3

Data and Storage

CLARUSWAY©
WAY TO REINVENT YOURSELF

Agenda

- Binary Number System
- Number Representation
- Letter Representation
- Voice Representation
- Image and Video Representation
- Bits and Bytes

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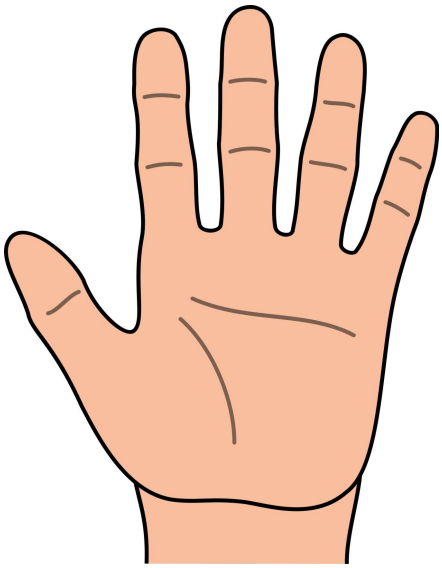
Binary Number System

- **decimal**
  - **0, 1, 2, 3, 4, 5, 6, 7, 8, 9,**

Binary Number System

- **binary**
  - **0, 1**

Binary Number System



Binary Number System

123

Binary Number System

100 10 1

123

1X100 + 2x10 + 3x1 = 123

Binary Number System

4 2 1

000

Binary Number System

4 2 1

001

Binary Number System

4 2 1

010

Binary Number System

4 2 1

011

Binary Number System

4 2 1

100

Binary Number System

4 2 1

111

4 2 1

111+1= ?

