Common District Assessment Cover Sheet
M.S.A.D. #49

Discipline: Science

Grade level/Course Title: 10th Grade/General Biology, Lab Biology, Honors Biology

Assessment Title: Carrying Capacity

Pacing: 10 days during Ecology/Populations Unit

Assessment Type: Constructed Response

Core Standard: NGSS LS 2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Assessment Summary: 18 long answer science questions, math (not assessed but can be done to complete doubling time and averages, graph of human population)

Suggested Assessment Time Frame: 2 days

Materials and Resources: CDA, graph paper, calculators

Required Prior Instruction: The factors impacting the size of animal populations should be covered. Ways to control populations and places on planet having population issues covered. Many students have had a social studies unit that covers some of these questions so it is good review. Suggested Activities: Population! The Board Game, Bill Nye population video, Research two countries assignment, Forest Biological Inventory Lab (2 classes) Invasive Species Project, Easter Island Article.

Suggested Prior Instructional Time: 10 days

Teacher Directions for Assessment Administration: Depending on level and timeframe, teachers can walk the students through the math parts as a class, provide a pre-made human population graph (general or lab biology) or choose to have students complete the math and graphs independently (honors bio). The math is not part of the rubric/standard's 1,2,3,4 grade. The 18 science questions are the ones assessed for the rubric. Teachers should use the Instructor Rubric as they grade the work and check-off which concepts the students cover in their answers. Do not hand out the Instructor Rubric, but staple to student's assessment after recording grade.

Common District Assessment
NGSS HS-LS 2-1
Biology: Carrying Capacity
Revised 3/10/2016

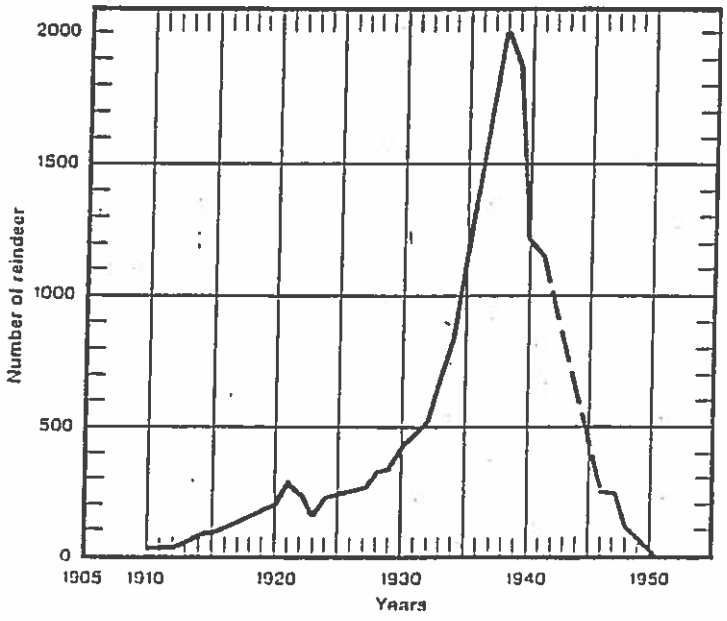
NGSS LS 2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Population Growth Lab

Introduction: Carrying capacity is the maximum population a given environment can support. Doubling time is the number of years required for a population to double its size. In this lab you will compare the growth of two populations and examine the roles played by carrying capacity, doubling time, and the factors that affect the population size.

Part A: Reindeer Population

Background Information: In 1911, 25 reindeer (4 males and 21 females) were brought to Saint Paul Island, off the coast of Alaska. Saint Paul Island is approximately 41 square miles and more than 200 miles out in the ocean from Alaska. On Saint Paul Island, there were no predators of the reindeer, and no hunting of reindeer was allowed. The graph below indicates what happened to the reindeer population on the island between 1911 and 1950. Use the graph to answer the Data Questions.



Data Questions: Refer to the graph to help you answer 1-6.

1. A. What was the size of the population at the beginning of this study? _____
   B. What was the size of the population in 1920? _____
   C. What was the difference in the number of reindeer between 1911 and 1920? _____
   D. What was the average yearly increase in population between 1911 and 1920? _____

2. A. What was the difference in the population between 1920 and 1930? _____
   B. What was the average yearly increase from 1920 to 1930? _____

3. What was the average yearly increase between 1930 and 1938? _____

4. During the three different periods (1911-1920, 1920-1930, and 1930-1938), which period had the greatest increase in reindeer?

5. A. What was the greatest number of reindeer found on Saint Paul Island between 1910 and 1950? _____
   B. In what year did that number occur? _____

6. In 1950, only 8 reindeer were still alive. What was the average yearly decrease in the population between 1938 and 1950?

   _____

Assessment Questions: Remember what you need to do to meet and exceed the standard.The questions below must be answered on lined paper. Use complete sentences and explain each question. Read the opening Background Information again and use the graph to help you.

1. Could immigration or emigration have played a major factor in determining the total population size of the reindeer herd after they were introduced to Saint Paul Island? Explain your answer.

2. What might account for the tremendous increase in the population of the reindeer between 1930-1938 as compared to the growth rate during the first few years the reindeer were on the island?

