Questions

1. Convert 15(Dec) to base 8(Oct).

(a) 17

(b) 1111

(c) F

(d) 45

Answer: **(a) 17**

Solution: To convert from decimal to octal, divide the number by 8 and keep track of the remainder.

15 ÷ 8 = 1 remainder 7 (1st remainder: 7)

1 ÷ 8 = 0 remainder 1 (2nd remainder: 1)

2. What is a Signal?

Answer:

A signal is a function that conveys information about the behaviour or attributes of some phenomenon. It can be used to encode data and can be either analog or digital. A signal is a gesture or message that people use to communicate with each other. The wave you give a good friend to call her over from across the room and the impulse that transmits your voice through the telephone to your mother are both signals.

3. What is a Bit?

(a) 8 bytes

(b) 1024 bytes

(c) 4 bytes

(d) Binary digit as a single 1 or 0

Answer: **(d) Binary digit as a single 1 or 0**

4. A signal can be used to encode a message. In real-life, Sound, Light and Electricity are all examples of what type of signal?

(a) Binary

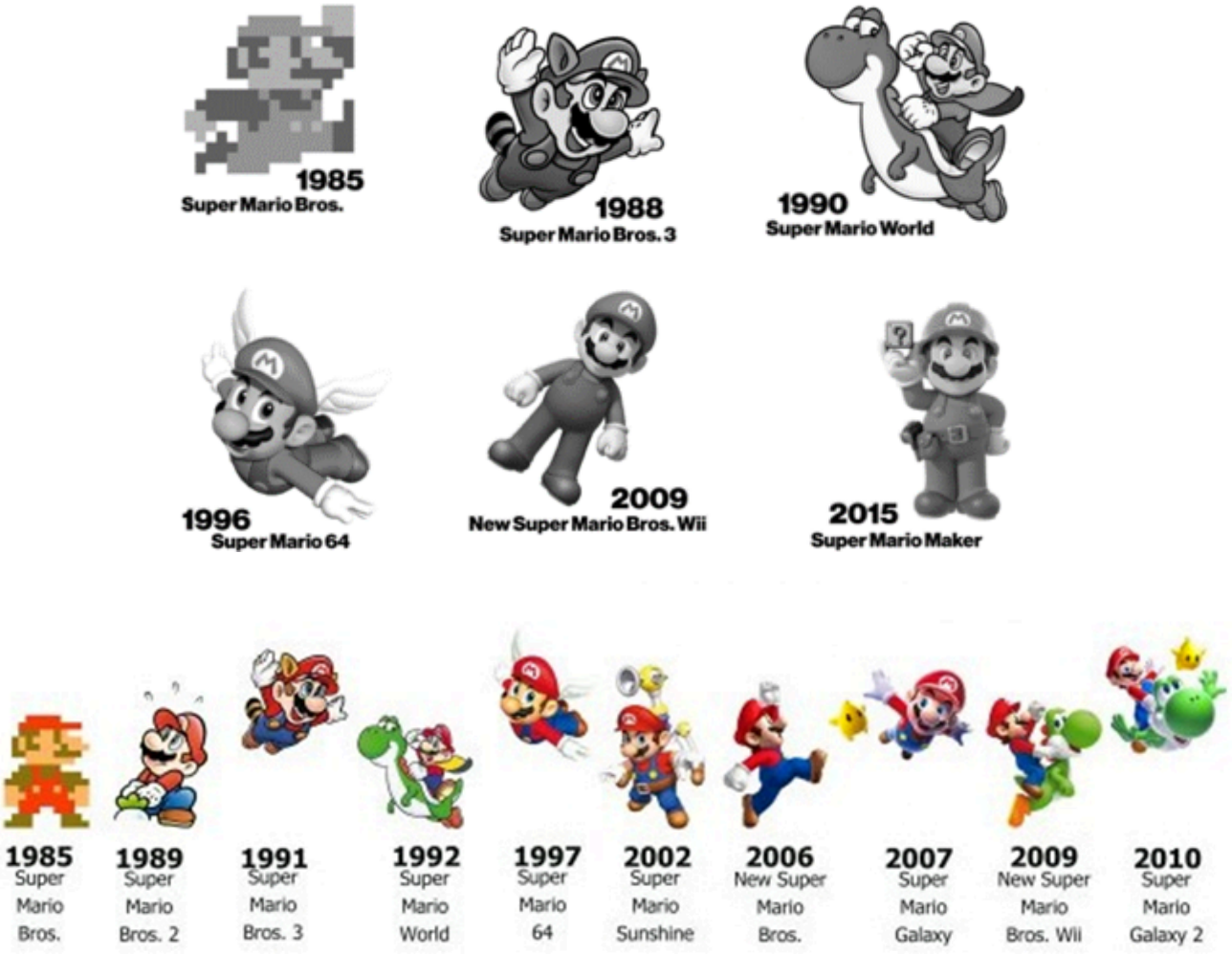
(b) Analog

(c) Digital

(d) Finite

Answer: **(b) Analog**

5. With reference to the image below, which of the following statements is true?



(a) Computers represent all information including text and graphics with binary digits (0,1)

(b) The greater the resolution of an image, the greater the number of bits needed for its representation

(c) The more the bits used to represent an image, the better the quality of the image

(d) All of the options

Answer: **(d) All of the options**

6. Convert 58(Dec) to base 16(Hex).

(a) 72

(b) 3A

(c) 97

(d) 111010

Answer: **(b) 3A**

7. What is the range of values for a 4-bit octal system?

(a) 65,536

(b) 256

(c) 16

(d) 4,096

Answer: **(d) 4,096**

Explanation:

- **Octal System:**
  - The octal system is base 8, meaning each digit can range from 0 to 7.
  - A 4-digit octal number would look like this: $xxxx_8$, where each 'x' can be any value from 0 to 7.

- **Range of Values:**
  - The smallest 4-digit octal number is 0000_8, which is 0 in decimal.
  - The largest 4-digit octal number is 7777_8.

- **Convert 7777_8 to Decimal:**
  - Each digit is multiplied by $8^{Position}$ and summed:
    - $7 \times 8^3 + 7 \times 8^2 + 7 \times 8^1 + 7 \times 8^0 = 7x512 + 7x64 + 7x8 + 7x1 = 4095$
    - So, the range of values is from 0 to 4095.
    - The total count of values from 0 to 4095 is 4096

8. The abbreviation 'MB' means _____ and has the value _____

(a) MegaBits, 1,024x1024

(b) Mega Bits, 1,000,000

(c) MegaBytes, 1,024x1,000

(d) Mega Bytes, 1,024x1024

Answer: **(d) Mega Bytes, 1,024x1024**

9. Computers work best with Digital signals primarily because?

