**Implementation of Birthday Paradox**

Theory:

The birthday problem (also called the birthday paradox) deals with the [probability](https://brilliant.org/wiki/uniform-probability/#probability-by-outcomes) that in a set of n randomly selected people, at least two people share the same birthday.

Though it is not technically a [paradox](https://brilliant.org/wiki/paradox/), it is often referred to as such because the probability is counter-intuitively high.

The birthday problem is an answer to the following question: In a set of n randomly selected people, what is the probability that at least two people share the same birthday?   
What is the smallest value of n where the probability is at least 50% or 99%?

Let p(n) be the probability that at least two of a group of nn randomly selected people share the same birthday. By the [pigeonhole principle](https://brilliant.org/wiki/pigeonhole-principle-definition/), since there are 366 possibilities for birthdays (including February 29), it follows that when n ≥ 367, p(n)=100%. The counterintuitive part of the answer is that for smaller n, the relationship between n and p(n) is (very) non-linear.

In fact, the thresholds to surpass 50% and 99% are quite small: 50% probability is reached with just 23 people and 99% with just 70 people.

Code:

| #include <iostream> using namespace std;     int main(){     // Assuming non-leap year     float num = 365;     float denom = 365;     float pr;     int n = 0;     cout << "Probability to find : ";     cin >> pr;     float p = 1;     while (p > pr){         p \*= (num/denom);         num--;         n++;     }     cout << "Total no. of people out of which there is: " << n << endl;     cout << "The probability that two of them have same birthdays is: "  << p << endl;     return 0; } |
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Output:

| D:\Files\Engineering\Semester - 6\AA\Experiments\Experiment 6>BirthdayParadox Probability to find : 0.5 Total no. of people out of which there is: 23 The probability that two of them have same birthdays is: 0.492703 |
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Observations:

We observe that the probability of 50% for two people having the same birthday requires just 23 people and the probability of 99% for two people having the same birthday requires just 99 people.

Conclusion:

The more the number of people, the more the number of people, and thus, more the probability of two people having their birthday on the same day.

References:

<https://betterexplained.com/articles/understanding-the-birthday-paradox/>

<https://www.geeksforgeeks.org/birthday-paradox/>