3. What effect might 2000 deer have on the vegetation of the island?

4. Consider all the factors an organism requires to live. What might have happened on the island to cause the change in the population between 1938 to 1950?

5. In 1950, 8 reindeer were still alive. If some of those were males and some were females, what do you predict would happen to the population in the next few years?

6. A. Beginning in 1911, when did that population double?
B. Now do the same for the population in that year, when did it double? Continue until it does not double again, list those years.
C. List the time (in years) it took to double each time.
D. What happened to the doubling time between 1911 and 1938?

7. What evidence is there to indicate that the deer had exceeded the island's carrying capacity?

8. A. What conclusions can you draw about a population that has uncontrolled growth?
B. What difference would you expect if a predator were present or if hunting were allowed?

Part B: Human Population

Procedure:

1. Using graph paper and the table below, set up a human population growth graph.

Human Population Growth

Date (A.D.)	Human Population (Millions)	Date (A.D.)	Human Population (Millions)
1	250	1930	2070
1000	280	1940	2300
1200	384	1950	2500
1500	427	1960	3000
1650	470 (*The Black Plague)*	1975	4080
1750	694	1980	4450
1850	1100	1985	4850
1900	1600	2010	_____ (see #3 below)
1920	1800		

Continue graphing 1930 -2010

2. Use your graph to answer the question
   A. How many years did it take the population of 1 A.D. to double? _____
   B. Is the amount of time it takes the human population to double increasing or decreasing?
   _____
   C. What does that tell you about how fast the human population is growing?
3. Extend your graph to the year 2010. What do you estimate the human population will be that year?

_____

4. Use the equation below to estimate the doubling time for the current population based on the population growth from 1980 to 1985. In what year will the present population double? _____

Show your math:

$$\text{A. Rate of growth} = \frac{(\text{Population in 1985} - \text{population in 1980}) \times 100}{(\text{population in 1980} \times 5)}$$

$$\text{B. Doubling time (years)} = \frac{70}{\text{Rate of growth (plug in answer from A)}}$$

C. What year will 1985's population size of 4850 million double to 9700 million ? _____

Discussion Questions:

Note: Answer these on lined paper.

1. Explain at least two similarities you see between the reindeer population graph and the human population graph?

2. What are the three or four most important factors required to sustain (support) a population?

3. A. Explain how the earth similar to an island such as Saint Paul?
   (provide at least two similarities)
   B. Does the earth have a carrying capacity? Explain your answer.

4. What might happen to the population of humans on earth if the present growth continues?

5. A. Provide **at least three ways** to reduce the growth rate of the human population?
   B. In your opinion, which of those methods would be most acceptable to society?

6. Cite a city or country (outside the United States) where population growth is a problem today. What problems does that place have?

7. Cite a place within the United States where population growth is a problem today. What problems does that place have?

8. Cite a place in the world where population growth is not a problem today. Why is it not a problem?

9. Explain two **environmental problems** that happen when there is a high human population?

10. What everyday steps can humans take to prevent a human population crash?

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NGSS HS-LS 2-1
Biology: Carrying Capacity
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Student's Rubric

After the population study and completion of the lab report, identification of the factors that affect population size is explained.

NGSS LS 2-1-- Factors Affecting Carrying Capacity				
Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	DOES NOT MEET	PARTIALLY MEETS	**MEETS**	EXCEEDS
	Correctly explains 5 or fewer factors that affect population size. .	Correctly explains 6-9 of the factors that affect population size.	**Correctly explains 10-12 of the factors that affect population size.**	Correctly explains 13 or more factors that affect population size.

Common District Assessment
NGSS HS-LS 2-1
Biology: Carrying Capacity
Revised 3/10/2016

Instructor's Rubric

After the population study and completion of the lab report, identification of the factors that affect population size is explained.

NGSS LS 2-1-- Factors Affecting Carrying Capacity				
Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	DOES NOT MEET	PARTIALLY MEETS	**MEETS**	EXCEEDS
	Correctly explains fewer than 5 factors that affect population size. .	Correctly explains 6-9 factors that affect population size.	**Correctly explains 10-12 factors that affect population size.**	Correctly explains 13 or more factors that affect population size.

Students comprehend these concepts (check as many that apply)

___ Immigration/Emigration/Hunting/Predators not a factor in reindeer part
___ Natality
___ Mortality
___ Food and Water Supply/Famine
___ Carrying Capacity understood
___ Hunting or Predators will help balance the population
___ Weather /Natural Disasters
___ Shelter/Space/Breeding Grounds
___ Ratio of Males to Females
___ Birth control
___ Education
___ Immigration and Emigration
___ Pollution
___ Natural Resources depleted
___ Environmental health
___ Habitat Loss
___ Disease
___ War
___ Supply and Demand
___ What methods we can do to extend carrying capacity
- recycle, less consumption, become vegetarians

Other concepts understood:

_____

_____

4 exceeds

Data Questions: Part A

1.) a: 25 reindeer
b: 200 reindeer
c: About 175 reindeer
d: About 19 reindeer a year (19.4 rounded down)

2.) a: a little over 200 reindeer
b: About 20 reindeers a year

3.) About 200 reindeer a year

4.) During the three different periods, 1930-1938 at the greatest increase in reindeer. It had about 200 reindeer a year or about a 1600 reindeer increase.

