galapagos,” means, “tortoise.”

Perhaps our first association with the word "Galapagos" is the name "Darwin." Charles Darwin's visit to the Galapagos Islands had a resounding impact on the formation of his Theory of Natural Selection. During his visit to the Islands, Darwin noted that the unique creatures were similar from island to island, but perfectly adapted to their environments, which led him to ponder the origin of the islands' inhabitants. Among those that struck Darwin so greatly were the finches that are now named in his honor. Darwin would later base some of his thoughts from the supposition that these finches were all descendents of the same lineage. Today, there are evolutionary biologists who still study these finches. Rosemary and Peter Grant, who study finches on the Galapagos Island called Daphne Major, have produced a documentary showcasing their work. The Grants spent years observing, tagging, and measuring Galapagos finches and their environment. During that time they documented environmental changes and how these changes favored certain individuals within the population. Those individuals survived and passed their characteristics on to the next generation, illustrating natural selection in action.

In their natural laboratory, the 100-acre island called Daphne Major, the Grants and their assistants watched the struggle for survival among individuals in two species of small birds called Darwin's finches. The struggle is mainly about food -- different types of seeds -- and how the availability of that food is dramatically influenced by year-to-year weather changes.

The Grants wanted to find out whether they could see the force of natural selection at work, judging by which birds survived the changing environment. For the finches, body size and the size and shape of their beaks are traits that vary in adapting to environmental niches or changes in those niches. Body and beak variation occurs randomly. The birds with the best-suited bodies and beaks for the particular environment survive and pass along the successful adaptations from one generation to another through natural selection.

Objective: Use the data to answer the following investigation questions:

Why were so many finches dying in 1977, and why were some finches able to survive?

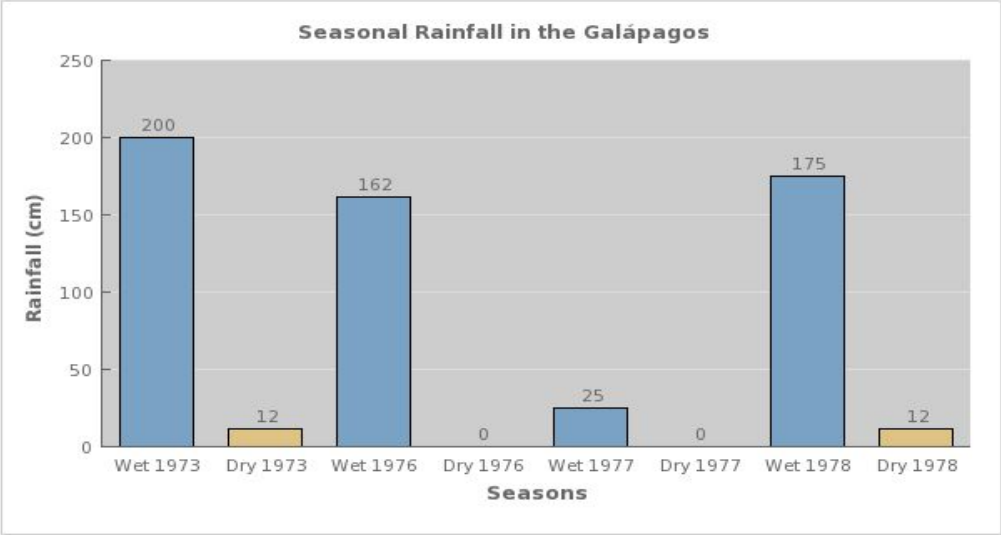
Properties of Finches

Leg Size	12.39 - 19.84 mm
Beak Size	7.21 - 14.35 mm
Wing Size	37.40 - 73.21 mm
Weight	6.2 - 19.1 g

Part 1.

A. Data collected from Daphne Major island from 1973, 1976, 1977, and 1978

Rainfall Measurements



1. What do you notice about rainfall measurements during the wet and dry seasons in 1977 compared to other years?

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2. On the island of Daphne Major, there are four types of seeds available from the following four plants:
    - Prickly Pear Cactus (**Scientific name:** Opuntia)
    - Chamaesyce (**Scientific name:** Chamaesyce amplexicaulis)
    - Portulaca (**Scientific name:** Portulaca howelli)
    - Tribulus (**Scientific name:** Tribulus cistoides)

    Data for four types of seed availability on Daphne Major are below. Check the data for 1977. Which plant seeds were available in Dry season of 1977? What are some of these available seed properties (size and hardness)?

