Atoms- 3.7 Practice Assessment

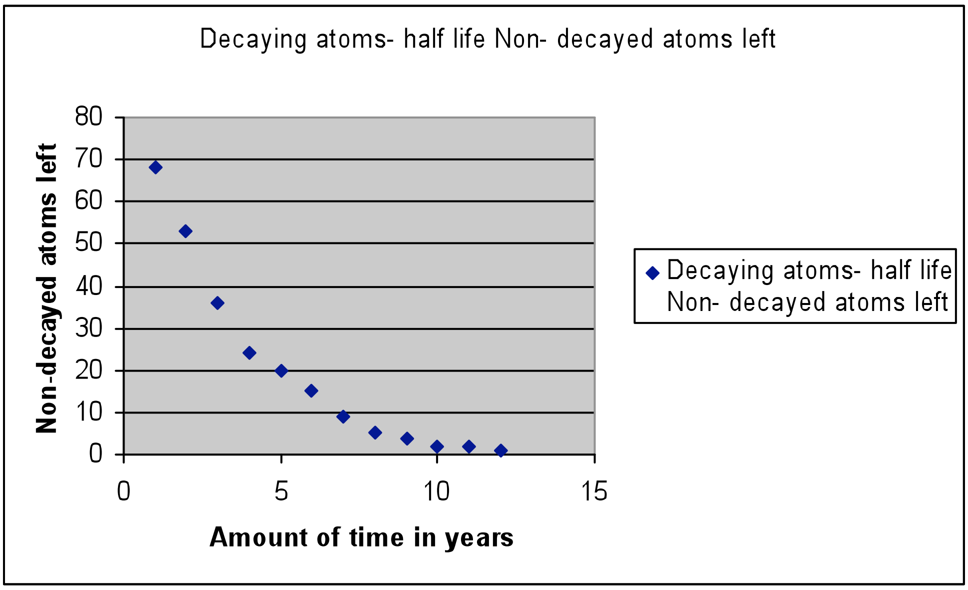
Started with 100 atoms (pins).

**Decaying atom**

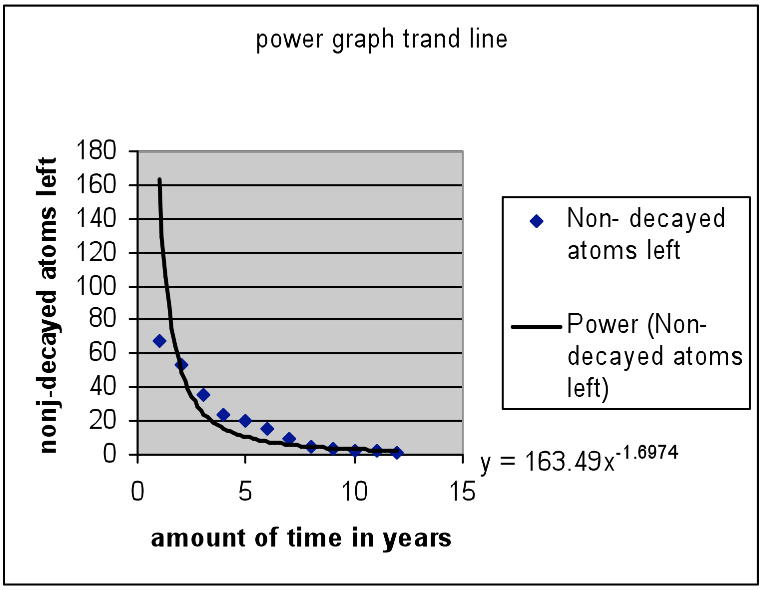
**atoms- half life**

| Amount of time (yrs) | Non- decayed atoms left |
|---|---|
| 1 | 68 |
| 2 | 53 |
| 3 | 36 |
| 4 | 24 |
| 5 | 20 |
| 6 | 15 |
| 7 | 9 |
| 8 | 5 |
| 9 | 4 |
| 10 | 2 |
| 11 | 2 |
| 12 | 1 |

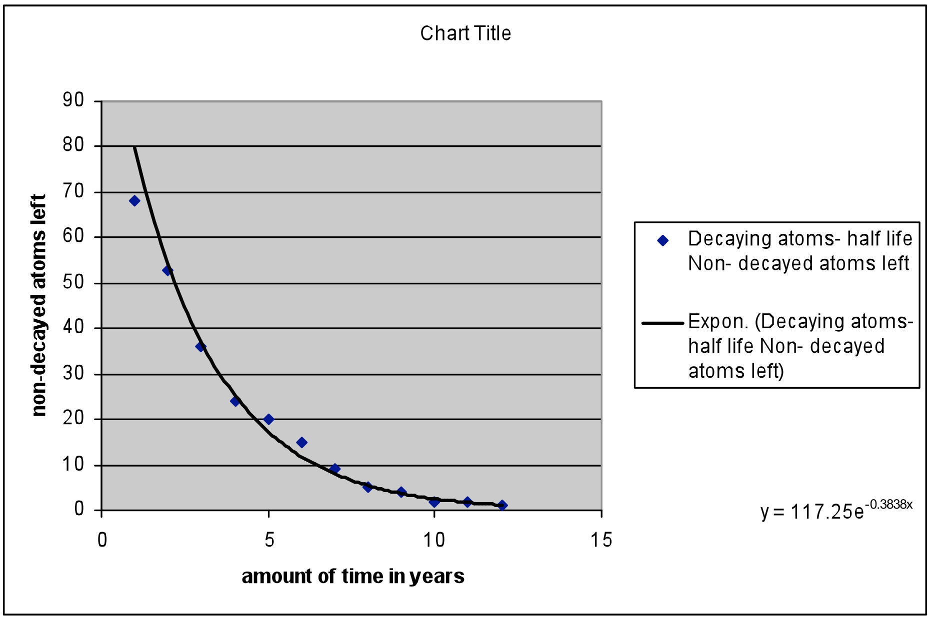
Graphed raw data:




Now to see what kind of graph this is I will use a trend line fitted to the data selecting which one is best fit- power or exponential.