5.) Greatest number of reindeer found: about 2,000
Year which it occured: 1938

6.) Average yearly decrease from 1938-1950: 166 reindeer

Assessment Questions:

1.) Immigration and Emigration couldn't have played a major role in determing the reindeer's population size. Saint Paul Island is more than 200 miles out in the ocean from Alaska. The reindeer could not leave after being brought there because they can't swim 200 miles in the ocean. Also, nothing else can come to Saint Paul, because they can't swim to it. The only way more reindeer could travel to or from it if they were brought.

2.) There was no tremendous increase in population until 1930-1938. This could be due to the small number of males that started the population. With only 4 males at the beginning, it took a while for the population to grow. After it had grown some, however, in about 1930, there must have been plenty of males and females to continue repopulating.

3.) 2000 deer would have an enormous effect on the vegetation of the island. They all would need to eat, and would be consistently be eating the plants/vegetation of Saint Paul Island. This would eventually cause a major decrease in vegetation size and also might end up extincting the vegetation for a time being.

4.) The reindeer population decreased all the way from 2000 reindeer to only 8 from 1938 to 1950. This could be because of the decrease in vegetation that would occur with 2000 reindeer on the Island. With 2000 reindeer, they would eat all of their food. Without enough food, reindeers would start to starve and die off. Lastly, with reindeers dying off and vegetation still needing to grow back, the population would decrease immensly. (2000 to 8)

5.) If there are 8 reindeers left in 1950, and some are female while others are male, the population could slowly start to increase once again. The community would be as it was at the start and try to repopulate again. We could expect the same trend: start off repopulating slowly, increase population speed, reach Carrying Capacity, decrease population, and restart once again.

6.) a: 1913

b: 1913 doubles in 1915
1915 doubles in 1920
1920 doubles in 1930
1930 doubles in 1932
1932 doubles in 1935
1935 doesn't double

c: 2 years
5 years
10 years
12 years
3 years

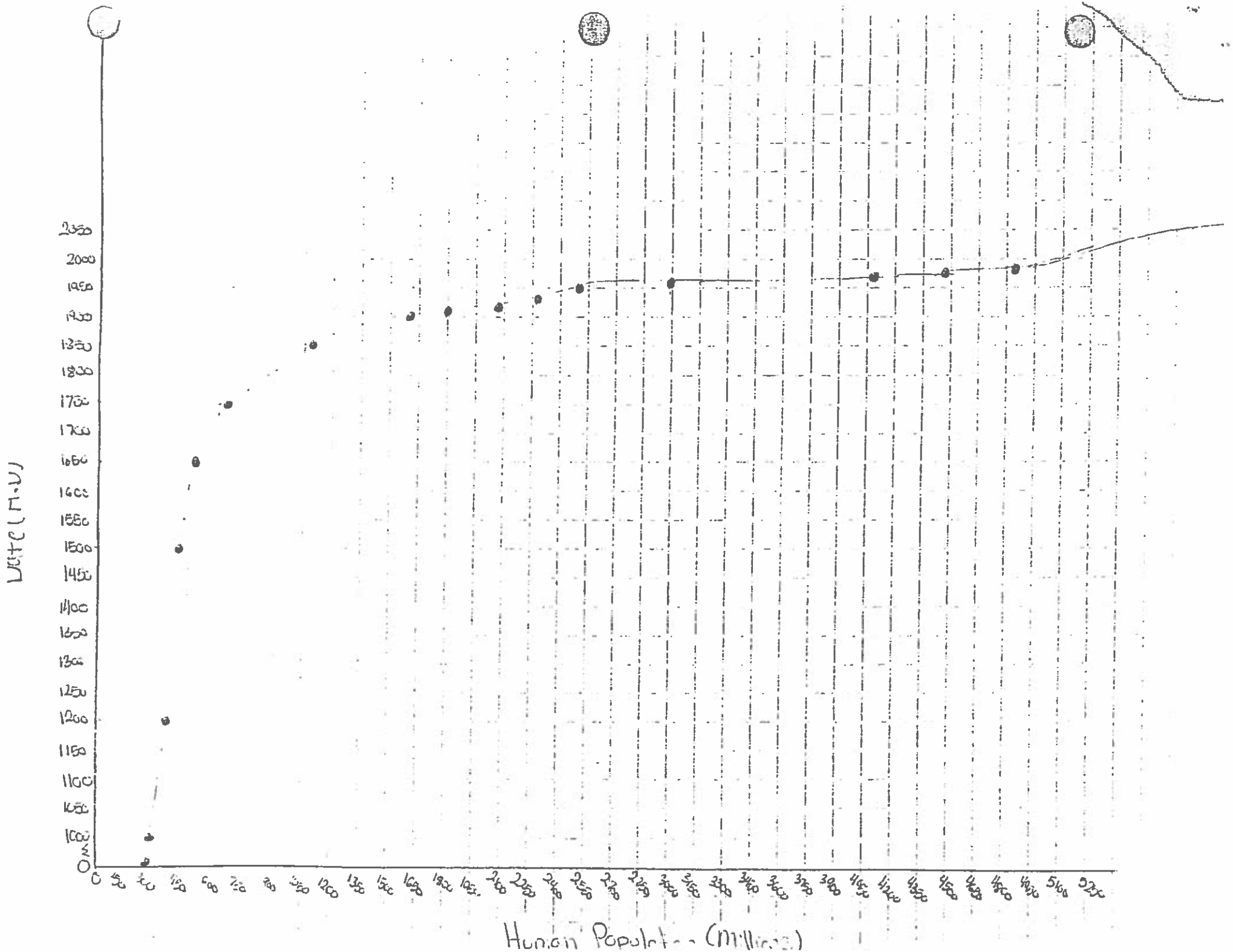
d: The doubling time varied throughout the years. It increased for about 4 doubeling years, and then slowed to no longer doubeling when it reached the carrying capacity. It could eventually start doubeling again if the population begins to increase once again.

