1 1 <− 10 Rule

1. Write down a prediction for what the mystery code will be when we use ... dots. Now try it below.

2. What is the 1 <− 10 rule?

2 Anti-Dots

Now that you've learned about exploding dots, let's talk about anti-dots.
We can show these as open dots. When we add an anti-dot and an exploding dot, this will equal zero. We will demonstrate this on the board. With anti-dots and exploding dots, we can do subtraction. For example, 7 exploding dots plus 3 anti-dots is 4 dots. Now, lets try some of these problems.

1. Key Concept: What is 8 exploding dots plus 8 anti-dots?

2. What is ... exploding dots plus 4 anti-dots?

3. What is ... anti-dots plus 2 exploding dots?

1. 100 - ....=

2. 123 - ....=

3. 112 -....=

4. 107 - ....=

5. 13 - ....=

6. -12 - ....=

7. -5 - ....=

3 More Practice!

1. Which base is 1020 written in? Do you know for sure? If not, what are all the possible bases it could be written in? Why?

2. Convert 10011 base 2 to base 10.

3. Convert 56 base 10 to base 2.

4. Now that you know how to convert between base 10 and base 2, try converting 45 base 10 to base 3. (You can always ask an instructor for help if you get stuck!)

4 Applications: Computer Science

Binary (base 2) is commonly used in computer programming. Since the electrical circuits in computers are like switches that have only two positions, on and off, we can represent any combination of switches using binary numbers (on = 1, off = 0). Recall from your handout that these base-2 numbers can represent numbers in any other base, such as base 10 (what people use in everyday life), as well as other symbols, such as letters. These strings of numbers can store data by representing different values, or bits. In this way, every time you press a key on your keyboard, you are implementing a different binary code (each key has a different code). In fact, whenever you type a word into Google, you are essentially creating a long string of binary code that is represented by the 1s and 0s we have learned about using exploding dots.