

## Digital Information

### Supplemental Lesson Ideas

Class discussions reinforce student understanding of binary numbers. Lesson ideas prompt students to think about how information is stored on familiar devices, such as music CDs. A group activity helps students apply what they have learned about binary numbers in a kinesthetic way.

- 1. Display an image of the Binary Table to show and demonstrate the first 16 binary numbers (number 16 will put you "off the chart"—a fun demonstration to do in front of students).**  
Make sure that students understand the term "binary." Relating the term to tricycle, bicycle, and unicycle may help them remember the term.
- 2. Ask students if they think you could use a microscope to see tiny 0s and 1s inside a computer.**  
Why or why not?
- 3. Ask students what difference, if any, are there in the way a television set displays pictures and the way a computer monitor shows pictures.**
- 4. Compare a music CD with a computer CD.**  
Have them consider that a CD used in a CD-player lets you listen to music, while a CD used in a computer can play music and provide text and pictures. What differences do they think there are in the way each CD stores the information it contains?
- 5. Give students the Computers and Pictures handout and specify the time frame and expectations.**  
(There's an online exercise similar to this.) Have students share the results of their work with their pictures.
- 6. Discuss the idea that information inside a computer is stored using a binary coding system.**  
Ask students to consider why one might want to use a code. Have them discuss the use of codes they are familiar with such as sign language, Morse code, bar codes, postal codes, or secret codes that they have invented. Why are codes used? What are the advantages and disadvantages of using codes?
- 7. Read and discuss the Binary Counter handout.**  
You can demonstrate the binary counting technique with a group of four students or have each group work to determine how the binary counter activity is to be done. If you demonstrate the activity, allow time for questions.

Divide the class into groups of 8-10. Give students time to work through the handout and practice with their counter. Have students switch roles about halfway through the allotted time so that all students get to be in the counter.

Select one or two groups to demonstrate counting to 15. Try adding one more person to the counter and see if they can handle the larger values. Have students discuss their thoughts about reading numbers in binary form compared to reading numbers in decimal form.

If you have time, you might engage the class in a short competition to see how quickly each group is able to read a number a group displays for the others. Vary this by having the groups display a value specified for them. Make sure that the values are correctly given by the counter before the counter dismantles the display.

- 8. Explore how our counting system, decimal notation, is just one of many ways to represent numbers and do calculations.**

Have them practice binary arithmetic so they can practice applying their understanding of binary numbers in the context of doing simple arithmetic.

9. **Discuss the ASCII code.**

Point out that if all computer manufacturers agree to use the same code, then it becomes much easier to move information from one brand of computer to another.

10. **Give students time to work on the Binary Numbers, ASCII Computer Code, and the Decision Making handouts.**

You can demonstrate the binary counting technique with a group of four students or have each group read one selection and compare the readings.