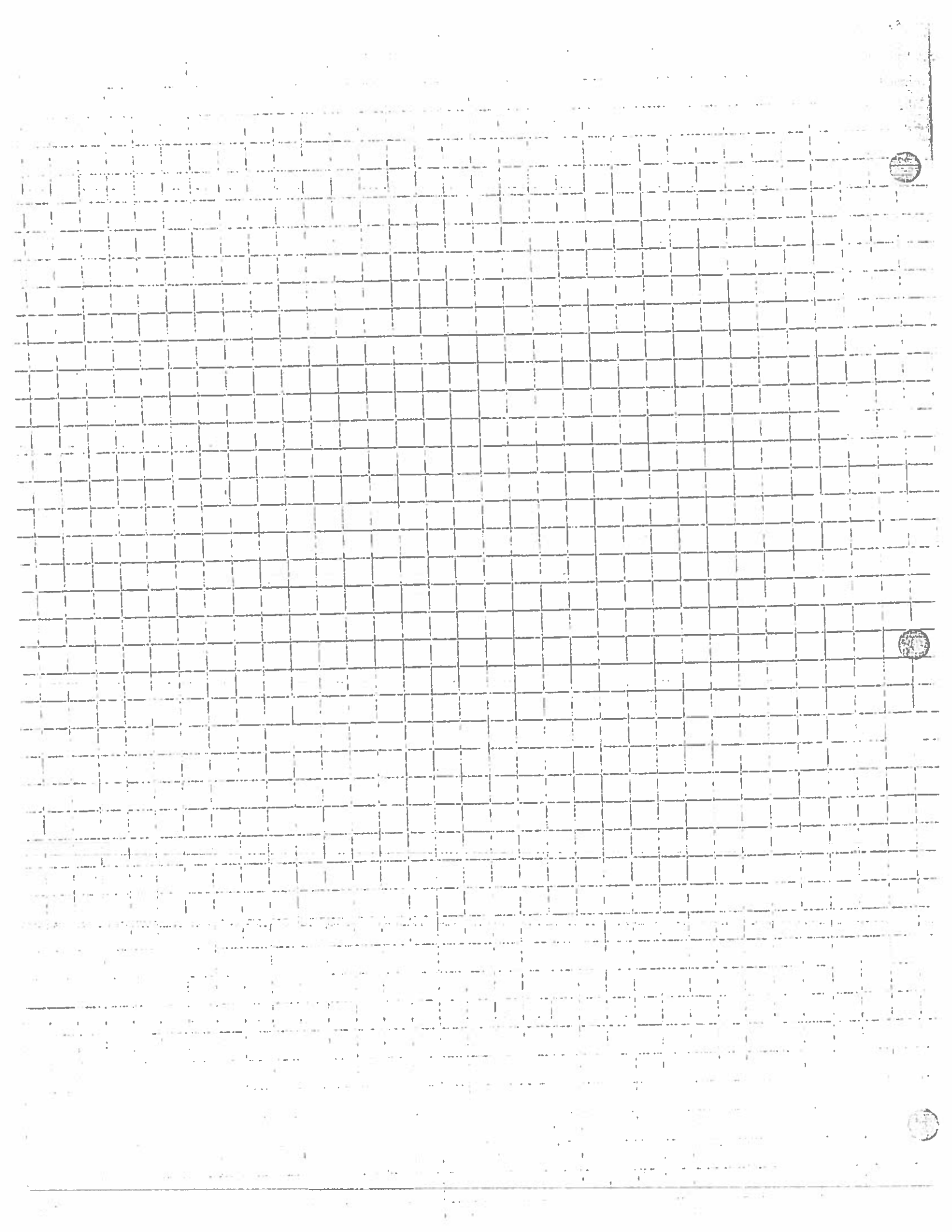
7.) There was a lot of evidence to indicate that the deer had exceeded the island's carrying capacity. The main piece of evidence was that the

deer started to decrease in numbers. One of the only reasons this could have happened is if their food source began to run out. The island could no longer keep up with feeding the deer and therefore the deer had met their carrying capacity. Also, the deer did not reach 2000 once again.