Binary Number System

8 4 2 1

1000

Binary Number System

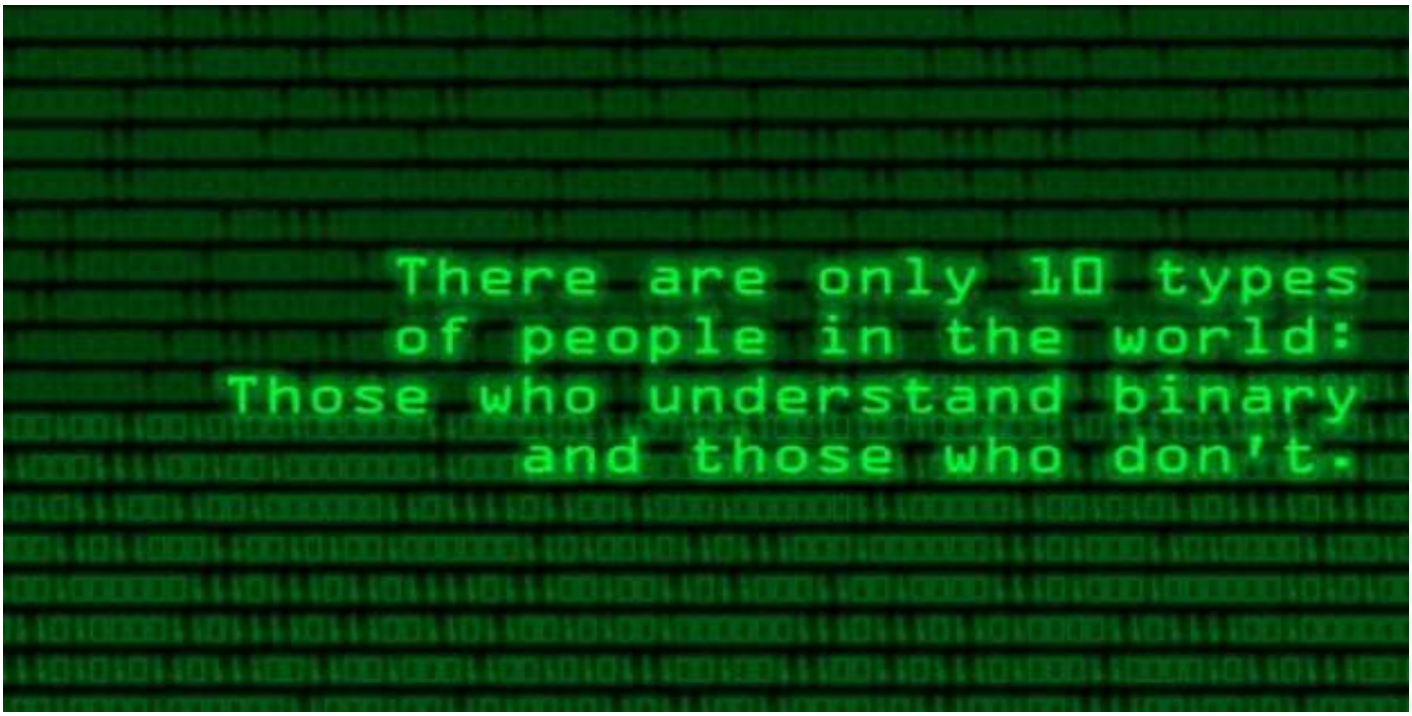
100 10 1

999

Binary Number System

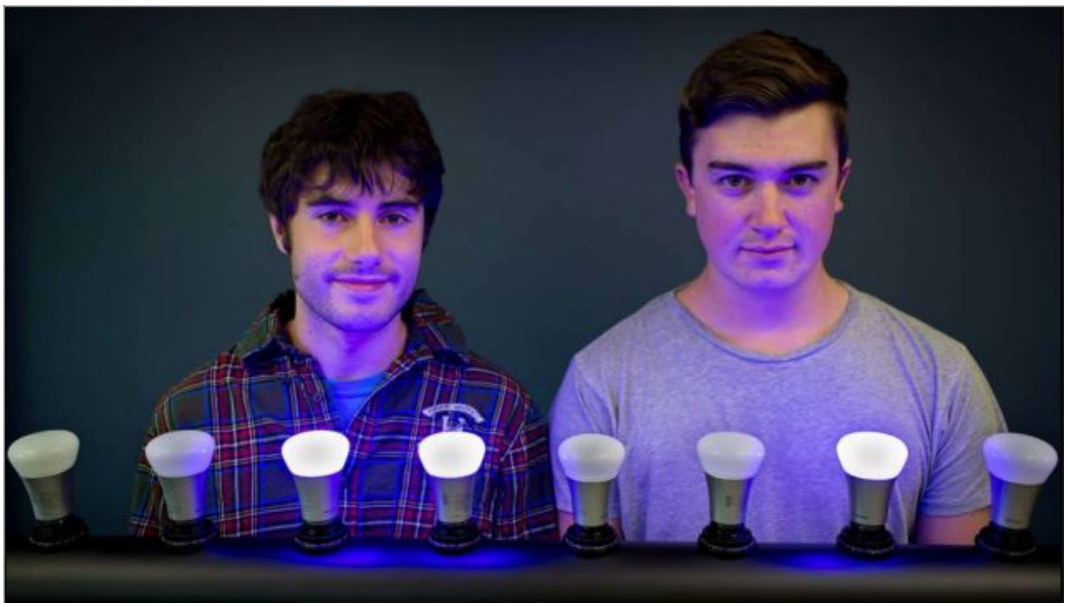
1000 100 10 1

1000



Binary Number System

- **Click to image:**



Let's practice

128	64	32	16	8	4	2	1

Choose a response

Choose the binary number system representation of 14

A. 1110
B. 1010
C. 1000
D. 1111
E. 1001

Students choose an option

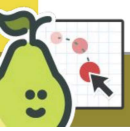
How about 50?

110010

110111

111101

110101



Students, drag the icon!

Binary Number System

1001

Binary Number System

11010 = ? in decimal

Number Representation

- Numbers are represented as integers.

Data Type	Operator used	Description
String	str	Text or numbers that can be combined in a print statement.
Integer	int	Whole number with no decimal part. Used to do calculations
Float	float	Real number with a decimal part. Use to do calculations.

