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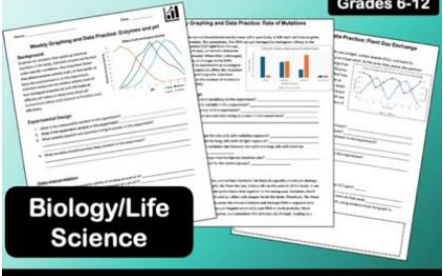
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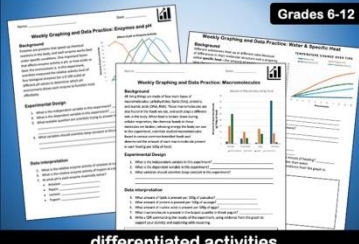
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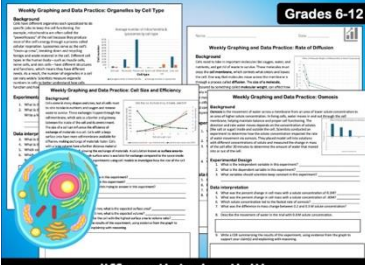
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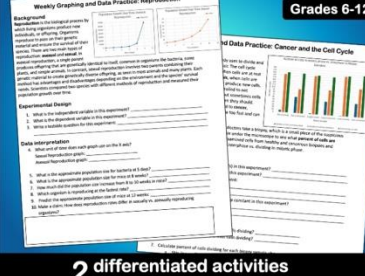
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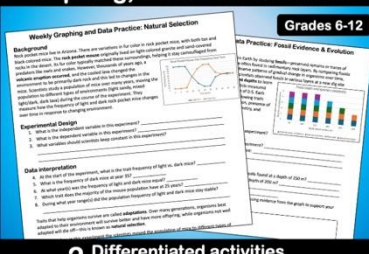
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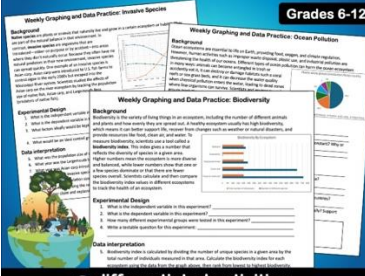
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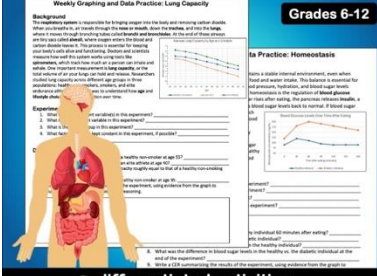
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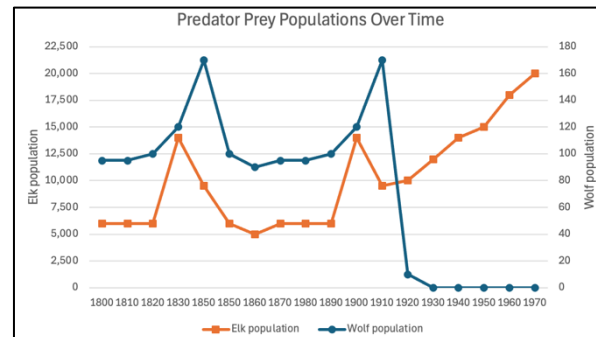


Weekly Graphing and Data Practice: Predator Prey

Simple 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. 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. Scientists collected data on wolf and elk populations before removal and after removal of gray wolves to determine how predator and prey 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 population**
3. Write a testable question for this experiment: **How does the presence or removal of a predator impact the prey population 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. Which population peaks first, predator or prey? **Prey**
7. What year were the wolves eliminated from Yellowstone National Park? **1920**
8. Describe the trend in the elk population after wolves were eliminated.

Elk population increased at a rapid, uncontrolled rate.

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.

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. Wolves are a natural predator of elk. When wolves were present, they helped control the elk population. After wolves were removed, elk populations grew unchecked.

Application

When the wolves were eliminated from the park in the early 1900s, elk populations were not the only population in the ecosystem impacted. As elk numbers increased, they overgrazed young willow and aspen trees, which disrupted the entire ecosystem—including habitats for birds and beavers.

10. Fill in the blanks to describe the population interactions in the Yellowstone ecosystem *before* wolf removal:

When elk populations increase, wolf populations **increase** and willow and aspen tree populations **decrease**. When wolf populations increase, elk populations **decrease** and willow and aspen tree populations **increase**.

11. Explain why the pattern you filled in above occurs:

This pattern happens because wolves, elk, and plants are all connected in a predator-prey-food relationship. When elk populations increase, they eat more willow and aspen trees, causing the tree populations to decrease. But if there are more elk, there is also more food for wolves, so the wolf population increases. When wolf populations increase, they hunt more elk, so the elk population decreases. With fewer elk eating them, the willow and aspen trees have a chance to grow, so their populations increase.

1. Describe the population interactions in the Yellowstone ecosystem *after* wolf removal:

After wolves were removed from the Yellowstone ecosystem, the elk population increased exponentially because they no longer had a natural predator. With more elk feeding freely, the willow and aspen tree population decreased due to heavy browsing. Without wolves to control elk numbers and behavior, young aspen trees were eaten before they could grow, leading to damage in the ecosystem and a decline in biodiversity. This shows how removing a top predator can unbalance the entire food web.

2. In 1995, conservationists reintroduced wolves to Yellowstone in an attempt to restore a healthier, balanced ecosystem. Predict how reintroducing wolves to Yellowstone will impact elk populations and other aspects of the ecosystem. Do you agree or disagree with the conservationists' decision? Support your answer with 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. Therefore, I agree with the conservationists' decision to restore wolf populations.

Graphing Answer Key

Year	Wolf population	Elk population
1800	95	6,000
1810	95	6,000
1820	100	6000
1830	120	14,000
1850	170	9,500
1850	100	6,000
1860	90	5,000
1870	95	6,000
1880	95	6,000
1890	100	6000
1900	120	14,000
1910	170	9500
1920	10	10,000
1930	0	12,000
1940	0	14,000
1950	0	15,000
1960	0	18,000
1970	0	20,000

