

LESSON 4

NUMBER SYSTEMS

WARM-UP: HOW MANY WAYS CAN YOU REPRESENT “7”?

- Take one minute to write your ideas down before sharing with your neighbors.
- We will make a list on the board.

WARM-UP DISCUSSION:

- How many ways can we come up with?
- Why do you think we use the symbols we do use to represent numbers? Who decided that?
- If we were going to design a new system for representing numbers, what features would this system need to have?
- In the previous lessons you all invented ways to represent a set of messages with bits. Today we will focus on representing numbers. By the end of class, you will have invented your own number system.

CIRCLE-TRIANGLE-SQUARE ACTIVITY - CREATING A NUMBER SYSTEM USING SYMBOLS

- Form teams of 2 or 3 students each.
- I'm going to pass out the Activity Guide – Number Systems: Circle-Triangle-Square
- The goal of this activity is not to make a “list” of all the permutations, but to develop a set of rules that could be followed to generate all of them.

QUESTIONS TO THINK ABOUT:

- Could you always tell me which permutation comes next?
- Could a classmate easily follow your rules to generate the same order?
- Would your rules still work if I only asked you to make all the permutations of length 2? What if I asked you instead to make all the permutations of length 4 or 5?

WRAP-UP

- Share out your methods
- Why are some sets of rules easier to use than others/
If so what do you think led to this difference?
- Do you think there are any limits to the number of
symbols we could use to represent numbers?
- All the permutations:
<https://code.org/curriculum/docs/csp/U1L06-numberSystemsExplanation.png>

CONNECTION TO BINARY NUMBERS

- What if we only had two symbols: a circle and a square? Could we still make a number system?
- What if we had 10 symbols: a circle, a triangle, a square, a star, and so on... Could we still make a number system?

THINK ABOUT IT...

- 0, 1, 2, 3, ... 9

HOMework

- Lesson 3 and 4 Worksheet

LESSON 5 (INCLUDED AT END OF
LESSON 4)

BINARY NUMBERS

VIDEO – WHAT’S NEXT?

[HTTPS://WWW.YOUTUBE.COM/WATCH?V=91HLBUJCHBS](https://www.youtube.com/watch?v=91HLBUJCHBS)

WARM-UP: RECALL...

- In the previous lesson you created 27 different 3-place patterns out of circles, triangles and squares, and tried to define a system of rules to generate all of the patterns.
- What if you only had a circle and square? With only a circle and square, how many 3-place patterns are there?

DISCUSSION POINTS

- Why might we want to create a number system that includes only two symbols?
- How large of numbers do you think system can represent? How could we go higher?
- The number system we have just been introduced to is called the **binary number system** and can be constructed entirely from bits. This is the number system implemented in almost every computer. While it may look different from our familiar number system, as we'll see in today's lesson, it can be used in the same way and shares many properties.

PRESENTATION

- Circle Triangle Square to Binary Bits

FLIPPY DO

- Instructions:
 - To get started, cut along the dashed lines to create individual tabs on the bottom of your Flippy Do.
 - In the third row (right about the tabs) add a 0 to each square.
 - Flip up your tabs and write a 1 on the back of each of them.
 - Check answer using the Binary Odometer (In code studio)

HOMework

- Activity Guide – Binary Practice → Complete by tomorrow
- Lesson 3-4 Worksheet

BINARY CALCULATOR