8.1 a: There are a few conclusions I can draw about a population with uncontrolled growth. To start, I can conclude that with no hunting, predators, or emigration/immigration, the population will keep growing until it reaches the carrying capicity. Plus, it will then decrease tremendously and then most likely increase eventually and restart the process. Without controlled growth, the population won't stay even and will fluctuate tremendously, going from a really low number of deer, to the carrying capacity, back to a really small population.

b: If a predator were present or if hunting were allowed, the population would most likely decrease. Hunting the deer would definitely decrease the population, and the higher amount of hunters, the more the deer decreasing rate would get higher. The predators, however, would only decrease the deer population, but after there is balance, they would not control the deer population. In fact, the deer population would control their's. (food controls predator)


Human Population (Millions)



Part B: Human Population

1.) Graph attatched

2.) a: The population had doubeled from 1AD by 1750, so about 1754 years. (it was doubeled between 1650 + 1750)

b: the amount of time it takes for the population to doubel is decreasing.

c: The human population is increasing at a higher rate. More people are being born every year and people are living for more years.

3.) I estimate that the population for 2010 will be between 5 million and 6 million people. To be more exact, I guess 5,300 people.

4.) The doubeling time for the current population is in 2049.

a: $\frac{(4850-4450)\cdot 100}{(4450\cdot 5)} \rightarrow \frac{40,000}{22250} = 1.798$

b: $\frac{70}{1.798} = 38.93$

2010 + 39 = 2049 1985 + 39 = 2024

c: In 2024

Discussion Questions:

1.) The human population graph and the deer population graph were similar in a few ways. For instance, both graphs have a section of line that is slowly increasing, however they are in different time periods. Also, they both had a section where the populations increased quickly, but again, they were in different spots. Overall,

the graphs were similar, but not at all the same.

2.) There are four most important factors to sustain a population. These include reproduction, food source, predators, and climate. Reproduction allows the population to grow and continue living. This is the Natality rate of the population. Food source allows the population to eat and therefore have energy. Climate also allows the population to either live thoroughly and long, a good climate for the species, or die and decrease in numbers, a bad climate or a natural disaster. Lastly, predators can affect the Mortality rate of the population, they kill off portions.

3) a: The Earth is similar to the island Saint Paul. For instance, they both hold a population that increases and decreases with time. (Saint Paul has deer and Earth has humans.) Also, they both don't have predators, but their populations have fluctuated down due to other reasons (Humans fluctuate due to murder, natural disasters, disease, etc. and deer fluctuate due to their carrying capicity, food supply, etc.) Lastly, both also have a carrying capicity, but Earth hasn't reached its yet.

b: The Earth has a carrying capicity. Like any other land holding a population, the Earth can only hold, feed, and sustain so many humans and animals. Eventually, we will run out of fac

space, etc. Overall, if we keep increasing as we are, we will overflow the Earth and reach our limit, or carrying capicity.

4.) Several things might occur to the population on Earth if our growth continues. To begin, we can run low on food. This would increase the price of grocery items, and put some families in a situation where they can't afford a home and food. Homeless family and people in general would increase, and our economy would be in a bad condition. Also, areas could begin fighting for space and land. Wars could break out. Lastly, the enviroment could be greatly affected. In a search for land, we could clear out forrests, burn them down, inhabit too many areas, pollute with light and garbage, and use trees to build more homes.

5.) a: There are some ways we could reduce population growth on Earth, but most wouldn't be acceptable to society. One way would be if people who did not want a child, didn't have a baby. There are a large number of orphans that can be raised inappropriately or not at all, and then might follow in their biological parents footsteps. Another way to reduce population is to not provide free health care in America (or other countries) for everyone. This would allow people to strive to get healthcare, but people who don't care to pay for healthcare wouldn't neccesarily live as long as others. Another way to reduce population growth on Earth is to

urge people to adopt children who have already been born, rather than to have many kids of their own. Parents could still birth a child of their own, but also adopt. A final possible way to reduce population growth is to restrict certain people from having children. Normal citizens would not be restricted, but those commited of extreme felonies or of abuse in the past would not be allowed to have a child.

b: In my opinion, the method that would be most accepted by society would be the idea of adoption promotion. Society doesn't want to be restricted at all, and this idea is just promotion. Even though this idea is probably the least effective, it would be most accepted because not many people want to accept that we have a population issue.

6.) China has a population growth problem, and even though they have children birth limits per couple, they still have issues. One of their major issues is pollution. They have to feed and employ their citizens, so there are many factories that pollute the air. Also, China still has issues employing everyone.

7.) New York has had a population growth issue. Problems that have arised are traffic and unemployed citizens. Traffic in New York is horendous for outsiders and there are high numbers of homeless and unemployed citizens with New York.

8.) Hamburg, Germany is a place in the world where there is not a population problem. It is not an issue because no one is wishing to immigrate to Hamburg, but a tremendous amount of people have emigrated out. People emigrated for a different climate, different possibilities, and because, overall, Hamburg is not the ideal living place.

