FLINN SCIENTIFIC

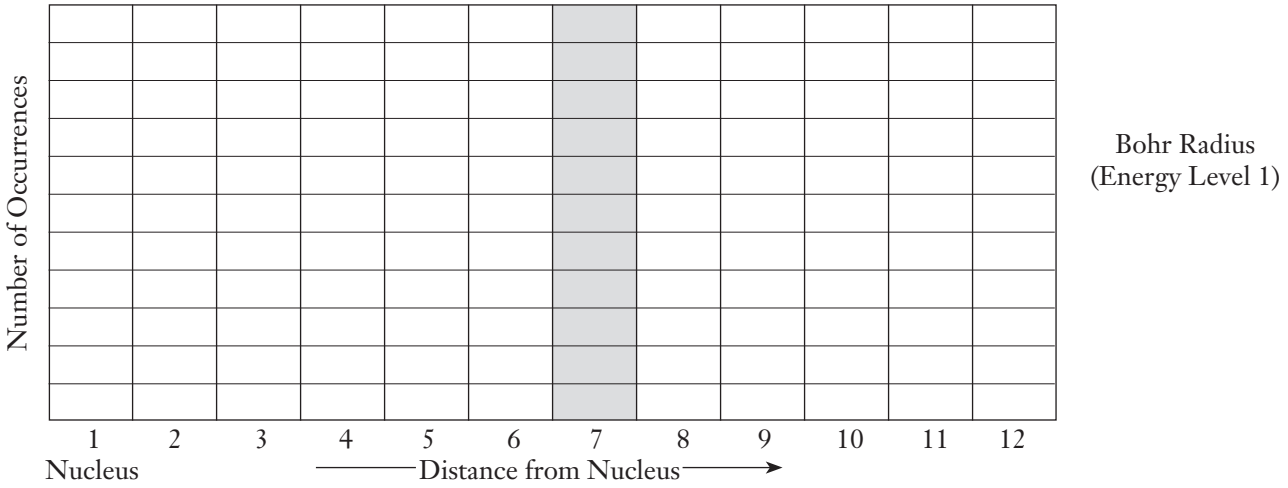
Name_____

## Data Table

| Roll # | Sum on Dice | Roll # | Sum on Dice | Roll # | Sum on Dice | Roll # | Sum on Dice | Roll # | Sum on Dice |
|---|---|---|---|---|---|---|---|---|---|
| #1 | | #11 | | #21 | | #31 | | #41 | |
| #2 | | #12 | | #22 | | #32 | | #42 | |
| #3 | | #13 | | #23 | | #33 | | #43 | |
| #4 | | #14 | | #24 | | #34 | | #44 | |
| #5 | | #15 | | #25 | | #35 | | #45 | |
| #6 | | #16 | | #26 | | #36 | | #46 | |
| #7 | | #17 | | #27 | | #37 | | #47 | |
| #8 | | #18 | | #28 | | #38 | | #48 | |
| #9 | | #19 | | #29 | | #39 | | #49 | |
| #10 | | #20 | | #30 | | #40 | | #50 | |

