BINARY NUMBER SYSTEM

CAPITAL GROUP℠

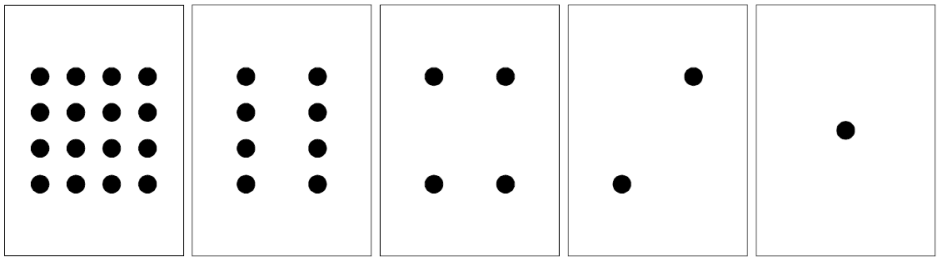
GIRL SCOUTS OF ORANGE COUNTY STEM CONSORTIUM

Objective

Find out what binary numbers are and how they can be used. Did you know that everything that you see or hear on the computer is stored using just two numbers: zero and one?

Materials

A set of five cards with dots on one side and nothing on the other



Discussion Topics

Q: What do you notice about the numbers of dots on the cards

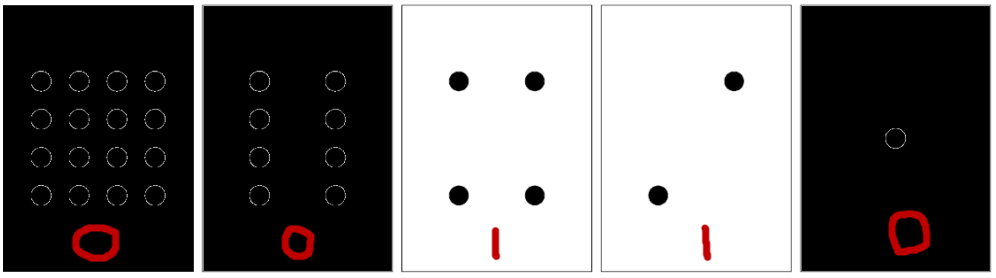
A: *Each card has twice as many dots as the card to its right*

Q: How many dots would the next card have (and so on)

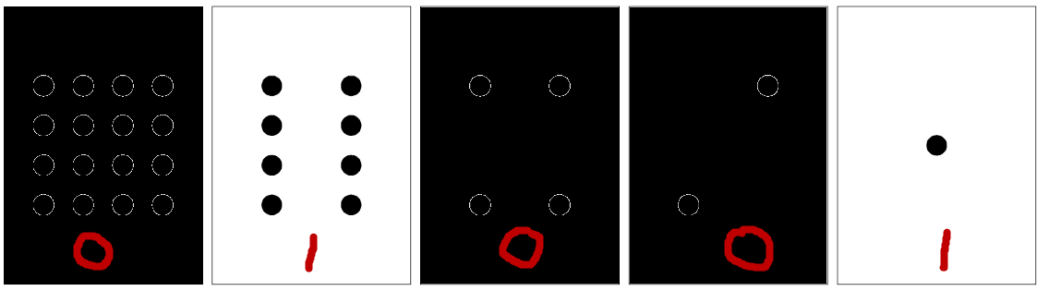
A: *32, 64, 128 …*

Activities

1. Have the girls make numbers by putting some of the cards face down and adding up the dots that are showing.
    - Make the number 6 (4-dot card and 2-dot card will be face up, the rest are face down); make the number 15 (8-4-2-1), 21 (16-4-1)
    - When the card is not showing, it is represented by a zero. When it is showing, it is represented by a one. This is the binary number system



2. *Have the girls make 01001. What number is this in decimal (9)? Have them try a few more until they get the concept.*



3. *Have the girls write their birth month/day in binary*

Extra Activities

- Apply the same concept but with letters of the alphabet instead of numbers.

Discussion Topics

- Each letter of the alphabet is assigned a number. a=1; b=2, l=12

1	2	3	4	5	6	7	8	9	10	11	12	13
a	b	c	d	e	f	g	h	i	j	k	l	m
14	15	16	17	18	19	20	21	22	23	24	25	26
n	o	p	q	r	s	t	u	v	w	x	y	z

- We already learned that each decimal number can be represented by 0 or 1

Activities

1. Pick a simple word and have them converted it to binary number
   a. The computer stores the word "hi" as 10000 (8=h) and 01001 (9=i)
2. Have the girls write their name in binary
3. Create a story and have them guess what the secret message is: