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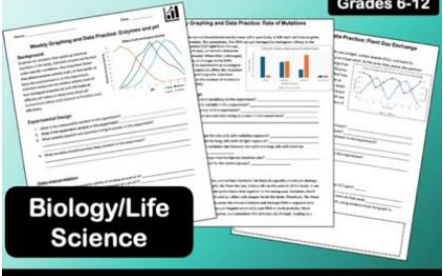
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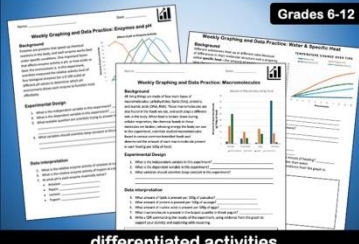
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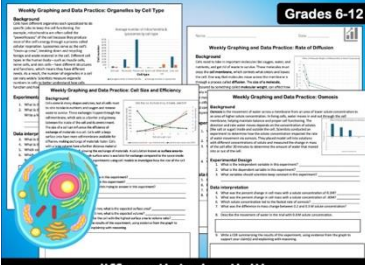
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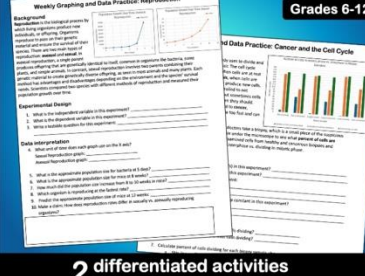
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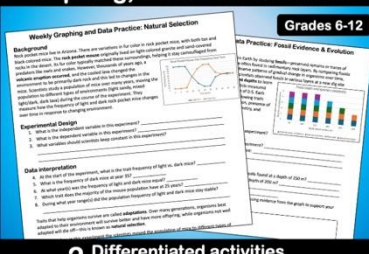
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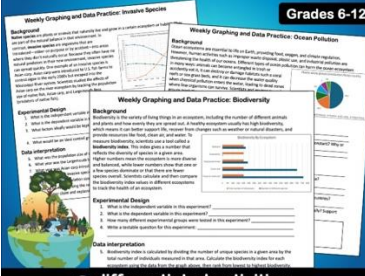
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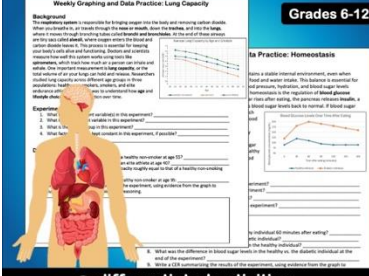
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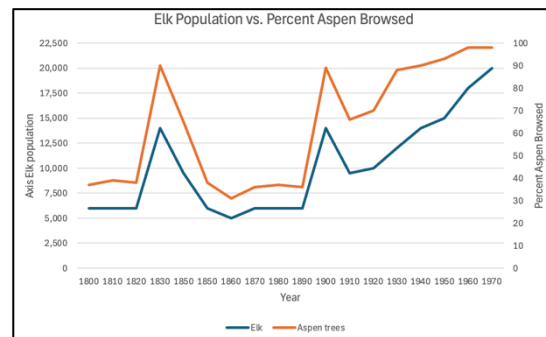
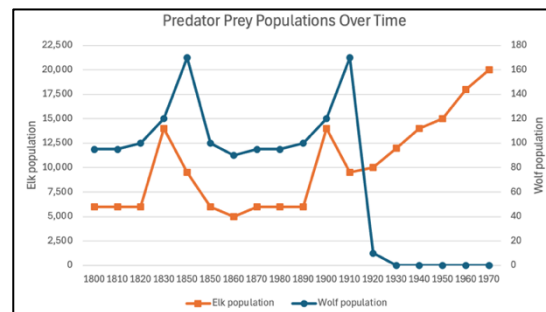


Weekly Graphing and Data Practice: Predator Prey

Complex Version Answer Key

Background

In an ecosystem, predator and prey populations are closely connected. Predators, the animals that hunt and eat the prey. Scientists have closely studied the predator-prey relationships in various ecosystems to understand how the populations influence each other and other populations in the ecosystem. One highly studied relationship is the gray wolf and elk populations in Yellowstone National Park. In the early 1900s, wolves were eliminated from the park, which influenced the elk population as well as Aspen tree populations, which are browsed (eaten) by elk. Scientists collected data on wolf and elk populations as well as percent of Aspen trees browsed before removal and after removal of gray wolves to determine how populations influence each other.



