

Name _____

Quantum Computing: Unlocking the Potential to Solve Unsolvable Problems

Open-Ended Response Answer Key

1. The impact of quantum computing on cybersecurity is significant due to its potential to factorize large numbers efficiently. This could compromise the security of data encrypted using current encryption methods. Organizations can prepare for quantum threats by transitioning to quantum-resistant encryption algorithms and cryptographic methods that are not vulnerable to quantum attacks. They should also invest in research to develop quantum-safe encryption techniques and stay updated with advancements in quantum computing to adapt their security measures accordingly.
2. In a scenario where quantum computing becomes widely accessible and affordable, industries and scientific research would experience transformative changes. Quantum computers could address currently unsolvable problems in fields like drug discovery, materials science, finance, and logistics. Scientific research could accelerate, leading to breakthroughs in various domains. Industries could optimize operations, enhance product development, and improve decision-making. However, the coexistence of classical and quantum computing would require careful integration and adaptation, with each technology serving specific roles based on their strengths and limitations.
3. As a researcher developing quantum algorithms, I would be interested in tackling optimization problems in logistics and route planning. Quantum computing's ability to efficiently find optimal solutions to complex routing problems could revolutionize the transportation and logistics industry. My research could lead to more efficient and environmentally friendly delivery routes, reducing costs and improving resource allocation. This would have a tangible impact on industries reliant on transportation and logistics.
4. In the future, classical and quantum computing technologies are likely to coexist, each playing distinct roles in problem-solving. Classical computers will continue to excel in everyday tasks like word processing and web browsing. Quantum computing will be leveraged for specific complex problems that benefit from its unique capabilities, such as factorization, optimization, and quantum simulation. The two technologies may even work together in hybrid systems, where classical computers handle certain aspects of a problem, while quantum computers tackle the computationally intensive portions, optimizing the overall solution. This coexistence will provide a well-rounded approach to problem-solving in various fields.

