

CP1402/CP5631 - Binary and Revision

Converting binary to decimal

bits	1	0	1	1	0	1	0	1
power	128	64	32	16	8	4	2	1
to add	128	0	32	16	0	4	0	1

$$128 + 32 + 16 + 4 + 1 = 181$$

bits	1	0	0	0	0	0	0	1
power	128	64	32	16	8	4	2	1
to add	128	0	0	0	0	0	0	1

$$128 + 1 = 129$$

Task 1

1. Fill in the powers of two, left to right
2. Write down the powers of two for each 1 bit

bits	1	0	1	1	0	1	1	1	0
power	256	128	64	32	16	8	4	2	1
to add	256	0	64	32	0	8	4	2	0

$$256 + 64 + 32 + 8 + 4 + 2 = 366$$

Task 2

Your turn. Without referring back to the table, convert the following binary numbers – **You must show your working:**

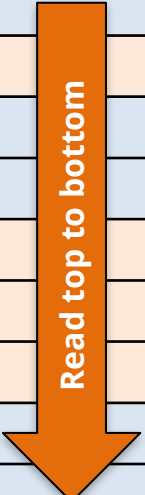
- 1) 11001110 $128 + 64 + 8 + 4 + 2 = 206$
- 2) 00100101 $32 + 4 + 1 = 37$
- 3) 11010101 $128 + 64 + 16 + 4 + 1 = 213$
- 4) 0001 $1 = 1$
- 5) 11 $2 + 1 = 3$

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Converting decimal to binary

Subtraction method

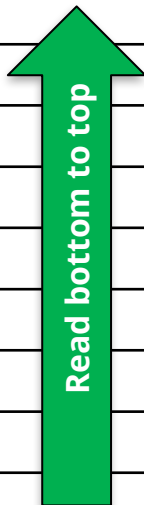
Number	Power of two	Difference	Bit
355	256 fits	$355 - 256 = 99$	1
99	128 doesn't fit		0
99	64 fits	$99 - 64 = 35$	1
35	32 fits	$35 - 32 = 3$	1
3	16 doesn't fit		0
3	8 doesn't fit		0
3	4 doesn't fit		0
3	2 fits	$3 - 2 = 1$	1
1	1 fits	$1 - 1 = 0$	1



Read top to bottom: 101100011

Remainder method

Number	Remainder	Division
152		$152 / 2 = 76 \text{ r } 0$
76	0	$76 / 2 = 38 \text{ r } 0$
38	0	$38 / 2 = 19 \text{ r } 0$
19	0	$19 / 2 = 9 \text{ r } 1$
9	1	$9 / 2 = 4 \text{ r } 1$
4	1	$4 / 2 = 2 \text{ r } 0$
2	0	$2 / 2 = 1 \text{ r } 0$
1	0	$1 / 2 = 0 \text{ r } 1$
0	1	done



Read bottom to top: 10011000

Task 3

Use the subtraction method to convert the following numbers – **You must show your working:**

1) 235

Number

Power of two

Difference

Bit

235	128 fits	$235-128=107$	1
107	64 fits	$107-64=43$	1
43	32 fits	$43-32=11$	1
11	16 doesn't fit		0
11	8 fits	$11-8=3$	1
3	4 doesn't fit		0
3	2 fits	$3-2=1$	1
1	1 fits	$1-1=0$	1

11101011

2) 182

Number	Power of two	Difference	Bit
182	128 fits	$182-128=54$	1
54	64 doesn't fit		0
54	32 fits	$54-32=22$	1
22	16 fits	$22-16=6$	1
6	8 doesn't		0
6	4 fits	$6-4=2$	1
2	2 fits	$2-2=0$	1
0	1 doesn't fit		0

10110110

3) 410

Number	Power of two	Difference	Bit
410	256 fits	$410-256=154$	1
154	128 fits	$154-128=26$	1
26	64 doesn't fit		0
26	32 doesn't fit		0
26	16 fits	$26-16=10$	1
10	8 fits	$10-8=2$	1
2	4 doesn't fit		0
2	2 fits	$2-2=0$	1
0	1 doesn't fit		0

110011010

Check your answers by converting back to decimal from the binary representation.

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Task 4

Use the remainder method to convert the following numbers – **You must show your working:**

1) 152

Number	Remainder	Division
152		$152/2 = 76 \text{ r } 0$
76	0	$76/2 = 38 \text{ r } 0$
38	0	$38/2 = 19 \text{ r } 0$
19	0	$19/2 = 9 \text{ r } 0$
9	1	$9/2 = 4 \text{ r } 1$
4	1	$4/2 = 2 \text{ r } 0$
2	0	$2/2 = 1 \text{ r } 0$
1	0	$1/2 = 0 \text{ r } 1$
0	1	done

10011000

2) 234

Number	Remainder	Division
234		$234/2 = 117 \text{ r } 0$
117	0	$117/2 = 58 \text{ r } 1$
58	1	$58/2 = 29 \text{ r } 0$
29	0	$29/2 = 14 \text{ r } 1$
14	1	$14/2 = 7 \text{ r } 0$
7	0	$7/2 = 3 \text{ r } 1$
3	1	$3/2 = 1 \text{ r } 1$
1	1	$1/2 = 0 \text{ r } 1$
0	1	done

11101010

3) 81

Number	Remainder	Division
81		$81/2 = 40 \text{ r } 1$
40	1	$40/2 = 20 \text{ r } 0$
20	0	$20/2 = 10 \text{ r } 0$
10	0	$10/2 = 5 \text{ r } 0$
5	0	$5/2 = 2 \text{ r } 1$
2	1	$2/2 = 1 \text{ r } 0$
1	0	$1/2 = 0 \text{ r } 1$
0	1	done

1010001

Check your answers by converting back to decimal from the binary representation.

Review

Answer the following

1. Fill out the seven layers of the OSI model:

- 1- Physical layer
- 2- Data link layer
- 3- Network layer
- 4- Transport layer
- 5- Session layer
- 6- Presentation layer
- 7- Application layer

2. Explaining Logical link Control (LLC) and Media Access Control (MAC) sublayers

Logical Link Control (LLC) sublayer remains relatively independent of the physical equipment and provides an interface between the MAC layer and the Network layer independent of the hardware

The MAC sub-layer is concerned with the physical components that will be used to communicate the information

Which computer can access the network when multiple computers are trying to access it simultaneously

Physical addressing (MAC addresses) and access control methods.

2. Which of the following devices **separate** networks into multiple **collision domains**?

- Repeaters
- Switches **THIS ONE**
- Hubs
- Routers
- Amplifiers

4. Which of the following devices **separate** networks into multiple **broadcast domains**?

- Repeaters
- Switches
- Hubs
- Routers **THIS ONE**
- Amplifiers

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5. Match the following descriptions to the correct cable type:

A relatively short length of cabling with connectors at both ends.

Cables or wireless links that provide interconnection between the entrance facility and MDF and between MDF and IDFs.

Connects workstations to the closest data room and to switches housed in the room.

Backbone cabling

Horizontal cabling

Patch cable

6. Define the following network infrastructure terms:

- Demarc

the device that marks where a telecommunications service provider's network ends and the organisation's network begins.

- Patch panel

a panel of data receptors which can be mounted to a wall or a rack, A patch panel provides a central termination point when many patch cables converge in a single location.

- MDF

the centralised point of interconnection for an organisation's LAN or WAN (also called MC or main cross connect)

- IDF

An intermediate distribution frame (IDF) is a free-standing or wall-mounted rack for managing and interconnecting a telecommunications cable between end-user devices and the main distribution frame