WIN Girl Scout Day Activities:

1. M&M/Skittle Half-lives(Session A):
   1. This activity is meant to show the basic idea of a half life being the amount of time to decrease in number by a half
   2. Materials: Candy, about 20 pieces per girl, graph paper, writing utensils
   3. Procedure: Count your initial pieces of candy, and plot that on the graph. Shake the candy in a coffee filter, or hands, and pour on the table. Count the ones that have a letter face up. Put these off to the side, they have “decayed”. Count the number that remain and plot. Continue this until there are just one or two left, or all have decayed. The plot that is created should approximate a typical half-life graph.
   4. Talk to the girls about how the graph looks, and what a half-life means. Remind them that the actual amount of time depends on the substance, and will not be a constant value for all materials
2. Ping Pong ball chain reaction (Session B):
   1. This activity is meant to show how chain reactions are started and sustained.
   2. Materials: Ping Pong balls, lots of them, and space
   3. Each girl will grab 2-3 balls (since there are 2-3 neutrons released in fission). Everyone will stand far apart. One person (the source) will start by throwing their balls up in the air. If a ball lands on a girl, then she throws her balls up in the air. Continue until no one else is hit. The idea is to start far apart, so that the reaction can’t be sustained. After the first time going through, everyone will move a little closer and try it again. This time maybe one or two girls will be able to throw their balls. Do it one more time with everyone close together, this time everyone will be able to throw their balls.
   4. Talk to the girls about how the space between everyone affected things and how they were able to keep the reaction going, and relate this to neutrons hitting U targets
   5. Add a twist: Since we have rainbow ping pong balls, the girls can only throw their balls up if they get hit by a certain color, to simulate thermal vs fast fission.
3. Marshmallow Fusion (Session B):
   1. This activity is meant to show how atoms will fuse together to form heavier elements. This is mainly in the context of a star
   2. Materials: 20 marshmallows for each girl, wet wipes, and a periodic table
   3. Each marshmallow you have will represent a proton. Start with 1 marshmallow (H) and fuse it with another one (H) to get He. This will be done by just pressing them together with your hands. Fuse all of your H together to form 10 He. With your He, fuse 3 together to form C, like it would in a star. As you make each fusion, show where the elements are on the PT. Talk about what would be the result if you fused other things together.
   4. Talk with the girls about the overall process of fusion, and how it is only for elements lighter than Fe.
   5. Add a twist: each marshmallow represents a proton OR a neutron and have them fuse them together to form C. Try to have them use an actual fusion chain to form it.
4. Radiation Dose (Session D):
   1. This activity is meant to show that we are always getting a radiation dose from the environment, and that is depends on where we live.
   2. Materials: ANS Radiation Dose Worksheet and pencils
   3. Work through the dose calculations with the girls, based on where they live (you can just use the location of the workshop). Help them think through if the criteria apply to them.
   4. Talk with the girls about background radiation and the natural sources of it
5. Radiation Sources (Session D):
   1. This activity is meant to show how detectors work, on a basic level, as well as activity levels.
   2. Materials: Geiger Counter and sources
   3. Measure the sources with the Geiger Counters. Talk about differences in activity for the sources. If you want, you can show the sources of the same species with the same activity, but with different ages to show how age can affect strength. If the girls are older you can go through some of the electronics of the Geiger counter.
   4. Add a twist: hide the sources in the room (MAKE SURE YOU REMEMBER WHERE THEY ALL ARE, SO YOU DON’T LOSE ANY) and have the girls search for them with the detector. Talk about the security applications of detectors.
6. Cloud Chamber (Session D):
   1. This activity is meant to demonstrate one of the few ways we have to see radiation
   2. Talk with the girls about the different forms of decay (Th decays via alpha) and ranges of particles.
7. Rutherford Boards (Session A):
   1. This activity will demonstrate the basics of how Rutherford was able to discover the nucleus, despite the thinking at the time.
   2. Materials: Paper, pencil, a block in the shape desired, and a wooden board, marbles
   3. The shape will be placed on the ground, with the board on top to cover it. Have the girls shoot marbles under the board, towards the shape. Move around the board shooting the shape at various angles. Based on the scatter of the marbles, draw the shape on the sheet of paper. Switch shape under the board.
   4. This activity may be too advanced for younger girls. It’s best for older ones. Feel free to skip if they are having a hard time with it.
8. Candy Atoms (Session A):
   1. This activity is meant to demonstrate the basic structure of an atom.
   2. Materials: mini M&Ms, licorice, Mike & Ikes (M&I), Marshmallows, tooth picks
   3. Each M&I will represent 23 protons, so you will need 4. Each marshmallow will represent 13 neutrons, so you will need 11 (For U235). Use the toothpicks to hold the nucleus together. Use the licorice to represent the electron orbitals, combining some together to get the larger orbitals. Fill in the electrons as they should be on the orbitals
   4. This entre activity is based on the following video: <https://www.youtube.com/watch?v=pe8mfGjWOlQ> check it out if you have questions.