



DSA

Alternate Base Systems for Cross-Curricular Fun & Engineering Applications

SHORT 10-MINUTE LECTURE ON ALTERNATE BASES

I. What are bases and number systems?

- A. Unary system---tally marks
- B. Alphabetic systems---letter for number (Hebrew) and no zero---Roman numerals
- C. Mixed-radix---time: seconds, min., hrs---calendar: days, weeks, months
- D. Place notation---what we all use today

II. Accustomed to decimal; but use other bases regularly

- A. Non-decimal customary measures
- B. Time and angle measurement
- C. Computers (binary, octal, hexadecimal)

III. Some uses for alternative bases

- A. Binary
 - 1. Extremely easy arithmetic (just shifting bits)
 - 2. Occasionally computer use (also shifting bits)
- B. Octal--Unix file permissions
- C. Hexadecimal
 - 1. Graphics design---color codes
 - 2. Binary frequently encoded in hexadecimal form
- D. Dozenal
 - 1. Human-scaled base
 - 2. Easy multiplication tables
 - 3. Extremely high factorability
 - 4. Use in measurement & quantity (time, angles, grocery goods, etc.)

IV. Use bases to explore number, measurement, and quantity