WILD About STEM

This activity targets grades 4 and up. A pencil, piece of paper, and calculator will be helpful. For more information about rabbits in your state, visit the website of your state's wildlife and/or conservation department.

Fernald Preserve

The Mathematics of…BUNNIES?!

Why is it important to know the numbers when it comes to wildlife? Because each year, scientists evaluate wildlife populations and their capacity for reproduction. This data is used to help establish wildlife regulations, including harvest limits and protections for species that could become endangered.

Admit it — when you read the word "math" the **last** image that pops into your head is a bunny. When it comes to numbers, however, eastern cottontail rabbits live up to their reputation as great multipliers. The eastern cottontail is one of two species of rabbit that is native to Ohio and can be found at the Fernald Preserve. In the United States, their range extends north to Canada, south to Mexico, and west to the Rocky Mountains.

Cottontails thrive in a variety of habitats, including meadows, farmlands, brushy areas, wetlands, forest edges, and even suburbs. Most of the year, a rabbit's diet consists of grasses, clovers , and many other plants. In winter, buds, twigs, and bark become important food sources for cottontails. Although you can see them anytime, cottontails are crepuscular, meaning they are most active at dawn and dusk.

*So how **do** cottontails relate to math? See if you can correctly answer the following questions:*

1 Give Me the Numbers?

The eastern cottontail breeding season lasts from April through September. During this time, a female can have up to five litters of baby rabbits, called kittens. If each litter has from two to seven kittens, how many could potentially be born to one mother cottontail each year?

A. 100 or more
B. 17 at the most
C. Up to 35
D. 75

Note: Baby rabbits leave their mother and strike out on their own when they are only three weeks old. Young cottontails can reproduce at three to four months of age, so it is possible for a female rabbit to have a first litter in the same year that she was born.

② Why So Many?

Prey animals — like rabbits, mice, and other small mammals — typically outnumber predators and produce several litters of fast-growing offspring each year. Small mammals are an important food source for predators, such as foxes, coyotes, bobcats, and birds of prey.

In contrast, most predators give birth to a low number of offspring once a year and it can take nearly a year for their young to mature.

Question: If there is a known population of 10 adult rabbits (assume half are females and it is summer) in one square mile of grassland with a few trees and a small stream, would you **predict** a higher or lower number of the following animals in the same habitat?

A.	Bobcats	higher	lower
B.	Baby rabbits	higher	lower
C.	Hawks	higher	lower
D.	Coyotes	higher	lower

Note: When nature is well balanced, one baby, on average, will survive to reproduce and replace the adult, continuing the species.

③ Multiplication Mathematics Makes More?

Can you determine how many descendants one female cottontail rabbit could potentially generate in five years?

For purposes of this exercise, assume the following:
- *In one year, a rabbit can produce up to five litters.*
- *Litters will average five female kittens.*
- *None of the young will reproduce until the next year.*
- *Each rabbit will live one year as an adult.*

A. 1,095
B. 9,765,625
C. 17
D. Too many to count

Note: Many small mammal species experience population cycles, meaning the number of young born fluctuates from year to year. Many factors are involved in this cycle, such as weather, habitat conditions, predation, and disease. About every ten years, cottontail rabbit numbers will increase dramatically, causing a population "explosion."

CHALLENGE FOR THE MATH LOVER: Wildlife Biologist Math?

Try the wildlife biologist mathematics challenge and answer the following questions.

For purposes of this exercise, assume the following:
- *There is a known population of 20 rabbits in a given area, half of which are females.*
- *In one year, a female rabbit will produce three litters.*
- *Litters will have two to six female kittens.*
- *None of the young will reproduce until the next year.*
- *Each rabbit will live one year as an adult.*

A. What is the lowest number of baby bunnies you might predict for a two-year period?

B. What is the highest number of baby bunnies you might predict for a two-year period?

C. What would you predict might be an average year?

Note: For help on this challenging math problem or any other questions,, you may email fernald@lm.doe.gov.

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Be a Nature Detective at Home:

Look at wildlife species in your back yard:

- What species have you seen?

- Can you predict which animals will have high or low reproduction rates? Why or why not?

- Can you predict what impacts humans may have on wildlife in your yard?

  o How do humans negatively impact wildlife?

  o How do humans positively impact wildlife?