

How Does Quantum Computing Work?

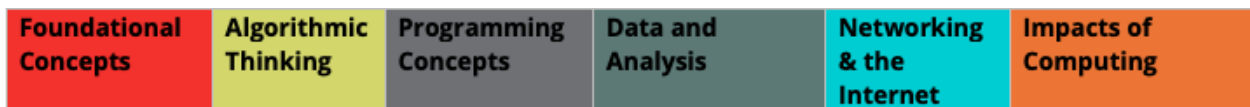
Lesson Plan for Grades 3-5

OVERVIEW & PURPOSE

This lesson introduces elementary students to quantum computing, how it works, and how it differs from classical computing.

EDUCATION STANDARDS

Tennessee K–8 Science Standards are built on six core principles:



This lesson includes introductory elements of Foundational Concepts, Algorithmic Thinking, Programming Concepts, Data and Analysis, and Impacts of Computing.

OBJECTIVES

1. Define the term quantum computing.
2. Compare and contrast classical computers and quantum computers and how they relate to binary codes and superposition.
3. Define and demonstrate how binary codes work.
4. Explain how quantum computing can improve our world.


MATERIALS NEEDED

1. Computer and projector screen (with speakers)
2. Optional: A printer will be needed for the interactive article activity.
3. Sticky notes
4. Students will need their own devices to play the Interactive Socrative Vocabulary Quiz Game


VOCABULARY

1. **Quantum physics**- the study of things that are very small
2. **Qubit**- quantum bits; tiny pieces of information
3. **Binary Code**- a two-digit code made of 0's and 1's.
4. **Superposition**- placing one thing in front of or on top of another to present multiple forms at the same time
5. **Entanglement**- a special type of superposition where particles can be linked, no matter how far apart they are

APPROXIMATE CLASS LENGTH: 1.5-2 HOURS (2 days of instruction)

1. What is Quantum Computing? Explained to kids and young teens (Only watch the first two segments/6 minutes)  Quantum Computing Expert Explains One Concept in 5 Levels of Diffi...
2. Interactive Article from Tech Goes Home: [How do Quantum Computers Work?](#)
3. Qubit Share-aloud Activity- Give each student a sticky note, and ask them to number to 3. Explain that you're going to call out three words, and you want them to write those words.
 1. To/Too/Two
 2. Sea, see, Sí
 3. For, four, fore

(You can choose other homophones.) Ask students to share their answers with their table, group, or elbow partner. Ask if any of them had the exact same answers, and explain, no matter which option they wrote, that's how quantum computers work. They see all the possibilities and know/find the right answer.

4. Quantum Vocabulary Adventure Challenge:  Quantum Adventures (1).pdf
5. [Quantum Computing Vocabulary Interactive Quiz](#) created by Tech Goes Home
6. Optional Quantum Computing Coding Computer Games:
<https://openprocessing.org/sketch/815868> <https://chord.cs.uchicago.edu/Quander/>
7. [Optional Additional Binary Code Activity](#): Use candy, play doh, or legos to create a colorful binary code.