



There is some reason to believe that cockroaches will inherit the earth. In fact, MythBusters proved that cockroaches can withstand some pretty intense nuclear radiation. Check out these internet articles for more information.

- <http://www.discovery.com/tv-shows/mythbusters/mythbusters-database/cockroaches-survive-nuclear-explosion/>
- http://www.slate.com/articles/news_and_politics/explainer/2008/07/will_cockroaches_inherit_the_earth.html



Let's explore what could happen in the case of a cockroach invasion.

Exploration #1:

Cockroaches are large bugs that breed very quickly. For the purpose of exploration, we will assume the following:

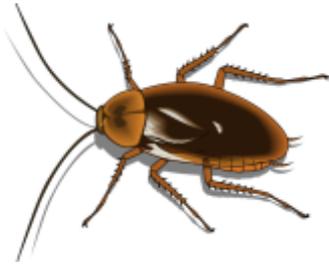
- Cockroaches breed quickly enough that their population doubles every 6 months.
- It takes 3 cockroaches to cover one square inch of the ground.
- We will start with a population of 1 cockroach (don't ask how it reproduces but it does).
- North Carolina is 53,819 square miles; the USA is 3.806 million square miles; North America is 9.54 square miles; and the earth is 196.9 million square miles.
- North Carolina's 53,819 square miles is equivalent to 2.16056×10^{14} square inches.

If no human beings are left to kill the cockroaches, how long will it take for cockroaches to cover the state of North Carolina? Explain how you arrived at your estimate.

How long would it take for cockroaches
To cover the USA?

To cover North America?

The entire Earth?



Exploration #2:

Acme bug company is diligently working on a spray to help control the population of cockroaches. They are interested in knowing the quantity of the population they are dealing with.

How many friends and family members does the first cockroach have on his 13th birthday? Explain how you found your answer. (Assuming none die from natural and/or unnatural causes.)

How many in 2 decades from the start?

What will the cockroach population be in 40 years from the start?

Are all of these models possible? Explain.

What do you notice about the relationship between time and number of cockroaches between the questions in the first exploration and the questions in the second exploration? Explain and show your reasoning.