

## Qubits and Bytes (6-7)

Hello! This document includes a brief outline of our Qubits and Bytes workshop, as well as relevant BC ADST curriculum connections. In this workshop, students will learn the difference between classical and quantum computing and will get a chance to work with binary, a marble based computer, and learn about a quantum mechanics concept: Superposition!

If you'd like to register for our workshops, please fill out our registration survey linked [here](#).

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| <p><b>BC Curriculum Ties</b><br/>(In addition to satisfying multiple core competencies)</p> | <p><u>BC Applied Design, Skills, and Technologies Curriculum Links 6-7:</u></p> <p>Complex tasks require the acquisition of additional skills &amp; complex tasks may require multiple tools and technologies.</p> <ul style="list-style-type: none"> <li>• <i>Applied Design:</i> <ul style="list-style-type: none"> <li>○ <i>Ideating – Generate potential ideas and add to others’ ideas</i></li> <li>○ <i>Prototyping – Develop a plan that identifies key stages and resources</i></li> <li>○ <i>Testing – Test the first version of the product or the prototype</i></li> </ul> </li> </ul> <p><u>BC Mathematics: Reasoning and Analyzing</u></p> <ul style="list-style-type: none"> <li>○ <i>Use logic and patterns to solve puzzles and play games</i></li> <li>○ <i>Use reasoning and logic to explore, analyze, and apply mathematical ideas</i></li> <li>○ <i>Use tools or technology to explore and create patterns and relationships and test conjectures</i></li> </ul> <p><u>ADST: Content</u></p> <ul style="list-style-type: none"> <li>○ <i>Computational Thinking</i></li> <li>○ <i>Computers and Communications Devices</i></li> <li>○ <i>Robotics, including sensors, control systems and effectors programming and logic for robotics components</i></li> </ul> |
| <p><b>Grade Levels</b></p>  | <p>6-7</p>  |
| <p><b>Time</b></p>  | <p>1~1.5 Hours</p>  |

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| <b>Goals of the Workshop</b> | <ol style="list-style-type: none"><li>1. Be able to understand and write numbers in binary</li><li>2. Learn how traditional computers work and make a simple counting algorithm</li><li>3. Learn an introduction to quantum computing and its advantages over traditional computing</li><li>4. Understand qubits and superposition</li></ol> |
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## Activity Descriptions

### Binary

Objective: To be able to understand and write numbers in binary.

Participants will:

- Learn how binary works and observe a classroom demonstration showing how numbers can represent different values.
- Use visual representations of problems and data

### Turing Tumble

Objective: To learn how computers understand and store information. Learn to use a marble based computer in order to make a simple counting algorithm.

Participants will:

- Learn how classical computers work and understand information
- Build a circuit to count and add up to 15 in binary

### Tiq-Tak-Toe

Objective: To demonstrate an introduction to quantum computing and its advantages over traditional computing. Learn about qubits and Superposition

Participants will:

- Participate in a quantum game of Tiq Tak Toe that utilizes the idea of Superposition
- Discuss probability and measurement in a demonstration



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**We can't wait to connect with your school & expose your students to the STEM field with our exciting, hands-on STEM activities!**