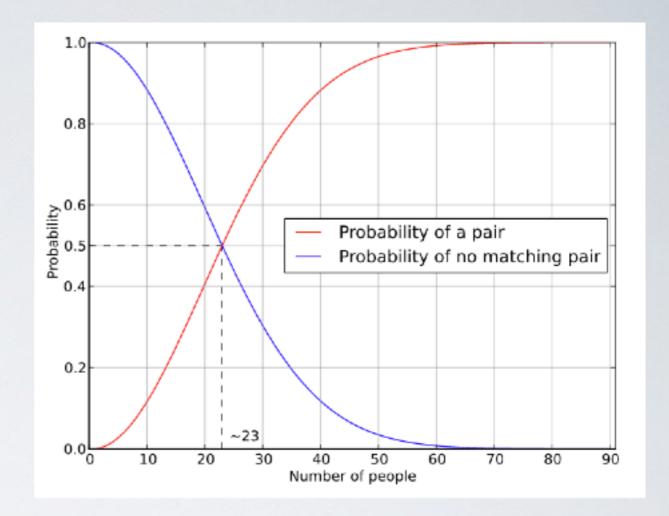
## Birthday Paradox

"There are 50% chance that 2 people have the same birthday in a room of 23 people"



## **N-bits security**

→ Given a hash function H of n bits output,
a collision can be found in around 2<sup>n/2</sup> evaluations
e.g SHA-256 is 128 bits security

## Broken hash functions beyond the birthday paradox

	Year	Collision
MD5	2013	2 <sup>24</sup> evaluations (2 <sup>39</sup> with prefix)
SHA-I	2015	2 <sup>57</sup> evaluations