

# Exponential Growth , Road Kill, and Sexual Reproduction

If you have traveled in the southern part of the United States and in Mexico, you may have noticed a particular animal which is often run over by automobiles. Why are these animals often the victims of drivers, and how do they manage to survive despite the large numbers being killed on the highways?



So far you have only applied the idea of exponential growth to nonliving objects or to organisms which reproduce by simple cell division. What about organisms which reproduce sexually like the goats and the dogs? Are they also subject to periods of exponential growth? Let us find out by meeting Mamadillo and Papadillo and some of their descendents.

## Investigation

### Adding Armadillos

*(Adapted from ZPG's Elementary Population Activities Kit)*

In the wild, the nine-banded armadillo of North and South America lives about three years after reaching maturity, and mates and produces four litters of offspring each year. We will study one such armadillo family that begins with Mamadillo and Papadillo, and figure out what it looks like in three generations (when Mamadillo is a grandmother).

Mamadillo and Papadillo mate and have one litter a year for three years. Each litter is always four little armadillos.

**What is the total number of baby armadillos borne by Mamadillo, her offspring, and their offspring, in the three years?**

**\*\*\*Extra challenge!** At this rate, how long would it take for there to be more than 2000 armadillos? Why aren't there very many armadillos today?

Make a table like the one shown on the next page. Graph the population of armadillos from your results. Your independent variable is the time, and your dependent variable is the number of armadillos.

**What might prevent the numbers of armadillos from being as large as you calculated?** Refer back to the activity on the bacteria to get some ideas. Do the limits on bacterial populations also apply to armadillos, goats, or dogs? Discuss your results with your classmates and prepare to present your ideas on limiting factors to the class.

**Table of Armadillo Population—Offspring of Mamadillo and Papadillo**

<b>Year</b>	<b>A Offspring from one year ago</b> [D, prev. line]	<b>B Offspring from two years ago</b> [D, 2 lines up]	<b>C Offspring from three years ago</b> [D, 3 lines up]	<b>D New offspring</b> [A+B+C]	<b>E Deaths</b>	<b>F TOTAL ALIVE</b> [2+D-E]
<b>0</b>	Originally there are two armadillos, Mamadillo & Papadillo.			—	<b>0</b>	<b>2</b>
<b>1</b>					<b>0</b>	
<b>2</b>					<b>0</b>	
<b>3</b>					<b>0</b>	
<b>4</b>						
<b>5</b>						

Earlier, you discussed and listed limiting factors on bacterial populations, and on goat and dog populations. The reproductive limits and life spans of armadillos keep us from being up to our armpits in armadillos.

Remember that earlier in the book you read about what would happen if all the elephants born survived. Would the same situation occur eventually with armadillos? What are other limiting factors which prevent us from being buried in armadillos?

Again, what are some limiting factors caused by humans that are affecting plants and animals around the world?

## How do we know Population Size?

We often talk about how big a population is and how fast it is growing, how many are surviving in a certain area, and whether or not a population is endangered. How can ecologists find out what is happening in a population in the wild? After all, they cannot go out into the field and see every individual organism. They can collect pelts and count them as they did with the lynx and the hare, or they can use what Field biologist call “mark-recapture” You will perform an activity which shows how this works.