LAB 3.1 RAT FACTS WORKSHEET

Student Name: _____ Date: _____

Rat Facts	
Common Name	Scientific Name

Rat Biology

- Average weight:
- Average length:
- Average life span:
- Diet:

Habits

Reproduction

- Max litter size:
- Average litter size:
- Gestation:
- Number of litters per year:
- Weaned at:
- Young are mature and can reproduce at:

Geographical Distribution

LESSON THREE LAB 3.2 RAT INVASION SCENARIO

Student Name: _____Date: _____

Instructions:
Set up a spreadsheet or use the worksheet Lab 3.3.1 to help answer the questions below. Show the rat count by month over an 18 month period. Assume the pregnant rat has her first litter shortly after arriving on the island and she dies after giving birth.

Scenario: One pregnant rat arrives on an island in the Pacific hidden inside a box of produce. There are no other rat populations present, but the island is home to a stable population of 100,000 nesting seabirds. The local community has been working on a Biosecurity Plan, but it isn't finished because not all parties can agree on the details of how to deal with a rat invasion. Because detection measures are not yet in place, the rat invasion goes unnoticed for just over 18 months.
Question 1: What is your best estimate of the island rat population size at the end of 12 months? Assume that litter size is always 8, and that rats always have half males and half females. Use the information given on rat biology to help in your estimation.
Question 2: The resident seabird population is at sea most of the year, but occupies the cliffs and burrows of the island to nest during the rat invasion. Assuming each mature rat will kill two birds each week, how many total birds/eggs/chicks will the rats consume? What is the resulting seabird population size?

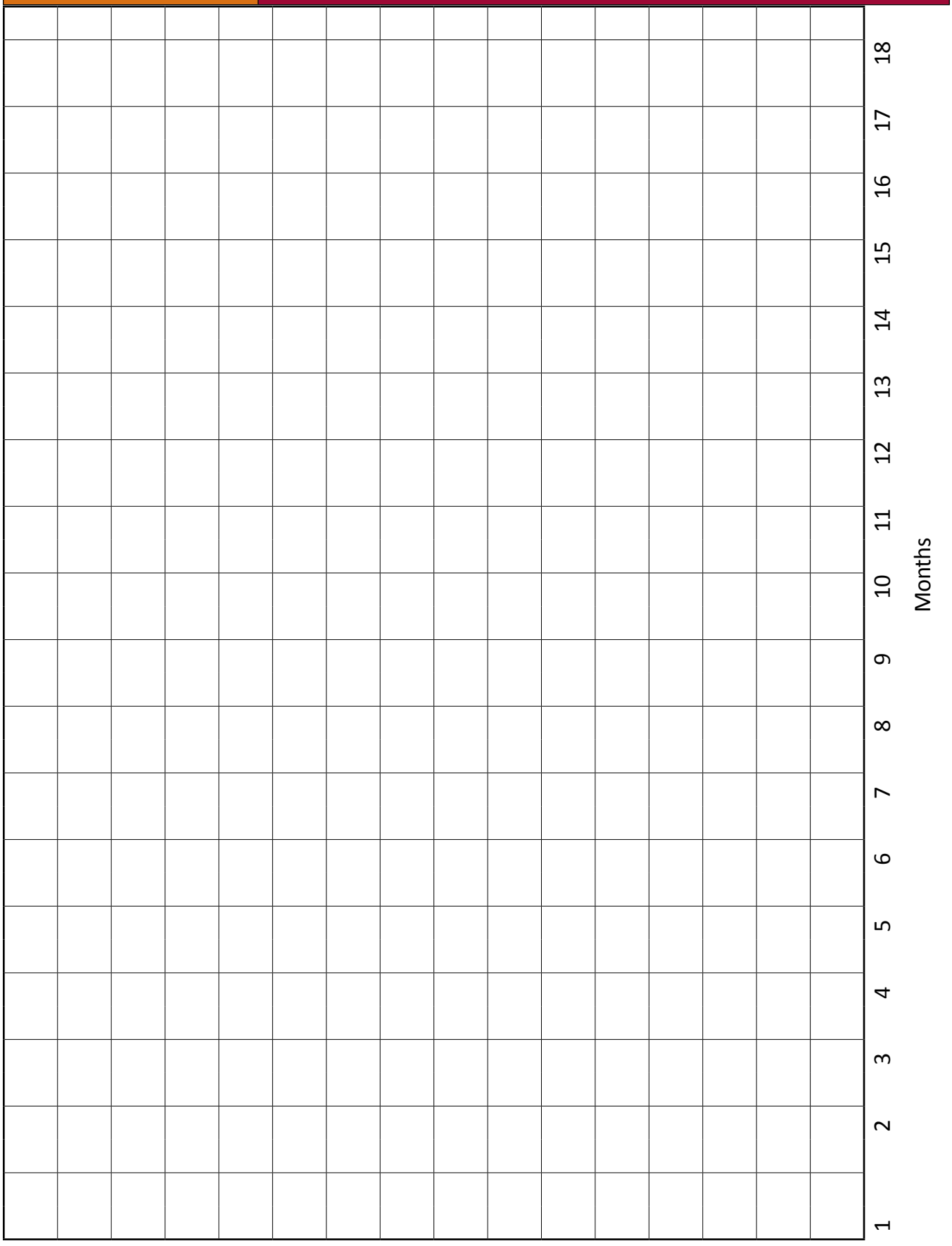
LESSON THREE LAB 3.3.1 RAT MATH WORKSHEET