Experimental Design

1. What is the independent variable in this experiment? **Presence/removal of wolves**
2. What is the dependent variable in this experiment? **Elk and aspen tree populations**
3. Write a testable question for this experiment: **How does the presence or removal of a predator impact other populations in the ecosystem?**

Data interpretation

4. What was the wolf and elk populations in 1850? **Wolf: 170, elk: 9,500**
5. What was the wolf population when the elk population was 14,000? **120**
6. What percent of Aspen was browsed when the wolf population was 170? **65%**
7. Which population peaks first, predator or prey? **Prey**
8. What year were the wolves eliminated from Yellowstone National Park? **1920**
9. Write a CER summarizing the results of the experiment, using evidence from the graph to support your claim and explaining with reasoning.

Prior to the removal of wolves, predator and prey follow natural cycles. When prey such as elk rise, this creates more food for wolves, leading to a subsequent rise in predator populations. Higher predator populations eat more prey, leading to a drop in prey- this occurs cyclically. For example, from 1800-1830, elk rose from 6000 to 14000. Subsequently, wolves rose from 95 to 120 and then 170 in 1850. In addition, producer consumption also follows a similar pattern- when there are more primary consumers like elk, there is a larger percentage of aspen browsed.

When the wolf population was eliminated, the elk population increased exponentially, leading to a higher percentage of aspen trees being browsed. Between 1900 and 1970, the wolf population dropped from 120 to 0, with wolves being removed in 1920. During that same period, the elk population rose from 14,000 to 20,000, and the percent of aspen browsed increased from 89% to 98%. Wolves are a natural predator of elk. When wolves were present, they helped control the elk population, which reduced the grazing pressure on aspen trees. After wolves were removed, elk populations grew unchecked, leading to overgrazing of young aspen shoots. This caused a dramatic increase in the percentage of aspen trees being browsed, which negatively impacted forest regeneration and overall ecosystem health.

Application

In 1995, conservationists reintroduced wolves to Yellowstone in an attempt to restore a healthier, balanced ecosystem.

10. Predict how reintroducing wolves to Yellowstone will impact elk populations and other aspects of the ecosystem. Explain your reasoning.

Reintroducing wolves to Yellowstone will likely cause the elk population to decrease initially, eventually returning to the normal healthy predator prey cycling. It will also lead to healthier growth of aspen trees and other plants in the ecosystem. Wolves are a natural predator of elk. When wolves are present, they reduce the number of elk through predation. This means fewer young aspen trees get eaten, allowing them to grow taller and stronger. As the plant life recovers, it can support more types of animals, like birds and beavers, improving the overall health and biodiversity of the ecosystem.

11. Scientists collected data for 20 years after wolves were reintroduced to Yellowstone. The data can be found on the right. Does the data support or refute your prediction in the previous question? Support your answer with evidence.

Year	Wolf population	Elk population	Percent Aspen Browsed
1970	0	20,000	98
1980	0	18,000	99
1990	0	20,000	98
2000	120	16,000	93
2010	100	6,000	45
2020	95	6,000	38

It supports the prediction. In the data table, when wolves were restored and we see population size of 120 in 2000, you can see in years following this, elk population decreasing, reaching 6000 in 2010. Following the decrease in elk, we see a subsequent decrease in percent of aspen browsed, with 38% browsed in 2020 compared to 98% browsed when wolves were removed.

12. Do you agree or disagree with the conservationists' decision to reintroduce wolves back into the Yellowstone ecosystem? Support your answer with reasoning.

Agree- The data shows that after wolves were removed, elk populations increased too rapidly, which led to overgrazing and damage to plants like aspen trees. This hurt the entire ecosystem. When wolves were reintroduced, they helped control the elk population and returned it to balanced levels. As a result, more young trees were able to grow, and the overall health and balance of the ecosystem improved. Reintroducing wolves helped restore the natural food web and made Yellowstone more diverse and stable.

Graphing Answer Key

Year	Wolf population	Elk population	Percent Aspen Browsed
1800	95	6,000	37
1810	95	6,000	39
1820	100	6000	38
1830	120	14,000	90
1850	170	9,500	65
1850	100	6,000	38
1860	90	5,000	31
1870	95	6,000	36
1880	95	6,000	37
1890	100	6000	36
1900	120	14,000	89
1910	170	9500	66
1920	10	10,000	70
1930	0	12,000	88
1940	0	14,000	90
1950	0	15,000	93
1960	0	18,000	98
1970	0	20,000	98