(a) Digital signals are easier to correct in case of errors

(b) Digital signals can be compressed

(c) Digital signals are easier to work with

(d) All of the options

Answer: **(d) All of the options**

10. Identify 3 differences between Analog and Digital signals.

Answer:

Parameter	Analog Signal	Digital Signal
Definition	A signal for conveying information which is a continuous function of time is known as an analog signal.	A signal which is a discrete function of time, i.e. non-continuous signal, is known as a digital signal.
Typical representation	An analog signal is typically represented by a sine wave function. There are many more representations for analog signals also.	The typical representation of a signal is given by a square wave function.
Signal values	Analog signals use a continuous range of values to represent the data and information.	Digital signals use discrete values (or discontinuous values), i.e. discrete 0 and 1, to represent the data and information.
Signal bandwidth	The bandwidth of an analog signal is low.	The bandwidth of a digital signal is relatively high.
Suitability	The analog signals are more suitable for transmission of audio, video and other information through the communication channels.	The digital signals are suitable for computing and digital electronic operations such as data storage, etc.
Effect of electronic noise	Analog signals are easily affected by electronic noise easily.	The digital signals are more stable and less susceptible to noise than the analog signals.
Accuracy	Due to more susceptibility to noise, the accuracy of analog signals is less.	The digital signals have high accuracy because they are immune from the noise.
Power consumption	Analog signals use more power for data transmission.	Digital signals use less power than analog signals for conveying the same amount of information.

Circuit components	Analog signals are processed by analog circuits whose major components are resistors, capacitors, inductors, etc.	Digital circuits are required for the processing of digital signals whose main circuit components are transistors, logic gates, ICs, etc.
Observational errors	The analog signals give observational errors.	The digital signals do not given observational errors.
Examples	The common examples of analog signals are temperature, current, voltage, voice, pressure, speed, etc.	A common example of a digital signal is the data stored in a computer's memory.
Applications	The analog signals are used in landline phones, thermometers, electric fans, volume knobs of radio, etc.	The digital signals are used in computers, keyboards, digital watches, smartphones, etc.