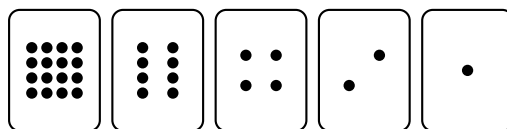


Count the Dots – Binary Numbers

Lege die Karten, absteigend nach Anzahl der Punkte sortiert, auf den Tisch:



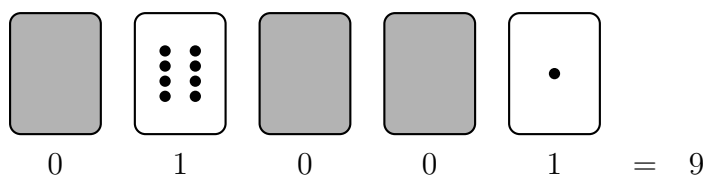
Aufgabe 1: Was ist das Besondere an der Anzahl der Punkte auf den Karten?

Es sind die Zweierpotenzen $2^4 = 16$, $2^3 = 8$, $2^2 = 4$, $2^1 = 2$, $2^0 = 1$.

Aufgabe 2: Wie viele Punkte müsste die nächsten Karte haben, wenn man die obige Reihe der Karten nach links fortsetzen würde?

$2 \cdot 16 = 32 = 2^6$ Punkte

Drehen wir eine Karte um, so dass ihre Punkte verborgen sind, dann schreiben wir eine „0“ unter die Karte. Ist die Punktzahl sichtbar, dann schreiben wir eine „1“ darunter. Die Summe der angezeigten Punkte ist dann die von den Karten dargestellte Zahl. Auf diese Weise können wir eine natürliche Zahl im *Binärsystem* darstellen.



Aufgabe 3: Welche Zahlen werden durch den oben beschriebenen Binärcode dargestellt? Verwende die Karten, wenn du die Rechnung nicht im Kopf durchführen willst.

Da die Ziffern im Binärcode nicht die gleichen Stellenwerte haben wie die Ziffern im Dezimalsystem, kennzeichnen wir Binärzahlen mit einer tiefgestellten 2.

(a) $00011_2 = 2 + 1 = 3$

(b) $10100_2 = 16 + 4 = 20$

(c) $01111_2 = 8 + 4 + 2 + 1 = 15$

Aufgabe 4: Stelle die folgenden Zahlen mit den Karten dar, indem du die dafür nötigen Karten aufdeckst bzw. umdrehst. Schreibe dann den zugehörigen *Binärcode* auf.

(a) $5 = 00101_2$






















(b) $11 = 01011_2$

(c) $28 = 11100_2$

Aufgabe 9: Tom is trapped on the top floor of a department store. It's just before Christmas and he wants to get home with his presents. What can he do? He has tried calling, even yelling, but there is no one around. Across the street he can see some computer person still working away late into the night. How could he attract her attention? Tom looks around to see what he could use. Then he has a brilliant idea—he can use the Christmas tree lights to send her a message! He finds all the lights and plugs them in so he can turn them on and off. He uses a simple binary code, which he knows the woman across the street is sure to understand.

1	2	3	4	5	6	7	8	9	10	11	12	13
A	B	C	D	E	F	G	H	I	J	K	L	M
14	15	16	17	18	19	20	21	22	23	24	25	26
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Can you work it out?

					$01000_2 \rightarrow 8 \rightarrow H$
					$00101_2 \rightarrow 5 \rightarrow E$
					$01100_2 \rightarrow 12 \rightarrow L$
					$10000_2 \rightarrow 16 \rightarrow P$
					$01001_2 \rightarrow 9 \rightarrow I$
					$01101_2 \rightarrow 13 \rightarrow M$
					$10100_2 \rightarrow 20 \rightarrow T$
					$10010_2 \rightarrow 18 \rightarrow R$
					$00001_2 \rightarrow 1 \rightarrow A$
					$00001_2 \rightarrow 16 \rightarrow P$
					$00001_2 \rightarrow 16 \rightarrow P$
					$00101_2 \rightarrow 5 \rightarrow E$
					$00100_2 \rightarrow 4 \rightarrow D$

Quelle: 2015 Computer Science Unplugged (csunplugged.org)

What's it all about?

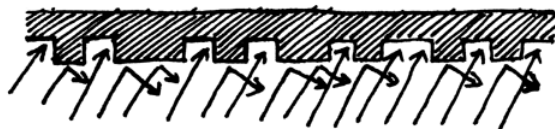
Computers today use the binary system to represent information. It is called *binary* because only two different digits are used. It is also known as base two (humans normally use base 10). Each zero or one is called a *bit* (**binary digit**). A bit is usually represented in a computer's main memory by a transistor that is switched on or off, or a capacitor that is charged or discharged.



When data must be transmitted over a telephone line or radio link, high and low-pitched tones are used for the ones and zeros. On magnetic disks (hard disks and floppy disks) and tapes, bits are represented by the direction of a magnetic field on a coated surface, either North-South or South-North.



Audio CDs, CD-ROMs and DVDs store bits optically—the part of the surface corresponding to a bit either does or does not reflect light.



The reason that computers only use two different values is that it's much easier to build devices that do it this way. We could have had CDs that have 10 levels of reflection so that we could represent all the digits from 0 to 9, but you have to build very expensive and precise devices to make it work. The other thing you may have noticed is that although we say that computers only store zeroes and ones, the actually don't have zeroes and ones inside them – just high and low voltages, or north/south magnetism, and so on. But it's quicker to write “0” and “1” than things like “shiny” and “not shiny”. Everything on computers is represented using these bits – documents, pictures, songs, videos, numbers, and even the programs and apps that we use are just a whole lot of binary digits.

One bit on its own can't represent much, so they are usually grouped together in groups of eight, which can represent numbers from 0 to 255. A group of eight bits is called a *byte*.

Quelle: 2015 Computer Science Unplugged (csunplugged.org)

<i>transistor</i>	ein Bauelement in elektronischen Schaltungen
<i>resistor</i>	ein Bauelement, um elektronischen Strom aufzuteilen oder zu begrenzen
<i>coated</i>	beschichtet
<i>floppy disk</i>	eine Diskette (informiere dich im Internet)