Student Name: _____ Date: _____

Starting seabird population: 100,000
Each adult rat consumes 2 seabirds every two months.

Rat Invasion							
Months	Pregnant Rats	Offspring	Male Offspring	Female Offspring	Rat Population	Seabirds taken	Seabird Population
0	1						100,000
2	1	8	4	4	8*	2	
4						16	
6							
8							
10							
12							
14							
16							
18							
*Assume the original rat dies after giving birth.							

LESSON THREE LAB 3.3.2 RAT MATH GRAPHING WORKSHEET



LESSON THREE LAB 3.4 RAT INVASION - HANDS ON ACTIVITY

PROCEDURE

Use this simple bean counting exercise to help students visualize the change in species composition that occurs with a rat invasion. In this exercise, the mixed beans represent nesting seabirds and the dark beans represent rats.

MATERIALS

- Lab 3.2 Rat Math Scenario
- Lab 3.3.1 Rat Math Worksheet
- Activity Board printed on 11 x 17 paper or drawn on butcher paper (**Optional**)
- Rats: 1 pound dried dark colored beans (e.g., black beans) or rat Gummy candy
- Seabirds: 1 pound dried mixed beans (no lentils or split peas) or jelly beans

INSTRUCTIONS

- Split students into 2 groups
- Group #1: Rats
- Group #2: Seabirds
- Gather around a table with the rats on one side and the seabirds on the other
- If you are using the Activity Board, place it on the table between the groups
- Start with one pregnant rat and all of seabirds (1 pound) in piles next to each other
- Using Lab 3.2.2 Rat Math Worksheet move down the table or Activity Board creating a new pile of rats every two months
- For every rat added to the population take away 2 seabirds until the seabird population is gone

QUESTIONS

- How long did it take the rats to eliminate all of the seabirds on the island?
  - 14-16 months
- What are the assumptions we are making about the rats and seabirds for this exercise?
  - All of the rats survive.
  - All of the females reproduce successfully.
  - No seabird chicks are born.

EXPLORE AND EXTEND

- Add seabird chicks to your population. For every two seabirds add one chick.

Rats	Seabirds
1 pregnant female	100,000
Month 2	
Month 4	
Month 6	
Month 8	
Month 10	
Month 12	

LESSON THREE LAB 3.5 ADVANCED RAT MATH WORKSHEET

PROCEDURE

Based on all of the information you have, complete the table below for the rat and seabird populations that includes gestation and maturity.

If you feel inspired, add data for the seabirds including chicks. For every 2 seabirds, one chick is produced.

Assume:

1. Gestation takes 3 weeks.
2. It takes each female rat 5 weeks to reach maturity when she can reproduce.

Rat invasion		Offspring				
Week	Adult Rat #	Immature females	Immature males	Mature females	Mature males	Life Stage
Week 0	1	0	0	1	0	
Week 1	1	4	4	1	0	birth
Week 2	1	4	4	1	0	
Week 3	1	4	4	1	0	
Week 4	1	4	4	0	0	
Week 5	1	4	4	0	0	
Week 6	8	0	0	4	4	maturity
Week 7						
Week 8						
Week 9						
Week 10						
Week 11						
Week 12						
Week 13						
Week 14						
Week 15						
Week 16						
Week 17						
Week 18						
Week 19						
Week 20						
Week 21						
Week 22						
Week 23						

LESSON THREE LAB 3.5 ADVANCED RAT MATH WORKSHEET

Rat invasion		Offspring				
Week	Adult Rat #	Immature females	Immature males	Mature females	Mature males	Life Stage
Week 24						
Week 25						
Week 26						
Week 27						
Week 28						
Week 29						
Week 30						
Week 31						
Week 32						
Week 33						
Week 34						
Week 35						
Week 36						
Week 37						
Week 38						
Week 39						
Week 40						
Week 41						
Week 42						
Week 43						
Week 44						
Week 45						
Week 46						
Week 47						
Week 48						
Week 49						
Week 50						
Week 51						
Week 52						
Week 53						
Week 54						