    _____

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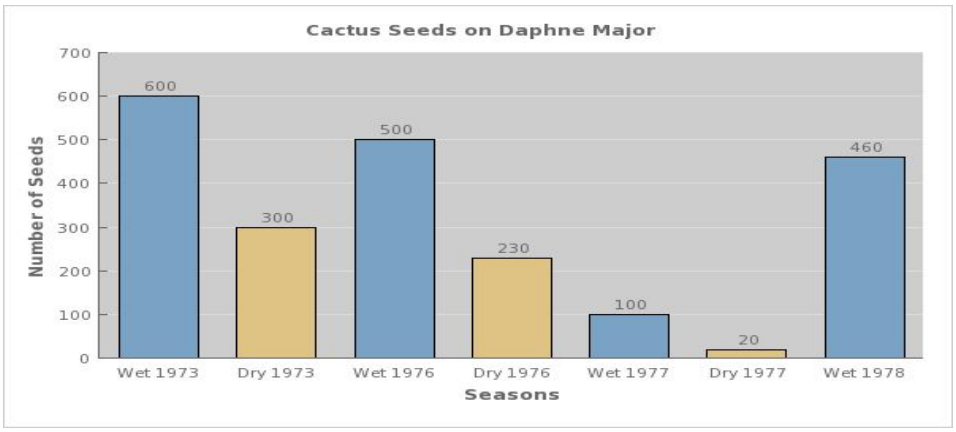
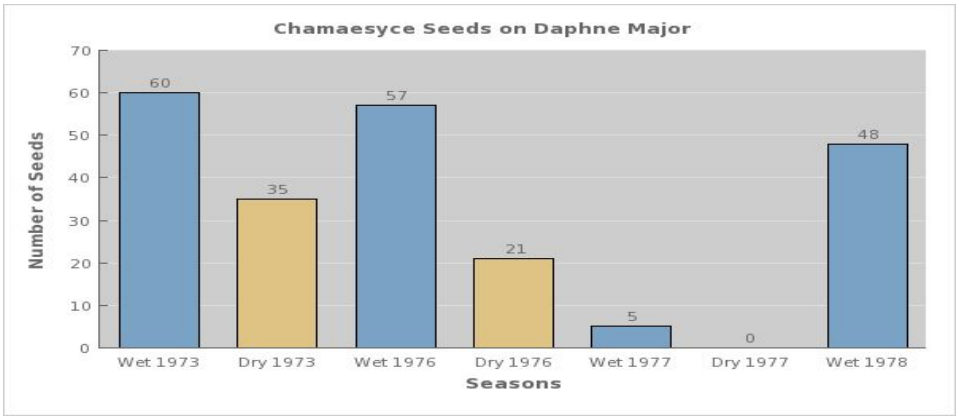
Seed Property of Catus Seed

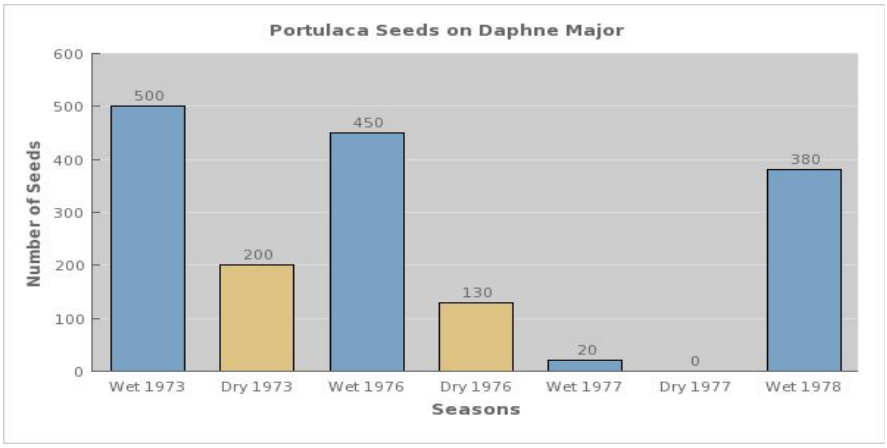
Seed Length	3.0 mm
Seed Volume	3.6 mm
Seed Rigidity	Medium