Letter Representation

- ASCII: American Standard Code for Information Interchange

TABLE 3
ASCII CHARACTER CODES (DECIMAL)

0	Ctrl-@	32	Space	64	@	96	`
1	Ctrl-A	33	!	65	A	97	a
2	Ctrl-B	34	"	66	B	98	b
3	Ctrl-C	35	#	67	C	99	c
4	Ctrl-D	36	$	68	D	100	d
5	Ctrl-E	37	%	69	E	101	e
6	Ctrl-F	38	&	70	F	102	f
7	Ctrl-G	39	'	71	G	103	g
8	Backspace	40	(	72	H	104	h
9	Tab	41	)	73	I	105	i
10	Ctrl-J	42	*	74	J	106	j
11	Ctrl-K	43	+	75	K	107	k
12	Ctrl-L	44	,	76	L	108	l
13	Return	45	-	77	M	109	m
14	Ctrl-N	46	.	78	N	110	n
15	Ctrl-O	47	/	79	O	111	o
16	Ctrl-P	48	0	80	P	112	p
17	Ctrl-Q	49	1	81	Q	113	q
18	Ctrl-R	50	2	82	R	114	r
19	Ctrl-S	51	3	83	S	115	s
20	Ctrl-T	52	4	84	T	116	t
21	Ctrl-U	53	5	85	U	117	u
22	Ctrl-V	54	6	86	V	118	v
23	Ctrl-W	55	7	87	W	119	w
24	Ctrl-X	56	8	88	X	120	x
25	Ctrl-Y	57	9	89	Y	121	y
26	Ctrl-Z	58	:	90	Z	122	z
27	Escape	59	;	91	[	123	{
28	Ctrl-\	60	<	92	\	124	|
29	Ctrl-]	61	=	93	]	125	}
30	Ctrl-^	62	>	94	^	126	~
31	Ctrl-_	63	?	95	_	127	Delete