The power trend line is not a very close fit.

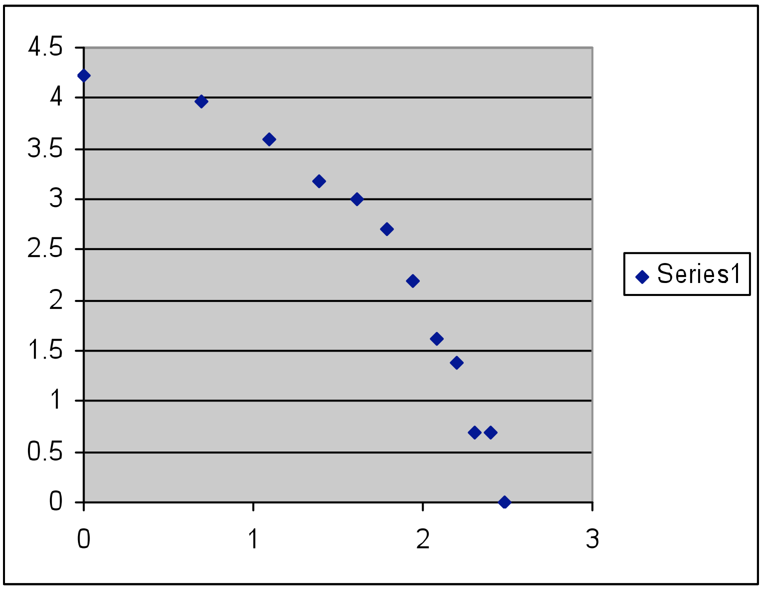



The exponential trend line however is a much closer fit so I can assume that the graph is exponential.

I will check this assumption by logging the data and checking to see if the points worked out produces a straight line.

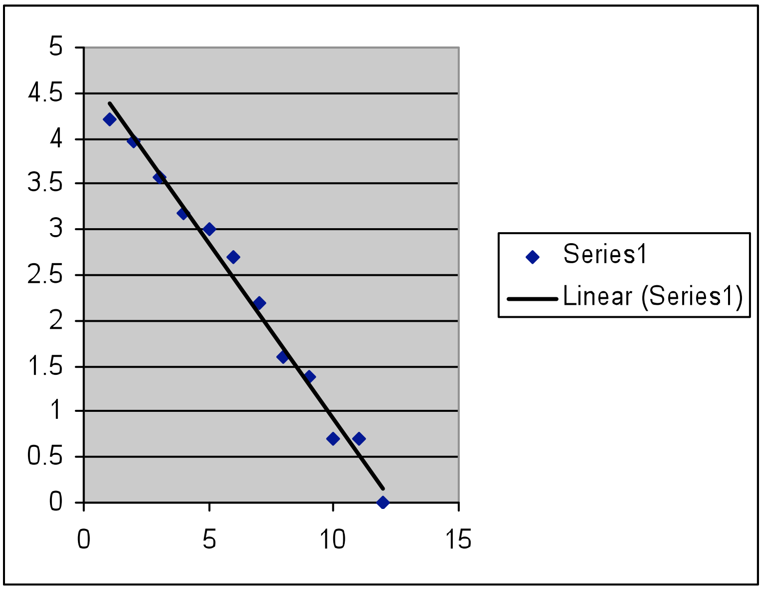
First a power conversion:

| Ln (x) | Ln (y) |
|---|---|
| 0 | 4.219508 |
| 0.693147 | 3.970292 |
| 1.098612 | 3.583519 |
| 1.386294 | 3.178054 |
| 1.609438 | 2.995732 |
| 1.791759 | 2.70805 |
| 1.94591 | 2.197225 |
| 2.079442 | 1.609438 |
| 2.197225 | 1.386294 |
| 2.302585 | 0.693147 |
| 2.397895 | 0.693147 |
| 2.484907 | 0 |




Then an exponential conversion:

| X | ln (y) |
|---|---|
| 1 | 4.219508 |
| 2 | 3.970292 |
| 3 | 3.583519 |
| 4 | 3.178054 |
| 5 | 2.995732 |
| 6 | 2.70805 |
| 7 | 2.197225 |
| 8 | 1.609438 |
| 9 | 1.386294 |
| 10 | 0.693147 |
| 11 | 0.693147 |
| 12 | 0 |




The points plotted from the exponential conversion fit the linear graph proving the proving that the graph/equation is exponential.

Graph Equation: y= 117.25e^(-0.3838x)

Half life of the simulated element:

y = 117.25e^(-0.3838x)
= 117.25 X 0.68^x
50 = 117.25 X 0.68^x
0.68^x = 50/117.25
x ln 0.68 = ln 0.4264
x = 2.21 years