

Gym Activities

Algorithmic Problem-Solving, Computational Thinking

4/9/19

<http://www.cs.bsu.edu/cs4ms/docs/GymActivities.pdf>

Binary Rock Wall Activity

Objective: Students will have to organize a sequence of 0's and 1's to match the given word or sequence of numbers. The first team that correctly assembles the sequence of numbers wins.

Kindergarten/1st Grade/2nd Grade:

Materials Needed:

- Way to show students a sequence of 0's and 1's
- Number Cards hanging on rock wall
- Cones

Rules/Guidelines:

- Divide students into groups of 4 - 5 (depending on rock wall space and # of students)
- Choose an 8 number binary sequence for students to recreate
 - Show each team the sequence of numbers the instructor created
 - Ex. 00010010
- Each team must assemble the sequence in the correct order.
- Students work together to collect 0's and 1's off the rock wall
 - One student from each team on the wall at a time
 - Rest of students remain behind cones & figure out next number to retrieve
- Once the students have assembled a sequence of 0's and 1's, the instructor will check to make sure they are in the correct sequence.
 - If the sequence of 0's and 1's are wrong, the team must correct their work
- First team to successfully assemble the sequence of numbers win

3rd Grade/4th Grade/5th Grade:

Materials Needed:

- ASCII or Binary Handout
- Number Cards hanging on rock wall
- Cones

Rules/Guidelines:

- Divide students into groups of 4 - 5 (depending on rock wall space and # of students)
- Choose a 2 - 3 letter word for students to spell OR a number (depending on time available)
 - Give each team a Binary or ASCII handout that they will use to determine the sequence of 0's and 1's
- Students work together to collect 0's and 1's off the rock wall
 - One student from each team on the wall at a time
 - Rest of students remain behind cones & figure out next number to get
- Once the students have assembled a sequence of 0's and 1's, the instructor will check to make sure they are in the correct sequence.
 - If the sequence of 0's and 1's are wrong, the team must correct their work
 - Optional: check sequence after spelling out whole word/number or check sequence after each letter/number
- First team to spell out given word or number wins

Binary P.E. Equipment Activity

Objective: Students will have to organize a sequence of 0's and 1's to match the given word or sequence of numbers. The first team that correctly assembles the sequence of numbers wins.

Kindergarten/1st Grade/2nd Grade:

Materials Needed:

- Way to show students a sequence of 0's and 1's
- ****Object Ideas**

Rules/Guidelines:

- Divide students into groups of 4 - 5 (depending on space and # of students)
- Choose an 8 number binary sequence for students to recreate
 - Show each team the sequence of numbers the instructor created.
 - Ex. 00010010
- Each team must assemble the sequence in the correct order.
- Students work together to collect 0's and 1's from miscellaneous gym equipment
 - One student from each team runs across gym to collect one item at a time
 - Rest of students remain behind the half-line & figure out next item to retrieve
- ****Object Ideas (scattered around one half of the gym):**
 - **0's = hula hoops, spot markers, soccer/kick balls, foam balls, (anything round-ish)**
 - **1's = pool noodles, rubber chickens, hockey sticks, cones, (anything straight-ish)**
- Once the students have assembled a sequence of 0's and 1's, the instructor will check to make sure they are in the correct sequence.
 - If the sequence of 0's and 1's are wrong, the team must correct their work
- First team to successfully assemble the sequence of numbers win

3rd Grade/4th Grade/5th Grade:

Materials Needed:

- ASCII or Binary Handout
- ****Object Ideas**

Rules/Guidelines:

- Divide students into groups of 4 - 5 (depending on space and # of students)
- Divide students into groups of 4 - 5 (depending on rock wall space and # of students)
- Choose a 2 - 3 letter word for students to spell OR a number (depending on time available)
 - Give each team a Binary or ASCII handout that they will use to determine the sequence of 0's and 1's
- Students work together to collect 0's and 1's from miscellaneous gym equipment
 - One student from each team runs across gym to collect one item at a time
 - Rest of students remain behind the half-line & figure out next item to retrieve
- ****Object Ideas (scattered around one half of the gym):**
 - **0's = hula hoops, spot markers, soccer/kick balls, foam balls, (anything round-ish)**
 - **1's = pool noodles, rubber chickens, hockey sticks, cones, (anything straight-ish)**
- Once the students have assembled a sequence of 0's and 1's, the instructor will check to make sure they are in the correct sequence.
 - If the sequence of 0's and 1's are wrong, the team must correct their work
 - Optional: check sequence after spelling out whole word/number or check sequence after each letter/number
- First team to spell out given word or number wins

“Glossary”

ASCII (pronounced “ask-ee”): *American Standard Code for Information Interchange*

“ASCII is used to translate computer text to human text.

All computers speak in binary, a series of 0 and 1. However, just like English and Spanish can use the same alphabet but have completely different words for similar objects, computers also had their own version of languages. ASCII is used as a method to give all computers the same language, allowing them to share documents and files.

ASCII is important because the development gave computers a common language.”

(Source: <https://rosieresearch.com/why-is-ascii-important/>)

Binary: “Binary (or base-2) a numeric system that only uses two digits — 0 and 1. Computers operate in binary, meaning they store data and perform calculations using only zeros and ones.

A single binary digit can only represent True (1) or False (0) in boolean logic. However, multiple binary digits can be used to represent large numbers and perform complex functions. In fact, any integer can be represented in binary.”

(Source: <https://techterms.com/definition/binary>)

Hexadecimal: “Hexadecimal is a convenient way to express binary numbers in modern computers in which a byte is almost always defined as containing eight binary digits. Two hexadecimal digits can represent eight binary digits, or a byte.”

(Source: <https://whatis.techtarget.com/definition/hexadecimal>)

Binary to Hexadecimal Handout

Ex. 0011 → 3 0100 → 4 00110100 → 34

Ex. 1010 → A 1101 → D 10101101 → AD

Binary Sequence	Hexadecimal
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

ASCII BINARY ALPHABET

A	1000001	N	1001110
B	1000010	O	1001111
C	1000011	P	1010000
D	1000100	Q	1010001
E	1000101	R	1010010
F	1000110	S	1010011
G	1000111	T	1010100
H	1001000	U	1010101
I	1001001	V	1010110
J	1001010	W	1010111
K	1001011	X	1010111
L	1001100	Y	1011001
M	1001101	Z	1011010