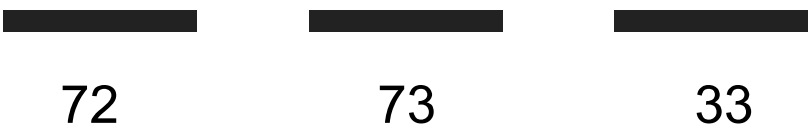
Letter Representation

- ASCII: American Standard Code for Information Interchange

7 bits ---> 128 letters/symbols

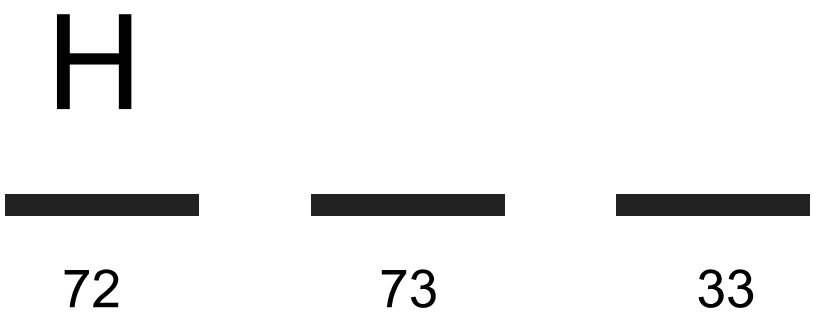
Letter Representation

- ASCII: American Standard Code for Information Interchange



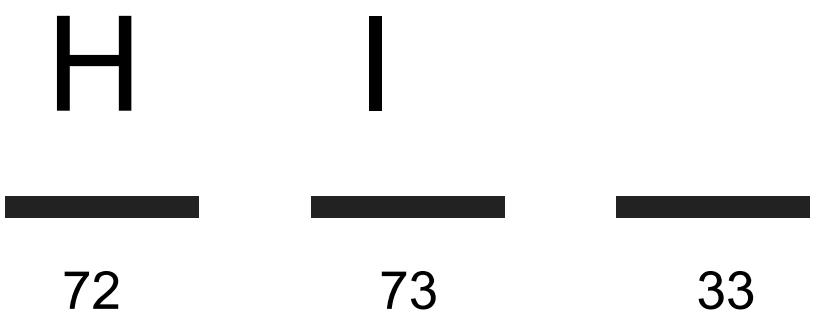
Letter Representation

- ASCII: American Standard Code for Information Interchange



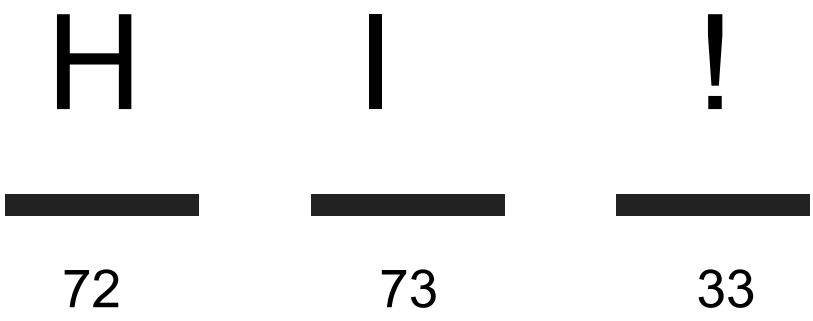
Letter Representation

- ASCII: American Standard Code for Information Interchange



Letter Representation

- ASCII: American Standard Code for Information Interchange

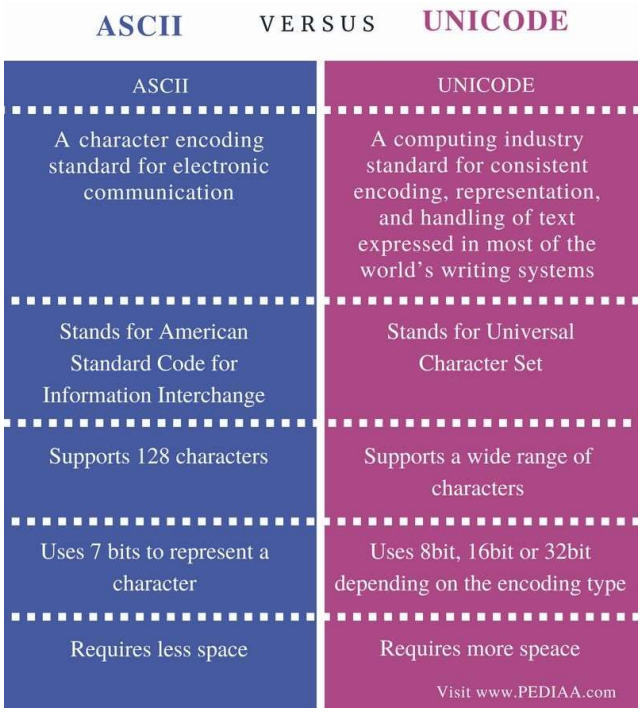


Letter Representation

- Unicode:

Bits of code point	First code point	Last code point	Bytes in sequence	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
7	U+0000	U+007F	1	0xxxxxxx					
11	U+0080	U+07FF	2	110xxxxx	10xxxxxx				
16	U+0800	U+FFFF	3	1110xxxx	10xxxxxx	10xxxxxx			
21	U+10000	U+1FFFFF	4	11110xxx	10xxxxxx	10xxxxxx	10xxxxxx		
26	U+200000	U+3FFFFFF	5	111110xx	10xxxxxx	10xxxxxx	10xxxxxx	10xxxxxx	
31	U+4000000	U+7FFFFFFF	6	1111110x	10xxxxxx	10xxxxxx	10xxxxxx	10xxxxxx	10xxxxxx