9.) There are a few enviromental problems that arise with a high population. To start, people may clear cut forests in order to inhabit more areas. Also, air pollution occurs due to the amount of cars, factories, etc. A final example of an enviromental issue that occurs with a high population is light pollution. Light pollution occurs because of all of the lights (artificial) that a high population of people use.

10.) There are a few everyday steps we, as an individual, can take to prevent a population crash. We can raise our children to the best of our abilities, adopt, help others, not waste food, conserve water, recycle, be employed, and also work to the best of our ability.

JR

(3) Meets

Population Growth-Reindeer **Assessment Quesions: Remember what you need to do to meet and exceed the standard. Use complete sentences and explain each question. Read the opening Background Information again and use the graph to help you.**

1. Could immigration or emigration have played a major factor in determining the total population size of the reindeer herd after they were introduced to Saint Paul Island? Explain your answer.

No. It was not possible ~~their~~ they were on an Island

2. What might account for the tremendous increase in the population of the reindeer between 1930-1938, as compared to the growth rate during the first few years the reindeer were on the island?

The more reindeer there are the more reproduce

3. What effect might 2000 deer have on the vegetation of the island?

~~#~~The Veg on the Island would go down dramaticcly With all the reindeer. ~~#~~

4. Consider all the factors an organism requires to live. What might have happened on the island to cause the change in the population between 1938 to 1950?

The Island reached it's carrying capacity after 2000 reindeer The island could not support enough vegitation to feed them all.

5. In 1950, 8 reindeer were still alive. If some of those were males and some were females, what do you predict would happen to the population in the next few years?

With only 8 Reindeer that would give the vegitation time to come back and the reindeer population would slowly go Back up

6a. Beginning in 1911, when did that population double?

1913 1935

6b. Now do the same for the population in that year, when did it double? Continue until it does not double again, list those years.

1911 1924 1930 1938 1944

6c. List the time (in years) it took to double each time.

13 6 8

6d. What happened to the doubling time between 1911 and 1938?

7. What evidence is there to indicate that the deer had exceeded the island's carrying capacity?

The Population ~~dropped~~ dropped

8a. What conclusions can you draw about a population that has uncontrolled growth?

That eventually the Island would not be able to support it uncontrolled groth

8b. What difference would you expect if a predator were present or if hunting were allowed?

They wouldnt have gotten so populated and Drastically decreased.

Population Growth-Humans

Assessment Questions: Remember what you need to do to meet and exceed the standard. Use complete sentences and explain each question. Read the opening Background Information again and use the graph to help you.

1. What similarities do you see between the reindeer population graph and the human population graph?

They both Spiked up in Population

2. What are the three or four most important factors required to sustain a population?

water
food
Space
mates

3a. In what ways is the Earth similar to an island such as St. Paul? (provide at least two similarities)

They Both use alot of resourses and The Population goes up

3b. Does the Earth have a carrying capacity? Explain your answer.

yes of course every Place does. eventually we would run out of resources

4. What might happen to the population of humans on earth if the present growth continues?

There would be way to many People and not enough of resources to go for the People

5a. Provide at least three ways to reduce the growth rate of the human population?

1 Sickness
2 limiting the amount of children a couple can have
3 #1 war

5b. In your opinion, which of those methods would be most acceptable to society?

2 limiting the amount of children a couple can have

6. Cite a city or country (outside the United States) where population growth is a problem today. What problems does that place have?

China - There are too many People having

7. Cite a place within the United States where population growth is a problem today. What problems does that place have?

los Angeles - it's due Population in CA

8. Cite a place in the world where population growth is not a problem today. Why is it not a problem?

Sahara desert - it's to hot and dry to live there

9. Explain two environmental problems that happen when there is a high human population?

Water Pollution Light Pollution and Garbage (solid waste) Pollution

10. What everyday steps can humans take to prevent human population crash?

By not using all our Resources up and not wasting them

good answers

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Student's Rubric

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NGSS LS 2-1-- Factors Affecting Carrying Capacity				
Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	DOES NOT MEET	PARTIALLY MEETS	MEETS	EXCEEDS
	Correctly explains 4 or fewer factors that affect population size.	Correctly explains 5-7 of the factors that affect population size.	**Correctly explains 8-11 of the factors that affect population size.**	Correctly explains 12 or more factors that affect population size.

KM 1 (2) partially meets.

