

Your Name: _____ Partner: _____

Date: _____ Period: _____

Nuclear Fission

phet.colorado.edu (Nuclear Fission Simulation)

Background: In this simulation, you will be using two isotopes of uranium. Complete the following information about uranium-235 and uranium-238.

1. *Isotope* *# protons* *# neutrons* *atomic mass*

uranium-235			
uranium-238			

Using the “Fission: One Nucleus” Tab...

2. Describe how you can trigger a fission reaction in the uranium-235 atom.

3. How many neutrons are released when the atom undergoes fission?

Using the Chain Reaction Tab...

4. What happens when you shoot a neutron at a uranium-238 atom?

5. What happens when you shoot a neutron at a uranium-239 atom?

6. What happens when you have one hundred U-235 (no U-238) atoms and shoot one neutron?

7. What happens when you have one hundred U-238 atoms (no U-235) and shoot one neutron?

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8. We want to know how the percentage of U-235 atoms affects the percentage of U-235 nuclei fissioned. Describe what happens in each of the following situations when you shoot ONE neutron into the field of nuclei on the screen.

***Note:** When you shoot your neutron, make sure it hits a U-235 atom.

Atoms	% U-235 (#U-235 ÷ Total)	% of Nuclei Fissioned (see bottom right corner)
100 U-235 0 U-238		
80 U-235 20 U-238		
60 U-235 40 U-238		
40 U-235 60 U-238		
20 U-235 80 U-238		
0 U-235 100 U-238		

9. Determine the variables
- Independent Variable:

 - Dependent Variable:

 - Constant Variable(s):

Your Name: _____

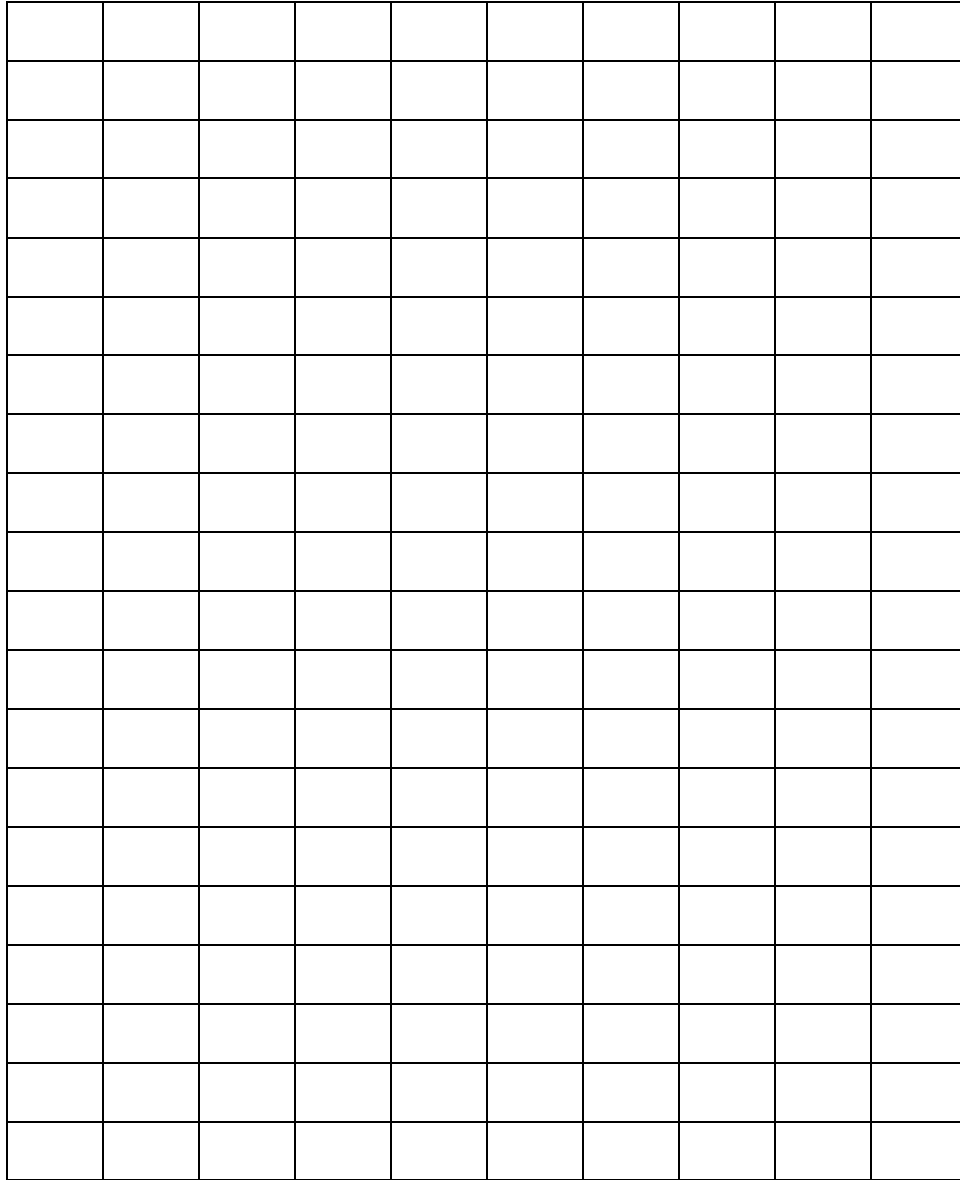
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10. Make a line graph of your data. Remember to:

- Use equally-spaced intervals for both axes.
- Place numbers at a LINE (not between the lines).
- Label both axes with words (the column titles from your data table).



11. How does the number of U-235 atoms affect the percentage of U-235 atoms fissioned?

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12. Using your observations in this simulation, explain why your answer to #11 makes sense.

13. Based on your experiment, what isotope of uranium is used in a nuclear reactor? Why must that be the case?

14. Use the internet to discover what percentage of natural uranium is U-235. Explain why uranium mines do not start a chain reaction and blow up.

Using the “Nuclear Reactor” Tab

15. Generate electricity! Adjust the control rods to generate power without letting the temperature get too high. You may need to adjust them as the reaction is taking place.
**In order to maintain a steady power output, do you need to put the control rods farther in or slowly take them out as the fission reaction takes place? Explain why this is the case.*