Letter Representation



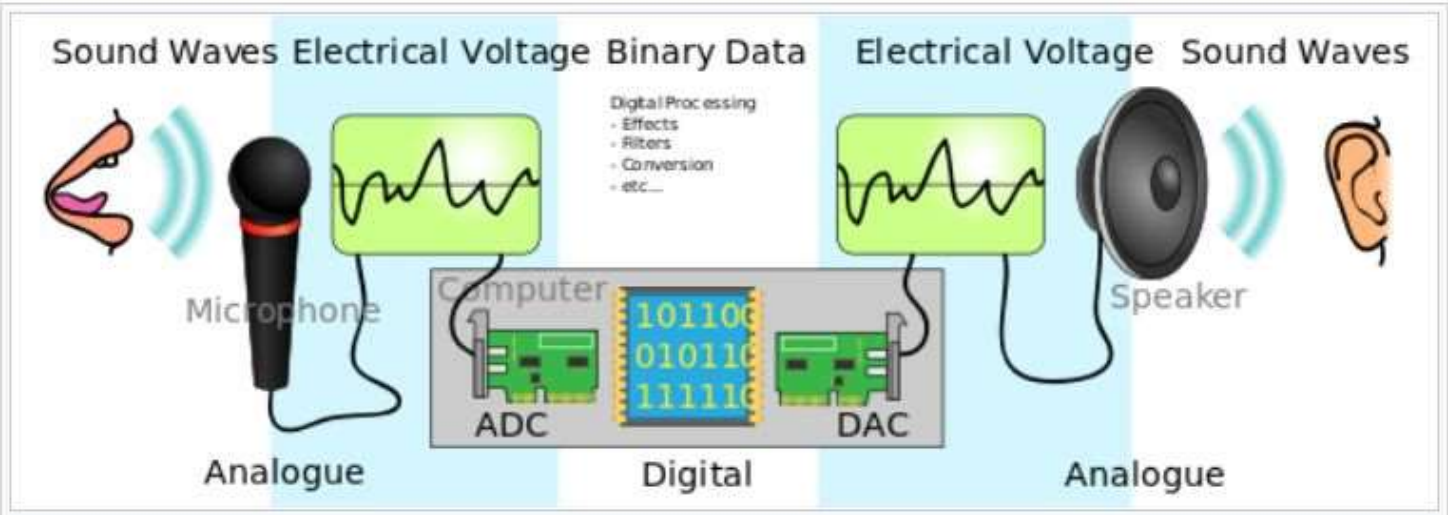
Letter Representation

- Unicode:



U+1F606 **U+1F69F** **U+1F63F**

Voice Representation



Voice Representation

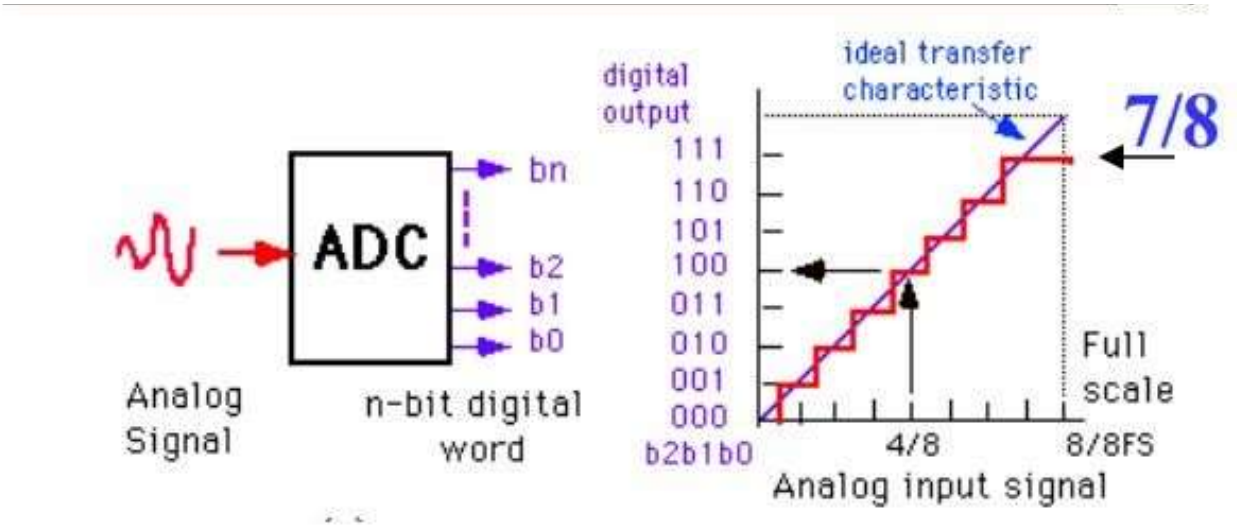


Image and Video Representation

- RGB (Red, Green Blue)