Seed Property of Chamaesyce Seed

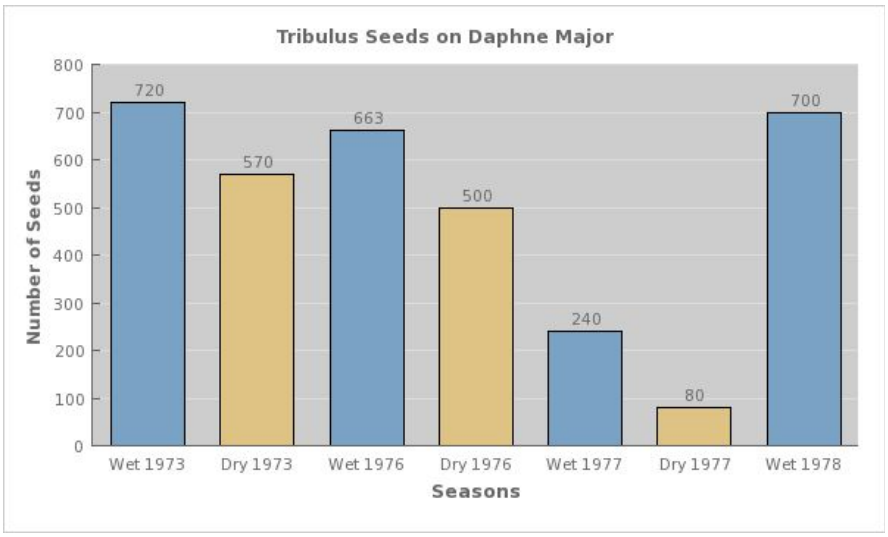
Seed Length	0.8 mm
Seed Volume	0.3 mm
Seed Rigidity	Soft





Seed Property of Portulaca Seed

Seed Length	1.0 mm
Seed Volume	1.8 mm
Seed Rigidity	Soft



Seed Property of Tribulus Seed

Seed Length	5.8 mm
Seed Volume	12.0 mm
Seed Rigidity	Hard

Hypothesis: Which type of beaks (small, medium, large) would be most suitable for the seeds available in 1977? Why?

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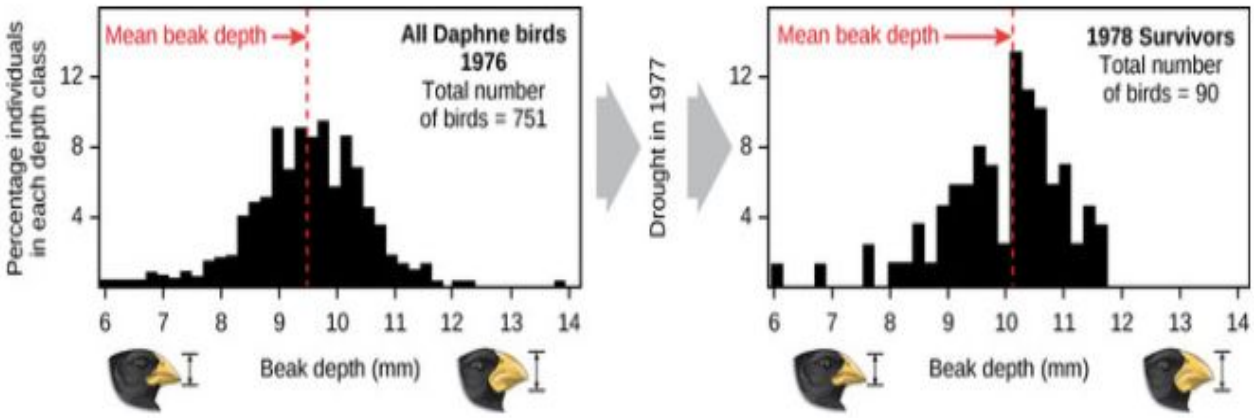
Part 2: Study the histograms below:



Histogram Comparison Questions:

3. Compared to 1976, the 1978 mean beak depth has _____.

a. Increased
b. Remained constant
c. Decreased

4. Compared to 1976, the 1978 bird population has _____.

d. Increased slightly
e. Remained constant
f. Decreased slightly
g. Decreased dramatically

Part 3: Conclusion

Why were so many finches dying in 1977? Be sure to use evidence to justify your claim.

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_____

Why were some finches able to survive? (hint: what characteristic/property helped finches to survive?) Be sure to use evidence to justify your claim.

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