



SOUNDS CLEAR TO ME NOW

MATERIALS:

- **THREE (3) PIECES OF 8½ IN. 11 IN. UNLINED TRACING PAPER**
- **SIMPLE DRAWING OF AN OBJECT (SEE CD)**
- **PENCIL**
- **METRIC RULER**



PROCEDURE:

1. Take one sheet of tracing paper.
2. Using the ruler, construct a 7 cm. x 7 cm. square in the middle of the page.
3. Mark off points 10 mm. apart from each other around the edge of the square.
4. Connect the dots across the square so that you have a grid with 10 mm. boxes.
5. Lay the grid over the picture of the CD to the right. With the pencil, shade in each box that contains a line of the drawing. Leave the other boxes empty. Label the drawing "Grid #1" and put it aside.
6. On a second piece of tracing paper, construct another 7 cm. x 7 cm. grid. This time, make the individual boxes 5 mm. (Note: you should have twice as many boxes in this grid than in the first one.) Repeat Step 5 and label the drawing "Grid #2."
7. On the final sheet of tracing paper, construct another 7 cm. x 7 cm. grid and make the individual boxes 2 mm. Place it over the picture, fill in the boxes as before, and label it "Grid #3."
8. Now lay the three sheets of paper side by side. What do you notice?

WHAT THIS MEANS:

You will see that the more boxes in the grid, the more closely the “filled in” boxes resemble the drawing. How does this relate to CD technology?

To make a CD, incoming sound waves are captured electronically and turned into a code using a technology called **signal sampling**. As the signal comes in, its **amplitude** is read, or sampled, at regular intervals and assigned numerical values between 0 and 65,000. The greater the number of samples per second (or in the case of this experiment, the greater the number of boxes in the grid), the greater the resolution and the more accurate the sound or clearer the picture. Most CDs use 44,000 samples per second, creating extremely accurate reproductions.






GLOSSARY:

Amplitude: The maximum extent of a vibration or oscillation, measured from the position of equilibrium.

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