72	73	33

Image and Video Representation

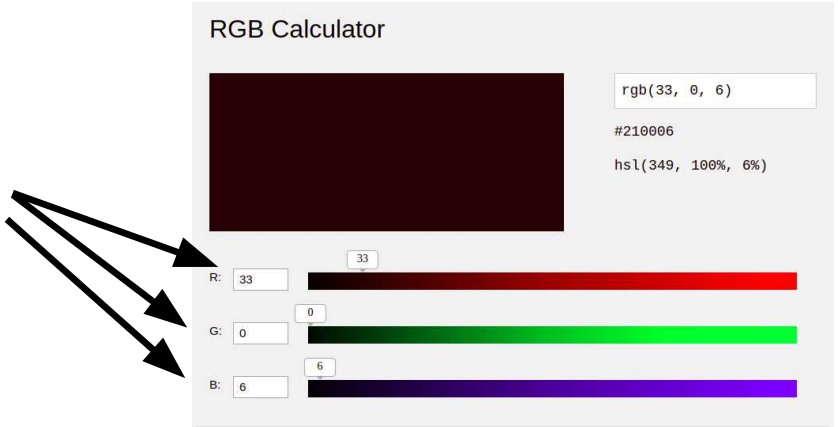


Image and Video Representation

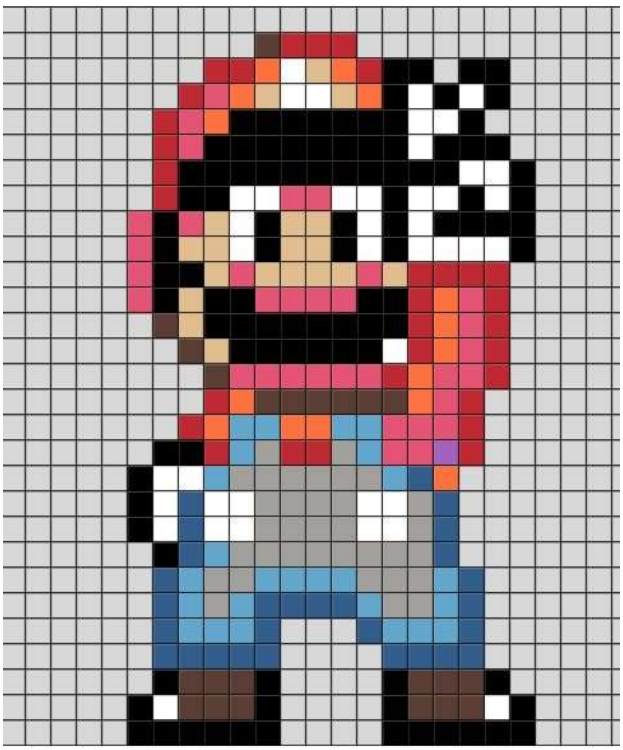
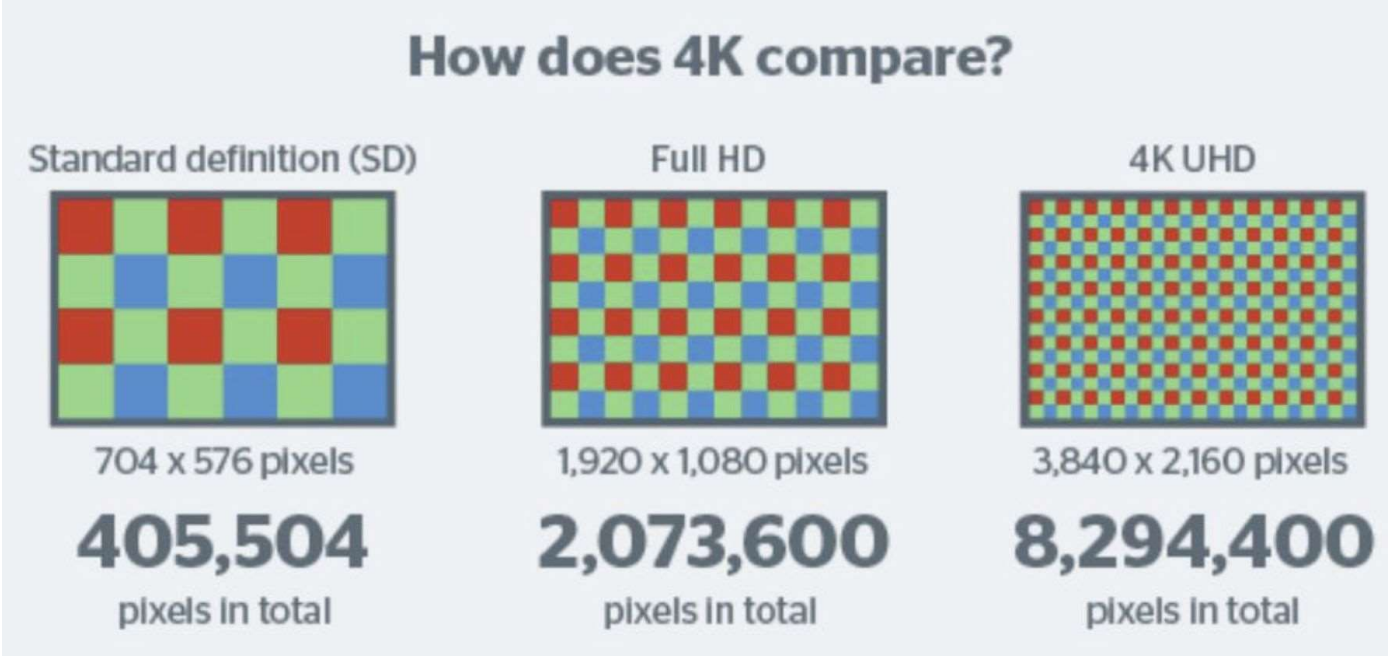
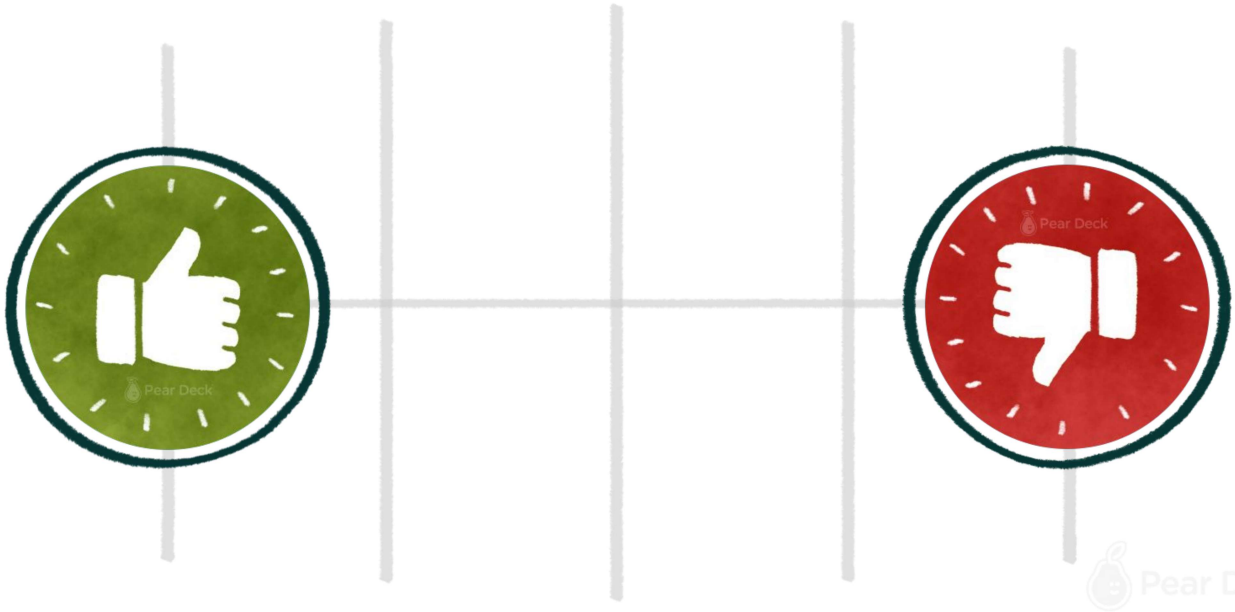