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NGSS LS 2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Population Growth Lab

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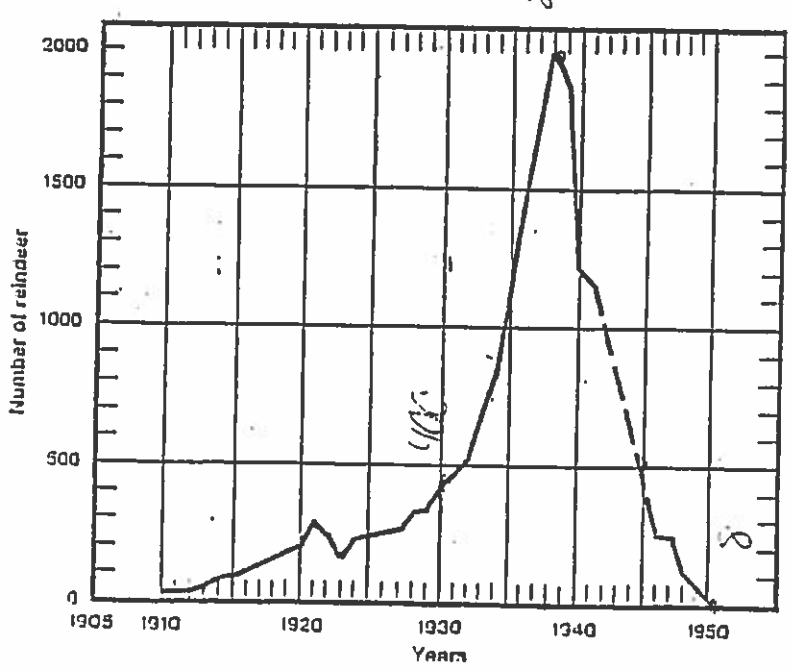
Part A: Reindeer Population

Background Information: In 1911, 25 reindeer (4 males and 21 females) were brought to Saint Paul Island, off the coast of Alaska. Saint Paul Island is approximately 41 square miles and more than 200 miles out in the ocean from Alaska. On Saint Paul Island, there were no predators of the reindeer, and no hunting of reindeer was allowed. The graph below indicates what happened to the reindeer population on the island between 1911 and 1950. Use the graph to answer the Data Questions.



Data Questions: Refer to the graph to help you answer 1-6.

1. A. What was the size of the population at the beginning of this study? 25
   B. What was the size of the population in 1920? 200
   C. What was the difference in the number of reindeer between 1911 and 1920? 175
   D. What was the average yearly increase in population between 1911 and 1920? 1

2. A. What was the difference in the population between 1920 and 1930? 200
   B. What was the average yearly increase from 1920 to 1930? 20

3. What was the average yearly increase between 1930 and 1938? 200

4. During the three different periods (1911-1920, 1920-1930, and 1930-1938), which period had the greatest increase in reindeer? 1930-1938

5. A. What was the greatest number of reindeer found on Saint Paul Island between 1910 and 1950? 2000
   B. In what year did that number occur? 1936

6. In 1950, only 8 reindeer were still alive. What was the average yearly decrease in the population between 1938 and 1950?
   -16

Assessment Questions: Remember what you need to do to meet and exceed the standard. The questions below must be answered on lined paper. Use complete sentences and explain each question. Read the opening Background Information again and use the graph to help you.

1. Could immigration or emigration have played a major factor in determining population size of the reindeer herd after they were introduced to Saint Paul? Explain your answer.

2. What might account for the tremendous increase in the population of the reindeer between 1930-1938 as compared to the growth rate during the first few years the reindeer were on the island?

3. What effect might 2000 deer have on the vegetation of the island?

4. Consider all the factors an organism requires to live. What might have happened on the island to cause the change in the population between 1938 to 1950?

5. In 1950, 8 reindeer were still alive. If some of those were males and some were females, what do you predict would happen to the population in the next few years?

6. A. Beginning in 1911, when did that population double?
   B. Now do the same for the population in that year, when did it double? Continue until it does not double again, list those years.
   C. List the time (in years) it took to double each time.
   D. What happened to the doubling time between 1911 and 1938?

7. What evidence is there to indicate that the deer had exceeded the island's carrying capacity?

8. A. What conclusions can you draw about a population that has uncontrolled growth?
   B. What difference would you expect if a predator were present or if hunting were allowed?

Part B: Human Population

Procedure:

1. Using graph paper and the table below, set up a human population growth graph.

Human Population Growth

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1750	694	1980	4450
1850	1100	1985	4850
1900	1600	2010	_____ (see #3 below)
1920	1800		

Continue graphing 1930 -2010

2. Use your graph to answer the question
   A. How many years did it take the population of 1 A.D. to double? 1650 YEARS
   B. Is the amount of time it takes the human population to double increasing or decreasing?
   INCREASING
   C. What does that tell you about how fast the human population is growing? ITS ... GROWTH
3. Extend your graph to the year 2010. What do you estimate the human population will be that year?
   7,500 HUMANS

4. Use the equation below to estimate the doubling time for the current population based on the population growth from 1980 to 1985. In what year will the present population double? 2035

Show your math: (4850 - 4450) x 100

A. Rate of growth = (Population in 1985 – population in 1980) X 100 / (population in 1980 X 5) = 40,000 / 22250 = 1.7

(11.7 x 7)

B. Doubling time (years) = 70 / Rate of growth (plug in answer from A) = 38.9

1.79

C. What year will 1985's population size of 4850 million double to 9700 million? 2035

Discussion Questions:

Note: Answer these on lined paper.

1. Explain at least two similarities you see between the reindeer population graph and the human population graph?

2. What are the three or four most important factors required to sustain (support) a population?

3. A. Explain how the earth similar to an island such as Saint Paul?
   (provide at least two similarities)
   B. Does the earth have a carrying capacity? Explain your answer.

