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| **UNIT2** |  |  |

# Lesson 10: Counting With Binary Numbers

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| Overview *Students will be exposed to binary numbers (many for the first time). Students will analyze patterns and learn to count using manipulatives and binary cards. The emphasis will be on counting and understanding the system of base 2 counting.* Lesson Summary* *Journal (as students enter/first few minutes of class): How many systems for counting do you know or have you heard of. Example: Counting on your fingers, skip counting, football/basketball scores. For further thought (asked at the beginning, but will be discussed at the end of class): Why do we use these different counting systems?*
* *First Activity: Students will make observations about binary cards (Count the dots activity)*
* *Students will make their own binary cards and work together to convert binary to decimal numbers*
* *Informal Assessment: With a premade deck of binary number cards, students will play “War” which will require quickly assessing which binary number is bigger. Advanced students will play a more difficult game like Rummy.*
* *For Further Thought: Revisit journal entry and answer follow up question.*
* *Homework: Use the Binary Odometer Widget and write a one paragraph reflection on what you observe.*

*https://studio.code.org/s/ECSPD3-Unit2/stage/4/puzzle/6** *Exit ticket: Convert two numbers from decimal to binary and two from binary to decimal.*

CS Content *This lesson will focus on problem solving and allowing students to understand binary numbers through exploration. Binary is an essential part of computer programming and understanding the functioning of computers.*  |  |  | Objectives**Students will be able to:*** Count forward and backward in binary numbers
* Estimate binary numbers to determine which is bigger
* Explain why binary numbers are important in computer science

Materials and Prep* Blank Flash Cards/Markers
* Scratch Binary Program/Computers
* Printed binary dots papers

Resources**Student Documents*** *CSunplugged.com*
* Scratch binary dots file

**Code Studio*** Binary Odometer Widget

https://studio.code.org/s/ECSPD3-Unit2/stage/4/puzzle/6**Video****Assessments*** Card Games
* Exit Ticket

Notes

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| This lesson will work best with intentional grouping of students in groups with varied ability levels |
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