Oide

Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí

Supporting the Professional Learning of School Leaders and Teachers

Session 3: Computer Systems II

LEAVING CERTIFICATE COMPUTER SCIENCE

Overview of the session

Part 1	Hexadecimal, ASCII, Hitomezashi Stitching
Part 2	Computer systems part picker activity
Part 3	Presentation and discussion on activity

By the end of this session..

Participants will have…

… developed a clear understanding of why the binary number system is fundamental in digital computing

… explored the Hexadecimal Number System

… gained proficiency in converting numbers between binary, hexadecimal, and decimal formats

… gained knowledge about ASCII, Unicode, and UTF-8 encoding

… personalised their initials by converting them into binary using ASCII and/or UTF values and represent using Hitomezashi stitching technique

… describe different components within a computer and the function of these components

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Number Systems

Hexadecimal, ASCII and Hitomezashi Stitching

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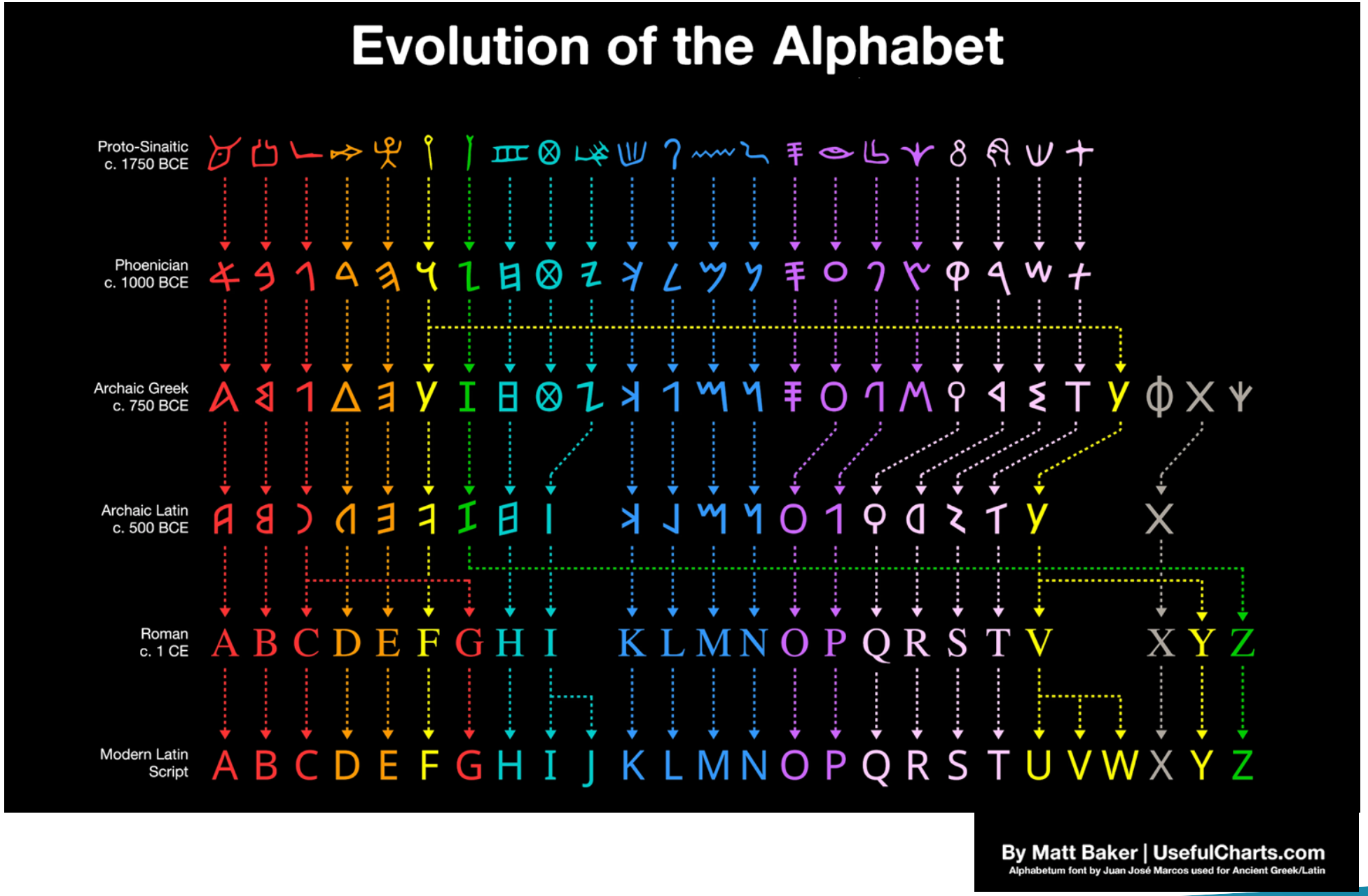
Evolution of the Alphabet
Proto-Sinaitic
c. 1750 BCE
Phoenician
c. 1000 BCE
Archaic Greek
c. 750 BCE
Archaic Latin
c. 500 BCE
Roman
c. 1 CE
A B C D E F G H I K L M N O P Q R S T V X Y Z
Modern Latin
Script
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
By Matt Baker | UsefulCharts.com
Alphabetum font by Juan José Marcos used for Ancient Greek/Latin

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Everything is 1s and 0s

All information that passes through a computer is formed from the controlled flow of electricity through its various components.

