$\qquad$ Date: $\qquad$ Class: $\qquad$

## Radioisotopes Investigation

You have 100 coins/chips which represent 100 unstable radioisotopes of the same element. When the coins/chips are facing up they will be considered to be radioactive (unstable). When the coins/chips are facing down, they will be considered to have decayed (become stable isotopes). Find out what happens when your coin/chip radioisotopes decay.

1. For Trial 1: Put all of the coins/chips in the container (plastic container or shoebox) facing up and then shake the container 10 times. This will represent a radioactive decay event.
2. Open the lid and carefully remove all of the coins/chips that are facing down. Record the number removed in the column marked "number stable after shaking."
3. Subtract to get the number of radioactive coins/chips which remain (or these could be counted in the container). Record this number in the column marked "number radioactive after shaking." This number then becomes the "number radioactive before shaking" for event 2.
4. Place the lid back on and repeat steps 1 to 3 , starting with event number 2 , until all of the coins/chips have been removed from the container (none are radioactive).
5. For Trial 2: Repeat the process for a second trial and record on the TRIAL 2 chart below.

TRIAL 1

| DECAY <br> EVENT <br> \# | Number <br> Radioactive <br> BEFORE <br> SHAKING <br> (face up) | - Number <br> Stable <br> AFTER <br> SHAKING <br> (face down) | = Number <br> Radioactive <br> AFTER <br> SHAKING <br> (face up) |
| :---: | :---: | :---: | :---: |
| 1 | 100 |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |
| 11 |  |  |  |
| 12 |  |  |  |

TRIAL 2

| DECAY <br> EVENT <br> \# | Number <br> Radioactive <br> BEFORE <br> SHAKING <br> (face up) | - Number <br> Stable <br> AFTER <br> SHAKING <br> (face down) | = Number <br> Radioactive <br> AFTER <br> SHAKING <br> (face up) |
| :---: | :---: | :---: | :---: |
| 1 | 100 |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |
| 11 |  |  |  |
| 12 |  |  |  |

6. Calculate the average number of radioactive pennies after shaking and record on the chart below.

| DECAY <br> EVENT <br> $\#$ | NUMBER <br> RADIOACTIVE <br> Trial 1 | NUMBER <br> RADIOACTIVE <br> Trial 2 | Average NUMBER <br> RADIOACTIVE after <br> shaking for two trials |
| :---: | :---: | :---: | :---: |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |
| 11 |  |  |  |
| 12 |  |  |  |

7. Plot and draw a line of best fit for the average number of radioactive coins/chips after shaking per decay event on GRAPH (1). Be sure to start your graph at event 0 (before the first shake) when all of the coins/chips are radioactive.

## GRAPH 1


8. Look at GRAPH ©. What is the shape of the line? Why do you think it is this shape?
9. Why were the coins/chips removed from the container once they flipped over and became stable? Why aren't they left in for the subsequent trials?
10. What factors may have influenced the number of coins/chips which flipped?
11.Look at the line on GRAPH © . How many events did it take for $50 \%$ of the radioisotopes (50 coins/chips) to be flipped?
12. Given our class value for the half-life of coins/chips, if you started with a sample of 300 coins/chips, how many coins/chips would still be radioactive after three half-lives? Show your work.

