

Group 1.

I. Discussion question

1. A computer has 64 MB (megabytes) of memory. Each word is 4 bytes. How many bits are needed to address each single word in memory?
2. What is the role of a program in a computer based on the von Neumann model?
3. Explain why a computer cannot solve a problem for which there is no solution outside the computer.
4. Convert decimal numbers to binary ones

Decimal	4-bit Binary	Decimal	8-bit Binary	Decimal	16-bit Binary
9	1001	7		255	
7		34		192	
2		125		188	
15		157		312	
12		162		517	
11		37		264	

Group 2.

I. Discussion question

1. What is the function of the memory subsystem in a computer?
2. What is the function of the ALU subsystem in a computer?
3. What is the function of the control unit subsystem in a computer?
4. Convert decimal numbers to binary ones

Decimal	4-bit Binary	Decimal	8-bit Binary	Decimal	16-bit Binary
6		66		543	
5		77		819	
8		88		1027	
13		99		2055	
14		109		63	

Group 3.

I. Discussion question

1. What is the function of the input/output subsystem in a computer?
2. Briefly describe the five generations of computers
3. Do some research and find out whether the Pascaline calculator is a computer according to the Turing model.
4. Convert decimal numbers to binary and hexadecimal ones

Decimal	Binary	Hexa.	Decimal	16-bit Binary	Hexadecimal
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9	1001	9	255	0000 0000 1111 1111	00FF
127	0111 1111	9F	192		
125			188		
157			312		
162			517		
37			264		

Group 4.

I. Discussion question

1. Do some research and find out whether Leibnitz' Wheel is a computer according to the Turing model.
2. Do some research about the ABC computer and find out whether this computer followed the von Neumann model.
3. Convert decimal numbers to binary and hexadecimal ones

Decimal	Binary	Hexa.	Decimal	16-bit Binary	Hexadecimal
66			543		
77			819		
88			1027		
99			2055		
109			63		

Group 5.

I. Discussion question

1. Describe pipelining and its purpose.
2. Do some research and find out whether the Jacquard Loom is a computer according to the Turing model.
3. Compute (b: binary, q: octal, h: hexadecimal)

$$3245_q + 247_q = ?_q = ?_b$$

$$1A7B_h + 26FE7_h = ?_h = ?_b$$

$$1101101101_b - 10110111_b = ?_b$$

$$3654_q - 337_q = ?_q = ?_b$$

$$3AB7_h - 1FA_h = ?_h = ?_b$$

$$36A_h - 576_q = ?_h = ?_b$$

$$64AE_h - 1001101_b = ?_q$$

Group 6.

I. Discussion question

1. Define a computer based on the von Neumann model.
2. What is the role of a program in a computer that is based on the Turing model?
3. Compute (b: binary, q: octal, h: hexadecimal)

101101111b
+ 100111011b
110110001b
110001101b

1011010b * 1011b
1101000b + 2ABh + 345q = ?h = ?q
3AFh / 1Ch = ?b = ?d
3ACh - 562q = ?b = ?d
3FFAh / 327q = ?b = ?d