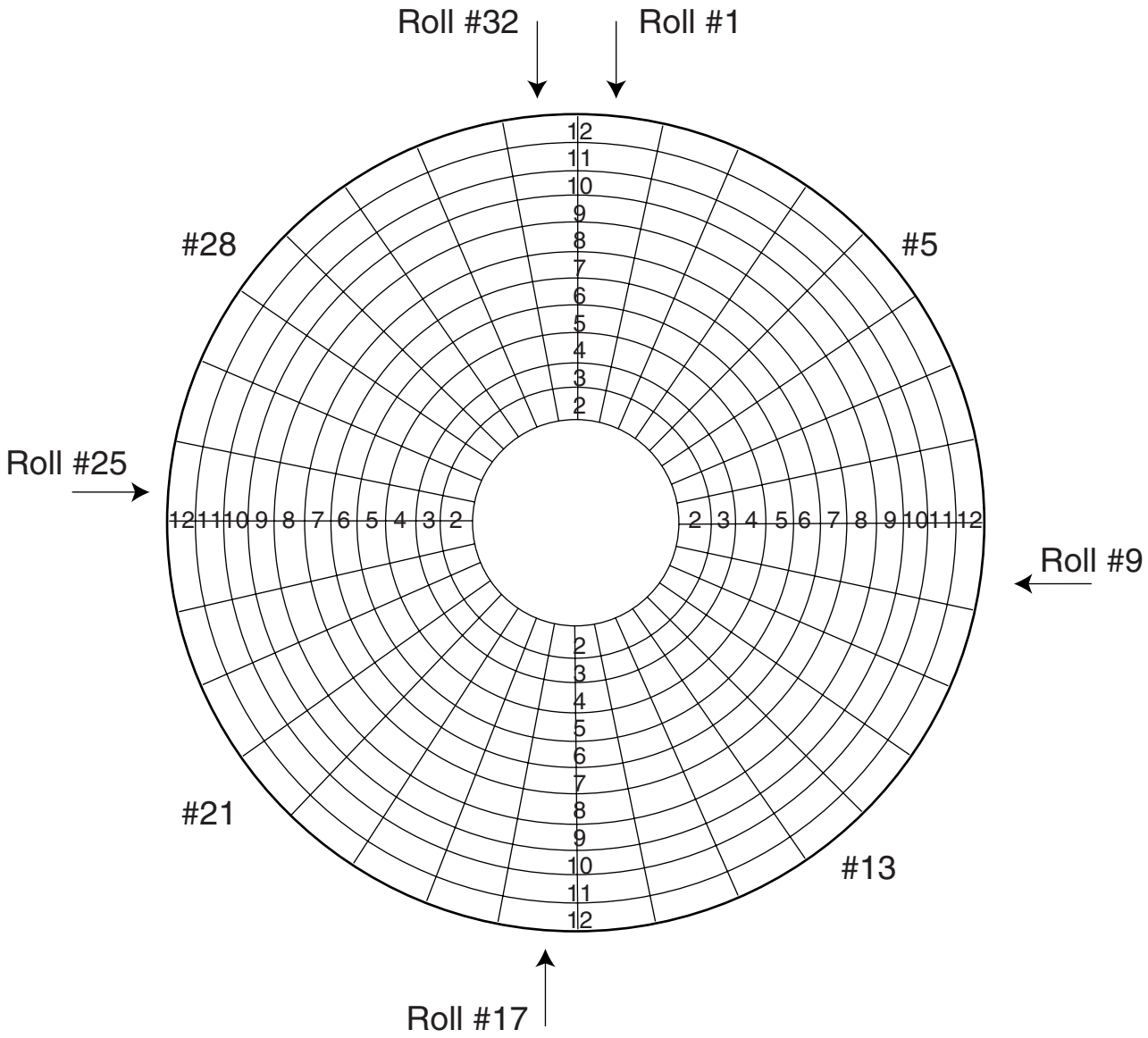
## Calculations and Post-Lab Questions *(Use a separate sheet of paper to answer the following questions.)*

Plot the numbers obtained for each roll of the dice as a histogram for energy level 1 (1s orbital). The x-axis represents the number rolled and the y-axis represents the frequency each number was rolled. Put an X in the box corresponding to the dice roll. If the dice roll value has been previously entered, place the X in the box above the last X entry. *Note:* The shaded area represents the Bohr radius for the electron in the lowest energy level.




1. What is the most frequent value (electron distance from nucleus) for the pair of dice?
2. How does the distribution of an electron in the wave mechanical model compare with the distribution for an electron using the Bohr model?
3. Explain where the electron in the lowest energy level (1s orbital) has the *greatest probability* of being found based on 50 "snapshots" or rolls of the dice.
4. Explain where the electron in the lowest energy level (1s orbital) has the *least probability* of being found based on 50 "snapshots" or rolls of the dice.
5. Referring to the graph again, are there any regions where the probability of finding the 1s electron is zero?
6. Explain how the wave mechanical model and the Bohr model are *similar*.
7. Explain how the wave mechanical model and the Bohr model are *different*.

# Energy Level Worksheet




Referring back to your original data, place a circle in the Energy Level Worksheet for your first 32 rolls of the dice. For example: If roll #1 gave a 9, then place a circle (●) in the 9 box for roll #1.

With a pencil, shade in the rings for each number. Shade the rings containing the fewest circles lightly. Darken the shading of the rings as the number of circles in the rings increases.

8. Describe the pattern observed when all the rings are shaded. If the graph was rotated about an axis through the center, what 3-D pattern would be observed?
9. Explain why rolling the dice is a good model for describing where an electron may be found at any given instant for the wave mechanical model of the atom. Would rolling one die be a better or worse model? Why?