Image and Video Representation



How well did you like this section?



Students, drag the icon!

Pear Deck Interactive Slide
Do not remove this bar

Bits and Bytes

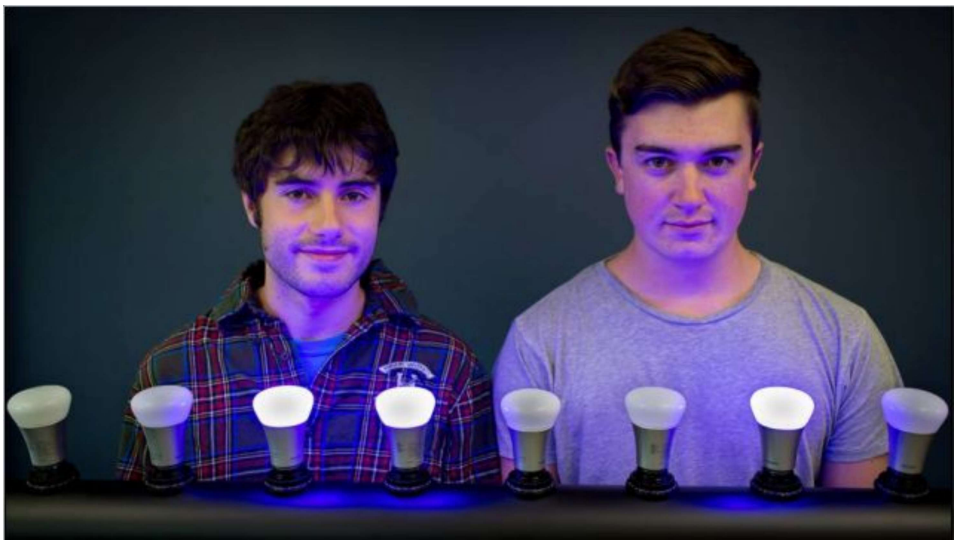
Bit

- **0/1**
- **true/false**
- **yes,no**

Bits and Bytes

Byte

- **8 bits**



Bits and Bytes

Kilobyte

- **1000 bytes**
- **8000 bits**

Bits and Bytes

Kilobyte

- ~~1000~~ 1024 bytes
- ~~8000~~ 8192 bits

Bits and Bytes

Kilobyte

- 2^{10} bytes

Bits and Bytes

Bits and Bytes

Megabyte

- 2^{10} kilobytes
- 2^{20} bytes
- 1024 kilobytes

Bits and Bytes

Bits and Bytes

Gigabyte

- 2^{10} megabytes
- 2^{20} kilobytes
- 2^{30} bytes
- 1024 megabytes

Bits and Bytes

Bits and Bytes

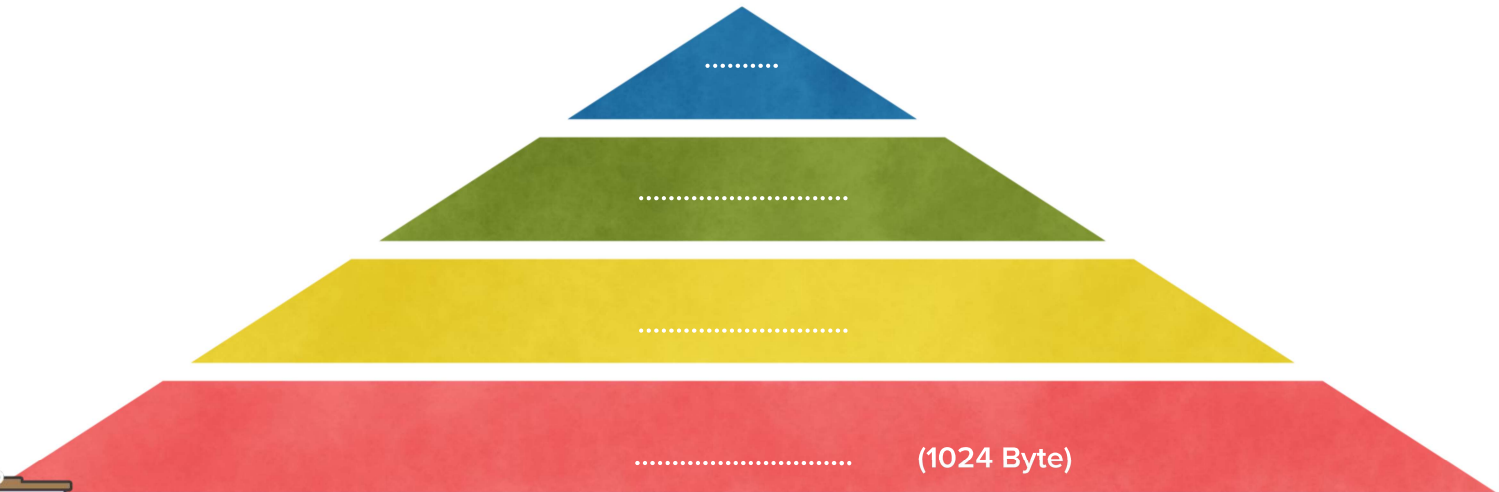
Terabyte

- 2^{10} gigabytes
- 2^{20} megabytes
- 2^{30} kilobytes
- 2^{40} bytes
- 1024 gigabytes

Bits and Bytes

bytEgyptian pyramids

Let's write to bits and bytes pyramid.



Students, draw anywhere on this slide!

Kahoot!

Circle how you are feeling:

Students, draw anywhere on this slide!

THANKS!

Any questions?

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