
InterHigh
Leading online school

COMPUTER SCIENCE

THEORY OF COMPUTER SCIENCE
(PAPER 1)

STARTER ACTIVITY:

- How can you best describe binary?

Binary Recap . . .

Answers please?

Homework 1: Binary systems

1. Give one reason why data is represented in binary in a computer. [1]

2. How many bits are there in a byte? [1]

3. How many bytes are there in a MB? [1]

4. A photographer takes up to 2000 photographs per week. Each photograph requires 5MB of storage on the camera's memory card.

   Select the camera memory card with the smallest capacity that can store 2000 photographs. (Put a tick in the box next to your answer.)

	Capacity in GB	
A	4	
B	8	
C	16	
D	32	

[1]

5. (a) Write down the denary equivalent of the number below. You should include your working.

   00000101 00010011 [1]

   (b) Write down the 2-byte binary representation of the following denary number

   1,201 [1]

[Total 6 marks]

Binary Recap . . .

Activity

Check your homework to see which task you should try!

1.1 DATA REPRESENTATION

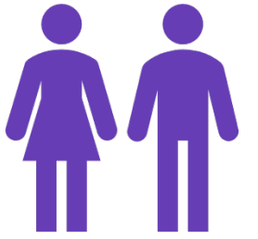
BINARY & REGISTERS

LEARNING OBJECTIVES

- **All will recognise the use of binary numbers in computer systems**

- **Most will convert positive denary integers into binary and positive binary integers into denary (a maximum of 16 bits will be used)**

- **Few will use binary in computer registers for a given application (such as in robotics, digital instruments and counting systems)**



Using 16 bits

- The eight most significant bit place values:

32,768	16,384	8,192	4,096	2,048	1,024	512	256	128
0	1	0	1	1	0	0	1	0

- The technique for conversion is identical to that used with only eight bits

Using 16 bits

32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1
0	0	0	1	1	0	1	0	0	1	1	1				
0	0	0	1												

0001101001110011

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6769

Worksheet 1

Worksheet

- Now complete the worksheet in your learning platform

Task 1

The questions below use 16 bits. Complete the place value headings in the grid for the 10th-16th bits. Then convert the following binary numbers to denary.

1) 0001 1100 0111 0001
2) 0010 0110 0010 0110
3) 1111 1111 1111 1111

							256	128	64	32	16	8	4	2	1

Convert **19,675** to binary using the table below:

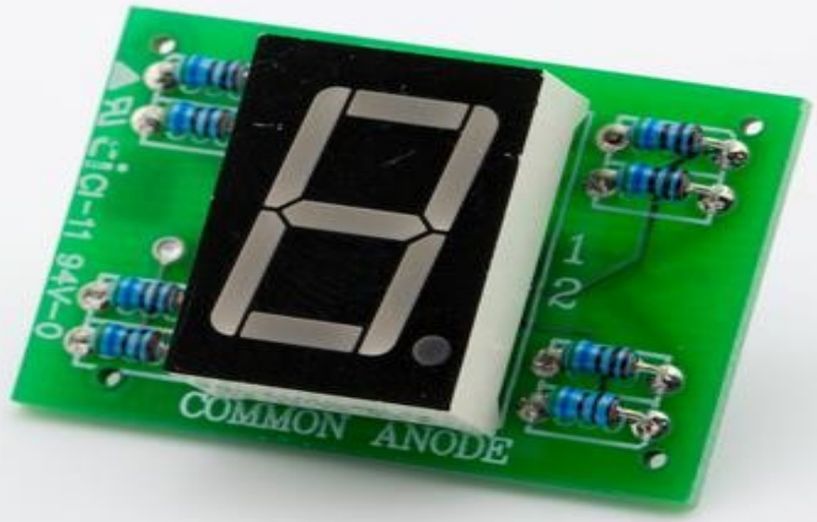
							256	128	64	32	16	8	4	2	1

Computer registers

- A computer register is a small, but very fast piece of memory
- It can have 8, 16 or 32 bits
- All calculations done by the computer are carried out in registers

Digital displays

- A standard numeric display uses 7 (or 8) segments
- Each segment is given a binary value
- Based on the binary values, lights are switched on or off to create a recognisable number



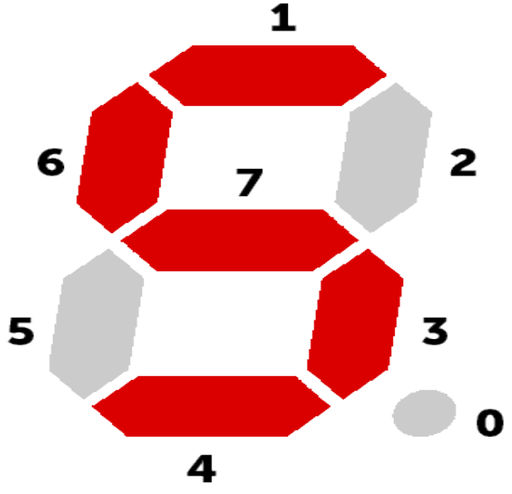
Binary in digital displays

Volunteer

- A register of 8 bits is used to store and determine the state of each segment (including the decimal point - 0)

Display Register

7	6	5	4	3	2	1	0
1	**1**	**0**	**1**	**1**	**0**	**1**	**0**



- What number would be represented if the register value was **11001100**?

Registers in industry

- Registers can also be used to hold the state of a machine
  - A robotic arm may have eight possible movements
  - The register values below extend and lower the arm whilst opening the claw

Rotate left	Rotate right	Open claw	Close claw	Extend arm	Retract arm	Raise arm	Lower arm
0	**0**	**1**	**0**	**1**	**0**	**0**	**1**

Plenary

- For your exam you need to be able to:
  - explain why computers use binary to represent any kind of data
  - give examples of the different types of data that computers can hold
  - convert numbers 0-65,535 to binary and vice versa
  - define bit, byte, kilobyte, megabyte, gigabyte, terabyte
  - understand how registers are used in applications

LESSON COMPLETE

SEE YOU NEXT LESSON!