Computer Science Unplugged

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• CS Unplugged is a book of activities that illustrate computer science principles without using a computer.
• Activities are short and are designed to be easily integrated into classes and include exercises and lesson plans for teachers.
ROADMAP

• Data
• Algorithms & Efficiency
• Structures & Abstractions
• Limits of Computing*

COUNT THE DOTS

10010
101010
10000000
01111111
01111111
10111111
**COUNT THE DOTS**

**HAPPY BIRTHDAY...**

Born July 16, 1967

**COUNT THE DOTS**

- Letters and other symbols are represented in computers in binary also!
  - blank 0 00000₂
  - A 1 00001₂
  - B 2 00010₂
  - C 3 00011₂
  - ...
  - Z 26 11010₂
COLOR BY NUMBERS

• Computer screens are divided up into a grid of small dots called *pixels* (picture elements). In a black and white picture, each pixel is either black or white.

• Computers store drawings, photographs and other pictures using only numbers.

• The following activity demonstrates how a computer image can be stored efficiently.
The letter a has been magnified to show the pixels. When a computer stores a picture, all that it needs to store is which dots are black and which are white.
COLOR BY NUMBERS

CS UNPLUGGED

- The basic edition of Computer Science Unplugged has 12 classroom exercises for you to use with your students.
- Each exercise has a number of extensions, activities and background information.
- All activities can be done without the use of computers, but they all demonstrate fundamental principles used in computers today.
The teacher's version of Computer Science Unplugged is available online at
http://www.csunplugged.org
▪ The book is FREE to download and use!
▪ Additional material will be published soon to add even more activities, including video to demonstrate how to use these activities effectively in your classroom.
This exercise illustrates even parity.

When computer data is transmitted to another computer, extra bits are added so that the number of 1s is even.

The receiving computer can detect if something gets messed up during the transmission and can correct it if there is one error.

What happens if there are two errors?

Here is an example of parity in real life:

1 \times 10 = 10
4 \times 9 = 36
2 \times 8 = 16
5 \times 7 = 35
9 \times 6 = 54
3 \times 5 = 15
7 \times 4 = 28
6 \times 3 = 18
7 \times 2 = 14

226 \div 11 = 20 \text{ remainder } 6
Checksum Digit = 11 - 6 = 5
CARD FLIP MAGIC

• More parity:

WHAT'S NEXT?

• Data
• Algorithms & Efficiency ← NEXT
• Structures & Abstractions
• Limits of Computing*