Two rats, one male and one female, scampered on board a ship that was anchored at a local dock. The ship set sail across the ocean. When it anchored at a deserted island in late December, the two rats abandoned the ship to make their home on the island.

Under these ideal conditions, it might be interesting to estimate the number of offspring produced from this pair in one year. You should make these four assumptions.

* The number of young produced in every litter is six, and three of those six are females.
* The original female gives birth to six young on January 1 and produces another litter of six every 40 days thereafter as long as she lives.
* Each female born on the island will produce her first litter 120 days after her birth and then produce a new litter every 40 days thereafter.
* The rats are on an island with no natural enemies and plenty of food, so no rats will die in this first year.

What will be the total number of rats by the following January 1, including the original pair?

The problem asks a simple exponential growth rate question, how fast would the rat population grow given the ideal conditions, All I did was create a chart that showed the day vs the number of mice, including pairs that were breeding and pairs that weren’t, this helped me visualize the problem in a way that I could better understand it. The way I solved this problem was simple, add 3 new pairs every row, then every three rows add 3 to the breeding pairs column, every three rows from *Any other row*, meaning that for the first 3 rows there would be no new breeding rats, after that add 3 every new row for 3 rows, then multiply the pairs breeding number from 3 rows ago by 3 to account for the new pairs being able to breed, giving me the number of breeding pairs so I can keep track of the growth rate. To find the total I simply had to add 3 each row for the first 3 rows, then look to the breeding mice column, if you look at the chart you will notice that the total pairs row has most of the same numbers in the same order as the breeding column this is because the nature of the problem is that the breeding pairs only constitute a portion of the total, and since the population increases at a constant rate, it will create this pattern because the difference in time and increase is the same, 3 new pairs from the original every 3 rows, and the nature of exponential growth. I think that I put time and effort into this POW to make sure I did my best work on it, I believe I put in enough effort to earn me an A even if the answer is wrong. Because I did my best.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Day | Pairs (after) | Pairs breeding | Mice before | Mice  after |
| 0 | 1 | 1 | 0 | 2 |
| 40 | 4 | 1 | 2 | 8 |
| 80 | 7 | 1 | 8 | 14 |
| 120 | 10 | 4 | 14 | 20 |
| 160 | 16 | 7 | 20 | 32 |
| 200 | 22 | 10 | 32 | 44 |
| 240 | 43 | 16 | 44 | 86 |
| 280 | 73 | 22 | 86 | 146 |
| 320 | 139 | 43 | 146 | 278 |
| 360 | 215 | 73 | 278 | 430 |
| 365 (end) | 215 | 73 | 278 | 430 |