The information contained in this electricity flow is interpreted as:

On = 1 and **Off** = 0.

We can, therefore, consider information flow through a computer in terms of 1s and 0s.

But how is this flow of 1s and 0s turned into something useful (and how do we turn something useful into 1s and 0s so that it may be worked on by a computer)?

Hexadecimal

Base 16 number system (has 16 digits, decimal has 10, binary has 2)

0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

Human-friendly gateway between decimal and binary

Used most notably for encoding colour information - Hex colouring

Red, Green and Blue can be a value from 00 to FF (0 – 255)

#000000 is black #FFFFFF is white #34ab2c is greenish

https://www.color-hex.com/

ASCII, Unicode, UTF8

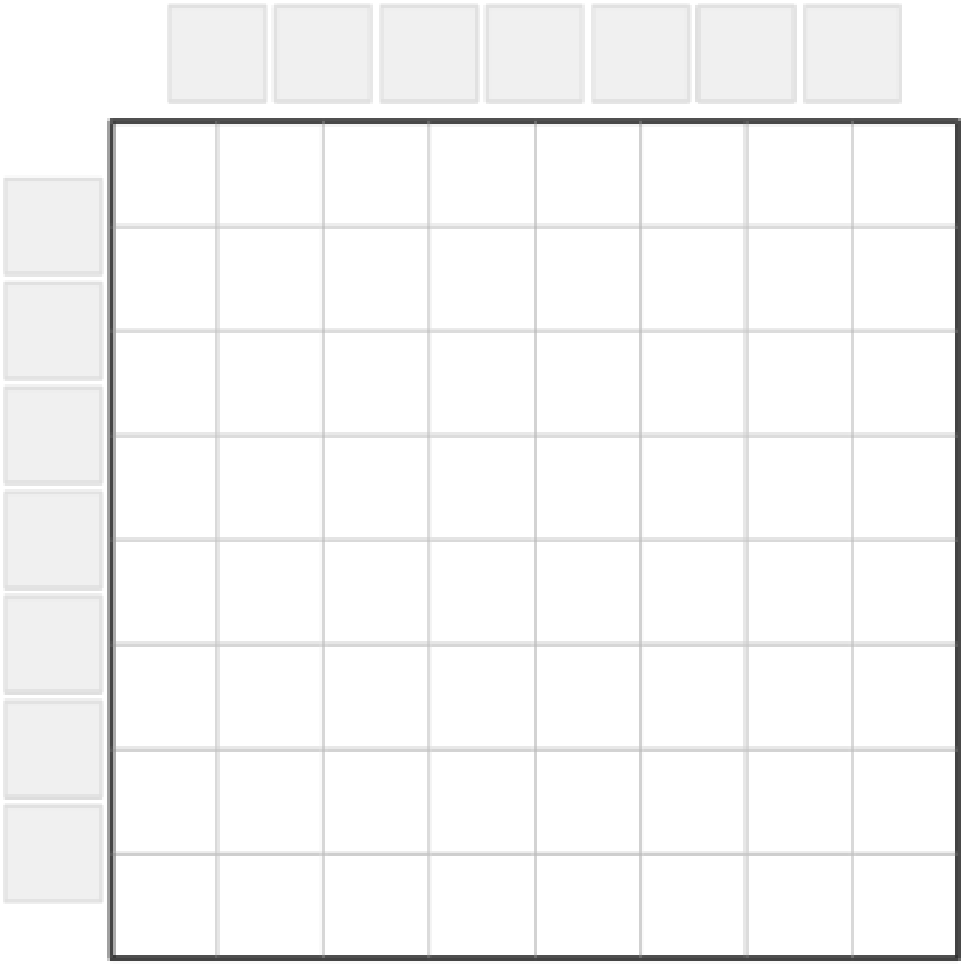
- Character encoding standards are used to ensure smooth and consistent information exchange
- ASCII uses 7 bits to encode 128 different characters (2^7)
- Include Arabic numerals and the English alphabet
- Unicode is an extension of ASCII, allowing for other alphabetic symbols to be encoded and transmitted
- UTF (Unicode Transformation Format) 8 is the most common format.

