Random Numbers

Learning objective

Science and Math content objective:

- Students will better understand the meaning of *chance* and *randomness* as they occur in nature.
- Students will learn that a sequence of numbers has properties such as *uniformity* and *randomness,* and that they can learn to recognize these properties.
- Students will learn to use some tools for assessing whether a distribution is uniform and whether it is random.
- In an optional section, students will explore an actual algorithm that generates pseudorandom numbers.

Science model/computation objectives:

- Students will learn that computers, being deterministic by their very nature, cannot produce truly random numbers.
- Students will understand that the distribution of random numbers produced by a computer are really *pseudorandom* distributions, and so not truly random.
- As part of computational thinking, students will gain some understanding of how a computer algorithm can produce numbers that appear to contain an element of chance.
- In a latter module, students will gain some understanding of how a computer can *simulate* natural processes that contain elements of *chance.*
- As part of computational thinking, students will know to question the reliability of computer models that simulate random events.

Scientific skills objective:

- Students will practice the following scientific skills:
    o Graphing (visualizing) data as histograms and *(x,y)* plots.
    o Describing correlations and randomness displayed by data.
    o Interpreting the contextual meaning of graphs.

Activities

In this lesson, students will:

- Use a computer program to generate random numbers.
- Test a sequence of random numbers for uniformity.
- Test a sequence of random numbers for randomness in multiple ways.

- *Optionally*, students will work with an actual computer algorithm used to generate a series of pseudorandom numbers.