

In the lower right quadrant, as the predator population rises, the prey population also rises. But as the predator numbers reach a particular value, the prey population starts to decrease, followed eventually by a decrease in the predator population as well (upper left quadrant). In time the predator population becomes small enough for the prey numbers to rebound and the process continues into another cycle. In nature the cycles are more complex than is indicated in the diagram, as there are many more influences on populations in the wild. In this investigation the factors will be confined simply to predator-prey numerical pressures.

Materials

- masking tape
- graphing paper
- construction paper
- Internet access
- spreadsheet and/or graphing software

Optional:

- computer simulations of predator-prey system

Procedure

Each lab group will need to set its own parameters for the simulation, as follows:

- how many mice are in the field under initial conditions
- the minimum number of mice a coyote needs to eat to survive and reproduce
- OPTIONAL: how many mice a coyote needs to eat *above the minimum* to produce 2 or more pups for the next generation

To generate data for the simulation, you will drop different-sized pieces of paper, representing mice and coyotes, onto a square marked out on the floor in the classroom. These pieces can be cut from sheets of graph paper to ensure size consistency.

Remember, the relationship between predator and prey is usually cyclical, and their corresponding numbers will rise and fall in some pattern. You will probably need at least 15 iterations of the simulation to see if you have a pattern. It may take some trial and error to determine the proper “rules” for your simulation to demonstrate a pattern. It is very possible that your model may produce chaotic variation. If this occurs, revamp your rules and continue.

Step 1 Using masking tape, mark off a “field” on the floor that is 50 cm (about 20 in.) square. If approved by your teacher, some groups should try smaller squares. Larger-sized “fields” will take too many coyotes and mice to be practical in the time allotted for this lab. (*Hint:* If your floor has tiles, use a certain number of them to delineate your field.)