4. What might happen to the population of humans on earth if the present growth continues?

5. A. Provide **at least three ways** to reduce the growth rate of the human population?
   B. In your opinion, which of those methods would be most acceptable to society?

6. Cite a city or country (outside the United States) where population growth is a problem today. What problems does that place have?

7. Cite a place within the United States where population growth is a problem today. What problems does that place have?

8. Cite a place in the world where population growth is not a problem today. Why is it not a problem?

9. Explain two **environmental problems** that happen when there is a high human population?

10. What everyday steps can humans take to prevent a human population crash?

Student's Rubric

After the population study and completion of the lab report, identification of the factors that affect population size is explained.

NGSS LS 2-1-- Factors Affecting Carrying Capacity				
Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	DOES NOT MEET	PARTIALLY MEETS	MEETS	EXCEEDS
	Correctly explains 4 or fewer factors that affect population size.	Correctly explains 5-7 of the factors that affect population size.	**Correctly explains 8-11 of the factors that affect population size.**	Correctly explains 12 or more factors that affect population size.

Assesment Questions
Decada Whitman

1. Emmegrating could affect the population because the reindeer may not be used to the climate so it takes a while to adjust
2. The amount of food
3. They might eat a lot of it.
4. They could have ran out of food or not have freshwater
5. It would grow
6. 1913
7. the population drops
8. a. It will reach maximum capacity
   b. It won't reach maximum capacity.

Discussion Questions

1. the populations start slow then increase rapidly. They increased fastin the 1900's.
2. Food, water, reproduction
3. a). there are new lands on Earth, we're alone.
   a2. earths population can [illegible] as we [illegible] an island.
   b. yes. if we had 10 billion people, peace, we wouldn't have enough food or freshwater for everyone.
4. We might over populate
5. a. have a child limit like China, or put people on birth control, or virus.
   b. birth control
6. China they are over populated and as a solution put a child limit to limit [illegible]

7. Washington D.C. not enough food or jobs and lots of homeless people
8. London. They have enough resources,
9. Food reduction, and droughts.
10. Birth control

Population.

Population
.05
.04
.03
.02
.01
0

(1) does not meet

Population Growth-Reindeer **Assessment Quesions: Remember what you need to do to meet and exceed the standard. Use complete sentences and explain each question. Read the opening Background Information again and use the graph to help you.**

1. Could immigration or emigration have played a major factor in determining the total population size of the reindeer herd after they were introduced to Saint Paul Island? Explain your answer.

the population grow because of all of the women

2. What might account for the tremendous increase in the population of the reindeer between 1930-1938, as compared to the growth rate during the first few years the reindeer were on the island? (More) develop ans. Explain

The mom had reindeer

3. What effect might 2000 deer have on the vegetation of the island?

not enef sas of food

4. Consider all the factors an organism requires to live. What might have happened on the island to cause the change in the population between 1938 to 1950?

5. In 1950, 8 reindeer were still alive. If some of those were males and some were females, what do you predict would happen to the population in the next few years?

the lac of food and spas

6a. Beginning in 1911, when did that population double?

1914

6b. Now do the same for the population in that year, when did it double? Continue until it does not double again, list those years.

1914 1938

6c. List the time (in years) it took to double each time.

1911

6d. What happened to the doubling time between 1911 and 1938?

It droped

7. What evidence is there to indicate that the deer had exceeded the island's carrying capacity?

when they died fast

8a. What conclusions can you draw about a population that has uncontrolled growth?

The water and food

8b. What difference would you expect if a predator were present or if hunting were allowed?

less deer

Population Growth-Humans Assessment Questions: Remember what you need to do to meet and exceed the standard. Use complete sentences and explain each question. Read the opening Background Information again and use the graph to help you.

1. What similarities do you see between the reindeer population graph and the human population graph?

they grow in size and we do too.

2. What are the three or four most important factors required to sustain a population? 2. How do we make more people?

space mates food water.

3a. In what ways is the Earth similar to an island such as St. Paul? (provide at least two similarities)

Food and water. The rain here can not get off

~~closed~~

3b. Does the Earth have a carrying capacity? Explain your answer.

~~yes~~ because of space and mates, closed system → limited resources not room soon

4. What might happen to the population of humans on earth if the present growth continues?

over growth = the rain here get killed off

5a. Provide at least three ways to reduce the growth rate of the human population?

for mating rates

5b. In your opinion, which of those methods would be most acceptable to society? ? Re-read the question

Food

6. Cite a city or country (outside the United States) where population growth is a problem today. What problems does that place have? ?

Like mate

Be sure to answer the question completely!

7. Cite a place within the United States where population growth is a problem today. What problems does that place have?

not enf
pospl space for

8. Cite a place in the world where population growth is not a problem today. Why is it not a problem?

we did not hit yet

9. Explain two environmental problems that happen when there is a high human population?

?

10. What everyday steps can humans take to prevent human population crash?

lemlet borbys

Need to answer?!

Student's Rubric

After the population study and completion of the lab report, identification of the factors that affect population size is explained.

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