U+1F601	😁	beaming face with smiling eyes	beaming face with smiling eyes | eye | face | grin | smile
U+1F606	😆	grinning squinting face	face | grinning squinting face | laugh | mouth | satisfied | smile
U+1F605	😅	grinning face with sweat	cold | face | grinning face with sweat | open | smile | sweat
U+1F923	🤣	rolling on the floor laughing	face | floor | laugh | rofl | rolling | rolling on the floor laughing | r
U+1F602	😂	face with tears of joy	face | face with tears of joy | joy | laugh | tear
U+1F642	🙂	slightly smiling face	face | slightly smiling face | smile

ASCII Characters in Hexadecimal

Hex	Value	Description	Hex	Value	Description	Hex	Value	Description	Hex	Value	Description
40	@	"at" symbol	50	P	Capital P	60	`	Grave / accent	70	p	Small p
41	A	Capital A	51	Q	Capital Q	61	a	Small a	71	q	Small q
42	B	Capital B	52	R	Capital R	62	b	Small b	72	r	Small r
43	C	Capital C	53	S	Capital S	63	c	Small c	73	s	Small s
44	D	Capital D	54	T	Capital T	64	d	Small d	74	t	Small t
45	E	Capital E	55	U	Capital U	65	e	Small e	75	u	Small u
46	F	Capital F	56	V	Capital V	66	f	Small f	76	v	Small v
47	G	Capital G	57	W	Capital W	67	g	Small g	77	w	Small w
48	H	Capital H	58	X	Capital X	68	h	Small h	78	x	Small x
49	I	Capital I	59	Y	Capital Y	69	i	Small i	79	y	Small y
4A	J	Capital J	5A	Z	Capital Z	6A	j	Small j	7A	z	Small z
4B	K	Capital K	5B	[	left/opening bracket	6B	k	Small k	7B	{	left/opening brace
4C	L	Capital L	5C	\	back slash	6C	l	Small l	7C	|	vertical bar
4D	M	Capital M	5D	]	right/closing bracket	6D	m	Small m	7D	}	right/closing brace
4E	N	Capital N	5E	^	caret/circumflex	6E	n	Small n	7E	~	tilde
4F	O	Capital O	5F	_	underscore	6F	o	Small o	7F	DEL	delete

Hitomezashi Stitching



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Computer Systems

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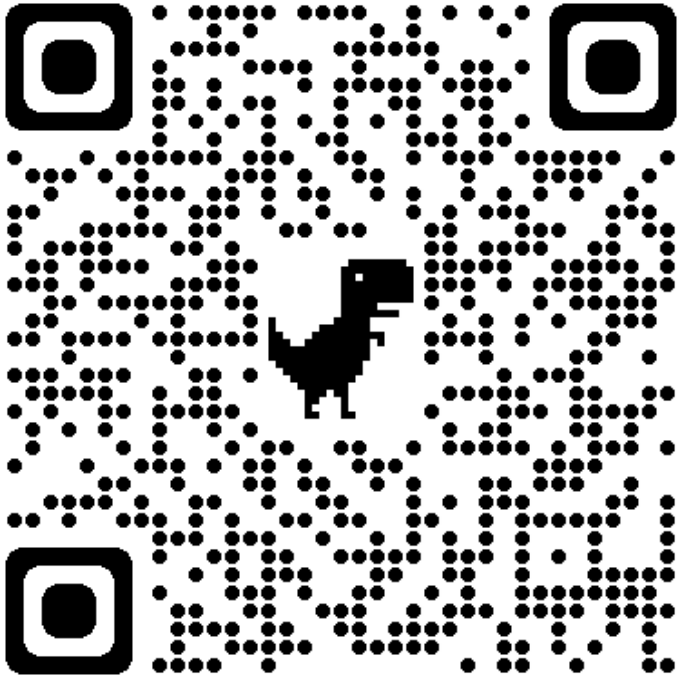
Quizlet Activity -
The Main Components of a Computer



https://quizlet.com/758765435/match

The Main Components of a Computer

The **Motherboard** is a Printed Circuit Board (PCB) that acts as the central hub of the computer. All devices and components are connected to it and all communication between devices is done through it.

Storage, either on Hard Disk Drives (HDD) or Solid State Drives (SSD) is where the Operating System, software, and files are stored and accessed by other components, as required. HDDs are cheap and can hold large amounts of data. SSDs are faster but currently more expensive for larger sizes.

Memory. Random Access Memory (RAM) is where the computer will temporarily store information required to complete tasks or keep software running. RAM is accessed/written faster than a disk drive. More RAM means that more and larger files can be stored and accessed ay any one time, leading to more efficient and quicker performance. Anything stored in RAM will erase when the power is turned off.

Group Activity

Breakout task – Build a desktop computer

Each group will be asked to research, design, and price a computer for a particular set of criteria.

Various websites are available to help you with this, including:

https://pcpartpicker.com/

https://www.reddit.com/r/buildapc/

https://www.custompc.ie/

https://www.tomshardware.com/topics/pc-builds

Please feel free to find and share your own sources of help!

Breakout task – Build a desktop computer

	Specification	**Budget**
Groups 1 & 5	General purpose home office computer	€500
Groups 2 & 6	Budget gaming computer	€800
Groups 3 & 7	Content creator's machine for video editing	€1000
Groups 4 & 8	A no compromises, simply ludicrous machine	€8000

Things to think about

What are the unique requirements of each computer’s intended function?

What will the users of these machines require in order to work most effectively?

Compromises will have to be made. There may be no one best compromise to make.

Discussion and presentation

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