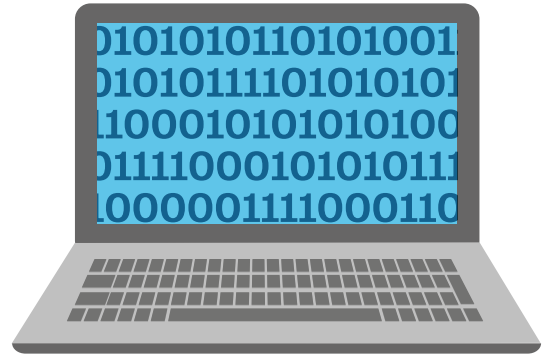# Learn Binary!

Collect

· 5 4x6 index cards (or make your own)

· Marker

· Paper

What is binary?

Computers count in a different way than we do. Instead of using ten numbers (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) to make different numbers like we do, computers only use the numbers "0" and "1." This way of writing information is called binary code. Binary is how all computers "speak" and store information. Inside of every computer are chips which have lots of tiny components called transistors. These transistors can only switch on or off. When the transistors are on, they represent a "1," and when they are off they represent a "0." Each card that you make will act like a transistor in a computer. When the side with the dots faces up, it means that the transistor is on and the computer will read "1." When the side with the dots is facing down, it means that the transistor is off and the computer will read "0." Each transistor card equals one bit of binary code. Eight bits equal one byte of binary code!

Make transistor cards

1. Make one dot, about the size of a dime, in the middle of the first card. Make 2 dots on the second card, 4 dots on the third card, 8 dots on the fourth card, and 16 dots on the last card.

2. Lay the cards on the table in order, starting with the most number of dots on the left. What do you notice about the cards? Can you see a pattern?
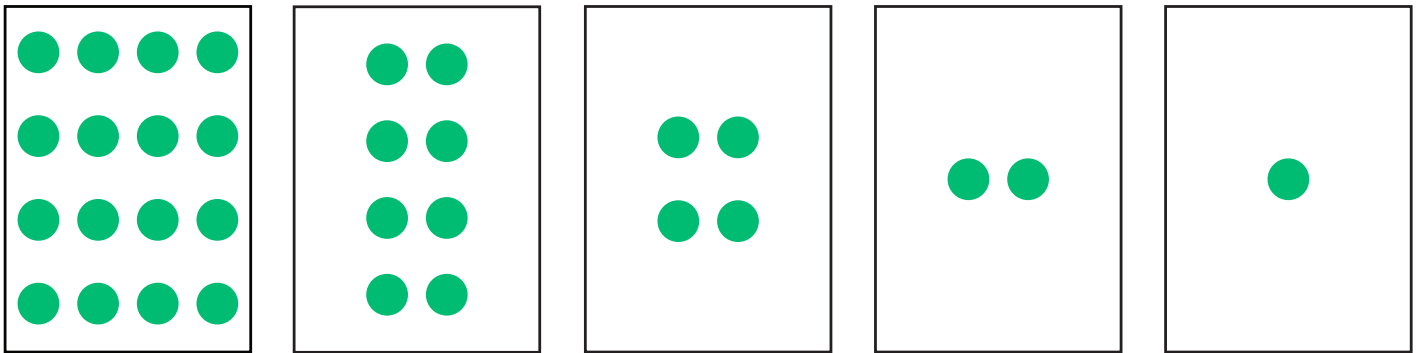

3. Count all of the dots that you can see. Altogether, there are 31 dots.

4. Flip over the card with 16 dots and the card with 8 dots.

5. Count the dots that you can see again. You have made the number 7! Can you make the number 3? What about the number 10?

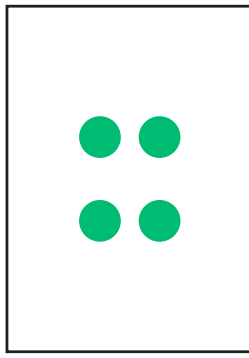## Now write in binary code!

6. When the side with dots is facing up, it is represented by the number "1." When the blank side is facing up, it is represented by the number "0." Try writing the binary code for the number 5. You should get "0 0 1 0 1." This is how a computer would write the number 5!
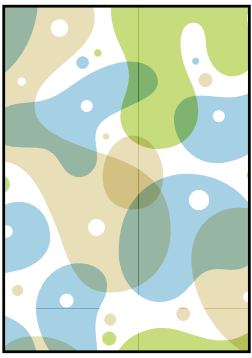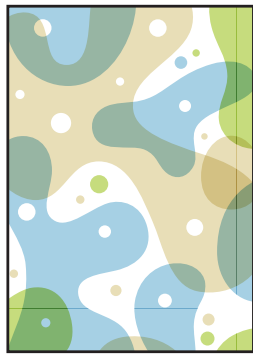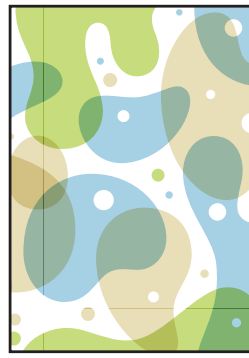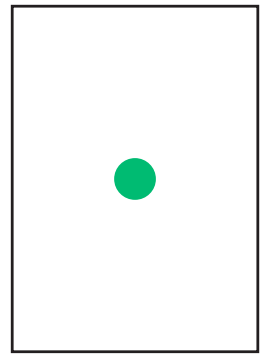
| 0 | 0 | 1 | 0 | 1 |

7. Try other numbers. Can you flip the cards to show your age? What about the day of the month that you were born?

8. Try using your cards to count from zero to thirty-one. Is there a pattern in how you flip the cards?